1978

Determinants Of The Performance And Development Of The Canadian Newsprint Industry, 1920 To 1970

John Halcot Church

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us a poor photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

THIS DISSERTATION HAS BEEN MICROFILMED EXACTLY AS RECEIVED

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de mauvaise qualité.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

LA THÈSE A ÉTÉ MICROFILMÉE TELLE QUE NOUS L'AVONS REÇUE

DETERMINANTS OF THE PERFORMANCE
AND DEVELOPMENT OF THE CANADIAN
NEWSPRINT INDUSTRY, 1920 TO 1970

by

John Halcot Church
School of Business Administration

Submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
August, 1977

ABSTRACT

The Canadian newsprint industry, the largest segment of the Canadian pulp and paper industry, accounts for roughly 1 per cent of Canada's gross national product, 5 per cent of Canada's total exports and employs more than 30 thousand Canadians, yet its financial performance since its inception in this country has been unsatisfactory. This research aims to develop a thorough comprehension of those factors under management's control which have been responsible for the industry's performance, so as to offer the industry's managers further opportunities to improve their decision-making practices and to improve the industry's economic performance.

This research indicates that:

(1) Excess newsprint capacity has been the major factor, under management's control, which has had significant adverse effects upon the industry's financial performance. The effect of excess capacity on the industry's financial performance is dependent upon many factors. Two important factors would appear to be (a) how the excess capacity

comes about (i.e. overexpansion by an existing large competitor or small competitor, or by new entrants, or by a decline in newsprint shipments), and (b) the magnitude of factor-cost increases.

(2) Price discounting has also been a major factor under management's control which has had adverse effects upon the industry's financial performance.

(3) Executives of leading Canadian newsprint-producing firms have significantly different perceptions among themselves of what factors are important in determining the industry's development and performance.

(4) Company pricing (including discount pricing) and capacity expansion practices differ between firms of the Canadian newsprint industry. These differences in practices would appear to originate in part from the differing perceptions "of what factors are important in determining the industry's development and performance" held by industry executives. Moreover, the procedures employed by the industry for making capacity expansion decisions are very simplistic and do not, for the most part, take into account the actions of rival firms or the special risks of this industry. These differing perceptions and decision practices have undoubtedly resulted in decisions which have adversely affected both the performance of the firm making the decision and of the industry.

The recommendations of this research address ways that executives might resolve such differences in perceptions and improve decision practices so as to improve capacity expansion decisions and pricing decisions and thus improve firm and industry profitability.

ACKNOWLEDGEMENTS

To the executives, government officers and all others who participated in this study and who so freely gave of their time and assistance, I am very grateful.

I wish to express my particular thanks to my thesis supervisor, Dr. Peter Kirkham, who, in spite of tremendous commitments, gave me his valued time, counsel and advice throughout this study.

Furthermore, I wish to state my appreciation to Professors Bob Britney and Mike Leenders of the Western Business School for their contributions and encouragement.

John H. Church

August, 1977

TABLE OF CONTENTS

LIST OF APPENDICES

LIST OF TABLES

LIST OF ILLUSTRATIONS

FIGURES

GRAPHS

CHAPTER I. INTRODUCTION

1. Purpose of Study

The Canadian newsprint industry's financial performance over the last decade, or for that matter for much of the last five decades, has been unsatisfactory by almost any standard.[1] There are undoubtedly many factors responsible for this lack of satisfactory financial performance. Often however, the industry's management is singled out for prime responsibility.[2] Broadly, this research seeks to develop a thorough comprehension of those factors which have affected the Canadian newsprint industry's financial performance and which have been under the control of the industry's managers, individually or collectively, so as to allow these managers further opportunities to improve their decision-making practices.

More specifically, this research[3] investigates, both

---

[1] A full description of the industry's financial performance concludes this chapter.

[2] See for example: Murray Leith, "Analyst Urges Expansion Now", Pulp and Paper Magazine of Canada (September 1973), p. 55.

[3] Several authors have previously described various aspects of the Canadian newsprint industry. In writing this thesis, an attempt has been made to avoid repeating what others have described. See for example: J.A. Gutherie, The Newsprint Paper Industry: An Economic Analysis, (Cambridge, Mass.: Harvard University Press, 1941); J.A. Gutherie, The Economics of Pulp and Paper, (Pullman, Washington: State College of Washington Press, 1950); L.E. Ellis, Newsprint: Producers, Publishers, Political Pressures, (New Brunswick, New Jersey: Rutgers University Press, 1960), and P. Reinertsen, "The Pulp and Paper Industries in Sweden and Canada" (Ph.D. dissertation, University of Chicago, 1958).

descriptively and quantitatively, such facets as the industry's economic development, the historical relationships between key industry demand - supply factors and industry conduct (e.g. pricing behavior and capacity expansion), the historical relationship between the industry's conduct and its subsequent financial performance, present management decision-making practices, and management perceptions of firm and industry conduct under various circumstances.

The prime vehicle for studying these aspects of the Canadian newsprint industry is the development of an econometric model of the newsprint industry. This model seeks to explain the industry's development and performance over the period 1920 through 1970. The model is constructed so as to account for the movements of key industry income statement variables (e.g. newsprint price, sales volume) and the capacity of the newsprint industry over those 50 years. This model has been developed so that it can be easily modified for forecasting purposes and could thus be used by individual firms in evaluating corporate strategy alternatives.

Specific objectives of this research, hypotheses and research methodology are discussed at length in Chapter II.

2. Importance of the Industry

In 1970,[4] the Canadian pulp and paper industry in

---

[4]Canadian Pulp and Paper Association, Reference Tables - 1973 (Montreal: Canadian Pulp and Paper Association, 1973), Table 55, p. 23.

relation to all Canadian industries ranked first in total salaries and wages paid, in total employment and in total value added by manufacturers. It ranked second behind motor vehicle manufacturers in terms of the total selling value of factory shipments.

During 1970, the gross production of Canada's pulp and paper industry was $2.851 billion.[5] The industry's value added by manufacture was $1.322 billion,[6] or almost 2 per cent of Canada's gross national product for that year. Even more importantly, the gross value of Canada's pulp and paper exports was $2.063 billion, or 12½ per cent of Canada's total exports.[7]

In this same year, the value of Canadian newsprint production accounted for slightly less than 40 per cent of the total value of all Canadian pulp and paper products produced.[8] Newsprint exports represent on the average about 90 per cent of Canada's newsprint production.[9] Of Canada's newsprint exports, about 80 per cent are destined for the United States. Other major destinations include the United Kingdom, Japan, the Latin American countries, and on occasion, the countries of Western Europe and Africa.[10]

---

[5] Ibid., Table 50, p. 22.

[6] Ibid., Table 55, p. 23.

[7] Ibid., Table 51, p. 22.

[8] Ibid., Table 36, p. 17.

[9] Ibid., Table 33, p. 16.

[10] Ibid., Table 34, p. 16.

Thus, it is apparent that the Canadian pulp and paper industry, and in particular its largest segment, the Canadian newsprint industry, is of vital importance to the Canadian economy, to the more than 80,000 people employed by the pulp and paper industry,[11] and to the Canadian people as a whole.

3. Scope of Study

This research deals solely with the newsprint industry - that group of firms which manufacture paper of the quality used by newspaper publishing firms. Newspaper publishing firms are not considered part of the newsprint industry. The emphasis of this research centers on the Canadian newsprint industry; however, considerable portions of the model-building aspects of this research were developed from a consideration of the whole North American newsprint industry. The homogeneous nature of the product and the fact that most Canadian-produced newsprint is sold in the United States make consideration of Canadian and United States newsprint manufacturers as a group a more logical approach to modeling this industry.

4. Background Information on the Newsprint Industry

This section presents background information both on the pulp and paper industry and on its largest segment, the newsprint industry.

[11] Ibid., Table 55, p. 23.

4.1 Function of the Pulp and Paper Industry

The function of the pulp and paper industry is to convert wood and wood residues (e.g. sawdust, shavings) into cellulose fibers, and then to convert the fibers into paper (e.g. newsprint, writing paper, kraft paper, fine paper) and board (e.g. boxboard, containerboard).

4.2 Pulp

Several different types of pulp are manufactured in Canada (e.g. dissolving and special alpha pulps, sulphite bleached and unbleached pulps, sulphate bleached and unbleached pulps, and mechanical pulp). Most of the World's output of pulp is used in the manufacture of paper and paper products.

The raw material from which newsprint is manufactured is a mechanical woodpulp - chemical (either sulphite or sulphate) woodpulp mixture containing about 80 per cent mechanical woodpulp. Since there are few uses for mechanical woodpulp other than in the manufacture of newsprint, most newsprint manufacturing facilities are fully integrated with mechanical pulp-making operations. It is not surprising then that newsprint-producing facilities are almost always situated near the wood resource as opposed to being located near the market.

4.3 Newsprint

Newsprint is that standard grade of paper used chiefly in the production of newspapers. Newsprint's primary advantage over other grades of paper is its comparatively low cost. Cost being directly related to quality, it is also its chief disadvantage when compared with other papers, such as book or writing papers.

4.4 The Process of Newsprint Manufacture

In an integrated mill (a mill which produces its own pulp for use in paper manufacture) the mechanical and chemical pulps are stored in separate tanks until required, then blended and pumped to the newsprint machine(s). On entering the paper machine, the mixture contains over 200 parts of water for every part of solid matter.

The chief component of the newsprint machine (Foudinier type) is a continuous belt of finely woven bronze wire upon which the woodpulp is evenly dispersed. Typically, such machines are 70 to 120 feet in length, up to 400 inches in width and run at output speeds approaching 2000 feet per minute. The paper is formed by extracting the water from the woodpulp mixture. Much of the water runs through the wire mesh (the wood fibers, although short, are too long to fall through the fine mesh) while the remaining moisture is removed by suction, pressure and heat as the mixture passes through several sets of rollers. The final set of rollers, the calander rollers, impart a smooth finish to the newsprint surface.

The chief component of newsprint, mechanical woodpulp, is made by either pressing pulpwood logs against rapidly rotating grindstones or by grinding previously chipped wood in rotating disk refiners.

In a chemical process, the wood is chipped and then cooked for several hours with cooking liquor in a high pressure, high temperature digester or series of digesters. The cooking separates the chips into wood fibers. This process removes lignin and other soluble constituents, leaving strong, long-fibered pulp. Since this process removes some of the wood's original constituents, the yield from this process can be as little as half that of mechanical pulping. Chemical pulps are used in newsprint production to give the paper sufficient strength to withstand the high-speed operation of today's modern newspaper presses.

4.5 Size and Costs of Modern Newsprint Mill

The processes of pulp and newsprint-making are quite simple and have changed only very little since their inception in the latter part of the nineteenth century. The size and costs of such facilities have, however, risen enormously since that period. In 1973, a new newsprint mill capable of producing a thousand tons of newsprint per day, would have involved an initial capital outlay of $125 million,[12] or in other words, about $350 per annual ton of output capacity. Newsprint was selling for $169 per ton during 1973.

There exists little economy of scale in newsprint manufacture. Eklund (1967) found that the initial investment per ton of newsprint manufacturing capacity and the manufacturing costs per ton of newsprint manufacturing capacity declined somewhat over the 0 to 500 metric ton per day range of capacity,

---

[12] W. Cheveldayoff, "Sellers' Market for Newsprint is Predicted", (Toronto) Globe and Mail, 1 March 1973, p. B2.

but declined very minimally as plant size increased over the 500 to 1000 metric ton per day range of capacity.[13] The 500 to 1000 metric ton per day capacity is typically the size of new newsprint mills.

4.6 The Structure of the Canadian Newsprint Industry

In 1970, the Canadian newsprint industry included 22 companies producing newsprint in 44 mills with an annual combined capacity of 9719 thousand tons.

In that year, the 8 largest Canadian producers of newsprint were:

Name of Company	Annual Capacity[14] (000 tons)
MacMillan Bloedel	1165
Can. International Paper	1110
Price	1071
Abitibi Paper	1029
Consolidated-Bathurst	975
Ontario Paper	584
Bowaters Canadian	573
Domtar	542
Total of top 8 producers	7049

[13] Risto Eklund, "Integration of Forest Industries - The Pulp and Paper Industry as a Model". Paper commissioned by FAO for a symposium organized by the ECE/FAO Timber Division on Integration in the Forest Industries, Geneva, February 1967, p. 21.

[14] Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 1, p. 2.

A listing of all 44 mills and their capacities for 1970 is presented as Appendix A.

These top 8 producers accounted for almost 73 per cent of available industry output. The top 5 alone accounted for 55 per cent of industry capacity. The Canadian newsprint industry is generally regarded as an oligopoly.[15]

Canada's 1970 newsprint capacity of 9719 thousand tons is particularly significant when one considers that the rest of the world had but 15267 thousand tons of available capacity.[16] Thus, Canada possesses some 39 per cent of World newsprint capacity.

4.7 Industry Trends

In order to place in perspective some of the quantitative findings of this thesis, it will be useful to have a clear description of the newsprint industry's development. Appendix B presents this description of the development of the North American newsprint industry over the period 1920 through 1970. Addressed are industry trends in the growth and location of newsprint consumption, production and capacity.

5. Can the Newsprint Industry Logically be Considered Separate from Other Wood and Wood-related Industries?

How can one justify looking at a segment of the pulp

---

[15] J.A. Gutherie, The Economics of Pulp and Paper, (Pullman, Washington: State College of Washington Press, 1950), p. 182.

[16] Canadian Pulp and Paper Association, Newsprint Data - 1971, (Montreal: Canadian Pulp and Paper Association, 1971), Table 29, page 21.

and paper industry, namely the Canadian newsprint industry (in some instances the North American newsprint industry), as separate from the lumber, pulp, paper and paperboard industries? One might conceivably have problems justifying such a separation if such products shared common markets or common production facilities, or if a strong price correlation existed between such products.

Let us start by looking at the relation between the lumber industry and the paper and paperboard industries (of which the newsprint industry is the largest segment). There is no question that lumber does not share common production facilities or common markets with paper and paperboard products. Is there, however, a correlation between the price of lumber and the price of pulp (the major raw material employed in the production of paper) since both are manufactured from the wood of trees? Reinertsen (1958) has reported a high price correlation between the price of pulpwood and the price of pulp, and between the price of saw timber and the price of lumber. More importantly, he reported only a slight correlation between the price of lumber and the price of pulpwood (0.32), or between the price of pulp and the price of saw timber (0.31).[17] Thus, there are ample reasons for considering the newsprint industry as almost totally unrelated to the lumber industry.

Can the newsprint industry, however, be logically con-

[17] Reinertsen, p. 8.

sidered separate from the pulp industry or from other paper or paperboard industries? Several factors suggest that it can. They are:

- Almost 80 per cent of the pulp used in the manufacture of newsprint is mechanical pulp. There is virtually no market for mechanical pulp except in the manufacture of newsprint. There is virtually no trade in mechanical pulp, as each newsprint manufacturer has sufficient mechanical pulp-making capacity at the location of his newsprint facilities to meet his requirements.[18] Thus, the mechanical pulp industry is so closely tied to the newsprint industry that it can only be considered part of it. The relationship between the newsprint industry and other pulp-producing segments of the pulp and paper industry would seem small.

- Historically, virtually all the newsprint produced has been consumed by newspaper publishers and likewise, virtually all the paper used by newspaper publishers has been newsprint; thus, the market for newsprint is very distinct from the markets for other paper and paperboard products.

- Given these facts, there are no reasons to expect significant price correlations between newsprint price and the prices of other pulp, paper or paperboard products. Graph 1-1 indicates the absence of such price correlations, other than to the extent that inflation affects all products.

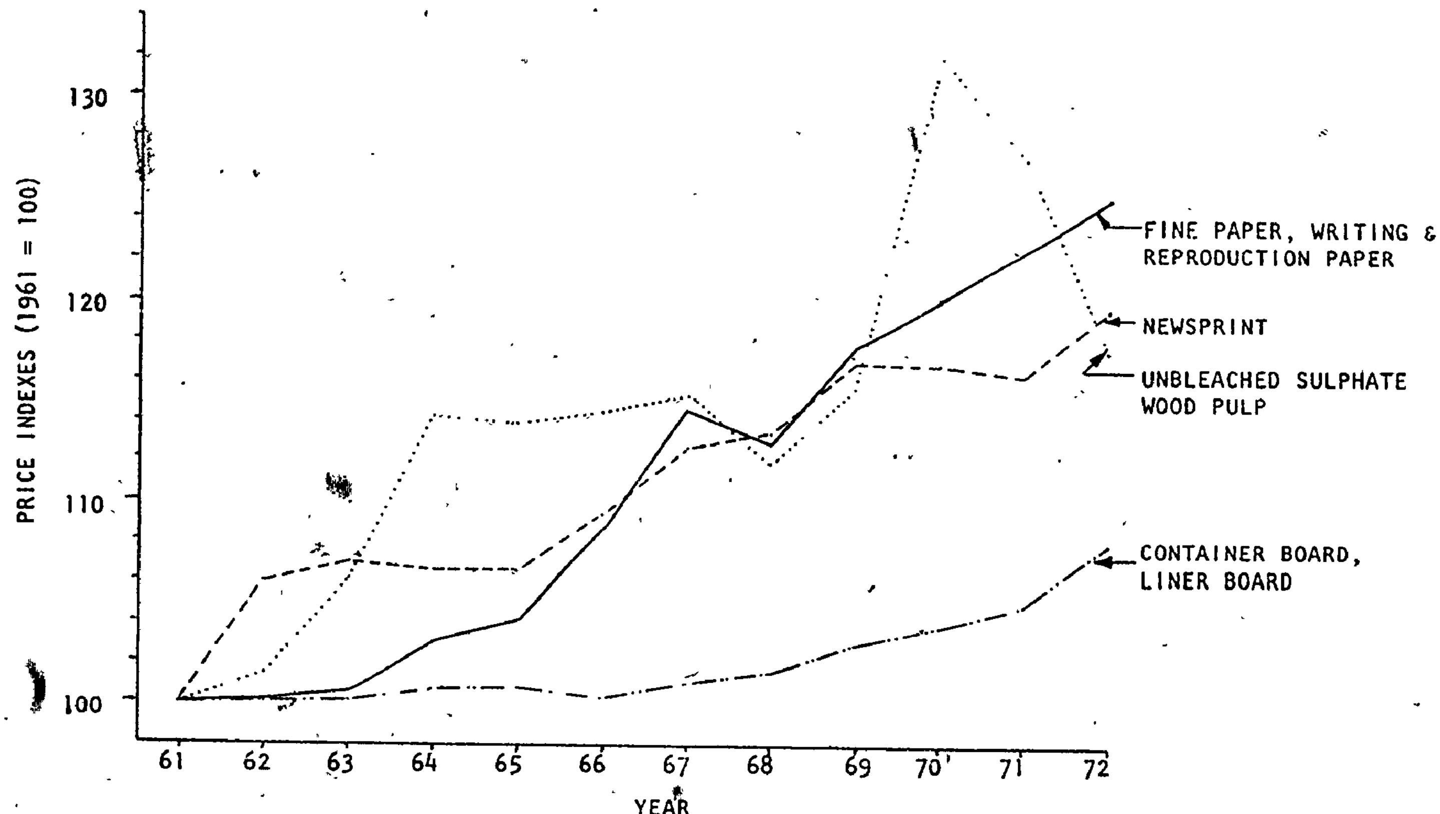
---

[18] Canadian Pulp and Paper Association, Reference Tables - 1973, Tables 25 and 30, pp. 13 and 15.

GRAPH 1-1

PRICE INDEXES FOR SELECTED CANADIAN PRODUCTS (1961 = 100)

(1961-1972)



Source: The sources for this graph and all other graphs are given in Appendix J.

The evidence presented shows that the newsprint industry is quite distinct in several important ways from the lumber industry, from other paper and paperboard segments of the pulp and paper industry, and from the pulp-producing segments of the pulp and paper industry, with the major exception of the mechanical pulp segment to which the newsprint industry is integrally bound.

6. The Canadian Newsprint Industry's Financial Performance

For several years now, there has been widespread criticism of the financial performance of Canada's pulp and paper firms. For example, Murray Leith (1973), an analyst with Ryan Investments of Vancouver, in an article published in the Pulp and Paper Magazine of Canada, described the historical performance of Canada's pulp and paper industry as follows:

> Let's look in more detail at what the Canadian pulp and paper industry has offered investors in the past. First there is the internal return generated within the company on shareholders' money already committed; secondly there is the external or 'marketplace' return realized by shareholders when they liquidate their holdings. We have heard a great deal about the inadequacy of the internal return on invested capital and shareholders' equity over the last two or three years. This is surprising, because actually, these returns have been sub-standard since the mid-50's; I fault management for letting it go on so long, shareholders for accepting it, and employees for ignoring it - as if poor investment returns didn't affect them too. . . .
>
> According to Statistics Canada, the average return on shareholders' equity for all Canadian industry from 1957 to 1969 was 8.9 % p.a., while that from the Canadian pulp and paper industry

was 7.2% - a full 1.7% lower. And for 1961-9, the return for the Canadian pulp and paper industry - 7.1% - was 1.7% lower than that for the U.S. pulp and paper industry. During 1971 and '72, returns on shareholders' equity of course became still further depressed. In 1972, three of the big five pulp and paper companies generated less than 4% return on shareholders' equity, though two companies with large lumber and plywood operations had 6.9% and 8.6%.

Turning to the 'market return', in absolute terms, it has been a long time since pulp and paper stocks rewarded the investor. We have to hark back to a brief period from 1949-56, when prices in both the U.S. and Canada rose by around 370% (dividends then averaged 5% p.a. and rose more than 130% over the seven years). But from 1957 to 1972, the pulp and paper shareholder has done very poorly. Of the four reasonably pure pulp and paper stocks publicly traded in Canada, two were the same price in 1972 as in 1957, one had fallen by 50%, and one by 75%. Dividends paid in 1972 were down seventy-eight per cent from those paid in 1957; even in 1969, the last good year, they were down 23%; the average annual yield from 1957 through 1972 was 4% based on declining stock prices. Even in relative terms, this performance is poor, for during the same time the Toronto Stock Exchange Industrial Index rose 176%, while the dividend yield averaged 3.3% on rising stock prices.[19]

The external return generated by Canada's pulp and paper firms can be further assessed by comparing their market returns with the market returns earned by other Canadian industries.

---

[19] Murray Leith, "Analyst Urges Expansion Now", Pulp and Paper Magazine of Canada (September 1973): 55.

The Bank of Canada in its monthly statistical summary publishes index numbers of security prices for selected groups of companies (e.g. preferred securities, industrial common stocks (e.g. foods, textiles and clothing, pulp and paper, petroleum, chemicals), utility common stocks (e.g. pipelines, telephone, electric power), finance stocks and mining common stocks) based upon the industrial classification employed at that time. These statistics can be used to determine the per cent increase or decrease from one year to the next in stock prices for each of the selected groups. The index values take into account stock splits. Such values ignore dividends received by investors and thus understate the true return earned by investors; in most instances however, the exclusion of such data is not expected to have a material effect upon comparisons between groups. Of particular significance for this research is the comparison between internal returns achieved by Canada's pulp and paper industry and external returns achieved by Canadian Industrial groups as a whole. One acceptable way of making this comparison is to regress the annual percentage change in pulp and paper securities against the annual percentage return of all industrials. Such a regression yields the following results:

% Annual CHANGE in pulp and paper securities = −6.685% + 1.5325 (0.1830) (% Annual CHANGE in all industrial securities)

$\bar{R}^2$ = .5935 Data: 1926-1976

This relationship indicates that when the Industrials do not change in value, pulp and paper securities can be expected to decline almost 6.7 per cent per year. Moreover, since 1926 (the first year for which data are available) the average annual percentage change in the Industrial group has been 5.1 per cent. Substituting this 5.1 per cent average gain in the Industrials in the regression equation yields:

$$\text{\% Annual CHANGE in pulp and paper securities} = -6.685\% + \underset{(0.1830)}{1.5325}\ (5.1) = 1.13\%$$

These results clearly indicate that the average marketplace return on pulp and paper securities has been poor in relation to other Industrial groups of securities over this long period of time. Lack of data does not permit direct marketplace performance comparisons between the pulp and paper group of securities and other specific groups within the Industrial group except over much shorter periods of time. Marketplace data are available for a number of Industrial groups since 1961. Such data indicate that as of the end of 1976, about as many Industrial groups outperformed the pulp and paper group as underperformed the pulp and paper group over that period. Over this period the pulp and paper group's marketplace performance was slightly lower than the marketplace performance of all Industrials. No definite conclusions can be made about the pulp and paper industry's performance _vis-a-vis_ the performance of other Industrial groups since 1961 because the period is too short and because such conclusions would rely too heavily on beginning and ending market values.

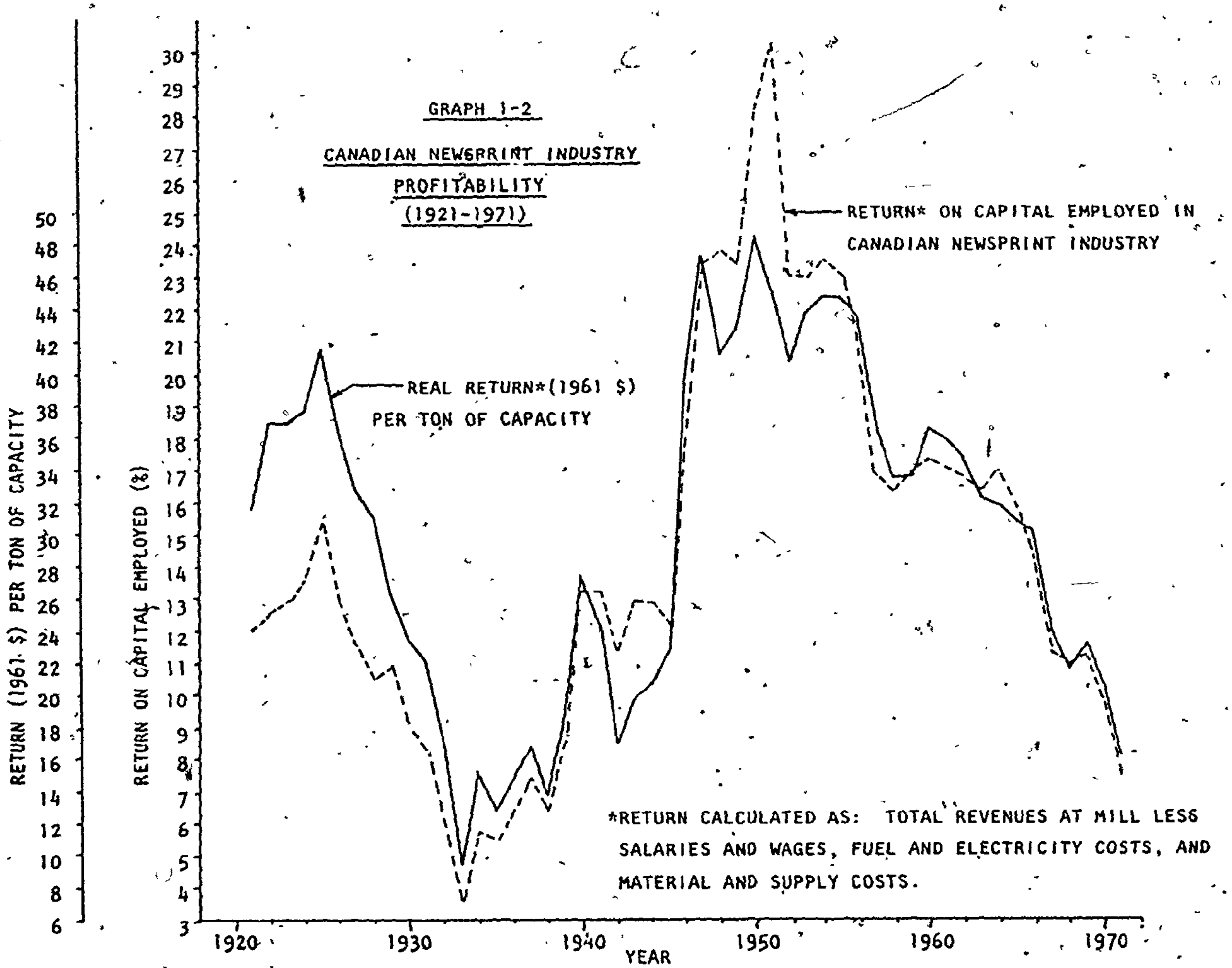
Special tabulations received from Statistics Canada permit a closer examination of the historical profitability of Canada's newsprint industry, as contrasted with the whole pulp and paper industry.[20] Graph 1-2 plots the real return (1961 $) per ton of newsprint capacity of Canadian newsprint manufacturers and the return (%) on capital employed in the Canadian newsprint industry over the period 1921 through 1971. Graph 1-3 plots the return (%) on capital employed for the Canadian pulp and paper industry as a whole, as well as for the Canadian newsprint industry.

It should be noted that the return for each year was calculated as total revenues at mill less all salaries and wages, fuel and electricity, and material and supply costs. The return is calculated before deduction of any head office expenses, research and development expenses, depreciation charges, interest expenses or income taxes.

The values of real return per ton of newsprint capacity are believed to be accurate for the full period under consideration. The values of return on capital employed for both the Canadian newsprint industry and for the Canadian pulp and paper industry are subject to several inaccura-

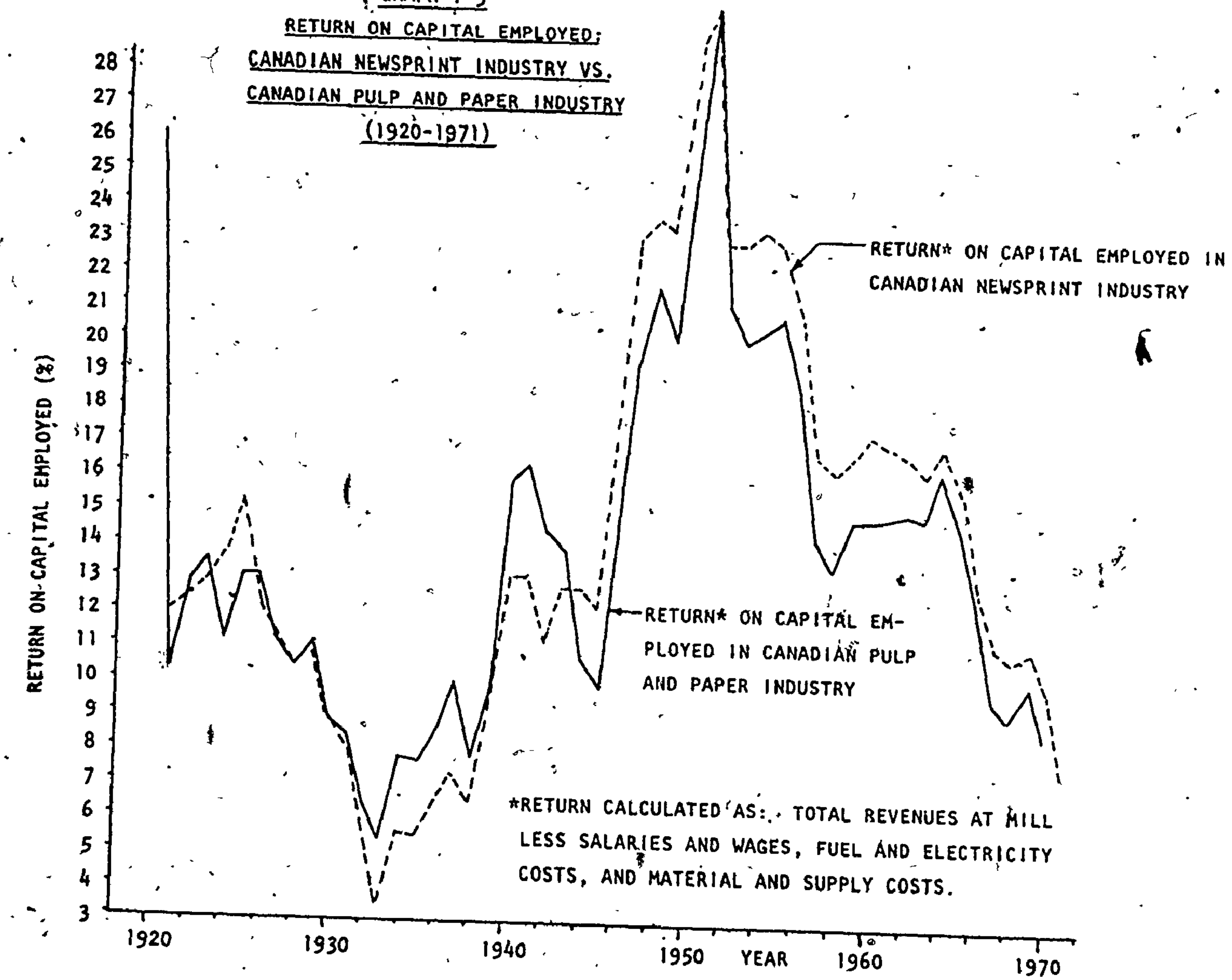
---

[20] As noted previously, the Canadian newsprint industry accounts for almost 40 per cent of the total value of all Canadian pulp and paper products produced.


GRAPH 1-2
CANADIAN NEWSPRINT INDUSTRY
PROFITABILITY
(1921-1971)
REAL RETURN*(1961 $) PER TON OF CAPACITY
RETURN* ON CAPITAL EMPLOYED IN CANADIAN NEWSPRINT INDUSTRY
RETURN (1961 $) PER TON OF CAPACITY
RETURN ON CAPITAL EMPLOYED (%)
YEAR
1920
1930
1940
1950
1960
1970
*RETURN CALCULATED AS: TOTAL REVENUES AT MILL LESS SALARIES AND WAGES, FUEL AND ELECTRICITY COSTS, AND MATERIAL AND SUPPLY COSTS.

GRAPH 1-3

RETURN ON CAPITAL EMPLOYED:
CANADIAN NEWSPRINT INDUSTRY VS.
CANADIAN PULP AND PAPER INDUSTRY
(1920-1971)



*RETURN CALCULATED AS: TOTAL REVENUES AT MILL LESS SALARIES AND WAGES, FUEL AND ELECTRICITY COSTS, AND MATERIAL AND SUPPLY COSTS.

cies.[21] The effect of these inaccuracies is most ~~likely~~ to significantly overstate the return on capital employed for both the Canadian newsprint industry and for the Canadian pulp and paper industry over the period 1920 through 1943. For the period 1944 to 1970, the return on capital employed ~~in~~ the Canadian pulp and paper industry is probably reasonably accurate; however, much less confidence can be placed in the return on capital employed figures for the Canadian newsprint industry.

During recent years, depreciation charges have been running at about $7 per ton of capacity for the Canadian newsprint industry as a whole or about $5 per ton in 1961 $. Also during recent years, head office expenses have equalled almost 7 per cent of sales or $9 per ton of capacity for the Canadian newsprint industry as a whole ($6 in 1961 $). Graph 1-4 shows recalculated rates of return based upon a 7 per cent of sales allowance for head office expenses.

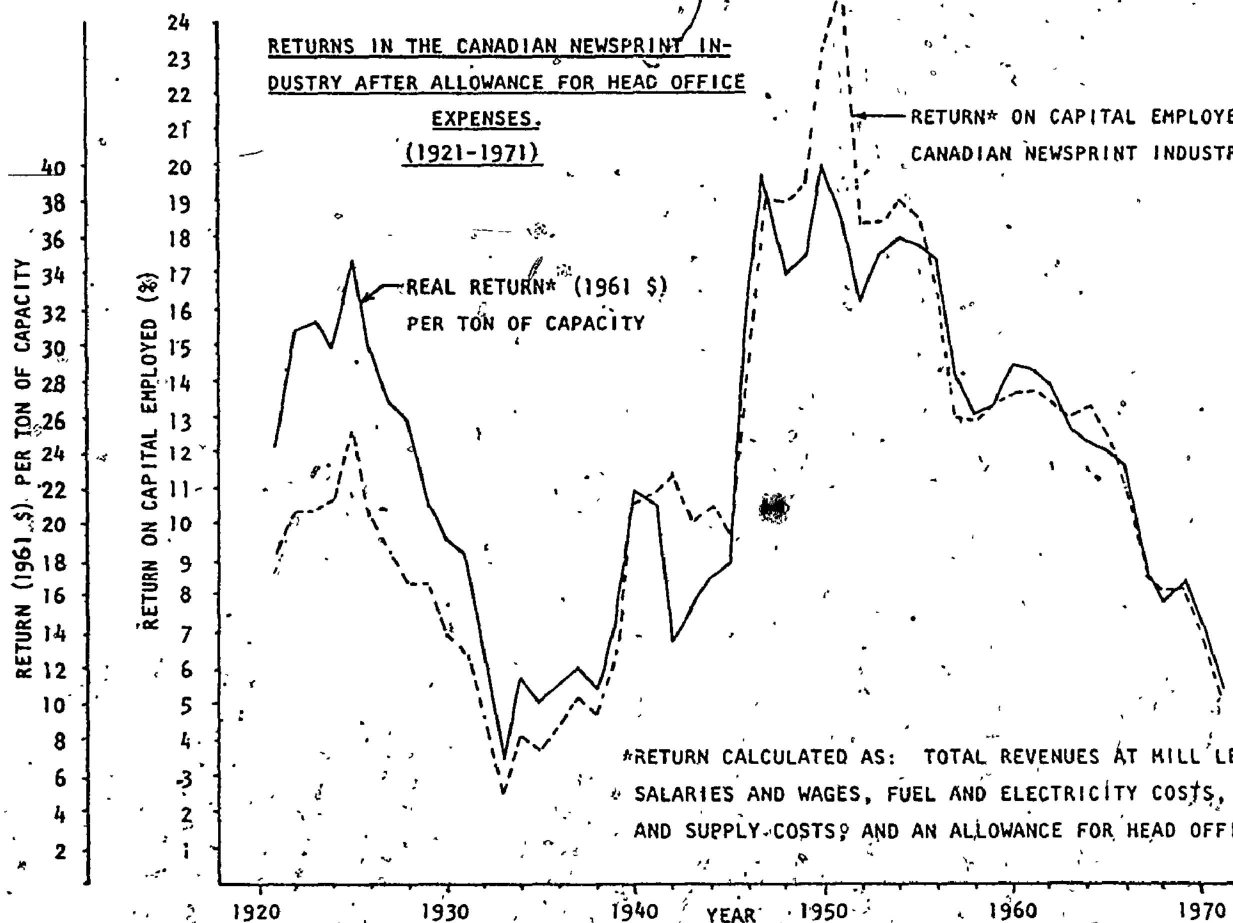
---

[21]Inaccuracies arise because of the varying methods used to estimate capital employed over the 50 years under consideration. Figures on capital employed in both the Canadian newsprint industry and the Canadian pulp and paper industry were compiled by Statistics Canada for the period 1920 through 1943. A major inaccuracy of such compilations was that they excluded the value of inactive mills, timber limits, power developments and investments in wholly or partly owned subsidiaries and other enterprises.

Figures of capital employed in the Canadian pulp and paper industry from 1944 through 1947 are based upon Canadian Pulp and Paper Association estimates based upon Department of National Revenue taxation statistics. These figures have been adjusted downward by the author so as to better correspond with Canadian Pulp and Paper Association estimates of capital employed for the period 1948 through 1970 whose estimates were used directly for that period. Values of capital employed in the Canadian newsprint industry over the period 1944 through 1970 are estimates by the author.

GRAPH 1-4

RETURNS IN THE CANADIAN NEWSPRINT INDUSTRY AFTER ALLOWANCE FOR HEAD OFFICE EXPENSES.
(1921-1971)



*RETURN CALCULATED AS: TOTAL REVENUES AT MILL LESS SALARIES AND WAGES, FUEL AND ELECTRICITY COSTS, MATERIAL AND SUPPLY COSTS, AND AN ALLOWANCE FOR HEAD OFFICE EXPENSES.

Are these returns satisfactory? If one accepts Murray Leith's[22] arguments that the long-term return on shareholders' equity for firms in the Canadian pulp and paper industry should average at least 12 per cent per annum _after_ taxes (or about 17 per cent before taxes on total capital employed, given reasonable assumptions about average capital structures, costs of debt, and effective tax rate), then, for the period 1921 through 1971, there have been very few years indeed (as indicated by Graph 1-4) when this industry has achieved a satisfactory return. From Graph 1-4, it can be seen that the average return _before_ taxes on capital employed over the full period was 11.4 per cent. During the last 15, 10 and 5 years of that period, the respective returns on capital employed were 11.1 per cent, 10.0 per cent and 7.4 per cent before taxes.

For a hypothetical firm who earned exactly the industry's average returns over these periods (i.e. 11.1 per cent, 10.0 per cent and 7.4 per cent), whose book capitalization was composed of 60 per cent equity and 40 per cent debt, whose cost of debt averaged 9 per cent before taxes over those periods and whose effective tax rate was 40 per cent, the firm's return after taxes on equity over the last 15, 10 and 5 years would have been 8.2 per cent, 7.0 per cent and 4.4 per cent. If during one or more of these years, its return on capital had fallen to 3.0 per cent or less, its return on equity capital would have turned negative.

Another way of assessing the newsprint industry's pro-

[22]Leith, p. 56.

fitability, one which avoids reliance on questionable capital employed values, is to use as a measure of industry profitability the real return received per ton of industry newsprint capacity. Graph 1-4 indicates that the average real return in constant 1961 $ over the full period under investigation was $23.80. If, as previously indicated,[23] a new newsprint mill in 1973 would have required an initial capital outlay of about $350 ($232 1961$) per ton of output capacity, then, if such an investment were to yield 17 per cent on the total capital employed before taxes, such an investment would require an annual before tax return of almost $40 (1961 $) per ton of newsprint capacity. Once again, Graph 1-4 shows that such returns were seldom realized over the period considered. In fact, the average $23.80 (1961 $) return per ton of capacity realized over the period is equivalent to a 10 per cent return before taxes on total capital employed.

Graph 1-5 shows that the Canadian - U.S. exchange rate has benefited profits of Canadian newsprint producers significantly during certain periods such as the early 40s, and throughout the 60s. Graph 1-5 also shows the yields on various classes of bonds over this period.

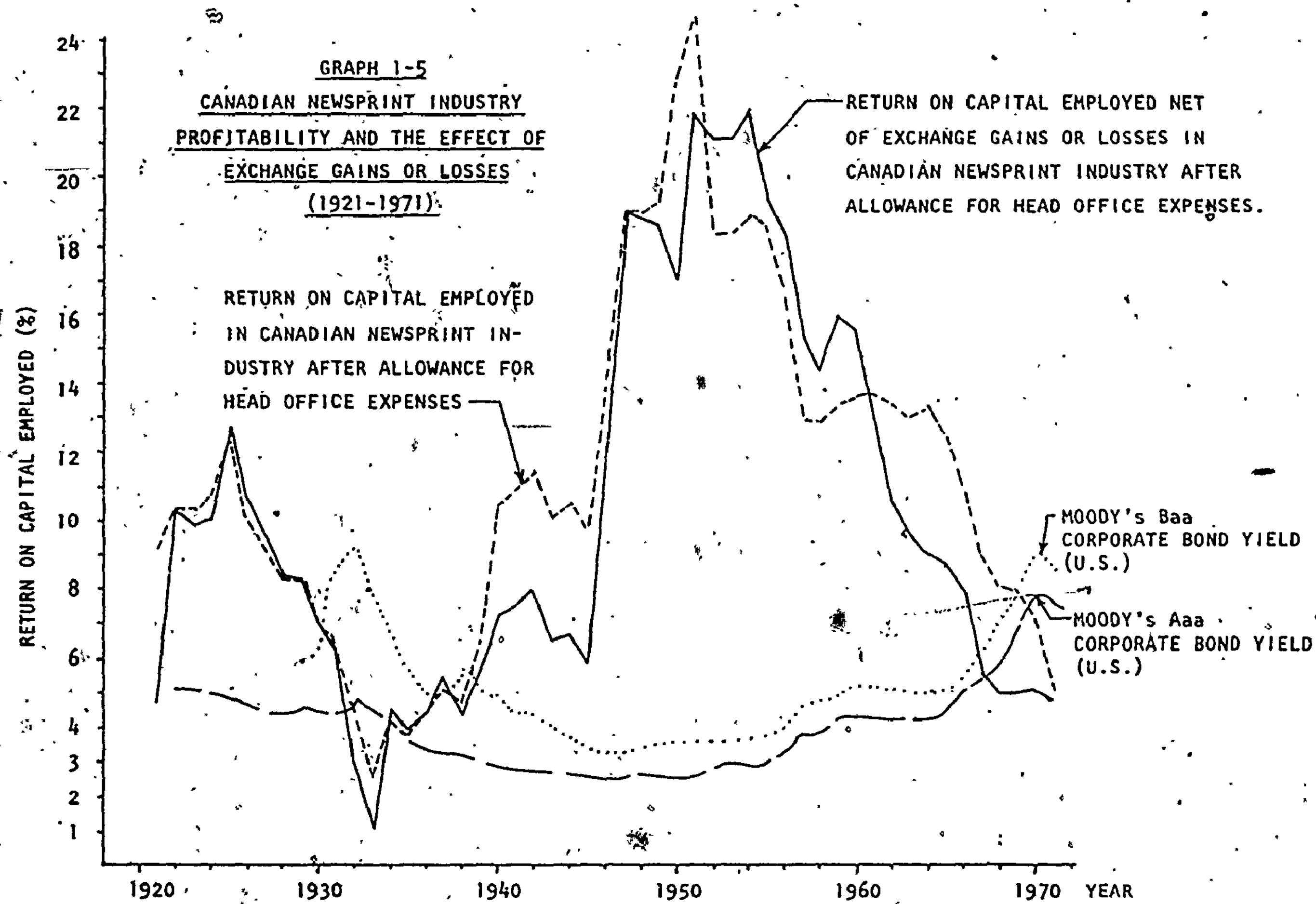
Straight comparisons between the return on capital employed in the newsprint industry and returns on bonds are

---

[23]Refer to discussion of "Size and Costs of Modern Newsprint Mill", p. 7.

GRAPH 1-5

CANADIAN NEWSPRINT INDUSTRY PROFITABILITY AND THE EFFECT OF EXCHANGE GAINS OR LOSSES (1921-1971)



not valid, since returns are calculated before deduction of corporate taxes. One is left with the distinct impression, however, that the returns on capital employed in the Canadian newsprint industry have not been commensurate with their associated risks.

It would appear that criticisms of the financial performance of the pulp and paper industry are at least equally applicable to the Canadian newsprint industry. The evidence presented clearly demonstrates that, over the long term, Canadian newsprint manufacturers collectively have been unable to achieve satisfactory returns for their shareholders.

7. Benefits of Improved Industry Profitability

In review, it has been demonstrated that, from a shareholder's viewpoint, the long-term financial performance of Canada's newsprint manufacturers has been unsatisfactory. Further, it has been stated that the primary objective of this research is "to develop a thorough comprehension of those factors which have affected the Canadian newsprint industry's financial performance...so as to allow managers in this industry further opportunities to improve their decision-making practices"[24] and thus improve individual firm as well as industry profitability. Some readers may believe that while an objective of improved profitability would undoubtedly better serve the interests of shareholders, such an objective may not be in keeping with the best interest of all Canadians.

[24] p. 1.

There are, however, several potential benefits of improved industry profitability which could be realized by our society. Those benefits which are most likely to occur will, to some degree, depend upon the source of the industry's improved profitability (e.g. as a result of cost reduction, sales volume increase, price increase or some combination of these 3 sources). What then are some of the benefits to be gained from a more profitable newsprint industry?

- A more profitable industry should find it easier, and perhaps less costly, to attract the large sums of capital needed for expansion.

- Increased profitability brought about through cost reduction should give a competitive edge to the Canadian industry on the international market.

- Improved profitability brought about by a sales dollar increase, as a result of a sales volume increase and/or price increase, should improve Canada's balance of trade.

- Improved profitability could mean more money devoted to research and may improve the product or the production facilities.

- Improved profitability could mean more money devoted to the purchase and installation of anti-pollution equipment.

- Improved profitability could mean more government tax revenues.

- Improved profitability could mean increased protection of Canada's wood resource through greater reforestation, improved sivicultural practices, increased fire, insect and decay protection.

This is not meant to suggest that the industry's performance has been unsatisfactory in these fields but that improved profitability would provide additional funds for such uses if required.

- Improved profitability could mean more industry research on the environmental effects of chemicals used for insect control.

There is increasing evidence that manufacturers are expected to offer a fair return to society on the resources expended as well as a fair return on shareholders' investments. Wood products are renewable resources, yet their regeneration is slow and increased output in this country comes about primarily from the utilization of previously untapped forest resources. Canada is rapidly running out of virgin woodland and is presently cultivating all low cost wood resource areas. The depletion of Canada's wood resources has been thoroughly studied by J.L. Keays[25] of the Western Forest Products Laboratory in Vancouver. Keays[26] believes that there are suitable sites available for at most 12 or 15 more new pulp and/or paper mills in Canada. These sites are located in more northerly, less accessible regions of Canada. He believes that mills constructed in these regions will be far more costly to construct and operate than that to which the industry has been accustomed.

---

[25] J.L. Keays, Projection of World Demand for Wood-Fibre to the Year 2000, (Vancouver, B.C.: Western Forest Products Lab., 1973).

[26] J.L. Keays, interview, Western Forest Products Lab., 1974.

Thus, like gas and oil, wood products are limited and have replacement costs which generally exceed present costs. It is likely that there will be mounting pressure on the industry to act in such a manner that will assure all Canadians fair compensation for these limited resources. If the industry's members are unable to improve upon the industry's performance, then undoubtedly, there will be pressure on Canada's governments to intervene.

CHAPTER II - HYPOTHESES AND METHODOLOGY

1. Objectives of Research

As has previously been stated, the major objective of this research is to identify those major factors under the industry's control which have contributed to the poor financial performance of Canada's newsprint industry, and thus, by so identifying those factors, allow the industry's current management opportunities to improve their decision-making practices and the industry's performance. In particular, this research focuses on the following aspects of Canada's newsprint industry:

- the industry's economic development,
- the historical relationships between key industry supply and demand factors and industry conduct,
- the historical relationship between the industry's conduct and its financial performance,
- present management decision practices, and
- current management's perceptions of firm and industry conduct.

So that this research may be of manageable proportions and in order to further focus the research effort, five hypotheses have been developed.

2. Hypotheses

Hypothesis 1. That executives of leading Canadian newsprint manufacturing firms have significantly different perceptions among themselves of what factors are important in determining the industry's development and performance.

Hypothesis 2. That executives of leading Canadian newsprint manufacturing firms will identify "excess industry capacity" and "newsprint pricing" as the two main factors which have adversely affected the industry's financial performance.

Hypothesis 3. That current company pricing and capacity expansion practices differ between firms of the Canadian newsprint industry.

Hypothesis 4. That, utilizing annual industry data covering the period 1920 through 1970, an econometric model of the Canadian newsprint industry can be constructed which will account for the major movements of those factors which this author and industry executives feel have most affected this industry's financial performance.

Hypothesis 5. That this model, though not developed for predictive purposes, will show indications of predictive potential. Equations having relatively high multiple correlation coefficients (as compared with naive forecasting equations), significant t ratios, and demonstrating an ability to identify major turning points will be considered as having predictive potential.

3. Restatement and Discussion of Hypotheses

Hypothesis 1. That executives of leading Canadian newsprint manufacturing firms have significantly different perceptions among themselves of what factors are important in determining the industry's development and performance.

If executives of leading Canadian newsprint manufacturing firms do in fact have differing perceptions of the factors which are important in determining the industry's development and performance, then, it is likely that some of these perceptions are inaccurate. Presumably, decisions are related to executive perceptions; thus, it is likely that industry managers with different perceptions of the factors important in determining the industry's development and performance will act differently when confronted with similar situations. Some of these actions will likely work to the detriment of the industry's financial performance.

Hypothesis 2. That executives of leading Canadian newsprint manufacturing firms will identify "excess industry capacity" and "newsprint pricing" as the two main factors which have adversely affected the industry's financial performance.

Hypothesis 2 should not be construed to mean that all executives will identify "excess industry capacity" and "newsprint pricing" as the two main factors which have adversely affected the industry's financial performance, only that these factors will be the most often mentioned factors.

There have been 2 periods of substantial excess newsprint capacity in North America, occurring simultaneously in the United States and Canada.[1] The first period lasted from 1929 until the end of the Second World War. The second period, which started in the late 50s, although not nearly as severe as the first period, had not ended by 1971. The period 1946 to 1957 is the only period during which North American newsprint mills have run at full capacity.

Murray Savage (1972), a long-time member of the Canadian Pulp and Paper Association feels that:

> Like most natural resource industries, pulp and paper is cyclical and its changes are generally coincident with those of the general economy, although sometimes more pronounced. . . .
>
> These cyclical changes are an important factor in the periodic problem of idle capacity which contributes to costs but not to income. This problem recurs with painful regularity and is often misunderstood. Demand can rise or fall very rapidly, but a period of from one to two years is required to construct new mill capacity. It follows that mills must maintain some reserve capacity to meet sudden surges of demand. Moreover, construction tends to occur in bursts when operating rates and profits are high and is often overdone when individual companies try to maintain their positions in the industry. Successive over-capacity problems disappear as demand continues to rise and their cost appear to be an unavoidable feature of this industry.[2]

---

[1] Table C1 on pages C1 and C2 of Appendix C lists for each of the years 1920 through 1970 the production, capacity and operating ratio (capacity utilization) for the Canadian newsprint industry. These figures are calculated annually by the Canadian Pulp and Paper Association from company reports. The Association's method of capacity measurement is also described in Appendix C. Table C2 on pages C6 and C7 of Appendix C presents similar data for the United States newsprint industry.

[2] Murray Savage, Review of Canadian Pulp and Paper Industry, (Montreal: Maison Placements Canada Inc., (January 1972)), p. 4

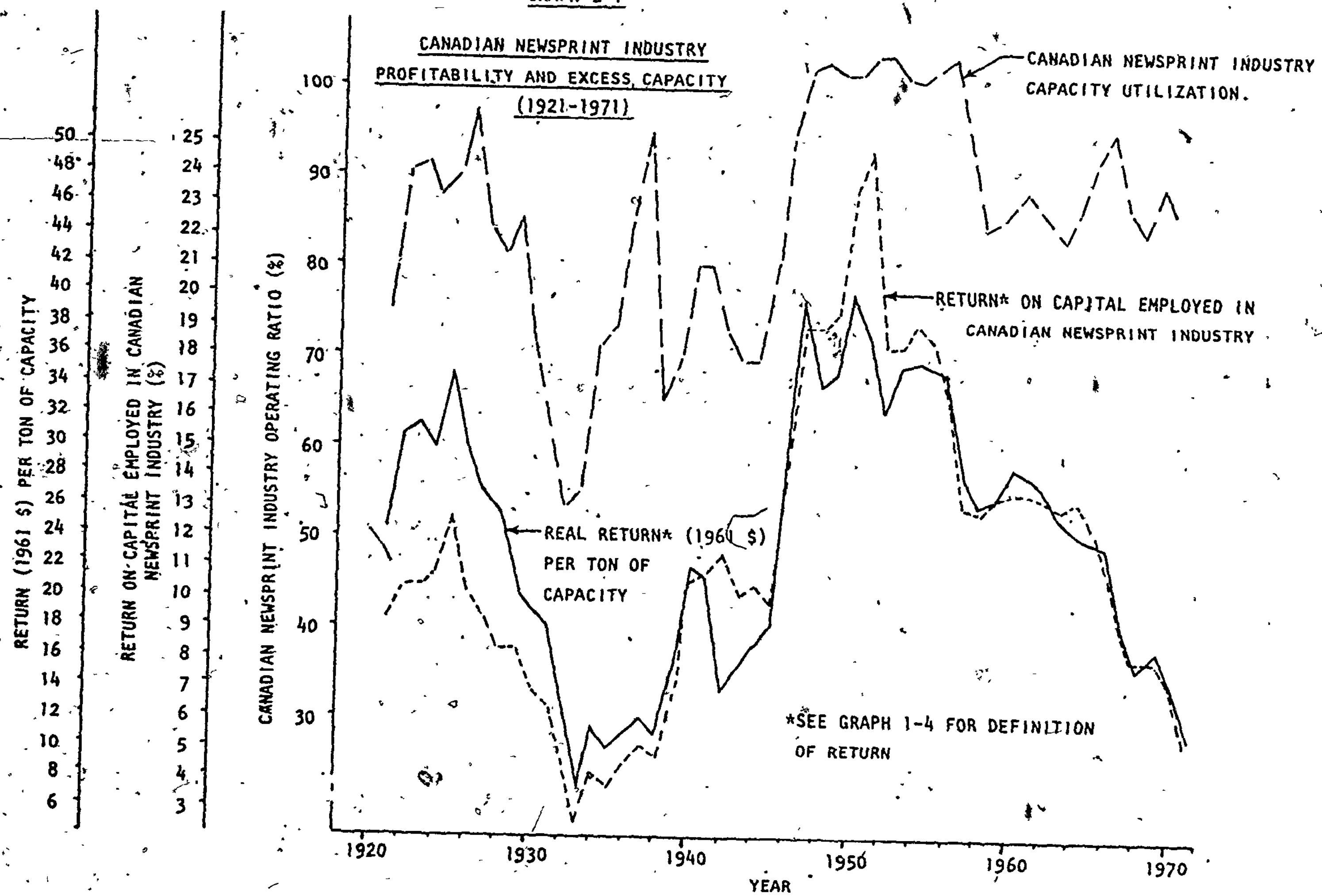
Graph 2-1 illustrates the strong relationship between industry profitability and the level of industry capacity utilization. This strong relationship is the main evidence for hypothesizing that executives of leading Canadian newsprint manufacturing firms will identify "excess newsprint capacity" as a main factor affecting the industry's performance.

During a period of excess capacity, there exist strong motivations for the management of individual newsprint firms to discount prices (from the list price). Figure 2-1, based upon confidential company information, shows the situation confronting the managers of this newsprint mill at the time (several years ago). Figure 2-1 shows that the mill's capacity was about 330 thousand tons, that it was producing and selling about 240 thousand tons, that its fixed costs excluding depreciation were about $6,450,000, that its variable costs including selling and administration expenses were about $78 per ton, and that its mill net was $125 per ton. Under such conditions, it was generating a cash flow of about $4,780,000 annually.

The mill faced a definite discount opportunity. It could secretly offer a $10 per ton discount to a large buyer whose contract with another firm had just ended. Such a buyer, were he to accept the offer, would generate an estimated 60 thousand tons worth of additional sales annually for the firm. On a marginal basis the 60 thousand tons would contribute another $2,220,000 worth of cash flow for the firm

GRAPH 2-1

CANADIAN NEWSPRINT INDUSTRY
PROFITABILITY AND EXCESS CAPACITY
(1921-1971)



(i.e. 60,000 x ($115/ton - $78/ton)). There was, of course, the chance that the competitor who lost the account would discount his tonnage (whether he realized that he had lost the contract because of a rival's price discounting or not). If such were to occur, then the $10 per ton price discount might become industry-wide. Should the practice become industry-wide, the original discounter would probably be forced to give equal price reductions to all of his buyers. By doing so, if he were able to maintain his sales volume at 300 thousand tons annually, his cash flow would be $4,650,000 (a $130,000 less than his original position). If, however, he were to lose some of his existing customers to other discounters who had followed his lead, he might very well realize only his original sales volume of 240,000 and because of the price decline his cash flow would be reduced by $2,350,000 to $2,430,000.

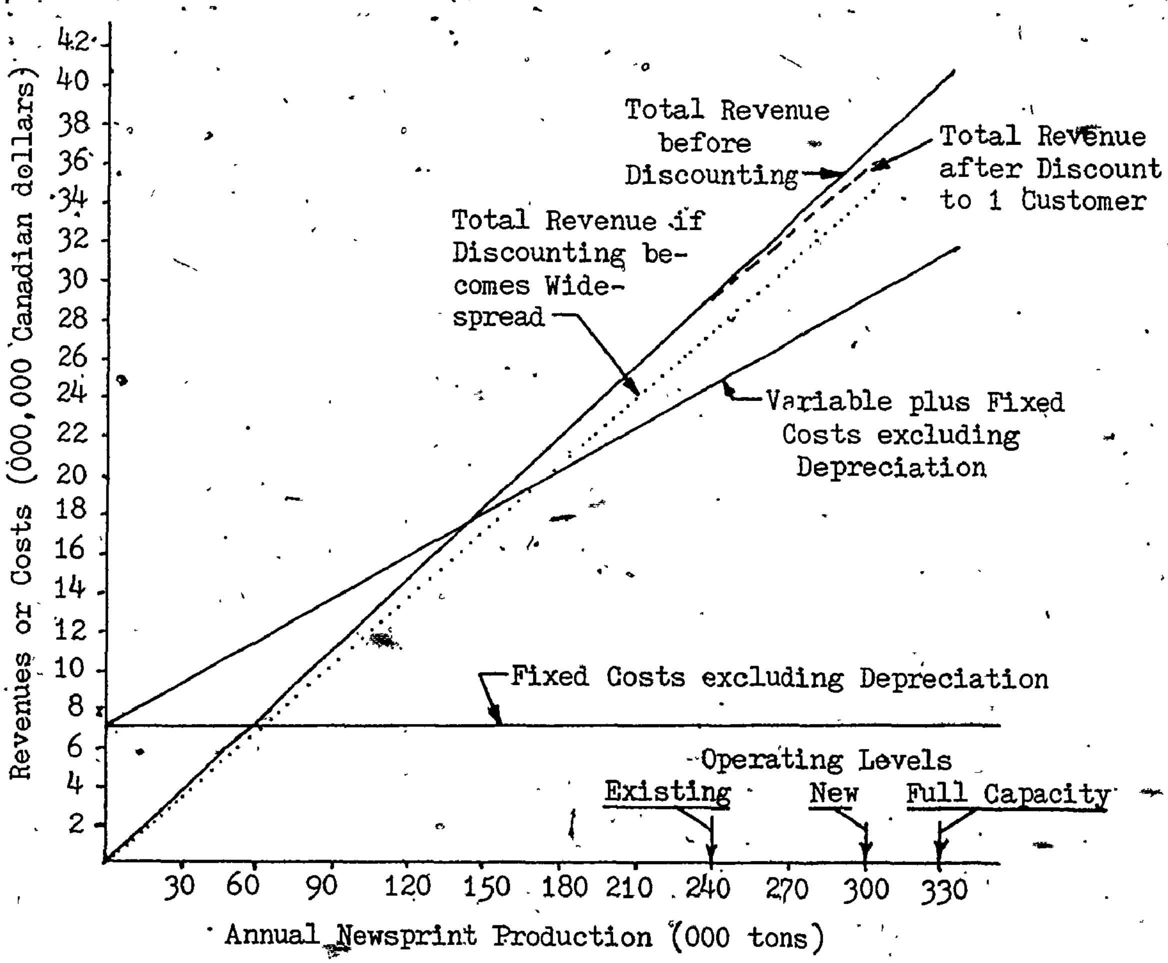
As is discussed in Appendix F,[3] firms generally realize that a list price reduction would be followed by retaliatory list price reductions which would leave every competitor in a reduced profit position, and so rivals would be reluctant to reduce prices under such conditions. However, the temptation is still very great to make a secret price concession (i.e. a discount), in the hope that rivals would not learn of the price reduction or follow suit and thus the discounter would be able to achieve a significant profit increase.

---

[3]Appendix F discusses oligopoly pricing behavior theories and survey findings and relates such theories and findings to the Canadian newsprint industry.

Figure 2-1

The Effect of Excess Capacity on Newsprint Pricing and Profitability



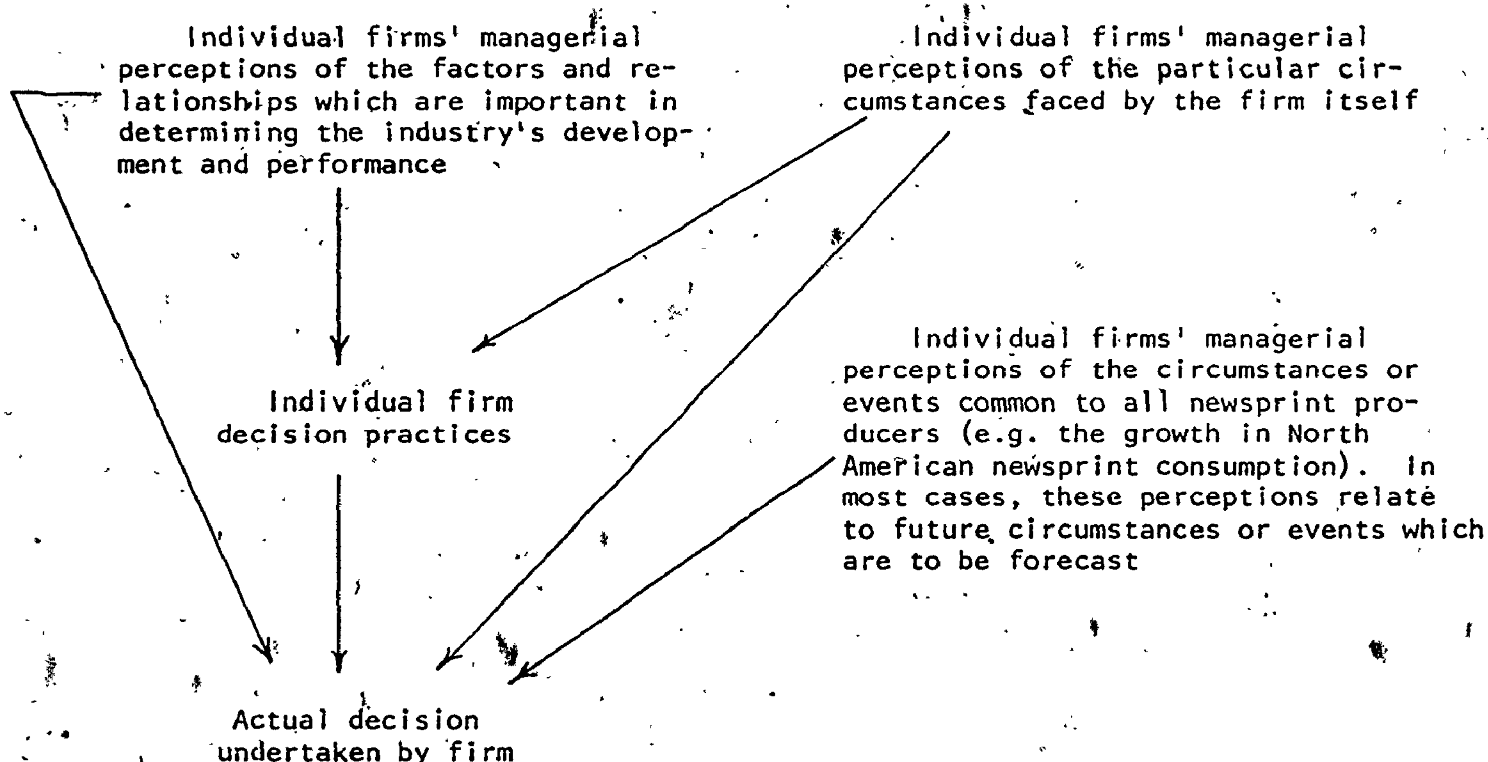
Source: Confidential

Hypothesis 3. That current company pricing and capacity expansion practices differ between firms of the Canadian newsprint industry.

Pricing and capacity expansion decisions, like many managerial decisions, can be thought of as resulting from an analysis of 3 major varieties of management perceptions. Figure 2-2 briefly diagrams this process. As can be seen,

Figure 2-2

The Role of Management Perceptions in Pricing and Capacity Expansion Decisions



individual firm decision practices can be viewed as a function of (1) the firm's managerial perceptions of the factors and relationships which are important in determining the industry's development and performance, and (2) the firm's managerial perceptions of the particular circumstances faced by itself. Actual firm decisions can be viewed as a function of those same 2 types of perceptions (given above) which yield a firm's decision practices, the decision practices themselves, and fourthly, the firm's managerial perceptions of circumstances or events common to all producers. Poor decisions can then be thought of as resulting from incorrect perceptions of (1) the factors and relationships which are important in determining the industry's performance and development, or (2) the particular circumstances faced by the firm itself, or (3) the circumstances or events common to all producers, or (4) some combination of the previous 3.

In the first chapter, it was clearly demonstrated that the financial performance of Canada's newsprint industry had been unsatisfactory, leaving little doubt that, from an economic point of view, many of the decisions made by this industry's member firms have been poor decisions. Hypothesis 1 of this research implies that a major cause of these poor decisions has been incorrect perceptions of the factors and relationships which are important in determining the industry's performance and development. Hypothesis 3 attempts to determine whether variations in decision practices exist and if so, whether the major cause of such variations is incorrect perceptions of the factors and relationships which are important in determining the industry's development and performance. It is felt that the identification of incorrect perceptions and of variations in decision practices due to such incorrect perceptions is a major step towards the improvement of individual firm decisions and thus towards the overall improvement in the financial performance of Canada's newsprint industry.

Hypothesis 4. That, utilizing annual industry data covering the period 1920 through 1970, an econometric model of the Canadian newsprint industry can be constructed which will account for the major movements of those factors which this author and industry executives feel have most affected this industry's financial performance.

If Hypotheses 1 and 3 prove to be correct, then an econometric model of the industry which can help to explain the major movements of key industrial variables (e.g. newsprint price, newsprint capacity) should bring about a more uniform perception of the factors and relationships important in determining the industry's development and performance and should help industry decision-makers to improve their decision-making practices, and thus possibly avoid making decisions which would have poor economic consequences, both for themselves and for the industry as a whole.

Hypothesis 5. That this model, though not developed for predictive purposes, will show indications of predictive potential.

An industry model which could be adapted for predictive purposes could be used by industry managers as an aid to their strategic planning activities.

4. Brief Listing of Research Steps Followed

Listed in this section are the data gathering, structuring and analysis steps which were undertaken. In some cases, further elaboration can be found in other sections of this and other chapters. In chronological order, the steps followed were:

Step 1. The research objectives and initial hypotheses were developed.

Step 2. A literature search was undertaken to determine what information and what data were available on the newsprint industry and to determine how other investigators had approached the task of modeling business entities, such as firms or industries.

Step 3. Based upon the findings of the literature search and in keeping the objectives of this research, a preliminary model of the newsprint industry was developed. No specific data were applied to the model at this stage. This preliminary model is discussed at length in Chapter III.

Step 4. Using the preliminary model as a guide, a series of open-ended questions was developed. These questions were then posed to several high level managers in 4 of Canada's leading newsprint manufacturing firms. The specific questions posed are given as Appendix D of this thesis. Management responses are the subject of Chapter IV.

Step 5. A final newsprint industry model was developed from a consideration of both the preliminary industry model and the interview responses. Chapter V presents this final model.

Step 6. Data were applied to the newsprint model and multiple regression analysis of the equations of the model was performed. Using single equation estimation techniques, each equation was fitted to annual data covering the period 1921 through 1970. The results of this analysis are presented in Chapter V.

Step 7. These results were compared with the results obtained through the use of naive forecasting methods so as to yield an indication of the model's predictive potential. The results of this comparison are presented as Chapter VI.

Step 8. The findings of (1) the empirical investigation, (2) the executive interviews, (3) the description of the industry's development (Appendix B) and (4) the search of the literature are brought together, summarized and expanded upon in Chapter VII. Then, Chapter VIII serves to develop possible strategies which executives of Canada's newsprint firms, either individually or collectively, might consider employing in order to improve the industry's financial performance.

5. Findings of Literature and Data Searches

5.1 The Economics of the Newsprint Industry

Despite the importance of the newsprint industry, very little has been written on the economics of the industry. The major sources of information on this industry, excepting trade publications, are Bowland (1971), Ellis (1948, 1960), Gutherie (1941, 1950), Haviland et al. (1968), Hunter (1955), Keays (1973), Reinertsen (1958), Rich (1970) and the Stanford Research Institute (1950).

5.2 Newsprint Statistics

The Canadian Pulp and Paper Association and Statistics Canada and their counterparts in the United States, the American Paper Institute and the U.S. Department of Commerce, publish a great many statistics on their respective newsprint industries. These agencies never release information on individual companies, but publish aggregate industry data on such variables as shipments, production, capacity and price. The 4 major Canadian sources of such statistics are the Canadian Pulp and Paper Association's annual publications, entitled Reference Tables, Newsprint Data, and Annual Newsprint Supplement, and the Statistics Canada annual publication, entitled Pulp and Paper Mills.

The Statistics Canada publication, entitled Pulp and Paper Mills also contains information on labor costs, wood costs and chemical costs aggregated for all Canadian pulp and paper manufacturers. Most of the data being collected by these bodies have been collected since the early 1900s.

Since newsprint manufacturing costs play a major role in the construction of an econometric model of the newsprint industry, labor costs, wood costs and chemical costs for the Canadian newsprint industry for the period 1920 through 1971 were requested of Statistics Canada. Such a request required a definition of Canada's newsprint industry. As each firm reports to Statistics Canada on an "establishment" basis, it was felt that newsprint manufacturing establishments could be separated from non-newsprint manufacturing establishments so as to yield reasonable estimates of newsprint manufacturing costs. Appropriate portions of the letter requesting such information and outlining several possible ways of handling the separation problem (the separation of newsprint from non-newsprint-producing establishments) are reproduced as Appendix E.

The special tabulations finally received from Statistics Canada defined the Canadian newsprint industry as including all establishments producing some newsprint except for the following establishments:

- An establishment was excluded if it produced newsprint infrequently (i.e. for only a very few years from 1920 to 1971).
- An establishment was excluded if newsprint consistently accounted for less than 70 per cent of its total shipment value (i.e. if it produced substantial amounts of products other than newsprint).
- An establishment was excluded if it produced very small amounts of newsprint; in particular, if it accounted for less than ½ of 1 per cent of industry sales.
- An establishment was excluded if more than 40 per cent of its newsprint production was of recognizable non-standard newsprint varieties, such as rotonews or colored newsprint.[4]

---

[4] For the industry as a whole, non-standard newsprint varieties seldom represent more than 5 per cent of newsprint production.

Over the period 1920 through 1971, 58 different establishments produced newsprint for 1 or more years. The exclusion criteria dropped 21 of these establishments which were then excluded in the determination of newsprint manufacturing costs. Tables 2-1 and 2-2 indicate the efficiency of the exclusion criteria in defining Canada's newsprint industry for cost estimation purposes.

Table 2-1

1971 Statistics on the Definition of the Canadian Newsprint Industry Employed for Cost Estimating Purposes

	Published results for pulp and paper industry	All newsprint manufacturers	Results for newsprint manufacturers included
Number of establishments	142	44	34
Value ($) of newsprint shipments (000,000)	1083	1080*	981*
Value ($) of total mill shipments (000,000)	2832	1421*	1143*
Newsprint shipments as a % of total mill shipments ($ value basis)	38	76*	86*

Source: Statistics Canada, Pulp and Paper Mills, 1971.
*Statistics Canada special tabulations.

Table 2-2

Other Statistics on the Definition of the Canadian Newsprint Industry Employed for Cost Estimating Purposes

Year	% of total newsprint produced accounted for by included establishments (tons basis)	Newsprint as % of total shipments for included establishments ($ value basis)
1921	87%	96%
1930	84%	96%
1940	88%	91%
1950	90%	90%
1960	86%	91%
1970	89%	87%

Source: Statistics Canada special tabulations

5.3 Corporate and Industry Models

Again, despite the importance of this industry, no economic models of the full pulp and paper industry, of the newsprint industry or of any other segments of the pulp and paper industry have previously been developed of which the author is aware.

Some economic models have been constructed of other industries, including Ueno and Tsurumi's (1969) model of the United States automobile industry.[5] A larger number of models

[5]Other models include: R.L. Miller, "A Short-Term Model of Textile Industries", American Economic Rev. LXI (June 1971): 279-289; W.H. Wallace, T.H. Naylor, and W.E. Sasser, "An Econometric Model of the Textile Industry in the United States", Rev. Econ. Stat. 50 (February 1968): 13-22; and, D.A. Wilton, "An Econometric Model of the Canadian Automotive Manufacturing Industry and the 1965 Automotive Agreement", Can. J. Econ. 5 (May 1972): 157-181.

have been constructed of the economics of individual firms.[6] Tsurumi (1969), for example, besides modeling the United States automobile industry with Ueno also developed models of each of the major competitors in that industry. Very few models either of Canadian industries or Canadian firms have been constructed.

Most of the models which have been developed, whether of industries or individual firms and which have been concerned with industry or firm conduct or performance, have used regression techniques almost exclusively as their means of analysis.

Industry or firm models have been developed for many purposes. For example, Gershefski's (1968, 1969) model of the Sun Oil Company showed how the company's process operations and accounting procedures could be expressed by a series of equations which could be used to compare and evaluate alternative strategies and to appraise the effects of different allocations of funds and resources. Such models are often referred to as corporate financial planning models. A review of such models has been carried out by Clowes and Marshall (1972). Along these same lines, Wallace et al. (1968) develop-

---

[6] Individual firm models include: N.B. Macintosh, H. Tsurumi, and Y. Tsurumi, "Econometric Model of the Firm for Strategic Planning", Draft Paper. (Kingston, Ontario: Queen's University), March 1971; R.A. Nobbs, "A Computerized Organization Model: its Development and the Measurement of its Benefits in a Strategic Planning Situation", (Ph.D. dissertation, Univ. of Western Ontario, 1972); and, G.W. Gershefski, "Corporate Models - The State of the Art", Managerial Planning (Nov.-Dec. 1969): 1-6.

ed their model of the United States textile industry as a "simulation device"[7]. Desai's (1966) model of the World tin economy was simulated so as to determine policies which would soften the impact of changing demand on the producers of tin. Desai's recommendations were aimed at those governments which had formed the International Tin Agreement. Vernon et al. (1969) constructed an econometric model of the American tobacco industry which ultimately they hoped to use "to perform policy simulation experiments to evaluate the effects of alternative governmental and managerial policies on the behavior of the industry"[8].

5.4 Modeling Canada's Newsprint Industry

In addition to the references already cited under the section headings "The Economics of the Newsprint Industry", "Newsprint Statistics", and "Corporate and Industry Models", the development of specific equations of the preliminary model of the newsprint industry (as discussed in Chapter III) required substantial reference to the literature on investment determinants (see Appendix G) and to the literature on pricing in oligopolies (see Appendix F).

6. Executive Interviews -- Purpose of Interviews and Executive Selection Criteria

Using the preliminary model (as discussed in Chapter

---

[7] Wallace et al., p. 21.

[8] J.M. Vernon, N.W. Rives, Jr., and T.H. Naylor, "An Econometric Model of the Tobacco Industry", Rev. Econ. Stat. 51 (May 1969): 149-158.

III) and the objectives and hypotheses of this research as a guide, a series of open-ended questions was developed. These questions were posed to several high level managers in 4 of Canada's leading newsprint manufacturing firms. The specific questions posed are given as Appendix D; management responses are the subject of Chapter IV.

Broadly, the major purpose of these interviews was to elicit facts, opinions and perceptions from those interviewed which could be used to prove or disprove the first 3 hypotheses of this research. A second purpose of these questions was to confirm which variables or relationships included in the preliminary model were appropriate, and to determine whether any variables or relationships had been overlooked in the development of the preliminary model.

It was thought that incorporation of interview results into the final model of the newsprint industry would increase the model's external validity and thus its ability to yield insights into the underlying forces shaping the industry's development and performance.

Only large firms' managers were interviewed, as it was felt that such firms were most likely to be the initiators of those decisions which most affected the industry's performance and development. Those interviewed included 3 managers from each of Abitibi Paper, Consolidated-Bathurst, Domtar and MacMillan Bloedel. These 4 firms had a combined annual newsprint capacity of 3711 thousand tons or 38 per cent of total Canadian newsprint capacity in the year 1970. In that same year, these 4 newsprint manufacturers operated 18 of the industry's 44 mills (40%). Reasons for choosing these particular firms were as follows:

- Each firm is Canadian-owned and controlled. It was felt that it would be considerably more difficult and expensive to determine where, by whom and how key decisions were being made in foreign-owned and controlled firms. Of Canada's larger newsprint manufacturers, Canadian International Paper, Ontario Paper and Bowaters Canadian are all foreign-owned and controlled.

- Firms were chosen so as to be representative of the several newsprint-producing regions of Canada. Both costs of newsprint manufacture and newsprint markets served are, to a ~~considerable extent,~~ determined by facility location; thus, it was felt important to interview a geographical cross-section of Canada's newsprint manufacturers. Of MacMillan Bloedel's 3 newsprint mills, 2 are located in British Columbia and the third and smallest mill is located in New Brunswick. Four (4) of Abitibi's 6 mills are located in Ontario with the others located in Manitoba and Quebec. All of Consolidated Bathurst's 5 mills are located in Quebec, while 3 of Domtar's 4 mills are located in Quebec, the other in Ontario.[9] Table 2-3 compares the mill locations of those firms interviewed with the mill locations of all Canadian newsprint manufacturers.

---

[9] The location of Canada's newsprint manufacturing capacity along with a description of and reasons for the various shifts in that capacity over the period 1920 through 1970 is fully discussed in Appendix B.

Table 2-3

Mill Location - 1970

Province	Industry No. of mills	Industry % of mills	Firms Interviewed No. of mills	Firms Interviewed % of mills
British Columbia	5	11	2	11
Manitoba	1	2	1	5
Ontario	10	23	5	28
Quebec	23	52	9	50
Maritimes	5	12	1	6
Total mills	44		18	
Total number of firms	22		4	

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971) Table 1, p. 2.

As can be seen from Table 2-3, the selection of firms was geographically representative. Geographically, the exclusion of Canadian International Paper (2 mills in Quebec, 1 in the Maritimes), Price (3 mills in Quebec, 1 in the Maritimes) and Ontario Paper (1 mill in Quebec, 1 in Ontario) does not seem crucial. The exclusion of Bowaters Canadian (2 mills both located in the Maritimes), the only other firm ranked as one of Canada's 8 top producers of newsprint, leads to some under-representation of the Maritime provinces, though its inclusion would have resulted in an equal over-representation of the Maritimes.

- Firms were chosen which had been active in leading or retarding a recent price increase or which were known to be actively considering capacity expansion. MacMillan Bloedel is generally regarded to be the price leader in the West.[10] In the East, Canadian International Paper, Price or Consolidated-Bathurst can be expected to lead price increases, whereas, despite its size, Abitibi is slow to follow.[11] Domtar, while an active leader in pulp price increases, is generally regarded as a price follower in the newsprint field.[12]

At the time of the interviews, MacMillan Bloedel was considering building a newsprint mill in the U.S. West, Domtar was actively considering a major expansion of its newsprint facilities in Quebec, and Consolidated-Bathurst had just added a new machine (actually a used machine) in one of their Quebec mills. The only other Canadian newsprint manufacturer known to be increasing or contemplating increasing newsprint capacity at that time was Kruger Pulp and Paper.

The organization positions of those interviewed included Chairmen of Boards, Presidents, Vice-Presidents in charge of Newsprint Operations, Planning Directors and Marketing Research Managers. Additionally, one industry consultant and a

---

[10] Industry and investment analyst informants (confidential).

[11] Industry and investment analyst informants (confidential).

[12] For descriptions of specific price change occurrences, see for example: "Rift Seems Developing in Newsprint Industry over Pricing", (Toronto) Globe and Mail, 25 Oct., 1973, p. Bl; "Four More Firms Follow Newsprint Price Rise", (Toronto) Globe and Mail, 29 July 1971; Guthrie (1941), pp. 106-126; and, Guthrie (1950), pp. 100-121.

number of government officials were interviewed, although such interviews seldom kept to the same questions as were asked of industry management.

Interviews were scheduled for and lasted 1½ hours. All interviews were tape recorded so as to make maximum use of the time available. Without exception, each firm and each manager contacted agreed to be interviewed and each manager was fully cooperative.

Managers interviewed were selected on the basis of their familiarity with and participation in pricing and/or capacity expansion decisions. Generally, such individuals were identified by the Presidents of the companies participating in this research.

CHAPTER III. PRELIMINARY MODEL OF THE CANADIAN NEWSPRINT INDUSTRY

1. Introductory Comments

In this chapter a preliminary model of the Canadian newsprint industry is developed. This preliminary model subsequently served as a guide in the development of the questions which were addressed to industry executives. These questions appear as Appendix D of this thesis. This model, along with executive responses to these questions, determined the final model structure as presented in Chapter V.

It is the purpose of this chapter, as stated in Hypothesis 4, to develop the framework for a "model of the Canadian newsprint industry . . . which will account for the major movements of those factors {which} have most affected this industry's financial performance".[1]

Three (3) points will become obvious to the reader of this chapter. They are:

- Explanation, not prediction, is the primary purpose of this research.

It is well recognized by researchers that explanatory models are seldom structured in the same manner as predictive models. But perhaps an even more important distinction between such models is the differing need for completeness. For example, a predictive model might be capable of predicting

[1] Chapter II, p.30.

the price of newsprint in period t on the basis of the manufacturing costs of newsprint in period t. From a predictive viewpoint, such a model is of limited value unless it can also predict (or has available predictions of) the manufacturing costs of newsprint during the period for which the prediction is required. An explanatory model, on the other hand, may be considered valuable if it can account for the relationship between newsprint's current price and current manufacturing costs. In this latter case, there is usually no over-riding necessity to explain the movement of manufacturing costs, or for that matter, to demonstrate an ability to forecast them. In this sense then, an explanatory model may be considerably less complete than a predictive model.

In another sense, however, explanatory models are often far more complete than predictive models. If, for example, on *a priori* grounds, the price of newsprint was not believed to be completely determined by manufacturing costs, but by the interaction of demand and supply variables, such that the current price of newsprint was determined by current demand for newsprint plus other factors, and at the same time, the current demand for newsprint was determined by the current price of newsprint plus other factors, then the explanatory model would require the simultaneous solution of 3 equations, if a proper explanation of the determinants of newsprint price was to be found. Such an explanatory model would be far more complex than most predictive models and in this sense more complete.

Since explanation and not prediction is the primary purpose of this research, the reader may find the preliminary model incomplete in the predictive sense.

- This research focuses on the explanation of newsprint price and capacity changes.

Newsprint pricing and capacity change decisions, both of which are completely under the control of the managements of industry member firms, are considered by this author to be the 2 decisions having the greatest impact on the industry's performance and development.[2]

- Explanations of changes in the costs of newsprint manufacture and distribution have not been dealt with.

The explanation of cost changes has been disregarded for 3 reasons. First, a large proportion of the annual changes in manufacturing and distribution costs are brought about by forces over which industry management has little if any control (e.g. the prices of fuel, electricity and chemicals). Second, as has previously been stressed, the value of this research as a whole is not dependent upon an explanation or prediction of cost movements (provided the entities they are used to explain do not in turn play a role in determining the costs themselves).[3] Third, cost movement explanation would entail a far greater research effort.

---

[2]Reasons for placing major emphasis on the explanation of industry price and capacity changes have been discussed earlier. See pages 31 through 33 of this thesis.

[3]The author has no reasons for believing that cost movements are determined by variables which cost movements determine.

The remainder of this chapter is divided into 3 sections. The first section gives a brief model overview. The second section develops those equations associated with the industry income statement. The third section considers capacity change estimation.

2. Model Overview

Figure 3-1 shows a flow chart description of the preliminary industry model developed in this chapter. This flow chart deals solely with those variables and relationships felt important in determining the performance of the Canadian newsprint industry as measured by its annual income statement. Figure 3-2 presents a flow chart description of the capacity expansion process.

Since many of the key variables which affect the development and performance of this industry are at least partially market-determined and since the largest market for Canadian-produced newsprint is the United States, many portions of the proposed model are developed for the North American newsprint industry as a whole.

3. Industry Income Statement Investigation

3.1 The Demand - Supply - Price Relationship

(a) The Proposition

If the demand curve for newsprint is highly inelastic and the supply curve for newsprint is relatively elastic, then changes in the supply can be expected to have very little effect upon the quantity demanded and supplied (the equilibrium point), but a significant effect on the price of newsprint; on the other hand, a shift in the demand curve for newsprint can be expected to

Figure 3-1 Model of the Canadian Newsprint Industry's Income Statement

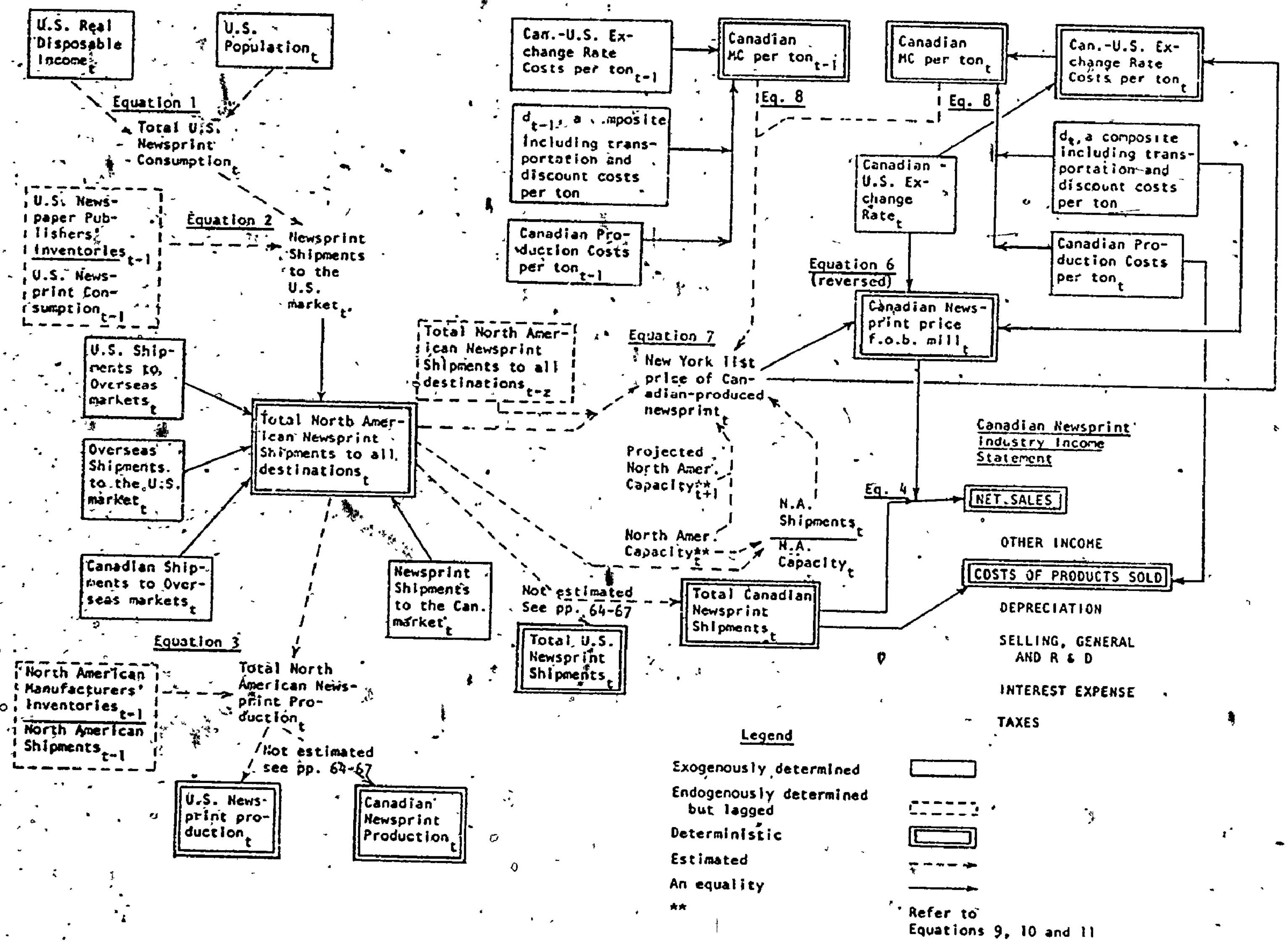
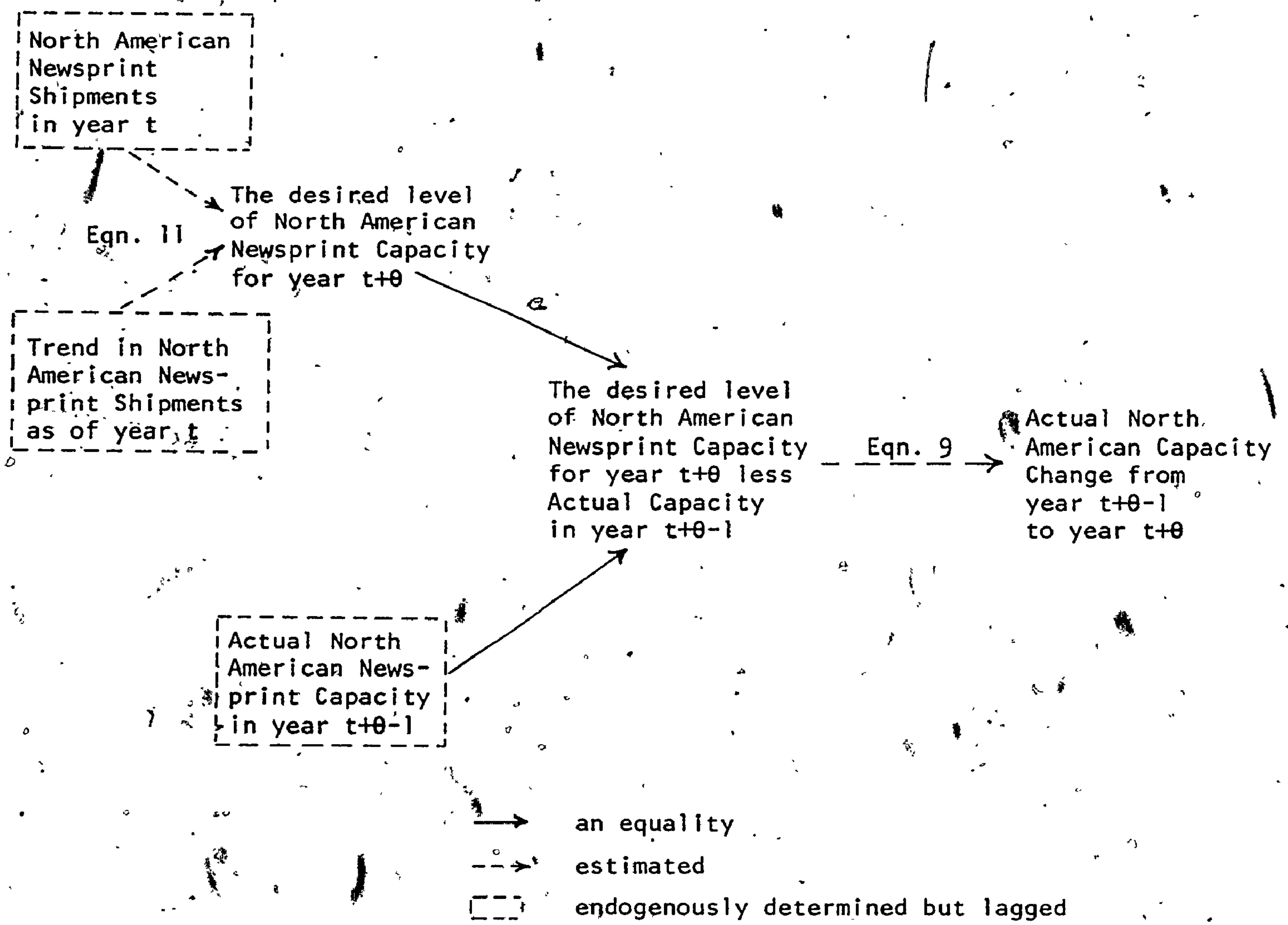


Figure 3-2 Capacity Change in the Canadian Newsprint Industry



have very little, if any, effect upon the price of newsprint, but a significant effect upon the quantity demanded and supplied. Figure 3-3 graphically portrays such a situation. Under such circumstances, the quantity of newsprint demanded (or supplied) can be considered a function solely of demand-related variables such as population, education and prosperity. Similarly, the price of newsprint can be considered as determined primarily by supply-related variables such as unit production and distribution costs.[4]

---

[4] Under conditions of inelastic demand and elastic supply, the quantity purchased and price estimating equations would be completely independent of each other and the coefficients of such equations can be properly estimated using ordinary least squares regression techniques. That is:

$$\text{Newsprint purchases}_t = f(\text{Demand-related variables}_t)$$

$$\text{Newsprint production}_t = f(\text{Newsprint purchases}_t) + f(\text{Other adjustment factors such as inventories})$$

$$\text{Newsprint price}_t = f(\text{Supply-related variables}_t)$$

If, on the other hand, the demand curve for newsprint was somewhat elastic and the supply curve somewhat inelastic, then the quantity purchased and price estimating equations would, of necessity, have to take on the following general forms:

$$\text{Newsprint purchases}_t = f(\text{Newsprint price}_t) + f(\text{Other demand-related variables}_t)$$

$$\text{Newsprint production}_t = f(\text{Newsprint price}_t) + f(\text{Other supply-related variables}_t)$$

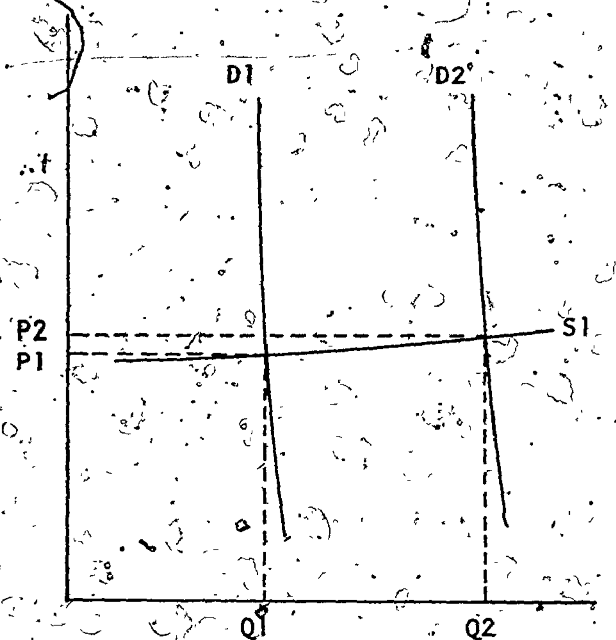
$$\text{Newsprint production}_t = f(\text{Newsprint purchases}_t) + f(\text{Other adjustment factors such as inventories})$$

Under such conditions, the coefficients of such equations could not be properly estimated using ordinary least squares and some other far more complex estimation procedure such as simultaneous equation estimation techniques would have to be employed.

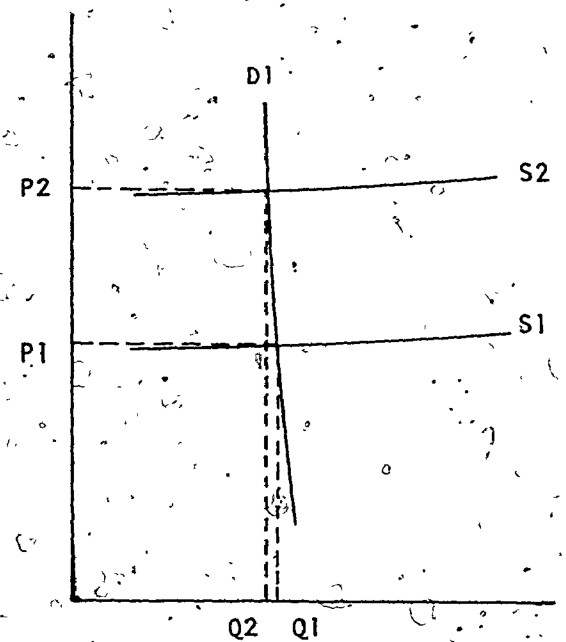
In order to avoid such estimation problems, researchers often introduce time lags into such models which, together with assumptions about the disturbances, make such models recursive. Such procedures have been employed for example by Wold (1959) and Stojkovicz (1964).

Figure 3-3

Price and Quantity Changes under Conditions of Inelastic Demand and Elastic Supply



A CHANGE IN DEMAND HAS ALMOST A ONE TO ONE EFFECT ON QUANTITY BUT ALMOST NO EFFECT ON PRICE.



A CHANGE IN SUPPLY HAS ALMOST NO EFFECT ON QUANTITY BUT ALMOST A ONE TO ONE EFFECT ON PRICE.

(b) The Evidence

What then is the evidence on the shape of the demand curve and supply curve for newsprint? As will be presented, there is a reasonable amount of evidence supporting the proposition that the demand curve for newsprint is strongly inelastic and that the supply curve for newsprint is elastic. A number of points can be made:

- The demand for newsprint is a derived demand, that is, it is dependent upon the demand for newspapers. Moreover, the cost of newsprint to the publisher normally constitutes only a small portion of the value of the finished product.[5]

- There exists no close substitute for newsprint which is or has been competitively priced.[6]

---

[5] Based upon data for the year 1950 reported by Far West Publishers,[7] newsprint costs accounted for from 10 per cent of total costs for newspapers of less than 10 thousand circulation to nearly 40 per cent for the largest metropolitan newspapers.

Moreover, according to Ross Hay-Roe (1973), a researcher with Fry Mills Spence Limited, a 50 per cent increase in U.S. newspaper prices would result in only a 4 per cent drop in newspaper circulation for about 6 months. See Ross Hay-Roe, "The Newsprint Shortage - all over but the earnings reports?", Fry Mills Spence Limited Research report, November 1973, p. 4.

[6] Haviland et al.'s (1968) study of the effects of free trade on Canada's pulp and paper industry indicates that the costs of producing bond paper (fine paper) in an up-to-date efficient large scale plant in Canada would be about 85 per cent higher per ton than the costs of producing newsprint in an up-to-date efficient plant. (Haviland, Tables 24 and 26, pp. 55 and 60).

[7] Stanford Research Institute, The Newsprint Situation in the Western Region of North America, (Stanford, Cal.: Stanford Research Inst., 1952), p. 29.

In attempting to predict U.S. newsprint consumption, which historically has virtually equalled U.S. newsprint purchases,[8] 2 approaches have been widely employed by other researchers. The first approach attempts to relate newsprint consumption to newspaper circulation and size, where circulation is expressed as a function of population and real disposable income and newspaper size is considered a function of advertising lineage which in turn is related to money disposable income.[9]

The second approach attempts to relate newsprint consumption directly to population and disposable income, without regard to such intervening variables as circulation, newspaper size, or advertising lineage.[10]

The key point to be made here is that both approaches determine the quantity demanded (and supplied) solely on the basis of demand-related variables, both methods continue to be widely used, and both methods have been found to be highly successful in relating newsprint consumption to the independent variables.[11]

---

[8] Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 9 and 10, pp. 5 and 6.

[9] Stanford Research Institute, The Newsprint Situation in the Western Region of North America, (Stanford, Cal.: Stanford Research Inst., 1952), pp. 114 and 115.

[10] *Ibid.*, for example.

[11] For example, Stanford Research Institute (1952) personnel were able to account for the movements of U.S. newsprint consumption over the period 1929 through 1951 using as explanatory variables population and disposable income. The multiple correlation coefficient for that equation was 0.955.

- Gutherie (1950), perhaps the most respected author on the economics of the newsprint industry, refers to the demand for newsprint as "inelastic and widely varying".[12]

- Stewart Rich (1970), a leading authority on the marketing of forest products, comments on the shape of the supply curve for newsprint as follows:

> The supply of paper {newsprint} can be either elastic or inelastic in response to price changes, depending on the presence or absence of excess capacity. With excess capacity, supply is quite elastic, that is price rises will bring forth more production.[13]

Actually, except for the years 1946 through 1956, the North American newsprint industry has, since records have been maintained in 1918, produced less each year than its productive capacity.[14]

Moreover, even during the period 1946 through 1956, newsprint manufacturers have demonstrated a remarkable ability to produce amounts far in excess of their theoretical capacities. For example, during 1955, U.S. newsprint manufacturers produced 10 per cent more than their rated capacity for that year.[15]

---

[12] Gutherie (1950), p. 181.

[13] S.U. Rich, Marketing of Forest Products: Text and Cases, (New York, New York: McGraw Hill, 1970), p. 474.

[14] The Canadian Pulp and Paper Association definition of capacity is the definition employed throughout this research. The C.P.P.A. definition of capacity is presented on pages C3 through C5 of Appendix C.

[15] Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montréal: Canadian Pulp and Paper Association, 1971), Table 6, p. 4.

(c) The Conclusion

The evidence presented supports the contention that the demand curve for newsprint is highly inelastic and that the supply curve for newsprint is quite elastic, at least over most of its range. Thus, the quantity of newsprint demanded or supplied can be explained solely in terms of demand-related variables such as population and disposable income. Moreover, the price of newsprint should be explained primarily by supply-related variables. Management responses[16] also support this contention.

3.2 The Consumption Function

One of the key values of the industry income statement is gross industry revenues. An accounting for changes from 1 year to the next in gross industry revenues requires an explanation of changes in the annual volume and price of newsprint shipments. The volume of newsprint shipments can be expected to be strongly linked to newsprint consumption; thus, the concern with the determinants of newsprint consumption. Initially, the model considers the determinants of U.S. newsprint consumption. The proposed equation is as follows:

$$\text{U.S. } C_t = a + b_1(\text{U.S. } P_t) + b_2(\text{U.S. } RDI_t) \qquad (1)$$

where U.S. C_t is the volume of newsprint consumed in the United States in year t, U.S. P_t is the population of the United States in year t, and U.S. RDI_t is the U.S. real disposable

[16] Chapter IV, pp.105 and 111-114.

income in year t.

An alternative and probably superior approach would have been to relate newsprint consumption to newspaper circulation and size and in turn to relate these variables to appropriate economic, demographic and educational variables. Such information was not available for much of the period under investigation.

Furthermore, statistics on Canadian newsprint consumption are not determined by any public or private agency or group, making estimation of a similar estimation equation for Canadian newsprint consumption impossible.

3.3 Shipments of Newsprint to the U.S. Market

Having discussed the consumption of newsprint in the United States, the next step is to consider the volume of newsprint shipments to that market. The question of the origin of such shipments is an important question, but one which will be laid aside for the time being.

In the proposed model, the following equation is proposed to account for the volume of newsprint shipments from all destinations including the United States itself.

$$S.\ U.S._t = a + b_1(U.S.\ C_t) - b_2\left(\frac{U.S.\ Pu.\ I_{t-1}}{(U.S.\ C_{t-1})}\right) \quad (2)$$

where $S.\ U.S._t$ equals the volume of newsprint shipments to the United States market from all destinations in year t, $U.S.\ C_t$ is the volume of newsprint consumed in the United States in year t, and $U.S.\ Pu.\ I_{t-1}$ is the volume of U.S. newspaper publishers' newsprint inventories held at the end of year t-1.

Thus, shipments to (or purchases by) the United States are hypothesized as a function of consumption and lagged inventory in the hands of the consumer (in this case, U.S. newspaper publishers). This formulation reflects the belief that purchases are planned to meet consumption, but if a high inventory level is carried over from the previous period, purchases will be reduced accordingly.

Actual consumption information is employed in place of planned consumption, since data exist for the former but not for the latter. Shipments (purchases) undoubtedly lead planned or actual consumption by some months but the use of annual data prohibits any meaningful handling of this timing.

The Canadian Pulp and Paper Association maintains statistics on the volume of newsprint shipments to Canada (all of which originate from producers located in Canada) but no public or private agency or group records the volume or value of Canadian publishers' newsprint inventories.

3.4 North American Manufacturers' Newsprint Shipments

Total North American producers' shipments of newsprint to all destinations may be said to be comprised of 6 separate components. These components are: (1) Canadian shipments to the Canadian market, (2) Canadian shipments to the United States, (3) Canadian shipments to Overseas markets, (4) United States shipments to the U.S. market, (5) U.S. shipments to Canada, and (6) U.S. shipments to Overseas markets. Since Canadian producers supply all of Canada's newsprint requirements and since total shipments to the United States are comprised of Canadian, U.S. and Overseas shipments to that market, total North American newsprint shipments can be restated as the sum of (1) total shipments to the U.S. market, plus (2) total shipments to the Canadian market, plus (3) Canadian shipments to Overseas markets, plus (4) United States shipments to Overseas markets, minus (5) Overseas shipments to the United States.

In this restatement of total North American producer newsprint shipments, the first and largest factor, total shipments to the U.S. market, has been fully specified by proposed Equations 1 and 2. The second factor, total shipments to the Canadian market, could have been estimated in exactly the same way as total shipments to the U.S. market were estimated, had it not been for the lack of suitable data. This lack of data forces total shipments to the Canadian market to be considered exogenously determined. Exports from or imports to North America are also considered exogenous to the system under consideration; thus, the remaining 3 factors are exogenous. Table 3-1 indicates the magnitudes and trends of these 5 components over the period 1920 through 1970.

Newsprint trade between the United States and Overseas countries, as demonstrated by Table 3-1, has historically been of small importance. Canadian newsprint shipments to Overseas countries have been and continue to be quite significant. Such shipments have, at times, fluctuated widely and are presumably determined by a much broader and more complex economic, political and technological system than has been or will be considered here.[17]

Table 3-1

North American Shipments
of Newsprint

Values in thousands of short tons

	Year 1920	1930	1940	1950	1960	1970
Total Shipments to U.S.	2196	3552	3774	5921	7379	9621
Total Shipments to Canada	110	162	185	355	487	716
Can. Shipments to Overseas	160	442	878	208	986	1731
U.S. Shipments to Overseas	N/A	5	15	15	77	141
Overseas Shipments to U.S.	51	134	34	171	147	314
Total North American Shipments	2451	4017	4817	6328	8783	11895
- Canadian	949	2749	3804	5311	6752	8592
- U.S.	1502	1268	1013	1017	2031	3303

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), various tables.

[17] A study of World newsprint trading patterns would require data on individual nation unit newsprint production and distribution costs. Such data are not available. Along these same lines, Ault (1972) made an empirical study of the determinants of World steel trade.

3.5 North American Newsprint Production

The following relation between North American shipments to all destinations and North American newsprint production is proposed:

$$N.A.\ P_t = a + b_1(N.A.\ S_t) - b_2\left(\frac{N.A.\ Pl.\ I_{t-1}}{N.A.\ S_{t-1}}\right) \quad (3)$$

where N.A. P_t is the volume of newsprint production in North America in year t, N.A. S_t is the volume of North American newsprint shipments to all destinations in year t, and N.A. Pl. I_{t-1} is the volume of North American producers' newsprint inventories at the end of year t-1.

Equation 3 is, of course, not strictly correct. Rather, newsprint production is planned (scheduled) to meet expected newsprint shipments. Actual production may differ from that planned because of machine failures, strikes or other reasons, likewise actual shipments may differ from expected shipments. Scheduled production would lead planned shipments by days, weeks, and sometimes months. Data availability confines the investigation to the use of actual yearly production and shipment values.

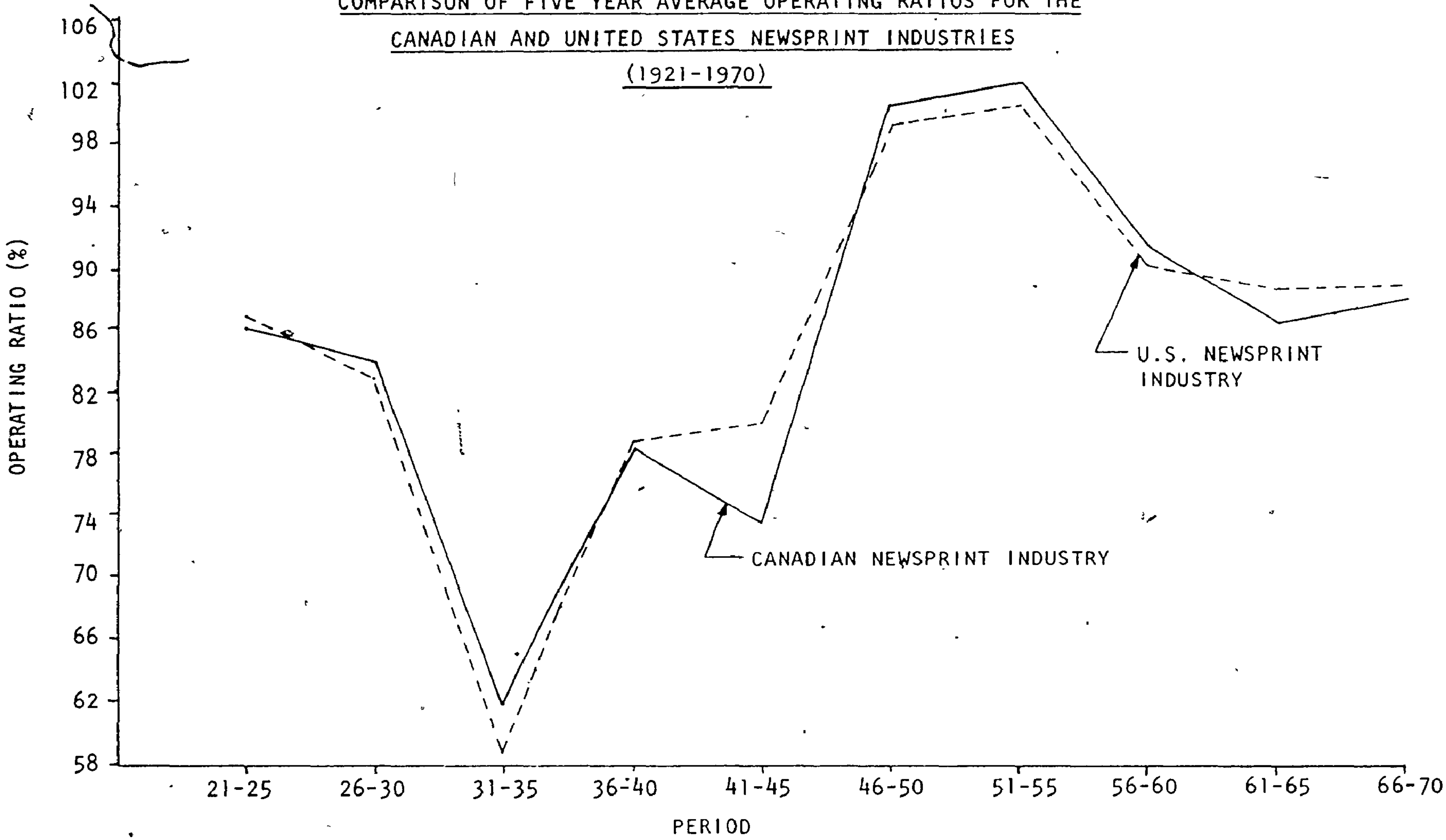
3.6 Origin of North American Shipments and Production

Historically, Canadian and U.S. newsprint producers have contended for their respective shares of U.S. demand. Graph 3-1 shows that between 1920 and 1970, Canadian and U.S. newsprint manufacturers have tended to operate at about the same levels of capacity utilization. U.S. producers have supplied a greater proportion of their newsprint production

GRAPH 3-1

COMPARISON OF FIVE YEAR AVERAGE OPERATING RATIOS FOR THE CANADIAN AND UNITED STATES NEWSPRINT INDUSTRIES

(1921-1970)



to the U.S. market than have Canadian producers, however, Canadian producers have supplied all of Canada's domestic newsprint requirements and have also supplied Overseas markets with significant tonnages. The correlation between Canadian and American operating ratios (capacity utilization ratios) cannot be denied, nor can it be easily explained.

Any explanation of shipment and production origin within North America would undoubtedly have to consider individual firm production and distribution costs; individual plant production costs, distribution costs, and economies of scale; regional market trends; and perhaps most importantly, individual firm's objectives and competitive practices. Many factors bearing on the new capacity location decision would also likely bear on the production and shipment origin question. A full consideration of the major forces affecting the location of North America's newsprint industry can be found in Appendix B, pages B21 through B38.

Because of the complexity of the origin question, no attempt is made here to form a mathematical model to explain newsprint production and shipment origin within North America.

If one were willing to accept the historical correlation between U.S. and Canadian operating ratios as valid for the future, then, of course, one could predict the magnitudes of Canadian newsprint production and shipments on that basis, provided one could make separate estimates of Canadian and U.S. capacity. Since most new capacity takes 2 to 3 years to construct, such capacity estimates could easily be made. It should be emphasized that such a formulation would be useful solely for predictive purposes and could not be expected to aid our understanding of the forces acting upon and within this industry.

Having considered at some length the factors affecting newsprint volumes, this research now considers the determinants of newsprint prices.

3.7 The Price of Newsprint

Net revenues of Canadian newsprint manufacturers can be said to equal the volume of Canadian newsprint shipments multiplied by the average price per ton received by Canadian manufacturers f.o.b. mill. That is:

$$C.\ N.\ R._t = C.\ S_t * C.Pr.\ a\ m_t \qquad (4)$$

where $C.\ N.\ R._t$ is the Canadian newsprint producers' net sales in year t, $C.\ S_t$ is the total volume of Canadian newsprint shipments to all destinations in year t, and $C.\ Pr.\ a\ m_t$ is the average price of Canadian-produced newsprint at mill in year t.

Unfortunately, the average Canadian newsprint price f.o.b. mill (i.e. $C.\ Pr.\ a\ m_t$) is a weighted average of such prices for shipments destined for Canada, the United States and Overseas. Since imports from or exports to Overseas countries have been considered exogenous to the system under investigation, it is logical to consider the price received by Canadian manufacturers for Overseas shipments also exogenous to the system. Thus, it is the determinants of the North American price of newsprint which we wish to determine.

One approach might be to equate Canadian newsprint producers' net sales in year t (C. N. $R._t$) to the sum of (1) the total volume of Canadian newsprint shipments to North America multiplied by the average North American price of Canadian-produced newsprint f.o.b. mill in year t, plus (2) the total volume of Canadian newsprint shipments to Overseas countries multiplied by the average Overseas price of Canadian-produced newsprint in year t. The second term in the above formulation would be exogenously determined and the average North American price of Canadian-produced newsprint f.o.b. mill in year t could be estimated by netting out of the term C. Pr. a m_t the Overseas price of Canadian-produced newsprint at mill. Unfortunately, the data which are available on the Overseas price of Canadian-produced newsprint f.o.b. mill are not appropriate for such purposes.[18]

The only information on newsprint prices which is readily available and which applies solely to the North Amer-

---

[18]The External Trade branch of Statistics Canada reports the value and tonnage of Canadian newsprint shipments exported to all destinations as a total and also by destination. The values of such shipments are reportedly given on an f.o.b. mill basis; however, often such exports would appear to be valued on a basis other than f.o.b. mill. For example, for the year 1970, the External Trade branch of Statistics Canada reported that 8,090,000 tons of newsprint valued at $1,110.4 million Canadian dollars had been exported from Canada. At the same time, the Forestry branch of Statistics Canada reported that Canadian newsprint mills had made total shipments of 8,764,000 tons worth $1,106.7 million Canadian dollars to all destinations including Canada. The tonnage figures seem reasonable, with the difference in tons reported equalling shipments to the Canadian market. However, the value figures are inconsistent.

ican market is the list price of Canadian-produced newsprint in the New York market. Although referred to as the New York list price, it has almost always served as the list price of Canadian newsprint in all parts of North America.[19]

3.8 The New York List Price of Newsprint

Unfortunately, not all newsprint purchased in North America is purchased at the New York list price. Newsprint may be purchased in 2 ways. It may be purchased under long-term contract (the contract market) where the agreement often extends as long as 5 or 10 years. Or, newsprint can be bought on the spot market where publisher and producer agree on the price for a specified amount of tonnage for near-term delivery. Manufacturers would be expected to meet all contracted tonnage commitments before undertaking to sell tonnage on the spot market. Several nations (e.g. India)[20] purchase a large portion of their newsprint requirements on the spot market.

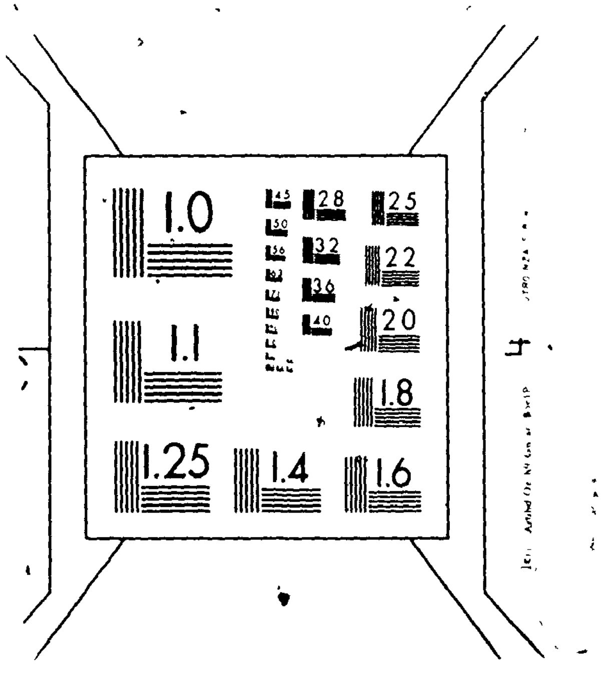
Long-term contracts typically specify both the volume and price of newsprint tonnage to be purchased over the life of the contract. The price to be paid is usually specified as the prevailing market price (i.e. the list price) as established by industry leaders. For example, a contract might stipulate that the price to be paid per ton be the average published prices of Consolidated Bathurst and International

---

[19] See for example, Gutherie, 1941, pp. 106-126 and Gutherie, 1950, pp. 109-117.

[20] "Newsprint Sought", (Toronto) Globe and Mail, 17 July, 1973.

2



Paper. The largest firms are free to establish their own list prices; however, the homogeneous nature of the product, the oligopolistic nature of competition,[21] and the continued historical presence of excess industry capacity[22] insure that most newsprint is sold at the same price on the same continent at any one point in time. There are, however, some exceptions.

Slack markets are sometimes believed to encourage the practice of price discounting from the list price. Very little is known about the conditions under which price discounting develops. Many of the questions posed to industry executives[23] seek to uncover the circumstances, magnitudes and practices of price discounting.

Purchases in the spot market can be made at almost any price depending upon current market conditions. The spot market is the only source of newsprint for customers requiring quantities in excess of their contract tonnages. In most years, less than 10 per cent of newsprint purchased in North America is purchased on the spot market.[24] During periods of excess capacity, spot prices are often equal to contract prices; thus, it is only during periods of tight supply that spot prices rise above contract prices. It is

---

[21]Oligopolistic pricing theories and practices and their application to newsprint pricing are the subject matter of Appendix F.

[22]Refer Chapter II, Graph 2-1, p. 33. Also p. 63 of this chapter.

[23]See Appendix D, questions 20 through 25.

[24]Gutherie, 1941, p. 106.

during such periods of tight supply that far less than normal tonnages are purchased on the spot market. Generally, the spot market has very little effect on the average price of newsprint sold in a particular year.[25]

Data availability once again rules out any empirical model-building investigation of the determinants of discounting or spot pricing. The determinants of the New York list price can, however, be investigated empirically.

Once the determinants of the New York list price of newsprint have been investigated, then the net revenues of Canadian newsprint manufacturers can be determined by employing the following equation:

---

[25] For example, during 1951, according to the Stanford Research Institute (1952, p. 17), 814 thousand tons of newsprint were purchased in the contract market by Western North American customers at an average delivered price of $117 U.S. per ton. In that same year, Western region consumers purchased on the spot market about 22.5 thousand tons of newsprint at an average delivered price of $220 U.S. per ton. The highest spot price paid in that year was $343 U.S. per ton. Thus, the average price paid for all newsprint tonnage (both contract and spot purchases) by Western North American publishers was $119 U.S. This is not to suggest that such high spot prices are common, for it is only during periods when the supplies are tight that spot prices rise substantially above contract prices; in 1951, Canadian producers operated their mills at 103 per cent of capacity and U.S. producers operated at 108 per cent of capacity.

The $117 U.S. contract price is somewhat higher than the New York list price of $111 U.S. for 1951. This occurred because U.S. Far West publishers purchased some 115 thousand tons of European-made newsprint under contract at significantly higher prices including delivery than were paid for North American shipments. (Stanford Research Institute, 1952, pp. 17 and 78)

$$C.N.R._t = C.S_t * (N.Y.L.Pr_t * C.US\,E.R._t - d_t) \quad (5)$$

where, $C.N.R._t$ is the Canadian newsprint producers' net sales in year t, $C.S_t$ is the total volume of Canadian newsprint shipments to all destinations in year t, $N.Y.L.Pr_t$ is the New York list price of newsprint in year t (an average), $C.US\,E.R._t$ is the Canadian - U.S. exchange rate during year t (an average), and d_t is given by the following expression:

$$d_t = N.Y.L.Pr_t * C.US\,E.R._t - C.Pr.a\,m_t \quad (6)$$

where, as previously has been seen (Equation 4), $C.Pr.a\,m_t$ is the average price of Canadian-produced newsprint f.o.b. mill in year t.

Thus, d_t is a composite value encompassing differences in New York and Overseas list prices, premiums paid for spot or contract tonnage to all destinations, discounts taken on spot or contract tonnage to all destinations, and transportation costs of newsprint shipments to all destinations. Lack of data requires that d_t be considered as exogenously determined in the proposed model.[26]

$C.US\,E.R._t$, the Canadian - U.S. exchange rate, is also considered to be exogenously determined. Determination of the Canadian newsprint producers' net sales ($C.N.R._t$), then,

---

[26]Considering d_t as exogenous may not be as questionable as it first appears. In any particular year, transportation costs undoubtedly account for more than half the value of d_t (See Chapter VII, pp. 231 to 233). Transportation costs, like all other costs, are considered exogenously determined since their movement is dictated by factors not under the control of the industry. Later in this chapter, d_t is employed as a proxy for transportation costs.

requires simply the estimation of the New York list price of newsprint.

3.9 Estimation of the New York List Price of Newsprint

The Canadian newsprint industry is generally regarded as a homogeneous oligopolistic industry.

> In general, no one firm is large enough to exercise monopoly power over those selling the same product, but, on the other hand, the output of the individual firm is sufficiently large to influence the price and output of the group.[27]

Many theories of pricing in oligopolistic industries have been developed. Appendix F of this research briefly describes some of the best-known theories of oligopoly pricing, and also reviews some of the survey findings on corporate pricing practices.

In light of these theories and company pricing practices and after consideration of the specifics of the newsprint industry itself and of the evidence concerning the elasticities of demand for and supply of newsprint, the following list price estimation equation is proposed:

$$\%\Delta N.\ Y.\ L.\ Pr_{t-1\rightarrow t} = a + b_1(\%\Delta NA.\ S_{t-z\rightarrow t}) + b_2(\%\Delta C.\ MC_{t-1\rightarrow t}) + b_3(\%\Delta NA.\ Ca_{t\rightarrow t+1}) \quad (7)$$

Subject to: $NA.\ CU_t$

where $\%\Delta N.\ Y.\ L.\ Pr_{t-1\rightarrow t}$ is the percentage change in the New York list price of newsprint from year t-1 to year t, $\%\Delta NA.\ S_{t-z\rightarrow t}$ is the percentage change in total North American

[27] Gutherie, 1950, p. 111.

newsprint shipments from year t-z to year t, %ΔC. $MC_{t-1 \rightarrow t}$ is the percentage change in Canadian manufacturing costs (actually includes other costs in addition to manufacturing costs) per ton of newsprint produced from year t-1 to year t, %ΔNA. $Ca_{t \rightarrow t+1}$ is the percentage change in North American newsprint capacity from year t to year t+1, and NA. CU_t is the average North American newsprint capacity utilization level during year t.

(a) The Shipment Variable (%ΔNA. $S_{t-z \rightarrow t}$)

The "%ΔNA. $S_{t-z \rightarrow t}$" is designed to reflect shifts in the demand curve for newsprint. If, as has been contended,[28] the demand curve for newsprint is highly inelastic, then changes in the amount of newsprint purchased (or shipped) should almost fully reflect shifts in the demand curve for newsprint. If, at the same time, the supply curve for newsprint is quite elastic, then shifts in the demand curve for newsprint as reflected by the term "%ΔNA. $S_{t-z \rightarrow t}$" should have little, if any, effect upon newsprint prices. Under such conditions, the economic and statistical significance of coefficient b_1 should be minimal. If the economic and statistical significance of coefficient b_1 is not minimal, then one would be forced to reconsider assumptions about the demand and supply elasticities of newsprint. The presumption then, is that the shipment variable is not a determinant of newsprint prices.

The precise form of the shipment change term was determined on the following basis. If demand is a determinant of

---

[28] pp. 56-64.

newsprint prices, then price changes can be expected to be made in light of both current and future expected demand. It is felt that industry price-setters perceive current and recent past changes in newsprint shipments as indicative of future changes.[29] Precisely over how many years (z), the trend should be calculated depends upon the pricing horizon of industry executives and should be determined from executive interviews.

(b) The Cost Variable ($\%\Delta C.\ MC_{t-1 \to t}$)

The "$\%\Delta C.\ MC_{t-1 \to t}$" term is designed to reflect shifts in the supply curve for newsprint. If properly measured and if the demand - supply curve elasticities are as assumed, then this term should have a major impact in the estimation of newsprint price changes.

The cost component for any period t is measured as:

$$C.\ MC_t = C.\ PC_t + C.US\ E.\ R.\ C_t + d_t \tag{8}$$

where $C.\ MC_t$ is the Canadian manufacturing costs per ton of newsprint produced (a misnomer as previously indicated) in year t. $C.\ PC_t$ is the Canadian production costs per ton of newsprint produced. It includes salaries and wages, fuel and electricity, materials and supplies costs of newsprint production. It does not include depreciation charges, financial expenses, head office or research and development expenses. $C.\ US\ E.\ R.\ C_t$ is the Canadian - U.S. exchange rate difference

[29] As Chapter VII (pp. 221 to 225) indicates - most of the forecasts of newsprint consumption in the United States which have been made over the last 25 years have been based upon historical trends. Thus, it is likely that individual firms likewise base sales volume estimates, to a large extent, on past trends.

expressed in dollars per ton. d_t, whose value is specified by Equation 6, is used as a proxy for average Canadian newsprint transportation costs per ton.[30]

Note that the production costs per ton are average, not marginal costs. Marginal costs which would be theoretically superior are not available. On the other hand, there is considerable support for the use of average costs, since management surveys show that managers have little concept of marginal costs and deal primarily in averages.[31]

Note further that nowhere in the proposed cost equation is a factor representing such fixed costs as depreciation. Again, such data are not available; however, the evidence reviewed on pricing in Appendix F clearly implies that variable costs are of more importance than fixed costs in pricing decisions.

Included in the cost equation is an exchange rate variable reflecting the difference in value between Canadian and U.S. dollars. Justification for the inclusion of this term is dependent upon the assumption that Canadian rather than American producers control the price of newsprint in

---

[30] A lengthy discussion of price discounting is the subject matter of pages 226 through 242 of Chapter VII. This discussion clearly indicates that price discounting has been relatively uncommon, and that even during such periods, the major component of d_t has been transportation costs. Thus, d_t should be a reasonable proxy for transportation costs.

[31] See for example: R. F. Lanzillotti, "Pricing Objectives in Large Companies", Chapter 37 in S. H. Britt and H. W. Boyd, Jr., Marketing Management and Administrative Action, (N.Y., N.Y.: McGraw Hill, 1963)

the United States.[32] If such is the case, then a decline in the American dollar *vis-a-vis* the Canadian dollar would mean less revenue per ton to the Canadian newsprint producer and would have a similar impact upon him as would a cost increase. Such a change would, of course, have no immediate effect upon American producers, but would offer them some competitive advantage. Thus, the question of who controls the price of newsprint in the United States is an important question to be addressed to industry executives.

Cost changes probably lead price changes to some degree, but since data are available only on a yearly basis, and since price changes are normally made on a quarterly basis, the change in Canadian costs is represented as occurring during the same year as its associated price change.

Canadian producer cost changes, rather than North American producer cost changes, are employed in the New York list price determination equation because Canadian producers manufacture far more newsprint than U.S. producers, because Canadian producers are thought to control the price of newsprint in North America, and because cost information on U.S. newsprint producers is not published.

---

[32] It would be difficult to view Canadian newsprint producers as residual suppliers of newsprint to the United States market, when, on average, over the period 1929 through 1970, Canadian newsprint producers have supplied 72 per cent (and never less than 59 per cent in any one year) of the United States' newsprint requirements.[33]

[33] Canadian Pulp and Paper Association, *Annual Newsprint Supplement - 1970*, (Montreal: Canadian Pulp and Paper Association, 1971), Table 8, p. 5.

(c) The Capacity Variable ($\%\Delta$NA. $Ca_{t \to t+1}$)

Changes in North American newsprint capacity as represented by the term "$\%\Delta$NA. $Ca_{t \to t+1}$" are likely to alter (usually extend) the range of outputs over which the supply curve remains strongly elastic. Under the assumption of a generally elastic supply curve, the effect on price of a capacity increase or decrease is likely to be small, thus coefficient b_3 in Equation 7 is expected to be of little economic or statistical significance, except perhaps during periods of high capacity utilization. Even during periods of high capacity utilization, the effect of an increase in capacity on the list price of newsprint is uncertain since the elongation of the supply curve might be expected to have some downward effect on price, but the increase in capacity might also have the effect of increasing the industry's fixed costs per ton, which would be expected to have an upward influence on prices.

(d) The Capacity Utilization Factor

If the supply curve for newsprint becomes considerably less elastic as production approaches capacity, then shifts in the demand or supply curves or extensions of the supply curve may have somewhat different effects on the price of newsprint at very high levels of capacity utilization than would normally be expected. This concern can be handled by estimating the price determination equation (Equation 7) over appropriate ranges of capacity utilization. The question is then, at what level of capacity utilization is the appropriate breakpoint between the elastic and the inelastic (or less elastic) segments of the supply curve?

One possible answer is that there is no such breakpoint, that the supply curve remains highly elastic, even at high levels of capacity utilization. Another possibility is that such a breakpoint exists at or above (but not below) the 90 per cent capacity utilization level. Rich (1970) writes:

> . . . when the industry moves significantly below 90 per cent of capacity, price weakness appears, as each firm tries to pick up extra sales by special price concessions. Under an oligopoly, this does not mean a price war or across-the-board price cuts, but rather discounts from list price.[34]

The pragmatic approach, and the one which is adopted, is to estimate the coefficients of Equation 7 for each of the following periods:

- 1930 through 1945 (period of low capacity utilization)
- 1922 through 1929 and 1957 through 1971 (periods of medium capacity utilization)
- 1946 through 1956 (period of high capacity utilization)

Graph 3-2 shows the contrast in capacity utilization levels between these periods. It is proposed to estimate the list price equation over the 1930 through 1945 period to determine if there exists a level of capacity utilization where industry profitability is so lacking that firms ruthlessly cut prices in an attempt to survive.

(e) Is There a Kink in the Demand Curve?

The approach to newsprint price estimation which has

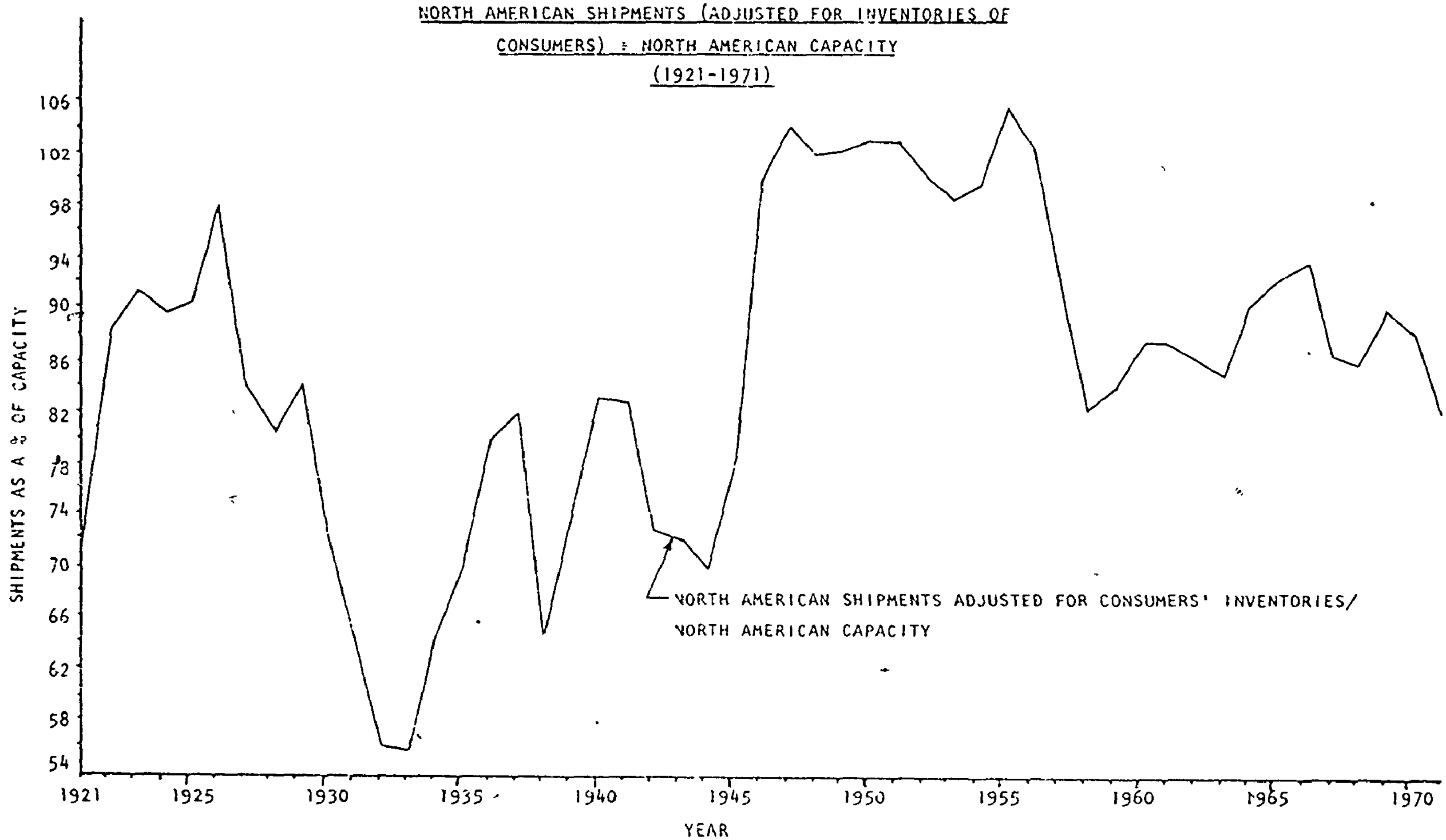
---

[34]Rich, p. 482.

GRAPH 3.2

NORTH AMERICAN SHIPMENTS (ADJUSTED FOR INVENTORIES OF CONSUMERS) ÷ NORTH AMERICAN CAPACITY

(1921-1971)



been proposed in no way refutes the kinked demand curve theory discussed in Appendix F. The kinked demand curve theory, as proposed by Hall and Hitch (1939), was developed to explain why oligopolistic firms avoid frequent price changes. The presence of a kink in the demand curve at low levels of capacity utilization strongly reinforces the assumption of an inelastic demand curve for newsprint. Additionally, it indicates that, in the short term, prices may be insensitive to small cost changes, especially at low operating rates.

This concludes this section on the determinants of industry income statement related variables. Having estimated the list price of newsprint, Equation 5 can be used to determine net Canadian newsprint sales. Since all cost components are exogenously determined, industry profits are then equal to net sales minus total costs.

4. North American Newsprint Capacity

A review of some of the economic theories of business investment and of some of the empirical and survey findings concerning the determinants of business investment are presented as Appendix G of this research.

4.1 The Need for Additional Capacity

(a) The Acceleration Principle

The aim of this section is to develop specific equations of the capacity expansion and contraction process for the North American newsprint industry. The starting point is the reconsideration of the acceleration principle which is discussed in Appendix G. Thus:

$$K = B^{*}X$$

where: K equals the level of capital stock, X equals the level of output and B equals the acceleration constant.

It is, however, desired that the estimating equation explain the level of capacity or the amount of capacity change rather than the level of capital stock. By using capacity instead of capital stock, the above equation is simplified as the acceleration constant will take on the value 1.00. Such a formulation disregards some forms of investment, as for example, replacement expenditures or investments taken on solely for cost reasons and which have no effect upon the industry's capacity. For a discussion of this approach, see Franco Modigliani's comments on Bert Hickman's paper "Capacity, Capacity Utilization and the Acceleration Principle" (1957).

Thus, it follows that:

$$NA.\ Ca = X$$

where NA. Ca is the level of North American newsprint capacity.

(b) Timing

Since the implementation of a decision to expand capacity cannot be instantaneously accomplished, the time element must be considered. Referring to time t as that time at which the decision is made, then, a decision made in time period t will affect the capacity level in some future time period t+θ.

---

[35] For the purposes of this research, the definition of capacity employed is that used by the Canadian Pulp and Paper Association as described in Appendix C, pages C3 through C5 .

(c) Firms Build Ahead of Demand

Chenery (1952) has shown that "if firms seek to minimize the cost of production over time they will build ahead of demand (when there are economies of scale) and will have a normal degree of overcapacity".[36] Along these lines Chenery formulated an equation where the increase in capital stock is proportional to the difference between the amount of capital needed for current output and the optimum degree of utilization of present capital. He showed that the "optimum relation between capacity and output . . . is a function of the economy of scale, the discount rate, the planning period, and the rate of increase in demand".[37]

Chenery's findings can partially be taken into consideration by reformulating the capacity equation as follows:

$$NA.\ Ca^{d}_{t+\theta} = X^{e}_{t+\theta+z},$$

where $NA.\ Ca^{d}_{t+\theta}$ is the desired level of North American capacity for year $t+\theta$, and $X^{e}_{t+\theta+z}$ is the expected required level of newsprint output in North America in year $t+\theta+z$. If, as Chenery says, firms build ahead of demand, the value of z will be greater than zero.

(d) Capacity Contraction

This latest formulation does not, however, allow for the chief discrepancy between the simple accelerator assumption and observed behavior, which is that capacity or capital cannot

---

[36] Hollis B. Chenery, "Overcapacity and the Acceleration Principle", Review of Economics and Statistics. 20 (January, 1952): 14 and 15.

[37] *Ibid.*, p. 1.

be contracted as rapidly as it can expand. Chenery says, "In each industry there is a technological limit to the rate at which capital is retired which depends on its durability, rate of obsolescence, and so forth".[38] This problem can easily be overcome by the use of the following formulation:

$$NA.\ Ca_{t+\theta} - NA.\ Ca_{t+\theta-1} = b_1(NA.\ Ca^d_{t+\theta} - NA.\ Ca_{t+\theta-1})$$

$$NA.\ Ca^d_{t+\theta} = X^e_{t+\theta+z}$$

and when $NA.\ Ca^d_{t+\theta} > NA.\ Ca_{t+\theta-1}$, b_1 takes on a value approaching an upper limit of 1.00. But when $NA.\ Ca^d_{t+\theta} <$ $NA.\ Ca_{t+\theta-1}$, b_1 takes on a low positive value.

In this formulation, θ can take on a value greater than 1, thus permitting the variable $NA.\ Ca_{t+\theta-1}$ to refer to some future as yet unknown level of capacity. To handle this problem, $NA.\ Ca_{t+\theta-1}$ is defined as equal to existing North American newsprint capacity plus the capacity of committed projects.

Most researchers studying the investment question have used models similar to the equation just presented. Most formulations have also included other variables, as for example, a profit expectation term or a cost of funds term.

(e) The Expected Level of Output

What then is the expected required level of output in period t+θ+z? As Eisner (1964) indicates, "it {is} important to recognize that the response of capital stock to changes in demand cannot be expected to be immediate. The business decision-maker must judge first the extent to which

---

[38] Ibid., p. 12.

any experienced change in demand is likely to be permanent or long run and, hence, influence his expectation of future demand. He may then be expected to react gradually over time to the changed expectation of future demand brought about by the experienced change in past demand. It should be appropriate, therefore, to attempt to explain investment in terms of a sufficient number of lagged sales variables".[39] In that research, Eisner used 7 lagged sales variables (years).

In the proposed model then, expected output is a function of historical North American newsprint shipments, as follows:

$$X^e_{t+\theta+z} = a_1(NA.\ S_t) + a_2(\theta+z)(NA.\ S_{trend})$$

where NA. S_t is the volume of North American newsprint shipments in year t, and NA. S_{trend} is the trend in North American newsprint shipments. The specific form of the newsprint shipment trend variable will be determined on the basis of executive interviews.

4.2 Expected Profitability

At this stage, the capacity change formulation is still basically a modified form of the acceleration principle. The level of expected future profits is another possible explanatory variable which may enhance or constrain the operation of this principle.

Unfortunately, it has been rather well established that present or past profits are poor indicators of expected future

---

[39] R. Eisner, "Capital Expenditures, Profits, and the Acceleration Principle", in Models of Income Determination. Studies in Income and Wealth, 28, (Princeton: Princeton Univ. Press, 1964), pp. 139-140.

profits. For example, in a study by Grunfeld (1960) he concludes that his "results do not confirm the hypothesis that profits are a good measure of those expected profits that will tend to induce investment".[40] Similarly, Jorgenson (1971) concludes "that where internal finance variables appear as significant determinants of desired capital, they represent the level of output".[41]

Possibly a better proxy for expected future profits is the stock market value of the firms within this industry. This approach can be justified on the grounds that stock market participants have as much information about future earnings as the managers of the firms themselves. In addition, participants in the stock market have strong economic motives to make accurate forecasts of future earnings. Results of studies by Grunfeld (1960) and Resek (1966) give indications that this approach may be fruitful. Unfortunately, most newsprint producers also manufacture many other wood-derived products such as timber, plywood, panelling, pulps and other papers and paperboards. For example, a study made during 1971 of Canada's largest forest products companies by Paul J. Hill,[42] a research analyst with Burns Bros. and Denton, indicated that

---

[40] Y. Grunfeld, "The Determinants of Corporate Investment", in A.C. Harberger, ed., The Demand for Durable Goods, (Chicago: University of Chicago Press, 1960), p. 219.

[41] D.W. Jorgenson, "Econometric Studies of Investment Behavior: A Survey", Journal of Economic Literature. 9 (December 1971): 1133.

[42] Paul J. Hill, "Forest Products Industry - Progress Report", Burns Bros. and Denton research report, June 1971, p. 20.

newsprint represented only 24 per cent of the sales of Canada's largest newsprint producer at the time, MacMillan Bloedel. Newsprint sales accounted for 73 per cent of the Price Company's sales, 50 per cent of Abitibi's sales, 32 per cent of Consolidated-Bathurst's sales, 25 per cent of Domtar's sales, 62 per cent of Great Lakes Paper's sales, and 23 per cent of B.C. Forest Products' sales. Thus, no suitable index of newsprint manufacturers' stock prices exists nor can be determined.

4.3 Funds Cost and Availability

An indication of the cost and availability of external funds might be included in the capacity change formulation. It is not included because survey findings discussed in Appendix G suggest that inclusion of such a term is unlikely to have significant effects. The inability to measure the availability of funds for newsprint expansion purposes is discussed in Chapter IV, page 130.

4.4 The Proposed Capacity Change Formulation

The complete formulation of the proposed investment equation then becomes:

$$\text{NA. Ca}_{t+\theta} - \text{NA. Ca}_{t+\theta-1} = b_1(\text{NA. Ca}^d_{t+\theta} - \text{NA. Ca}_{t+\theta-1}) \tag{9}$$

where $\text{NA. Ca}^d_{t+\theta} = X^e_{t+\theta+z}$ (10)

and $X^e_{t+\theta+z} = a_1(\text{NA. S}_t) + a_2(\theta+z)(\text{NA. S}_{trend})$ (11)

and $b_1 \rightarrow 1.00$ when $\text{NA. Ca}^d_{t+\theta} > \text{NA. Ca}_{t+\theta-1}$

and $b_1 \rightarrow 0.00$ when $\text{NA. Ca}^d_{t+\theta} < \text{NA. Ca}_{t+\theta-1}$

4.5 The Effect of Technology on Capacity

Nowhere in this formulation has an allowance been made for capacity changes that result from technological change. If the technological change is one of plant and equipment modifications, then investment can take place and little or no changes may occur in firm or industry capacity. Some technological changes, on the other hand, may be made for the express purpose of gradually increasing capacity. Neither of these forms of within-firm modification are of much concern to our formulation. However, if a technological change results in a major relocation of the industry because of manufacturing or other economies (as was the case once ways were found of making Southern pine into newsprint), then capacity may expand in these new locations for cost reasons alone, that is, without the expected industry need for new capacity. In this case, the capacity of one region may be declining while that of another region is expanding. The model proposed has no way of handling this possibility. Such technological changes will pose fewer problems, however, if, as proposed capacity changes are extended for North America as a whole, then technological change will primarily dictate where new capacity will locate when it is required.

4.6 Decision to Implementation - Time Considerations

There is one last problem to be mentioned. That problem is the determination of the time lag structure of the proposed formulation and in particular the values of θ and z.

θ, it will be recalled, should measure the time from when the decision was made to the time when the new capacity was actually realized. Such a time lag is expected to be in the order of 2 or 3 years in the case of new mill capacity. The problem is that capacity can and has been increased in several other ways which require far shorter time from decision to implementation. Since this problem is not easily resolvable, as a starting point, a 3 year capacity planning horizon will be employed in the preliminary model formulation regardless of the means used to alter capacity.

The value of z, which reflects management's decision to build ahead of demand, will be approximated from field survey information.

This then, concludes the presentation of the preliminary model of the newsprint industry. The origin (whether Canadian or American) of North American newsprint capacity changes will not be empirically investigated in this research. A thorough discussion of the factors affecting the location of newsprint operations in North America over the period 1920 through 1970 is presented as part of Appendix B of this research.

Executive survey findings are presented in the following chapter.

CHAPTER IV. MANAGEMENT SURVEY RESULTS

1. Introduction

Questions asked, purposes of the questions, use of responses, selection of firms and individuals interviewed are the subjects of Appendix D and that section of Chapter II entitled "Executive Interviews - Purpose of Interviews and Executive Selection Criteria".

Throughout this chapter, sentences or paragraphs enclosed in large brackets (i.e.{}) deal with this author's perceptions, conclusions or conjectures. These brackets are used to clearly distinguish author's perceptions from management's conclusions. In some instances, further elaboration of the purpose of one or a series of questions is included in the presentation.

The presentation of management survey results begins with a description of management's perceptions of the industry's performance (past, present and future) and the factors which management feels have precipitated that performance. This is followed by a discussion of company practices (in particular, newsprint pricing and capacity expansion practices) and executive perceptions of such industry practices. The chapter continues with a summary discussion of the similarities and differences between executive views and the preliminary model specification. A discussion of the veracity of the first 3 hypotheses of this research concludes this chapter.

2. Performance

This section deals with responses to questions 3 through 7, as listed in Appendix D of this research.

2.1 Historical Performance Rating and Criteria

(a) Financial Performance

Without exception, the financial performance of the Canadian newsprint industry was judged unsatisfactory over the last 10 to 15 years. All interviewees downgraded the industry's financial performance as measured chiefly by return after taxes on investment. The investment value referred to most often was the depreciated costs of assets.

{For 2 reasons, it is significant that the industry's managers view the industry's financial performance as less than satisfactory. First, it supports the contention and evidence presented in Chapter I that the industry's annual performance, with few exceptions, has been unsatisfactory throughout the time since its inception in this country. Thus, it further indicates the desirability of such research. Second, management's presumed desire to improve the industry's performance indicates a willingness on their part to institute change, and thus an openness to suggestions for improvement.}

(b) Replacement of Equipment

Some respondants felt that the industry, especially the eastern Canadian newsprint industry, had done a poor, at most fair, job of replacing worn-out equipment. As a result, eastern Canadian newsprint producers were tending to become less cost competitive, although there were other factors (e.g. the trends in wood and transportation costs) which were partially offsetting this effect on the industry's competitiveness.

(c) Social Needs

Only 1 manager addressed the industry's performance with respect to meeting the social needs of the community. In particular, he thought that the industry's response to meeting the industry's pollution problems was only fair but defensible, since any firm making pollution control expenditures not made by other firms would be put at a competitive disadvantage.

(d) Obligations to Customers

Two (2) respondants mentioned that the industry had done a rather good job in meeting its obligations to its customers.

2.2 Factors Responsible for the Poor Financial Performance of the Industry

(a) Overcapacity

Market demand

Overcapacity was the major factor identified. This overcapacity was generally attributed to the industry's inability to properly judge market demand, which in turn was the result of various firms' inability to make proper market forecasts, and to read turnarounds in the market.

Government incentive programs

Management tended to be critical of government incentive programs, the purpose of which was to encourage capacity expansion and thus create additional employment opportunities and tax revenues.

World-wide consultants

One (1) executive was critical of forest products consultants who advocated capacity increases on the basis of the effect such capacity would have upon a nation's balance of payments and employment, rather than on the basis of normally considered economies of the proposed project.

Provincial government pressures

A number of executives stated that provincial government pressures had, at times, been brought to bear on pulp and paper firms to more fully utilize wood resources on their leased lands.

The influences of government incentive programs, world-wide consultants and provincial government pressures have tended to disregard the need for additional capacity. Most executives felt, however, that most of the newsprint capacity which was added over the last 15 years in Canada would have been initiated with or without such political influences, but that these influences have affected the timing of such capacity expansions and thus, the health of this industry. A minority of executives felt that such political influences have significantly added to the magnitude of the overcapacity problem.

(b) Prior Management Philosophy

Market share objectives

Prior management philosophy was another factor mentioned by many executives which adversely affected the industry's performance. Many executives are under the impression that newsprint capacity was expanded in the past so as to fulfill market share objectives. Overcapacity was the natural outgrowth of the tendencies of individual firms to set unrealistic sales and growth targets. When 1 firm announced its intention to expand its capacity, this was taken as a signal that it intended to increase its market share. In order to protect their market shares, other firms felt it necessary to expand also.

Return on investment

Many executives felt that only recently has there been a much greater utilization of strict financial criteria (such as the discounted cash flow criteria) as the primary basis upon which to judge the acceptability of new capacity.

(c) Foreign Exchange Rates

Most managers felt that the recent performance of the Canadian newsprint industry was adversely affected by the change in foreign exchange rates with the United States which occurred in 1962 and in 1970. The dramatic fall in the value of the Canadian dollar relative to the U.S. dollar, which occurred between 1960 and 1962, yielded Canadian firms large exchange profits, and thus, a considerable competitive edge over their U.S. competitors. From 1962 to 1970, Canadian producers, shielded by the exchange umbrella, enjoyed an artificial prosperity. This artificial prosperity clouded the decline of the cost competitive position of the Canadian newsprint industry. When, in 1970, the Canadian dollar moved back into line with the U.S. dollar, the Canadian industry lost not only its exchange profits, but also much of its ability to compete on a price basis with U.S. manufacturers. The result was the very near collapse of several firms in newsprint and other pulp and paper products.

{It is clear that those interviewed believed that excess industry newsprint capacity was the major factor, under the industry's control, which had had a major negative impact upon the industry's profitability. Poor forecasts, management philosophy, and government incentives were simply factors leading the industry to overexpand. The industry, of course, has virtually no control over exchange rates. Contrary to Hypothesis 2 of this research, newsprint pricing was not identified as a major factor adversely affecting the industry's performance. As will be discussed later, newsprint pricing was obviously a problem; however, it was felt by those interviewed that newsprint pricing would not have posed any serious problems had it not been for the presence of excess industry capacity.}

2.3 Executive Ratings of their Own Firm's Performance

(a) Rating Comparison

All managers rated the performance of their own firm in comparison to the performance of other firms in the Canadian newsprint industry.

(b) Performance Ratings

Few executives rated their own firm's performance as considerably better or worse than the performance of other firms in the industry. Executives generally felt that their performance should be judged only on the basis of decisions over which they had control. Although executives viewed excess capacity and newsprint pricing as under the control of the industry collectively, they felt they should be judged only in regards to their own capacity and pricing decisions. Moreover, although industry management views both industry capacity and newsprint price as under their collective control, the degree of control is seen as differing significantly. Whereas industry capacity can be altered by the actions of any one of the industry's members, those interviewed felt that the price of newsprint (in particular, the list price) would only be altered by the collective (not collusive) action of several of the industry's member firms.

All executives felt that factors such as the exchange rate, the price of newsprint, and industry excess capacity affect each firm in much the same way and dominate other factors in dictating an individual firm's financial performance.

In rating their own performance then, executives rated their firm's performance with respect to decisions over which the firm has substantial control, even though such decisions may have had only a small impact on the firm's overall performance. Often-mentioned firm strengths which favorably affected the firm's financial performance were: (1) forecasting ability and, in particular, the ability to forecast changes in short-term and long-term newsprint purchases or consumption, and (2) firm discipline as characterized chiefly by an ability to avoid being caught up in the capacity expansion bandwagon effect, and by adherence to list prices or being one of the last firms to price discount during slack market conditions.

2.4 Future Industry Performance

(a) Locations for New Capacity Scarce

Most executives were hopeful, if not confident, that the newsprint industry will perform financially more satisfactorily in the future as compared to the past. Their hopefulness is based primarily on the rather widely adopted belief that there remain very few good sites for a new pulp or pulp and paper mill in the World. They see the main constraint as the future availability of economically competitive fiber supplies. There are some sites available (e.g. central British Columbia) where wood supplies are abundant; however, it is the opinion of most executives interviewed that a mill located in such an area could produce newsprint only at a considerably higher cost per ton than present industry facilities. Thus, there would be much reluctance on the part of those interviewed to establish new facilities in such locations.

(b) Better Management

Most executives felt that there has been a significant upgrading in management understanding, skills and decision-making capabilities. The primary upgrading vehicle has been the appointment to key executive positions of experienced managers with strong financial backgrounds. Such action has resulted in stricter firm adherence to return on investment criteria for decision purposes.

(c) Financial Constraints on New Capacity

Most executives felt that further capacity expansion in the newsprint field will be constrained by the sheer magnitude of the financial investment required.

(d) Technology

Many differing views were expressed about the magnitudes of capacity increases which can be achieved through the improvements of existing equipment. A major question in this regard is how quickly paper machine technological improvements will be forthcoming and how quickly such improvements will be adopted.

2.5 Summary of Factors which Executives Believed were Responsible for the Industry's Performance

By far the most frequently mentioned factor affecting the industry's financial performance (past, present or future) was the amount of excess newsprint capacity (or related variables such as the level of capacity utilization).

{It is highly significant that seldom were pricing practices, sales promotion activities or other marketing-related functions named as important determinants of industry performance. Such findings imply that producers have very little effect on the total demand for newsprint and that the price of newsprint, while producer-determined, is invariably linked to the magnitude of the industry's excess capacity as well as to costs. In these regards, executive views support the preliminary model specification presented in the previous chapter.}

The exchange rate was the only other major factor, other than factors directly linked by the executives themselves to the level of industry excess capacity, viewed as having a significant impact upon the industry's performance. {The importance of exchange rates is understandable since a change in exchange rates can significantly alter the competitive position of 1 nation's newsprint industry with respect to that of other nations.}

Factors mentioned as directly influencing the capacity expansion decision were numerous and, for the most part, unaccounted for in the preliminary industry model. Factors mentioned were those which executives felt tended to induce the industry to overexpand. The primary motive for expanding capacity was to fulfill an expected need for additional capacity in order to service increases in the demand for newsprint. This is consistent with our preliminary model capacity change formulation.

Factors unaccounted for in our preliminary model, such as management philosophy, government pressures and government incentive programs are undoubtedly important in inducing the industry to overexpand; unfortunately, quantification of such factors, which would be necessary if they were to be taken into account in any mathematical model of the industry, would be a tremendous, if not impossible, task and beyond the scope of this research.

3. Company Practices and other Management Perceptions

Industry Income Statement

The presentation of executive responses follows approximately the same order as the presentation of the preliminary model developed in the previous chapter.

3.1 The Demand for Newsprint

Do executives believe the consumption of newsprint to be price sensitive? Of those interviewed, 1 manager felt that newsprint consumption was price elastic, a couple did not know and the remainder felt that the consumption of newsprint was highly price inelastic. { These views strongly support previous arguments that production and consumption are primarily demand determined. }

3.2 Canadian Newsprint Shipments

(a) Shipments to the Domestic Market

All executives interviewed expressed no doubt whatsoever that Canadian producers would continue to supply virtually all of Canada's domestic newsprint requirements as they had done in the past.

(b) Shipments to the United States

All executives felt that U.S. newsprint producers would continue to operate their mills at or above rated full capacity for the foreseeable future. They have been operating at full capacity since 1969.

Moreover, they felt that U.S. producers would operate full out even if there was a major recession in the United

States. Canadian producers would be forced to accept almost all of the slack. Such a situation was attributed to U.S. publishers' preference for U.S. manufactured newsprint. This preference was considered nationalistic in origin as opposed to relating to quality or service considerations.

Those firms which made estimates of Canadian newsprint shipments to the United States made them on the assumption that American producers would operate at full capacity, that Scandinavian producers would ship some small amount to the United States (somewhere in the order of 400 thousand tons annually) and that Canadian manufacturers would pick up the difference between those shipments and total U.S. newsprint consumption.

(c) Shipments to Overseas Countries

Of the firms interviewed, only 1, MacMillan Bloedel, sells a significant portion of its newsprint output in Overseas countries.

When estimating the level of Canadian newsprint shipments to Overseas markets, MacMillan Bloedel sums the individual nation market requirements for newsprint for those countries in which Canadian firms are capable of competing, and then divides this total between Canadian and Scandinavian interests on the basis of the historical ability of each nation to compete in that market. Adjustments to such estimates would then be made which would take into account special factors.

Overseas markets have traditionally been regarded as swing tonnage markets. That is, newsprint producers attempt to sell the bulk of their potential output to U.S. and Canadian publishers under long-term contracts at acceptable profit margins; the excess they try to sell as spot tonnage in Overseas countries at the going price, provided it is sufficiently high to cover variable costs. Such policies have often led to rather dramatic changes in newsprint prices in some Overseas countries as more or less tonnage seeks a market in those countries. Producers such as MacMillan Bloedel and Price are attempting to change the swing tonnage philosophy of some of their competitors as they have made large commitments, often under long-term contract, with numerous Overseas publishers.

{Executive views that U.S. newsprint producers will be able to operate at full capacity regardless of the economic conditions are completely at odds with historical occurrences, presented in the previous chapter, which have been characterized by a tendency for operating rates to equalize in Canada and the United States.}

3.3 Newsprint Pricing

(a) Contract Pricing

The long-term contracts of Abitibi, Consolidated-Bathurst and MacMillan Bloedel state that the price to be paid per ton of newsprint is to be the price as announced by that firm from time to time.

The contracted price of Consolidated-Bathurst and

MacMillan Bloedel can be altered when desired by the respective firm; Abitibi must give 3 months notice to its customers of a price change.

According to those interviewed, Price and Canadian International Paper are also free to dictate at any time the list price of their newsprint. All other Canadian producers tie the price of their product to the announced price of 1 or more of these 5 largest Canadian newsprint producers.

(b) Price Policies

Interviewed executives of Abitibi, Consolidated-Bathurst and MacMillan Bloedel, when asked if their firm had an explicit pricing policy (Question 21, Appendix D), replied that their firms did not have such policies.

Domtar's officials said that they had a general pricing policy which was to match the announced prices of the leading eastern Canadian newsprint producers. Domtar officials stated that prices were set so as to protect their market share, where market share refers to its share of in place capacity. During periods of industry price discounting, officials stated that their pricing policy generally meant that " they wouldn't be first to discount, but they wouldn't be far behind either ".

(c) Executive Perceptions of their Firm's Price Discounting Behavior

All executives interviewed admitted that their firms had discounted prices at some time in the past.

All executives were strongly opposed to discounting as an industry practice. Most executives interviewed believed that the total market size is unaffected by discounting. They felt that no major newsprint manufacturer could possibly acquire sufficient new contracts which would more than offset the drop in newsprint price occurring as a result of initial and retaliatory discounting.

No executive felt that his firm had ever been the first firm in the industry to discount prices in the past, but only matched discounts offered to their customers by their competitors. All admitted that their firm had offered discounts to new customers in order to recoup tonnage lost to other discounting firms.

Eastern producers said that they had tended to discount unilaterally when it was deemed necessary. MacMillan Bloedel, to the recollections of its officers, has never had a standing order policy to meet the competition's price. MacMillan Bloedel has discounted, but only on a situation-to-situation basis.

(d) Market Price Control in the Domestic Market

Most individuals interviewed felt that the North American market for newsprint could be considered independently from Overseas markets. Who then dictates the price of newsprint in the North American market? All individuals interviewed agreed that Canadian manufacturers had sole control over the price of newsprint in Canada.

(e) Market Price Control in the United States

There were a number of different opinions expressed as to who determines the price of newsprint in the United

States. One (1) executive felt that the Canadians, the Americans and the Scandinavians each substantially influenced the U.S. price of newsprint. All other executives interviewed felt that the Scandinavians played a minor role, if indeed they played any role at all, in determining the price of newsprint in the United States. Slightly more than half the interviewees thought that Canadian manufacturers were the sole major influence on the U.S. price of newsprint. Others felt that the Canadians controlled the price in all parts of the United States except in the South, where southern U.S. manufacturers now control the price. One individual believed that the Canadians control the price of newsprint in the U.S. market in times of short supply, that the Americans control the price during periods of significant overcapacity, and that at all other times both groups exert major influence on the price.

{It seems somewhat confusing that whereas those interviewed felt that Canadian manufacturers were the major controllers of the price of newsprint in the U.S. market, these same executives viewed Canadian producers as marginal suppliers of newsprint to the United States market. The question arises that if Canadian producers can control the price, why can they not exert more control over the volume of Canadian shipments? This question was posed to several of the executives interviewed, but few offered an explanation. One (1) executive felt that American manufacturers were in a much preferred position to pick up spot tonnage sales.}

(f) Market Price Control in the Overseas Countries

The consensus among those interviewed was that the Scandinavians controlled the price in most of Europe and in many other Overseas countries. In some countries, Canadians and Scandinavians together controlled the price (although one gathered the impression that the Scandinavians generally led price increases whereas Canadian manufacturers initiated price drops (generally through price discounting)). A number of executives felt that Canadian producers tended to be their own worst enemies, not U.S. or Scandinavian producers.

It should be noted that those interviewed felt that control of the price of newsprint in any of the World's major markets lies with newsprint producers and not with purchasers or with any regulating agency.

(g) Conditions under which Prices Increase in North America

Cost increases prime motivator

The executives interviewed offered many views as to when the price of newsprint was likely to be increased. All executives interviewed felt that the major factor affecting the price of newsprint was the cost of producing that newsprint; however, all executives felt that the relationship between newsprint cost and newsprint price was modified by firm or situational variables, such as the level of industry capacity utilization and/or industry profitability.

The effect of industry profitability

Summing the opinions of those interviewed, the price of newsprint can be expected to increase under the following conditions of industry profitability:

- When industry profitability is very low and a number of mills are operating in the red, any cost changes will be fully reflected by price changes. If this were not to occur, then a very large number of firms would be forced out of business, an event neither producers nor customers would relish. Under such conditions, both publishers and producers have vested interests in seeing the price of newsprint increase.

Should costs decrease during a period of such poor profitability, competition for tonnage can be expected to be so severe as to tend to bring prices down an equal amount.

Thus, under such conditions, margins can be expected to remain relatively stable and very small, at least until the demand and supply come closer into line.

- If industry profitability is above the intolerable level, then most executives felt that a list price increase announced by any one of them was unlikely to be followed by the others, unless the demand and supply of newsprint were in reasonable balance.

Capacity utilization effects

Most executives interviewed felt that a very large portion of the cost increases could be passed on to customers when the industry is operating in the 88 to 90 per cent level of capacity utilization. The lower the industry operating level, the lower the proportion of cost increases that can be passed along. Between approximately 88 and 93 per cent capacity utilization, executives felt that price increases can be made which fully cover any cost increases. Above the 93 per cent capacity utilization level, price increases can be made over and above any cost increases. At such rates of capacity utilization, firms will gradually increase the price of newsprint until they are making what they consider to be a fair return on their net assets employed. Under these conditions, a firm can normally justify an incremental addition to its newsprint capacity. However, before major capacity expansion would be undertaken by any particular firm, the price of newsprint would once again have to rise to that level (or show clear indications of doing so) where such additional capacity could be justified on a DCF return on investment basis.

Maximum margins

In response to the question (Question 27, Appendix D) concerning whether there existed a price, margin or return above which executives would be reluctant to increase the price, margin or return, all executives interviewed felt that there was a margin which should not be exceeded. No executive was prepared to say the precise amount of this margin, as no producers had faced this situation for many years.

Generally, however, the executives of those firms interviewed did not wish to make "excessive profits" and thus risk publishers' charges of gouging. Their major concern was that the powerful U.S. press could sway public opinion against the producers to such a point that governments would become involved in the situation either through the control of prices or profits or by offering incentives to producers to expand production in the United States.

{ The conditions under which the price of newsprint increases in North America, as visualized by some of Canada's leading newsprint authorities, is a complex dynamic process. Thus, it will be very difficult to capture or prove mathematically. The nature of the process, as described in the preceeding pages, is, however, both logical and consistent, and thus probably accurately portrays the set of circumstances under which newsprint prices have increased in the past. }

(h) Conditions under which Prices Increase in Overseas Countries

Factors underlying price increases in Overseas countries are not strictly within the scope of this research. In countries where Canadians control the price of newsprint, the conditions under which the price of newsprint increases are the same as previously described for North America. No information or views were sought about the conditions under which the price of newsprint increases in countries where the Scandinavian producers control newsprint prices.

Generally, however, when World newsprint supply becomes tight, mill nets for Canadian firms on Overseas sales are often higher than mill nets on North American sales. Mill nets to Canadian firms on U.S. destined tonnage have generally exceeded those mill nets on Overseas shipments, in times of excess World newsprint capacity.

(i) Price Leadership

The major distinction identified by those interviewed between price leaders and price followers was newsprint facility size. Some, though not all, of the large firms interviewed felt that they had a responsibility to take on a price leadership role.

It is significant that those interviewed felt firm size (as measured by the amount of newsprint capacity) was the key determinant of price leadership, since newsprint capacity was also the major factor in the selection of firms for interview purposes (i.e. 3 out of Canada's 5 largest newsprint producers were interviewed). Here then, is additional evidence of the validity of the pricing process described for the whole industry, despite the small sample size (i.e. 4 firms interviewed out of 22 Canadian newsprint producers).

(j) Conditions under which Price Discounting Develops in North America

Merely a reflection of demand and supply

Two (2) different concepts of the conditions under which price discounting has occurred were voiced. A minority of executives felt that price discounting was merely a reflection of a supply - demand imbalance and that the lower the industry operating rate, the more discounting was likely to occur.

Overexpansion by new entrants

The majority of executives felt that discounting was not an inevitable function of the supply - demand situation.

They felt discounting started when newsprint capacity was overexpanded by an independent (i.e. not publisher controlled) new entrant to the industry. Such a producer coming on stream in a slack market would be unable to sell a significant portion of his tonnage unless he resorted to a discount strategy.

While strongly criticizing the initial management decision of the new entrant to enter newsprint manufacture at such an inopportune time (i.e. when supply and demand were not in balance), all executives agreed that the new entrant, having completed his mill, has had little choice except to discount when faced with slack market conditions.

These executives felt that had a large existing newsprint manufacturer expanded during a slack market, that rather than discounting, he would have shut down his least efficient mill and would have waited for demand to strengthen before reoffering such tonnage for sale.

It was generally felt that a firm which was forced to discount in order to buy its way into the market, would offer such discounts to very large publishers located close to the new mill; thus some of the discounting cost could be offset by savings in transportation costs. The likely result was that the discounter would take large tonnages of newsprint away from 1 or 2 existing industry members, as the discounter would be discounting in what traditionally had been considered their home market. After losing some tonnage and watching his (their) operating rate(s) decline as compared to the rest of the industry, the affected existing member(s) would start to match the discounter's price. In some cases, the affected existing member(s) would also begin to discount in other markets in order to recoup lost tonnage. The process continues until almost all industry members are discounting to some degree for one reason or another.

{If one accepts the new entrant discounting concept, then discounting from the list price in this industry is not, in economic terms, just a description of price adjustment that one would normally expect to see take place in a period of demand - supply imbalance; for, if an existing member firm were to overexpand capacity during a slack market, no price discounting would be expected to occur.}

When is the demand and supply in balance?

If discounting has been prevalent in the market, then most executives felt that such discounting would be eliminated from new contracts as the industry operating rate rose from 85 to 90 per cent.

All managers thought that there would be little need for discounting, either by a new entrant or an existing member, if the industry operating rate was above the 90 per cent level.

Contract lengths

Except in the case of the initial discounter who is buying his way into the market, large existing firms meeting the discounts of other firms have been reluctant to sign long-term contracts with publishers on a discount basis. Thus, when discounting is prevalent, contract lengths tend to shorten appreciably. Often, discount contracts are of the 2 to 3 year variety; whereas, during periods of tight supply, contracts may be negotiated from 5 to 10 years.

(k) Conditions under which Price Discounting Develops in Overseas Countries

Discounting tends to be particularly acute in Overseas countries, as discounting by large existing newsprint producers would normally be effected in markets other than in their home market. Overseas countries are thus often the center of discounting activities, as few Canadian manufacturers consider Overseas countries as their home markets and look to them as swing tonnage markets. This, as has previously been mentioned, is not the case with MacMillan Bloedel or Price.

{The description of executive views of the process of and circumstances surrounding the price discounting of newsprint is included here primarily for descriptive completeness. Since data do not exist on discounting (nor on any possible proxy, such as contract length), this phenomenon cannot be taken into consideration explicitly in our mathematical model of the newsprint industry.}

{Most of the views expressed on list price changes are consistent with the mathematical description proposed in the preliminary model chapter, although that model did not specifically consider the effect of differing levels of industry profitability.}

4. Company Practices and other Management Perceptions Industry Capacity

4.1 The Decision to Expand

(a) Firm Recognition of Need for Additional Capacity

Demand and supply in balance

Present firm demand and supply of newsprint must be in balance before any of those interviewed would consider expanding.

Sales forecasts trigger expansion proposals

When supply is tight, a number of firms will initiate capacity expansion proposals. In all firms interviewed, the need for new capacity is made apparent to management by sales personnel. Often, the first indication that additional capacity will be required occurs when marketing, sales or planning managers work up their annual budgets and 1, 2 or 5 year plans.

Manufacturing and engineering consulted

Given that additional newsprint capacity will be required to meet sales forecasts, manufacturing is then consulted to determine how such additional capacity might be acquired.

Often, manufacturing will determine that the capacity increase proposed can be achieved through the speeding up of existing equipment. As one manager pointed out, however, this is not to say that all firms will necessarily speed up existing machinery before undertaking any major (e.g. new mill) capacity increase. If, for example, a firm is operating at full capacity, it might be reluctant to lose sales and profits over the period it would have to be shut down in order to achieve the equipment modifications necessary for machine speed up. In such an instance, if management felt that market conditions were favorable, it might proceed directly with the construction of a new mill.

Confirmation of initial sales estimates

If the need for major new capacity is apparent, salesmen will poll their customers to determine how much additional paper they require and would be willing to buy from their firm.

Capital cost estimate

Once a market seems assured for a sizable chunk of the proposed new capacity, then a capital cost estimate is worked up for the proposed facility based upon preliminary engineering estimates. A feasible start up date is also determined.

Industry newsprint consumption forecasts

Firms expanding want to be certain that they will be able to sell a large percentage of the output of the proposed mill at the time the mill's output is ready for marketing. Management realizes that this will be the case only if industry demand and supply are in reasonable balance at the time the new capacity comes on stream. Thus, in any proposal, 1 or more long-term forecasts of newsprint consumption are made. The building block of all consumption forecasts is the forecast of newsprint consumption in the United States.

Those firms interviewed make their own forecasts of U.S. newsprint consumption, based upon historical trends or determined on the historical relation between consumption and aggregate economic variables such as population, disposable income and/or gross national product. Such long-term projections are then compared with the consumption projections of such groups as the Canadian Pulp and Paper Association and FAO.

Some firms additionally hire consultants to estimate future consumption levels. The desire for objective forecasts is what prompts the hiring of consultants. Objectivity is essential in the eyes of some executives when making assessments of the effects on newsprint consumption of future, as yet unused or undeveloped methods of communication.

Some of those firms interviewed also make consumption forecasts for major Overseas countries.

{An individual firm's assessment of the industry's need for new capacity appears affected to some degree by the firm's "industry" concept. Firms selling predominantly in the United States consider North American customers and producers as the industry, whereas, firms with large Overseas commitments take a more global view of the industry.}

Industry capacity forecasts

The firm considering expansion then makes estimates of future newsprint capacity availability in North America and Overseas countries. Such capacity projections usually cover the next 3 to 4 years, taking into consideration new capacity under construction and any other announced capacity additions not under construction, but which are likely to proceed as planned. Most firms use the capacity projections of the Canadian Pulp and Paper Association and modify them as they see fit.

If industry newsprint demand and supply are expected to remain in reasonable balance for some years to come, then operating cost and newsprint price forecasts will be developed.

(b) Profitability Estimation

<u>Operating cost estimates</u>

Operating cost estimates for the proposed capacity addition are made for the year in which the new capacity will come on stream and are generally made on the assumption that about 90 per cent of added capacity will be sold.

<u>Price forecasts</u>

The price forecast is regarded by executives interviewed, as by far the most difficult and uncertain forecast. Moreover, it is regarded as the most critical factor in a project's success. Several approaches to price forecasting have been used by the firms interviewed.

<u>Minimum price determination and assessment based upon actual projected costs of new mill.</u> Having determined detailed cost predictions for the proposed new capacity at the time the new capacity is expected to come on stream, historical or anticipated cost trends are then applied to this cost base to determine future production and distribution costs. The exchange rate is often ignored here. By applying a required minimum hurdle rate of return to these cost estimates, a minimum price at start up and a minimum price trend can be determined. Top level executives must then make an assessment of

the chances that newsprint prices will achieve these minimum required levels.

Minimum price determination and assessment based upon projected costs for a typical new mill. One firm has used the approach of modeling the economics of a typical new mill and thus determining at specified rates of return, the price levels to which newsprint prices would have to rise in order to justify such new capacity. The costs of the typical new mill would not necessarily nor normally be equal to the costs of the particular new mill under consideration. Having determined the industry price level and costs for the proposed new mill, the firm then applies its own minimum hurdle rate of return in order to judge the merits of the proposed expansion.

{MacMillan Bloedel, which uses this approach, was the only firm interviewed to explicitly incorporate in its decision analyses, situations facing its competitors (i.e. the economics of a typical new mill) and their decision practices and policies (i.e. determining the price at specified rates of return where one can then utilize rates of return required by competitors).}

Sales and marketing executives' forecast. Another approach is to have experienced sales and marketing executives make their best estimate of the price which is likely to prevail at the time the new capacity is expected to come on stream. This price is then compared with manufacturing's cost estimates and yields the margin which is expected to be earned when the mill starts to produce newsprint.

In most proposals, the new mill is predicted to operate full out (or at the very minimum at 90 per cent of rated capacity) for its 15 to 20 year life. Usually, the calculated margin at start up is predicted to remain constant over the economic life of the project; that is, management assumes that any cost increases will be fully passed on in price increases.

Project acceptance criteria

Hurdle rates. The minimum hurdle rate for most firms on pulp and paper projects is 12 per cent, calculated on a discounted cash flow basis (after taxes, of course). However, most chief executives interviewed would be reluctant to propose an expansion of newsprint facilities (as at interview time at least) unless such expansion could show a rate of return considerably above the minimum hurdle rate. In the 4 firms interviewed, effective hurdle rates in early 1974 ranged from a low of 12 per cent DCF to a high of 18 per cent DCF.

Risks high. Executives interviewed considered newsprint capacity expansion a highly risky undertaking. Some of the risks mentioned were related to:

- the size of the commitment of funds required,
- the widely-held belief that Canadian newsprint producers were more than ever marginal suppliers of newsprint to the U.S. market,
- the historically poor performance of this industry, as viewed by the executives themselves,
- the historically slow growth of newsprint consumption, making the effects of overexpansion rather long-lasting,

- the possibilities of technology development which would permit many Overseas countries to economically produce their own newsprint from indigenous wood species,

- the possible development by Russia of a massive newsprint industry, and

- the reluctance to invest large sums during a period of high inflation because of the uncertainty of final costs of the new facility and thus its economic viability.

It was these risks which made those executives interviewed reluctant to accept newsprint facility expansion proposals showing minimum acceptable hurdle rates.

To help them assess the merits of a particular project proposal, those interviewed often requested, in addition to the basic proposal, the following analyses:

- Sensitivity analyses varying cost, price and operating rates where the calculated rate of return is compared with a specified hurdle rate or sensitivity analyses varying hurdle rates where assessments are to be made of the chances that the price of newsprint will attain minimum required levels.

- An analysis of what DCF would be realized if the new mill were operating presently. Thus, an estimate of return, based upon today's prices and the costs of the proposed mill, were it operating today, is made. Those executives interviewed said that they would be reluctant to send a proposal for capacity expansion to the Board of Directors unless such capacity would be profitable if it was operating under present conditions.

- An analysis of where (in which of the company's mills, including the proposed new mill) newsprint would be produced if demand slackened appreciably.

In any capacity expansion proposal, management feels considerably more confident if the additional capacity will be able to produce newsprint at an operating cost per ton somewhat less than the cost per ton of producing newsprint in their least efficient mill. Firms would like to be certain that if there was a downturn in newsprint sales, the new facility would not be the first of their mills to shut down. It would be very nice, of course, if new capacity could be justified for cost reduction reasons alone, but such, according to those interviewed, is seldom, if ever, the case.

Financial constraints

In those companies interviewed, even if a newsprint expansion proposal could be shown to have a satisfactory DCF return, this would not assure the project's acceptance. In all firms interviewed, funds available for capital expenditures were limited. Each firm usually faced many opportunities for profitable investment. Of all acceptable proposals, only those showing the best combination of risk and return, without exceeding financial constraints, are accepted.

Most executives interviewed in early 1974, felt that there was little likelihood of major capacity expansion by Canadian newsprint manufacturers because most of the funds available for capital expenditures would be spent on non-deferrable investments and on projects involving smaller sums of money and which usually show very high returns with less risk (e.g. equipment speed ups). Markets were also strong at that time for pulp, packaging, fine paper, lumber and plywood, and so these manufacturers were considering many possible investments whose sum far exceeded their resources.

(c) Forecasting has been one of Industry's Main Weaknesses

Executives interviewed felt that in the past, capacity was expanded when it should not have been, because of an inability, at least on the part of the expanding firms, to correctly identify market conditions. A typical executive comment was - "I would place emphasis on the tendency of people to be overly optimistic about the future and to extrapolate trends that really should not be extrapolated, they should be formulated and predicted according to some understood changing set of conditions. Blind extrapolation of the short-term past has been the downfall of many people who have undertaken expansion projects".

In partial defense of prior management's expansion decisions, some managers emphasized that we should not overlook the inherent difficulty in correctly reading and forecasting the market; inherent in the sense that the consumption of newsprint is quite seasonal as well as cyclical (i.e. follows the business cycle) and thus at times it has been difficult to distinguish long-term growth trends from shorter-term seasonal or cyclical patterns.

(d) Who Expands?

Executives demonstrated little consensus in response to the question of what characteristics distinguish expanding firms from non-expanding firms.

Most of those who felt that differences existed between expanders and non-expanders stressed possible differences in managerial motivation and philosophy.

Firms felt most likely to expand were:

- Firms which produced only newsprint - most of these are small newsprint producers.
- Firms producing pulp and/or paper products other than newsprint and wished to diversify and thus minimize their exposure to any one product.
- Firms associated with or owned by publishers - again, these tend to be the smaller newsprint producers.
- Firms owning or licensing suitable new mill sites.
- Large firms capable of swinging the capital requirements necessary - most executives estimated that there were perhaps 5 existing producers with such capability at that time.

(e) Special Expansion Situations

{The views expressed by those interviewed are, of course, the views of large independent Canadian newsprint-producing firms' executives. A publisher-owned newsprint producer may expand capacity and justify it in considerably different economic ways. The output of publisher-owned mills in Canada accounts for a small percentage of total industry output.}

A producer may expand in the same location or in a new location for cost reduction reasons alone. Executives interviewed did not believe that capacity had ever been added on this justification basis. Newsprint mills are usually kept up-to-date and thus generally do not become technologically obsolescent to the point where new capacity can be justified for cost reduction reasons alone. It is not surprising then, that almost all managers felt that technological change had played a minor role in the formation of excess capacity in this industry.

On the other hand, the technological breakthroughs, as described in Appendix B, which allowed newsprint to be manufactured from southern pine species and which preceded the massive growth of newsprint capacity in the southern United States, surely have had a profound impact on this industry's development. None of the executives interviewed, however, mentioned these breakthroughs.

Executive views, taken as a whole, generally support the capacity expansion formulation proposed in the previous chapter. There are, however, many executive views which have not been accounted for in the proposed formulation (e.g. political pressures, government incentive programs, management philosophy differences, decision criteria of publisher-owned newsprint firms, costs of least efficient mills) whose exclusion will limit the explanatory ability of the preliminary formulation.

5. Summary Comments

5.1 Executive Views vs. Preliminary Model

Taken as a whole, views expressed by industry executives strongly support the preliminary model structure developed in the previous chapter.

Executives interviewed additionally mentioned many other factors not explicitly incorporated into the preliminary model structure. The final model, developed in the following chapter, attempts to take into consideration many of these factors. Since data do not exist for many of these factors, their quantification and incorporation will be impossible. For example, the funds available for the expansion of newsprint manufacturing capacity is undoubtedly a key determinant of the size of the capacity expansion in any particular period; yet, no information exists on the amount of such funds available. As a proxy variable one could undoubtedly determine some measure of the liquidity of a major portion of Canada's newsprint-producing companies. There are, however, no good reasons for believing that such a proxy would be at all satisfactory. On the contrary, the funds available for newsprint capacity expansion are a function both of the total funds available and of the merits of the other investment proposals under consideration. At the time of interview, Canadian newsprint executives indicated that there existed far more acceptable proposals than their firms could possibly finance; thus, the number, size and profitability of alternative investment proposals, factors for which historical information does not exist, are major factors in the determination of the funds available for newsprint facility expansion. The final model, however, along with some understanding of the role of these unincorporable factors, should offer the reader considerable insight into the economics of this industry.

5.2 Veracity of Hypotheses 1, 2 and 3 of this Research

(a) Restatement of First Three Hypotheses

<u>Hypothesis 1</u>. That executives of leading Canadian newsprint manufacturing firms have significantly different perceptions among themselves of what factors are important in determining the industry's development and performance.

<u>Hypothesis 2</u>. That executives of leading Canadian newsprint manufacturing firms will identify "excess industry capacity" and "newsprint pricing" as the 2 main factors which have adversely affected the industry's financial performance.

<u>Hypothesis 3</u>. That current company pricing and capacity expansion practices differ between firms of the Canadian newsprint industry.

(b) Veracity of Hypothesis 1

Certainly, those executives interviewed shared many of the same perceptions of those factors important in determining the industry's performance and development. For example, all executives felt that excess capacity had been the chief cause of the financially poor performance of this industry in recent years. On the other hand, those executives interviewed held significantly differing perceptions concerning such things as: (1) the factors promoting excess capacity in this industry, (2) the price elasticity of demand for newsprint, (3) those producers who effectively control the price of newsprint in the United States market, (4) the conditions under which the price of newsprint is likely to rise, and (5) the conditions under which price discounting develops in this industry. These major differences in executive perceptions fully support Hypothesis 1 of this research.

(c) Veracity of Hypothesis 2

As has been previously discussed, those interviewed felt that excess industry capacity was the major factor underlying the industry's financial performance. Contrary to this hypothesis, however, newsprint pricing difficulties were considered simply a function of the amount of excess industry capacity. The pricing of newsprint of itself was not considered a major factor adversely affecting the industry's performance. It is surprising that Canadian newsprint executives were so prepared to accept as inevitable a relationship between the industry's ability to control margins (through their ability to control prices) and the amount of excess industry newsprint capacity. Such thinking, should it continue, effectively means that Canadian newsprint manufacturers must rely solely on means of controlling the amount of excess industry newsprint capacity if industry profitability is to improve.

(d) Veracity of Hypothesis 3

The description of company pricing and capacity expansion practices given in this chapter clearly supports the hypothesis that such practices differ between firms of the Canadian newsprint industry. For example, there are list price leaders and followers, discount leaders and followers; there are those who during a period of discounting, discount across the board (i.e. to all customers) while others discount selectively; there are some producers who actively seek very long-term contracts, while others seek contracts of a shorter duration; and there are several different forecasting methods, assessment procedures and hurdle rates employed for evaluating a capacity expansion proposal.

If these differing practices result primarily from differing managerial perceptions of the factors and relationships important in determining the industry's performance and development, then such variation in these practices undoubtedly adversely affects the individual firm's and the industry's financial performance. On the other hand, if differing practices result primarily from the different circumstances faced by each producer, then the effect on individual firm profitability is not nearly so clear. Table 4-1 indicates that both differing managerial perceptions and differing circumstances likely play important roles in the adoption of differing managerial pricing and capacity expansion practices in the Canadian newsprint industry. For example, managers of firms which have often played the role of a price leader, invariably

Table 4-1

Summary of Differing Company Practices and Likely Reasons for Such Differences

List of Differing Company Practices	Likely Reasons for such Differences: Differing managerial perceptions of the factors and relationships important in determining the industry's performance and development	Differing circumstances faced by each producer
Pricing Practices		
List Price Leadership	Differing perceptions of the elasticity of demand for newsprint Differing perceptions of which producers control the price of newsprint in the United States Differing perceptions of the conditions under which the price of newsprint is likely to rise	The risks (of not being followed) are presumably greater for small producers than large producers
Discount Price Leadership	Differing perceptions of the elasticity of demand for newsprint	The economics of discounting may be favorable for a new entrant
Discounting - Across the board vs. selective cuts	Not clearly identifiable	Possible influence on the economics of discounting due to geographical dispersion of markets and/or facilities
Contract Length	Differing perceptions of the conditions under which the price of newsprint is likely to rise Differing perceptions of the conditions under which price discounting appears and stops	Location of facilities with respect to traditional contract and spot tonnage markets
Capacity Expansion		
Price/Margin Forecasting Approach	Differing perceptions of the factors promoting excess capacity Differing perceptions of the conditions under which the price of newsprint is likely to change	
Hurdle Rate Employed	Differing perceptions of the risks involved in capacity expansion	Firm's funds availability Range of alternative proposals

felt that the demand for newsprint was strongly price inelastic, whereas, those managers of firms which most often played the role of price follower were considerably less certain about the elasticity of demand for newsprint. Similarly, the firm using the most sophisticated forecasting methods (and most logical) for the evaluation of newsprint capacity expansion proposals, voiced the most complete and most consistent description of the factors promoting excess capacity in this industry and the conditions under which margins can be expected to rise or fall. There is, of course, no certainty that such perceptions are correct, only that they have been well thought out. In summary then, the evidence would indicate that the variation in Canadian newsprint firm pricing and capacity expansion practices results in measurable degree from differing managerial perceptions of the factors and relationships important in determining the industry's performance and development. Of course, even the use of generally similar practices, where circumstances permit, need not result in similar decisions, as there is always room for disagreement about general economic trends upon which key forecasts are likely to be based.

CHAPTER V. REGRESSION ANALYSIS RESULTS

1. Introduction

Again in this chapter, an attempt has been made to present the materials in much the same sequence as the proposed equations were presented in Chapter III, the preliminary model chapter. The first portion of this chapter deals with industry income statement related equations, while the second portion presents a model of industry capacity change.

Data sources for each of the variables used in the equations presented in this and the following chapter are listed in Appendix H.

2. Industry Income Statement

2.1 The Demand for Newsprint

Following the presentation in the preliminary model chapter, the analysis starts with a consideration of the determinants of U.S. newsprint consumption. Such consideration yielded the following results:

$$\text{U.S. } C_t = -749.1 + \underset{(0.0168)}{0.0819}\text{ U.S. } HH_t + \underset{(3.168)}{20.388}\text{ U.S. } RDI_t$$

$$-\underset{(120.9)}{1022.4}\, D_t \qquad \text{(1a)}$$

$\overline{R}^2 = 0.9876$ RSD = 258,200 tons

Data: 1919-1970   D.W. = 1.216 (positive first order autocorrelation)

where U.S. C_t is the volume of newsprint (000 tons) consumed in the United States in year t, U.S. HH_t is the number of households in the United States (000s) in year t, U.S. RDI_t

is the U.S. real disposable income (1929 $ billions) in year t and D_t is a dummy variable equal to 1.00 for the years 1919, 1942, 1943, 1944, 1945 and 1946 (the war years) but otherwise equal to zero.

$\bar{R}^2$ is the squared multiple correlation coefficient adjusted for degrees of freedom, RSD is the residual standard deviation, and D.W. is the Durbin-Watson statistic.

The number of U.S. households was used as a measure of the newspaper buying population as was suggested by Jon Udell, perhaps the most noted consultant, researcher and author in the field of newsprint consumption forecasting.

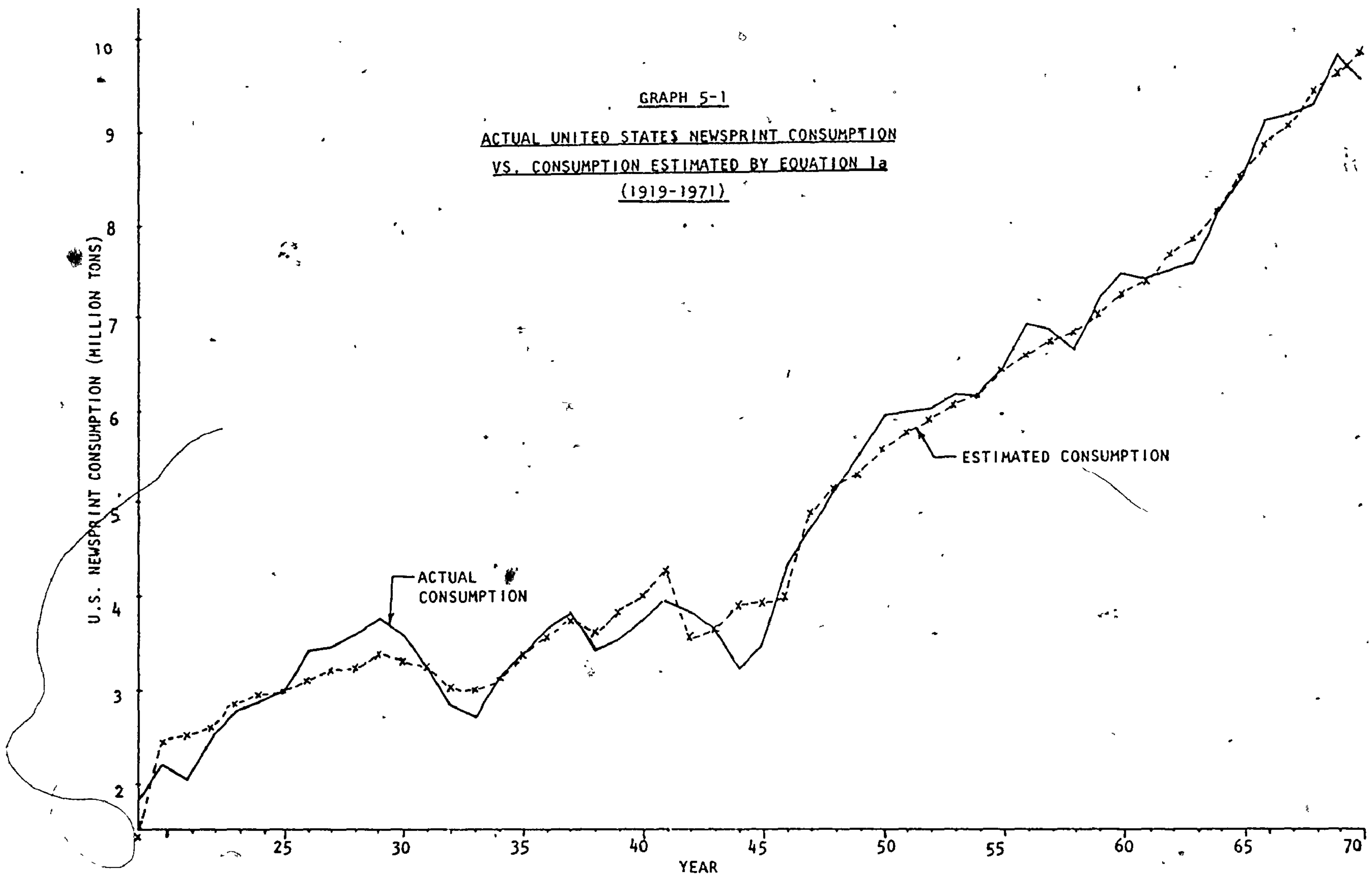
D_t is a dummy variable which allows for the fact that U.S. newsprint consumption was drastically curtailed during the war years by U.S. government controls over the production of newsprint.

Graph 5-1 plots actual and estimated U.S. newsprint consumption where the estimates are based upon Equation la.

As might be expected, there exists a strong correlation (0.9799) between the number of households and the level of real disposable income, thus making interpretation of the coefficients difficult. Moreover, the Durbin-Watson value indicates positive first order autocorrelation, meaning that, while the least squares procedure yields consistent and unbiased estimates, these estimates are not necessarily fully efficient, and the standard error values are not correct. With such positive autocorrelation, it is not surprising that Equation la captures the trend in newsprint consumption but fails to identify the short run fluctuations and sharp turns.

GRAPH 5-1

ACTUAL UNITED STATES NEWSPRINT CONSUMPTION VS. CONSUMPTION ESTIMATED BY EQUATION 1a (1919-1971)



Partial resolution of these problems was felt possible through a reformulation of the consumption function, as follows:

$$\text{U.S. } C/HH_t = 65.23 + \underset{(0.0035)}{0.0601} \text{ U.S. } RDI/HH_t - \underset{(6.54)}{64.24} D_t \quad \text{(1b)}$$

$\bar{R}^2 = 0.8795$ RSD = 15.02 pounds per household
Data: 1919-1970

where U.S. C/HH_t is the volume (pounds) of newsprint consumed per household in the United States in year t, U.S. RDI/HH_t is the U.S. real disposable income per household in year t (1929 $), and D_t is a dummy variable equal to 1.00 for the war years but otherwise equal to zero.

Such a formulation offers an opportunity to econometrically determine whether the consumption of newsprint is elastic or inelastic with respect to price. This can be accomplished by adding to our previous equation a variable reflecting the real price of newsprint (i.e. the price of newsprint as it compares with the prices of all other goods). Thus:

$$\text{U.S. } C/HH_t = 97.84 + \underset{(0.0034)}{0.0593} \text{ U.S. } RDI/HH_t - \underset{(6.67)}{69.51} D_t$$

$$- \underset{(0.1948)}{0.4482} \text{ R. N. Y. L. } Pr_t \quad \text{(1c)}$$

$\bar{R}^2 = 0.8914$,   RSD = 14.40 pounds per household

Data: 1919-1970   D.W. = 1.09 (positive first order autocorrelation)

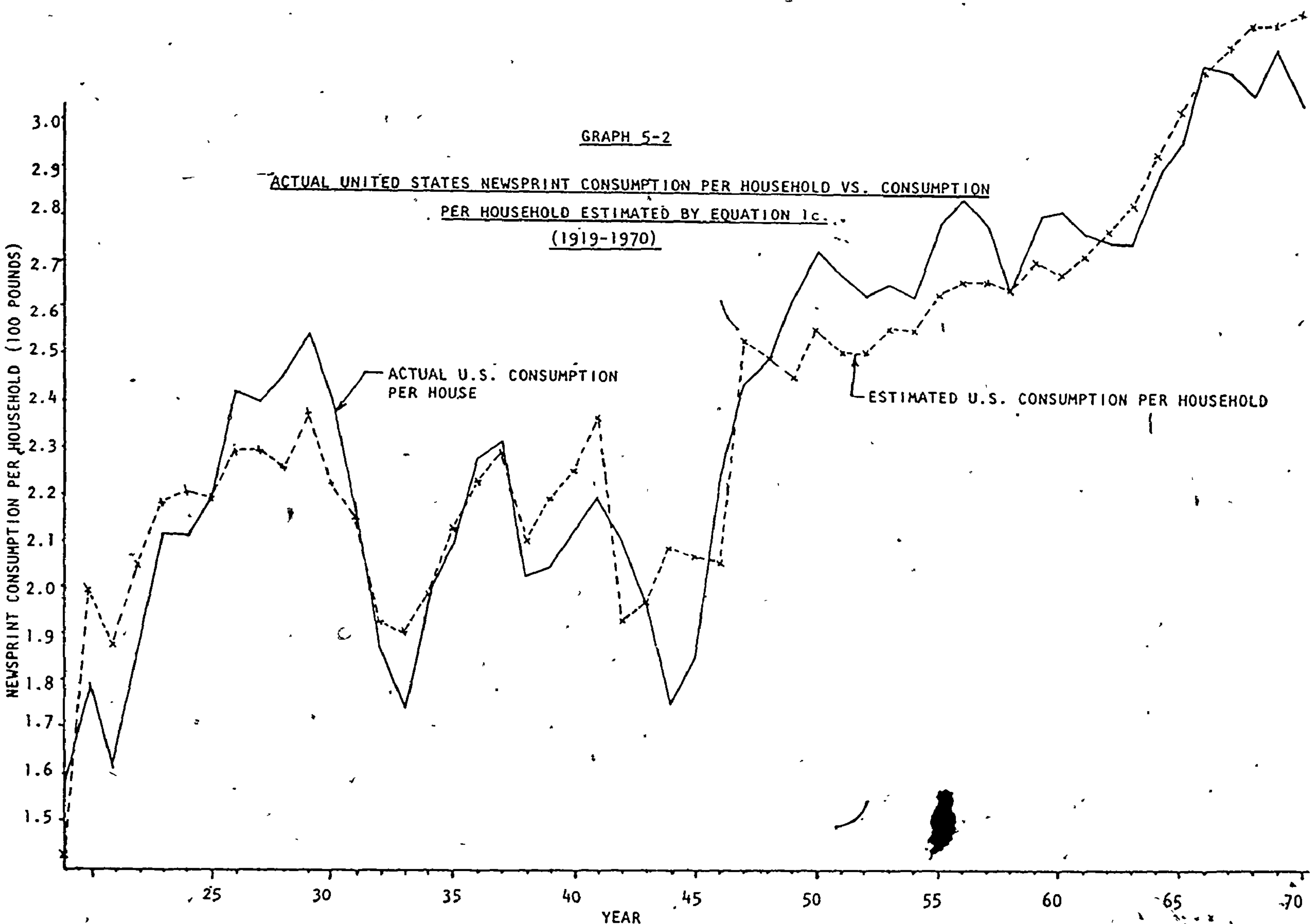
where R. N. Y. L. Pr_t is the real New York list price of newsprint in year t (1929 U.S. $).

Actual and estimated (using Equation 1c above) U.S. newsprint consumption per household figures are plotted as Graph 5-2. As can be seen, there exists once again strong

GRAPH 5-2

ACTUAL UNITED STATES NEWSPRINT CONSUMPTION PER HOUSEHOLD VS. CONSUMPTION PER HOUSEHOLD ESTIMATED BY EQUATION 1c.

(1919-1970)



first order autocorrelation which is borne out by the Durbin-Watson value of 1.09. While it is possible that a transformation, as for example to first differences, might yield more satisfactory results, it seems more likely that the autocorrelation has resulted from the exclusion of one or more important variables influencing the United States consumption of newsprint per household. A more satisfactory result may have been obtained if consumption had been considered a function of circulation, average newspaper size and/or advertising lineage, with these variables in turn considered functions of gross economic and/or demographic values. Such an approach was not adopted, because neither actual data nor proxy data existed for circulation, average newspaper size, or advertising for much of the period under consideration. Equation 1c does, however, appear to capture both the trend and sharp changes in newsprint consumption per household. Equation 1c does miss many of the short-term variations.

Converting the residual standard deviation (RSD) into tons per year yields 290,000 tons per year based upon an average number of households over this period of 40,366 thousand.

Over the period 1919 to 1970, the average consumption of newsprint in the United States per household was 241.0 pounds, the average real disposable income per household in 1929 dollars was \$3044 U.S. and the average real price of newsprint in 1929 dollars was \$65.73 U.S.

According to Equation 1c, a 1 per cent increase in the real price of newsprint would be expected to result in a 0.295 pound (i.e. -0.4482 * 0.01 * $65.73 U.S.) decrease in newsprint consumption per household which is an average decrease in U.S. newsprint consumption per household of 0.12 per cent (i.e. 100% * (-0.295/241.0)). Thus, the consumption of newsprint in the United States over the period 1919 through 1970 has been highly inelastic with respect to price. Specifically, the elasticity of newsprint consumption with respect to price has equalled -8.3 (i.e. 1.00/-0.12).

On the other hand, a 1 per cent increase in real disposable income per household would be expected to result in an increase of 0.75 per cent in U.S. newsprint consumption per household. Thus, the elasticity of newsprint consumption with respect to disposable income has equalled +1.33 (i.e. 1.00/0.75).

As stated in the preliminary model chapter, when appropriate data exist, the consumption of newsprint in Canada or any other nation could presumably be accounted for by using similar formulations.

2.2 Shipments of Newsprint

The estimated equation explaining the volume of newsprint shipments to the United States from all destinations including the United States itself is as follows:

$$S.\ U.S._t = 313.00 + \underset{(0.0065)}{0.9998}\ U.S.\ C_t - \underset{(567.0)}{2605.5}\left(\frac{U.S.\ Pu.\ I_{t-1}}{U.S.\ C_{t-1}}\right) \quad (2a)$$

$\bar{R}^2 = 0.9980$ RSD = 98,800 tons   Data: 1922-1970

D.W. = 2.01 (the hypothesis of random residuals cannot be rejected) where $S.\ U.S._t$ equals the volume of newsprint shipments to the United States from all destinations in year t (000 tons), $U.S.\ C_t$ is the volume of newsprint consumed (000 tons) in the United States in year t, and $U.S.\ Pu.\ I_{t-1}$ is the volume (000 tons) of U.S. newspaper publishers' newsprint inventories held at the end of year t-1.

Recall from the preliminary model chapter that the interpretation of this equation is that purchases are planned to meet consumption, but that if there is a high inventory carry over from the previous year, purchases will be reduced to allow current consumption to reduce these excess inventorie

2.3 Newsprint Production

Applying data to the formulation proposed in the preliminary model chapter gave the following results:

$$N.A.\ P_t = 64.31 + \underset{(0.0025)}{0.9964}\ N.A.\ S_t - \underset{(464.7)}{1239.9}\ \left(\frac{N.A.\ Pl.\ I_{t-1}}{N.A.\ S_{t-1}}\right)_{t-1} \tag{3a}$$

$\bar{R}^2 = 0.9998$ RSD = 36,764 tons Data: 1922-1970

D.W. = 1.88 (the hypothesis of random residuals cannot be rejected)

where $N.A.\ P_t$ is the volume of newsprint production (000 tons) in North America in year t, $N.A.\ S_t$ is the volume (000 tons) of North American newsprint shipments to all destinations in year t, and $N.A.\ Pl.\ I_{t-1}$ is the volume (000 tons) of North American newsprint manufacturers' inventories at the end of year t-1.

Again, newsprint production is planned to meet shipments; however, if there exists a high inventory level carried over from the previous year, production will be reduced to allow current orders to reduce excess inventories.

The extremely high correlations between newsprint production and newsprint shipments, between newsprint shipments and newsprint consumption, and between newsprint consumption and demand-generating factors such as disposable income, again support the proposition that in this industry, the quantity of newsprint supplied is primarily demand-determined.

Moreover, if newsprint consumption has fallen short of the desired demand because of newsprint shortages, then an analysis of the residuals associated with Equations 1a and 1c should show that during periods of very high industry capacity utilization, such as through the period 1946 to 1956, estimated newsprint consumption should exceed actual newsprint consumption. Reference back to Graphs 5-1 and 5-2 strongly suggest that this has not been the case. Admittedly, estimated consumption would have exceeded actual consumption during the war years if special allowances had not been made to reflect the stringent production limits imposed by the government.

2.4 The List Price of Newsprint in New York

Applying data to Equation 7 of the preliminary model chapter yielded, generally speaking, discouraging results. Much of the problem was felt to originate from the lumping together of production, exchange and transportation costs and from the use of percentage changes rather than absolute value changes.

In reformulating the price change equation, it was decided that the primary emphasis should shift to the development of a satisfactory single equation covering the full period before adjusting for the capacity utilization level.

The basic building block of the reformulated price equation then became the relationship between price changes and cost changes. One of the initial regressions yielded the following results:

$$\Delta N.\ Y.\ L.\ Pr_{t-1\to t} = 0.1186 + \underset{(0.1101)}{1.1124}\ \Delta C.\ PC_{t-1\to t}$$

$$+ \underset{(0.2003)}{0.7650}\ \Delta d_{t-1\to t} + \underset{(0.1770)}{0.6191}\ \Delta C.US\ E.\ R.\ C_{t-1\to t} \qquad (7a)$$

$\bar{R}^2 = 0.8476$ RSD = \$2.78 U.S. Data: 1922-1971

D.W. = 1.78 (the hypothesis of random residuals cannot be rejected)

where $\Delta N.\ Y.\ L.\ Pr_{t-1\to t}$ is the absolute change in the New York list price of newsprint (U.S. \$/ton) from year t-1 to year t, $\Delta C.\ PC_{t-1\to t}$ is the absolute change in Canadian newsprint production costs (Can. \$/ton) from year t-1 to year t, $\Delta d_{t-1\to t}$ is a measure (actually a surrogate as explained in Chapter III) of the absolute change in Canadian newsprint transportation costs (Can. \$/ton) from year t-1 to year t, and $\Delta C.US\ E.\ R.\ C_{t-1\to t}$ is the absolute change in the Canadian - U.S. exchange rate differential (Can. \$/ton) from year t-1 to year t.

These results were very encouraging and gave support to the reformulation under consideration.

In a similar formulation, but including capacity and shipment change variables as proposed in the preliminary model chapter, the coefficients of such additional variables were both statistically and economically not significant; moreover, the addition of such variables had negligible effects upon the value of the cost term coefficients reported above. Such findings as discussed in the preliminary model chapter are not surprising.

(a) Taking Account of Executive Views

An attempt was then made to improve the results by taking into account executive responses which suggested that prices would likely rise far more rapidly than costs when the industry underwent a turnaround from a period of low profitability and low capacity utilization to a period of very high capacity utilization and easily recognizable need for additional capacity. Under such circumstances, executives interviewed expect prices to rise to the level where a satisfactory return at the very least is being realized on existing facilities. Moreover, if newsprint expansion is to occur, prices would have to increase to an even higher level under usual circumstances.

Graph 3-2 (in Chapter III, page 85) demonstrates that there was only one period over the years 1922 through 1971 when such circumstances were easily recognizable. That period occurred following the Second World War during the years 1946 and 1947. During 1946, North American shipments of newsprint adjusted for inventories rose as a percentage of North American capacity from 78 per cent to 99 per cent (by far the largest historical rise) and in the following year rose to

104 per cent, its highest level in history to that date. Thus, it is proposed that an additional variable be added to our price change formulation for the years 1946 and 1947 to reflect the unusual circumstances of those years.

Further inspection of Graph 3-2 reveals that during the years 1932 and 1933, North American shipments of newsprint adjusted for inventories amounted to only slightly more than half the available North American newsprint capacity. The unhealthiness of this situation can be more fully understood when one realizes that newsprint shipments, as a percentage of capacity during these 2 years, were some 8 points lower than in any other year over the period 1921 through 1971. It was during this period also that the Price Company went bankrupt and an unprecedented number of newsprint mills were closed down.

The handling of years 1932 and 1933 poses some small problem. The question arises as to what the net effect of the circumstances prevailing in 1932 and 1933 would be on the price of newsprint. In Chapter III, it was argued that there possibly exists some level of capacity utilization (a very low level) when firms would likely ruthlessly cut prices in an attempt to survive. The fact that a major newsprint producer did not survive would support this argument. On the other hand, recall from Chapter IV that those newsprint executives interviewed felt that under such conditions (as prevailed in 1932 and 1933) both newsprint producers and customers would have vested interests in seeing newsprint prices rise at least to the extent of any cost increases. Thus, it is proposed that an additional variable be added to the price formulation equation for the years 1932 and 1933; the value of this additional variable will indicate which of the above explanations is appropriate for the years 1932 and 1933.

(b) Industry Capacity Utilization

Following the preliminary formulation, we wish to make explicit allowance for the industry level of capacity utilization. There are a number of ways in which this can be accomplished. The most desirable way would be to re-estimate the coefficients of Equation 7a for each range of capacity utilization desired. This procedure would, however, add a considerable number of new variables to our formulation, 8 new variables if 3 ranges of capacity utilization were employed. Data scarcity would argue against using such an approach.

Another approach would be to permit only the constant term in Equation 7a to take on a different value for each range of capacity utilization. Although theoretically inferior to the previous approach, this approach was felt more practical, considering the data limitations, and was therefore employed in the reformulation of the price equation.

Additional constant terms were added to the formulation for each of the periods proposed in Chapter III (i.e. 1930 to 1945; 1922 to 1929 and 1957 to 1971; and, 1946 to 1956), thus accounting very roughly for periods of low, medium and high capacity utilization.

(c) Reformulation of Equation 7a

Incorporating the changes proposed in the previous 2 sections yielded the following results:

$$\Delta N.\ Y.\ L.\ Pr_{t-1 \to t} = -0.7985 + \underset{(0.6339)}{1.8395}\ D1_t + \underset{(0.7566)}{2.1579}\ D2_t$$

$$+ \underset{(0.0829)}{0.9396}\ \Delta C.\ PC_{t-1 \to t} + \underset{(0.1469)}{0.9094}\ \Delta d_{t-1 \to t}$$

$$+ \underset{(0.1299)}{0.5741}\ \Delta C.US\ E.\ R.\ C_{t-1 \to t} + \underset{(1.5065)}{8.3089}\ D3_t$$

$$- \underset{(1.5656)}{6.8262}\ D4_t \qquad (7b)$$

$\bar{R}^2 = 0.9394$ RSD = \$1.84 U.S. Data: 1922-1971

D.W. = 2.01 (the hypothesis of random residuals cannot be rejected)

where all variables are the same as for Equation 7a and additionally $D1_t$ represents the effects on price occurring during a period of low industry capacity utilization and takes on a value of 1.00 for the years 1930 through 1945 inclusive (otherwise $D1_t$ takes on a value of zero); $D2_t$ represents the effects on price occurring during periods of high industry capacity utilization and takes on a value of 1.00 for the years 1946 through 1956 inclusive; $D3_t$ represents the unusual circumstances of 1946 and 1947 and takes on a value of 1.00 for those years; and $D4_t$ represents the unusual circumstances of 1932 and 1933 and takes on a value of 1.00 for those 2 years.

(d) Comments on Coefficients of Equation 7b

These results appear extremely good, especially when one considers that decision-makers have the tendency to increase prices by nice round numbers; that is to say, if costs went up by \$8.69, then the decision-maker is undoubtedly more likely to increase his price by \$7.50 or \$10.00 than he is to increase his price by \$8.69.[1]

Actual and estimated (using Equation 7b) newsprint list price changes over the period 1922 through 1971 are plotted as Graph 5-3.

Once again, a similar formulation, incorporating capacity and shipment change terms, proved of negligible value, although the coefficients of such terms were not permitted to change with the level of capacity utilization which presumably limited the explanatory potential of such terms. Indications were found, in fact, that shipment and capacity change terms might be both economically and statistically significant during periods of high industry capacity utilization.

Interpretation of the results presented in Equation 7b is rather straightforward. A number of points are apparent:

- List price changes have reflected, almost fully, changes in production and distribution costs.

- On the other hand, the list price of newsprint has been much less sensitive to changes in the exchange rate. This difference in sensitivity can be accounted for by the very nature of the cost changes. Changes in Canadian production and distribution costs can be expected to parallel similar cost changes in the United States and thus, such

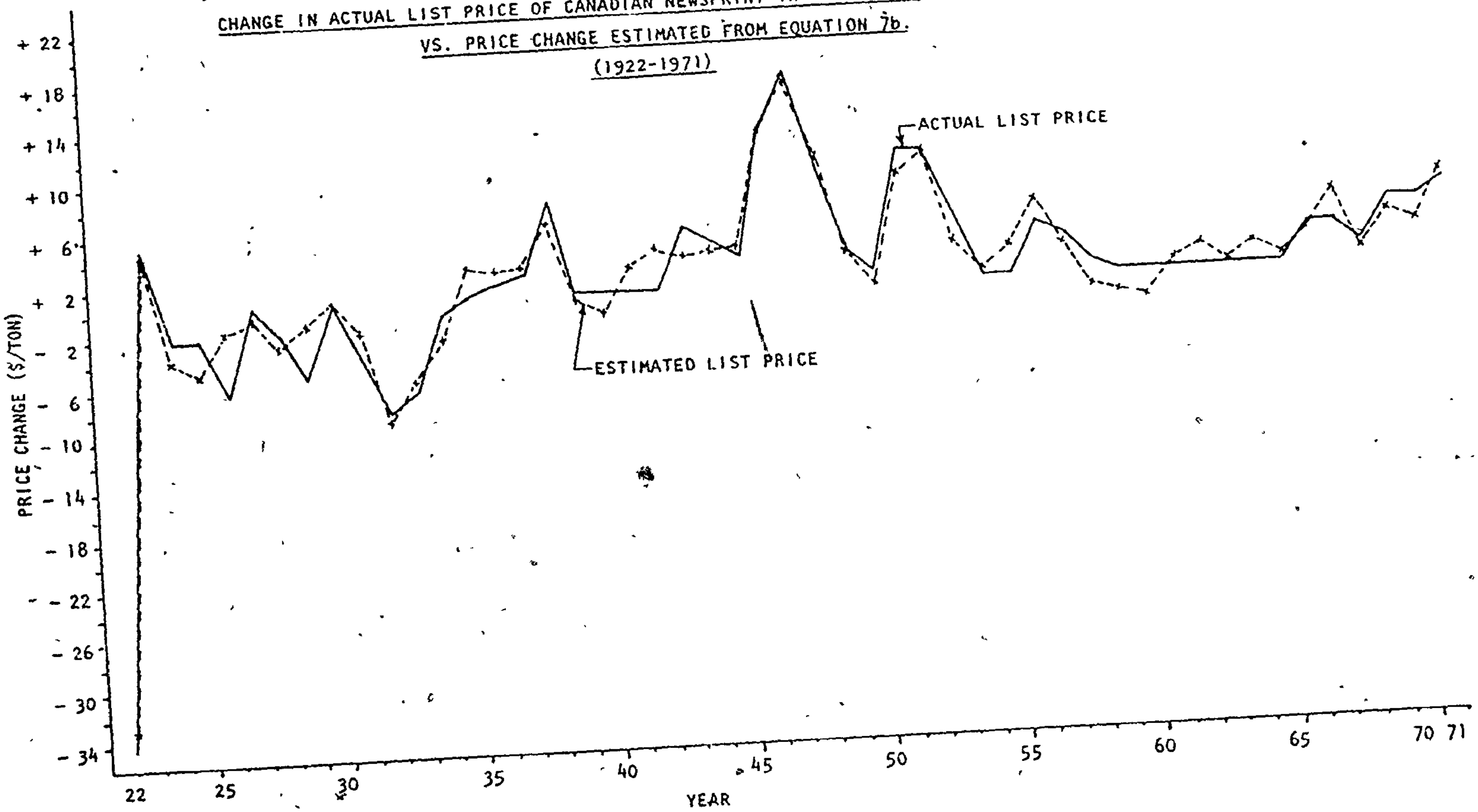
---

[1]For example, over the period 1920 through 1971, 60 per cent of the changes in <u>average annual</u> N. Y. list price from one year to the next have been exactly equal to 1 dollar or an exact multiple of 1 dollar.

GRAPH 5-3

CHANGE IN ACTUAL LIST PRICE OF CANADIAN NEWSPRINT IN THE NEW YORK MARKET (U.S. $/TON) VS. PRICE CHANGE ESTIMATED FROM EQUATION 7b.

(1922-1971)



changes can be expected to have little effect on the competitiveness of each nation; by definition, however, such is not true of changes in the exchange rate.

- The situation transpiring in 1946 and 1947 does appear to be rather atypical. During each of these years the price of newsprint is estimated to have risen by more than 8 dollars over and above the effect of other influences. It seems likely that this occurrence resulted from the dramatic shift which occurred in those years from a buyer's market for newsprint to a seller's market for newsprint. The exceptional increase in newsprint price presumably reflects manufacturers' desires to return to reasonable levels of profitability and the lack of competition which would prevent them from doing so.

- Likewise, the desperate circumstances of 1932 and 1933 appear to have brought about such fierce price competition that the price of newsprint in each of those years is estimated to have fallen almost 7 dollars more than otherwise would have been expected.

- Addressing the effect of industry capacity utilization on newsprint price, there has been a significant upward influence on price, over and above the influence of other factors during periods of high capacity utilization. During periods of medium capacity utilization, list price has tended to drop off slightly after netting out other influencing factors. A small but upward influence on price is estimated during periods of very low capacity utilization. Such a positive influence, however, may be atypical, as it may reflect an effort by manufacturers to recoup some of the margin lost during the panic sell-off of 1932 and 1933.

(e) Other Factors Affecting the Price of Newsprint

There are many other factors which undoubtedly have played a role in influencing the movement of the list price of newsprint. We might, for example, question whether the marginal effect on price of a cost increase is the same as the effect of a cost decrease. We might also question whether the same relationships between price and cost changes hold during an improving market situation (i.e. industry capacity utilization rising) as during a deteriorating market situation. We might further question whether there is some cost carry over effect; that is, whether cost changes in the previous year have some influence on this year's price change. Unfortunately, data availability and problems of multicolinearity rule out any definitive answers to such questions. The data do suggest however, that such factors may be important.

3. North American Newsprint Capacity

3.1 Actual vs. Desired Levels of Capacity

This section explores the conditions under which North American newsprint capacity has been expanded. As outlined in Chapter III, the approach adopted is to determine the relationship between capacity and the desired level of North American newsprint shipments.

We start by considering proposed Equations 9 through 11, as presented in Chapter III. One set of results, based upon an assumed 3 year lag between the decision to alter capacity and the actual change in output capability, is as follows:

$$NA.\ Ca_{t+3} - NA.\ Ca_{t+2} = 366.2 - \underset{(0.1593)}{0.1907}\ (\delta_1)(NA.\ Ca^d_{t+3} - NA.\ Ca_{t+2}) + \underset{(0.0443)}{0.1322}\ (\delta_2)(NA.\ Ca^d_{t+3} - NA.\ Ca_{t+2}). \qquad (9a)$$

$\bar{R}^2 = 0.1539$ Data: 1920-1971 D.W. = 0.68 (indicating positive autocorrelation)

$$NA.\ Ca^d_{t+3} = NA.\ S_t + 3.0\ (NA.\ S_t - NA.\ S_{t-5})/5 \qquad (11a)$$

where NA. Ca_{t+3} is the actual level of North American newsprint capacity (000 tons) in year t+3, NA. Ca^d_{t+3} is the desired level of North American newsprint capacity (000 tons) in year t+3, NA. S_t is the volume (000 tons) of North American newsprint shipments to all destinations in year t, δ_1 equals 1.0 and δ_2 equals 0.0 when NA. Ca^d_{t+3} exceeds NA. Ca_{t+2} and δ_1 equals 0.0 and δ_2 equals 1.0 when NA. Ca^d_{t+3} is less than NA. Ca_{t+2}. Note that NA. Ca_{t+2} is the actual level of North American newsprint capacity in year t+2; it is used as a proxy for the actual capacity in year t plus additional capacity to which funds have been committed and which is planned to come on stream in year t+1 or year t+2.

It should be noted that the precise form of Equation 11a must be specified before Equation 9a can be estimated. Many alternative specifications of Equation 11a are, of course, possible.

There are a multitude of similar formulations which could have been used. For example, we could have assumed a different lag structure, a different trend component, or a different planning period. The planning period implied by Equation 11a is 3 years, which assumes that management does not build ahead of demand, but justifies capacity addition on the basis of expected industry newsprint shipments at the time the proposed new capacity would come on stream. Industry views support the assumption that the industry tends not to build ahead of perceived demand.

The results presented in Equation 9a are particularly disappointing since the coefficient of the first NA. Ca^d_{t+3} - NA. Ca_{t+2} term bears an incorrect sign, though it is not statistically significant. A number of reformulations of Equations 9a and 11a were made. Such changes yielded progressively better estimating equations (i.e. improved $\bar{R}^2$) but lacked common sense appeal.

3.2 Major Reformulation

It was obvious that a more sophisticated approach to capacity change explanation would have to be taken and that some of the factors that might affect the results, but had been ignored, would have to be taken into account.

(a) Optimum Level of Capacity Utilization

Chenery (1952) has suggested that there is an optimum degree of plant utilization which is less than full capacity at which management should prefer to operate their facilities. This might be particularly applicable to the newsprint industry where, as has previously been demonstrated, the consumption of newsprint is of a highly seasonal nature, and where shipments also have historically followed this seasonal pattern. Specifically, Chenery showed "that if firms seek to minimize the cost of production over time they will on the average build ahead of demand (when there are economies of scale) and will have a normal degree of overcapacity".[2]

The following formulation was then proposed since it was thought to add more flexibility to the situation and would enable easy handling of Chenery's findings.

$$\%\Delta NA.\ Ca_{t+\theta-1\rightarrow t+\theta} = b_I + b_2(\delta_1)(NA.\ CU^e_{t+\theta+z} - NA.\ CU^d_{t+\theta+z}) + b_3(\delta_2)(NA.\ CU^e_{t+\theta+z} - NA.\ CU^d_{t+\theta+z}) \qquad (12)$$

$$\text{where } NA.\ CU^e_{t+\theta+z} = \left[\frac{NA.\ S_t + (\theta+z)(NA.\ S_{trend})}{NA.\ Ca_{t+\theta-1}}\right]100 \qquad (13)$$

and where $\%\Delta NA.\ Ca_{t+\theta-1\rightarrow t+\theta}$ is the percentage change in North American newsprint capacity from year $t+\theta-1$ to year $t+\theta$, $NA.\ CU^e_{t+\theta+z}$ is the expected level of North American newsprint industry capacity utilization in year $t+\theta+z$, $NA.\ CU^d_{t+\theta+z}$ is the desired optimum level of North American newsprint capacity utilization in year $t+\theta+z$, and δ_1 equals 1.0 and δ_2 equals 0.0 when $NA.\ CU^e_{t+\theta+z}$ exceeds $NA.\ CU^d_{t+\theta+z}$, and δ_1 equals 0.0 and δ_2 equals 1.0 when $NA.\ CU^e_{t+\theta+z}$ is less than $NA.\ CU^d_{t+\theta+z}$. As before, θ is the number of years by which the decision to expand leads the increase in actual capacity, $\theta+z$ equals the planning period, and t is the year in which the decision to

---

[2] Hollis B. Chenery, "Overcapacity and the Acceleration Principle", Econometrica, 20, (January 1952), p. 14.

expand is made.

Note that Equation 13 must be specified precisely before Equation 12 can be estimated. In this case, the expected level of North American capacity utilization in year $t+\theta+z$ is assumed to equal the expected volume of newsprint shipments in year $t+\theta+z$ divided by actual plus committed capacity (i.e. $NA: Ca_{t+\theta-1}$) at time t.

In this formulation, the desired level of capacity utilization will be considered constant over the full period of analysis. This desired level of capacity utilization should be chosen to reflect optimum capacity utilization as determined by consumption and shipment seasonality.

Chenery (1952) showed that the optimum rate of capacity utilization was significantly different in each of the industries he investigated and that these differences could be accounted for chiefly by differing industry growth rates. As will be shown later, newsprint demand growth rates have varied substantially over the period 1920 through 1970. Chenery's findings may be accounted for in our proposed capacity change estimation equation by simply allowing the planning period (i.e. the value of θ plus z) to change with differing growth rates. It seems only logical that management will look (plan) further into the future when the risks of doing so appear smaller.[3] This approach shall be considered in greater

---

[3]As will be recalled, those executives interviewed indicated that the low growth rate of newsprint consumption was a major factor contributing to their belief that the risks associated with capacity expansion were high.

detail later in this chapter.

It should be clearly understood that for Equation 12 to be estimated, the lag (θ), the planning period (θ+z), the means of calculating the trend in North American newsprint shipments, and the optimum or desired level of capacity utilization must each be specified. Such a formulation offers the researcher an enormous amount of flexibility which is, of course, balanced by the difficult problem of cautious interpretation of results.

Estimates of Equation 12, based upon several specifications of Equation 13 yielded improved, yet still unsatisfactory results.

(b) Lag Structure

It was apparent from the initial results that considering the lag (i.e. the time between the decision to expand capacity and the coming on stream of that capacity) to be a constant 3 years was too unrealistic and was perhaps the chief reason for the poor initial results.

Lag and the means of capacity change

Graph C1 (Appendix C, page C9) shows the historical growth of North American newsprint shipments and North American newsprint capacity.

Changes in Canada's newsprint capacity have taken on several forms. The most important of these forms have been;

- new newsprint mills (a mill contains at least 1 newsprint machine, often more),
- new machines in existing mills (these may replace

old inefficient machines or may be merely added to provide additional capacity),

- plant improvements which result in a speeding up of existing equipment,

- changes (generally increases) in the normal hours of operation, as for example, going from a 6 to 7 day work week,

- changes in product specifications, as for example, changing paper thickness. Changes in product specification were rare until the shortages of 1973 and 1974; and lastly, the chief means of capacity decrease,

- the mothballing of obsolete facilities, either complete mills or certain machines.

The period of most rapid Canadian newsprint capacity expansion covered the years 1920 through 1930, when annual capacity rose from 1016 thousand tons to 3902 thousand tons. Over 90 per cent of this capacity increase can be accounted for by the installation of new machines; a total of 81 machines were installed between the year ends of 1919 and 1929.[4]

Most of these new machines were installed in new mills.

---

[4]Figures on the nature and magnitude of Canadian newsprint capacity changes presented in this and the following 7 paragraphs were determined on the basis of material contained in the following: Gutherie, The Newsprint Paper Industry: An Economic Analysis: 57-75; Canadian Pulp and Paper Association, Newsprint Data (Montreal: Canadian Pulp and Paper Association), various issues 1948 through 1971; Statistics Canada, Pulp and Paper Mills (Information Canada, Ottawa), various years' publications, 1926 through 1971.

Between 1926 and 1930 alone, 9 new newsprint mills commenced operations. In 1970, these same 9 mills accounted for 24 per cent of total Canadian newsprint capacity.

The construction of new mills stopped abruptly in 1930 as excess capacity became prevalent. In 1920, the industry was operating at 92 per cent of capacity, but by 1930 the operating rate had fallen to 71 per cent and would fall further to a low of 53 per cent some 2 years later.

Twenty (20) years later, in 1951, there were 38 mills in operation in Canada, exactly the same number that were in operation in 1930. During this period, no less than 6 mills had stopped newsprint production, 4 new newsprint mills had been constructed and Newfoundland's 2 mills were included in published Canadian figures as of 1949. The number of machines in operation also remained roughly constant over these 20 years. Despite the lack of new mill construction, Canadian newsprint capacity rose by 1458 thousand tons to 5360 thousand tons in 1951. Approximately 70 per cent of the capacity increase during this period can be attributed to plant improvements, of which the speeding up of existing machines played an important role.

The following 5 years (1952 to 1956 inclusive) saw considerable pressure on Canadian manufacturers as operating ratios continued to exceed the rated full capacity level. However, having experienced many years of excess capacity, Canadian manufacturers were reluctant to build new mills. During these 5 years, Canadian newsprint capacity increased by 953 thousand tons or at about 3 times the absolute rate in increase of the 30s and 40s. Despite this large increase, only 1 new mill was constructed in Canada, and that in British Columbia. During this period, over half the capacity increase arose through existing machine speed ups and other plant improvements.

Between 1956 and 1967, total Canadian capacity increased from 6243 thousand tons to 9294 thousand tons. During this period, 5 new mills were built in Canada with cumulative productive capacity in 1967 of 860 thousand tons. During this period, an additional 12 new machines were installed in existing Canadian mills. Most of these machines had annual capacities in the 100 thousand ton range. Also during this period, U.S. Southern capacity trebled, adding an additional 800 thousand tons of capacity, which resulted almost entirely from new mill construction. Thus, new machines and new mills combined accounted for by far the largest chunk of the capacity increase which occurred between 1956 and 1967.

Large amounts of new capacity also occurred in 1966 and 1967 when many Eastern Canadian mills converted over to 7 day continuous operations from the normal 6 day week. This switchover increased capacity by 588 and 158 thousand tons in 1966 and 1967 respectively.

Most of the capacity increases which were realized in Canada and the U.S. South in the late 60s were accomplished through the installation of new machines in existing plants designed to incorporate new machines when demand warranted their installation.

The discussion of the last few paragraphs serves to demonstrate that several methods of expanding capacity have been used and that no one method has dominated capacity increases. Discussion follows on the relation between lag time and the means by which capacity is increased. To build a new mill in a new location has undoubtedly taken 2 or 3 years from the time the decision was made until the time when the mill could turn out reasonable levels of output. The lag may have been even longer for some mills during periods of substantial industry capacity expansion, as the order backlogs faced by machinery suppliers would likely have meant extended delivery dates.

Installation of a new machine in an existing mill may well take just as long. Usually, one doesn't merely order a new newsprint machine, take delivery and set it down in its designated spot as might be understood from the phrase - "installation of a new machine in an existing mill" - in truth, the process is often exactly the same as building a new mill, except that it is built beside an existing mill and the wall between them is removed. Invariably, if a significant amount of newsprint capacity is to be added through the installation of a new machine, then too, additional pulping, drying and logging capacity must be installed. If equipment delivery times are short and if the mill building is large enough to handle the new capacity, then perhaps the lag time can be reduced to a year and a half.

Speed ups can be undertaken at any time and may take anywhere from a few days to several years to complete, depending upon the nature of the speed up. Often, however, such changes can be made in weeks or months.

Changes in hours of operation can normally be accomplished (if available, of course) within a year, as these would have to be negotiated at the bargaining table.

In the case of both speed ups and changes in the normal hours of work, the actual lag may be increased by management's desire to implement the change at a particular time of the year, as for example, during the normal summer holiday period. This would tend to extend the average lag for such capacity changes.

Perhaps the quickest capacity changes occur following a decision to shut down obsolete or uneconomic capacity. The lag time in such cases may be days, weeks or months.

Table 5-1 summarizes the likely lag between decision and capacity change for each of the various methods by which newsprint capacity has been changed in the past.

Table 5-1

Lag Time and Means of Capacity Change

Means	Lag Time
1. New newsprint mills	2 years plus
2. New machines in existing mills	1½ years plus
3. Plant improvements	weeks plus
4. Changes in normal hours of work	months plus
5. Changes in product specifications	weeks plus
6. Shutdown of obsolete facilities	weeks plus

Incorporating a variable lag structure into proposed formulation

One logical approach to the problem of incorporating differing lags into the capacity estimation equation would be to set up a separate equation for each of the various means of capacity change. Unfortunately, the capacity data which are available are not suited for such purposes. We are left with no recourse but to attempt to construct a single estimating equation with separate components representing each of the various means of capacity change.

We might, for example, use an equation of the following general form:

$$
\begin{aligned}
\%\Delta NA.\ Ca_{t+\Theta-1\rightarrow t+\Theta} = {} & b_1 + b_2(n_1)\left(NA.CU^{e}_{(t+a_1)+(\Theta-a_1)+z_1}\right. \\
& \left. - NA.\ CU^{d}_{(t+a_1)+(\Theta-a_1)+z_1}\right) + b_3(n_2)\left(NA.\ CU^{e}_{(t+a_2)+(\Theta-a_2)+z_2}\right. \\
& \left. - NA.\ CU^{d}_{(t+a_2)+(\Theta-a_2)+z_2}\right) + b_4(n_3)\left(NA.\ CU^{e}_{(t+a_3)+(\Theta-a_3)+z_3}\right. \\
& \left. - NA.\ CU^{d}_{(t+a_3)+(\Theta-a_3)+z_3}\right) + b_5(n_4)\left(NA.\ CU^{e}_{(t+a_4)+(\Theta-a_4)+z_4}\right. \\
& \left. - NA.\ CU^{d}_{(t+a_4)+(\Theta-a_4)+z_4}\right)
\end{aligned} \qquad (14)
$$

where $t+a_r$ is the decision year, $\Theta-a_r$ is the lag, and $\Theta-a_r+z_r$ is the planning period. The first bracketed term involving expected minus desired levels of capacity utilization could represent new mill expansion; the second bracketed term could represent new machines in existing mills; the third, plant improvements; and the fourth term could represent capacity shutdowns. In such a case, Θ might equal 3 years, a_1 might equal 0.0, a_2 might equal 1 year, a_3 and a_4 might equal 2 years, and z_1 through z_4 could take on equal or unequal values. In this generalized equation, n_1 would equal 1.0 when the related expected level of North American capacity utilization exceeds the desired level of capacity utilization; otherwise it would equal 0.0; similarly for n_2 and n_3. n_4 would equal 1.0 only when the related desired level of capacity utilization exceeds the expected level.

Of course, in any specific formulation, each variable in the bracketed terms must be specified precisely. There are an infinite number of specific formulations which could be attempted, some of which by chance alone are likely to give good results. Thus, care must be taken to specify the values of the terms sensibly and to avoid an excessive number of trials.

Even the generalized structure of Equation 14 is far from satisfactory. A serious problem arises from the additive nature of the formulation. That is, often, when the first bracketed term representing the need for new mill capacity is positive, the second bracketed term, indicating a need for new machines, will also be positive. A response, however, to either one of these needs may negate the need originally indicated by the other factor.

(c) Growth Rate Considerations

Even were we to attempt to estimate the coefficients of Equation 14, it would be necessary to specify the values of z_1 through z_4, which in turn determine the appropriate planning periods.

Moreover, it would seem logical and in keeping with Chenery's (1952) findings to believe that management's planning horizon is related to the industry growth rate. Such a relationship would appear to be especially significant in the newsprint industry, since the medium term (i.e. 5 to 10 years) growth of shipments in this industry has fluctuated considerably over the industry's history. Changes in the industry's growth rate can be easily visualized from inspection of Graph C1, Appendix C, page C9.

Additionally, there may be a relationship between the industry growth rate and the means by which capacity is expanded. It makes sense that if the need for new capacity is growing slowly, then such need can and will most likely be fulfilled through plant improvements and speed ups; whereas, if the perceived need for new capacity is rising rapidly, then improvements and machine speed ups will be of insufficient magnitude to meet these requirements; thus, firms will consider more sizable expansions as through the construction of a new mill or installation of a new machine. There is considerable evidence that the means by which capacity is changed is related to the industry growth rate. Such evidence takes on 3 forms:

- As discussed in detail in the previous section of this chapter entitled "3.2 b.i. Lag and the Means of Capacity Change", most new newsprint mills and most new machines came on stream during the periods of greatest capacity and shipment growth.

As presented in Chapter IV (page 126), those newsprint executives interviewed stated that plant improvements and machine speed ups invariably showed higher returns on a given amount of investment than the larger undertakings and involved less risk, so they were more likely to be accepted by top management and approved by the Board of Directors.

Table 5-2 and Graph 5-4 clearly demonstrate, at least for the period 1946 to 1960, that across the major newsprint-producing regions of Canada, the slower the rate of increase of capacity, the more plant improvements and machine speed ups were responsible for that increase. Thus, in summary, there are strong reasons to believe that there is at least a strong association, if not a causal relationship, between the industry growth rate and both management's planning horizon and the means chosen for capacity change.

Once the motivation for mothballing capacity (the subject of the following section) has been discussed, a major reformulation of the proposed capacity change equation can be made.

Table 5-2

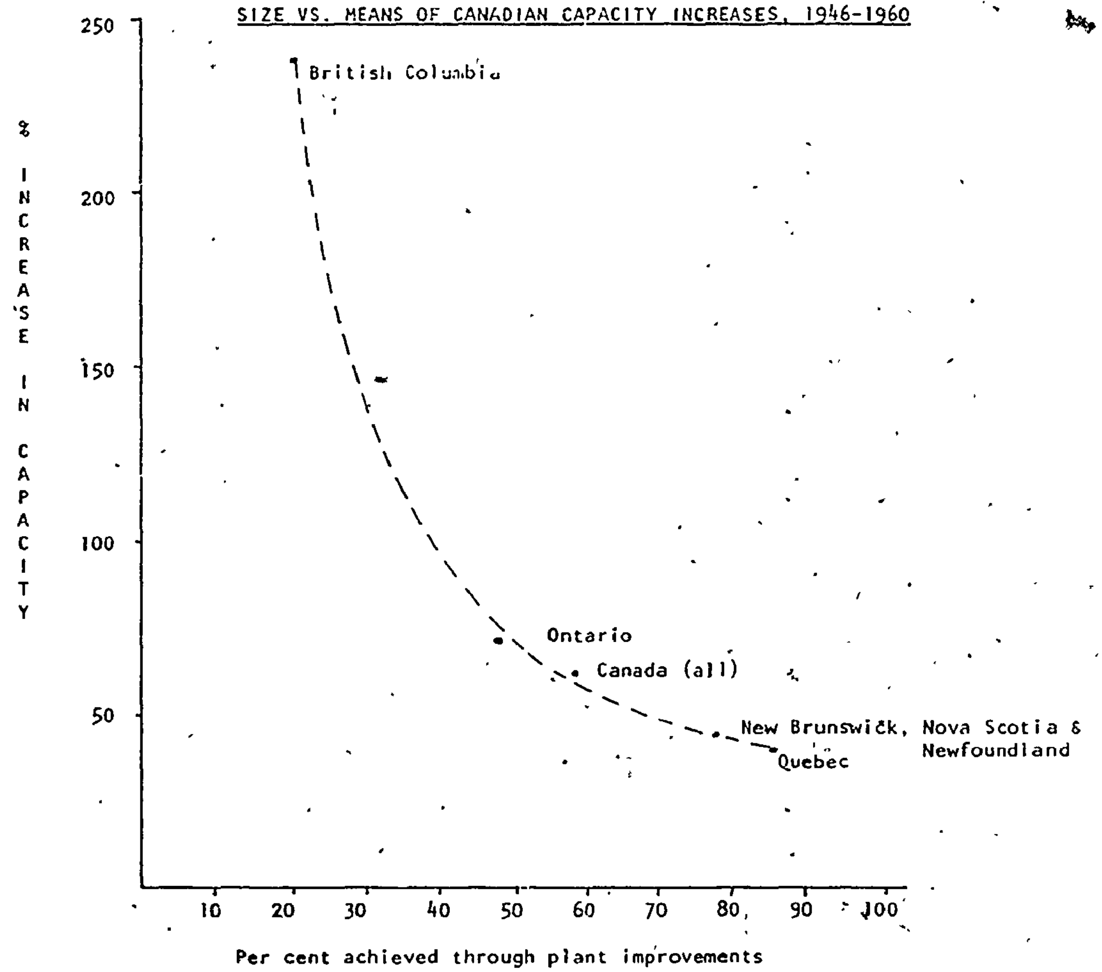
Means of Capacity Increase by Region, 1946 to 1960

Nature of Capacity Change	Region of Canada				
	All Canada	Quebec	Ontario + Man.	Maritimes	B.C.
Plant Improvements	58%	85%	48%	78%	21%
New machines in old and new mills	42%	15%	52%	22%	79%
Capacity increase in tons (000)	2970	1087	865	317	701
per cent (%)	64%	42%	72%	47%	238%

Source: Canadian Pulp and Paper Association, Annual Newsprint Data - 1960, (Montreal: Canadian Pulp and Paper Association, 1961), pp. 12 and 13.

GRAPH 5-4

SIZE VS. MEANS OF CANADIAN CAPACITY INCREASES, 1946-1960



(d) Motivation for Mothballing Newsprint Capacity

A crucial question is whether machines are mothballed, and capacity thus reduced, because of substantial amounts of idle capacity or because of extremely low profitability or for other reasons.

The newsprint industry is composed of firms whose returns can be considered as forming a distribution around the industry's average profitability. There are always some firms earning less than the industry average and some firms realizing substantially less than the industry average return. As industry profitability decreases, the probability increases that one or more firms will be unable to continue producing newsprint. Some firms will be able to convert their mills to the production of other paper grades, but be this the case or not, newsprint capacity is generally reduced as newsprint machines are mothballed.

Capacity increases requiring only a short time to implement, such as capacity increases resulting from plant improvements or speed ups, changes in normal working hours, and changes in product specifications may likewise result from industry prosperity. Since such capacity changes can be effected in short duration, there is little incentive for firms to build ahead of demand, when utilizing such means to increase capacity. Rather, they will wait until the demand and profitability are demonstrated by the current circumstances. Such reasoning is consistent with executive views presented in Chapter IV.

(e) Final Formulation

Attempting to incorporate those lag, growth and motivation aspects just discussed into the capacity change formulation led to the following estimation equation:

$$\%\Delta NA.\ Ca_{t+1\to t+2} = \underset{}{-5.92} + \underset{(0.0300)}{0.2098}\,(\eta_1)(NA.\ CU^e_{t+2+z} - 90) + \underset{(0.0300)}{0.1065}\,(R.\ N.\ Y.\ L.\ Pr_{t+2}) + \underset{(0.2416)}{0.6003}\,(\%\Delta S.O.D._{t+1\to t+2}) + \underset{(0.7792)}{2.5363}\,(D5_{t+2}) \qquad (15)$$

$\bar{R}^2 = 0.7926$ RSD = 1.90% Data: 1920-1971

D.W. = 1.41 (test for first order autocorrelation is inconclusive)

$$\text{where: } NA.\ CU^e_{t+2+z} = \left[\frac{NA.\ S_t + (2+z)(NA.\ S_{trend})}{NA.\ Ca_{t+1}}\right]100 \qquad (16)$$

and where:

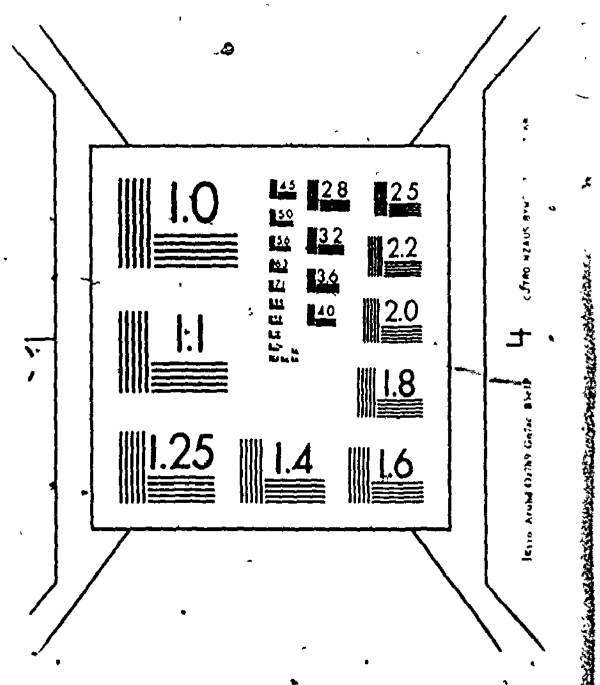
z equals	when: the industry growth of shipments equals
0.0	1.5% or less
1.0	1.6% - 3.0%
2.0	3.1% - 4.5%
3.0	4.6% - 6.0%
4.0	6.1% - 7.5%
5.0	7.6% plus

(17)

where $\%\Delta NA.\ Ca_{t+1\to t+2}$ is the percentage change in North American newsprint capacity from year t+1 to year t+2, $NA.\ CU^e_{t+2+z}$ is the expected level of North American newsprint industry capacity utilization in year t+2+z, $R.\ N.\ Y.\ L.\ Pr_{t+2}$ is the real New York list price of newsprint in year t+2 (1929 U.S. $), $\%\Delta S.O.D._{t+1\to t+2}$ is the percentage change in standard operating days from year t+1 to year t+2, $D5_{t+2}$ is a dummy variable equal to 1.00 for the years 1920 through 1929 inclusive (i.e. when t equals 1918 through 1927), $NA.\ S_t$ is the volume (000 tons) of North American newsprint shipments to all destinations in year t, NA. S_{trend} is the trend of North American newsprint shipments (000 tons per year), NA. Ca_{t+1} is the actual level of North American newsprint capacity (000 tons) in year t+1, n_1 equals 1.00 when NA. CU^e_{t+2+z} exceeds 90 per cent, otherwise it equals 0.0 and z+2 equals the planning period in years. The implied value of θ is, of course, 2 years (the number of years by which the decision to expand leads the increase in actual capacity).

The trend used was the annual 5 year time trend of North American newsprint shipments as determined from regression of shipments against time. The growth rate was calculated as the annual trend in shipments divided by the level of shipments at the time the decision is being made. From 1932 to 1949 inclusive, trends and growth rates were calculated on the previous 10 rather than 5 years of shipments, since this period was characterized by widely fluctuating demand and generally low levels of capacity utilization, and management would undoubtedly be more cautious in interpreting demand changes. The rather arbitrary use of either a 5 or 10 year trend is an obvious weakness of the formulation, yet, as has been argued, the explanation of capacity changes is not simple, but highly complex. Since it is logical that during a period of widely varying demand, decision-makers are likely to have less confidence in the latest demand and demand trend values and as a result will rely upon longer-term trends in order to lessen their uncertainty, then the use of differing time period trends is called for. For example, one might propose a linear relationship between the relative demand varia-

3



tion and the length of trend utilized which is perhaps more logical than either a 5 or 10 year trend. However, an infinite number of possible relationships exist and the more variations which are tried, the less valid are the results likely to be, since by chance alone, one is likely to find a reasonable fit. Thus, despite the arbitrariness of using either a 5 or 10 year trend, such procedure was felt to be more valid than alternate possible procedures.

Equation 15 differs substantially from generalized estimation Equation 14. In Equation 15, the term $NA.\ CU^{e}_{t+2+z} - 90$ represents the need for new mill and new machine (in existing mill) capacity. Bringing these 2 terms, as they were expressed in Formulation 14, together at least partially overcomes the problem that "a response. . . to either one of these needs may negate the need originally indicated by the other factor"[5]. A decision had to be made about the proper lag for this combined term - 2 years was chosen. Using a lag of 3 years yielded much the same results.

The real price of newsprint is a proxy for current profitability which in turn reflects a major factor motivating management to use short-term means of altering their capacity. Thus, this term should account for decreases in capacity brought about through the mothballing of mills and machines and should additionally account for increases in capacity brought about through plant improvements and changes in product specifications.

---

[5] above, p. 165.

The term $\%\Delta S.O.D._{t+1 \rightarrow t+2}$ reflects such factors as the number of Sundays in any particular year, leap years and any changes in the length of the normal work week. Only once in the last 55 years has a significant change been made in the length of the normal work week. That change took place in 1966 and carried over into 1967 when mills converted from 6 to 7 day a week operations.[6] In Equation 15, changes in industry capacity resulting from changes in standard operating days have been netted out of the equation, as such changes are either a once in a lifetime occurrence or are merely a function of the calendar.

The term $D5_{t+2}$ represents an attempt to net out special influences which existed in the 20s. It was during this period that relocation of the newsprint industry from the United States Northeast and Midwest to Eastern Canada took place. Tariff changes, government policies, dwindling U.S. wood supplies and a host of less important factors favored the establishment of productive facilities in Canada. The economics of locating in Canada were possibly so great that new Canadian capacity, established to replace U.S. capacity, could probably be justified on the basis of cost savings alone, without regard for the need for new capacity. Having added such new capacity, however, existing U.S. capacity would not be

---

[6] Companies often operate only 4 or 5 days per week when demand is poor, but this has no effect on their capacity which is rated on maximum weekly production. Prior to 1966, many firms were prohibited by law from operating on Sunday.

shut down as long as there was demand for its output. Thus, it wasn't until the 30s, when profits fell to record lows and many mills were idle, that much of the initial U.S. capacity was mothballed or converted to the production of some other paper product.

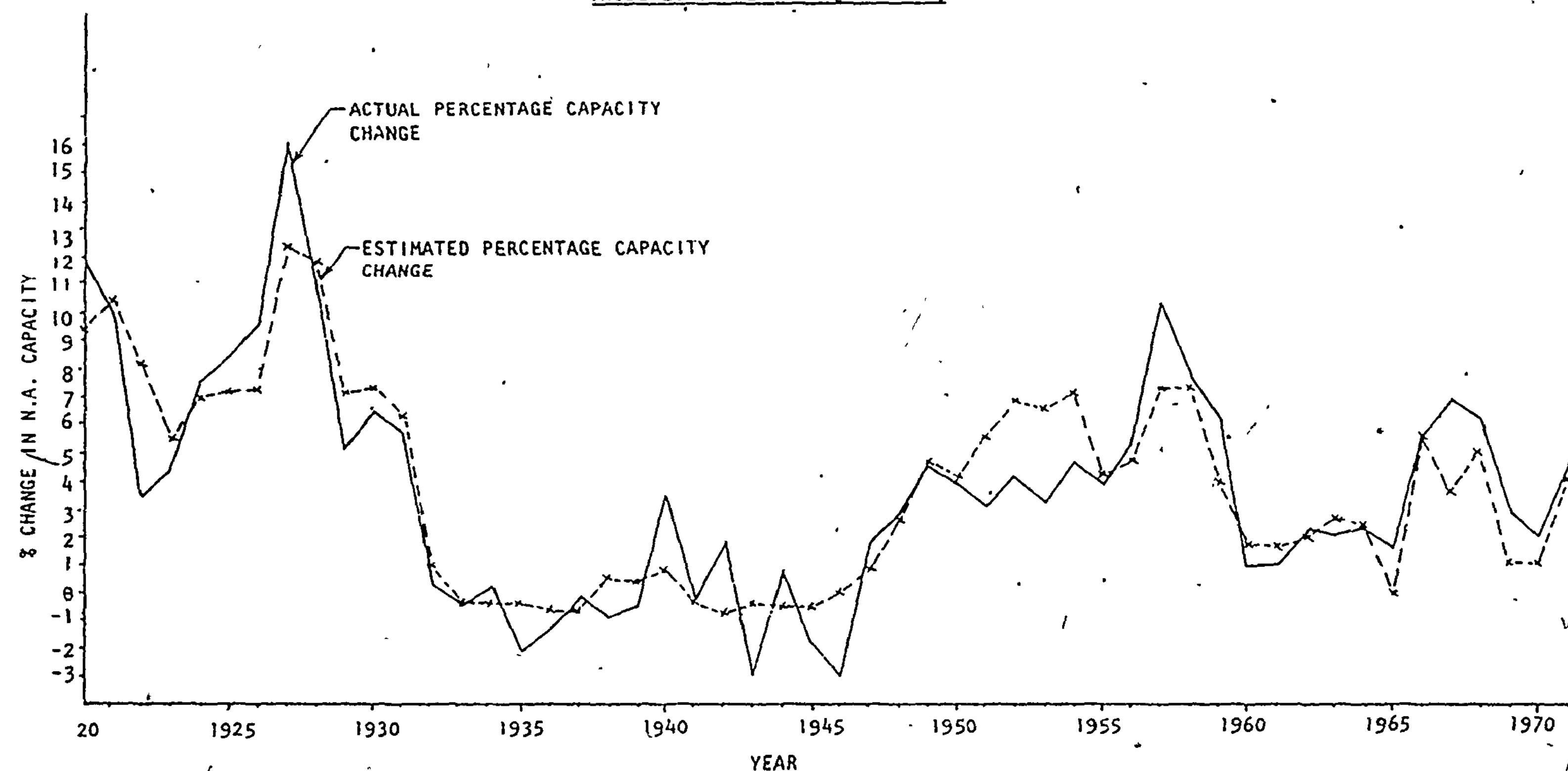
3.3 Discussion of Findings

Estimation Equation 15 appears to offer a partial explanation of the factors which have led to capacity changes in the North American newsprint industry. Graph 5-5 compares actual with estimated percentage changes in North American newsprint industry capacity over the period 1920 through 1970. The estimating equation shows considerably less short-term variation in capacity changes than actually occurred. This was expected to some degree, since capacity changes take place in discreet steps. For example, today's modern newsprint machines are equivalent to about 1 per cent of existing North American industry capacity; moreover, most new mills are planned to ultimately house 2, 3, or more such machines.

It is particularly encouraging that the common sense approach taken yielded an estimation equation in which all signs were correct, all coefficients were statistically and economically significant, and the overall fit of the equation was quite good. However, the presence of a constant in the estimating equation equal to a minus 5.92 is somewhat bothersome, since it indicates that, if all other terms were zero in a particular year, then North American newsprint capacity would be expected to decline 5.92 per cent. It is not possible,

GRAPH 5-5

ACTUAL NORTH AMERICAN CAPACITY CHANGES (%) VS. THOSE ESTIMATED BY EQUATION 15



however, for all of the other terms to equal zero in a particular year. In particular, the real New York list price of newsprint will take on a positive value. Equation 15 can be rewritten as follows:

$$\%\Delta NA.\ Ca_{t+1\rightarrow t+2} = \underset{(0.0300)}{+0.2098}\ (n_1)(NA.\ CU^{e}_{t+2+z} - 90)$$

$$+ \underset{(0.0300)}{0.1065}\ (R.\ N.\ Y.\ L.\ Pr_{t+2} - 55.58) + \underset{(0.2416)}{0.6003}\ (\%\Delta S.O.D._{t+1\rightarrow t+2})$$

$$+ \underset{(0.7792)}{2.5363}\ (D5_{t+2}) \qquad (15a)$$

Estimating Equation 15a removes the constant value and utilizes the term "R. N. Y. L. Pr_{t+2} - 55.58" as the proxy term for the industry's current profitability. Such a proxy would appear reasonable, as the average real New York list price of newsprint over the period considered equalled $65.42 U.S.

As mentioned earlier, the flexibility achieved through the type of capacity change formulation proposed is, to some degree, balanced by the caution one must exercise in interpreting the resulting estimation equation. Nevertheless, a number of conclusions can be drawn which are supported by both the coefficients of the estimation equation and by common sense.

These conclusions are:

- New mill and new machine capacity additions are strongly motivated by a perceived need for new capacity. There is the strong implication that this perceived need for new capacity is a function of (1) the expected demand for newsprint at some future time, (2) the existing industry capacity plus announced capacity additions, and (3) an optimum degree of plant utilization.

- Additionally, there is the suggestion that "the expected demand for newsprint" is determined from an extrapolation of recent historical trends, either of shipments themselves or of factors upon which shipments are considered to depend.

- The results indicate that management's planning horizon varies with the proposed means of capacity change and with the industry's growth rate. The planning horizon, it will be recalled, reflects management's desires to build ahead of demand.

- Results indicate that speed ups, plant improvements and facility closedown or conversion have been responsible for roughly 29 per cent of all North American newsprint capacity changes.[7] This result compares roughly with published figures of the Canadian Pulp and Paper Association.

It appears that machine speed ups, plant improvements and facility closedowns take little time to implement and are motivated primarily by existing profitability considerations. Profitability may, of course, also reflect fund availability, which, in turn may constrain capacity growth.

---

[7] Substituting into Equation 15a the average real New York list price of newsprint ($65.42 U.S.) over the period considered, it can be seen that the average effect of the term "0.1065 (R. N. Y. L. Pr_{t+2} - 55.58)" has been a positive 1.048 per cent influence on capacity (i.e. 0.1065*(65.42 - 55.58)). Since the average annual capacity change has been a positive 3.64 per cent, then the current profitability proxy variable accounts for 29 per cent of North American capacity changes.

- The tremendous increase in North American newsprint capacity which occurred in the 20s cannot be accounted for solely in terms of need or profitability. Technological and government-controlled factors (e.g. tariffs and quotas) appear to have played important roles in the industry's relocation and the associated capacity rise of that period.

Graph 5-5 also reveals some interesting possibilities:

- Management may have been reluctant to make major capacity additions in response to a perceived need for additional output if the industry has just recovered from a period of poor profits. This is suggested by the fact that actual capacity change failed to keep up with estimated capacity change during the years 1950 through 1954. It is also reflected in management's present (1974) conservative approach towards capacity addition following the industry's poor financial performance during the early 70s. On the other hand, the lack of sufficient funds, rather than management's reluctance, may have a limiting effect on capacity additions during these periods.

- Graph 5-5 also lends some support to the belief of some industry executives that at least some firms have built additional capacity merely to maintain their share of industry capacity and thus presumably protect, in the long run, their share of the market. Evidence that this may be the case is most readily identifiable during the peak years of capacity addition; ~~that is~~, during the years 1920, 1927, 1957 and 1967. During each of these years, the actual capacity increase far exceeded the estimated capacity increase, thus pointing to the possibility of a bandwagon effect.

3.4 Sensitivity of Results

It should be noted that the coefficients of Equation 15 and the overall squared multiple correlation coefficient adjusted for degrees of freedom (i.e. $\bar{R}^2$) are quite insensitive to changes in the desired level of capacity utilization (e.g. over the range 85% to 100%). This is encouraging, as there is no published evidence concerning the magnitude of this desired or optimum level of capacity utilization. Thus, if one strongly believes that the desired level of capacity utilization is more appropriately 95%, then Equation 15 can be modified accordingly with very little effect on the coefficients of other terms, or more importantly on the conclusions which can be drawn.

Moderate changes in the values of z, reflecting changes in the planning horizon, also have a small effect upon the specification of Equation 15. For example, increasing the planning period by 1 year for each level of industry growth yields much the same coefficient values and an improved $\bar{R}^2$ statistic. Utilizing a constant planning horizon for all growth rates, however, yields a much lower $\bar{R}^2$ statistic, thus adding support to the conclusion that management's planning horizon varies with the industry's growth rate.

Small correlations between the independent variables of Equation 15 and the consistency of coefficient values under changing specifications, indicate that the estimation equation does not suffer from multicolinearity problems.

4. In Conclusion

In reconsidering Hypothesis 4 of this research, I believe it is fair to state that an econometric model of the Canadian newsprint industry was constructed which accounted in large part for the major movements in newsprint prices and industry capacity; that is, "those factors which this author and industry executives feel have most affected this industry's financial performance".

Materials presented in this chapter also support Hypothesis 5 of this research -- that this model will show indications of predictive potential; however, a more thorough analysis of the model's predictive potential is presented in the following chapter.

CHAPTER VI. COMPARISON OF REGRESSION RESULTS WITH RESULTS DETERMINED BY NAIVE ESTIMATING EQUATIONS

1. Introduction

Often, when estimating time series values, one will find that time alone will account for a great deal of the change in the variable under consideration. Time, however, cannot be said to have explanatory significance in most research studies.

Usually, even a stronger relationship exists between the value of the variable under consideration and its own past values than with time. It is this relationship between a variable's present value and its own past values which will be reported in this chapter and contrasted, in ways which are described below, with the results presented in Chapter V. An equation which estimates a variable's present value based upon its own past values will be referred to as a naive estimating equation.

The generalized form of the naive estimating equations presented in this chapter is as follows:

$$X_t = b_1 + b_2(X_{t-1}) + b_3(X_{t-2}) + b_4(X_{t-3})^{1} \quad (17)$$

[1]Box and Jenkins (1976) refer to this model as a third order autoregressive linear model. The third order autoregressive linear model is one of a very large set of models more generally referred to as autoregressive integrated moving average models which are used extensively for forecasting purposes. Third order autoregressive models have been found useful for forecasting movements in stationary (fixed mean) series and less so for forecasting movements in non-stationary (no fixed mean) series. Integrated moving average series models have been found to be more useful in forecasting non-stationary economic variables such as stock prices.

In this formulation, the present value of the variable under investigation is estimated as a function of a constant, its own value in the previous year, 2 years ago and 3 years ago.

Recall that the major purpose of this chapter is to assess the predictive potential of the estimating equations presented in Chapter V. Because of severe data limitations, which rule out any possibility of actually using the estimating equations as forecasting equations and thus compare forecasted results with actual results, the predictive potential of the estimating equations developed in Chapter V will be further assessed by contrasting their estimating capabilities with the estimating capabilities of naive estimating equations.[2]

What then are likely to be the characteristics of an estimating equation which possesses predictive potential?

2. Measurement of Predictive Potential

Certainly the overall goodness of fit of the estimating equation will yield a strong indication of the estimator's predictive potential.

An estimator's ability to capture major turning points

---

[2]The naive estimating equations presented in this chapter (i.e. third order autoregressive) are simply one form of a multitude of time series based forecasting models in use. Undoubtedly, improved time series based forecasting models could be determined for the prediction of key economic entities of the Canadian newsprint industry.

should also indicate its predictive potential. Naive estimating equations, by their very structure, cannot be expected to properly indicate major turning points.

An estimator's predictive potential is most probably also indicated by the estimator's ability to properly indicate the direction of change, as for example, whether the price of newsprint will increase, decrease or stay the same.

Finally, an estimator's predictive potential may also be indicated by the estimator's ability to properly demonstrate the direction of the rate of change of the variable under consideration, as for example, whether the price of newsprint will rise more, less or the same amount as last year's newsprint increase.

Thus, in comparing the predictive potential of those estimating equations developed in Chapter V with the proposed naive equations, 4 factors (or fewer, depending on the factor's applicability) will be compared. These are: (1) the overall goodness of fit (as measured by the $\bar{R}^2$ statistic), (2) the ability to catch major turning points, (3) the direction of change estimation capability, and (4) the rate of change direction estimation capability.

3. Industry Income Statement Equations

3.1 United States Newsprint Consumption

Application of consumption data to the generalized naive estimating equation gives the following results:

$$U.S.\ C_t = 90.96 + \underset{(0.1463)}{1.3391}\ U.S.\ C_{t-1} - \underset{(0.2388)}{0.5309}\ U.S.\ C_{t-2} + \underset{(0.1514)}{0.1993}\ U.S.\ C_{t-3} \qquad (18)$$

$\bar{R}^2 = 0.9867$ RSD = 267,277 tons

Data: 1919 - 1970 D.W. = 1.92 (the hypothesis of random residuals cannot be rejected)

where U.S. C_t is the volume of newsprint consumed (000 tons) in the United States in year t.

On the basis of $\bar{R}^2$ alone, the proposed consumption estimation equation (Equation 1a, Chapter V, page 136) would seem to be only marginally better than the naive estimator, Equation 18.

An attempt to improve upon these results by estimating U.S. consumption on the basis of the previous year's consumption, changes in the number of U.S. households, and changes in real disposable income, yielded the following equation:

$$U.S.\ C_t = -15.52 + \underset{(0.0201)}{0.9528}\ U.S.\ C_{t-1} + \underset{(0.1217)}{0.4316}\ \Delta U.S.\ HH_{t-1 \to t} + \underset{(6.94)}{17.23}\ \Delta U.S.\ RDI_{t-1 \to t} \qquad (19)$$

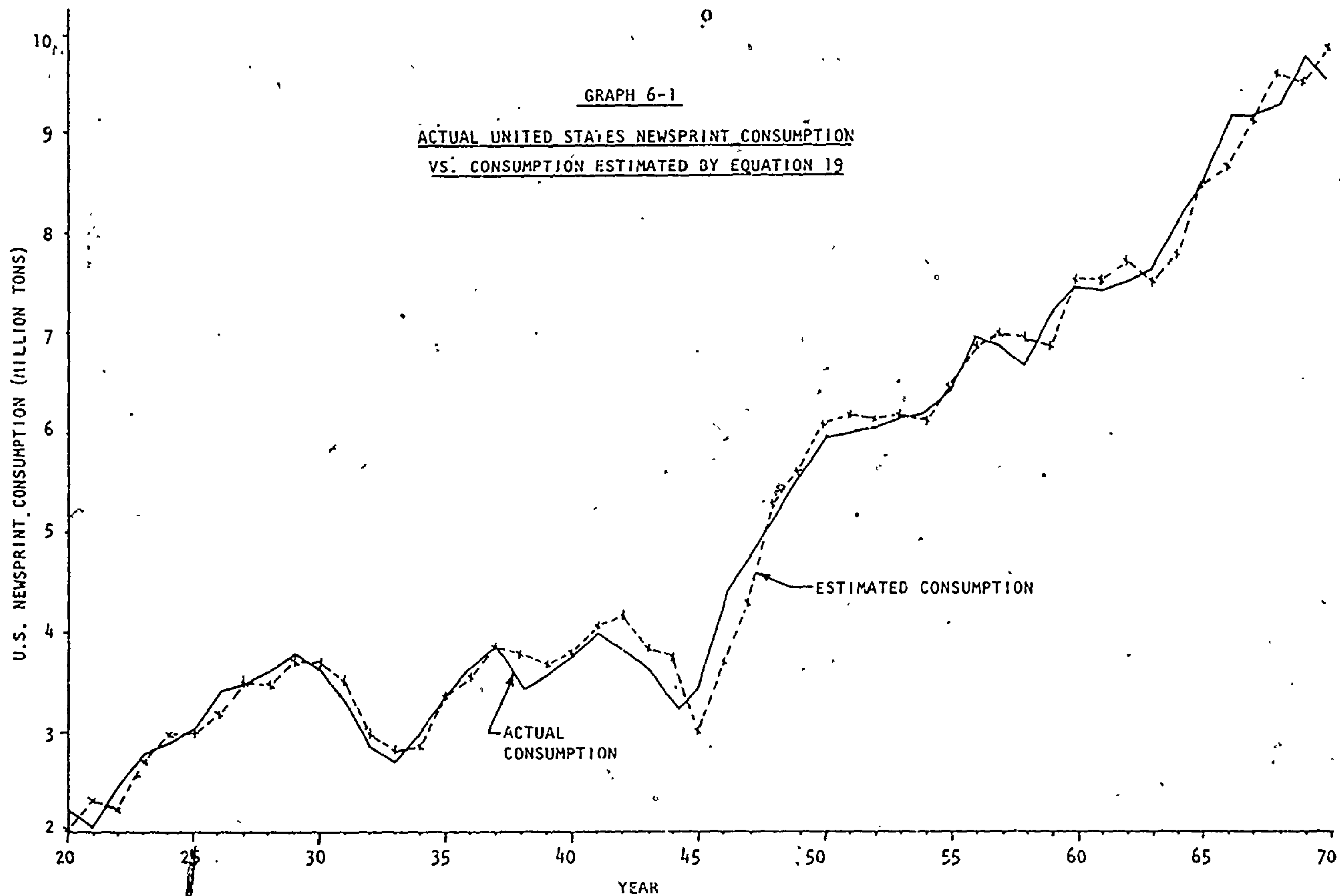
$\bar{R}^2 = 0.9894$ RSD = 236,697 tons

Data: 1920 - 1970 D.W. = 1.67 (the hypothesis of random residuals cannot be rejected)

where U.S. C_t is the volume of newsprint (000 tons) consumed in the United States in year t, ΔU.S. $HH_{t-1 \to t}$ is the change in the number (000) of U.S. households from year t-1 to year t, and ΔU.S. $RDI_{t-1 \to t}$ is the change in U.S. real disposable income (1929 U.S. \$ billions) from year t-1 to year t.

Estimates of U.S. newsprint consumption as given by Equation 19 and actual U.S. newsprint consumption values are plotted as Graph 6-1. As can be seen, peaks and troughs in estimated U.S. newsprint consumption (as estimated by Equation 19) tend to lag by 1 year the actual peaks and troughs of newsprint consumption. This is due to the fact that the major factor determining the level of U.S. newsprint consumption (using Equation 19) in 1 year is the previous year's consumption. Tables 6-1, 6-2 and 6-3 present comparisons of $\bar{R}^2$, turning point identification, and direction of change estimation capability for the proposed estimating equation (Equation 1a), the naive estimator (Equation 18), and the revised estimator (Equation 19).

It can be seen from these tables that the revised estimator (Equation 19) has a slightly higher $\bar{R}^2$ value than the proposed estimator (Equation 1a). In terms of major turning point identification ability and direction of change indication capability, however, the proposed equation is far superior to either the naive or revised estimators. Thus, the proposed equation is likely to be quite suitable for predictive purposes.



GRAPH 6-1

ACTUAL UNITED STATES NEWSPRINT CONSUMPTION VS. CONSUMPTION ESTIMATED BY EQUATION 19

Table 6-1

U.S. Newsprint Consumption

$\bar{R}^2$ for Various Proposed Estimation Equations

	Proposed Equation 1a	Naive Estimator Equation 18	Revised Estimator Equation 19
$\bar{R}^2$ statistic	0.9876	0.9867	0.9894
RSD (tons)	258200	267277	236698
Data (years)	1919-1970	1919-1970	1920-1970
Durbin Watson	1.216	1.92	1.67

Table 6-2

U.S. Newsprint Consumption

Turning Point Identification Abilities of Proposed Equations

Major Turning Points (year)	Proposed Equation 1a	Naive Estimator Equation 18	Revised Estimator Equation 19
1929	Yes	No	Yes
1933	Yes	No	Yes
1937	Yes	No	Yes
1938	Yes	No	No
1941	Yes	No	No
1944	No	No	No
Number of major turning points properly identified (per cent)	5 (83%)	0 (0%)	3 (50%)

Note: A "Yes" signifies that the estimating equation properly caught a major turning point.

For a peak year to be considered a major turning point year, consumption had to rise at least 10 per cent from the last turning point year and had to fall by at least 10 per cent before the next turning point year; vice versa for troughs.

Table 6-3

U.S. Newsprint Consumption

Direction of Change Indication Capabilities of Estimators

Actual vs. Indicated Direction of Change		Proposed Estimator		Naive Estimator		Revised Estimator	
Actual	Indicated	No.	%	No.	%	No.	%
Up	Up	38	75%	27	53%	29	57%
Up	Down	0	0%	11	22%	9	18%
Down	Up	7	14%	7	14%	4	8%
Down	Down	6	11%	6	11%	9	18%
Total Incorrect		7	14%	18	35%	13	26%

3.2 U.S. Newsprint Consumption per Household

The second variable which we wish to consider is U.S. newsprint consumption per U.S. household. The naive estimating equation is as follows:

$$\text{U.S. } C/HH_t = 0.01 + \underset{(0.1451)}{1.2483}\ \text{U.S. } C/HH_{t-1} - \underset{(0.2240)}{0.4714}\ \text{U.S. } C/HH_{t-2} + \underset{(0.1435)}{0.1421}\ \text{U.S. } C/HH_{t-3} \qquad (20)$$

$\bar{R}^2 = 0.8948$ RSD = 13.6 pounds

Data: 1920 - 1970 D.W. = 1.97 (the hypothesis of random residuals cannot be rejected)

where U.S. C/HH_t is the volume (pounds) of newsprint consumed per household in the United States in year t.

On the basis of $\bar{R}^2$ alone, this naive estimator yields better results than the proposed consumption per household estimating equation (Equation 1c, Chapter V, p. 139)

A revision gave the following results:

$$U.S.\ C/HH_t = 27.32 + \underset{(0.0485)}{0.8961}\ U.S.\ C/HH_{t-1} + \underset{(0.0144)}{0.0375}$$

$$\Delta U.S.\ RDI/HH_{t-1\to t} - \underset{(0.3151)}{0.1671}\ \Delta R.\ N.\ Y.$$

$$L.\ Pr_{t-1\to t} - \underset{(6.8677)}{9.3252}\ D_t \qquad (21)$$

$\bar{R}^2 = 0.9016$ RSD = 13.46 pounds Data: 1920 - 1970

D.W. = 1.32 (indicating positive autocorrelation of the 5 per cent significance level)

where U.S. C/HH_t is the volume of newsprint (pounds) consumed per household in the United States in year t, ΔU.S. $RDI/HH_{t-1\to t}$ is the change in real disposable income per household in the United States from year t-1 to year t (1929 U.S. $), ΔR. N. Y. L. $Pr_{t-1\to t}$ is the change in the real New York list price of newsprint from year t-1 to year t (1929 U.S. $), and D_t equals 1.00 for the war years (1942 through 1946) but otherwise equals zero.

The predictive potentials of the proposed estimator (Equation 1c), the naive estimator (Equation 20), and the revised estimator (Equation 21) are contrasted in Tables 6-4, 6-5 and 6-6.

Table 6-4

U.S. Newsprint Consumption per Household
$\bar{R}^2$ for Various Proposed Estimation Equations

	Proposed Equation 1c	Naive Estimator Equation 20	Revised Estimator Equation 21
$\bar{R}^2$ statistic	0.8914	0.8948	0.9016
RSD (pounds)	14.40	13.60	13.46
Data (years)	1919-1970	1920-1970	1920-1970
Durbin Watson	1.09	1.97	1.32

Table 6-5

U.S. Newsprint Consumption per Household

Turning Point Identification Abilities of Proposed Equations

Major Turning Points (year)	Proposed Equation 1c	Naive Estimator Equation 20	Revised Estimator Equation 21
1920	Yes	No	No
1921	Yes	No	No
1929	Yes	No	Yes
1933	Yes	No	No
1937	Yes	Yes	Yes
1938	Yes	No	No
1941	Yes	No	Yes
1944	No	No	No
1950	No	No	No
1954	Yes	No	Yes
1956	Yes	Yes	No
1958	Yes	No	No
1960	No	Yes	No
1963	No	No	Yes
Number of turning points properly identified (per cent)	10 (71%)	3 (21%)	5 (36%)

Note: A "Yes" signifies that the estimating equation properly identified a major turning point.

For a peak year to be considered a major turning point year, consumption per household had to rise at least 5 per cent since the last turning point year and had to fall by at least 5 per cent before the next turning point year; vice versa for troughs.

Table 6-6

U.S. Newsprint Consumption per Household

Direction of Change Indication Capabilities of Estimators

Actual vs. Indicated Direction of Change: Actual	Indicated	Proposed Estimator 1c No.	%	Naive Estimator 20 No.	%	Revised Estimator 21 No.	%
Up	Up	23	45%	19	37%	21	41%
Up	Down	7	14%	11	22%	9	18%
Down	Up	10	20%	9	18%	7	14%
Down	Down	11	22%	12	24%	14	27%
Total Incorrect		17	33%	20	39%	16	31%

Note: The number incorrect is the number of times that the appropriate estimator indicated that consumption per household would increase and it actually decreased plus the number of times the estimator indicated that it would decrease and it actually increased.

It can be seen from these tables that the proposed Equation 1c does a far better job of identifying turning points than either of the other 2 estimators. On a basis of overall fit or direction of change indication capability however, all 3 estimators performed about equally. Equation 1c undoubtedly explains the factors underlying newsprint consumption per household changes better than either the naive or revised equations; however, its predictive ability really depends upon the accuracy with which forecasters can predict changes in real disposable income per household and how well management can predict changes in the real New York list price of newsprint.

The inability to achieve better overall results is not surprising, as these formulations do not explicitly take into account factors reflecting advertising or overall business activity. Recall that such factors were omitted from consideration because of data limitations.

3.3 The List Price of Newsprint in New York

The naive estimating equation takes on the following form:

$$\text{N. Y. L. Pr}_{t-1\to t} = 0.7386 + \underset{(0.1421)}{0.4090}\ \text{N. Y. L. Pr}_{t-1\to t-2} - \underset{(0.1214)}{0.3137}\ \text{N. Y. L. Pr}_{t-2\to t-3} + \underset{(0.1184)}{0.1906}\ \text{N. Y. L. Pr}_{t-3\to t-4}{}^{3} \qquad (22)$$

$\bar{R}^2 = 0.2035$ RSD = \$6.42 U.S. Data: 1922-1971

D.W. = 1.96 (the hypothesis of random residuals cannot be rejected)

[3] This is more commonly referred to as a first difference, third order autoregressive model.

In this case, the initial proposed and relatively simple formulation (Equation 7a, Chapter V, p. 145) shall be compared with the final proposed estimator (Equation 7b, Chapter V, p. 149) and with the naive Equation 22. Tables 6-7, 6-8 and 6-9 present comparisons of $\bar{R}^2$, direction of change estimation capability (i.e. ability to properly indicate whether the price would rise, fall or stay the same), and rate of change direction estimation capability (i.e. ability to indicate whether the price would rise more or less or fall more or less than the previous year) for our 3 estimators. Turning points are rather meaningless when one is considering price changes, but would be more meaningful if one were considering the absolute price of newsprint.

Table 6-7

List Price of Newsprint in New York

$\bar{R}^2$ for Various Proposed Estimation Equations

	Initial Proposed Equation 7a	Final Proposed Equation 7b	Naive Estimator Equation 22
$\bar{R}^2$ statistic	0.8476	0.9394	0.2035
RSD ($ U.S.)	2.78	1.84	6.42
Data (years)	1922-1971	1922-1971	1922-1971
Durbin Watson	1.78	2.01	1.96

Table 6-8

List Price of Newsprint in New York

Direction of Change Indication Capabilities of Estimators

Actual vs. Indicated Direction of Change Actual	Indicated	Initial Proposed Equation No.	%	Final Proposed Equation No.	%	Naive Estimator Equation No.	%
Rise	Rise	22	44%	22	44%	22	44%
Rise	Fall	2	4%	2	4%	2	4%
Fall	Rise	0	0%	0	0%	4	8%
Fall	Fall	10	20%	10	20%	6	12%
Level	Rise	8	16%	11	22%	13	26%
Level	Fall	8	16%	5	10%	3	6%
Total Incorrect:		2	4%	2	4%	6	12%

Note: The number incorrect is the number of times the appropriate estimator indicated a price rise when the price actually decreased plus the number of times the estimator indicated a price decline when the price actually rose; it does not include the number of times a rise or fall was indicated and the price did not change.

Table 6-9

List Price of Newsprint in New York

Rate of Change Direction Indication Abilities of Equations

Actual vs. Indicated Direction Indication Actual	Indicated	Initial Proposed Equation 7a No.	%	Final Proposed Equation 7b No.	%	Naive Estimator Equation 22 No.	%
More	More	15	31%	16	33%	14	29%
More	Less	3	6%	2	4%	4	8%
Less	More	5	10%	4	8%	9	18%
Less	Less	13	27%	14	29%	9	18%
Same	More	8	16%	7	14%	6	12%
Same	Less	5	10%	6	12%	7	14%
Total Incorrect:		8	16%	6	12%	13	27%

Note: The number incorrect is the number of times the appropriate estimator indicated the price would rise more than the previous year but it actually rose less or would fall less but it actually fell more (both of these outcomes are included in Less More) plus those situations implied by More Less.

These tables clearly demonstrate that the derived list price determination equation (Equation 7b) is superior in all respects to the naive estimating equation (Equation 22). The derived equation is then more likely to yield acceptable predictions than the naive estimating equation.

4. North American Newsprint Capacity

The capacity change naive estimating equation was found to be:

$$\Delta NA.\ Ca_{t+1\rightarrow t+2} = 66.40 + \underset{(0.1504)}{0.8196}\ \Delta Na.\ Ca_{t\rightarrow t+1}$$

$$- \underset{(0.1925)}{0.1187}\ \Delta NA.\ Ca_{t-1\rightarrow t} + \underset{(0.1477)}{0.0220}\ \Delta NA.\ Ca_{t-2\rightarrow t-1} \qquad (23)$$

$\bar{R}^2 = 0.5445$ RSD = 171733 tons

Data: 1922 - 1971 D.W. = 1.93 (the hypothesis of random residuals cannot be rejected)

Again, these results can be compared with those of the proposed explanatory equation (Equation 15, Chapter V, p.170). Tables 6-10, 6-11 and 6-12 present comparisons of overall fit, direction of change estimation capability (i.e. ability to properly indicate whether capacity will rise, fall or stay the same), and rate of change direction estimation capability (i.e. ability to properly indicate whether capacity will rise more or less or fall more or less than the previous year) for the explanatory equation (Equation 15) and the naive estimator (Equation 23).

Table 6-10

North American Newsprint Capacity Changes

$\bar{R}^2$ for Various Proposed Estimation Equations

	Proposed Equation 15	Naive Estimator Equation 23
$\bar{R}^2$ statistic	0.7926	0.5445
RSD	1.90%	171733 tons
RSD Equivalent based upon an average North American capacity of 7.4 million tons	140000 tons	2.32%
Data	1920-1971	1922-1971
Durbin Watson	1.41	1.93

Note: The naive estimator's RSD is undoubtedly aided because data input to this estimator did not include data for the years 1920 and 1921, when capacity changes in percentage terms were very large (11.8% and 9.9% respectively) in comparison to most other years.

Table 6-11

North American Newsprint Capacity Changes

Direction of Change Indication Capabilities of Estimators

Actual vs. Indicated Direction of Change: Actual	Indicated	Proposed Equation 15: No.	Proposed Equation 15: %	Naive Estimator Equation 23: No.	Naive Estimator Equation 23: %
Rise	Rise	38	73%	38	76%
Rise	Fall	4	8%	2	4%
Fall	Rise	2	4%	8	16%
Fall	Fall	8	15%	2	4%
Total Incorrect:		6	12%	10	20%

Note: The number incorrect is the number of times the appropriate estimator indicated a capacity rise when the capacity actually decreased plus the number of times the estimator indicated a capacity decline when the capacity actually rose.

Table 6-12

North American Newsprint Capacity Changes

Rate of Change Direction Indication Abilities of Equations

Actual vs. Indicated Direction Indication		Proposed Equation 15		Naive Estimator Equation 23	
Actual	Indicated	No.	%	No.	%
More	More	17	33%	11	22%
More	Less	9	18%	15	31%
Less	More	7	14%	14	29%
Less	Less	18	35%	9	18%
Total Incorrect:		16	31%	29	59%

Note: The number incorrect is the number of times the appropriate estimator indicated the capacity would increase more than the previous year but it actually rose less or would fall less but it actually fell more (both of these outcomes are implied by Less More) plus those occurrences implied by More Less.

Once again, these results suggest that the predictive potential of the derived explanatory equation (Equation 15) exceeds that of the naive estimator.

5. Summary

In summary then, evidence exists which suggests that the equations developed to explain the newsprint industry's development and performance may be adapted, with relatively good potential for success, to the prediction of the industry's future development and performance. The evidence presented in this chapter clearly supports Hypothesis 5 of this research that the derived "model, though not developed for predictive purposes, will show indications of predictive potential".

CHAPTER VII. SUMMARIZATION AND EXPANSION OF FINDINGS OF RESEARCH

1. Introduction

The major purpose of this chapter is to summarize and expand upon the findings of this thesis. The unsatisfactory nature of the Canadian newsprint industry's financial performance was documented, and the potential benefits of improved industry profitability were discussed in Chapter I.

2. Excess Capacity and Industry Performance

This research has clearly shown that the major factor which has adversely affected the financial performance of Canada's newsprint industry has been excess newsprint capacity. The supporting evidence is as follows:

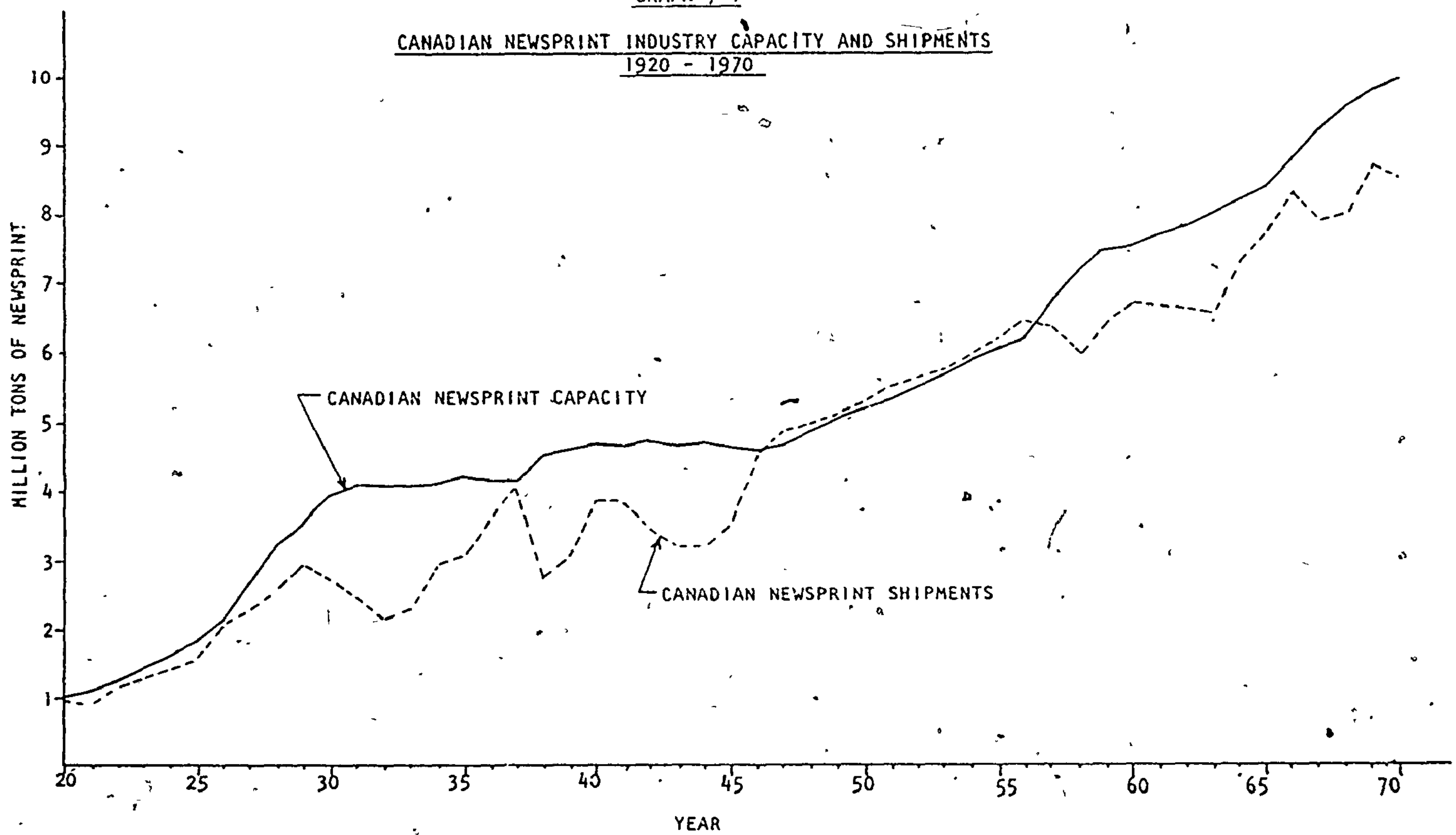
- Graph 2-1 (Chapter II, page 33) and Graph 7-1 indicate the substantial absolute and relative amounts of excess capacity which have existed in this industry.

- Graph 2-1 (Chapter II, page 33) also demonstrates the marked association between the industry's profitability and the industry's rate of capacity utilization (a relative measure of excess capacity).

- Executives of leading Canadian newsprint manufacturing firms also considered their industry's financial performance (over the period which they could recall) as having been unsatisfactory (Chapter IV, page 96), and that excess capacity had been the chief cause of such performance (Chapter IV, page 97). However, executives believed that not only

GRAPH 7-1

CANADIAN NEWSPRINT INDUSTRY CAPACITY AND SHIPMENTS
1920 - 1970



the amount of excess capacity but also the means by which this excess capacity came about were important determinants of financial performance. For example, a majority of executives felt that price discounting (a factor which undoubtedly affects industry profitability) was much more likely to occur under conditions of excess capacity when such excess capacity was brought about by new entrant mill construction (Chapter IV, page 111).[1]

- The econometric model of the newsprint industry, while indicating that cost changes have been the major determinant of list price changes, also showed that industry margins are influenced by the magnitude of excess industry capacity (Chapter V, Equation 7b, page 149). In particular, margins can be expected to decline when the industry is not operating at or near full capacity. Executives generally support this view, indicating that price discounting (should it exist at the time) should disappear and margins firm during a recovery when the industry level of capacity utilization approaches 90 per cent (Chapter IV, page 117).

Excess capacity has played a very important role in determining this industry's financial performance; how then has this excess capacity come about?

3. The Development of Excess Capacity in the Canadian Newsprint Industry, 1920-1970

Excess capacity exists when available newsprint

---

[1]The effect of excess capacity on the pricing of newsprint is considered in more detail on pages 226 through 242 of this chapter.

capacity exceeds newsprint production. To understand how excess capacity comes about requires an understanding of the determinants of newsprint capacity and of the determinants of newsprint production.

3.1 Newsprint Production, Shipments and Consumption

Empirical results clearly show almost perfect correlation between newsprint production and newsprint shipments (Chapter V, Equation 3a, page 143). Empirical results also indicate a very close parallel between a nation's newsprint consumption and newsprint shipments to that nation (including shipments by its own newsprint producers) (Chapter V, Equation 2a, page 142). This research, however, offers no clear explanation of what factors determine how much of one nation's newsprint consumption is supplied by another nation's (or the same nation's) producers (e.g. how much of the United States newsprint consumption is supplied by Canadian newsprint manufacturers); nor does this research give a clear explanation of what factors determine what amount of a nation's newsprint shipments are destined for a particular market (e.g. what portion of Canada's newsprint shipments are destined for the United States). In fact, what evidence does exist, concerning the origin and destination of newsprint shipments, is conflicting. On the one hand, evidence presented in Chapter III (Graph 3-1, page 70) indicated, for reasons not clearly identifiable, that on average, Canadian and U.S. newsprint manufacturers had sold roughly equivalent percentages of their manufacturing capacities over the period

1921 through 1970. On the other hand, executives of leading Canadian newsprint-producing firms expect U.S. newsprint producers to operate at full capacity regardless of general economic conditions (Chapter IV, page 105). It should be added that this expectation on the part of Canadian newsprint executives originates from a perception that U.S. publishers will buy American-produced newsprint for nationalistic reasons alone, whenever possible, rather than purchase newsprint of foreign manufacturers (Chapter IV, page 116). This expectation that U.S. producers will be able to operate at full capacity may, of course, be based upon the assumption that Canadian newsprint producers will maintain list prices and refrain from price discounting, a practice to which Canadian newsprint executives are unanimously opposed, but which they may have resorted to in the past in order to achieve newsprint volume at the expense of U.S. producers.

Undoubtedly, excess capacity in this industry has resulted in part from inaccurate forecasts; in particular, inaccurate forecasts of newsprint consumption and newsprint shipments. The accuracy of newsprint consumption and shipment forecasts may be related to the actual variation in consumption and shipment values over time. What then has this variation been?

The newsprint industry is regarded as a slow growth industry. In particular, U.S. newsprint consumption (refer Graph 7-2) has grown at an annual rate of 3¼ per cent since 1913, the first year for which figures on newsprint consump-

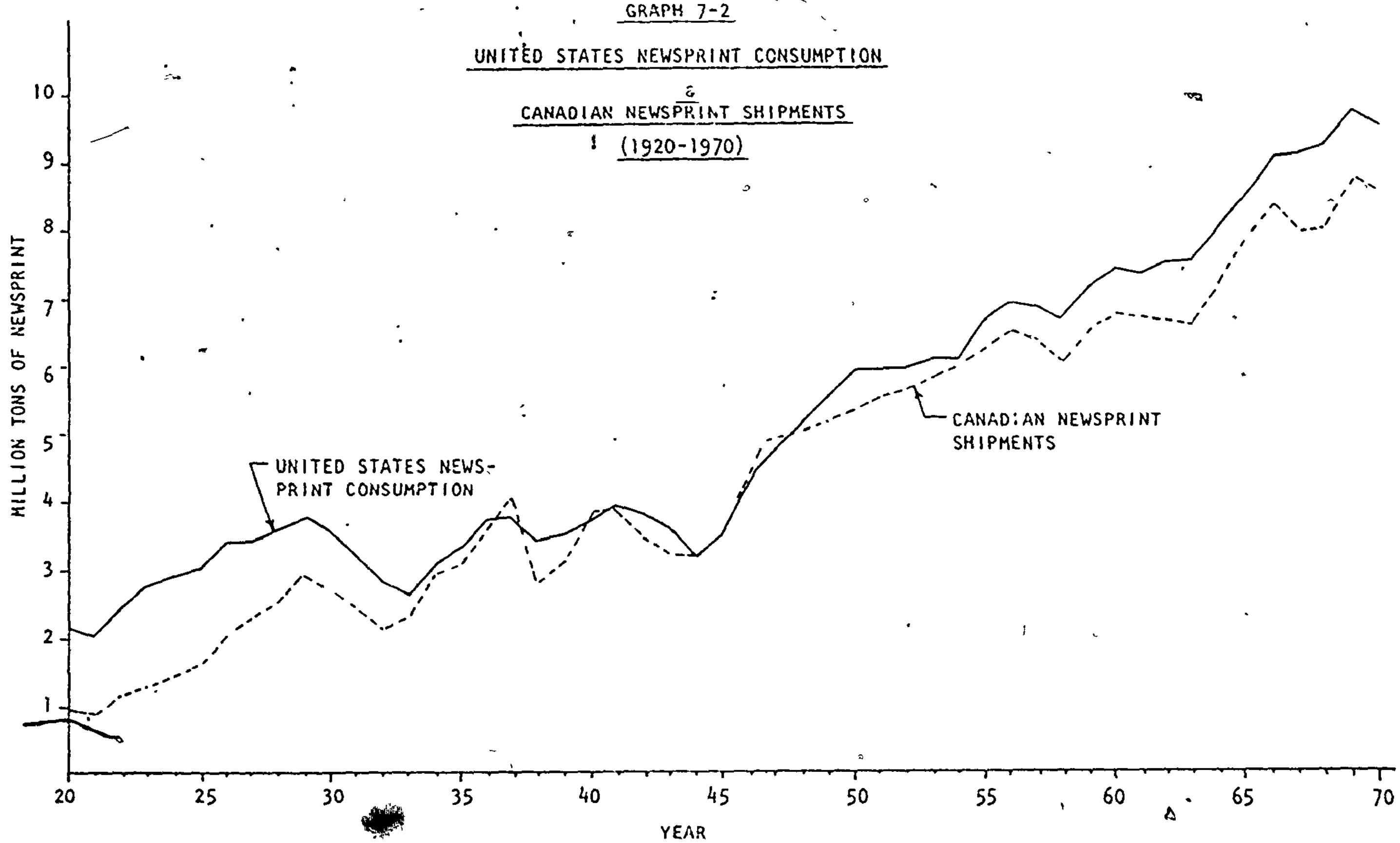
GRAPH 7-2

UNITED STATES NEWSPRINT CONSUMPTION

&

CANADIAN NEWSPRINT SHIPMENTS

(1920-1970)



tion are available.[2] Newsprint consumption, however, has not grown at a uniform rate over this period. From 1913 until 1929, U.S. newsprint consumption rose in excess of 6 per cent annually. This relatively high growth period was followed by a period lasting some 16 years (1929-1945) when newsprint consumption failed to increase. Following the Second World War, U.S. newsprint consumption recommenced its upward trend, rising on average, 3 per cent annually since that time. Despite the slow growth in newsprint consumption, annual changes in newsprint consumption have, on occasion, been severe. Graph 7-3 shows a frequency distribution of the yearly percentage change in U.S. newsprint consumption. Graph 7-3 demonstrates that in slightly more than ¼ of the cases, U.S. newsprint consumption rose or fell by 8 or more per cent. In 15 per cent of the cases, consumption rose or fell by 12 or more per cent. Variations in newsprint consumption are not, of course, random occurrences; they can be accounted for in large part by demographic, economic and political factors (see for example, Chapter V, Equations la, lb and lc).

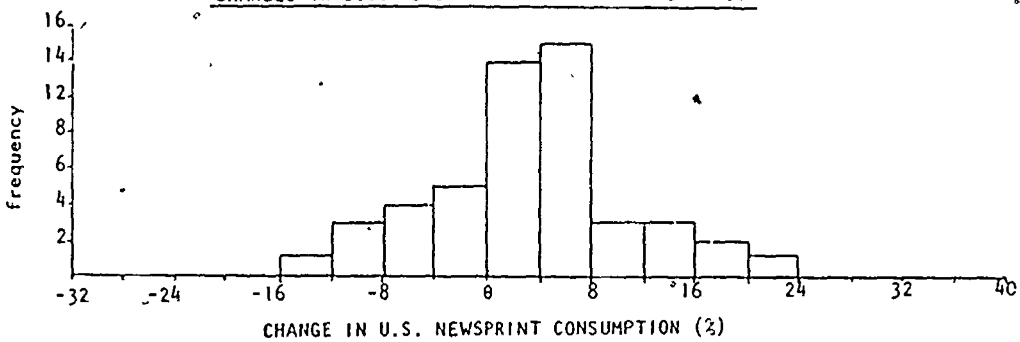
As shown in Graph 7-4, changes in Canadian newsprint shipments have been much more pronounced than changes in U.S. newsprint consumption. In 43 per cent of the years between 1920 and 1971, Canadian newsprint shipments have risen or fallen by 8 or more per cent; they have risen or fallen by 12 or more per cent in 27 per cent of the instances.

---

[2] The C.P.P.A. publication Annual Newsprint Supplement, published annually, gives data covering the last 50 to 60 years on Canadian shipments and capacity and upon U.S. consumption, shipments, capacity and price.

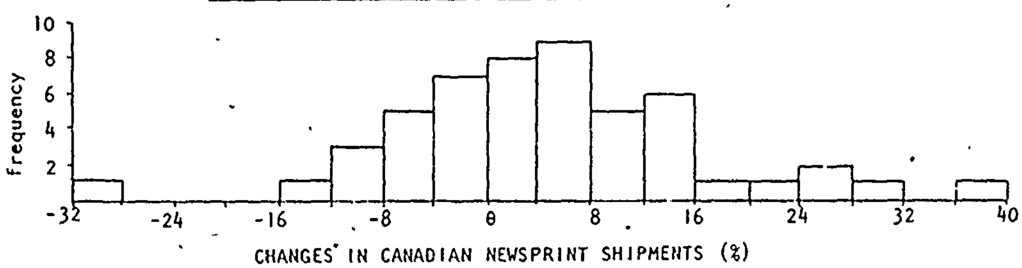
GRAPH 7-3

CHANGES IN U.S. NEWSPRINT CONSUMPTION 1920-1971



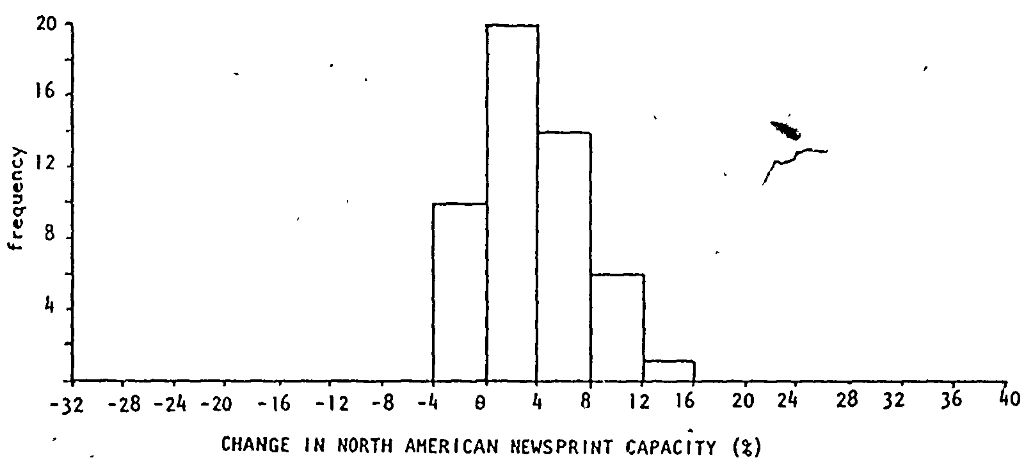
GRAPH 7-4

CHANGES IN CANADIAN NEWSPRINT SHIPMENTS 1920-1971



GRAPH 7-5

CHANGES IN NORTH AMERICAN NEWSPRINT CAPACITY 1920-1971



3.2 Newsprint Capacity

In contrast to annual consumption and shipment changes, newsprint capacity changes have taken place in a much more orderly fashion. For example, Graph 7-5 shows that North American newsprint capacity has changed by 8 or more per cent in less than 15 per cent of the years during the period from 1920 to 1971, and changed by 12 or more per cent on only one occasion. As would be expected, all of the large capacity changes have been capacity increases.

This research has presented considerable empirical evidence (Chapter V, Equation 15, page 170), managerial recall and perception (Chapter IV, pages 119 to 129), theoretical evidence (Chapter III, pages 86 to 94, and Appendix G), and descriptive historical reasoning (Appendix B, pages B15 to B38) concerning the determinants of capacity expansion or contraction.

In dealing with the subject of capacity change, there are several questions which this research has addressed. These questions are:

- What are the major determinants of capacity expansion in this industry? Are these determinants the same, regardless of the means employed to expand capacity?

- What are the determinants of where new capacity will locate?

- What effect will the new capacity (or the mothballing of old capacity) have on the industry's performance? Will these effects be national or regional? Do the effects vary with the means by which capacity is altered? Are there other factors dictating what effects on industry performance will occur?

Briefly, this research indicates that:

- Several means of expanding newsprint capacity have been employed, including new mill construction, new machine installation, extension of working hours, and plant improvements, including machine speed ups. (See Chapter V, pages 158 to 163).

- Each means of expanding newsprint capacity takes, on average, a different implementation time span. That is, the time period from that point in time when the decision to expand capacity is made, to that time when the capacity can be utilized, varies with the means by which the capacity is altered. Meaningful differences in implementation time spans are likely to occur even between capacity changes employing the same means of capacity alteration (e.g. new mill lead time (implementation time span) may vary with the backlog of machine suppliers, with mill location, or with strike activity). (See Chapter V, pages 158 to 163).

- There are differences in the determinants of each means of capacity expansion. (See (4) and (5) below.) On a regional basis, for example, large percentage increases in year to year capacity (say, over 4 per cent) cannot normally be achieved without the construction of new mills or the addition of new machines to existing mills. (See Chapter V, pages 167 to 168).

- The major determinant of new mill and new machine newsprint capacity additions is a perceived need for new capacity. (Chapter V, page 176) A perceived need for new capacity exists when the expected rate of capacity utilization (i.e. the utilization of existing capacity plus announced capacity additions) at some future time $t+\theta+z$ exceeds the optimum or desired level of plant utilization. By definition, the expected rate of capacity utilization at time $t+\theta+z$ is equal to the expected demand for newsprint at that time divided by the amount of existing capacity plus announced capacity changes.

Empirical results (Chapter V, page 177) suggest that the expected demand for newsprint at time $t+\theta+z$ is determined generally by extrapolation to time $t+\theta+z$ of recent trends, either of newsprint shipments themselves or of factors upon which shipments are considered to depend. There is also some suggestion that the greater the annual variation in annual newsprint shipments at the time expansion is being contemplated, the greater is management's reliance on long-term (10 or more years) trends than on short-term trends (say, less than 5 years). (Chapter V, pages 171 to 179).

Analysis of the residuals of the econometric model's capacity change estimation equation (Chapter V, Equation 15, page 170) indicates that fund availability may have constrained new mill and new machine capacity additions during certain periods; in particular, during the late 40s and early 50s.

Management's planning horizon (i.e. the number of years between that point in time when the expansion decision is made (time t) and time $t+\theta+z$) for new mill and new machine capacity appears to be positively related to the industry's growth rate at the time the decision is made. In particular, the greater the industry growth rate, the further management desires to build ahead of demand.

- The major determinant of capacity additions resulting from machine speed ups, plant improvements or increased hours of work appears to be current profitability. (Chapter V, page 172).

The planning horizon for such capacity increases would appear to equal the lead time and would, in most cases, be a matter of months.

- The location of new capacity is, of course, highly dependent upon the means by which capacity is expanded. Capacity increases due to plant improvements, machine speed ups, new machines in existing mills or increased operating hours must occur at the locations of existing mills.

There have been 3 major shifts in the location of productive capacity in North America since 1920. Each of these major shifts was accomplished through the construction of many new newsprint-producing mills in the new location. The first major shift of productive capacity was to Eastern Canada from the U.S. Northeast. The availability and cost of suitable wood species, and tariff considerations were the major factors leading to this northward movement of the industry. The second major shift was to the coastal regions of Canada and was precipitated by raw material and transportation cost advantages. The third major shift of productive capacity was from Canada and the northern portion of the United States to the U.S. South. Adaption of pulping processes to the pulping of Southern wood species allowed newsprint producers to manufacture newsprint in that large and fast-growing newsprint market. (Appendix B, pages B32 to B38).

- New capacity of itself, has little effect on industry performance. Excess capacity, which may result from new capacity, has, as has been shown, significant adverse effects upon the industry's performance.

3.3 Excess Capacity - The Canadian Experience

One can describe excess capacity in a variety of ways; one way, and the way which is adopted here, is to define periods of excess capacity. For sake of no better definition, a period of excess capacity will be considered to have begun when the industry's rate of capacity utilization falls to a level of less than 85 per cent and lasts until a year in which the industry operates at 90 per cent or greater. Moreover, such a period must last at least 3 years. Using this definition, there have been 4 periods of excess capacity in Canada's newsprint industry. These periods were:

Period Duration	Years Duration	Average Capacity Utilization over Period
1927-1936	10	72%
1938-1945	8	72%
1958-1965	8	86%
1968-1970*	3	86%

*1970 was the last year included in the analysis.

The next few pages deal with the causes of excess capacity in each of these 4 periods.

(a) Excess Capacity - 1927 to 1936

Graph 7-1 shows that substantial additions to Canada's newsprint manufacturing capacity were made in the years 1927 (595 thousand tons), 1928 (546 thousand tons), 1929 (250 thousand tons), 1930 (390 thousand tons) and 1931 (225 thousand tons). In the 5 years from 1926 to 1931, Canadian newsprint capacity doubled and this was achieved almost entirely through new mill construction (Chapter V, page 159). At this same time, Canadian newsprint shipments were rising at record rate.

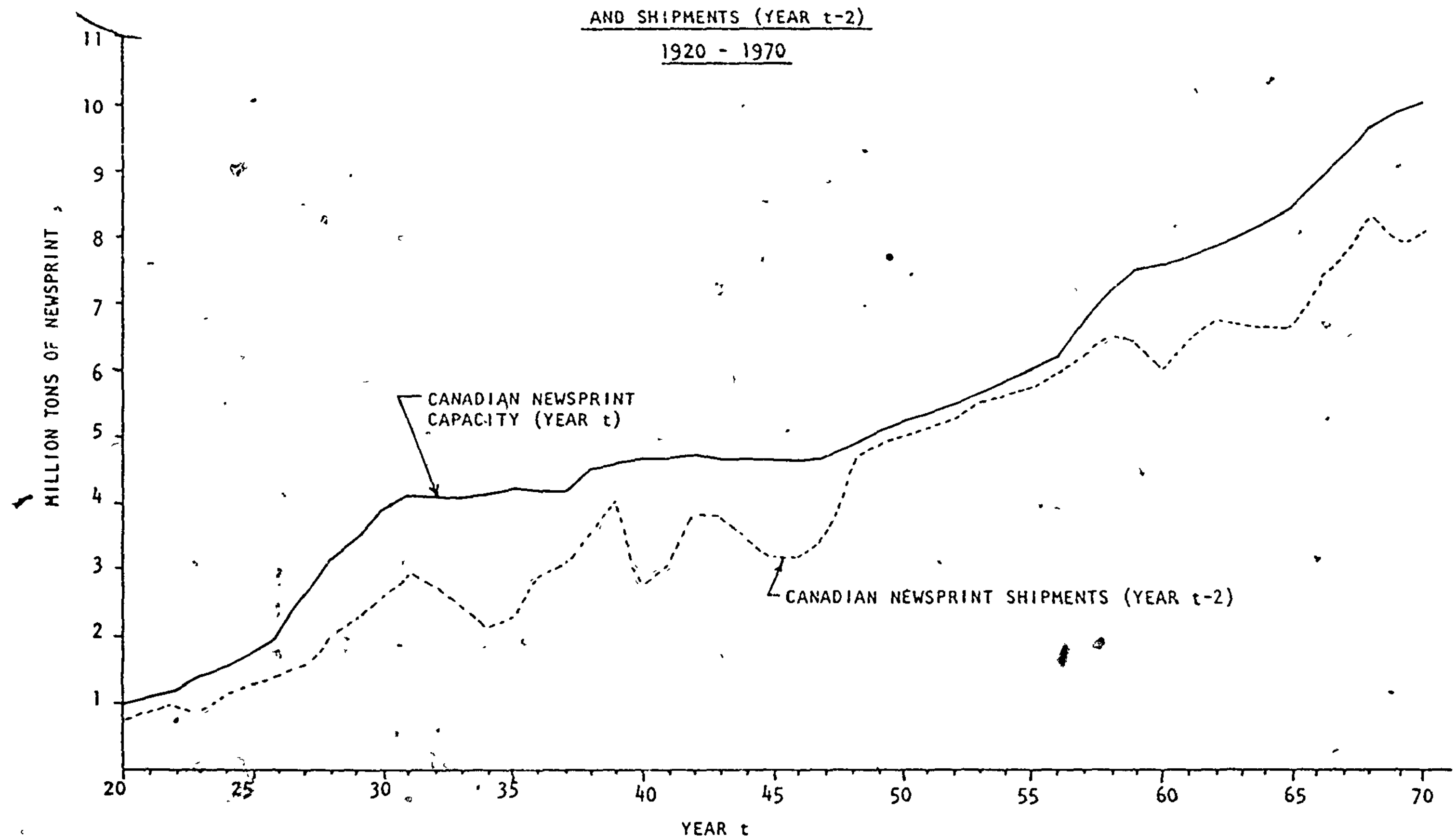
Since most of the new capacity was brought about through new mill construction, we can expect about a 2 year lag from that point in time when the individual decisions were made to build newsprint capacity to that time when such capacity was available for newsprint production. Graph 7-6 plots Canadian newsprint capacity for each year and Canadian newsprint shipments 2 years previously (i.e. at the time the decision to undertake such new mill capacity would have been made). As can be seen from Graph 7-6, there is a close parallel between newsprint shipments and newsprint capacity over

GRAPH 7-6

CANADIAN NEWSPRINT INDUSTRY CAPACITY (YEAR t)

AND SHIPMENTS (YEAR t-2)

1920 - 1970



the 1926 to 1931 period when capacity was doubled.

In 1929, the year during which resources were committed to the 225 thousand tons of newsprint capacity which was to come on stream in 1931, Canadian newsprint shipments had risen consistently in each of the last 9 years, as had U.S. newsprint consumption, and although some excess capacity existed (the industry operated at 85 per cent capacity utilization during 1929), if newsprint shipments had continued their upward trend, planned capacity (i.e. actual 1931 capacity) would have been fully utilized by 1933 or perhaps sooner. However, U.S. newsprint consumption and Canadian newsprint shipments did not continue their upward movement; Canadian newsprint shipments declined dramatically, as did U.S. newsprint consumption and Canadian shipments to the United States (see Graph 7-7), during 1930, 1931 and 1932. By 1932, rather than operating at close to full capacity, the Canadian newsprint industry found itself operating at just more than half capacity. Although the industry recovered partially in 1937, it wasn't until the end of the Second World War that a sustained recovery was achieved.

Most probably, the excess capacity which developed during this period was caused chiefly by inaccurate forecasts of newsprint consumption and shipments. Moreover, the inaccurate forecasts did not result simply from placing too much reliance on short-term consumption or shipment trends, because in fact, the long-term trends were consistent with the trends of the middle and late 20s. Graph 7-8 shows the

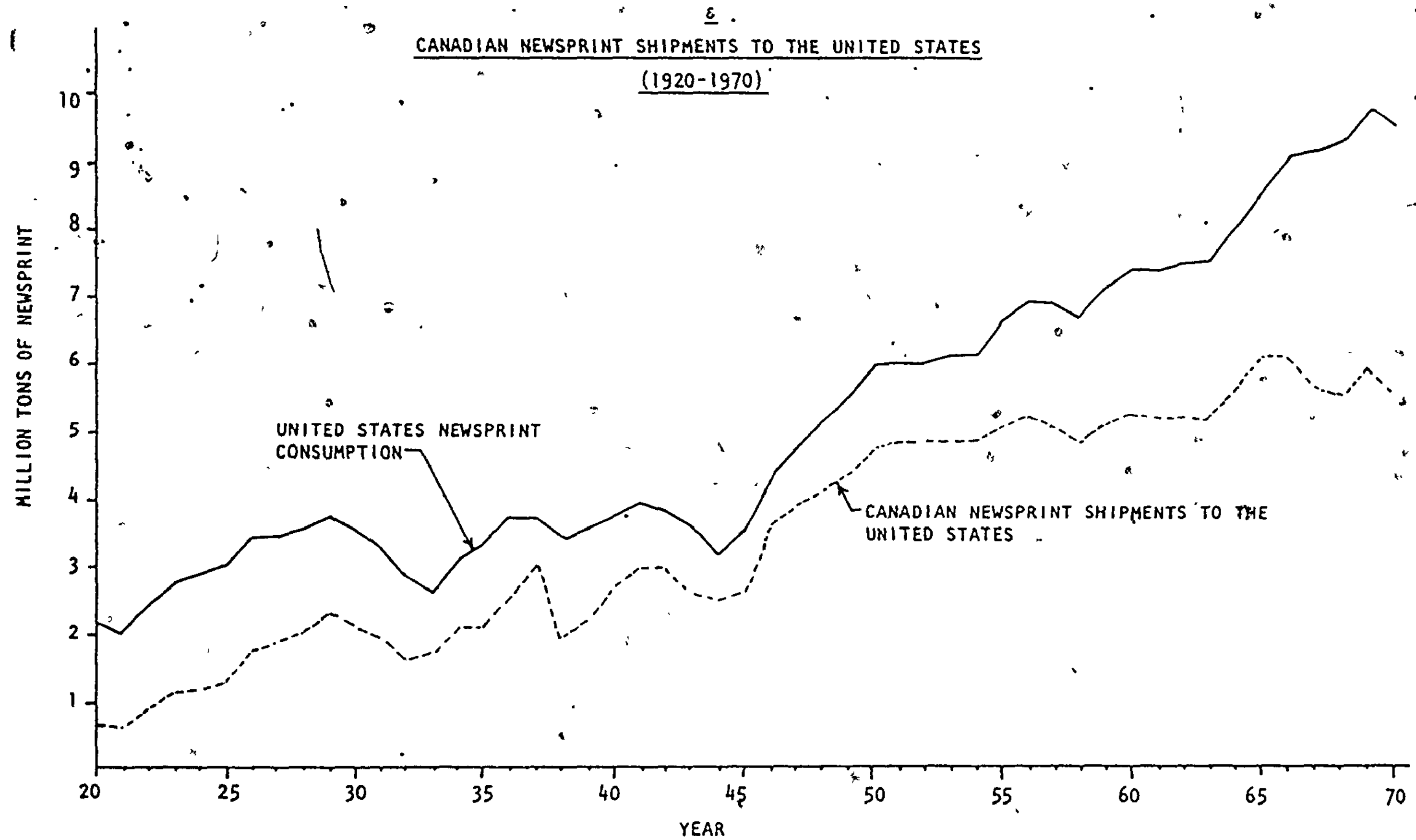
GRAPH 7-7

UNITED STATES NEWSPRINT CONSUMPTION

&

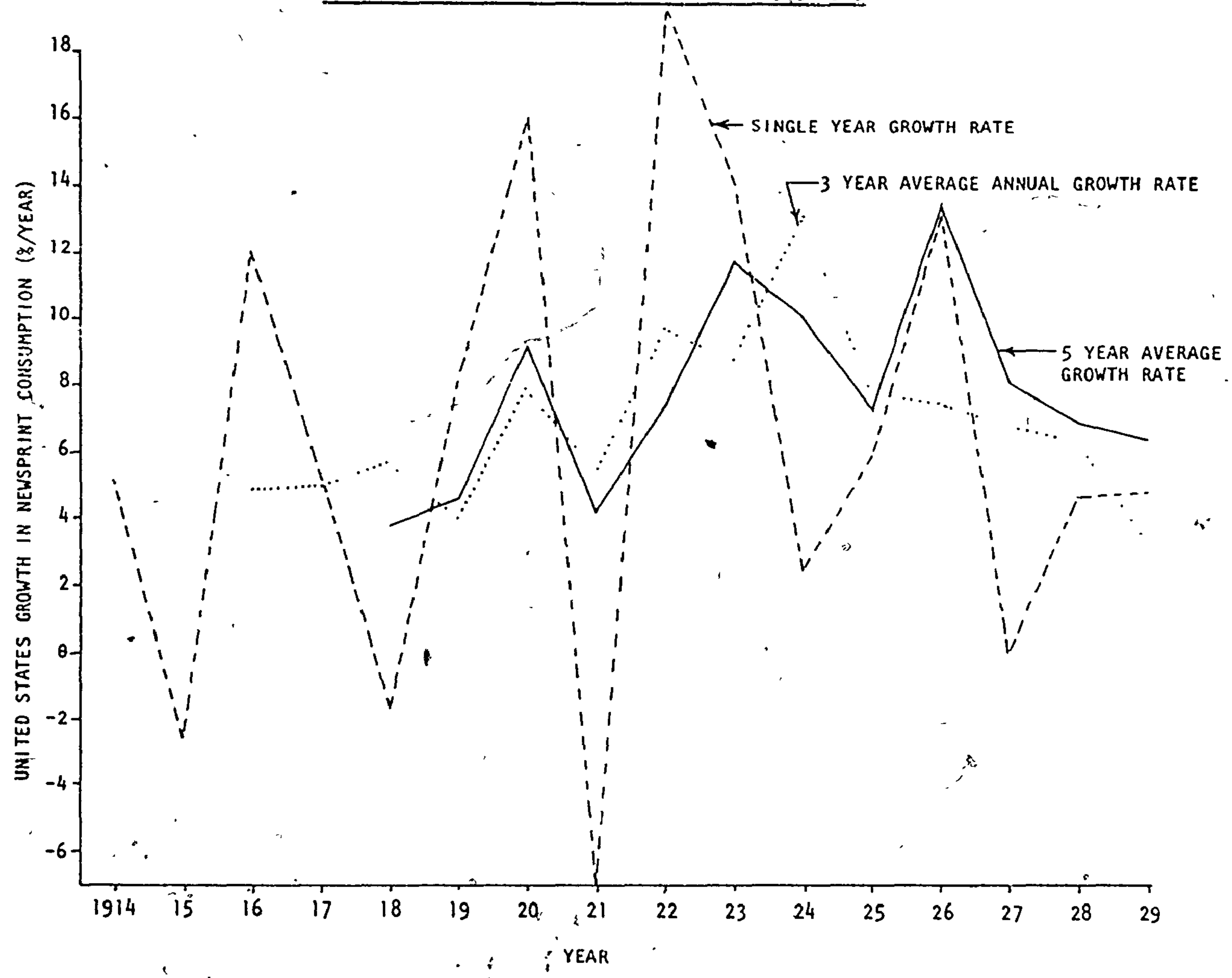
CANADIAN NEWSPRINT SHIPMENTS TO THE UNITED STATES

(1920-1970)



GRAPH 7-8

GROWTH IN U.S. NEWSPRINT CONSUMPTION 1913-1929



growth in U.S. newsprint consumption from 1913 (the first year for which figures are available) to 1929. Although newsprint consumption did decline in 3 of those years, after each year of consumption decline, consumption rose sharply in the following year. Three (3) year and 5 year averages clearly indicate a consistently strong upward growth in newsprint consumption. Given this long and consistent upward growth in newsprint consumption and shipments, whether anyone could visualize the no growth period of the 30s and early 40s is doubtful. The experience of this period does, however, point out the tremendous risks in this business. In hindsight, much of the excess capacity of this period could have been avoided if producers had not built ahead of demand. The rewards from building ahead of demand must, of course, be weighed against the costs of overexpansion. In this instance, the risks of overexpansion far outweighed the potential benefits of building ahead of demand. The disasterous effect on industry profitability is shown by Graphs 1-2 (page 18), 1-3 (page 19), 1-4 (page 21) and 1-5 (page 24).

(b) Excess Capacity - 1938 to 1945

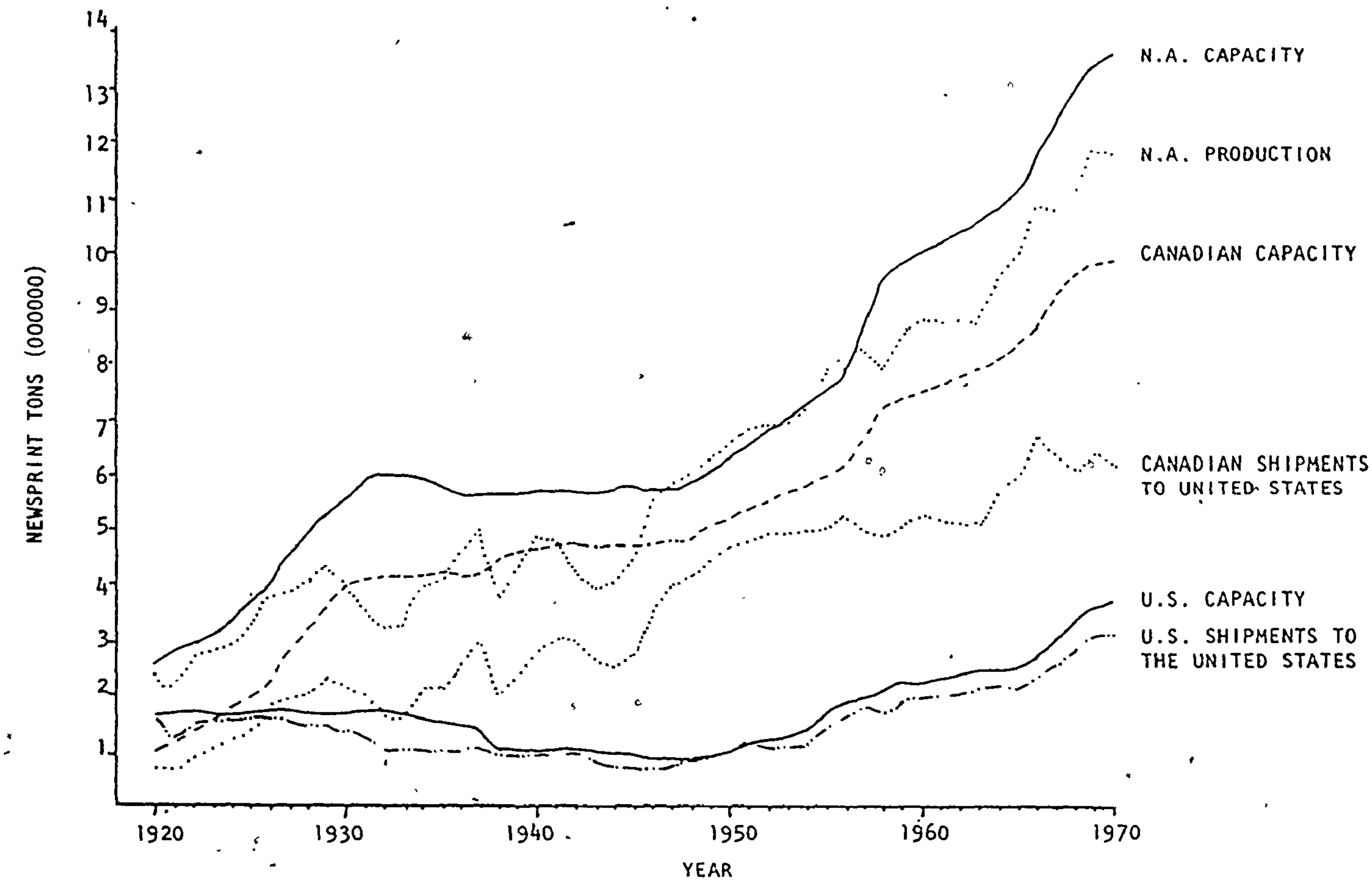
In 1937, with the industry operating at 95 per cent of capacity and with Canadian shipments having almost doubled in the last 5 years, 2 mills which had been shut down for several years (Abitibi's Ste. Anne de Beaupre and Fort William mills) were reopened and several firms devoted themselves to making low cost machine improvements and machine speed ups. The result was an increase of 324 thousand tons in Canadian newsprint manufacturing capacity during late 1937 and 1938. During this period of expansion, only 1 new mill was constructed (Donohue's Clermont mill); it accounted for a very small percentage of this capacity increase.

Graph 7-1 shows that, once again, shipments fell off substantially and the 324 thousand tons of additional capacity simply prolonged an excess capacity problem that had started in the late 20s. Graphs 1-2 (page 18) and 1-4 (page 21) again demonstrate the significant profit depression which occurred during this period; however, industry profitability was favorably affected by a change in the Canadian - United States exchange rate which occurred between 1938 and 1940.

Canadian and U.S. newsprint manufacturers reacted to this lengthy period of excess capacity and poor profitability (i.e. 1927 through 1946) in 2 distinctly different ways. U.S. producers were able to convert their newsprint facilities, in a large way, to the production of other paper and related products. In 1927, U.S. newsprint capacity was 1,788 thousand tons; by 1946, their production capability had fallen to 839 thousand tons (see Graph 7-9). Much of this capacity was converted to the production of various types of board, tissue paper and coarse paper, the consumption of which, unlike newsprint, was rising rapidly in the United States. (See Appendix B, pages B1 to B8). The economics of conversion did not exist for Canadian newsprint manufacturers, as the market in Canada for such products was very small and tariffs effectively prevented the manufacture of such products in this country

GRAPH 7-9

NORTH AMERICAN CAPACITY, PRODUCTION AND SHIPMENTS, 1920 - 1970



for export; thus, Canadian newsprint capacity lay idle for many months each year. With the decline in U.S. newsprint capacity came an increasing reliance by U.S. publishers on Canadian-produced newsprint; whereas, in 1927, Canada supplied 54 per cent of the U.S. requirements of newsprint, by 1946, Canada supplied 82 per cent of the United States newsprint needs.[3] Supplying 82 per cent of a region's requirements should give the supplier effective control over the price of his product, so the poor industry profitability of this period cannot be attributed to the actions of producers of other countries. In fact, the liquidation of newsprint capacity by U.S. producers should have had a positive effect on both Canadian and U.S. newsprint industries. The very fact that U.S. producers were able to convert capacity, while Canadian producers had to wait until demand recovered again, demonstrates the tremendous risks in newsprint manufacturing in this country. Where risks are high, investors normally expect above average returns, which, of course, were never realized.

(c) Excess Capacity - 1958 to 1965

By 1946, Canadian newsprint shipments had come into line with Canadian capacity. U.S. consumption, which had risen rapidly in the late 40s (see Graph 7-7), continued its upward movement through the 50s. The demand for Canadian

---

[3] Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 8, p. 5.

newsprint pushed hard against the existing capacity. In an attempt to keep up with demand, Canadian newsprint capacity was expanded each year from 1947 through 1956; the expansion was moderate and gradual and accomplished almost entirely through plant improvements and machine speed ups. Only 1 new mill (Crown Zellerbach's mill at Elk Falls, British Columbia) came into operation during this period.[4]

But then, in 1957, 1958 and 1959, Canadian newsprint capacity expanded at a far greater rate than during the previous 10 years. Canadian newsprint capacity increased by 514 thousand tons in 1957, by 482 thousand tons in 1958, and by 283 thousand tons in 1959. Much of this capacity increase came about from the construction of new mills (e.g. MacMillan Bloedel's Alberni mill, 1957, 100 thousand tons) or from expansion of existing mills by new machine installations (e.g. MacMillan Bloedel's Powell River Mill, 1957, 90 thousand tons; Ontario-Minnesota's Kenora mill, 1957, 90 thousand tons; Great Lakes Paper mill, 1957, 90 thousand tons; Crown Zellerbach's Elk Falls mill, 1958, 80 thousand tons; MacMillan Bloedel's Alberni mill, 1958, 100 thousand tons; Abitibi's Fort William mill, 1958, 90 thousand tons; and, Great Lakes Paper mill, 1958, 110 thousand tons[5]). It is not obvious why this massive increase in capacity was undertaken by Canadian manufacturers of newsprint; note, there were no new entrants during this period. Perhaps it was the sudden upward

---

[4] Canadian Pulp and Paper Association, <u>Newsprint Data</u>, various years.

[5] <u>Ibid</u>.

movement of U.S. newsprint consumption which took place in 1955 (a 475 thousand ton increase, or 7.7 per cent) and 1956 (a 261 thousand ton increase, or 3.9 per cent) after 4 years of stagnation. Unfortunately, the uptrend in U.S. consumption was short-lived, as consumption fell during 1957 and 1958 (see Graph 7-2), just as the bulk of new capacity was coming on stream. The effect was sudden and severe; Canadian newsprint producers who had operated at 103.6 per cent of rated capacity during 1956, found themselves operating at 84.2 per cent of rated capacity by 1958.[6] The effect on industry profitability was notably less severe (see Graph 1-2, page 18).

Canadian newsprint shipments increased slightly over the next few years; but capacity changes, though gradual, continued to grow at a faster rate than shipments. By 1963, the Canadian newsprint industry capacity utilization had fallen to 82.3 per cent. Industry profits had fallen significantly from the level of 1958 (see Graph 1-2, page 18).

During 1962 and 1963, with Canadian newsprint shipments stagnant, with more excess capacity than the industry had seen for 17 years, and with industry profits depressed, some firms were planning and had started to construct new or expanded facilities for newsprint manufacture. During 1964, 5 major capacity projects came to fruition (i.e. B.C. Forest Products' mill at Crofton, 125 thousand tons; Ontario Paper's

---

[6] *Ibid.*

expansion of its Baie Comeau mill, 100 thousand tons; Beaver Wood Fibre, 35 thousand tons; the Gaspesia Pulp and Paper mill, 90 thousand tons; and Soucy's mill, 30 thousand tons[7]). During 1965, 1 major capacity project came on stream which was the 160 thousand ton capacity Rothesay Paper mill. For a time, it appeared that the expanders of this period had made excellent decisions, as Canadian newsprint shipments moved sharply upwards during 1964, 1965 and 1966; yet, industry profits continued to fall, indicating some price competition, a subject which shall be discussed in greater detail when we consider the effects of excess capacity on newsprint pricing. Despite poor and declining profitability, Canadian newsprint manufacturers continued to expand their productive capabilities during 1966 and 1967, this time through the expansion of working hours. Again, profitability declined as shipments fell back, and the industry operating rate fell to 86.6 per cent in 1967 and to 83.2 per cent in the following year.

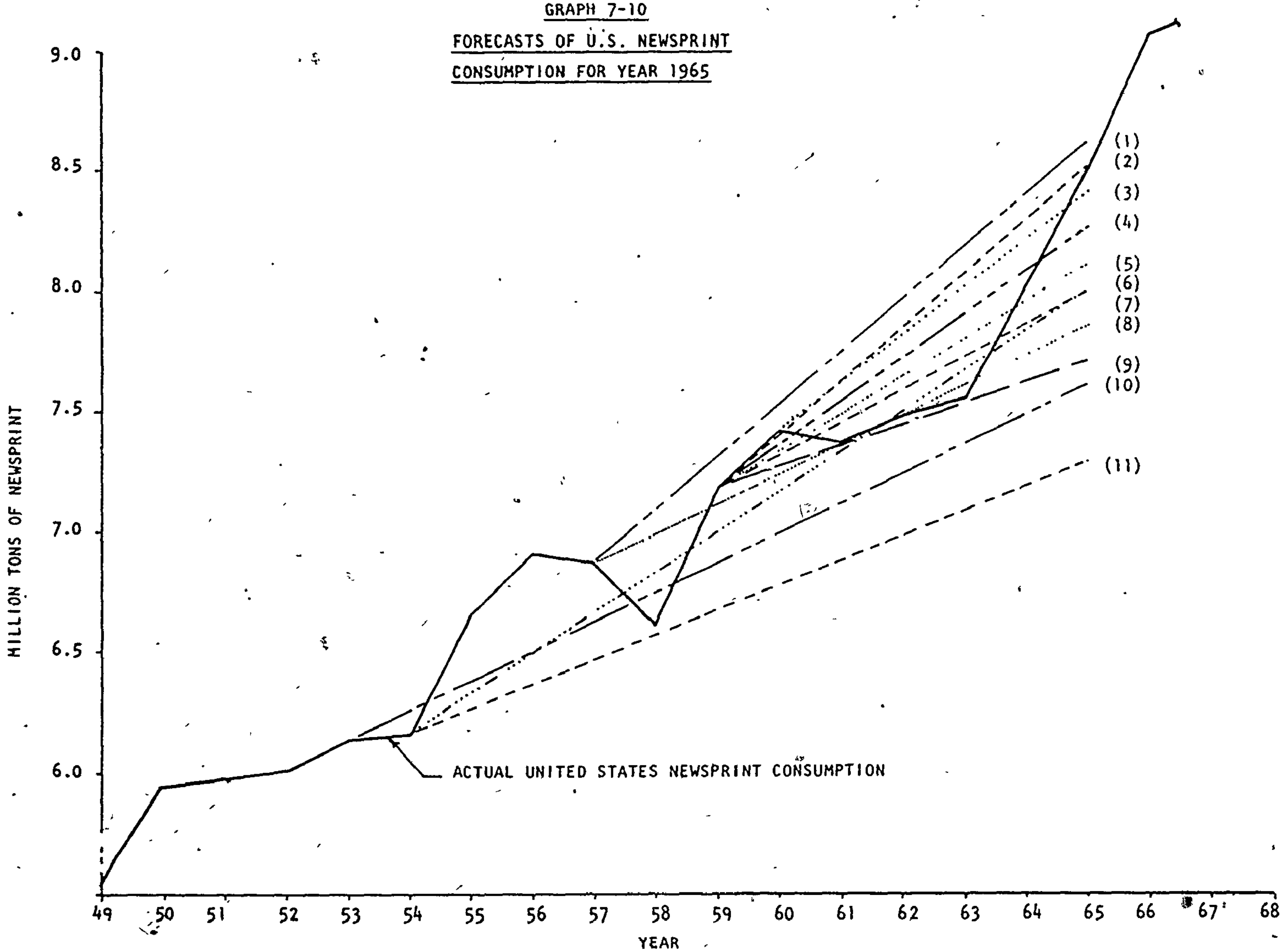
Whereas inaccurate industry forecasts were likely a major factor in the development of the excess capacity which developed in the late 20s and early 30s, such was not the case during the late 50s and early 60s. Of 11 important medium and long-term (5 years or more) forecasts of U.S. newsprint consumption for the year 1965, only 1 forecast (as shown in Graph 7-10) exceeded the actual consumption achieved. The

---

[7] Ibid.

GRAPH 7-10

FORECASTS OF U.S. NEWSPRINT CONSUMPTION FOR YEAR 1965



average forecast was for newsprint consumption some 500 thousand tons below what actually was achieved. Of course, predicting consumption and predicting shipments are 2 different matters, yet, there are no reasons to believe that shipment forecasts would be anything but as conservative as consumption forecasts.

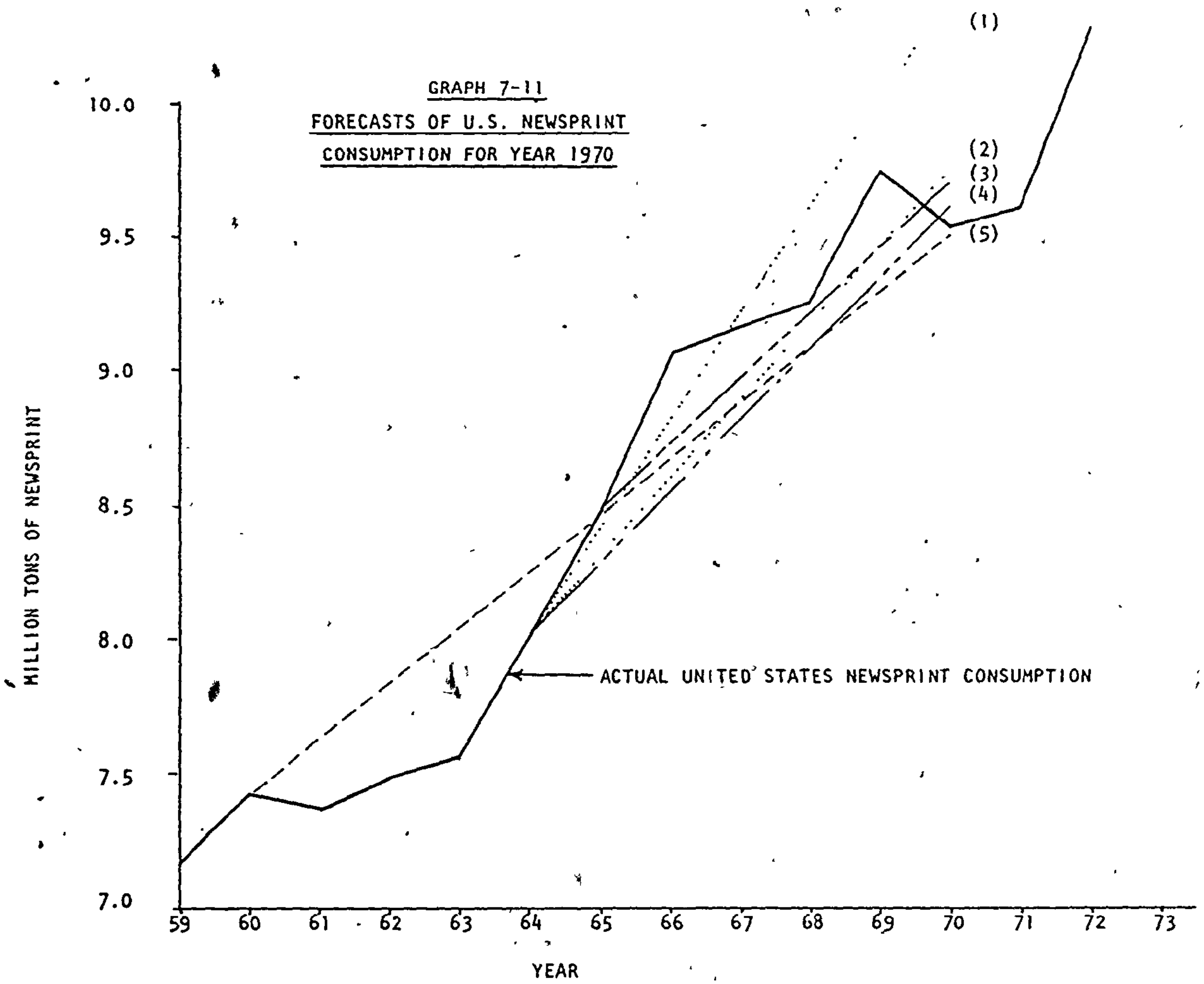
Certainly the decisions made by industry members and by new entrants to expand capacity in a big way during the late 50s and to continue to expand capacity moderately during the 60s are difficult to comprehend. It is not surprising, therefore, that the estimated capacity change equation tended to fall short of accounting for the full capacity change which occurred over this period (see Chapter V, Graph 5-5, page 175).

(d) Excess Capacity - 1968 to 1970

Except for a brief 2 year period (1965-1966), the pattern of excess capacity which had been established during the late 50s and early 60s continued into the 70s. Canadian newsprint shipments seemed reluctant to maintain a trend for any more than 3 years (see Graph 7-1). Industry profitability continued its decline, but was still being aided by a favorable exchange rate with the United States (see Graph 1-5, page 24). U.S. consumption forecasts (see Graph 7-11) again tended to underestimate the actual consumption which would take place. Yet Canadian newsprint capacity continued the rapid upward movement established during the previous 10 years. Again, most of the new capacity which came on stream

GRAPH 7-11

FORECASTS OF U.S. NEWSPRINT CONSUMPTION FOR YEAR 1970



during this period originated from the expansion of existing mills through the installation of new machines. Once again, it is not surprising that actual capacity expansion was greater during this period than estimated by the capacity expansion estimation equation developed in Chapter V (see Chapter V, Graph 5-5, page 175).

(e) Summary of Major Determinants of Excess Capacity

Recapping, some of the major determinants of excess capacity have been:

Period of excess capacity	Factors encouraging excess capacity
1927-1936	- Sudden, unexpected long-term downturn in the World's economies (Chapter VII, page 215) - Building facilities in anticipation of future needs (Chapter VII, page 215) - Building of facilities which have little, if any usefulness, except for the manufacture of newsprint (making conversion and thus the future reduction of capacity economically impractical). (Chapter VII, page 215)
1938-1945	- Carryover of factors contributing to previous period of excess capacity
1958-1965	- Definite prolonged overexpansion by existing producers and during the later part of the period by new entrants (Chapter VII, page 219 and Chapter IV, page 115) - Shifting markets encouraging locational shifts in newsprint manufacturing capacity (Appendix B, pages B8 to B12) - Economies of integrating new newsprint operations with existing lumber, plywood and pulp operations (Appendix B, page B30) - Building facilities in anticipation of future needs (Chapter VII, page 220) - Possible political pressures to more fully utilize the wood resource (Chapter IV, pages 97 to 98)

Period of excess capacity	Factors encouraging excess capacity
1968-1970	- Same as for previous period - Also, desire to modernize machines which usually resulted in the replacement of several machines by 1 machine with a capacity often considerably greater than the original capacity (Chapter VII, Table 7-2, page 236)

The effect of excess capacity on industry profitability during the late 50s and throughout the 60s has been referred to several times in the discussion of the last few pages. As shipment volumes closely paralleled capacity during this period, declining margins must have played a major role in the profit decline. Precisely how excess capacity affected industry margins during this period is the subject of the following section.

3.4 Excess Capacity and Newsprint Pricing

The effect of excess industry newsprint capacity on the New York list price of Canadian newsprint has already been summarized (page 199). Executives of Canadian newsprint manufacturing firms indicated that some discounting from this list price had occurred during the 60s and early 70s (page 108). Executives held differing views as to the conditions under which discounting was likely to occur. All executives felt that the industry would have to be operating below 90 per cent of capacity before any discounting would occur (page 117). Some executives believed that the amount of discounting was simply a function of the amount of excess capacity of the industry (page 115). Others felt that price discounting was not an inevitable function of the demand - supply situation, but was likely to occur only when newsprint capacity was expanded by an independent new entrant during a period of excess capacity (page 115). Although individual executives were able to recollect specific instances when price discounting had occurred, executives were generally uncertain about how widespread or how severe discounting had been. Although data limitations precluded an econometric analysis of the price discounting phenomenon, its potential importance in explaining industry performance dictates the need for a preliminary analysis.

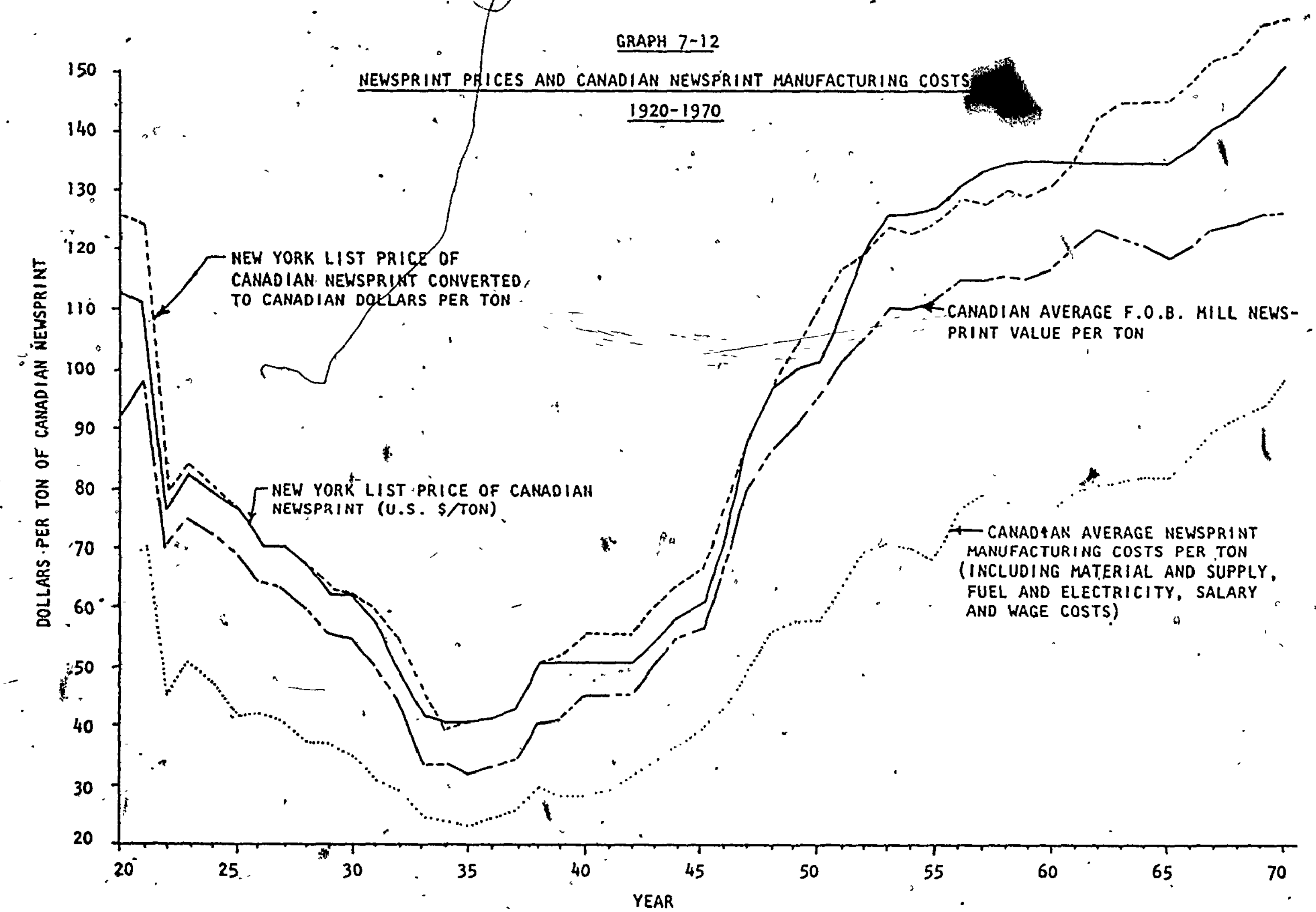
(a) Preliminary Investigation of the Frequency of Occurrence and Magnitude of Price Discounting

Graph 7-12 plots for each year from 1920 to 1970, the New York list price of Canadian newsprint (U.S. dollars), the New York list price of Canadian newsprint converted into Canadian currency, the Canadian average value of newsprint f.o.b. mill, and the Canadian average direct manufacturing costs per ton. The New York list price of newsprint converted into Canadian dollars ($158.69 per ton in 1970) should equal the Canadian average value per ton of newsprint f.o.b. mill ($126.28 per ton in 1970), plus average transportation costs per ton (about $23 per ton during 1970, according to an industry informant), minus an allowance for any spot tonnage which was sold at a price exceeding list (negligible during periods of excess capacity, such as 1970), plus or minus an allowance for any sales which may have been negotiated in other than U.S. dollars (usually of little or no

GRAPH 7-12

NEWSPRINT PRICES AND CANADIAN NEWSPRINT MANUFACTURING COSTS

1920-1970

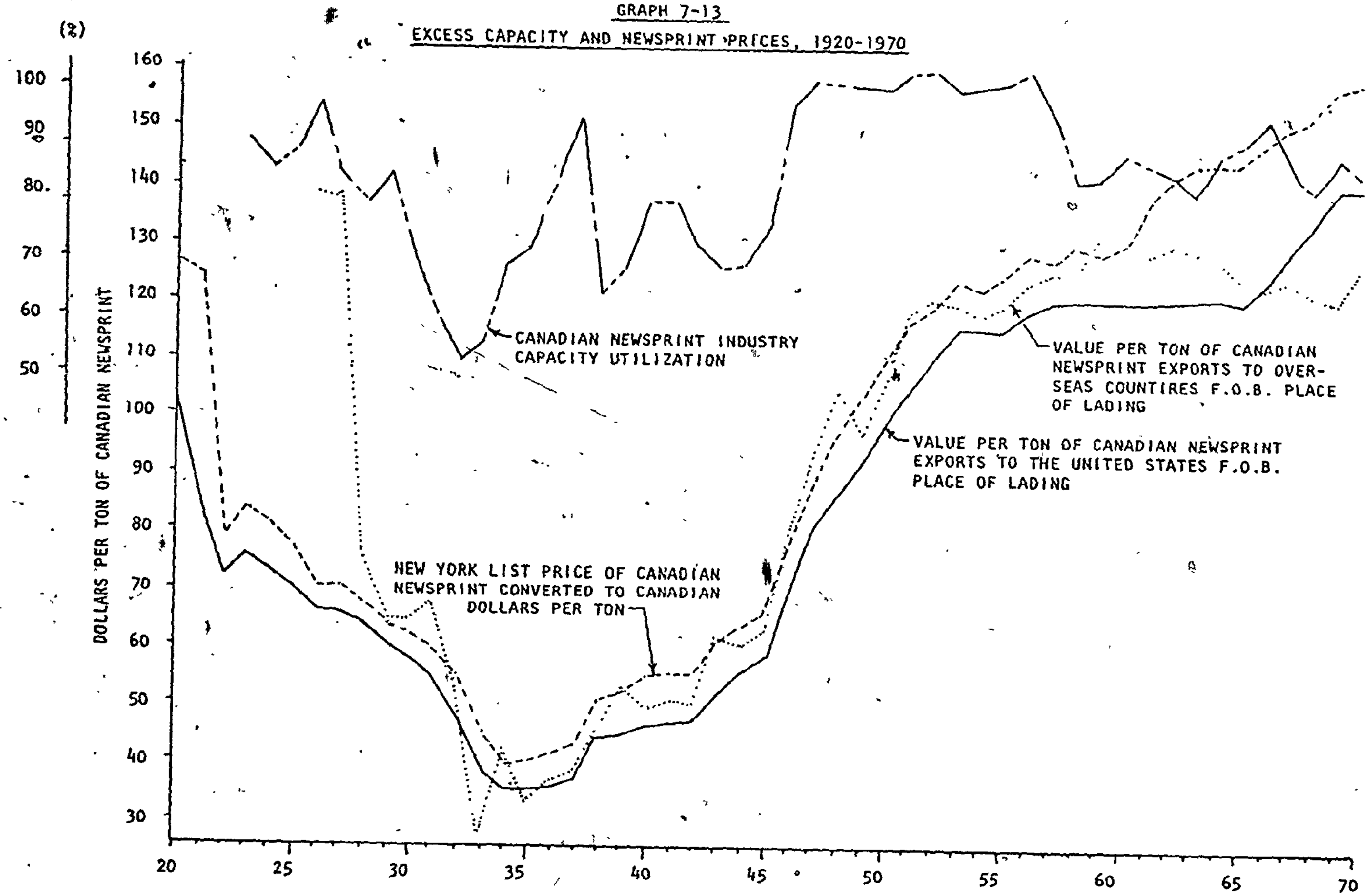


importance), plus an allowance for any discounting from the list price which may have occurred (which, by calculation should have equalled on average, 9 to 10 dollars per ton during 1970). During a period of excess capacity then, the difference between list and f.o.b. mill prices should equal the sum of transportation costs plus discounting. Moreover, a major change from 1 year to the next in this difference of values may very well signify a change in the magnitude of discounting.

Similarly, Graph 7-13 shows the movements of Canadian newsprint capacity utilization, the New York list price of Canadian newsprint converted into Canadian dollars, and the average value per ton f.o.b. place of lading of Canadian newsprint exports destined for the United States. The average value per ton f.o.b. place of lading of Canadian newsprint exports destined for Overseas markets is also included, though the figures are considered less reliable. The New York list price of newsprint converted into Canadian dollars ($158.96 per ton in 1970) should equal the Canadian average price of newsprint exports to the United States f.o.b. place of lading ($140.45 per ton in 1970), plus average transportation costs per ton to the United States from point of lading (which are not known nor easily estimated, but which, once again, seem unlikely to vary greatly from any 1 year to the next), minus an allowance for any spot tonnage which was sold at a price exceeding list (negligible during periods of excess capacity), plus an allowance for any discounting which may have occurred on U.S. newsprint shipments.

GRAPH 7-13

EXCESS CAPACITY AND NEWSPRINT PRICES, 1920-1970

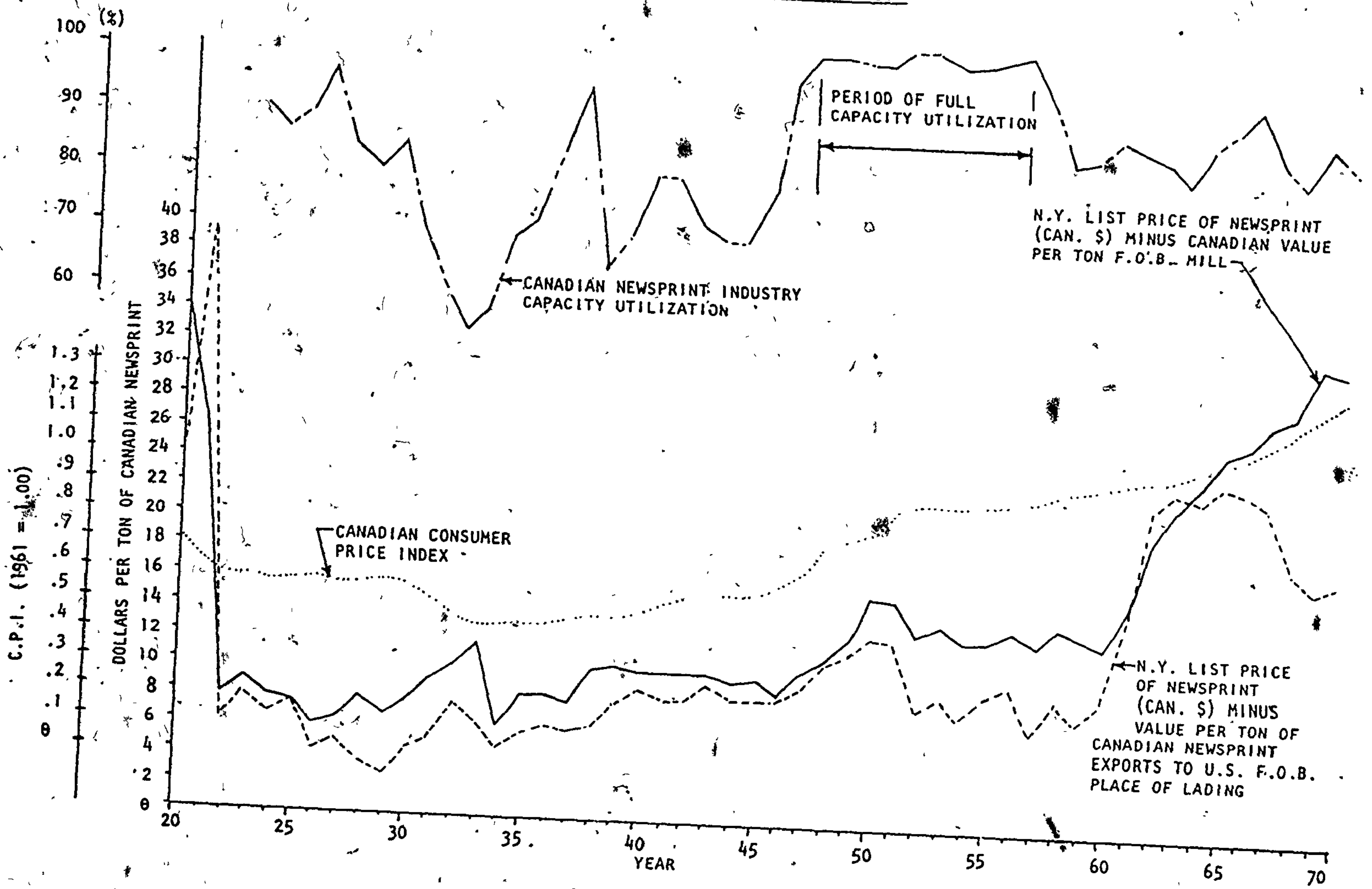


Graph 7-14 plots both of these differences, that is, the difference between list price and mill value per ton and the difference between list price and export value of U.S. bound newsprint, along with the Canadian newsprint industry capacity utilization (which indicates those years during which excess capacity existed) and the Canadian Consumer Price Index (which gives a picture of how prices were changing in general and may indicate the general pattern of transportation cost changes). Ignoring the period of the early 20s, when data are known to be unreliable, the first indication of price discounting can be seen during the years 1930 through 1933, when the difference between list price and mill value practically doubled, while prices in general declined. Discounting of price over this period, as operating rates fell dramatically, might easily be expected, as the industry found itself operating at about half capacity. The tremendous capacity expansion which had taken place just previous to this period (see pages 210 to 215) had been initiated mainly by new entrants to the industry. Graph 7-13 indicates that price discounting may have been particularly severe in Overseas markets in 1933.

Discounting would appear to have ended abruptly in 1934 as Canadian newsprint shipments staged a significant comeback. Some discounting may have occurred during the late 30s and early 40s, though the evidence is not clear. Although the difference between list price and mill value rose somewhat after the Second World War, this is probably accounted for by transportation cost increases, resulting from

GRAPH 7-14

PRICE DISCOUNTING INDICATIONS, 1920-1970



transportation rate increases corresponding with the general movement in prices of all goods and services. Discounting appears to have commenced again in 1961 and grown sharply in 1961, 1962 and 1963, while continuing to rise at a slower rate until 1970. Discounting in the United States market appears very marked during 1961 and 1962, but appears to have lessened somewhat by 1970. Graph 7-13 suggests that discounting in Overseas markets played a rather small role during the early 60s, but became an important factor in the late 60s and in 1970; in this connection and perhaps as a result, Canadian Overseas shipments of newsprint rose 62 per cent from 1967 to 1970.[8] One executive, for example, could remember selling newsprint in Argentina during 1970-1971 at 80 dollars per ton mill net, when domestic tonnage was selling in the 130 to 135 dollars per ton mill net range.

(b) Regional Price Discounting

Except then for a short period in the early 30s, price discounting appears to be a phenomenon primarily of the 60s. The analysis now concentrates on the 2 periods of most recent excess capacity, starting with the year 1957.

Table 7-1 lists the values of average mill price and productive capacity for each of the major newsprint-producing regions of Canada over the period 1957 to 1970. Graph 7-15 plots these values. Table 7-2 gives the size and location of

[8] Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 4, p. 3.

Table 7-1

Regional Capacity and f.o.b. Mill Prices, 1957-1970

YEAR	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Canadian Average f.o.b. Mill Price	114.45	115.89	114.80	117.96	120.48	121.70	121.83	119.76	117.85	120.45	121.40	123.52	124.94	128.19
B.C. & Man. f.o.b Mill Price	112.04	117.91	116.12	118.74	129.90	124.01	129.23	123.28	116.41	115.88	119.20	118.85	122.76	127.49
Ontario f.o.b. Mill Price	115.29	114.72	113.94	118.80	119.13	125.41	125.82	124.24	124.06	126.64	129.90	134.11	132.94	130.88
Quebec f.o.b. Mill Price	114.84	115.72	114.78	116.16	117.85	119.78	118.54	117.46	117.09	120.21	119.15	122.38	122.82	130.74
Atlantic Provs. f.o.b. Mill Price	113.66	116.51	114.81	115.85	121.06	119.56	118.08	116.80	112.68	117.77	119.14	117.96	122.81	118.21
Canadian Total Newsprint Capacity	6756	7239	7521	7611	7734	7844	8055	8274	8421	8878	9294	9655	9612	9719
B.C. Newsprint Capacity	763	924	990	996	1086	1078	1197	1289	1343	1362	1464	1645	1590	1556
Ont. & Man. Newsprint Capacity	1713	1912	2051	2065	2062	2084	2117	2134	2110	2197	2275	2331	2253	2301
Quebec Newsprint Capacity	3338	3435	3507	3557	3554	3638	3662	3781	3807	4090	4233	4330	4447	4529
Atl. Provs. Newsprint Capacity	943	968	973	992	1032	1044	1078	1070	1161	1229	1322	1349	1321	1333

Sources: Statistics Canada, Special Tabulations
Canadian Pulp and Paper Association, Newsprint Data, various years.

GRAPH 7-15

REGIONAL CAPACITY AND F.O.B. MILL PRICES, 1957-1970

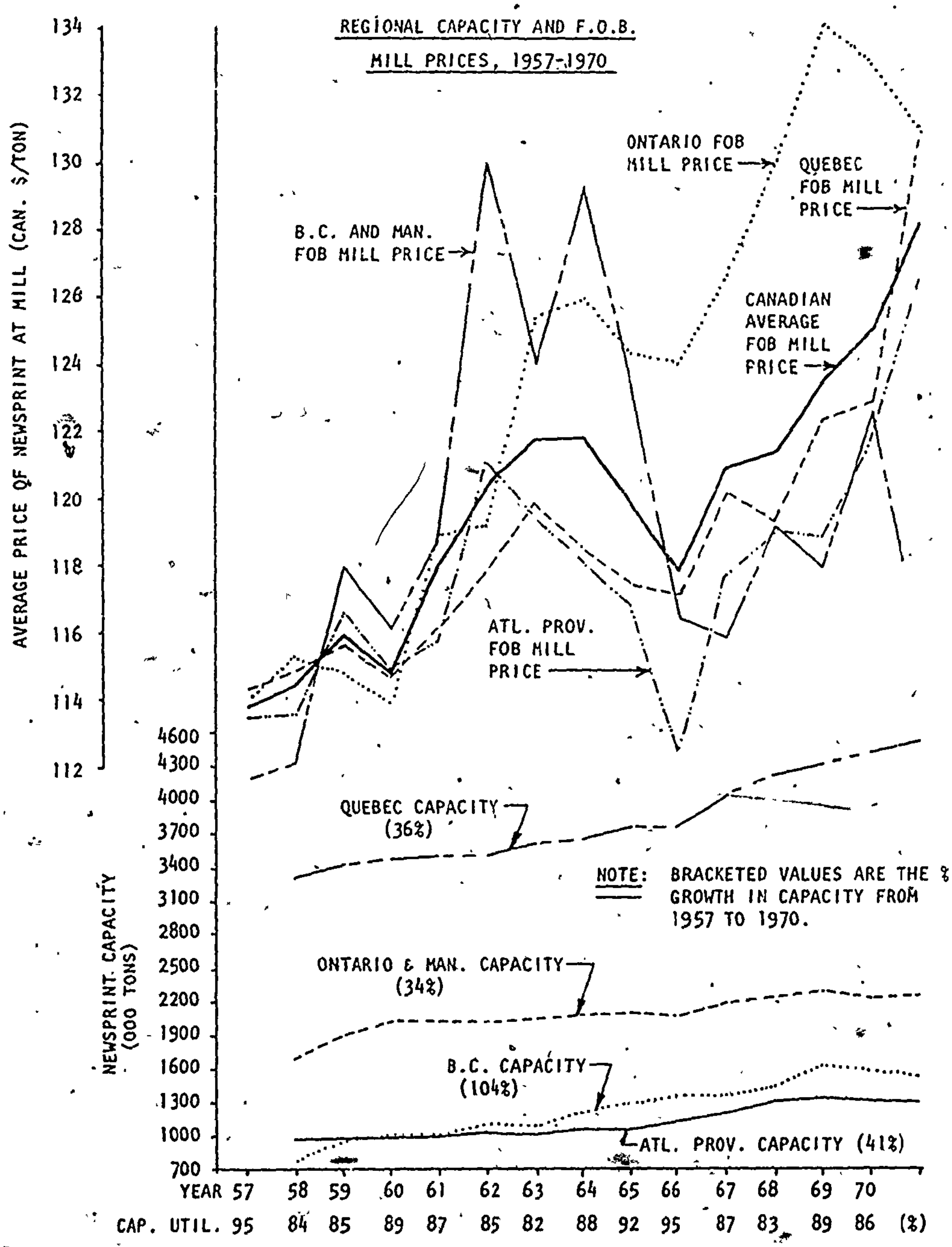


Table 7-2

New Machine Canadian Newsprint Capacity Additions - 1957 to 1970

Year	Location	Size	Company and Mill Name: New Entrant	Company and Mill Name: New mill by existing producer	Company and Mill Name: New machine in existing mill
1957	B.C.	100000		M.B. Alberni	
	B.C.	90000			M.B. Powell River
	Ont.	90000			Ont. - Minn.
	Ont.	90000			Great Lakes Paper*
1958	B.C.	80000			C.Z. Elk Falls
	B.C.	100000			M.B. Alberni
	Ont.	90000			Abitibi Fort William
	Ont.	110000			Great Lakes Paper
1963	B.C.	140000			M.B. Alberni
1964	B.C.	125000	B.C. Forest Crofton		
	Que.	100000			Ont. Paper Baie Comeau
	Que.	90000	Gaspesia Pulp and Paper**		
	Que.	30000	Soucy**		
1965	N.B.	160000	Rothesay Paper		
1966	Que.	115000	(net 50000)		Con.-Bath. Grand'Mere
1967	B.C.	160000			M.B. Powell River
	Ont.	110000	(net 50000)		Spruce Falls P. & P.
1968	B.C.	125000			B.C. Forest Crofton*
	Que.	100000			Price Chandler
	Que.	120000	(net 40000)		Price Alma
	Nfld.	140000	(net 35000)		Price Grand Falls
1969	Que.	180000			C.I.P. Gatineau
	Que.	100000			Donohue Brothers* **

* indicates major expansion by previously small producer
** indicates major ownership or tie in with large U.S. publisher

all new newsprint machines installed in Canada during this period. Analysis of Tables 7-1 and 7-2 and Graphs 7-14 and 7-15 indicates that very little new Canadian capacity came on stream in 1960, 1961, or 1962, nor were any new Canadian newsprint machines installed in 1959, 1960, 1961 or 1962. U.S. capacity also rose very slowly over this period. So the apparent discounting in 1961 and 1962 of Canadian newsprint in the United States cannot be attributed to overexpansion by any particular group of firms, but likely resulted from the general competitive pressures of a period of excess capacity. Graph 7-15 clearly indicates that Ontario producers, followed closely by Quebec producers, acted as the discount leaders during 1961, as the mill prices of these 2 regions increased far less than the mill prices of Western producers and somewhat less than those of Atlantic producers.

During 1962, the forces of competition presumably resulted in some fallback in Western and Atlantic mill prices, while Ontario producers made significant advances in mill prices and Quebec mill prices rose slightly. In 1962, Quebec producers and the Atlantic Provinces' producers appeared to be the heaviest discounters. In 1963, the only region to significantly increase its capacity was British Columbia (MacMillan Bloedel added a 140 thousand ton machine to its Alberni mill), yet that region was able to increase its mill prices an average 5 dollars per ton; in Ontario, mill prices advanced marginally, while in Quebec and the Atlantic Provinces, mill prices fell. From 1960 (a year of little or no apparent discounting) to 1963 (a year of substantial apparent discounting), the New York list price of Canadian newsprint had risen the equivalent of 14 Canadian dollars, the B.C. and Manitoba mill value per ton had risen almost 11 dollars, the Ontario mill value had risen 7 dollars, the Quebec mill value had risen just over 2 dollars, and the Atlantic Provinces mill value had risen just over 2 dollars.

With the list price of newsprint (in Canadian dollars) keeping relatively constant in 1964 and 1965, mill prices fell dramatically in the West (falling almost 13 dollars in the 2 years); mill prices also fell substantially in the Atlantic Provinces (falling 6 dollars in the 2 years); mill prices fell slightly in Ontario (2 dollars) and in Quebec (2 dollars). The increase in discounting activity in B.C. and in the Atlantic Provinces may very well have been precipitated by the coming on stream of large independent new entrant mills in these regions (i.e. B.C. Forest Product's 125 thousand ton Crofton newsprint mill, with an eventual planned capacity of 3 times that amount, and Rothesay Paper's 160 thousand ton newsprint mill in New Brunswick, with an eventual planned capacity of at least twice that amount). No new machines came on stream during these 2 years in Ontario. In Quebec, 3 new mills came into operation, however, in all 3 cases, American publishers held large interests in these mills or mill expansions, and so very little of this capacity came onto the open market. The occurrences of 1964 and 1965 do support some executives' views that discounting occurs when an independent new entrant builds capacity during a period of significant excess capacity.

In 1966 and 1967, almost 900 thousand tons of additional capacity came on stream across Canada. Most of this new capacity took place in the East (Quebec and the Atlantic Provinces) and resulted from increased working hours (i.e. shifting from a 6 to 7 day working week). Three (3) new machines did, however, come into operation; each machine being an expansion by an existing producer. By 1967, the industry operating rate was lower than it had been in 3 years and the outlook for 1968 was even worse; yet, an increase in list price (U.S. $) was achieved (approximately 7 Canadian dollars since 1965) and mill nets in all regions increased (approximately 5 Canadian dollars since 1965). It would appear that discounting need not disappear before list prices can be raised.

From 1967 to 1970, several new machines came into operation, all by existing producers and the excess capacity situation changed little; yet, once again, producers were able to increase the list price in each year (an $11.50 U.S. increase since 1967, however, only a $6.64 Canadian increase because of a change in exchange rate), and average Canadian mill prices managed a similar increase ($6.79), which likely signifies some decrease in the amount of discounting, as transportation costs probably increased over this period.

(c) Summarization of Findings Concerning the Practice of Price Discounting in the Canadian Newsprint Industry

Recapping, a number of conclusions can be made concerning the practice of price discounting of Canadian newsprint. These are:

- Severe price discounting appears to occur infrequently. Only 2 periods of severe price discounting are apparent over the period 1920 to 1970. The first period was a short period of increasing price discounting activity which commenced in 1930 or thereabouts, and ended in 1934. The second and much longer period started in 1961 and continued through to the end of the period under consideration. (See Graph 7-14)

- There appear to be 2 distinctly different types of discounting behavior which have occurred. Firstly, there is the discount offered by a large independent new entrant, who finds his new mill coming on stream during a period of excess capacity and finds that he must buy (i.e. discount) his way into the market. Such discounts are most likely offered on large, long-term, contracted tonnage. The effect of such discounts appears to be primarily regional and may very well be long-term if the excess industry capacity situation is long-term. Secondly, there is the discount offered by existing producers who, during a period of excess capacity, offer discounts on spot tonnage sales or very short-term contracted tonnage. Such discounts may be offered for a variety of reasons, but one reason is undoubtedly to improve market share (see Chapter IV, pages 115 to 118).

The discounting experiences of the 60s offer examples of both types of discounting. Ontario's producers appear to have been the first to discount during the 60s, in particular, 1961. The discounting must have been existing producer instigated, as no new producers came on stream during that period. Moreover, the discounts must have been of a short-term nature, as Ontario's mill prices recovered quickly. In fact, Ontario producers enjoyed the highest f.o.b. mill prices of any region on average over the 60s. In contrast, the mill price experience of British Columbia and the Atlantic Provinces since the coming on stream of their respective new entrants (i.e. B.C. Forest in B.C. and Rothesay Paper in New Brunswick) has been considerably poorer than the performance of Quebec or Ontario mills since that time. See Table 7-3.

Table 7-3

Movements of Regional Newsprint f.o.b. Mill Prices since just prior to the coming on stream of Major, Independent, New-Entrant Newsprint Capacity

New Entrant Name: B.C. Forest, Crofton Mill

Date and Location: 1964 (first phase), British Columbia

Change in f.o.b. mill prices from 1963:

IN TO	1964	1965	1966	1967	1968	1969	1970
BC & Man.	-5.95	-12.82	-13.35	-10.03	-10.38	-6.47	-1.74
Ontario	-1.58	-1.76	0.82	4.08	8.29	7.12	5.06
Quebec	-1.08	-1.65	1.67	0.61	3.84	4.28	12.20

New Entrant Name: Rothesay Paper

Date and Location: 1965 (first phase), New Brunswick

Change in f.o.b. mill prices from 1964:

IN TO	1965	1966	1967	1968	1969	1970
Atl. Provs.	-4.12	0.97	2.34	1.16	6.01	1.41
Quebec	-0.37	2.75	1.69	4.92	5.36	13.28
Ontario	-0.18	2.40	5.66	9.87	8.70	6.64

- Discounting, once started, seems difficult to end and the fact that list prices are increasing need not mean that discounting has ceased (as for example, from 1966 to 1970).

- Generally, discounting does not appear to be an inevitable function of the demand - supply situation. Except for the period from 1930 to 1934, discounting does not appear to have been a major factor during the periods of substantial excess capacity lasting from 1930 through to the end of the Second World War.

- Excess capacity accompanied by a favorable change in the Canadian - United States exchange rate (i.e. favorable to Canadian newsprint producers) seems to encourage price discounting. Perhaps during such periods, Canadian producers feel they can achieve significant volume increases at the expense of American newsprint producers. (See Graphs 7-12 and 7-14.)

CHAPTER VIII. MANAGERIAL DECISION PRACTICES AND FUTURE INDUSTRY PERFORMANCE IMPLICATIONS OF STUDY

1. Introduction

This chapter serves to develop alternative policies and strategies which Canadian newsprint manufacturers might consider employing as a basis for improving decision practices which, it is expected, would lead to improved industry and individual firm profitability.

2. The Industry's Future Performance

As in the past, the industry's future financial performance will most likely be dependent, in large measure, upon the industry's ability to control excess Canadian newsprint capacity. How likely is it then, that Canadian newsprint producers will be able to maintain a reasonable balance between shipments and capacity? Whereas, there are several factors which indicate that the industry is unlikely to be able to maintain such a balance, there are, on the other hand, several other factors which indicate that such a balance may be achieved. Table 8-1 lists some of the more important factors which may result in a lessening of the Canadian newsprint industry's average level of excess newsprint capacity. Table 8-2 lists some of those factors which are likely to promote a continuance of the Canadian newsprint industry's previous excess capacity experiences.

The dwindling wood resource may ultimately force a balance between supply and demand of all wood products in-

Table 8-1

Factors which may result in a lessening of the Canadian Newsprint Industry's average level of excess capacity

Dwindling wood supply	Trees are renewable resources, yet their regeneration is slow, and increased output in this country comes about primarily from the utilization of previously untapped forests. Canada is rapidly running out of virgin woodland. The depletion of Canada's wood resources has been thoroughly investigated by J.L. Keays (1973) of the Western Forest Products Laboratory in Vancouver, British Columbia. Keays[1] believes that there are suitable sites available for, at most, 12 or 15 new pulp and/or paper mills in Canada. These sites are located in the northern, poorly accessible regions of Canada. Mills constructed in these regions are expected to be far more costly to construct and operate than existing mills. Keays[2] does suggest a number of ways in which the World's supply of wood fiber can be substantially increased, other than by the exploitation of coniferous forests not presently in use. Taking such ways into account, Keays projects that there will be a shortfall of 200 million cubic meters of wood worldwide by the year 2000. Keays admits, however, that because data on wood resources have a low index of reliability, there may, in fact, be no shortfall, or the shortfall may be as much as 400 million cubic meters.[3] Keays projects that the demand for wood by the year 2000 will have reached 4000 million cubic meters.[4]
Improvement in management decision-making skills	As was stated in Chapter IV, most executives feel that there has been significant upgrading in management understanding, skills and decision-making capabilities. In particular, the appointment of experienced financial managers to key executive positions in several of Canada's largest firms has resulted in stricter firm adherence to return on investment criteria for decision purposes.
Financial constraints and alternative resource usage	Again, as was discussed in Chapter IV (page 121), those executives interviewed felt that capacity expansion in the newsprint field would be constrained by the sheer magnitude of the financial investment involved. Moreover, the financial risks may be considerably less for investments in other wood-using fields. For example, of the 6 broad categories of paper and paperboard identified by Keays, the slowest growth in demand is expected to take place in newsprint, reflecting the belief that per capita newsprint consumption is approaching its saturation level in many developed nations, whereas, the per capita consumption of most other paper and paperboard products is far from their expected saturation levels.[5]

[1] J.L. Keays, interview, Western Forest Products Laboratory, 1974.

[2] J.L. Keays, <u>Projection of World Demand for Wood-Fibre to the Year 2000</u>, (Vancouver, B.C.: Western Forest Products Laboratory, 1973), p. 6.

[3] Ibid., p. 1

[4] Ibid., p. 18.

[5] Ibid., p. 11.

Table 8-2

Factors likely to promote a continuance of the Canadian Newsprint industry's previous excess capacity experiences

Canada, the marginal supplier of newsprint to the United States	As discussed in Chapter IV (page 105), the industry's executives believe that Canada is presently, and will continue to be, a marginal supplier of newsprint to the United States. If this view is correct, then changes in U.S. newsprint consumption or U.S. newsprint capacity are likely to have a more pronounced effect upon Canadian newsprint shipments to the United States than in the past. Thus, the potential for increased levels of excess capacity exists.
Alternative sources of newsprint supply	Many nations which purchase newsprint from Canada, have large, native wood resources for which a suitable technology for the manufacture of newsprint has not as yet been developed. Other nations are moving towards the development of vast plantations. Often, balance of payments and employment considerations outweigh traditional economic considerations in the development of newsprint manufacturing capabilities.
Competing communication vehicles	News and advertising can, of course, be transmitted by other media. Keays[1] for example, identifies 5 major presently unused means of communication other than the conventional method. One means which has received attention over the last few years is direct television transmission of the contents of any newspaper sent out from a central, universal, news-transmission center. How quickly new methods will replace conventional methods may, of course, be highly dependent upon the availability and cost of newsprint.
Alternative usages of newsprint	There are no alternative usages of newsprint other than in the transmission of news or advertising materials, nor are there likely to be in the future. Moreover, the growth of newsprint consumption is slowing as several developed nations approach the newsprint saturation level per capita.[2]
Alternative usages of Canadian newsprint capacity	Tariffs on most pulp and paper products (newsprint being the main exception) and small domestic markets continue to indicate that capacity developed for newsprint production in this country cannot be economically converted to the production of other paper or paperboard products.

[1] J.L. Keays, Projection of World Demand for Wood-Fibre to the Year 2000, (Vancouver, B.C.: Western Forest Products Laboratory, 1973), p. 2.

[2] Ibid., p. 11

cluding newsprint, but for industry executives to count on such an occurrence would be, in this author's opinion, a great mistake. By the year 2000, unimaginable changes may have occurred in the production of wood or substitute materials, in the production of newsprint paper or substitutes, or in society's basic values (which might, for example, have a dramatic effect upon advertising, or upon the nature and purpose of business, or upon resource ownership, control or usage). In summary then, it is this author's opinion that unless industry members take action to prevent the occurrence of excess capacity, or are able to curb the effects of excess capacity upon industry performance, there is little chance that excess capacity and unsatisfactory financial returns will not recur.

The following sections of this chapter consider possible means of controlling the amount of excess industry capacity and alternative ways of curbing the effect such excess capacity has on financial performance.

3. Controlling the Amount of Excess Newsprint Capacity

The control of excess newsprint capacity effectively means the control of both newsprint shipments and newsprint capacity.

3.1 Controlling Capacity Additions - A Framework for Individual Firm Capacity Expansion Decisions

Although it is possible, though unlikely, that Canadian newsprint manufacturers could meet and agree to limit, capacity increases and/or to designate which firms in Canada would add or delete newsprint capacity, such actions would likely be illegal, and probably not particularly effective, as it would be totally unrealistic to expect that a similar control over new entrants or over producers of other countries (in particular, over U.S. manufacturers) could be exercised.

This section then, addresses the question of how should individual firms' managers decide whether or not to expand newsprint capacity.

The capacity expansion decision is undoubtedly the most important decision made by individual firms within the newsprint industry. An expansion at the right time will lead to increased firm profitability and possibly increased responsibility and compensation for its managers; whereas, an inopportune expansion may very well culminate in severe financial losses and the dismissal of top management.[1] Likewise, managers of firms who do not recommend expansion of facilities during seemingly favorable circumstances must be able to clearly justify such a decision or they invite replacement by what are felt to be more aggressive managers.

The risks to the firm and its management of newsprint capacity expansion are high because the return earned by the individual firm is determined largely, not by its own actions, but by the actions of its many competitors and by other factors over which it is able to exercise little, if any, control.

---

[1] See, for example, "Why Reed Stopped Acquiring", Business Week, July 18, 1977, pp. 76-77

Thus, the individual firm capacity expansion decision process must take into account the likely actions of competitors if it is to be effective. Figure 8-1 presents one possible approach which individual firm capacity expansion decision-makers might consider employing when making the capacity decision. The steps to this approach are as follows:

- Using a procedure such as is outlined in Table 8-3, the decision-maker would attempt to determine the price of newsprint (under the constant cost assumption) at which each existing competitor and each probable new entrant would be likely to expand capacity. This price level will presumably differ for each competitor and for each alternative open to each competitor, since each alternative will have its own fixed and variable costs and assumed or planned operating rate. Additionally, each firm will have its own required rate of return, method of calculating the projected rate of return and funds constraint. These factors can then be employed to determine the break even price which each newsprint capacity expansion project would have to achieve and maintain in order to meet the expected financial return.

- The decision-maker must then make an assessment of how much additional World newsprint capacity can be justified on the basis of long-term projected consumption and shipment patterns. This assessment will yield the projected capacity gap (i.e. the amount that projected shipments exceed existing and committed capacity) at some point in time t. It would then be reasonable to expect that additional capacity be planned for time t to meet the capacity gap projected for time t.

Figure 8-1

Framework for Capacity Expansion Decisions

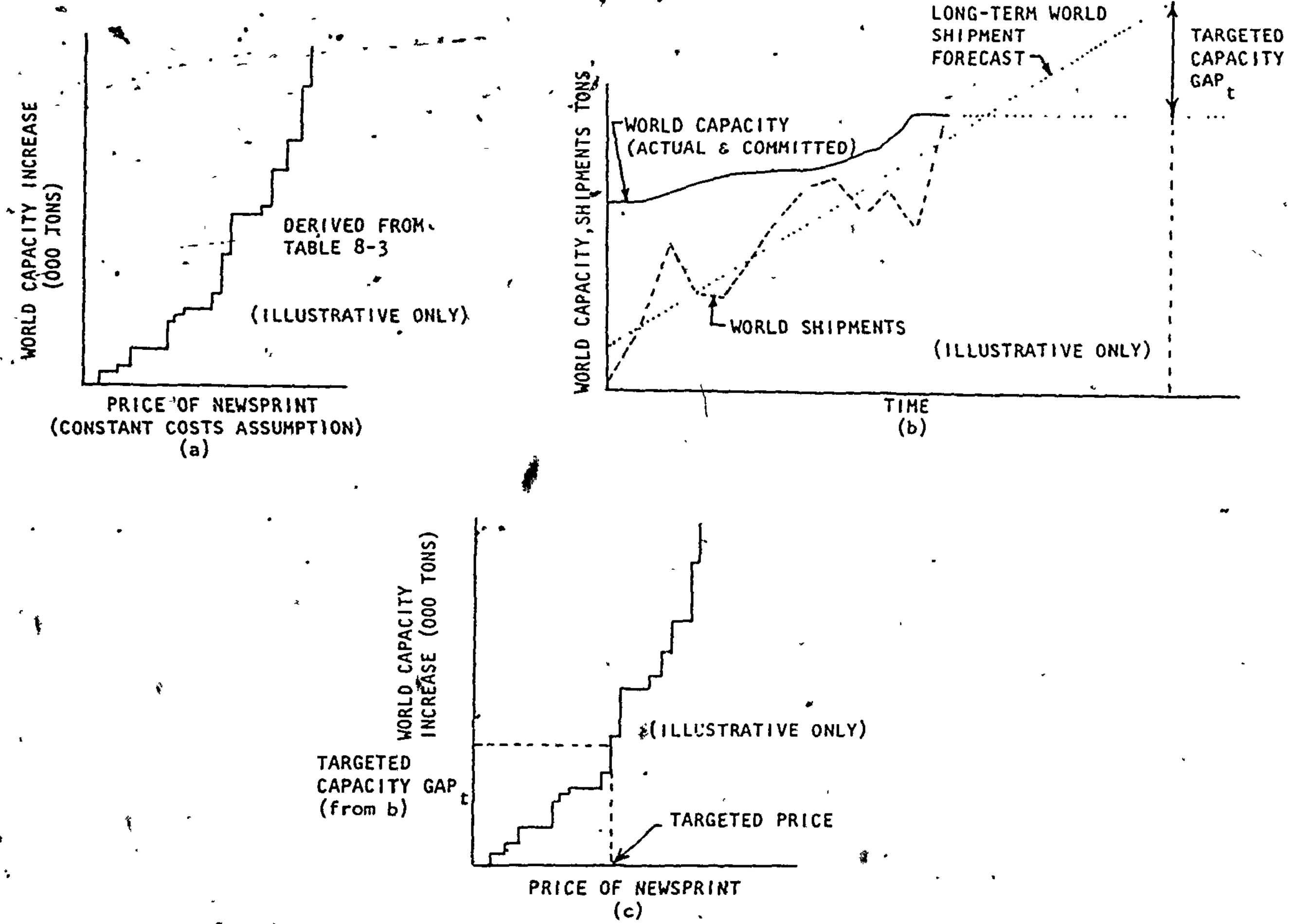


Table 8-3

Expected Capacity Additions Tabulation Form (Illustrated)

Capacity Alternative			Return		Risk Measures					
Name of Competitor or New Entrant	Expansion Alternative	Size of Alternative	Economics of Alternative: Relevant Costs Etc.	Economics of Alternative: Break Even Price	Effect on industry economics if expansion comes on stream during poor market conditions. i.e. Industry capacity utilization: 70%	80%	90%	Effect on firm profitability if expansion comes on stream during poor market conditions i.e. Industry capacity utilization: 70%	80%	90%
A	1		Important Factors:	Calculated	Important Factors:			Important Factors:		
	2		Fixed and variable costs		- New Entrant?			- Proximity of Facilities		
	3				- Small Producer?					
	4		Assumed Operating Level		- Publisher Owned?			- Overlapping Markets		
B	1							- Firm Traditional Strategies		
	2		Company's Required Return					(e.g. Pricing)		
	3									
C	1		Likely Timing of Expansion							
	2									

If such additional capacity is to be forthcoming, then the price of newsprint will have to rise to the targeted level (i.e. the level depicted in Figure 8-1(c)). The targeted price then, will be just sufficient to bring on an amount of capacity equal to the capacity gap.

- Under no circumstances should the decision-maker expand his own capacity if his firm cannot achieve its desired rate of return at the targeted price. Should the firm expand if it can achieve the desired rate of return at the targeted price? Not always. The situation is complicated by the fact that the price of newsprint may very well rise considerably above the targeted price because of a short-term demand - supply imbalance. In such cases, there is a great temptation for competitors to feel that such a situation will continue, and under such circumstances much more than the targeted capacity increase may come on stream. Thus, the decision-maker can be reasonably assured of making a good investment only if he can justify additional capacity at the targeted price, and if he can make certain, or be assured that the price of newsprint will not rise above this targeted price at least until that time when an additional capacity gap justifies an upward revision of the targeted price. Canada's largest newsprint producers may be in a position where any one could effectively prevent the list price of newsprint from exceeding the targeted price, a position which presumably they should adopt, regardless of whether or not they themselves expand newsprint facilities. Small producers undoubtedly would have almost no power to ensure that list prices do not exceed the targeted level, and thus, capacity expansion for them is even more risky. Spot prices may very well rise well above the targeted level, but it is unlikely that competitors would expand their facilities (and thus cause industry-wide excess capacity) on the basis of high spot prices, if the firm could not achieve its desired level of profitability at the existing list price.

In summary then, the decision-maker should expand if his firm can achieve its expected rate of return at the targeted price when he can be relatively certain that the list price of newsprint will be prevented from rising above the targeted level. Such an approach however, overlooks the fact that the long-term World shipment forecast may be overstated. If the projection is high, then the targeted capacity gap is also high and excess capacity is certain to develop. The effects of this overexpansion will normally be small in magnitude and short-lived in duration. If, however, some of the justifiable capacity expansion projects entail large expansions by small firms or the construction of facilities by new entrants, then the effects on industry profitability of an excess capacity situation as discussed in this research may be rather severe. In cases where some of the justifiable capacity expansion projects involve large expansions by small producers or the construction of facilities by new entrants, the risks of capacity expansion are higher than normal and the decision-maker should make an appropriate upwards adjustment of the firm's expected return and recalculate the relevant alternatives' break even prices. The new break even prices can once again be compared with the targeted price to determine whether or not expansion is justifiable.

3.2 Other Factors Tending to Limit Overexpansion by the Newsprint Industry

The hiring of competent financial managers and the investigation and dissemination of information concerning the determinants of excess capacity and of financial performance (a task which this research has addressed) should lessen the possibility of overexpansion in this industry. Additionally, newsprint producers might consider lobbying for a removal of U.S. tariffs on a wide range of pulp and paper products and redesigning newsprint mills so that conversion of newsprint capacity to the production of other paper or paperboard grades during a period of future excess newsprint capacity might be made economically feasible.

3.3 Controlling Newsprint Shipments

Unlike the control of excess newsprint capacity, the control of newsprint shipments should be much more easily achieved. It seems a paradox that, whereas Canadian newsprint producers export 90 per cent of their newsprint production, of which some 85 per cent goes to the United States, and that, whereas Canadian newsprint producers supply 65 per cent of the United States' total newsprint requirements, and that, whereas Canadian newsprint producers see themselves as the main establishers of newsprint prices in North America, that Canadian newsprint producers should be considered, and indeed consider themselves, marginal newsprint suppliers to the United States. If Canadian producers are to effectively control newsprint shipments, then one possibility would be to alter both the image and the actuality of Canada as a marginal newsprint supplier. Ultimately, what is required is a change in the nature of the contract between newsprint producer and newsprint consumer. In other words, a redistribution of the risks of newsprint production between producer and consumer must be achieved. The specific nature of possible changes in newsprint contracts can be more properly considered after discussion of the possible ways of controlling the effects of excess capacity.

4. Controlling the Effects of Excess Capacity

If excess capacity cannot be controlled, then industry profitability will likely continue to be unsatisfactory unless some means of controlling the effects of excess capacity (in particular, its effects on newsprint pricing and margins) can be found. One possibility is to tie the list price of newsprint to costs of manufacture and distribution. In this way, the list price of newsprint would reflect actual cost changes; however, as has been seen, the list price of newsprint has not always reflected the price at which newsprint is actually being sold because of long-term and short-term price discounting. Long-term, large volume price discounting by new entrants could, of course, be avoided if other industry members agreed to absorb a major portion of the new entrant's capacity. Unfortunately, even ignoring the possible legal problems, the large number of newsprint-producing firms in this country makes any such agreement extremely difficult to achieve without doing more harm than good.

5. Final Recommendations

It should be obvious that there are no easy ways to control either the amount of excess capacity or the effects of such excess capacity. There are, however, a number of actions in addition to those already suggested, which industry managers might consider taking, which would most likely have some positive effect upon industry and individual firm profitability. It is the author's view that none of these possible actions are strictly prohibited by the existing Combines Investigation Act, nor by the recent amendments proposed under Bill C-42. Regular meetings as proposed below might, unless caution is exercised, lead to agreements or arrangements which are illegal. Important sections of Canada's Combines Investigation Act and of Bill C-42 are reproduced as Appendix I of this thesis. Note that Section 32(4) of the Act, subject to certain limitations, permits agreements and arrangements which would normally be illegal, if such agreements and arrangements relate only to the export of products from Canada.

Possible actions are:

- Employ a capacity expansion decision-making framework similar to that proposed in this chapter (pp. 246 to 253) for making decisions about when to expand newsprint capacity.

If the capacity expansion decision-making framework is to be successfully employed, then Canada's largest newsprint producers must be capable and prepared to ensure that, during profitable times, the list price of newsprint does not rise above the "targeted" level (i.e. that level which will ensure only sufficient new capacity to meet customers' needs). Otherwise, over expansion and excess capacity are likely to recur, accompanied by poor profitability. If Canada's largest newsprint producers feel they do not possess this capability, then they should work towards the achievement of this capability or else risk a continuance of the industry's unsatisfactory financial performance.

The Canadian Pulp and Paper Association could be charged with gathering together much of the information required for making capacity expansion decisions using such a framework.

Such a framework could also be modified for making decisions about when to mothball existing capacity.

- Hold regular meetings with other newsprint executives for the following purposes:

- To discuss the industry's financial performance and to elicit from individual managers their perceptions of the factors underlying that performance.

- To determine what differences in managerial perceptions exist. As has been demonstrated (Chapter IV, pages 131 to 132), substantial differences in managerial perceptions existed at the time interviews were held.

- To determine why such differences in managerial perceptions exist and to resolve such differences, or at least set in motion research activities which might be expected to resolve such differences.

- To discuss and disseminate information on company practices such as procedures for investment proposal generation and evaluation. As has been shown (Chapter IV, pages 105 to 135), companies in the Canadian newsprint industry have employed varying pricing and capacity expansion practices.

- To discuss and disseminate information on future trends and on planned actions of individual firms and to assess their effects upon the industry's future performance.

- Adopt specific pricing policies and specific contract terms. Make these pricing policies and contract terms known to competitors as well as to customers. Try to persuade other competitors to do the same.

- Attempt to achieve greater industry discipline by buying out the newsprint interests of other producers. Several pulp and paper firms have attempted to minimize the risks by diversifying into several pulp and paper fields; unfortunately, this may have simply increased the number of competitors in each field and brought about greater competition and less industry discipline. Individual firms might consider the merits of mergers or of swapping facilities (e.g. a kraft pulp mill for a newsprint mill).

- Attempt to obtain both industry and government approval for the removal of some or all marketing decisions from the individual producer. Marketing boards, such as exist in some agricultural fields, might be beneficial.

- Lobby for removal of U.S. tariffs on all pulp and paper products and redesign newsprint mills so that the conversion of newsprint capacity to the production of other paper or paperboard grades during a period of excess newsprint capacity might be made economically feasible. The merits of free trade cannot, of course, be judged simply on the basis of its effect upon Canada's newsprint industry, yet, this is obviously a very important consideration.[2]

- Have Canadian Pulp and Paper Association personnel actively research the determinants of financial performance in this industry. Since Association member firms report a large amount of information on an individual facility basis, the Association can, if its members so desire, investigate the determinants of individual firm performance (as contrasted with industry performance). The Association could also seek answers to important questions, such as:

- What are the major determinants of an individual firm's operating rate?

- What are the major determinants of the volume of Canadian newsprint shipments to the United States...to various regions of the United States?

- What are the major determinants of the volume of Canadian newsprint shipments to other parts of the World?

The Association can also extend its analysis of the determinants of individual firm and industry performance to Canada's other pulp, paper and paperboard industries.

- Develop econometric models of the individual firm's economics and of the various pulp and paper industry economics

---

[2] The effect of free trade on major segments of Canada's pulp and paper industry has been investigated by Haviland, Takacsy and Cape (1968).

for predictive and strategic planning purposes.

Additionally, both federal and provincial governments can aid this industry:

- By encouraging firms to expand only when there is a clear need for such new capacity. Governments who wish to revitalize their pulp and paper industries and which seek to reduce unemployment must be prepared to see the complete close-down of inefficient facilities at the same time as new facilities are opened so as to keep consumption and capacity in line. Otherwise, they simply promote excess capacity, the harmful effects of which have been fully discussed in this research. Today's modern newsprint-producing facilities have the capability of producing newsprint with far less labor input than the older facilities and so governments should realize that the rebuilding of pulp and paper mills may make them better able to compete on a more profitable basis but should also result in reduced, not increased employment in this industry.

- By encouraging pricing policies (such as that called for by the capacity expansion decision-making framework) which will ensure a higher and less variable return to Canada's newsprint producers and to society as a whole.

Unfortunately, federal and provincial governments have acted in the past in ways which encourage both the expansion of facilities when they were not required by the market and the raising of prices to such levels during good times which was certain to lead to over expansion.

- By encouraging and financially supporting research activities which would result in quality-improving or cost-reducing product and process innovations or would result in the more efficient management or operation of existing facilities. The long-term viability of this industry can only be ensured if this industry is able to compete competitively in the World's market. Canada can no longer simply depend on its abundance of easily accessible, low-cost virgin woodlands to effectively compete, for such woodlands are already being fully exploited, it must now ensure that it develops and employs increasingly efficient ways of turning its wood resources into products which the World requires.

APPENDIX A

Capacity of Individual Canadian Newsprint Mills

Table A-1

Canadian Capacity of Individual Newsprint Mills - 1970

Mill Name and Location	Capacity (tons)	
Beaupre, Que.	156361	
Fort William, Ont.	126368	
Iroquois Falls, Ont.	323422	
Pine Falls, Man.	168371	
Sault Ste. Marie, Ont.	93842	
Thunder Bay, Ont.	160173	
Abitibi Paper Co. Ltd.		1028537
Anglo-Canadian Pulp and Paper Mills Ltd.		326031
Beaver Wood Fibre Co. Ltd.		34998
Corner Brook, Nfld.	385906	
Liverpool, N.S.	187584	
Bowaters Canadian Corp.		573490
British Columbia Forest Products Ltd.		225961
Dalhousie, N.B.	279197	
Gatineau, Que.	506801	
Three Rivers, Que.	324287	
Canadian International Paper Co.		1110285
Cap de la Madeleine, Que.	109802	
Grand'Mere, Que.	232441	
Port Alfred, Que.	275024	
Shawinigan Falls, Que.	278452	
Three Rivers, Que.	79439	
Consolidated-Bathurst Ltd.		975158
Elk Falls, B.C.	251834	
Ocean Falls, B.C.	96390	
Crown Zellerbach Canada Ltd.		348224
Dolbeau, Que.	161043	
Donnacona, Que.	144614	
Red Rock, Ont.	71017	
Three Rivers, Que.	165070	
Domtar Newsprint Ltd.		541744
The Donohue Company Ltd.		226308
The E.B. Eddy Co.		60832

Table A-1 continued

Mill Name and Location	Capacity (tons)	
The Great Lakes Paper Co. Ltd.		442078
Kruger Pulp and Paper Ltd.		149991
James Maclaren Co. Ltd.		131824
Port Alberni, B.C.	410247	
Powell River, B.C.	571452	
Saint John, N.B.	183791	
MacMillan Bloedel Ltd.		1165490
Nova Scotia Pulp Ltd.		
Baie Comeau, Que.	365910	
Thorold, Ont.	218211	
Ontario Paper Co. Ltd.		584121
Fort Frances, Ont.	48726	
Kenora, Ont.	271045	
The Ontario-Minnesota P. & P. Co. Ltd.		319771
Alma, Que.	294849	
Chandler, Que.	234204	
Grand Falls, Nfld.	296856	
Kenogami, Que.	245387	
The Price Co. Ltd.		1071296
St. Raymond Paper Ltd.		23343
F.F. Soucy, Inc.		36943
Spruce Falls Power & Paper Co. Ltd.		342486
TOTAL ALL CANADA		9718911

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 1, p. 2.

APPENDIX B

Industry Trends, 1920 through 1970

1. Consumption and Sources of Supply

1.1 Newsprint and other Pulp and Paper Consumption

We should not confuse the importance of the Canadian newsprint industry with other segments of the pulp and paper industry.

Although newsprint accounts for roughly 70[1] per cent of Canada's total pulp and paper production, this value bears no relation to Canada's consumption.

Table B-1 presents consumption values of paper and paperboard in the United States for the period 1920 through 1970. The United States market is singled out in this discussion because it is the largest national consumer of all pulp and paper products and is by far the largest consumer of Canadian-produced newsprint. For example, in 1970, U.S. newsprint consumption of 9621 thousand tons accounted for 42 per cent of World newsprint demand. The second biggest consumer nation, Japan, used 2176 thousand tons.[2]

In 1920, newsprint comprised 29 per cent of total U.S. paper and paperboard consumption. By 1970, however,

---

[1] Seventy (70) per cent in tonnage terms; unless otherwise noted all figures in this appendix are expressed in tons or percentages based upon tonnage values.

[2] Canadian Pulp and Paper Association, Newsprint Data - 1971 (Montreal: Canadian Pulp and Paper Association, 1971), pp. 26 and 27.

Table B-1

United States Consumption of Various Papers and Paperboards, 1920-1970

(000 tons)

Product	1920	1930	1940	1950	1960	1970
Newsprint	2185	3496	3774	5832	7279	9848
Board	2264	3809	5979	11032	15327	22808
Print & Conv	1024	1686	2169	3316	4698	7256
Fine Paper	389	711	687	1155	1750	n.a.
Coarse Paper	999	1556	2403	3226	3918	4877
Tissue Paper	195	354	716	1353	2180	3591
Const P. & B.	375	568	839	2646	3266	4279
All Other	197	139	189	450	721	n.a.
Total Paper and Board	7640	12319	16757	29012	39138	56894

Source: American Paper Institute, The Statistics of Paper: 1971 (New York: The Institute, 1971), various tables.

Table B-2

United States Production of Various Papers and Paperboards, 1920-1970

(000 tons)

Product	1920	1930	1940	1950	1960	1970
Newsprint	1512	1226	1056	1013	2004	3356
Board	2313	3854	6200	11090	15851	24960
Print & Conv	1069	1704	2206	3305	4700	7043
Fine Paper	415	713	736	1197	1777	n.a.
Coarse Paper	1044	1580	2501	3297	3957	4952
Tissue Paper	195	353	734	1365	2201	3611
Const P. & B.	375	592	862	2646	3194	4137
All Other	262	146	190	460	760	n.a.
Total Paper and Board	7185	10169	14484	24375	34444	52470

Source: American Paper Institute, The Statistics of Paper: 1971 (New York: The Institute, 1971), various tables.

newsprint's share had dropped to 17 per cent on a tonnage basis. This lackluster growth in newsprint consumption is in marked contrast with the consumption growth of other paper products. While newsprint consumption rose 350 per cent in the period from 1920 to 1970, total paper and paperboard consumption rose 645 per cent, paperboard consumption alone rose 910 per cent, printing and converting paper consumption increased over 600 per cent and construction paper and board rose 1040 per cent. In fact, no other grade of paper rose at as slow a rate as newsprint.

A comparison of Tables B-1 and B-2 shows that with the exception of newsprint, U.S. manufacturers have historically produced practically all the paper and paperboard consumed in that country. Thus, the rise in production has matched almost identically the rise in consumption in that country. Between 1920 and 1970, U.S. paper and paperboard production increased 630 per cent.

Tables B-3 and C-2 (page C6) give a full listing of U.S. annual newsprint consumption and production in tons.

The story of Canadian production is somewhat similar, as Tables B-4 and B-5 show.

Table B-6 presents figures on the growth of woodpulp production in the U.S. and Canada. Between 1920 and 1970, U.S. production of all grades of woodpulp rose 1000 per cent, while Canadian production rose 840 per cent. But more significantly, Canadian woodpulp exports to the United States

Table B-3

United States Newsprint Consumption and Stocks

(tons)

Year	Consumption				Consumers' Stocks*	
	ANPA	†Per Cent	Total	Per Capita	ANPA	Total
1913	....	...	1,473,000	30.3	....	....
1914	....	...	1,547,000	31.2	....	....
1915	....	...	1,500,000	30.0	....	....
1916	....	...	1,600,000	33.2	....	....
1917	....	...	1,779,000	34.4	....	....
1918	....	...	1,752,000	33.5	....	....
1919	....	...	1,892,000	36.0	....	....
1920	....	...	2,197,000	41.3	....	....
1921	1,818,617	89.0	2,043,390	37.7	196,741	269,025
1922	2,048,852	84.0	2,439,110	44.3	211,325	281,107
1923	1,819,141	65.5	2,777,315	49.6	209,996	281,278
1924	1,679,620	59.0	2,846,814	49.9	199,979	255,962
1925	1,808,229	60.0	3,013,715	52.0	163,614	198,252
1926	2,028,779	59.5	3,409,713	58.1	228,832	304,174
1927	2,707,045	79.0	3,426,639	57.6	264,885	337,766
1928	2,761,475	77.0	3,586,331	59.5	247,552	314,783
1929	2,949,878	78.5	3,757,806	61.7	278,548	353,258
1930	2,735,428	76.0	3,599,247	58.5	256,472	305,830
1931	2,625,869	81.0	3,241,814	52.3	236,153	278,705
1932	2,265,741	80.0	2,832,176	45.4	136,443	238,700
1933	2,154,106	80.0	2,692,632	42.9	237,403	364,422
1934	2,435,824	80.0	3,107,280	49.2	323,453	480,237
1935	2,675,744	80.0	3,344,680	52.6	294,494	365,886
1936	2,953,557	80.0	3,691,946	57.7	305,885	878,505
1937	3,059,795	80.0	3,824,743	59.4	613,514	832,535
1938	2,737,815	80.0	3,422,260	52.7	315,027	409.929
1939	2,730,217	77.5	3,520,372	53.8	328,494	423,473
1940	2,855,952	76.5	3,731,331	56.5	356,472	465,733
1941	2,946,660	75.0	3,929,773	53.9	385,206	521,508
1942	2,834,940	74.3	3,815,532	56.6	479,349	645,492
1943	2,720,257	75.0	3,627,000	53.1	366,702	468,205
1944	2,351,096	72.5	3,242,891	46.9	342,280	483,822
1945	2,455,116	70.5	3,481,302	40.8	266,811	375,900
1946	3,136,278	73.0	4,296,268	60.8	292,806	409,867
1947	3,504,878	76.0	4,752,904	66.0	377,033	507,219
1948	4,000,829	78.0	5,140,806	70.1	453,145	619,357
1949	4,257,489	77.0	5,529,206	74.1	445,863	608,807

Table B-3 continued

Year	Consumption ANPA	†Per Cent	Total	Per Capita	Consumers' Stocks* ANPA	Total
1950	4,541,760	76.5	5,936,941	78.3	424,960	593,252
1951	4,511,023	75.5	5,974,865	77.4	522,196	713,807
1952	4,551,208	76.0	5,983,471	76.3	611,969	820,640
1953	4,668,602	76.0	6,142,806	76.9	551,769	780,510
1954	4,683,698	76.0	6,162,761	75.9	516,363	721,594
1955	8,044,993	76.0	6,638,140	80.3	458,352	672,816
1956	5,208,781	75.5	6,899,020	82.1	635,756	897,739
1957	5,140,099	75.0	6,805,466	80.2	674,980	940,400
1958	4,949,986	74.5	6,644,276	76.3	651, 8	907,154
1959	5,327,839	74.5	7,151,481	81.0	658,772	906,851
1960	5,532,154	74.5	7,425,709	82.2	628,092	880,620
1961	5,460,989	74.0	7,379,716	80.4	583,949	827,054
1962	5,577,325	74.5	7,436,342	80.3	603,591	841,047
1963	5,584,871	74.0	7,547,124	79.8	545,090	761,980
1964	6,031,261	75.0	8,041,706	83.7	584,551	798,478
1965	6,387,261	75.5	8,459,948	87.0	573,352	804,837
1966	6,808,362	76.0	9,076,702	92.2	681,404	951,487
1967	6,207,404	75.5	9,143,998	91.9	629,976	871,441
1968	7,025,410	76.0	9,243,998	91.9	633,317	852,896
1969	7,344,443	75.4	9,740,640	95.9	699,337	937,518
1970	7,130,063	74.7	9,544,930	93.2	740,456	1013,487

*End of Each Year.

Reference: Table 10 of Monthly Report

†U.S. total consumption is based on consumption reported by the ANPA group. For each year the percentage of total U.S. supply taken by this group is assumed to represent the percentage of total consumption used by the group. Total U.S. consumption is obtained by extending ANPA consumption by this percentage to 100.
Total consumers' stocks at the beginning of each year plus supplies received less total consumption equals stocks at the end of the year.

Source: Canadian Pulp and Paper Association, *Annual Newsprint Supplement - 1970*, (Montreal: Canadian Pulp and Paper Association, 1971), Table 9, p. 5.

Table B-4

Canadian Production of Various Papers and Paperboard, 1920-1970

(000 tons)

Product	1920	1930	1940	1950	1960	1970
Newsprint	938	2791	3770	5278	6739	8607
Board	158	233	500	771	1060	1823
Book & Writ.	73	69	102	214	404	899
Wrapping	77	78	140	223	321	472
Tiss. & San.	4	11	34	77	149	282
All Other	27	37	39	208	300	509
Total Paper and Board	1277	3219	4585	6771	8973	12592

Source: Canadian Pulp and Paper Association, Reference Tables (various years) (Montreal: Canadian Pulp and Paper Association).

Table B-5

Canadian Production Change

1920-1970

Product	% Change
Newsprint	820
Board	1050
Book & Writ.	1130
Wrapping	500
Tissue & San.	7000
All Other	1800
Total Paper and Board	890

4

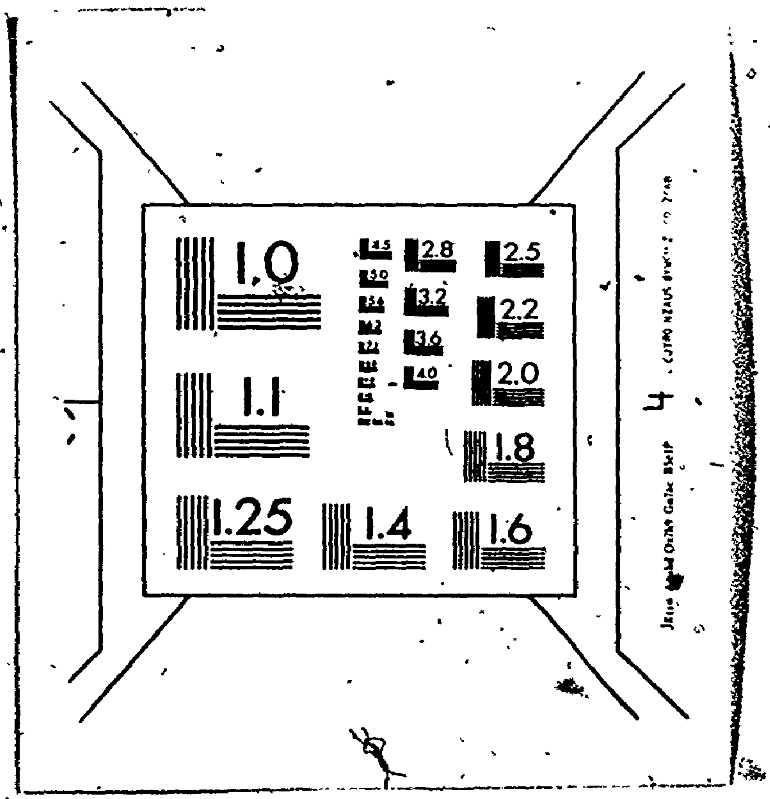


Table B-6

Woodpulp Statistics

(000 tons)

	Year					
	1920	1930	1940	1950	1960	1970
U.S. Production	3822	4630	8959	14849	25315	42216
Can. Production	1960	3619	5291	8473	11461	18390e
Can. exports to United States	630	736	828	1717	2000	3316
Total Can. exp.	820	760	1068	1846	2601	5582

Sources: Statistics Canada, American Paper Institute as given in: Canadian Pulp and Paper Association, Reference Tables - 1966, and 1971, (Montreal: Canadian Pulp and Paper Association, 1966 and 1971), Tables 18, 21 and 22, pp. 7, 9 and 12, and Tables 17, 20 and 27, pp. 8, 9 and 12.

Table B-7

Canadian Pulp and Paper Exports to the United States Compared with U.S. Consumption (000 tons)

	Year					
	1920	1930	1940	1950	1960	1970
Woodpulp exports[1]	630	647	826	1694	2000	3316
Newsprint exports[1]	679	2145	2741	4748	5279	6144
Pulpwood exports[1]	847	840	1022	1252	853	936
Total exports to U.S. from Can.	2156	3632	4589	7694	8132	10396
U.S. Consumption of Paper & PapB.	7640	12319	16757	29012	39138	56894
Can. exp. to U.S. as % of U.S. Cons.	28.2	29.5	27.4	26.6	20.8	18.3
U.S. Consumption of newsprint	2197	3599	3731	5937	7426	9545
Can. newsprint exp. to U.S. as % of U.S. Cons.	30.9	59.8	73.5	79.9	71.1	64.4

Notes: [1]Newsprint and pulpwood exports are recorded in equivalent woodpulp tonnages on the basis that a ton of woodpulp yields a ton of paper and that a cunit of pulpwood yields 0.8 tons of paper.

Sources: Canadian Pulp and Paper Association, A.P.I., Statistics Canada, as given in Tables B-1 and B-2 and in Canadian Pulp and Paper Association, Reference Tables - 1966 and 1971, (Montreal: Canadian Pulp and Paper Association, 1966 and 1971), Tables 11, 12, 21 and 45, pp. 4, 6 and 17, and Tables 14, 20 and 34, pp. 7, 9 and 14.

increased only 425 per cent during this period. In comparison, Canadian newsprint exports to the U.S. gained more than 800 per cent.

A major realignment of Canadian pulp and paper exports to the United States appears to have occurred between 1920 and 1970. As our newsprint industry boomed, exports of woodpulp lost momentum. The pattern of change is more clearly laid out in Table B-7, in which pulpwood exports have been included.

Prior to 1910, the United States imported negligible amounts of newsprint, but this situation altered rapidly, so that by 1950, Canada produced nearly 80 per cent of the U.S.'s requirements. Since that time, Canada's share of U.S. consumption has declined somewhat, so that in 1970, Canada accounted for less than 65 per cent of the U.S.'s needs.

However, looking at the paper and paperboard industry as a whole, we find that Canada's position has deteriorated markedly. In 1920, Canada supplied the U.S. market with pulpwood, woodpulp and paper products (chiefly newsprint) the sum of which in equivalent paper terms accounted for 28 per cent of U.S. consumption. Canada's position remained essentially the same until the late 50s, when its position started to deteriorate. By 1960, Canada supplied less than 21 per cent of the States' needs, and by 1970, this had fallen to 18.3 per cent.

1.2 U.S. Regional Newsprint Consumption

With over 90 per cent of Canada's newsprint production going to U.S. markets, it is obvious that the health of Canada's newsprint industry depends on strong and growing U.S. consumption. Tables B-8 and B-10 give some general figures on United States consumption and supply.

Values of U.S. consumption by area when available are given in Table B-8 for the period 1920 to 1970. This period is characterized by a dramatic shift in regional consumption of newsprint. While U.S. consumption in total rose an unimpressive 166 per cent in the period 1928 to 1970, consumption in the Northeast and Midwest rose even less, by 94 per cent and 134 per cent respectively. In 1928, these 2 areas combined accounted for 73 per cent of total U.S. consumption. The rapid consuming regions of this period were the South and West, registering consumption increases of 308 and 400 per cent respectively. By 1970, their combined share of total U.S. consumption had risen to 45 per cent from 27 per cent.

This shift of consumption to the South and West was considerably more pronounced in the later part of this period, i.e. 1950 through 1970. In fact, during the earlier years (1928-1950), although the percentage increases in the South and West far exceeded those of the Northeast and Midwest, in absolute tonnage terms, the Midwest and Northeast posted the largest gains, increasing 779 and 650 thousand tons respectively. The South's consumption meanwhile rose 551 thousand tons and the West's 456 thousand tons. In contrast, during the 1950 to 1970 period, the South's consumption rose 1316 thousand tons, while consumption increased 966 thousand tons in the West, 705 thousand tons in the Midwest and 697 thousand tons in the

Table B-8

United States Newsprint Consumption by Region

(000 tons)

Year	U.S. Cons. total	North-East[1]	Mid-West[1]	South[1]	West[1]
1920	2197				
1925	3014				
1928	3586	1438	1107	601	355
1930	3599				
1935	3345	1375e	1050e	550e	370e
1940	3731				
1945	3481				
1950	5937	2088	1886	1152	811
1955	6638	2130	2091	1439	978
1960	7426	2313	2222	1665	1226
1965	8460	2458	2409	2006	1587
1970	9545	2785	2591	2468	1777
% increases					
1928-70	166%	94%	134%	808%	400%
1928-50	66	45	70	92	128
1950-70	60	33	37	115	119
Abs. increases					
1928-50		650	779	551	456
1950-70		697	705	1316	966
1960-70		472	369	803	551
% of U.S. Cons.					
1928		41%	32%	17%	10%
1970		29	27	26	19

Notes: [1]For a breakdown of the States in each region, refer to Table B-9.

Sources: Canadian Pulp and Paper Association; Gutherie, Newsprint Paper Industry, p. 245.

Table B-9

Composition of the Regions of the United States

Region	States included
Northeast:	Conn., Me., Mass., N.H., N.J., N.Y., Pa., R.I., Vt.
Midwest:	Ill., Ind., Iowa, Kans., Mich., Minn., Mo., Nebr., N. Dak., Ohio, S. Dak., Wis.
South:	Ala., Ark., Del., D.C., Fla., Ga., Ky., La., Md., Miss., N.C., Okla., S.C., Tenn., Tex., Va., W. Va.
West:	Alsk., Ariz., Calif., Col., Haw., Idaho, Mont., Nev., N.M., Ore., Utah, Wash., Wy.

Note: Individual States are included in regional figures in the year in which they joined the United States of America.

Source: Canadian Pulp and Paper Association, Newsprint Data - 1973, (Montreal: Canadian Pulp and Paper Association, 1973) inside back cover.

Table B-10

Source of United States Newsprint Supply

The Whole United States

Year	Canada	Source (%) United States	Europe
1920	31	67	2
1925	44	51	5
1930	60	36	4
1935	66	28	6
1940	73	26	1
1945	79	21	-
1950	80	17	3
1955	77	21	2
1960	72	26	2
1965	72	25	3
1970	64	33	3

The United States Northeast

Year	Canada	United States	Europe
1935	75e	22e	3e
1963	78	17	5
1970	76	20	4

The United States Midwest

Year	Canada	United States	Europe
1935	75e	22e	3e
1963	90	10	-
1970	86	14	-

The United States South

Year	Canada	United States	Europe
1935	58	34	8
1963	40	56	3
1970	36	59	5

The United States West

Year	Canada	United States	Europe
1930	21	68	11
1935	15	65	20
1940	32	66	2
1945	46	54	-
1950	47	42	11
1965	67	30	3
1970	51	45	4

Sources: C.P.P.A.; Gutherie, Newsprint Paper Industry, p. 242; Stanford Research Institute, The Newsprint Situation in the Western Region of North America.

Northeast.

In the latest period considered, 1960 to 1970, absolute consumption gains of 803, 551, 472 and 369 thousand tons were achieved by the South, West, Northeast and Midwest respectively.

It might be expected that such shifts in regional consumption would precipitate similar shifts in North American capacity and production. Attention should then be shifted from consumption to sources of supply.

1.3 Sources of U.S. Supply

Table B-10 shows the source of total U.S. consumption supplied by Canada, Europe and the United States itself.. The trend in sources of supply appears to conform well with the previously considered consumption patterns. From 1920 to 1950, Canada increased its share substantially from 31 per cent to 80 per cent. Recall that it was during this period that the Northeast and Midwest posted the largest absolute tonnage gains in consumption and that even as late as 1950, these areas accounted for some 67 per cent of U.S. consumption.

From 1950 on, however, Canada's share dropped, until by 1970, it held 64 per cent. The United States manufacturers' share rose from 17 per cent to 33 per cent. It was during this same period that the South and West appeared as the regions of major consumption growth accounting for 62 per cent of the total U.S. newsprint consumption increase between 1950 and 1970.

The Southern and Western portions of the United States being considerably less accessible to the prime interior producing regions of Canada (i.e. Quebec and Ontario), we might expect a shift in North American capacity and production to the U.S. South and West and to the Canadian West. Of course, such a shift could not occur unless sufficient supplies of wood, electricity and labor were available, which was generally the case.

Table B-10 also shows the changing pattern of supply for various U.S. regions. Generally, Canada's share of U.S. supply in the Northeast and Midwest grew rapidly in the 1920s, so that by 1935, Canada supplied an estimated 75 per cent of that area's usage. By 1970, Canada supplied 76 per cent of consumption in the Northeast and 86 per cent of the Midwest, both figures down slightly from mid-sixty values.

In the South, the story is quite different. In the 20s and 30s, Canada replaced the Northeast as a supplier of newsprint to that market. By 1935, Canada supplied 58 per cent of that market's newsprint requirements, but this gradually declined as Southern consumption rose relative to other regions. It was during this period that methods were developed by which Southern pine could be converted to newsprint, thus encouraging investment in that area so as to save considerable amounts on transportation (previously much of the area's requirements were imported from Eastern Canada). By 1970, Canada supplied only 36 per cent of this region's newsprint needs; the U.S. supplied 59 per cent with Europe supplying the remainder.

The pattern in the West is much alike the pattern in the South, except that events occurred some 20 to 25 years later. Recall that even as late as 1950, Western consumption amounted to less than 14 per cent of total U.S. consumption. It was during the 40s and 50s that the size of this market justified a rather large expansion of newsprint capacity in Western Canada. From supplying 21 per cent of this region's demand in 1930, the Canadian position improved until 1965, by which time it supplied 67 per cent. That position has deteriorated to 51 per cent as a result of increasing competition from U.S. Southern and Western manufacturers.

2. Newsprint Production and Capacity

The changing pattern of North American newsprint production and capacity is outlined in Tables B-11 through B-13. It is evident from Table B-11 that Eastern Canada (Quebec and the Atlantic provinces) has been able to maintain its position despite the changing consumption pattern in the United States. In 1924, this area (including a small amount produced in Manitoba) accounted for 56 per cent of Canadian production. By 1969, its share had risen to 62 per cent, with the Quebec region benefiting the most. Quebec's position has remained strong because of its relatively easy access to the Northeast and Southern consuming regions of the States. Ontario, which on average must absorb substantially higher transportation costs in supplying the Northeast or South has had to be content with supplying the Midwest and some Western portions of the Northeast. Consumption in the Midwest posted the largest

Table B-11

Canadian Newsprint Production

(000 tons)

Year	Total	Ont.	Que.	B.C.	Atl. & Man.*
			Region of Canada		
1924	1417	517	791	100	
1929	2984	851	1341	200	577
1935	3083	713	1406	260	583
1940	3770	947	1954	261	608
1946	4506	1073	2402	304	727
1950	5279	1240	2766	377	896
1955	6191	1427	3160	542	1062
1960	6739	1608	3156	890	1085
1965	7720	1743	3576	1240	1161
1969	8758	1924	4164	1450	1220
% increases					
1924-69	520%	272%	582%	1350%	-
Abs. increases					
1950-60		368	390	513	189
1960-69		316	1008	660	135
% of total Can. production					
1924		37%	56%	7%	-
1929		29	45	7	19%
1935		23	46	8	19
1950		23	52	7	17
1960		24	47	13	16
1969		22	48	17	14

* included with Quebec

Sources: Canadian Pulp and Paper Association; Guth~~erie~~; Stanford Res. Inst.; Statistics Canada

Table B-12

Canadian Capacity

(000 tons)

Year	Total	Region of Canada: Ont. & Man.	Quebec	B.C.	Atlantic
1946	4641	2100	2470	295	675
1950	5227	1308	2723	383	813
1955	6064	1491	3113	562	898
1960	7611	2065	3557	996	992
1965	8421	2110	3807	1343	1161
1970	9719	2301	4529	1556	1333
% increases					
1946-70	110%	92%	84%	428%	98%
1960-70	28	12	27	56	34
Abs. increases					
1946-70	5078	1101	2059	1261	658
% of total capacity					
1946		26%	53%	6%	15%
1960		27	47	13	13
1970		24	47	16	14

Source: Canadian Pulp and Paper Association, Newsprint Data - 1960, 1966, and 1971, (Montreal: Canadian Pulp and Paper Association, 1960, 1966 and 1971), Table 7, p. 12, Table 13, p. 14, and Table 16, p. 14.

Table B-13

United States Newsprint Capacity

(000 tons)

Year	Total	North-east	Mid-west	West	South
		Region of the United States			
1924	1632	1008e	334e	290e	-
1929	1741	1040e	336e	364e	-
1935	1504	825e	250e	380e	-
1946	839	----------	789----------		50
1950	992	----------	772----------		220
1955	1409	-------616	----	386	407
1960	2399	-------734	----	468	1197
1965	2497	-------705	----	579	1213
1970	3396	-------755	----	875	1766
% change					
1924-70	108%	----	-44% ---	200%	1
Abs. change					
1924-70	1764	----	-587 ---	585	1766
% of total U.S. capacity					
1924		62%	20%	18%	-
1935		55	17	25	-
1950		-----------	78 ----------		22%
1960		------ 31	----	20	50
1970		------ 22	----	26	52

Source: Canadian Pulp and Paper Association, Newsprint Data - 1960, 1966 and 1971, (Montreal: Canadian Pulp and Paper Association, 1960, 1966 and 1971), Table 6, p. 11, Table 19, p. 19 and Table 24, p. 18.

Table B-14

Ability of U.S. Regions to Supply their Own Requirements as measured by their "Capacity/Consumption" Ratio

Year	Total	North-east	Mid-west	West	South
		Region of the United States			
1928-29	49%	72%	30%	103%	-
1935	45	60e	24e	103e	-
1945	28				
1950	17	-----------	16%----------		19%
1955	21	-----15%	-----	40	28
1960	32	-----16	-----	38	72
1965	30	-----15	-----	37	59
1970	36	-----14	-----	49	71

Source: Tables B-13 and B-8

increase of all U.S. regions in the 1928 to 1950 period, gaining 779 thousand tons; however, in more recent years, its position has declined. For example, the Midwest had by far the smallest consumption rise of all 4 regions in the 1960-1970 period.

From producing 37 per cent of Canada's newsprint production in 1924, Ontario's share has declined to 22 per cent in 1969. In contrast, the big winner in this period has been the province of British Columbia, which produced 17 per cent of Canada's output in 1969, up from 7 per cent in 1924. All of this gain was made between 1950 and 1969, when U.S. Western region consumption increased 966 thousand tons and Southern consumption rose 1316 thousand tons. Both regions are easily accessible by water from coastal B.C. with the Western region also easily accessible by rail.

In summary, rising U.S. Western consumption has been accompanied by a shift in Canadian production from Central Canada to the Canadian West. Relatively increasing Southern consumption has accentuated the shift of Canada's production to the Eastern and Western coasts, which can supply this market by water, but, more importantly, has jeopardized the overall Canadian producer position in favor of Southern and Western U.S. manufacturers, who have significant transportation advantages. Recall, it was during the 1928-1950 period that increasing Southern and Western consumption accounted for but 41 per cent of the U.S. consumption rise, while Canada's share of U.S. supply rose from 44 per cent to 80 per cent;

however, during the 1950-1970 period, the South and West accounted for 62 per cent of the increase in U.S. consumption, while Canada's share of U.S. supply fell to 64 per cent.

Canadian capacity, as presented in Table B-12 has displayed essentially the same development as Canadian production. This is as one would expect, as a marked difference in development would necessitate gross differences in operating rates in various regions, which seems unlikely.

United States production statistics by region are generally unavailable, but United States capacity statistics are available for some years, refer Table B-13. The South, having no productive capacity as late as 1935, had constructed only 50 thousand tons of capacity by 1946. But accompanying the rapid consumption rise in this region in the 50s and 60s, was an impressive productive capacity increase which reached 1766 thousand tons by 1970. In 1970, the capacity of the South was 52 per cent of the nation's capacity. The South was outperformed by only 1 region in North America - Quebec - whose capacity rose by 2059 thousand tons between 1946 and 1970.

Western U.S. capacity increased 585 thousand tons between 1924 and 1970, but most of this increase has taken place since 1955, accompanying rising consumption in that area.

Combined capacity of the Northeast and Midwest has fallen 587 thousand tons. This drop occurred in the 20s, 30s and 40s, as U.S. capacity was being converted to the production of other grades of paper and paperboard. In 1924, these 2 regions maintained 82 per cent of total U.S. capacity; today, they represent a mere 22 per cent of capacity.

Table B-14 shows each region's ability to supply its own consumption requirements. No U.S. region, with the exception of the West in the 20s and 30s, has been able to supply all of its own needs. The Northeast, which at one time (1928-1929) could supply 72 per cent of its requirements, can supply only 14 per cent now; on the other hand, the South, with no productive capacity 40 years ago, can now supply 71 per cent of its own needs. Inter-regional shipments and the fact that production seldom matches capacity make the figures presented in Tables B-13 and B-8 not strictly comparable.

Shifts in regional consumption in the United States have obviously played a major role in determining location of the productive facilities of the newsprint industry in North America; however, there are other as important factors, which shall be addressed in the following section.

3. Industry Location Considerations

Plant location decisions are made chiefly on cost and availability considerations. Note, this discussion is limited to the location decision and takes as given the original decision to expand. A brief listing of some of the major factors contributing to the location of the newsprint industry within North America is given in Table B-15.

There have been 3 major shifts in North American productive capacity since the early 1900's, including the shift from the Northeast and Midwest to Eastern Canada (primarily Quebec and Ontario), the shift from the central regions of Canada to the coasts and the shift from Canada as a whole to the U.S. South and West. Each shift can be attributed to different underlying location factors as we will soon see.

3.1 The Push Northward

The locational factors underlying the industry's shift to Eastern Canada from the U.S. Northeast and Midwest were the availability of wood, pulpwood transportation costs, tariff changes, integrated facility savings, labor costs and the political climate.

In the early 1900s, almost all U.S. newsprint was consumed in the large metropolitan cities of the Northeast. In order to supply this market, U.S. manufacturers established newsprint-making facilities close to their markets, e.g. in 1904, the States of New York, Maine and Wisconsin accounted for 75 per cent of U.S. newsprint production. At this time, the U.S. was virtually self-sufficient in the manufacture of newsprint. Quite quickly, the wood which had been readily available to these mills was consumed and with growing periods in that region approaching 50 and 60 years, mills were forced to incur ever-increasing pulpwood transportation costs. Manufacturers in the Northeast continued to move closer to what wood supplies remained in that region,

Table B-15

General Location Considerations of the North American Newsprint Industry, 1920-1970

1. Availability considerations

   - wood supplies
   - labor
   - transportation (rail or water)
   - electricity
   - water

2. Cost considerations

   2.1 Operating Costs

   - harvesting costs and wood growth considerations
   - transportation costs - chemicals in paper out
   - labor costs
   - availability and costs of residue wood from other operations
   - electricity, fuel and chemical costs

   2.2 Capital Costs

   - general building and construction costs
   - incentives from governments
   - the process costs - i.e. costs associated with the manufacture of pulp from various types of trees and paper from the various types of pulp

3. Other considerations

   - tariff considerations
   - ecological considerations
   - tax considerations
   - government policies

situating themselves on inland logging rivers. As local supplies of wood gave out, each pulp mill had to rely more and more heavily on imported pulpwood. Being located on inland logging rivers added just that much more to transportation costs, as the pulpwood had to be brought in by rail. Moreover, consumption and thus production were increasing so rapidly that the pulpwood cut exceeded the annual growth in these areas. By 1918, it was estimated that suitable wood species in these areas would last only 23 years in the Northeast and 18 years in the Midwest at the then prevailing rates of cutting and growth. By the late 1920s, pulp mills in New York and Pennsylvania had depleted their local wood supplies to such an extent that more than half their pulpwood requirements had to be imported.[3]

Meanwhile, the Canadian government, attempting to benefit from these developments, granted timber leases on favorable terms to pulp and paper companies. Many of these leases were purchased by American manufacturers. With natural growth far exceeding probable cut, the depletion of local pulpwood supplies was not a problem for Canadian mills. By 1913-1915, the average cost of pulpwood used in the manufacture of a ton of mechanical woodpulp was $9.47 for U.S. mills and $2.25 less for Canadian mills.

---

[3]Much of this information is contained in: Helen Hunter, "Innovation, Competition, and Locational Changes in the Pulp and Paper Industry: 1880-1950", Land Economics 31 (November 1955): 314-327.

Tariffs[4] also played an important role in the northward movement of the newsprint industry. Generally, their role was one of slowing the shift. In 1883, the U.S. imposed its first tariff on newsprint, a straight 15 per cent *ad valorem*. In 1897, in an attempt to maintain the processing of wood in the United States, the U.S. government, at the urging of its manufacturers, passed the Dingley Act, which introduced a $1.67 per ton tariff on pulp imports and changed the newsprint tariff to $6.00 per ton, approximately equal to 15 per cent *ad valorem* at that time. Newsprint and other printing papers from any country were further subject to additional duties if that country placed export duties on its pulpwood. The Dingley Act was established to protect the American pulp and paper industry and to discourage the Canadian provinces from imposing any restrictions on the export of pulpwood to the United States. The Canadians who had been considering pulpwood export duties, on the other hand wanted to broaden their own industry through further processing of pulpwood into woodpulp and paper.

The response to the Dingley Act was a reduction by the Quebec government of 25 cents per cord on wood cut from Crown lands, provided such wood was further processed within Quebec. This move was labelled a pulpwood export duty by the United States and thus, the retaliatory tariffs of the

---

[4]Much of this information is contained in: L.E. Ellis, *Print Paper Pendulum: Group Pressures and the Price of Newsprint*, (New Brunswick, New Jersey: Rutgers University Press, 1948) Chapters IV & V.

Dingley Act were applied. In 1902, Ontario, not wishing to incur these retaliatory tariffs, decided instead to prohibit the export of pulpwood cut from Crown land, thus evading the duty. Similar legislation covering Crown lands was passed by the Federal government in 1908, by Quebec in 1910 and by New Brunswick in 1911.

The U.S. government, under pressure from newspaper publishers and conservationists, finally allowed, by the Underwood Act of 1913, both woodpulp (mechanical and chemical) and newsprint free access to the United States market. In that year, Canadian manufacturers supplied 15 per cent of the United States' demand for newsprint. From supplying 218 thousand tons of newsprint to the U.S. market in 1913, Canadian exports to the U.S. rose rapidly to 679 thousand tons in 1920 and to 1315 thousand tons in 1925.

Similarly, woodpulp imports by the United States, which amounted to 541 thousand tons in 1913, increased to 906 thousand tons in 1920 and to 1666 thousand tons in 1925, a rise over the period of more than 200 per cent. Meanwhile, U.S. woodpulp production increased approximately 40 per cent.

Although imports of woodpulp increased rapidly over this period, most of this increase took place in imports of sulphite and sulphate pulps. Mechanical pulp, which accounted for 42 per cent of U.S. woodpulp imports in 1909, accounted for only 20 per cent by 1925. This points out the advantages of integrated facilities (pulp and paper mills together) in the production of newsprint. The main advantage of integrated production is the elimination of the expensive step of transporting the pulp to a separate mill. In some operations, as in the case of a fine paper mill manufacturing numerous types of paper, there may be a big advantage in being situated near the consumer and absorbing the extra transportation step, but, this is not the case with a standard mass-produced, low cost paper such as newsprint.

Pulp can generally be transported to a paper mill located elsewhere, either as a slush (99 per cent water) and bear extremely heavy transportation costs or the pulp can be dried first, shipped in the air dry state (about 10 per cent water) and reconstituted at the paper mill. This second method involves considerably less transportation costs, but substantially increased processing costs. Complete or partial drying of pulp, however, is almost always the most economical method of shipping woodpulp, especially in the case of mechanical woodpulp, which will not store well for any length of time, as it loses its freshness in warm weather.

Reinertson (1958) indicates the magnitude of extra costs incurred in a non-integrated operation:

> . . . a U.S. Tariff Commission study indicates that for unbleached sulphite pulp in northeastern mills in 1935, lapping {which yields a partially dried woodpulp} added about 10 per cent to total costs, and drying and baking added about 20 per cent. No data are given for the costs of lapping or drying mechanical pulp, but note that while the absolute costs would probably be about the same, the costs of lapping or drying relative to total costs would be more than twice as much for mechanical pulp as for unbleached sulphite pulp, since the total cost per ton of

producing mechanical pulp was less than half that of unbleached sulphite.[5]

Thus faced with dwindling supplies of local pulpwood, the high transportation costs associated with importing pulpwood, the cost disadvantages of importing woodpulp and thus not benefiting from an integrated process operation, it appears inevitable that the manufacture of newsprint would shift northward to Eastern and Central Canada.

This northward shift continued until the early 1950s, at which time Canada supplied the U.S. with 80 per cent of her newsprint requirements, the United States produced a further 17 per cent and imported 3 per cent from European countries.

3.2 To the Coasts of Canada

The second major shift of the industry was the movement of capacity to the coastal regions of Canada from Central Canada and in particular the dramatic rise of the newsprint industry in British Columbia.

Ontario participated, as did Quebec and the Maritimes, in the great expansion which took place after the tariff removal of 1913. Between 1920 and 1930 alone, the daily capacity of Ontario's mills increased over 5 times from 721 tons to 3786 tons per year.[6] The first large mill was built by

---

[5] Reinertsen, p. 44.

[6] F.M. Barnes, "The Establishment and Location of the Newsprint Industry in Ontario", Table 1, p. 15.

the Ontario Paper Company at Thorold in 1913. It was wholly owned by and supplied paper to the Chicago Tribune. It established itself in Ontario because of an offer to contract for a large supply of cheap power, although it had to import all of its pulpwood from Quebec. The next mills were built in the Iroquois Falls - Kapuskasing area. Also between 1918 and 1924, 4 mills were started in the Port Arthur - Fort William region. Thus, by 1924, most of the good locations (on major waterways) in the province had been taken up; moreover, plants were gradually being constructed further and further away from the lucrative Northeast markets of Boston and New York. With the Midwest market growing slowly, it is not surprising that further gains were to take place in Quebec and the Maritimes, both of which had more suitable locations and easier access to the Northeast and the quickly growing Southern market. Thus, from 1924, when Ontario produced 37 per cent of Canadian production, its share dropped to 23 per cent by 1935. Its share has remained relatively constant since that time. The regional balance for Canada as a whole remained essentially the same until the early 50s. By that time, it was obvious that the Southern and Western regions of the United States would be the areas of greatest consumption growth in the 50s and 60s. Thus, productive capacity started growing in British Columbia. This area has always had the natural advantages of abundant wood, water and fuel supplies and was just waiting for U.S. markets to gain momentum. Ontario was able to maintain its position in the Midwest, but Quebec and the Maritimes started losing

Southern customers to British Columbia. As a result, B.C.'s share of Canadian production rose some 10 percentage points between 1950 and 1970. British Columbia was able to make these inroads because of its natural cost advantages. Its chief advantage lies in wood-related costs which include:

- the higher wood density (pounds per cunit of wood) of West coast wood species. The overall density of woods used in the manufacture of newsprint on the West coast is 2500 as compared to 2250 in Quebec.[7]

- the Western abundance of chips and sawmill residue from lumber operations, which are used in the manufacture of chemical pulps. Chips and mill residue, until recently, could not be used in the groundwood pulp furnish, but only in the chemical pulp portion (20 to 25 per cent) of the pulp mixture from which newsprint is manufactured.

- the higher density of wood per acre in British Columbia, which cuts harvesting costs and encourages mechanization. In 1968, British Columbia boasted a 43 cunits of merchantable timber (7.1 inch dbh and over) per acre, while Quebec's forests contained only 8 cunits per acre (4 inch

[7]These values calculated on the basis of wood specie densities given in Table A-1, Private Planning Association of Canada, Trade Liberalization and the Canadian Pulp and Paper Industry, (Toronto: The University of Toronto Press for the Private Planning Association of Canada, 1968) p. 94 and pulpwood usage by specie, process and region of Canada as published by Dominion Bureau of Statistics, Pulp and Paper Mills: 1965 (Ottawa: Queen's Printer, 1965), Table 12A, pp. 14-15.

dbh and over).[8]

Moreover, 50 per cent of Canada's merchantable timber, 4 inch dbh or larger, was located in British Columbia in 1963. Quebec accounted for 4 per cent and Ontario 15 per cent.[9]

The Private Planning Association of Canada (1968) estimated an average wood-related cost difference amounting to $9.03 per ton of newsprint favoring B.C. over Quebec in 1964.[10] These costs were worked up for a hypothetical mill, producing 680 tons of standard grade newsprint per day and operating 345 days per year. The pulp furnish was assumed to be 75 per cent groundwood and 25 per cent semi-bleached sulphate (kraft) pulp. Cost savings of $9.00 per ton gives B.C. manufacturers a significant cost advantage over Quebec producers in attempting to reach the U.S. South.

British Columbia, even with its vast wood resources, would not have developed so quickly however, if it were not for the tremendous advances in consumption made by the U.S. South and West. Recall (Table B-14) that the West, which was practically self-sufficient in the 20s and early 30s, had the productive capacity to meet less than 50 per cent of its own requirements in 1970.

---

[8] J.G. Bowland, Economic Indicators in Forestry and Forest-based Industries in Canada: 1961-1969, (Ottawa: Department of the Environment, Canadian Forestry Service, Publication No. 1297, 1971), p. 27.

[9] Ibid., p. 28

[10] Private Planning Association of Canada, Table XXIII, pp. 52-53.

Transportation costs have always been so large that British Columbia could never have competed with Quebec producers in the Northeast market nor in the vast majority of cities in the Midwest.

3.3 Return to the United States

The third and final shift of production which shall be considered is the shift of production facilities to the South and West of the United States, or more generally away from Canada. The timing of this shift overlaps with the Canadian shift of capacity expansion from the Eastern regions of Canada to British Columbia.

This shift started in the late 40s in the South and even later in the West. Recall from Table B-13 that even as late as 1950, Southern capacity was a mere 220 thousand tons. Twenty (20) years later, its capacity had risen to 1766 thousand tons, or 52 per cent of total U.S. newsprint capacity.

It was not for lack of wood that the Southern States did not emerge as a major newsprint-producing region in an earlier period. Table B-16 shows total and merchantable pulpwood stands in selected regions of the U.S. and Canada. The South stands out as that U.S. region containing more pulpwood than any other area of the States. In fact, this area contains almost two thirds as much pulpwood as the combined Eastern regions of Canada, including Ontario, Quebec, New Brunswick and Nova Scotia. However, the distinctive feature of this area is the abundance of pine species - all but

Table B-16

Total and Merchantable Pulpwood Stands in Canada and the United States, Including Saw Timber

(Millions of cords)

	Total Stand				Merchantable Stand			
	Spruce and Balsam	Jack, Norway, Lodgepole and Southern Pine	Hemlock	Total	Spruce and Balsam	Jack, Norway, Lodgepole and Southern Pine	Hemlock	Total
Nova Scotia	29	...	2	31	29	...	2	31
New Brunswick	56	3	...	59	50	2	...	52
Quebec	479	44	2	523	332	29	1	362
Ontario	297	80	1	378	214	54	2	270
Total Eastern Provinces	865	127	5	004	627	85	5	717
Total Prairie Provinces	87	103	...	190	53	66	...	119
British Columbia	200	115	116	431	61	24	51	136
New England & Middle Atlantic States	51	47	20	118	...	...	...	...
Lake States	30	36	34	100	...	...	...	...
Southern States	...	620	10	630	...	...	...	...
Columbia River Basin	249	...	267	516	...	...	...	...
West Coast	144	...	259	403	...	...	...	...
Interior	105	...	8	113	...	...	...	...
Calif. & South Rocky Mtns.	211	...	...	211	...	...	...	...
Alaska	34	...	120	154	...	...	...	...

Source: Gutherie, The Newsprint Paper Industry, An Economic Analysis, Harvard Univ. Press, Cambridge, Mass., 1941. page 237.

1 per cent of the pulpwood of this area is pine. There are 4 pine species common to the South - Jack, Norway, Lodgepole and Southern pine.

For years, it was considered unlikely that a process could be developed by which these pines could be economically converted to newsprint. The technological problems were many and were chiefly related to the quality of the pulp produced from these pines. Low quality pulp, as might be expected, produces low quality paper. Spruce has a fine, dense and consistent fiber and can be ground under a wide range of grinding conditions and still produce an acceptable pulp; such is not the case with Southern pine. Color too is a major problem. Fast-growing trees, such as the pines of the South, develop significant amounts of pitch as the trees age. As a result, pulp made from such trees tends to be particularly dark in color and methods must be developed for successful bleaching of the pulp. The color is also susceptible to a fungus called blue stain, which develops rapidly in the moist Southern climate.

Research had overcome many of the technical problems by 1940, and it was in that year that the South's first mill using Southern pine was built at Lufkin, Texas. This mill was constructed and planned at a time when U.S. manufacturers were enjoying relatively good times. The rate of utilization of American capacity in 1939 was 97 per cent. The United States had not enjoyed such a high operating rate since 1920.

The years following 1940 saw a severe downturn in U.S.

consumption, which bottomed out in 1944. Both U.S. and Canadian capacity declined from 1940 through 1946. Consumption rebounded strongly after the Second World War, so that by early 1947, it was obvious that additional North American capacity would be required. It was in 1949 that the Southern States' second newsprint mill commenced operations on the Coosa River in Alabama. Thus, it was the poor economic climate which had hindered the expansion of capacity in the U.S. South once the manufacturing technical problems had been overcome in the late 1930s. From 1950 through to 1970, Southern capacity rose rapidly and accounted for 65 per cent of the U.S. total capacity increase during that period. Moreover, the Southern capacity increase of 1546 thousand tons exceeded the growth in consumption in that area of 1316 thousand tons, showing that the Southern mills were able to make inroads on their Northern competitors' traditional buyers.

Besides the now natural location advantages enjoyed by the South, additional incentives for capacity expansion were established by the United States government. Between 1952 and December of 1953, certificates of necessity were granted to 8 U.S. newsprint manufacturers, costing 183 million dollars and covering 571 thousand tons of capacity. Advantageous tax regulations permitting the rapid writeoff of mill construction costs were also established by the U.S. Defense Production Administration following the War. These measures were applicable, of course, to all regions of the States and did not single out Southern producers in any way, but the effect was to encourage expansion of newsprint facilities in the U.S. rather than in Canada.

Nevertheless, the ability of Southern producers to out-compete other producing areas is based primarily upon its advantage in transportation costs in delivering to the Southern market. Its ability to compete in the Northeast and Midwest is considerably less.

Another of the South's advantages has been its relatively low labor costs, especially for wood cutters and woods workers. On the other hand, low wages and a preponderance of small privately owned woodlots has discouraged mechanization of woods operations. Were operations to be mechanized, one might expect wage rates to increase, and thus diminish many of the cost savings from mechanization. Canadian woods operations are much more highly mechanized than the woods operations of the U.S. South.

In summary then, the recent shift of productive facilities to the South resulted mainly from overcoming the technological problems of producing newsprint from Southern native pines. Having overcome the technical problems, the area's capacity grew rapidly because of its advantages, which include 40 per cent of the country's forests with extremely rapid regeneration rates, adequate water supply, cheap labor and access to Southern markets.

The rapid increase in capacity in the West since 1955, seems to have occurred primarily in response to rapidly increasing consumption in that region and in the South, and as an outlet for chips and mill residue resulting from the vast lumber operations in that region. The growth in newsprint capacity has been somewhat impaired by the growth in the plywood industry, which competes with newsprint for use of mill residue. Moreover, the increasing recognition that wood is the scarce resource, encourages forest owners to produce products with higher selling prices, such as lumber, wrapping papers, etc. This was most definitely one of the chief reasons why Northeast producers have failed to increase the newsprint capacity of their companies.

The importance of other wood products in the West is reflected by the fact that in 1954, the West contributed 56 per cent of the U.S. value added in lumber manufacture, and 65 per cent of the U.S. value added in plywood and veneer manufacture. In that same year, it contributed only 13 per cent of the U.S. value added in pulp, paper and board manufacture.

Table B-17 gives a summary of the major location factors relevant to the most pronounced shifts of productive capacity in North America since 1920.

Table B-17

Summary of Factors Responsible for the Shifts of Productive Capacity in North America, 1920-1970

Location factor	Nature of Capacity Shift: I. U.S. Northeast to Eastern Canada	II. From Central to Coastal areas of Canada: Ont. → Que.	II. From Central to Coastal areas of Canada: East → West	III. Canada to U.S. South
Availability of wood	Very Imp.	Not Imp.	Not Imp.	Not Imp.
Technological knowhow	Not Imp.	Not Imp.	Of Some Imp.	Very Imp.
Transportation costs	Not Imp.	Important	Important	Very Imp.
Wood costs	Important	Not Imp.	Important	Fair
Integrated facility advantages	Important	Not Imp.	Not Imp.	Not Imp.
Use of wood residues from other operations	Not Imp.	Not Imp.	Important	Not Imp.
Labor costs	Of Some Imp.	Not Imp.	Not Imp.	Important
Tariffs	Very Imp.	Not Imp.	Not Imp.	Not Imp.

APPENDIX C

Newsprint Capacity - Its Magnitude and Measurement

Table C-1

Capacity, Production and Operating Ratio of the Canadian Newsprint Industry, 1920-1970

Year	Capacity (000 tons)	Production (000 tons)	Operating Ratio %
1919	905	849	93.8
1920	1016	938	92.3
1921	1151	852	74.0
1922	1277	1143	89.5
1923	1465	1330	90.8
1924	1638	1418	86.5
1925	1823	1619	88.8
1926	2121	2068	97.5
1927	2716	2290	84.3
1928	3262	2612	80.1
1929	3512	2984	85.0
1930	3902	2791	71.5
1931	4127	2516	61.0
1932	4142	2186	52.8
1933	4149	2282	55.0
1934	4182	2911	69.6
1935	4263	3083	72.3
1936	4218	3535	83.8
1937	4211	3998	94.9
1938	4535	2893	63.8
1939	4633	3175	68.5
1940	4716	3770	79.9
1941	4703	3771	80.2
1942	4763	3455	72.5
1943	4678	3219	68.8
1944	4726	3265	69.1
1945	4672	3592	76.9
1946	4641	4506	97.1
1947	4729	4820	101.9
1948	4883	4982	102.0
1949	5113	5176	101.2
1950	5227	5279	101.0
1951	5360	5516	102.9
1952	5510	5687	103.2
1953	5723	5721	100.0
1954	5920	5984	101.1
1955	6064	6191	102.1

Table C-1 continued

Year	Capacity (000 tons)	Production (000 tons)	Operating Ratio %
1956	6242	6469	103.6
1957	6756	6397	94.7
1958	7239	6096	84.2
1959	7520	6394	85.0
1960	7611	6739	88.5
1961	7734	6735	87.1
1962	7844	6691	85.3
1963	8055	6630	82.3
1964	8274	7301	88.2
1965	8421	7720	91.7
1966	8878	8419	94.8
1967	9293	8051	86.6
1968	9655	8031	83.2
1969	9840*	8758	89.*
1970	10000*	8607	86.*

Source: C.P.P.A. Annual Newsprint Supplement - 1970, except those values marked with * which are estimated values based on the same method of calculation as previous years. In 1969, the C.P.P.A. changed its method of capacity calculation.

1. Canadian Newsprint Capacity - Its Measurement

The Canadian Pulp and Paper Association each year makes a survey of World newsprint demand and supply. It publishes its findings in its annual publication, Newsprint Data.

The C.P.P.A. obtains statistics regarding Canadian mill activity from direct reports by the companies concerned.

The capacity is calculated from past records for all machines installed prior to the beginning of any year plus expected capability of new machines coming into production during the year. The industry capacity per year is the sum of annual capacities of all mills, each operating at its daily capacity for the maximum number of days which make up its normal full operating program for the year.

All newsprint machine time spent making other grades of paper is treated as not available for newsprint production and eliminated from newsprint capacity.

Annual capacity figures are intended to represent the maximum possible production under optimum conditions in each year. For comparability with production, capacity figures are expressed in terms of standard newsprint of 32 pound base weight.

When a mill produces only standard newsprint, capacity and production are directly comparable; however, whenever the output of any machine varies from this product, its maximum performance tends to fall below rated capacity. "For example, the probable production loses involved in making rotonews or offset news is impractical to record, but may amount to several percentage points."[1]

The comparability between production and capacity has been subject to small but increasing distortion in recent years, as variations in newsprint have developed.

Thus, as of 1969, the specific method for calculating Canadian capacity was modified slightly. For 1969 and subsequent years, capacity was revised downward to reflect the "manufacture of increasing proportions of customers' requirements of special qualities within the definition of newsprint but involving reduction of machine speed, loss of efficiency and loss of trim because of variation in basis weight and other specifications precluding simultaneous production".[2]

Other changes were also made in 1969 in the calculation of newsprint capacity, but presently, these have very little effect on the newsprint capacity figure.

In 1969, the change in method resulted in a 2.5 per cent reduction (2.6 per cent in 1970) in the capacity figure over the 1969 figure calculated under the old method. Rather than subject the data of 1969 and 1970 to this sudden revision and because no way could be found of suitably adjusting the data for, say, 1960 to 1968 (the figures for capacity prior to

---

[1]Canadian Pulp and Paper Association, Newsprint Data - 1969 (Montreal: Canadian Pulp and Paper Association, 1969), p. 13.

[2]Canadian Pulp and Paper Association, Newsprint Data - 1971 (Montreal, Canadian Pulp and Paper Association, 1971), p. 13.

1960 are considered by the C.P.P.A. to be quite accurate and not subject to the aforementioned overstatement), the original (non-revised) overstated capacity values for 1969 and 1970 are included in the appropriate tables. These are at least comparable to the capacity figures of the early 60s.

Table C-2

Capacity, Production and Operating Ratio of the U.S. Newsprint Industry, 1920-1970

Year	Capacity (000 tons)	Production (000 tons)	Operating Ratio %
1919	1388	1375	99.0
1920	1548	1512	98.
1921	1668	1225	73.
1922	1639	1447	88.
1923	1578	1485	94.
1924	1632	1481	91.
1925	1721	1530	89.
1926	1763	1634	95.
1927	1788	1485	83.
1928	1735	1417	82.
1929	1741	1392	80.
1930	1687	1232	76.
1931	1768	1157	65.
1932	1771	1008	57.
1933	1735	946	55.
1934	1714	961	56.
1935	1504	912	61.
1936	1471	921	63.
1937	1464	945	65.
1938	1094	820	75.
1939	972	939	97.
1940	1081	1013	94.
1941	1085	1014	94.
1942	1126	952	85.
1943	1033	804	78.
1944	1033	720	70.
1945	981	724	74.
1946	839	770	92.
1947	845	825	98.
1948	850	867	102.
1949	876	899	103.
1950	992	1014	102.
1951	1050	1124	107.
1952	1165	1147	99.
1953	1170	1084	98.
1954	1280	1211	95.
1955	1409	1552	110.

Table C-2 continued

Year	Capacity (000 tons)	Production (000 tons)	Operating Ratio %
1956	1625	1717	106.
1957	1921	1825	95.
1958	2100	1758	84.
1959	2390	1964	82.
1960	2399	2038	85.
1961	2376	2093	88.
1962	2471	2153	87.
1963	2461	2218	90.
1964	2469	2261	92.
1965	2497	2179	87.
1966	2647	2408	91.
1967	3024	2620	87.
1968	3424	2934	86.
1969	3495*	3232	92.
1970	3530*	3309	94.

Source: C.P.P.A. Annual Newsprint Supplement - 1970, except those values marked with * which are estimated values based on the same method of calculation as previous years. In 1969, the C.P.P.A. changed its method of capacity calculation.

2. United States Newsprint Capacity - Its Measurement

Figures for the United States newsprint capacity and production are taken from the 1970 Annual Newsprint Supplement published by the Canadian Pulp and Paper Association. The C.P.P.A. obtains its figures from the Newsprint Division of the American Paper Institute.

Capacity values are calculated essentially the same way as are Canadian capacity statistics,[3] and are subject to the same revisions as Canadian figures since 1969.

The magnitudes of these revisions, however, have been rather substantial, amounting to reductions of 8.3 per cent in 1969 and 3.9 per cent in 1970; nevertheless, for the same reasons as previously explained, U.S. capacity for 1969 and 1970 are reported in the original overstated form.

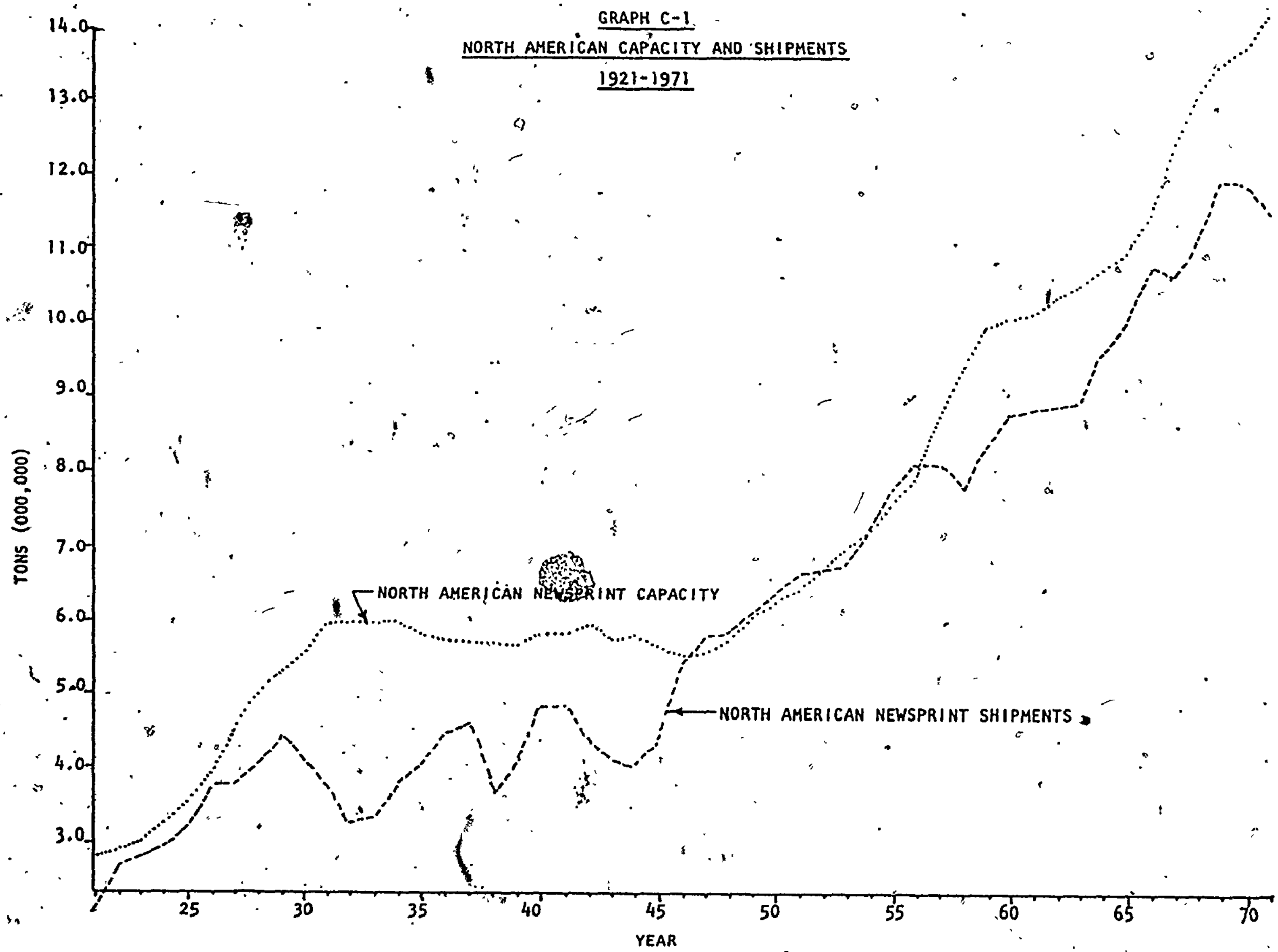
---

[3] Refer Appendix C, pages C3 to C5

GRAPH C-1

NORTH AMERICAN CAPACITY AND SHIPMENTS

1921-1971



APPENDIX D

Questions Asked of High Level Executives in the Canadian Newsprint Industry

1. How long have you been ____________(position) of ________ (company)?
2. What other positions have you held?

{These first 2 questions attempt to determine the types of activities and decisions with which the manager being interviewed has had experience. How much time was spent for each executive on each of the following questions was subjectively determined by the amount of interview time available and by the executive's experience.}

Management Perception of Industry and Firm Performance

3. How would you rate the performance of the Canadian newsprint industry over the last 10 to 15 years?

Note: Let the respondant define "performance". Attempt not to lead him too much for this and subsequent questions concerning management perception of industry and firm performance.

4. What factors do you feel have been responsible for this ____________ performance?
5. How would you rate the performance of your own firm over this period?

Note: Once again, let the respondant determine with whom (all other Canadian manufacturing firms, all pulp and paper firms, individual competitors) to compare his firm's performance.

6. How do you feel the Canadian newsprint industry will per-

form in the future? Why? What has changed? How have ____ (these factors) changed?

7. What do you feel are the key managerial decisions which have most affected the performance of the Canadian newsprint industry?

(Question 7 was asked only of those executives whose responses to the previous 4 questions were felt lacking by the interviewer.

Unstructured questions 3 through 7, attempted to elicit management's views of what types of decisions or factors dictate, have dictated or will dictate the industry's financial or economic performance and its development. Any model-builder who seeks to explain an industry's economic performance or development should presumably at least consider taking into his formulation, factors which the decision-makers themselves say are important in explaining that industry's performance or development.

The questions which follow address factors which the author felt would be important in explaining the industry's economic performance and development.)

Executive's View of His Own Decision-Making Role

8. As ____________ (position), how do you view your role in relationship to 1) newsprint pricing, and 2) newsprint facility expansion by your firm?

Capacity Expansion

9. What do you feel are the circumstances under which newsprint capacity is expanded in this industry?

Note: Probe in order to bring out influencing factors, means of capacity expansion, and firm criteria for expansion.

10. Under what conditions do you feel your firm would expand its present facilities?

11. What investment criteria do you use or have you used when deciding whether or not to expand newsprint plant capacity?

12. What, if any, differences exist between firms which have expanded their newsprint capacity and those which have not expanded newsprint capacity?

Note: Probe as to ownership, size, ability to raise funds, and cost structure differences.

13. Under what conditions has capacity expansion led to situations of excess capacity?

Note: Let the respondant determine when capacity is excessive.

14. How would you evaluate the merits of a proposal to expand the newsprint capacity of your firm?

Note: Probe as to forecasting methods, the importance of present vs. future returns, investment criteria, size of project and risk, and other investment alternatives.

(Question 14 was asked of only those executives who would be in a position to evaluate the merits of a proposal made to them.)

15. At what level of industry capacity utilization would you expect to find substantial capacity expansion being planned by the newsprint industry? Or, at what level of industry profitability would you expect to see substantial capacity expansion being planned by the industry?

16. When did you last substantially expand the capacity of your newsprint operations?

Note: Probe as to when the project was approved, construction started, first saleable product manufactured. Probe as to the size of the new capacity, if it replaced existing equipment, what means was used to increase the capacity, why the new capacity was installed. Probe as to whether a formal written proposal was made in order to justify the expenditure and whether a post audit evaluation was made. Probe as to what factors (volume, price, etc.) were forecast and for how long and how.

17. Have technological changes played a major role in the formation of excess capacity? If so, when and how?

18. A manager in a responsible position in one of Canada's newsprint firms, in discussing the reasons for excess capacity, recently said "I would place emphasis on the tendency of people to be overly optimistic about the future and to extrapolate trends that really should not be extrapolated, they should be formulated and predicted according to some understood changing set of conditions . . . blind extrapolation of the short-term past has been the downfall of many people who have undertaken expansion projects. Do you agree with this manager's remarks? Has your own firm acted in this way? and if so, what has been done to ensure that this won't happen again?

The Price of Newsprint

19. Who (the firms of what nations) establish the price of

newsprint in Canada, in the United States, in Overseas countries?

20. What do you feel is the process by which the price of newsprint increases? What do you feel is the process by which the price of newsprint decreases?

21. Does your firm have a pricing policy? If so, what is it?

Note: Probe for conditions under which firm would lead an industry price increase or attempt to do so. Probe for conditions under which firm would discount or has discounted price.

22. What, if any, differences do you feel exist between:
    1. Firms initiating price increases and other firms in the industry, and
    2. Firms initiating price discounting and other firms in the industry?

23. Have publishers actively sought out suppliers who would be willing to give them a discount or have suppliers actively sought out new customers by offering prospective customers price discounts?

24. Do you believe there is a relation between newsprint contract prices charged by Canadian manufacturers (or industry margins) and the industry level of capacity utilization? Same question for spot prices. If yes, what is this relation? Same question for spot prices.

25. Assuming for a minute that the industry is going through a period of little or no change in the costs of production, distribution or exchange -

1. then, during a deteriorating market situation (i.e. stagnant or declining demand and declining capacity utilization), at what level of industry capacity utilization would you expect to observe:

   - the first signs of price weakness? (which are?)

   - major signs of price weakness? (which are?)

   - list price declines?

2. or on the other hand, during an improving market situation (i.e. rising demand and increasing capacity utilization), at what level of industry capacity utilization would you expect to observe:

   - the first signs of price strengthening? (which are?)

   - major signs of price strengthening? (which are?)

   - list price increases?

   - spot prices rise above contract prices?

26. Do you keep sufficient records so as to know at all times what your total variable costs per ton of newsprint are? ... what your fixed costs are?

27. Is there a price, margin or return above which you would be reluctant to increase the price, margin or return?

28. If the industry as a whole experienced a cost increase, what percentage of this cost increase would you expect to be passed on to customers in terms of a price increase at the following rates of capacity utilization:

- 50%	- 60%	- 70%
- 80%	- 90%	-100%

What other factors would affect your response?

Shipments

29. On average, what percentage of your customers' costs are their newsprint costs?

30. At any point in time, how sensitive do you feel North American newsprint demand is to price changes?

31. What is the nature of your long-term contracts? Is length of contract, tonnage and price specified?

32. On average, what percentage of the newsprint which you sell is sold under long-term contract?

33. What factors do you feel are important in determining the volume of Canadian newsprint shipments to the Canadian market, to the United States market, to Overseas markets?

34. Do American manufacturers have advantages over Canadian manufacturers in supplying the United States market? What are these advantages?

Forecasting

35. Does your firm make annual (as for budget purposes) or other (as for proposal justification) forecasts of newsprint sales? How are these used? How are they made?

36. Does your firm make annual or other forecasts of newsprint prices in the markets in which you sell newsprint? How are these used? How are they made?

37. Does your firm make annual or other forecasts of newsprint costs? How are these used? How are they made?

38. Does your firm make annual or other forecasts of newsprint capacity? How are these used? How are they made?

APPENDIX E

Excerpts from Letter to Statistics Canada

The major emphasis of my research to date has been to determine the effect on newsprint prices, costs and exports of a change in the utilization of capacity. Data covering such variables as capacity, production, consumption, prices and exports are available from various sources for the period 1920-1970.

However, I do not have data on the profitability of newsprint manufacturing establishments over this period. Most firms in this industry produce a number of products (e.g. lumber, plywood, newsprint, market pulp, etc.) and report the profits from such operations on a consolidated basis.

Talking generally about profits, I feel that an adequate measure of profitability for the <u>total pulp and paper industry</u> is the difference between "value added" (total activity) and total "employee salaries and wages" as reported annually in the Stat. Can. publication, <u>Pulp and Paper Mills</u>. This figure should closely approach <u>operating profits</u>.

As companies report to Stat. Can. on an establishment basis, I would think that the newsprint-producing establishments could be separated from non-newsprint-producing establishments. I realize that the division would not be perfect, as many establishments produce other products besides newsprint.

There appear to be a number of ways of handling the separation problem:

1. Lump together all establishments producing newsprint or newsprint and other products. I feel that if over 90 per cent of the product sold (in tons or dollars) by such establishments on an aggregate basis was newsprint, then the data would be acceptable. If, for example, 92 per cent of the product sold was newsprint for a particular year, then the operating profits for the newsprint industry would be calculated as: (the unadjusted "newsprint-producing, and newsprint-producing and other product-producing" establishment value added minus employees' wages and salaries) X (the adjustment factor, which, for that particular year, would be 0.92).

2. Sum the results for establishments selling only newsprint and determine for each year the percentage of total newsprint industry sales accounted for by these establishments. Thus, the operating profits for the newsprint industry for a particular year would equal: (the appropriate unadjusted establishment value added minus employees' wages and salaries) X (the adjustment factor - 100/% of newsprint sold by these establishments).

3. Sum the results for establishments producing (selling) at least 80 per cent newsprint; in other words, for an establishment to be included, it should not have sales of non-newsprint products exceeding 20 per cent of its sales. For example, suppose in a particular year, that these establishments sold $600 (million) worth of all products, of which $540 was newsprint and that total industry sales of newsprint

was $575, then the operating profits for the newsprint industry for that year would equal: (the appropriate unadjusted establishment value added minus employees' wages and salaries) X (540/600) X (575/540).

To help ascertain which procedure might be most appropriate, I studied the products produced by establishments as reported in the 1965 issue of Pulp and Paper Mills. The results are:

1. Total establishments reporting = 132, of which 43 produced at least some newsprint.

2. Only 1 establishment produced only newsprint, but 22 establishments produced only pulp and newsprint.

3. All of the 43 establishments, except 1, produced groundwood pulp for use in the newsprint-making process.

It would seem impossible to separate newsprint production from pulp production, and where the pulp produced goes into the manufacture of newsprint, such division is not my desire. On the other hand, a number of establishments may produce pulp beyond the establishments' needs and sell the excess as "market pulp". Including revenues and profits attributable to such pulp will, of course, raise profits above that associated with newsprint manufacture. Thus, I feel that procedure 3 is probably the most suitable; in such a case, to be included, an establishment would have to sell at least 80 per cent newsprint (preferably dollar basis, but tons will do), that is, not more than 20 per cent of its product sold can be composed of market pulp, fine papers, paperboard, etc.

Procedure 1 may still be applicable and yet I doubt that 90 per cent or more of such establishments' sales will be newsprint.

APPENDIX F

Oligopoly Pricing Behavior

Economic Theories and Survey Findings

and

The Newsprint Industry

1. Economic Theories of Oligopoly Pricing

There have beeh a number of theories developed concerning pricing in oligopolistic industries. In addition, some surveys of business practice and conduct have addressed the question of corporate pricing. Some of the literature on this subject shall be briefly reviewed.

> When either pure competition or pure monopoly prevails, there exist clear-cut solutions to the firm's price and output decision problem assuming only that managers seek to maximize expected profits and that they hold definite (though probabilistic) expectations concerning future cost and demand conditions. With rivalry among the few, however, this is not so. Each firm recognizes that its best choice depends upon the choices its rivals make. The firms are interdependent, and they are acutely conscious of it. Their decisions depend then upon the assumptions they make about rival decisions and reactions, and many alternative assumptions might be entertained.[1]

The first major theory of oligopoly pricing was that advanced by Cournot. He hypothesized that each firm within an oligopolistic industry would choose to market that level

---

[1] F.M. Scherer, Industrial Market Structure and Economic Performance, (Chicago: Rand McNally, 1971), p. 131.

of output which would maximize its own profits. The level of output would be determined by assuming that all other firms would market fixed quantities. Unfortunately, price rather than output is the firm's key decision variable, i.e. firms set the price and let the buyers determine how much to buy at that price.

Many efforts were subsequently made to remedy the Cournot theory, but "all suffer from the objection that an intelligent business man would find his assumptions contradicted if he tested them thoroughly".[2]

A considerably different approach was adopted by Chamberlain some years later. Chamberlain (1933) hypothesized that when the number of sellers was small and they produce a completely standardized product, each will realize its interdependence with other firms and will therefore be reluctant to make any move which, when countered, would leave all members of the industry worse off. In his formal analysis, he used only the example of duopolists producing at zero cost, and was thus able to show that under these conditions, firms would set the price at the monopoly level.

Unfortunately, when cost functions and/or market shares vary from firm to firm, which is the case in the Canadian newsprint industry, conflicts can theoretically arise which, unless resolved through formal collusive agreements, will interfere with the maximization of collective monopoly

---

[2] Scherer, p. 135.

profits. Scherer (1971) says "when fixed costs are high and/or when marginal costs vary substantially among firms, it is conceivable that no set of price quantity choices consistent with independent action by industry members will maximize collective profits".[3] This finding, of course, does not deny that "firms . . . will . . . be reluctant to make any move which, when countered, would leave all members of the industry worse off"; it does strongly suggest that the monopoly price is unlikely to be the price which will occur.

As for almost all oligopoly-produced products, newsprint prices have demonstrated a good deal of price stability over the long run. Hall and Hitch (1939) developed a theory which is referred to as the kinked demand curve theory, in order to explain why oligopolistic firms shy away from frequent price cutting:

> The theory asserts that oligopolists face two different subjectively estimated demand curves: one describing the quantities they will sell at various prices, assuming that rivals maintain their prices at present levels (the Cournot assumption); and the other describing the amount of output sold, assuming that rivals exactly match any price changes away from the present level (the price matching, constant market shares assumption). The latter curve has the same elasticity at any given price as the overall industry demand curve.[4]

Their theory is represented diagramatically in Figures F-1 & F-2, which serve to demonstrate how product

[3] Ibid., p. 139

[4] Ibid., p. 145

Figure F-1

The Effect of Cost Changes on Price and Quantity under the Kink Assumption

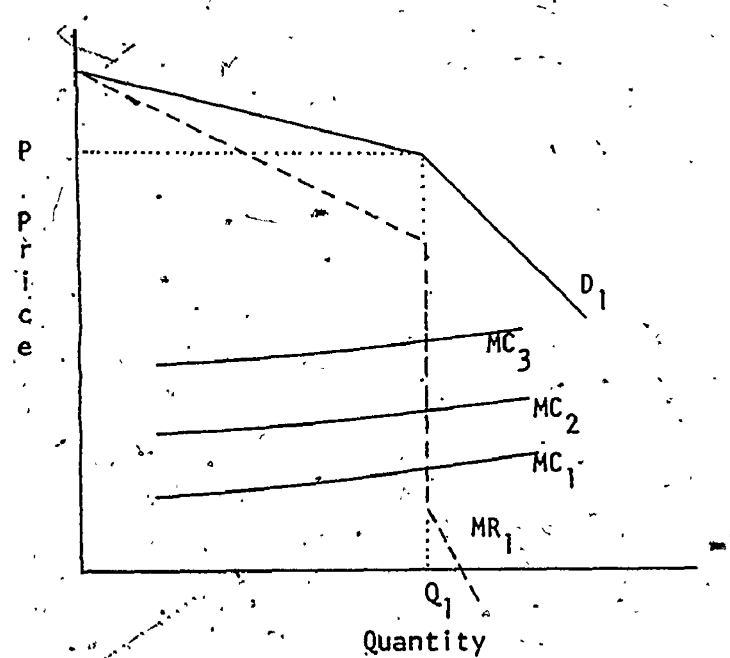
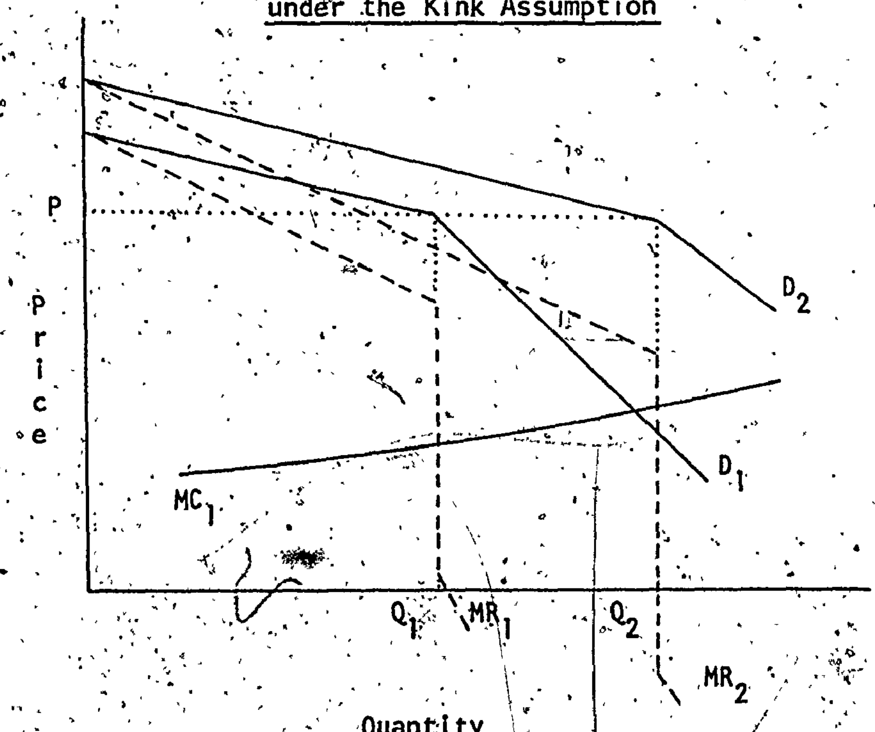


Figure F-2

The Effect of Demand Changes on Price and Quantity under the Kink Assumption



price can remain constant despite a number of demand and/or cost shifts.

The kink occurs because of the different rival reactions an individual firm expects in response to an increase or decrease of its selling price. If a particular firm, Firm A, raises its price, it might conceivably expect its competitors not to change their prices, because by doing so, Firm A's competitors will realize substantial sales volume increases at Firm A's expense. Newsprint being a homogeneous product, it is unlikely that a customer would be willing to pay a higher price for one producer's product than for any other producer's product. On the other hand, if Firm A lowers its price, it would expect its competitors to follow suit or otherwise it would attain large volume gains at its competitors' expense. Thus, in either case, there is no point in Firm A changing its price, for in both cases, it would expect a decline in profits.

The kinked demand theory appears quite reasonable and would appear to explain the tendency towards price stability. But prices do rise and fall too! How can these price changes be accounted for? The answer to this question lies in the answer to another question - what is the perceived shape of the demand curve when the industry is operating at or near full capacity? Under these conditions, if Firm A raises its price, other firms will be unable to supply any demand which would normally switch away from Firm A. This assumes relatively high barriers to entry, which is characteristic of high fixed cost industries, such as the newsprint industry. Thus, Firm A will be able to maintain its sales volume at the higher price and therefore achieve larger profits. Given this situation, it seems highly likely that rival firms likewise will raise their prices.

Similarly, there would be little point in Firm A lowering its price as it would be unable to supply the increased demand for its product. But, even should Firm A lower its price, there would be no reason for its rivals to do so likewise.

This line of reasoning is similar to that of C.W. Efroymson (1943), who originally proposed the reflex curve theory as an extension of the kinked demand theory. Thus, when the industry is at or near full capacity output, the shape of the demand curve can be depicted as in Figures F-3 and F-4.

It should be mentioned that Hall and Hitch also recognized that if orders increased to the point where existing firms had difficulty in fulfilling them, that the kink would straighten out. They did not go so far as to suggest that the demand curve would become backwards kinked (i.e. reflex).

In summary then, the theory, as it is applied to the Canadian newsprint industry, implies that the lower the capacity utilization, the more obtuse the shape of the kinked demand curve, and thus, the more likely that the industry will maintain the same price over a wide range of demand changes and cost shifts. Of course, there is no assurance

Figure F-3

The Reflex Kink Assumption

(when production is at or near full capacity)

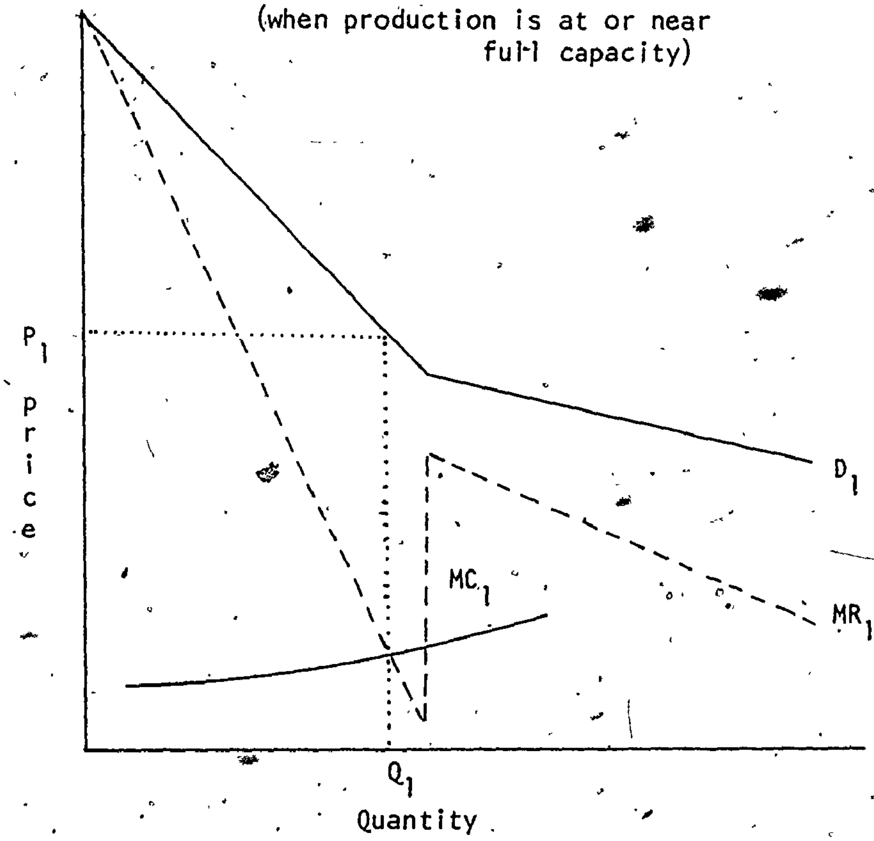
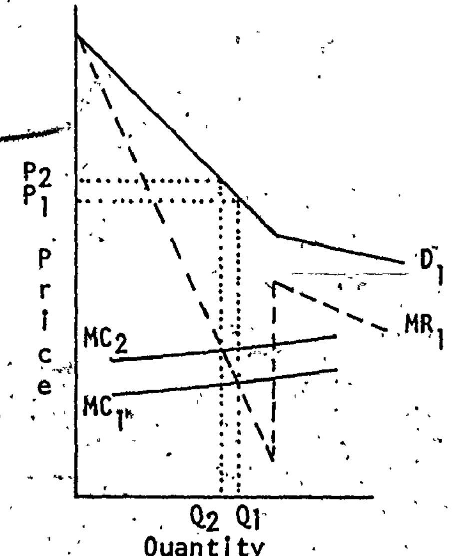
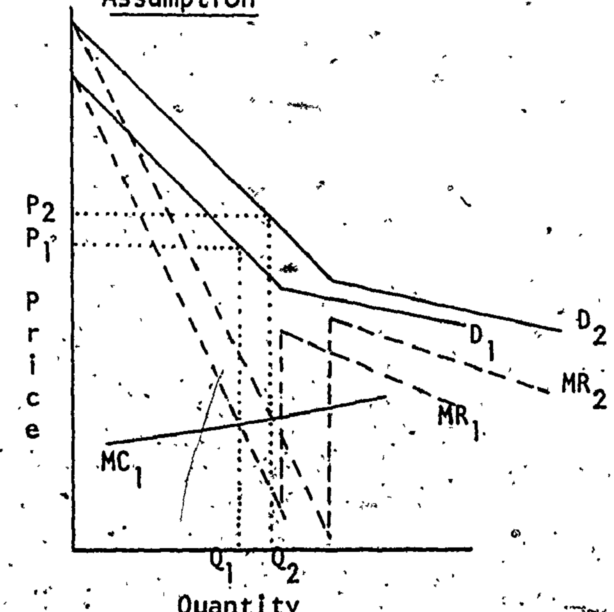


Figure F-4

(a) The Effect of Cost Changes on Price and Volume under the Reflex Assumption



(b) The Effect of Demand Changes on Price and Volume under the Reflex Assumption



that an individual producer will not lower his price in the hope of gaining a large volume of sales increase. The effectiveness of such a strategy will depend on how quickly competitors will follow his lead. There is little doubt that, in time, if he persists to maintain the lower price, his rivals will drop their prices to match his price.

On the other hand, the higher the capacity utilization, the more reflex-shaped the demand curve. Price will tend to be unstable, as there are 2 possible price - output combinations, where the marginal costs equal the marginal revenues. Moreover, independent of which output is optimal,[5] even slight shifts in demand or marginal costs would imply a change in the best profit output and price.

Stigler (1947) has been perhaps the biggest critic of the kinked demand curve theory. He lists a number of examples of situations which he says refute the kink hypothesis. Being a critic of the theory, he has chosen those situations which do not appear to conform to the theory. Moreover, he addresses a very narrow view of the theory and appears to disregard what the theory says about the shape of the demand curve and its relationship to capacity utilization. The proponents of the kinked demand curve theory emphasize its explanatory powers primarily in homogeneous oligopolies,

---

[5]Efroymson (1943, p. 105) states that there may be ". . . two ordinates . . . at which marginal cost is equated with marginal revenue. Of these one and only one indicates that output at which profits are maximized."

whereas Stigler criticizes the theory because of the dissimilarity in price changes in such products as cars.

There is some agreement among proponents and critics that if the kink demand theory is useful, it will be most useful in explaining price behavior in oligopolistic industries where:

- differences among rival products are small or nonexistant,
- there are an intermediate number of rivals, 5 to 10,
- firms are all of about the same size and there is no one firm which is particularly dominant in size,
- collusion among industry members does not appear to be a major factor, and lastly,
- the number of buyers is large.

As it happens, these are almost the exact characteristics of the North American newsprint industry, and thus, we might expect that the kinked demand curve theory may offer some potential for explaining its price behavior.

Moreover, the fact that the list price of Canadian newsprint in the New York market remained exactly the same at $134 per ton for 9 consecutive years from 1958 until 1965, is evidence of some price rigidity in this industry.

2. Survey Findings on Corporate Pricing

One of the most extensive surveys was Kaplan, Dirlam, and Lanzillotti's (1958) survey of pricing in large U.S. firms. Some of their conclusions of particular relevance to us were:

- The most typical pricing objectives found were:
  - pricing to achieve a target return on investment
  - stabilization of price and margin
  - pricing to realize a target market share
  - pricing to meet or prevent competition

It is important to recognize, however, that "a company statement of policy is not necessarily an accurate representation of what that policy is".[6]

- Target return pricing, although often used for the pricing of new products is also typical of low-unit profit high volume commodities, such as steel, aluminum and chemicals.

- No single objective or policy rules all price-making in any given company. In many companies, a close interrelationship exists among target return pricing, desire to stabilize prices or margins and target market share. This can perhaps account for the researchers' observation that "even officers who were quite familiar with company policy in the pricing area were among those who could not illustrate the policy by a detailed follow through of particular price decisions".[7]

---

[6] R.F. Lanzillotti, "Pricing Objectives in Large Companies" in S.H. Britt and H.W. Boyd, Marketing Management and Administrative Action, (New York, New York: McGraw Hill, 1963), p. 418.

[7] A.D.H. Kaplan, J.B. Dirlam, and R.F. Lanzillotti, Pricing in Big Business - A Case Approach, (Washington, D.C.: The Brookings Institute, 1958), p. 5.

- Meeting competition will often override other pricing objectives, especially for a firm selling a homogeneous product (i.e. one similar to rival products) and where the firm has a relatively low market share.

> Large companies whose resources are concentrated in established standard products are aware of the general unprofitability of price wars when confronted with similarly large and resourceful competitors; hence they keep in step with the competition on price and depend on such factors as favorable location, or availability of adequate supplies and satisfactory service to customers, for their competitive strength at the going price. In the use of these devices, however, product features (e.g. vulnerability to substitution) may determine how successful a stable price policy can be, even for the large and resourceful company.[8]

- Over half the firms interviewed stated they used a target return on investment pricing objective. Under this pricing system, both costs and profits are calculated on a standard volume basis. Thus, when output is less than standard volume, firms are expected to fall short of their profit objectives and when output exceeds the standard volume, firms are expected to exceed their profit objectives. Such a policy then will result in much the same pricing behavior as would an objective of gross margin stabilization or price stabilization when costs are relatively steady.

Of those companies surveyed, the average target mentioned was 14 per cent after tax based on stockholder equity plus long-term debt. The responses ranged from a low of 10 per cent to a high of 20 per cent.

---

[8] *Ibid.*, p. 254.

The costs considered in big business pricing are largely long-run costs. "With price policy in big business typically directed toward the longer-term considerations of standard costs, average return on investment, and continuing growth, few price adjustments would be expected in response to short-run fluctuations in demand or costs. Large deviations from the general market price must be weighed against future as well as present impact."[9]

On the subject of pricing to maintain market shares, the authors say: "The seriousness with which a firm regards the maintenance of its traditional marekt share in turn depends on its opportunities to diversify and grow with smaller shares of more product markets."[10]

---

[9] A.D.H. Kaplan, Big Enterprise in a Competitive System, (Washington, D.C.: The Brookings Institute, 1964), p. 164.

[10] Kaplan, Dirlam and Lanzillotti, p. 286.

APPENDIX G

Investment, Capacity and Capacity Expansion

There are 2 formal bodies of economic theory which most theorists and researchers have utilized in attempting to explain business plant and equipment investment. Besides plant and equipment, there is, of course, substantial investment made in business inventories. No attempt will be made to account for the investment in business inventories in our model of the Canadian newsprint industry. The interested reader may refer to Eisner (1963) for a survey of the literature on inventory investment. Eisner[1] refers to these 2 formal bodies of economic theory as either "embodying an 'interequilibrium approach'" or "concerned mainly with 'intertemporal allocation'". Both theories are based upon profit maximization assumptions.

1. The Interequilibrium Approach

The interequilibrium approach theory involves the

> . . . concept of an initial (long run) equilibrium position for the firm and a final equilibrium position which differs from the previous one as a result of some change in external circumstances, and involving the further, dynamical notions of the adjustment of the firm from its initial to its final equilibrium state. It will be stressed that models of this sort entail our thinking of the firm as being often in a disequilibrium position, moving from one equilibrium to another.[2]

---

[1] R. Eisner and R.H. Strotz, Determinants of Business Investment, (Prepared for the Commission on Money and Credit, 1963), p. 15.

[2] Ibid., pp. 15 and 16.

Changes which would be expected to produce a new long-run equilibrium for the firm would be changes in demand, changes in factor costs or conditions of supply and changes in technology.

The formal theory assumes that the firm is maximizing profits at any particular long-run equilibrium position and thus, the firm has chosen a particular optimal plant size consistent with the maximizing profits assumption. The theory also assumes that the firm is operating under conditions of complete certainty as to technology, product demand and factor supply; thus, any change in external circumstances is completely unexpected, yet, on the other hand, completely accepted as being the new state of certainty and thus dictates moving to a new long-run equilibrium position.

Given that some sudden and unexpected change in external circumstances occurs, the question then, is how we expect plant size to change. I will now attempt to relate what economic theory indicates should be the response of plant size to sudden changes in demand, factor costs or conditions of supply and technology for a firm operating in an oligopolistic industry, such as the Canadian newsprint industry.

In a homogeneous oligopolistic industry, there is no doubt that a sudden rise in industry demand will bring about a new higher level of optimal industry output corresponding with the new long-run equilibrium. It is only reasonable that as the optimal equilibrium level of output rises, so too the desired stock of capital level will increase. From such reasoning has evolved that economic theory known as the acceleration theory or acceleration principle, which hypothesizes that the desired stock of capital is positively related to the level of demand for output. A great number of investment studies have utilized this principle. I will return to a discussion of this principle later.

Unfortunately, we cannot be so certain a priori what the effect on the desired stock of capital will be of a sudden change in factor costs or technology. "If the cost of plant and equipment should decline, one would suppose that the optimal plant size would increase, so that the sales of both the individual firm and the industry would rise."[3] Likewise, the decline in the costs of other factors (e.g. wage rates) can be expected to lead to an increase in industry output, but unfortunately, this need not imply that plant and equipment will increase; in fact, it might decrease as a result of the substitution of labor for the now relatively more expensive capital equipment.

"It is even more difficult to say anything worthwhile at the a priori level about the effect of a change in technology. Technological advance may be either labor saving or capital saving and so, even though it may be expected to result in a diminution of cost and expansion of industry output, it is by no means certain that it must lead to an increase in the amount of capital devoted to the industry."[4]

---

[3] Ibid., p. 18.

[4] Ibid., p. 18.

Our inability to say anything a priori about desired capital changes in response to cost factor changes or technology changes, and yet at the same time, to be able to say a priori that there will be an effect on output because of cost factor changes or technology changes, sheds some doubts on the usefulness of the acceleration principle. Here, we should note that "from its inception the acceleration principle has been based on 'the law of derived demand', and the output changes that were considered relevant were those resulting from changes on the side of demand, not on the side of cost, including technology."[5] In the past, researchers studying the determinants of investment have made little, if any distinction between output changes resulting from demand, cost or technology changes. The implicit assumption, of course, being that changes in demand are of most importance in explaining output changes.

Before moving on to a further discussion of the acceleration principle and related principles, let me say a few words about the other major theoretical approach on business plant and equipment investment. That approach, as has been previously mentioned, is concerned mainly with "intertemporal allocation".

2. The Intertemporal Allocation Approach

> In contrast with the interequilibrium type analysis, the intertemporal allocation models are not truly dynamic. They do not explain how investment varies over time but are concerned essentially with describing the criteria

[5] Ibid., p. 19.

> by which intertemporal allocations are rationally made.
>
> . . . At the most elementary level we can consider the familiar formulation of the investment demand schedule as given by Keynes. An expected stream of future returns associated with a given investment program, $R_1, R_2, \ldots, R_n, \ldots$ is evaluated by discounting it at some appropriate rate of investment r, thereby giving the present value of the investment program
>
> $$V = R_n/(1+r)^n$$
>
> . . . If the appropriate interest rate varies with time, this formula becomes
>
> $$V = R_n/(1+r_n)^n$$
>
> . . . If the present value exceeds the cost of the project, the project is expected to be profitable.[6]

Along these same lines, Jorgenson (1967) has developed an optimal capital accumulation model which seeks to maximize the present value of the firm. Jorgenson's approach can be considered dynamic; however, considering the state of development of this approach and the lack of research utilizing this approach, it seems more appropriate to develop the preliminary model of the Canadian newsprint industry from the interequilibrium approach. In particular, as many researchers have done in the past, the investment equations of the preliminary model will be developed from the acceleration principle and modified to reflect other theories and research findings.

3. Acceleration and Related Theories of Investment

The acceleration theory as it was originally conceived,

---

[6] *Ibid.*, p. 135.

hypothesized a direct relation between the actual level of capital and the level of output. Note that the actual level of capital has been assumed to equal instantaneously the desired level of capital and the actual level of output has been assumed to equal the demand for output. The basic equation then becomes:

$$K = BX$$

where: K = the level of capital stock

X = the level of output

B = the acceleration constant.

This statement was soon recognized by most researchers to be much too simple and moreover did not describe the course of actual economic events, and so a number of modifications have been proposed. Two (2) modifications which have been widely accepted are:

- That capital stock should lag output or more specifically that the change in capital stock should lag a change in output. The reasoning here was that if output induces investment and investment takes time to be realized, then the actual level of capital stock should lag output by some period of time.

- Researchers also recognized that the acceleration principle might become inoperative if (contrary to the underlying theory which assumes an initial equilibrium position) there existed an underutilization of the existing capital stock. Thus, if the existing stock of capital, because of underutilization, exceeded the desired stock at a new, higher level of demand, no acquisition of new capital would be needed. Many investigators have used this modified form of the acceleration principle in attempts to explain and predict investment expenditures in many industries. These investigators include Manne (1945), Chenery (1952), Modigliani and Kisselgoff (1957), Clark, P.G. (1953), and Eisner (1964). Although various investigators' formulations of the investment model may look quite different, such differences are usually more seeming than actual. A general formulation of the modified acceleration principle, which encompasses most of these researchers' formulations, will be presented later, when the specific investment equation for the Canadian newsprint industry is discussed.

The acceleration principle has not been the only principle that has received a great deal of inspection. A major line of research has also evolved from the proposition that "whatever causes firms to desire an increase in output also enhances their present profits".[7] Thus, investigators such as Tinbergen (1938), Klein (1951), Meyer and Kuh (1955) and Hickman[8] (1964) have argued that past and present profits are most significant in determining capital expenditures.

---

[7] *Ibid.*, p. 19.

[8] It would not be proper to leave the reader with the impression that Hickman solely advocates the profit principle, for such an impression would be incorrect. He has, however, argued the profit principle when commenting on other investigators' research work.

Investigators who believe past or current profits to be the key determinant of investment usually consider such profits as a good indication of expected future profits or as a direct measure of the internal availability of funds with which to make investments; thus, profits are usually considered an expectations variable or a constraint variable.

There is also the possibility, as Klein (1948) has argued, that managers are motivated under certain circumstances to build empires and thus entrepreneurs are investing not to maximize profits but because they take "pride in the size of their establishments".[9] Then current and past profits might be a key variable in explaining investment in that the more profitable the current business, the more the firm can afford to overexpand. Such thinking is not incompatible with Cyert and March's (1963) behavioral view of the firm or with Baumol's (1959) theory that firms seek to maximize sales subject only to a minimum profits constraint.

Other investigators such as Anderson (1964), Meyer and Glauber (1964), Resek (1966) and Evans (1967) have suggested that the cost and/or availability of funds, either internal or external, are also key determinants of business investment. The rationale underlying the research of these researchers is Duesenberry's theory of investment which Anderson (1964) has characterized as

> . . . a restatement of the neoclassical position that investment is determined by the intersection of the marginal efficiency schedule with the marginal cost of funds

[9] L.R. Klein, "Notes on the Theory of Investment", Kyklos, 2 (1948): 101.

> schedule. The marginal efficiency schedule, Duesenberry argues, shifts about primarily in response to changes in the rate of utilization of existing capacity. The marginal cost of funds schedule shifts about in response to changes in the degree of financial risk as well as to changes in the market cost of funds.[10]

Jorgenson (1971) made a survey of the econometric studies of investment behavior which covered such studies up to the end of 1971. He concluded:

> The determinants of the desired level of capital may be divided into three groups: 1) capacity utilization, represented by the ratio of output to capacity, the difference between output and capacity, change in output, sales less previous peak of sales, and so on; 2) internal finance, represented by the flow of internal funds, the stock of liquid assets, debt capacity, and accrued tax liability; 3) external finance, represented by interest rates, rates of return, stock prices, the market value of the firm. Our first objective is to evaluate the role of these groups of variables in the explanation of investment behavior.
>
> Capacity utilization appears as a highly significant determinant of desired capital in most of the studies we have considered. Measures of capacity utilization appearing as significant determinants of investment include Anderson's measure of sales less previous peak sales, Bourneuf's difference between the FRB index of industrial production and the McGraw-Hill capacity index, and the Wharton School capacity index employed by Evans. The level of real output may be regarded as a measure of capacity utilization in a relationship also including capital stock. Measures of output employed in this way include deflated sales as employed by Kuh, Hickman's real gross product originating, Resek's change in the FRB index of industrial production, and the change in deflated sales employed by Eisner. . . .

---

[10] W.H.L. Anderson, _Corporate Finance, and Fixed Investment: An Econometric Study_, (Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1964), p. 37.

> Capacity utilization or output provides the only significant determinant of desired capital for several of the models of investment behavior included in our survey. These models include . . . the models of Bourneuf, Eisner, Evans and Hickman for industry groups. All of these models reduce the flexible accelerator model of Chenery and Koyck with desired capital proportional to output.
>
> Variables associated with internal finance do not appear as significant determinants of desired capital in any model that also includes output as a significant determinant.
>
> Among variables associated with external finance, the interest rate appears as a significant determinant of desired capital in the Anderson and Resek models. . . . External finance variables are, however, definitely subordinate to variables associated with output. External finance appears as a significant determinant of desired capital only in models such as the Anderson and Resek models, with output a highly significant determinant.[11]

Eisner (1957) has reviewed the literature resulting from interviews with business men concerning their investment behavior. The studies which he reviews are those of Meade and Andrews (1938), Mack (1941), Heller (1951), Katona and Morgan (1952), Gort (1951), de Chazeau (1954), Andrews and Brunner (1952) and other studies undertaken largely for forecasting purposes.

Eisner's survey found many common threads in the findings of these various researchers. Some of these are:

- A tremendous emphasis on the significance of the level of sales or demand, and associated with this is generally the level of profits. Generally, the orientation is future,

---

[11] D.W. Jorgenson, "Econometric Studies of Investment Behavior: A Survey", Journal of Economic Literature. 9 (December, 1971): 1130 - 1133.

although present profits and sales may be used as the future is expected to be much like the present. In some cases, emphasis is placed on trends and in particular, on the trend in sales or demand.

- There is little evidence that changes in the cost of equipment or buildings influence the physical volume of capital expenditures.

- Current interest rates do not appear to have any direct connection with investment decisions. The cost of capital in general, does not appear to be important in determining investment behavior, although the current selling price of the company's stock, reflecting the cost of equity financing, seems to have some importance. Availability of cash or capital is of some importance to smaller firms.

Eisner cautions the reader, however, to accept such findings for what they are. He points out in particular, that actions important to individuals may cancel out in the aggregate, and things reported by only a few may be the major factors either because they do not cancel out or because they affect large decisions.

APPENDIX H

Data Sources and Measurement

<u>Variable:</u> U.S. C_t

Description: The volume of newsprint (000 tons) consumed in the United States in year t.

Source: Canadian Pulp and Paper Association, <u>Annual Newsprint Supplement - 1970</u>, (Montreal: Canadian Pulp and Paper Association, 1971), Table 9, p. 5.

<u>Variable:</u> U.S. HH_t

Description: The number (000s) of households in the United States in year t.

Source: U.S. Department of Commerce, <u>Historical Statistics of the United States - Colonial Times to 1957</u>, Tables A242 to A244, p. 15.

U.S. Department of Commerce, <u>Statistical Abstracts of the United States</u>, various years.

<u>Variable:</u> U.S. RDI_t

Description: The U.S. real disposable income (1929 $ billions) in year t.

Source: U.S. Department of Commerce, <u>Historical Statistics of the United States - Colonial Times to 1957</u>, Table F1-21, p. 139.

U.S. Department of Commerce, <u>Statistical Abstracts of the United States</u>, various years.

<u>Variable:</u> U.S. C/HH_t

Description: The volume (pounds) of newsprint consumed per household in the United States in year t.

Measurement: Calculated as the value of U.S. C_t divided by the value of U.S. HH_t.

<u>Variable:</u> U.S. RDI/HH_t

Description: The U.S. real disposable income (1929 \$) per household in year t.

Measurement: Calculated as the value of 1,000,000 times the value of U.S. RDI_t divided by the value of U.S. HH_t.

<u>Variable:</u> R. N. Y. L. Pr_t

Description: The real list price of newsprint (1929 U.S. \$) in New York in year t.

Measurement: Calculated as the value of N. Y. L. Pr_t divided by the U.S. gross national product implicit price index using 1929 as the base year.

Source: U.S. Department of Commerce, <u>Historical Statistics of the United States - Colonial Times to 1957</u>, Table F1-5, p. 139.

U.S. Department of Commerce, <u>Statistical Abstracts of the United States</u>, various years.

<u>Variable:</u> S. $U.S._t$

Description: The volume (000 tons) of newsprint shipments to the United States from all destinations in year t.

Source: Canadian Pulp and Paper Association, <u>Annual Newsprint Supplement - 1970</u>, (Montreal: Canadian Pulp and Paper Association, 1971), Table 7, p. 4.

<u>Variable:</u> U.S. Pu. I_{t-1}

Description: The volume (000 tons) of U.S. newspaper publishers' newsprint inventories held at the end of year t-1.

Source: Canadian Pulp and Paper Association, <u>Annual Newsprint Supplement - 1970</u>, (Montreal: Canadian Pulp and Paper Association, 1971), Table 10, p. 6.

Variable: N.A. P_t

Description: The volume (000 tons) of North American newsprint production in year t.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 3 and 6, pp. 3 and 4.

Variable: N.A. S_t

Description: The volume (000 tons) of North American newsprint shipments to all destinations in year t.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 4 and 6, pp. 3 and 4.

Variable: N.A. Pl. I_{t-1}

Description: The volume (000 tons) of North American newsprint manufacturers' inventories at the end of year t-1.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 10, p. 6.

Variable: N.Y. L. Pr_t

Description: The list price of newsprint (U.S. \$/ton) in New York in year t.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 26, p. 11.

Variable: C. PC_t

Description: Canadian newsprint manufacturers' production costs (Can. \$/ton) in year t.

Source: Special tabulations received from Statistics Canada.

Measurement: As previously discussed in Chapter II, pp.

Variable: C.US E. R. C_t

Description: The Canadian - U.S. exchange rate difference expressed in Canadian dollars per ton of newsprint.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 26, p. 11.

Variable: d_t

Description: A measure of Canadian newsprint transportation costs per ton (Can. $/ton) in year t.

Measurement: See Equation 6, Chapter III.

Variable: C.US E. $R._t$

Description: The average Canadian - U.S. exchange rate in year t.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 26, p. 11.

Variable: C. Pr. a m_t

Description: The average price (Can. $/ton) of Canadian produced newsprint at mill in year t.

Source: Statistics Canada, Pulp and Paper Mills, (Ottawa: Information Canada, various years 1926-1971).

Variable: NA. Ca_t

Description: North American newsprint capacity (000 tons) in year t.

Source: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 2 and 6, pp. 2 and 4.

<u>Variable:</u> NA. $Ca^{d}_{t+\theta+z}$

Description: The desired level of North American newsprint capacity (000 tons), desired in year t for year t+θ+z.

Measurement: See Equation 11a, Chapter V.

<u>Variable:</u> NA. $CU^{e}_{t+\theta+z}$

Description: The expected level of North American newsprint capacity utilization (%), expected in year t for year t+θ+z.

Measurement: See Equations 13 and 16, Chapter V.

<u>Variable:</u> NA. S_{trend}

Description: The trend (000 tons per year) of North American newsprint shipments.

Measurement: Measured in a variety of ways, see Chapter V.

<u>Variable:</u> $S.O.D._{t}$

Description: Canadian newsprint manufacturers' standard yearly operating days in year t.

Source: Canadian Pulp and Paper Association, <u>Annual Newsprint Supplement - 1970</u>, (Montreal: <u>Canadian Pulp and Paper Association</u>, 1971), Table 2, p. 2.

APPENDIX I

Important Sections of the Combines Investigation Act

32(1) Every one who conspires, combines, agrees or arranges with another person

(a) to limit unduly the facilities for transporting, producing, manufacturing, supplying, storing or dealing in any product,

(b) to prevent, limit or lessen, unduly, the manufacture or production of a product, or to enhance unreasonably the price thereof,

(c) to prevent, or lessen, unduly, competition in the production, manufacture, purchase, barter, sale, storage, rental, transportation or supply of a product, or in the price of insurance upon persons or property, or

(d) to otherwise restrain or injure competition unduly, is guilty of an indictable offence and is liable to imprisonment for five years or a fine of one million dollars, or to both.

32(2) Subject to subsection (3), in a prosecution under subsection (1), the court shall not convict the accused if the conspiracy, combination, agreement or arrangement relates only to one or more of the following:

(a) the exchange of statistics,

(b) the defining of product standards,

(c) the exchange of credit information,

(d) the definition of terminology used in a trade, industry or profession,

(e) cooperation in research and development,

(f) the restriction of advertising or promotion, other than a discriminatory restriction directed against a member of the mass media,

(g) the sizes or shapes of the containers in which an article is packaged,

(h) the adoption of the metric system of weights and measures, or

(i) measures to protect the environment.

32(3) Subsection (2) does not apply if the conspiracy, combination, agreement or arrangement has lessened or is likely to lessen competition unduly in respect of one of the following:

(a) prices,

(b) quantity or quality of production,

(c) markets or customers, or

(d) channels or methods of distribution,

or if the conspiracy, combination, agreement or arrangement has restricted or is likely to restrict any person from entering into or expanding a business in a trade, industry or profession.

32(4) Subject to subsection (5), in a prosecution under subsection (1) the court shall not convict the accused if the conspiracy, combination, agreement or arrangement relates only to the export of products from Canada.

32(5) Subsection (4) does not apply if the conspiracy, combination, agreement or arrangement

(a) has resulted or is likely to result in a reduction or limitation of the volume of exports of a product,

(b) has restrained or injured or is likely to restrain or injure the export business of any domestic competitor who is not a party to the conspiracy, combination, agreement or arrangement,

(c) has restricted or is likely to restrict any person from entering into the business of exporting articles from Canada, or

(d) has lessened or is likely to lessen competition unduly in relation to an article in the domestic market.

Important amendments proposed in March 1977 to the Combines Investigation Act - Bill C 42.

32(5) Subsection (4) does not apply if the conspiracy, combination, agreement or arrangement <u>that is in question in a prosecution</u> under subsection (1)

(a) is contrary to any agreement into which Canada has entered with any other country relating to private restrictions on international trade,

(b) has restrained or injured or is likely to restrain or injure the export business of any domestic competitor who is not a party to the conspiracy, combination, agreement or arrangement,

(c) has restricted or is likely to restrict any person from entering into the business of exporting products from Canada,

(d) has lessened or is likely to lessen competition unduly in relation to a product in the domestic market, or

(e) has resulted or is likely to result in a reduction or limitation of the <u>value</u> of exports <u>from Canada</u> of a product.

32(5.1) An agreement or arrangement to which subsection (4) applies does not lessen competition unduly within the meaning of paragraph (5)(d) only because it has an adverse effect on prices in the domestic market, if such effect is unintended and is ancillary to the primary objectives of the agreement or arrangement.

Source: Consumer and Corporate Affairs Canada, Proposals for a New Competition Policy for Canada - II Stage. March 1977, pp. 202-204.

APPENDIX J

Sources of Graphically Presented Materials

Graph 1-1: Price Indexes for Selected Canadian Products (1961-1972)

Canadian Pulp and Paper Association, Reference Tables - 1973, (Montreal: Canadian Pulp and Paper Association, 1973), Table 65, p. 26.

Graph 1-2: Canadian Newsprint Industry Profitability (1921-1971)

Return of Canadian Newsprint Industry ($)

Special tabulations received from Statistics Canada (1921-1971).

Capital Employed by Canadian Newsprint Industry ($)

Special tabulations received from Statistics Canada (1921-1943).
Estimated by author from values of capital employed in full Canadian pulp and paper industry as provided by:
Canadian Pulp and Paper Association, Reference Tables - 1973, (Montreal: Canadian Pulp and Paper Association, 1973), Table 59, p. 25, (1952-1971).

Canadian Pulp and Paper Association, Reference Tables - 1970, (Montreal: Canadian Pulp and Paper Association, 1970), Table 62, p. 23, (1950-1951).

Canadian Pulp and Paper Association, Reference Tables - 1966, (Montreal: Canadian Pulp and Paper Association, 1966), Table 71, p. 26, (1944-1949).

Real Return of Canadian Newsprint Industry ($)

Special tabulations received from Statistics Canada (1921-1971).

Capacity of Canadian Newsprint Industry (tons)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 2, p. 2, (1921-1971).

Graph 1-3: Return on Capital Employed: Canadian Newsprint Industry vs. Canadian Pulp and Paper Industry (1920-1971)

Return on Capital Employed in Canadian Newsprint Industry (%)

Graph 1-2 of this thesis (1921-1971).

Return of Canadian Pulp and Paper Industry ($)

Statistics Canada, Pulp and Paper Mills, (Ottawa: Information Canada, various years), Tables of Principal Statistics, (1920-1971).

Capital Employed by Canadian Pulp and Paper Industry ($)

Statistics Canada, Pulp and Paper Mills, (Ottawa: Information Canada, various years), (1920-1943).

Canadian Pulp and Paper Association, Reference Tables - 1966, (Montreal: Canadian Pulp and Paper Association, 1966), Table 71, p. 26, (1944-1949). Note: Values adjusted by author.

Canadian Pulp and Paper Association, Reference Tables - 1970, (Montreal: Canadian Pulp and Paper Association, 1970), Table 62, p. 23, (1950-1951).

Canadian Pulp and Paper Association, Reference Tables - 1973, (Montreal: Canadian Pulp and Paper Association, 1973), Table 59, p. 25, (1952-1971).

Graph 1-4: Returns in the Canadian Newsprint Industry After Allowance for Head Office Expenses (1921-1971)

Graph 1-2 of this thesis (1921-1971).

Graph 1-5: Canadian Newsprint Industry Profitability and the Effect of Exchange Gains or Losses (1921-1971)

Primary Source

Graph 1-4 of this thesis (1921-1971).

United States Dollar Exchange Rates are Federal Reserve System and Bank of Canada rates as given by: Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 26, p. 11, (1921-1971).

United States Corporate Bond Yields (%)

July 1966, pp. 166 and 168.

Graph 2-1: Canadian Newsprint Industry Profitability and Excess Capacity (1921-1971).

Primary Source

Graph 1-4 of this thesis (1921-1971).

Newsprint Industry Capacity Utilization (%)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 3, p. 3, (1921-1971).

Graph 3-1: Comparison of Five Year Average Operating Ratios for the Canadian and United States Newsprint Industries (1921-1970)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 3, p. 3, and Table 6, p. 4.

Graph 3-2: North American Shipments (Adjusted for Inventories of Consumers) ÷ North American Capacity (1921-1971)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 2, p. 2, Table 4, p. 3, Table 6, p. 5 and Table 10, p. 6.

Graph 5-1: Actual United States Newsprint Consumption vs Consumption Estimated by Equation 1a (1919-1971)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 9, p. 5.

Graph 5-2: Actual United States Newsprint Consumption per Household vs Consumption per Household Estimated by Equation 1c (1919-1970)

U.S. Newsprint Consumption

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1974), Table 9, p. 5.

Graph 5-2 continued

Households

U.S. Bureau of Census, Historical Statistics of the United States: Colonial Times to 1957, A242-A244, p. 15, (1919-1957).

U.S. Bureau of Census, Statistical Abstracts of the United States, various years, (1958-1971).

Graph 5-3: Change in Actual Price of Canadian Newsprint in the New York Market (U.S. $/ton) vs Price Change Estimated by Equation 7b (1922-1971)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 26, p. 11.

Graph 5-4: Size vs Means of Canadian Capacity Increases 1946-1960

Canadian Pulp and Paper Association, Newsprint Data - 1960, (Montreal: Canadian Pulp and Paper Association, 1961), pp. 12 and 13.

Graph 5-5: Actual North American Capacity Changes (%) vs Those Estimated by Equation 15

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 2 and 6, pp. 2 and 4.

Graph 6-1: Actual United States Newsprint Consumption vs Consumption Estimated by Equation 19

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 9, p. 5.

Graph 7-1: Canadian Newsprint Industry Capacity and Shipments 1920-1970

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 2 and 4, pp. 2 and 3.

Graph 7-2: United States Newsprint Consumption and Canadian Newsprint Shipments (1920-1970)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 4 and 9, pp. 3 and 5.

Graph 7-3: Changes in U.S. Newsprint Consumption, 1920-1971

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 9, p. 5.

Graph 7-4: Changes in Canadian Newsprint Shipments, 1920-1971

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Table 4, p. 3.

Graph 7-5: Changes in North American Newsprint Capacity, 1920-1971

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 2 and 5, pp. 2 and 4.

Graph 7-6: Canadian Newsprint Industry Capacity (year t) and Shipments (year t-2), 1920-1970

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 2 and 4, pp. 2 and 3.

Graph 7-7: United States Newsprint Consumption and Canadian Newsprint Shipments to the United States (1920-1970)

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1971, (Montreal: Canadian Pulp and Paper Association, 1972), Tables 4 and 9, pp. 3 and 5.

Graph 7-8: Growth in U.S. Newsprint Consumption 1913-1929

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 9, p. 5.

Graph 7-9: North American Capacity, Production and Shipments 1920-1970

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 2, 3, 4, 6 and 7, pages 2 to 4.

Graph 7-10: Forecasts of U.S. Newsprint Consumption for Year 1965

Note: The 11 forecasts shown were given in various issues of the publication: Canadian Pulp and Paper Association, Newsprint Data (various years) (Montreal: Canadian Pulp and Paper Association, various years).

Forecast #	Original Sources
1	A.N.P.A., Newsprint: A Forward Look to 1965, April 1957.
2	Forest Service, U.S. Dept. of Agriculture, Feasibility of Using Lake State Hardwoods ..., April 1959.
3	F.A.O., World Demand for Paper to 1975, 1960.
4	U.S. Dept. of Commerce for I.F.C. Committee, Pulp, Paper and Board - Supply-Demand - Newsprint Outlook, July 1959.
5	Econometrics Institute, Paper Industry Outlook, May 1959.
6	The Intelligence Unit of the Economist, Reports and Paper on Mass Communication, (prepared for UNESCO), April 1954.
7	A.P.I., Submission and Forecasts to F.A.O., Sept. 1959.
8	Royal Commission on Canada's Economic Prospects, Outlook for Canadian Forest Industries, March 1957.
9	F.A.O., Estimates of Paper and Board Demand, Oct. 1959.
10	U.S. President's Material Policy Commission, Resources for Freedom, (Paley Report), June 1952.
11	Stanford Reserach Institute, America's Demand for Wood, 1954.

Graph 7-11: Forecasts of U.S. Newsprint Consumption for the Year 1970

Note: The 5 forecasts shown were given in the publication: Canadian Pulp and Paper Association, Newsprint Data - 1964, (Montreal: Canadian Pulp and Paper Association, 1964), p. 6.

Forecast #	Original Source
1	U.S. Dept. of Commerce, Pulp, Paper and Board Supply-Demand, July 1964. (Optimistic forecast)
2	A.N.P.A., Report on Newsprint, April 1964.
3	A.N.P.A., 1975 U.S. Newsprint Consumption, Dec. 1965.
4	U.S. Dept. of Commerce, Pulp, Paper and Board Supply-Demand, July 1964. (Conservative forecast)
5	F.A.O., World Demand for Paper to 1975, 1960.

Graph 7-12: Newsprint Prices and Canadian Newsprint Manufacturing Costs, 1920-1970

New York List Price of Newsprint

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 26, p. 11.

Canadian Average f.o.b. Mill Newsprint Value per ton

Statistics Canada, Pulp and Paper Mills, (Ottawa: Information Canada, various years), Table of Mill Shipments of Basic Paper and Paperboard, by Kinds.

Canadian Average Manufacturing Costs per ton

Special tabulations received from Statistics Canada.

Graph 7-13: Excess Capacity and Newsprint Prices, 1920-1970

New York List Price of Newsprint

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 26, p. 11

Graph 7-13 continued

Canadian Newsprint Industry Capacity Utilization

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Table 3, p. 3.

Export Values per ton

Statistics Canada, Trade of Canada - Exports by Countries, (Ottawa: Information Canada, various years).

Graph 7-14: Price Discounting Indications 1920-1970

Graphs 7-12 and 7-13.

Graph 7-15: Regional Capacity and f.o.b. Mill Prices 1957-1970

Table 7-1.

Graph C-1: North American Capacity and Shipments 1921-1971

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970, (Montreal: Canadian Pulp and Paper Association, 1971), Tables 2, 4 and 6, pp. 2, 3 and 4.

BIBLIOGRAPHY

American Paper Institute, The Statistics of Paper: 1971. New York: American Paper Institute, 1971.

Anderson, W.H.L. Corporate Finance, and Fixed Investment an Econometric Study. Boston: Division of Research Graduate School of Business Administration, Harvard University, 1964.

Andrews, P.W.S. and Brunner, E. Capital Development in Steel. Oxford: Basil Blackwell, 1952.

Ault, D. "The Determinants of World-Steel Exports: An Empirical Study". Review of Economics and Statistics, Vol. 54, February 1972. pp. 38-46.

Barnes, F.M. The Establishment and Location of the Newsprint Industry in Ontario (unpublished). Fredericton, New Brunswick: University of New Brunswick, year of publication not given.

Baumol, W.J. Business Behavior, Value and Growth. New York, New York: MacMillan, 1959.

Bowland, J.G. Economic Indicators in Forestry and Forest-based Industries in Canada: 1961-1969. Ottawa, Canada: Department of the Environment, Canadian Forestry Service, Publication No. 1297, 1971.

Box, G.E.P. and Jenkins, G.M. Time Series Analysis - Forecasting and Control. San Francisco, California: Holden Day, 1976.

Canadian Pulp and Paper Association, Annual Newsprint Supplement - 1970. Montreal: Canadian Pulp and Paper Association, 1971.

Canadian Pulp and Paper Association, Newsprint Data. Montreal: Canadian Pulp and Paper Association, various years 1948 through 1971.

Canadian Pulp and Paper Association, Reference Tables. Montreal: Canadian Pulp and Paper Association, various years 1966 through 1973.

Chamberlain, E.H. The Theory of Monopolistic Competition. Cambridge: Harvard University Press, 1933.

Chenery, H.B. "Overcapacity and the Acceleration Principle". Econometrica, Vol. 20, January 1952. pp. 1-28.

Cheveldayoff, Wayne. "Sellers' Market for Newsprint is Predicted". (Toronto) Globe and Mail, 1 March 1973, p. B2.

Clark, P.G. "The Telephone Industry: A Study in Private Investment" in Leontief, W. et al. Studies in the Structure of the American Economy, Theoretical and Empirical Explorations in Input-Output Analysis. New York, New York: Oxford University Press, 1953.

Clowes, G.A. and Marshall, S.A. "Corporate Financial Models: a Survey". Institute of Electrical Engineers Proceedings, Vol. 119, March 1972. pp. 369-376.

Cyert, R.M. and March, J.G. A Behavioral Theory of the Firm. Englewood Cliffs, New Jersey: Prentice-Hall, 1963.

de Chazeau, M.G. "Regularization of Fixed Capital Investment by the Individual Firm" in Regularization of Business Investment. Princeton: Princeton University Press for the National Bureau of Economic Research, 1954. pp. 75-106.

Consumer and Corporate Affairs Canada. Proposals for a New Competition Policy for Canada, Second Stage. Ottawa, March 1977.

Desai, Meghnad. "An Econometric Model of the World Tin Economy, 1948-1961". Econometrica, Vol. 34, January 1966. pp. 105-134.

Eisner, R. "Capital Expenditures, Profits, and the Acceleration Principle" in the National Bureau of Economic Research publication Models of Income Determination, Studies in Income and Wealth, Vol. 28. Princeton: Princeton University Press, 1964. pp. 137-176.

Eisner, R. and Strotz, R.H. Determinants of Business Investment. Prepared for the Commission on Money and Credit, 1963.

Eisner, R. "Interview and Other Survey Techniques and the Study of Investment" in Problems of Capital Formation. Studies in Income and Wealth, Vol. 19. Princeton: Princeton University Press, 1957. pp. 513-601.

Efroymson, C.N. "A Note on Kinked Demand Curves". American Economic Review, Vol. 33, March 1943. pp. 98-109.

Eklund, Risto. "Integration of Forest Industries - The Pulp and Paper Industry as a Model". Paper commissioned by the FAO for a symposium organized by the ECE/FAO Timber Division on Integration in the Forest Industries, Geneva, February 1967.

Ellis, L.E. Newsprint: Producers, Publishers, Political Pressures. New Brunswick, New Jersey: Rutgers University Press, 1960.

Ellis, L.E. Print Paper Pendulum: Group Pressures and the Price of Newsprint. New Brunswick, New Jersey: Rutgers University Press, 1948.

Evans, M.K. "A Study of Industry Investment Decisions". Review of Economics and Statistics, Vol. 49, May 1967. pp. 151-164.

"Four More Firms Follow Newsprint Price Rise". (Toronto) Globe and Mail, 29 July 1971.

Gershefski, G.W. "Corporate Models - The State of the Art". Managerial Planning, Vol. 13, November-December 1969. pp. 1-6.

Gershefski, G.W. "The Development and Application of a Corporate Financial Model". (Planning Executives Institute, Ohio, 1968).

Gort, M. "The Planning of Investment: A Study of Capital Budgeting in the Electric Power Industry". Journal of Business, Vol. 24, April and July 1951. pp. 79-95 and 181-202.

Grunfeld, Y. "The Determinants of Corporate Investment" in Harberger, A.C. (ed.) The Demand for Durable Goods. Chicago: University of Chicago Press, 1960.

Gutherie, J.A. The Economics of Pulp and Paper. Pullman, Washington: State College of Washington Press, 1950.

Gutherie, J.A. The Newsprint Paper Industry: An Economic Analysis. Cambridge, Massachusetts: Harvard University Press, 1941.

Hall, R.L. and Hitch, C.J. "Price Theory and Business Behavior". Oxford Economic Papers, No. 2, May 1939. pp. 12-45.

Haviland, W.E., Takacsy, N.S. and Cape, E.M. Trade Liberalization and the Canadian Pulp and Paper Industry. Toronto, Canada: Published for the Private Planning Association of Canada by the University of Toronto Press, 1968.

Hay-Roe, Ross. "The Newsprint Shortage - All Over but the Earnings Reports?" Fry Mills Spence research report, November 1973.

Heller, W.W. "The Anatomy of Investment Decisions". Harvard Business Review, Vol. 29, March 1951. pp. 95-103.

Hickman, B.G. "Comment" in the National Bureau of Economic Research publication Models of Income Determination, Studies in Income and Wealth, Vol. 28. Princeton: Princeton University Press, 1964. pp. 166-172.

Hickman, B. "Capacity, Capacity Utilization, and the Acceleration Principle" in Problems of Capital Formation. Studies in Income and Wealth, Vol. 19. Princeton: Princeton University Press, 1957. pp. 419-468.

Hill, Paul J. "Forest Products Industry - Progress Report". Burns Bros. and Denton research report, June 1971.

Hunter, H. "Innovation, Competition, and Locational Changes in the Pulp and Paper Industry: 1880-1950". Land Economics, Vol. 31, November 1955. pp. 314-327.

Jorgenson, D.W. "Econometric Studies of Investment Behavior: A Survey". Journal of Economic Literature, Vol. 9, December 1971. pp. 1111-1147.

Jorgenson, D.W. "The Theory of Investment Behavior" in Ferber, R. (ed.) Determinants of Investment Behavior. New York, New York: National Bureau of Economic Research, 1967.

Kaplan, A.D.H. Big Enterprise in a Competitive System. Washington, D.C.: Brookings Institution, 1964.

Kaplan, A.D.H., Dirlam, J.B. and Lanzillotti, R.F. Pricing in Big Business / a case approach. Washington, D.C.: Brookings Institution, 1958.

Katona, G. and Morgan, J.N. "The Quantitative Study of Factors Determining Business Decisions". Quarterly Journal of Economics, Vol. 66, February 1952. pp. 67-90.

Keays, J.L. Projection of World Demand for Wood-Fibre to the Year 2000. Vancouver, British Columbia: Western Forest Products Laboratory, 1973.

Kisselgoff, A. and Modigliani, F. "Private Investment in the Electric Power Industry and the Acceleration Principle". Review of Economics and Statistics, Vol. 39, November 1957. pp. 363-380.

Klein, L.R. (ed.) Essays in Industrial Econometrics, Vols. 1 and 2. Philadelphia, Pennsylvania: Economics Research Unit, University of Pennsylvania, 1969.

Klein, L.R. "Studies in Investment Behavior" in the National Bureau of Economic Research publication Conference on Business Cycles. New York, New York: N.B.E.R., 1951. pp. 233-237.

Klein, L.R. "Notes on the Theory of Investment". Kyklos, Vol. 2, 1948. pp. 97-117.

Lanzillotti, R.F. "Pricing Objectives in Large Companies". Chapter 37 in Britt, S.H. and Boyd, H.W., Jr. Marketing Management and Administrative Action, New York, New York: McGraw Hill, 1963.

Leith, M. "Analyst Urges Expansion Now". Pulp and Paper Magazine of Canada, Vol. 74, September 1973. pp. 54-58.

Lesser, C.E.V. Econometric Techniques and Problems. Great Britain: Hafner Press, 2nd ed., 1974.

Macintosh, N.B., Tsurumi, H. and Tsurumi, Y. "Econometric Model of the Firm for Strategic Planning". Draft. Kingston, Ontario: Queens University, March 1971.

Mack, R.P. The Flow of Business Funds and Consumer Purchasing Power. New York: Columbia University Press, 1941.

Manne, A.S. "Some Notes on the Acceleration Principle". Review of Economics and Statistics, Vol. 27, May 1945. pp. 93-99.

Meade, J.E. and Andrews, P.W.S. "Summary of Replies to Questions on the Effects of Interest Rates". Oxford Economic Papers, No. 1, October 1938. pp. 14-31.

Meyer, J. and Glauber, R. Investment Decisions, Economic Forecasting, and Public Policy. Boston: Division of Research, Graduate School of Business Administration, Harvard University, 1964.

Meyer, J.R. and Kuh, E. "Acceleration and Related Theories of Investment, An Empirical Inquiry". Review of Economics and Statistics, Vol. 37, August 1955. pp. 217-230.

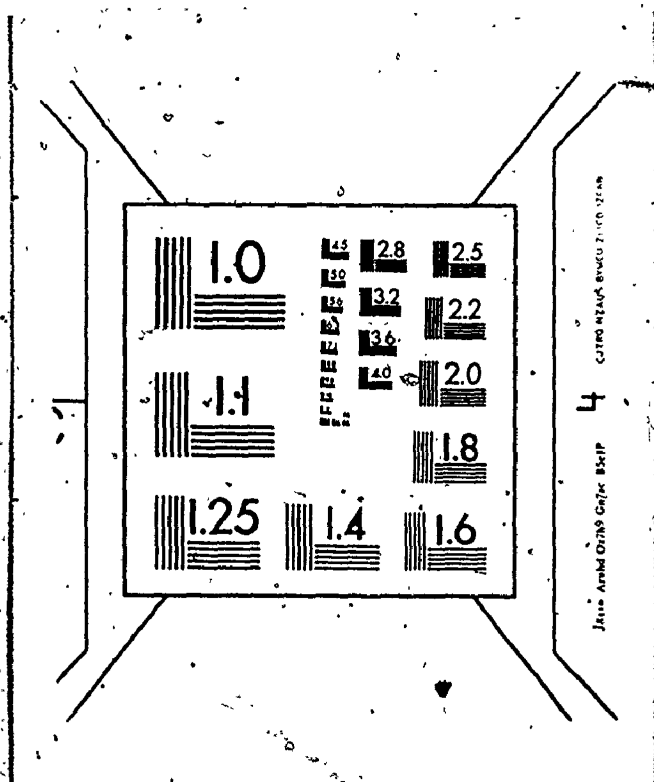
Miller, R.L. "A Short-Term Model of Textile Industries". American Economic Rev., Vol. 61, June 1971. pp. 279-289.

"Newsprint Sought". (Toronto) Globe and Mail, 17 July 1973.

Nobbs, R.A. "A Computerized Organization Model: its Development and the Measurement of its Benefits in a Strategic Planning Situation". Ph.D. dissertation, University of Western Ontario, 1972.

Reinertsen, P. "The Pulp and Paper Industries in Sweden and Canada". Ph.D. dissertation, University of Chicago, 1958.

5 OF/DE 5



Resek, R.W. "Investment by Manufacturing Firms: A Quarterly Time Series Analysis of Industry Data". Review of Economics and Statistics, Vol. 48, August 1966. pp. 322-333.

Rich, S.U. Marketing of Forest Products: Text and Cases. New York, New York: McGraw Hill, 1970.

"Rift Seems Developing in Newsprint Industry over Pricing". (Toronto) Globe and Mail, 25 October 1973, p. B1.

Savage, Murray. Review of Canadian Pulp and Paper Industry. Montreal: Maisons Placements Canada, January, 1972.

Scherer, F.M. Industrial Market Structure and Economic Performance. Chicago: Rand McNally, 1971.

Statistics Canada, Pulp and Paper Mills. Ottawa: Information Canada, various years 1926 through 1971.

Stojkowicz, G. "Market Models for Agricultural Products" in H. Wold (ed.) Econometric Model Building. Amsterdam: North Holland Publishing Co., 1964.

Stigler, G.J. "The Kinky Oligopoly Demand Curve and Rigid Prices". Journal of Political Economy, Vol. 55, October 1947. pp. 432-449.

The Newsprint Situation in the Western Region of North America, A Report by the Stanford Research Institute. Stanford, California: Stanford Research Institute, 1952.

Tinbergen, Jan. "Statistical Evidence on the Acceleration Principle". Economica, Vol. 5, May 1938. pp. 164-176.

Tsurumi, H. "An Econometric Study of Oligopolistic Competition among American Automobile Firms, Together with a Forecast Exercise" in Klein, L.R. (ed.) Essays in Industrial Econometrics, Vol. 1. Philadelphia, Pennsylvania: Economics Research Unit, University of Pennsylvania, 1969.

Ueno, H. and Tsurumi, H. "A Dynamic Supply and Demand Model of the United States Automobile Industry, Together with a Simulation Experiment" in Klein, L.R. (ed.) Essays in Industrial Econometrics, Vol. 1. Philadelphia, Pennsylvania: Economics Research Unit, University of Pennsylvania, 1969.

U.S. Bureau of Census, Historical Statistics of the United States: Colonial Times to 1957. Washington, D.C., 1960.

U.S. Bureau of Census, Statistical Abstracts of the United States. Washington, D.C., various years.

Vernon, J.M., Rives, N.W., Jr. and Naylor, T.H. "An Econometric Model of the Tobacco Industry". Rev. Econ. Stat., Vol. 51, May 1969. pp. 149-158.

Wallace, W.H., Naylor, T.H. and Sasser, W.E. "An Econometric Model of the Textile Industry in the United States". Rev. Econ. Stat., Vol. 50, February 1968. pp. 13-22.

Wilton, D.A. "An Econometric Model of the Canadian Automotive Manufacturing Industry and the 1965 Automotive Agreement". Can. J. Econ., Vol. 5, May 1972. pp. 157-181.

Wold, H. "A Case-Study of Interdependent Versus Causal Chain Systems". Rev. International Stat. Inst., Vol. 26, 1959. pp. 5-25.