VERTICAL INTEGRATION
AND
MONOPOLY REGULATION:
A CASE-STUDY OF THE BELL CANADA - NORTHERN TELECOM COMPLEX

by

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Submitted in Partial Fulfillment
of the
Requirements for the Degree of
MASTER OF ARTS
in the Department
of
Economics

McGill University
Montreal

June 1981

A case-study of the Bell Canada-
Northern Telecom Complex

ABSTRACT

This thesis analyses the effects of the vertically integrated complex Bell Canada - Northern Telecom upon competition in the Canadian telecommunications equipment industry and upon the regulation of the suppliers of telecommunication services in Canada.

After having examined the most representative models of vertical integration under different market structures, the introduction of the theory of regulation into these models follows. Thus the theory of regulation in a vertically integrated environment is examined. A number of very important conclusions are derived, giving policy guidance in the area of vertically integrated and regulated industries.

The relevance and usefulness of the above models is examined by studying the Canadian telecommunications industry which exhibits both elements of regulation and a vertically integrated structure. The telecommunications industry, however, is also undergoing important changes in structure, conduct and performance due to increasing competition as a result of both technological change and regulatory decisions. In particular, the recent CRTC decision (August 5, 1980) to allow the connection of terminal equipment which meets Bell's standards, has rendered largely irrelevant the analysis and the effects of the vertically integrated Bell-Northern complex which are contained in the "Green Book" put together by the Research Branch of the Combines Investigation Act. The CRTC's decision to introduce competition in the increasingly important terminal attachment market reduces the importance of Bell-Northern's vertical integration structure. Any divestiture is likely to produce at best only small gains, and at worst possibly losses of efficiency derived from an integrated structure. Thus, the public interest is better served by the maintenance of that structure. In order to further permit such competition a reduction in the tariff may be indicated.

Finally, a recapitulation and an assessement of the various models and their implications for theory, practice and public policy finishes this thesis.

RÉSUMÉ

Cette thèse présente l'analyse des influences et des conséquences de l'intégration verticale (qu'est Bell Canada et Northern Télécom), sur la compétition dans l'industrie de l'équipement canadien en télécommunications et sur les règlements qui régissent les fournisseurs en services des télécommunications du Canada.

Nous examinerons les modèles les plus représentatifs de l'intégration verticale sous différents marchés, suivit de l'introduction sur la théorie des règlements de ces modèles. De cette façon nous étudierons et approfondirons la théorie des règlements dans un environnement intégré verticalement.

Un nombre important de conclusions en ressort, donnant les directives de la politique à suivre aux industries intégrées et règlementées verticalement. L'importance et l'utilité de ces modèles mentionnés ci-dessus, sont considérées avec attention en étudiant l'industrie canadienne en télécommunications qui présente les éléments de règlementation et d'une structure verticalement intégrée. Cependant, l'industrie en télécommunications subit aussi un changement structural important dû à la croissance de la compétition, et par conséquent, des changements technologiques et règlementaires en résultent. Entre autre, la récente décision du CRTC (le 5 août 1980) qui permet aux abonnés de brancher leurs équipements au erminal (tout en rencontrant les normes de Bell Canada), a rendu l'analyse, hors de propos, ainsi que les effets de l'intégration verticale, dont ceux-ci sont contenus dans le livre intitulé "Green Book" et réunis ensemble par "The Research Branch of Combines Investigation Act."

La décision du CRTC, qui présente l'importante compétition qui accroît sans cesse sur le marché de l'équipement pour terminal, réduit l'importance de la structure verticale et intégrée de Bell Canada et Northern Télécom. Toute dissolution est susceptible de produire, au meilleur, très peu de bénéfices ou très peu d'avantages, et au pire la perte possible d'efficacité ou de rendement, provenant d'une structure intégrée. Donc en

maintenant cette structure l'intérêt du public est et sera mieux servi. De sorte, pour permettre davantage une telle compétition, une réduction des tarifs serait tout indiquée.

Pour terminer, une récapitulation et une évaluation des différents modèles ainsi que leurs portées en théorie, en pratique et politique publique sont étudiés.

ACKNOWLEDGEMENTS

I am deeply indebted to Professor Christopher Green, Director of the Centre for the Study of Regulated Industries and Professor in the Economics Department of McGill University, for his invaluable assistance to me in the writting of the present thesis. He first interested me in the subject, and raised several issues which I have tried to address in these pages. Throughout the study he has made many suggestions and his comments have materially improved the style of the presentation. This thesis was completed through his continuous and helpful guidance, encouragement and support both ethical and financial. I am grateful to him.

I would like to express my gratitude to Professor Robert Cairns, who offered a number of constructive suggestions in the initial stages of my work, read the whole draft several times and contributed substantial improvements with his comments. His assistance was indispensable to finishing this thesis.

I would also like to thank Professor John McPherson for his helpful comments on the theoretical part of the thesis.

I wish to thank Miss Rhonda Greenfeld, research librarian in the Bell Canada's library in Montreal and Miss Cathy Duggan, secretary in the Centre for the Study of Regulated Industries at McGill University for providing me with recent and important materials.

Finally, I am also indebted to Mlle Michelle Larose for providing valuable editional assistance and who many times typed, cheerfully and efficiently, the text of this thesis; the final typing done by Mlle Line Bourget to whom I express my deep thanks.

TO

my beloved mother and

to the memory of my father

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

The aim of this thesis is to examine the effects of the vertically integrated complex Bell Canada - Northern Telecom (Bell-Northern) upon competition in the Canadian Telecommunications equipment industry and upon the supply and regulation of telecommunication services in Canada. A basic issue involves the various incentives firms have to exert some form of control over multiple stages of production. The objective is to assist in explaining the vertical dimensions within which economic units choose to operate, and the economic effects of that choice. It is very important to understand the vertical ties in order to explain the existing economic structure of the telecommunications industry and to formulate desirable public policy.

The history of vertical control as a policy issue is a very long one in both legal and economic fields. Various forms of vertical control such as, vertical integration (V.I.), tying contracts, resale price maintenance etc., all have come under attack by courts and legislatures.

The major applications of vertical integration policy at this time, relate to the petroleum and the telecommunications industries. In the U.S. the Department of Justice has brought an antitrust suit which if successful would separate the telephone operating companies belonging to AT & T from the equipment manufacturing subsidiary Western Elecric (W.E.). Similarly, in Canada the RTPC (Restrictive Trade Practices Commission) is examining the vertical ties of Bell Canada and its manufacturing subsidiary Northern Telecom with an eye to whether such a vertical structure is in the public interest.

Chapter 3 starts with the presentation of the theory of vertical integration.

Then the theory of regulation is extended to a case of a vertically integrated firm. A firm is said to be integrated when its control expands to the production and/or distribution of a number of products each of which could be produced or distributed by firms that restricted themselves to a single activity. It is said to be horizontally integrated if it controls a number of firms producing and/or distributing the same product or group of products. It is said to be vertically integrated when two or more separate stages of production are combined under common ownership. Enterprises devoted to the successive stages or levels of development, manufacture, and sale of a particular product are integrated under a common management. Vertical expansion may be "downstream" or "forward" meaning integration into stages close to the final consumer or "backward" or "upstream" meaning integration into production of inputs previously supplied by independent firms.

Integration either horizontal or vertical or both may be used to reduce, maintain or extend market imperfections and monopoly power. It is usually acknowledged that vertical integration by itself cannot create market power. However, some economists (Commanor, Spengler)[1] have argued that joining two successive stages of production can give a firm extensive leverage over non-integrated rivals which are competitors at one stage of production and suppliers or customers at another.

It has been argued that vertical integration is often a response to either a cost opportunity or to a bargaining situation. Thus, some private economies of integration will be available for those firms integrating forwards or backwards as these terms defined above.

It is usually argued that vertical integration is not the only means through which the economies of vertical control are achieved. Other forms of vertical control are also available which can do as well as vertical integration. For example, it has been argued and recently it has been proven that vertical integration and tying contracts have

identical results[2]. Tying contracts are those in which a seller agrees to sell or lease one product, say a machine (the tying good) to the buyer only if the buyer agrees to buy another product or service, say, raw materials (the tied good), processed by the machine from the seller. In this way the seller of the tying good forecloses the non-integrated competing sellers from the opportunity to sell the tied good to the purchaser.

Other forms of vertical control which can be used either in one or another situation, either as complements or as substitutes to vertical integration are: a) Full-line forcing: the purchaser of the previous example must purchase all the line of products produced by the seller in order to be able to purchase this machine; b) Requirements contracts: a buyer agrees to buy all of his requirements from a particular seller. Here again the seller foreclosures competing sellers from the opportunity to meeting the requirements of these particular purchasers for the whole duration of the contract; c) Exclusive Dealings: a buyer - a retailer or wholesaler - is required to deal only with the products of a particular seller; d) Resale Price maintenance: a maximum or minimum price for resale is setting by the producer or wholesaler of a product. However, each of the above forms of vertical control can be used to achieve only some of the same results obtained by vertical integration[3]. Moreover they are either illegal per se (resale price maintenance) or run afoul of the law if they have the effect of substantially lessening competition (tying and exclusive dealing contracts).

While recognizing the existence of the various forms of vertical control and their importance as a means of achieving some of the effects of vertical integration, this thesis concentrates on the "pure" form of vertical control i.e., vertical integration. This is so because, the insights obtained by examining the "pure" case of vertical integration are valid as well for the other forms of vertical control. Also, in the study of regulated industries the only relevant form of vertical control is vertical integration.

The premises on which the discussion of vertical integration is centered is the

allegation that it is a manifestation of and a response to market failure[4]. The market failure is due to the absence of a perfect intermediate market - a market with perfect information, zero transaction costs and competitive pricing. In the absence of these conditions in reality, the use of vertical control is becoming more attractive relative to reliance on markets. The attractiveness of vertical control vis-à-vis market transactions increases as the benefits of integration outweigh the costs from such an action (integration). The costs stem from any possible diseconomies of integration while the benefits are those which stem from the enlargement or extension of the firm's profit possibility frontier. Various factors affecting the firm's profit possibility frontier such as the enhancement of market power due to elimination or reduction of competition through market foreclosure; the power to practice price discrimination; the ability to increase barriers to entry through relative cost advantages and increased financing requirements to potential entrants; the elimination or reduction of transaction and/or information costs; the ability to exploit possible technological and/or scale economies; the possibility eliminating or avoiding direct (public regulation) and indirect (fiscal policies) government controls.

Although identifying costs and benefits is easy in the theoretical models it is, in practice, an extremely difficult task. Nevertheless, it is argued by some economists that the vertical ties of Bell-Northern group has resulted in a number of advantages for the Canadian telecommunications industry. Such efficiency gains have resulted mainly from the free flow of information (reduction of transaction costs) and the ability of the group to exploit technological or scale economies.

> "The Bell-Northern relationship has created what is virtually a unique situation in Canada - a high technology industry in which Canada is succeeding. It has created what many government studies have indicated is desirable in Canada - a complex which caries out extensive R & D in this country and which is at the forefront of technology in the industry"[5].

It is clear that the Bell-Northern group is the largest private-sector enterprise, in terms of technological spending in Canada: approximately 7% of its sales is spent for R & D programs[6]. This is unsually high even in the U.S. electronics industry and in other countries where industrial R & D is well supported by government-financed programs.

A comparison of the Canadian telecommunications industry with the electronics industry suggests that the latter is failing to realise its potential in both domestic and export markets. The electronics sector is currently experiencing a significant adverse trade balance estimated to be approaching $2 billion at the date of the Clyne Report[7]. The telecommunications industry, however, has maintained a relatively strong, competitive and progressive presence domestically and abroad.

Nevertheless, there are not only benefits arising out of the vertical structure of Bell Canada - Northern Telecom group. Increased barriers to entry, reduction of competition through market foreclosure are at least some of the most important costs which it has been alleged by the Director in his Investigation that have stemmed from the vertical links of Bell-Northern complex. These issues will be discussed at greater length in chapter 4.

In chapter 2, the examination of vertical ties of Bell-Northern group is undertaken. More specifically, the supply and demand conditions of the Canadian telecommunications industry are examined and the effects of the vertical structure upon competition in the Canadian telecommunications equipment industry and upon the regulation and provisions of telecommunication services in Canada are examined. Moreover, a brief exposition of the material presented by the Director of Investigation and Research Combines Investigation Act (hereafter "the Green Book") is presented.

In chapter 3 the theory of vertical integration and regulation is presented in connection with our special case-study of Bell-Northern complex. Equiped with the information in chapter 2 on the prevailing market conditions and structure of the Canadian

telecommunications market, the models resembling as closely as possible these market conditions are analyzed. Indeed, from the theory of vertical integration the successive monopoly model is chosen and presented as the most applicable one to the Bell-Northern group. Nevertheless, even this model has its weaknesses. In particular it is based on the assumptions that the production function is linear homogeneous implying constant returns to scale and that the factor proportions are fixed. However, it is widely accepted that "natural" monopolies, like that studied here - Bell Canada - exhibit increasing returns to scale techology. Therefore, by employing the assumption of the linear homogeneous model does not seem to describe accurately the technology of the industry, the behavior of which we intend to study. An empirical estimate carried out by Dobell et. al. of Bell Canada's technology, utilizing an aggregate production function of Cobb-Douglas form, suggested the presence of only modest increasing returns to scale over Bell's operations as a whole (Dobell, et. al. 1972). Another empirical study, done by Melvyn Fuss and Leonard Wavernman found, using translog production function, that the hypothesis of constant returns to scale represents a close description of the Bell Canada's technology (Melvyn, F. and Wavernman, L., 1978). Thus, the assumption of constant coefficient model utilized for describing the technology of the regulated monopoly, Bell Canada, may not be so unrealistic as might seem to be the case at first glace.

Not withstanding, another weakness of this model is that it fails to explain the behavior of the vertically integrated industries under regulation. Thus, we turn to the theory of regulation in order to gain insight, Unfortunately, the traditional theory of regulation is not helpful either, mainly because it concentrates on single-stage firm, thereby, ignoring the vertical structure of the real world. The model needed is one which will incorporate the theory of regulation in a vertically integrated structure. The longtrip through the literature of vertical integration and regulation winds up with the

presentation of three models which incorporate vertical integration and regulation. These are entitled "partial", "total" and "effective" regulation models and the thesis not only describes them, but evaluates and compares them. In the "partial" regulation model we assume that the downstream firm - the stage supplying telecommunication services (Bell Canada) - is regulated permitting it to earn no more than a fixed percentage of its capital investment or a "fair rate of return" on its rate base. In this model it is assumed that the allowed rate of return is less than the rate of return the firm would obtain if it were allowed to maximize profits, but is greater than the cost of capital. In that case the firm exhibits the A-J effect but not the rate base padding behavior as is explained and illustrated in Chapter 4. In the "total" regulation model both the equipment and the telecommunications service stages are jointly regulated, but the constraint is not binding because the regulated firms can avoid the constraint by inflating their transfer or internal price. Finally, in the "effective" regulation model the regulatory constraint is binding. Both stages are individually regulated. In this case the regulated firms cannot avoid the constraint by inflating their transfer or internal price. Although none of the three models provides an "ideal" tool for analysing the Bell-Northern complex, the conclusions drawn from them give very useful insights. In the last chapter the theoretical model in which Bell is assumed to be effectively constrained by rate-of-return regulation, is presented and contrasted with the model which is implied by the RTPC's "Green Book".

Chapter 4 begins with the exposition of the significant changes which have occurred in telecommunications market structure and technology since the appearance of the "Green Book". Classifying the major types of equipment used to provide telephone services into three major groups as terminal-, switching- and transmission-equipment, it is agreed that the crucial technological changes taking place are occuring primarily

in the terminal equipment area. The existence of competitive substitutes of terminal equipment was extremely limited at the period of appearance of the "Green Book". On the contrary, presently a great deal of new substitutes, including answering machines, telephone automatic dialers, speaker phones, call forwarder, concentrators, multiplexors, teleprinters, telephone sets, electronic key systems and intelligent terminals have made their appearance in the terminal equipment field. It is important to emphasize that this rapid rate of technological change in terminal equipment has increased the potential for entry into the Canadian telecommunications terminal equipment industry and has also reduced the importance of Bell Canada - Northern Telecom link. All these technological changes affect and still more will affect the future role of the Canadian terminal submarket as this is explained in Chapter 4. It is argued that the combination of these important technological changes and liberalizing regulatory decisions such as that taken by CRTC on August 5, 1980, which permitted customers to choose their own supplier of terminal attachments equipment, is likely to substantially reduce the importance of the vertical links between Bell and Northern Telecom. An extensive evaluation of the recent CRTC decision is made with regard to the likely effects which they will have on competition in the Canadian telecommunications equipment industry. One important conclusion is that, the "Green Book" advocacy of increased competition in telecommunications equipment industry has been largely accomplished by the CRTC's decision on terminal attachments, without resort to the vertical disintegration of Bell-Northern Telecom. However, we suggest that this may be only a partial solution to the problem. A more complete change in policy is to include a reduction of the Canadian tariff imposed on the imported telecommunications equipment; however, the thesis does not deal with this issue. Chapter 4 ends with an application of the theory presented in Chapter 3 to the case-study of Bell - Northern Telecom.

In chapter 5, the main conclusions and policy recommendations are stated. Moreover, an interpretation of the solution suggested by the "Green Book" in connection with the models presented in chapter 3 is undertaken. Under different assumptions, the equivalence between the behaviour of the single-stage firm facing a competitive input market and that of the multi-stage firm constrained to earn zero profit at the upstream stage is established.

CHAPTER 2

A. VERTICAL STRUCTURE OF THE CANADIAN TELECOMMUNICATIONS INDUSTRY

2.1 INTRODUCTION

In this chapter the discussion will be on the relationship between regulatory policies and vertical organization and behavior of a specific regulated industry. The focus will be on a single industry - the telecommunications industry of Canada - by analysing the likely effects of vertical integration and regulatory decisions in that industry. More specifically, the discussion will be on the effects of the ownership of Northern Electric (now Northern Telecom) an equipment manufacturer, by Bell Canada, a regulated telecommunication carrier, upon competition in the Canadian telecommunications equipment industry and upon the regulation and provisions of telecommunication services in Canada.

2.2 BELL CANADA - NORTHERN TELECOM COMPLEX

The largest telecommunication operation in Canada is the vertically integrated complex of Bell Canada - Northern Telecom (Bell-Northern group). Bell Canada is the largest supplier of telecommunication services and equipment. Ontario, Quebec, Newfoundland and North West Territories are the provinces provided with telecommunication services and facilities by Bell Canada. In addition, Bell has equity interests in the New Brunswick Telephone Company Limited and in Maritime Telegraph and Telephone Company Limited (M T & T) which provides telecommunication services in New Brunswick and Nova Scotia respectively[8].

Bell Canada is subject to regulation by the Canadian Radio-Television and Telecommunications Commission (CRTC) in respect of its rates and the issuance of its capital stock. Prior to April 1, 1976 such regulatory functions were carried out by the

Canadian Transport Commission (CTC).

. The largest manufacturer of telecommunications equipment in Canada is Northern Telecom Limited, a 50.3% owned subsidiary of Bell Canada[9]. Northern Telecom and its subsidiaries manufacture and market a broad line of telecommunications equipment and electronic office systems for sale throughout the world (United States, Central and South America, Europe, Middle East, Caribbean area, Africa, India and Philippines). Northern Telecom operates 27 manufacturing plants in Canada. In the Unites States, Northern Telecom operates 14 manufacturing facilities, through Northern Telecom Inc. (NTI), a wholly owned subsidiary organized in 1971 to manufacture and market telecommunications equipment in U.S. Its headquarters are in Nashville, Tennessee. Moreover, Northern Telecom has manufacturing facilities in Malaysia, Turkey, Brazil, England and two in Republic of Ireland. It has officies in Hong-Kong, Singapore, Switzerland, France and West Germany[10].

In 1969, the Bell-Northern group established the Bell Northern Research Ltd (BNR) which is owned 30% by Bell and 70% by Northern Telecom in 1979. BNR operates R & D laboratories and undertakes most of Northern Telecom research activities. BNR is the largest industrial research and development organization in Canada. It carries out research, design, development, long range planning and systems engineering in all fields of telecommunications[11].

2.3 THE GTE COMPLEX

The second largest telecommunications operation in Canada is the vertically integrated complex of British Columbia Telephone Company (B.C. Telephone) and its manufacturing affiliates, Automatic Electric and Lenkurt Electric. The B.C. Telephone Co. is the largest operating telephone company of the General Telephone and Electronics group (GTE group) the second largest telecommunication complex in the U.S. Automatic

Electric Ltd and Lenkurt Electric Ltd are also equipment suppliers to the GTE owned operating telephone companies. Approximately 75% of the equipment requirements of the B.C. Telephone complex are provided by its manufacturing affiliates (Automatic and Lenkurt Electrics). These affiliates have a R & D facility at Brockville, Ontario. B.C. Telephone Company and its related subsidiaries provided telephone services to approximately 10% of the total Canadian market in 1965, 12.6% in 1974 and 12% in 1978. B.C. Telephone purchased 8% of its telecommunications equipment from Northern Telecom and 70% form its affiliates. B.C. Telephone announced in February 1979 that it had entered into an agreement with GTE to purchase both Automatic and Lenkurt Electric Canada from GTE in exchange for shares in B.C. Telephone[12]. B.C. Telephone is about 1/4 or 1/5 the size of Bell Canada.

B. THE MARKET FOR TELECOMMUNICATIONS EQUIPMENT IN CANADA

2.4 SUPPLY OF TELECOMMUNICATIONS EQUIPMENT

The domestic and international telecommunications equipment market is served by a number of suppliers. These suppliers are either Canadian-owned manufacturers, or Canadian-based ones but foreign owned or importers. The most important of them are: a) Northern Telecom Ltd; b) Automatic-Lenkurt Electrics Canada Ltd; c) A.E.I. Telecommunications (Can.) Ltd; d) Collins Radio Co. of Canada Ltd; e) I.T.T. Canada Ltd; f) Reliable Communications and Power Products Ltd; g) Canada Wire and Cable Co. Ltd; h) Phillips Cables Ltd; i) R.C.A. Ltd. With the exception of two of these suppliers, the rest of them are not involved in the production of a full line of telecommunications equipment but rather tend to specialize in a very few lines of equipment. For example, the chief interest for A.E.I. Telecommunications (Can.) Ltd is the production of switching equipment, while Collins Radio Co. and R.C.A. Ltd mainly manufacture

point to point radio equipment. I.T.T. specializes in the production of station apparatus. Automatic Electric produces a whole range of telecommunication products and competes with the other major producers. Automatic Electric is the main distributor for the products of both Reliable Communication and Power and Phillips Cables Ltd. However, Automatic Electric doesn't produce any wire and cable. Only Northern Telecom appears to manufacture a full line of telecommunications equipment. Its spectrum of products cover, central office exchanges and switching equipment, that is radio point to point, multiplex, station apparatus, telephone wire and cable, coxial cable, multi-function terminal systems, and other computer-related equipment. Northern Telecom is the manufacturer which dominates both the wire and cable industry and the telecommunications equipment industry in Canada. Its sales revenue amounted to $1,900,522 in 1979. Northern Telecom is the industrial leader in the Canadian telecommunications equipment industry. Its market share is steadily increasing both inside and outside Canada. Its sales for the year 1979 continued to increase thereby maintaining its 1979 sales is those in foreign markets exceeded sales in Canada for the first time. Its sales in Canada accounted for 49.7% of total sales, while sales in the U.S. were 10.6%. These figures for the 1978 year were 59.2%, 32.1% and 8.7% respectively (see table 1 next page). More specifically its sales of telecommunications equipment in Canada were higher but declining as a percentage of the total to 58.5% in 1979, compared with 67.3% in 1978. In the U.S. these telecommunications equipment sales increased to 35.5% of the total compared with 27.5% in 1978. The same sales were higher outside North America, being 6% in 1979 as compared with 5.2% in 1978 (see table 2, next page). Its sales of electronic office systems also increased, in 1979 to $349.8 million or 18.4% of its consolidated sales. Its sales of switching and transmission systems also increased, amounting to $1,505 billion or 79.2% of its revenues in 1979. A wide range of telecommunications products are sold at least in 70 countries. Some examples are: the sale of the contrempra

telephone in Hong-Kong, the sale of crossbar central office telephone switching in Greece, the sale of a DMS-100 to Grand Bahamas Telephone Company, the sale of 9 SL-1_S to Jutland Telephones in Denmark; the sale of 26 SL-10_S to the Deutsche Bundespost etc.[13]

TABLE 2.1

Percentage (%) of Northern Telecom's Total sales in Canada, U.S.A., others

Year	Canada	U.S.A.	Others	Total
1978	59.2	32.1	8.7	100
1979	49.7	39.7	10.6	100

Source: Bell Canada's and Northern Telecom's Annual Reports

TABLE 2.2

Percentage (%) of Northern Telecom's sales of telecommunications equipment in Canada, U.S.A., others

Year	Canada	U.S.A.	Others	Total
1978	67.3	27.5	5.2	100
1979	58.5	35.5	6.0	100

Source: Bell Canada's and Northern Telecom's Annual Reports

Apart from the competition existing inside Canada (as it was described above), competition in the telecommunications equipment market also exists outside Canada as well. European, Japanese and U.S. firms are the major competitors.

There also exists, some German, English, Norwegian and American subsi-

diaries assembling or manufacturing a limited amount of equipment in Canada, thereby increasing competition among the telecommunication manufacturers. However, the fact is that, one single firm, Northern Telecom, is the dominant firm in the manufacture of telecommunications equipment in Canada. The other firms are of minor importance since they don't produce a full range of products as Northern Telecom does and they have not penetrated the market (domestic or international) as has Northern Telecom, with the minor exceptions of Automatic-Lenkurt Electric. Imports are a source of potential competition for the Canadian manufacturers but they have not entered the market to any great extent due may be to the existence of the Canadian tariff.

2.5 DEMAND FOR TELECOMMUNICATIONS EQUIPMENT

The major purchasers of telecommunications equipment are the operating telephone companies, and the subscribers of these companies. Therefore, the market for telecommunications equipment can be divided in two submarkets: a) the customer; and b) the subscriber submarkets. The latter is not so well developed in Canada due to both statutory restrictions and the administrative policies of operating telephone companies towards the attachment of subscriber owned equipment. A detailed analysis of this submarket is undertaken in chapter 4. In this section the discussion is restricted to the analysis of the customer market.

2.5a THE CUSTOMER MARKET

Bell Canada is the dominant firm in the customer market as the evidence below discloses. Bell Canada operates about 9.3 million telephones in Canada, representing about 62% of estimated 15.1 million telephones in Canada. More than 64% of these telephones are in Quebec and Ontario. Bell Canada operates approximately 95% of all telephones in these provinces[14]. Bell Canada also provides specialized telecommunication networks serving pipeline companies and electrical utilities, service and facilities

for private line telephone and signal channel use and a microwave radio relay system for transmission of radio and television. Electronic switching centres are being installed to replace or supplant existing electromechanical systems. In the operation of Bell's territory are 174 electronic switching centres. In addition to traditional private branch exchange (PBX) services, special telephone services are provided including CENTRES, paging services, mobile telephones, conference services and automatic answering equipment. Furthermore, Bell and its major telephone subsidiaries are members of the Trans-Canada Telephone System (TCTS), a working association of nine major Canadian Telephone organizations plus Telesat Canada which operates a coast-to-coast microwave radio relay network more than 40,000 miles, of which over 12,000 miles are located within Bell's service area.

Thus, Bell Canada has a dominant position, in the Canadian telecommunications industry (see table 2.3). Table 2.3 shows various indicators of size for five major Canadian telephone companies in 1978. The largest is Bell Canada. It is not surprising therefore, to find that its major manufacturing subsidiary, Northern Telecom, dominates in the Canadian equipment market. The purchasing policies of Bell discloses the reasoning.

> "Bell Canada buys 96% of its telephone equipment in Canada. However, 90% of it is supplied by Bell's subsidiary, Northern Telecom. Forty percent of the remaining 4% is bought abroad."[15]

The structure of the telecommunications industry has raised important public policy questions particularly with regards to competition and performance in the telecommunications equipment market. The main issue is whether, this industry structure, together with the conduct of the major telephone companies (Bell Canada, B.C. Telephone), relating to such matters as buying procedures, terminal attachments, interconnection etc., has resulted in substantial barriers to competition. The focus of the current controversy is whether Northern Telecom should be divested from its parent Bell

Canada and the likely effects of this divestiture. Over the past 15 years The Combines Division has investigated the vertical ties of Bell and its manufacturing subsidiary Nortern Telecom with an eye to whether or not such a vertical structure is in the public interest[16].

TABLE 2.3

Indicators of size of Five Canadian Telephone Companies, 1978

Size	Bell Canada	British Columbia Telephone Company	Manitoba Telephone System	Alberta Government Telephones	Saskatchewan Telecommunications
Operating revenues ($millions)	2,497.4	576.3	148.2	443.5	164.4
Net telephone plant ($millions)	6,189.	1,641.	432.4	1,958.2	472.2
Employees	53,328.	13,925.	4,788.	10,696.	3,957.
Telephones	8,845,402.	1,683,421.	640,953.	1,017,954.	551,053.

Source: Robert Babe: "Vertical Integration and Productivity: Canadian Telecoms." JEI March 1981.

The RTPC inquiry commenced as a examination of various complaints concerning the type of conduct followed by the Bell-Northern group and more specifically, its restrictive attachment rules, and allegations of price discrimination, market foreclosure though purchasing practices, and unfair competitive advantage associated with a large captive market. The inquiry was also concerned in the dominant position of Northern Telecom in the telecommunications equipment market due mainly to the parent company's expansionary policy. Significant question concerning the competitive functioning of the telecommunications equipment manufacturing industry in Canada have

been raised. The inquiry examined the impact of vertical integration upon the structure, conduct and performance of the telecommunications equipment manufacturing industry and upon the effective regulation of the telephone firms. The documentary evidence presented in the investigation suggests that vertical integration in the telecommunications industry is not in the public interest. According to the Director of Investigation, because Bell Canada purchased almost exclusively all its required equipment from its affiliate Northern Telecom the telecommunications equipment manufacturing industry in Canada remained highly concentrated. Furthermore, the "Green Book" alleged that the complex was directed to the goal of defending its vertical integration structure before the regulatory committee.

According to the "Green Book" market foreclosure was still a characteristic of the telecommunications in 1973-74. Moreover, a CTC inquiry recognized that vertical integration is a great burden upon the regulatory function. Furthermore, the RTPC's inquiry suggested that Northern Telecom's performance had improved as it becomes more independent of Bell Canada. These points led the Director to the conclusion that the competitive environment has been harmed by the vertical integration structure of the telecommunications equipment industry, that this structure caused problems for effective regulation and that a vertical structure impaired Northern Telecom's performance. Also, the evidence presented by the Director suggested that such a structure was not the best one for meeting the further demands of the industry due to the dynamic changes in the entire telecommunications market. These dynamic changes threaten many aspects of the telephone firm's traditional monopoly. The conclusion reached by the Director was that

> "the best policy solution to the issues raised in this statement is the introduction of increased competition in the telecommunications equipment industry. Furthermore, the most effective long term method of achieve this goal is through the divestiture of Northern Telecom from Bell Canada as a means of reducing exist-

ing barriers to entry into the telecommunications equipment industry"[16] (Green Book, p. 184).

However, this is precisely what the recent terminal attachment decision has done. That is, it introduced more competition in the telecommunications equipment industry. On August 5, 1980 the CRTC authorized, on an interim basis, attachment of customer owned terminals to Bell's, switched network. Since then the importance of vertical ties between Bell Canada and Northern Telecom have been reduced. Thus, due to the introduction of both technological change and regulatory decisions in the vertical structure of the Canadian telecommunications equipment industry, the issue of vertical ties between Bell-Northern group with which the RTPC is concerned it no longer seems as important as it was prior to the terminal attachment decision. A further discussion of the important issue is undertaken in chapters 4 and 5. In the meantime we turn to the theory of vertical integration and regulation for further insights.

CHAPTER 3

THE VERTICAL INTEGRATION AND MONOPOLY REGULATION LITERATURE

3.1 INTRODUCTION

The great controversial issue concerning the separation of Bell Canada from Northern Telecom was the subject matter of chapter 2. This chapter outlines the main theories of vertical integration and regulation. The selection and the critical presentation of the most representative models will first be done and their evaluation in connection with our case-study will follow. It is important to see what policy guidance the models can give. It should be noted from the outset that the models are based on very restrictive assumptions which do not reflect really the conditions which we are facing in reality. An important issue is how sensitive the conclusions are to the assumptions of the models presented. In general we find that neither the theory of vertical integration itself nor the theory of regulation is particularly useful in analysing the impact of the regulation of Bell-Northern complex. However, an integration of these two theories seems to be more satisfactory from the point of view of giving some policy guidance to the subject matter analyzed here. We start by first presenting the theory of vertical integration in relation to the other forms of vertical control.

3.2 THE CAUSES AND EFFECTS OF VERTICAL INTEGRATION

Vertical integration is one form of vertical control. It is also the most often used in the real world, mainly because of the advantages vis-à-vis the other forms of vertical control. That is why a fairly extensive literature has been emerged concerning the issue of vertical integration. It is only recently that a growing interest in the other forms of vertical control and especially with tying contracts has also emerged.

The theoretical interest in vertical integration and tying contracts have been

stimulated in recent years mainly in response to a concern about the appropriate public policy towards these phenomena. The transactions cost approach, the development of uncertainty models and the introduction of variable proportions models gives good explanations to the incentives for vertical control and its effects.

In summary, it can be said that the main reasons given to explain why firms show a preference for vertical integration are: 1) reduction of risk (Arrow, Carlton); 2) price discrimination (Perry, Gould); 3) avoidance of regulation and/or price controls (Stigler); 4) elimination of bilateral monopoly or successive monopoly (Machlup and Taber); 5) economies of control and information (Williamson); 6) life-cycle hypothesis for vertical integration (Stigler); 7) the use of monopolized input in variable proportions (Vernon and Grathan, Blair and Kaserman, Warren Boulton);) raising entry barriers; 9) the economic disturbance theory of mergers (Gort); 10) monopoly power and economies of scale pursuit theory of vertical integration; 11) taxation theory of vertical integration; and the synergy theory of vertical integration.

Because the majority of these models focus on the incentives for vertical integration under different market structures it is more convenient to summarize them under four major headings. More specifically, it is possible to classify them as: 1) the incentives for vertical control under competitive conditions; 2) the incentives for vertical control under fixed proportions (market power affects vertical control); 3) the incentives for vertical control with variable proportions; 4) the incentives for vertical control due to government policies (direct policies).

The emphasis given in this chapter will be on the last three headings. Nevertheless, because several models are included under each heading only a selection of the most representative will be presented here. To give the reader an overview of the main theoretical findings with respect to the incentives to vertical integrate a summary of each follows.

Under competitive conditions the incentives for vertical integration may be the result of technological interdependencies in production (Williamson 1971), or internalization of externalities (Coase 1937, Williamson 1971), or from the desire to control crucial resources under uncertainty (Carlton 1976, 1978, 1979-1980, Arrow 1975), from the desire to reduce transaction costs (Coase 1937, Williamson 1971), and improvement of information flows (Williamson 1971, Carlton 1976). In that case the social welfare effects of integration are ambiguous. Although, the aggregate welfare is always lower with vertical integration than without it the introduction of new technology is more likely to occur in a market with vertical integration than in one without it. (Carlton 1979-1980).

Under conditions of monopoly or monopsony the incentives for vertical integration may be emanate from the desire to practice price discrimination (Perry 1977; Gould 1978), from the desire to increase barriers to entry, from the desire to eliminate bilateral monopoly, successive monopoly and monopsony (Machlup and Taber).

The results under these conditions are indeterminate. The final price may be reduced under conditions of imperfect factor markets and competitive product markets. Or if the factor makets are competitive and the product markets are imperfect vertical integration may lead to a higher final price. This is the outcome expected since, in general, the market for final goods are highly imperfect. Thus, under these conditions, an increase in consumer prices and decrease in final output is expected. This also depends on where in the production process market power can be exercised. Usually the market in which demand is highly inelastic are those in which this control is exercised. A classic example is the price of crude oil by OPEC.

The incentive for vertical integration may also be due to various government policies. Integration can reduce the total tax paid, if sales taxes are imposed on each level of output. A vertically integrated firm can also use internal accounting procedures

to shift income from a country or region where it is taxed heavily to another country or region where it is taxed at the lowest rate. Price controls can also be avoided by internalizing pricing decisions. Vertical integration may be encouraged by rate of return regulation. In this way the internalization of costs which determine the firm's rate base is succeeded.

Thus, before drawing any general conclusion about the effects of vertical integration one must first examine the incentives for vertical integration and the structure of the markets. That is, we must examine each case on its merits. There is no a priori case for or against vertical integration.

3.3 MARKET POWER AFFECTS VERTICAL CONTROL

From the presentation of the industry structure it has been concluded that, the Canadian telecommunications equipment industry is dominated by one firm, Northern Telecom, which is vertically integrated with its parent, a regulated natural monopoly firm, Bell Canada. The dominant equipment producing firm, Northern Telecom, supplemented by a competitive fringe, sells its products to various customers, the main one being Bell Canada. The models presented below ignore the existence of a competitive fringe and they also ignore the fact that the major customer of the dominant supply firm, is in our case a regulated monopoly.

Of the many models of vertical integration the one which most closely resembles our case-study is the model of successive monopoly. This model will be presented first, and then it will be compared with the bilateral monopoly case. After investigating the weeknesses of this model, we attempt to improve on it. One way to improve it is to make it more representative of the real world and to relate it to the theory of regulation. Therefore, the introduction into this model of "partial", "total" and "effective" regulation is accomplished. The presentation of various forms of regulation will

give to us more insight and thereby more appropriate policy guidance in interpreting the "Green Book's" argument.

3.4 SUCCESSIVE MONOPOLY AND BILATERAL MONOPOLY

A lot of attempts have been made by economists to analyse the effects of vertical integration upon prices and output in the input and the product markets. It will be shown that under conditions of successive monopoly or bilateral monopoly, vertical integration may both increase total profits and lower the price of the final product. This result of vertical integration is the same as a single downstream monopoly.

It is said that bilateral monopoly exists when a single monopolist seller, a firm producing an input A for example, faces a single monopsonist buyer, a firm producing a final output X. Successive monopoly is said to exist when both the A firm and the X firm are monopolists. Thus product A, produced by Northern Telecom for example, is sold to several firms producing goods X, Y and Z where X is produced by Bell Canada for example and Bell Canada has a monopoly in its market but no monopsony power towards the A firm. Bell Canada and the other purchasers is assumed to treat the price set by the supplier Northern Telecom as a parameter, but each purchaser acts as a monopolist in his own market (myopic chain situation (Scherer 1970)).

Thus, if successive monopoly conditions exists then vertical integration will replace parametric price setting between the two firms. Theory suggest that the result will be an increase in output and joint profits and a decrease the price of the final product.

If we assume that the downstream firm exhibits a fixed proportions production function then the above conclusions can be depicted graphically. It can also be shown that if the downstream firm faces competition in input and product markets, using inputs in fixed proportions and if vertical integration does not result in the effects as

that of internalization of externalities, informational economies or tax avoidance then downstream vertical integration with unrestricted monopoly power will have no effect on either the prices and quantities on the inputs, or the price and quantity of the final product or the level of monopoly profits. Thus, it will be argued that if such an integration occurs it increases welfare since it will result in cost reduction due to improved control, information flows and the like. However, it will also be shown that such results are strickly dependent on the fixed proportions production function and on the exclusion from the models of any uncertainty.

3.5 MONOPOLIZED OUTPUT AND COMPETITIVE INPUT

Consider two industries X, and A and a market supplying labor input B. It is assumed that A industry supply its input A (capital goods) to industry X which supplies the good or service X to consumers under conditions of monopoly. The labor input B is supplied under competitive conditions. It is further assumed that one unit of capital A and one unit of labor B is needed to produce one unit of the output X. This assumption is very important for simplifying our diagramatic exposition (Scherer 1970, p. 243-244). For simplicity, assume that the transformation of A and B into X is costless so that firm X's cost is equal to the sum of the prices p^A and p^B charged by the competitive firms A and B respectively. Since A and B supply their outputs under competitive conditions the prices p^A and p^B charged by them to the X industry will be $p^A=c^A$, $p^B=c^B$ where c^A, c^B are constant marginal costs to A and B firms respectively (including a normal profit). It is also assumed that A and B can be provided to X under conditions of constant long-run unit costs. Therefore, the marginal and average unit cost functions of supplier firms A and B are the horizontal lines $AC^A=MC^A=C^A$ and $AC^B=MC^B=C^B$ respectively as they are shown in figure 1.a. The X monopolist will be in equilibrium where $MR^X=MC^X=MC^A+MC^B$. Thus the monopolist X will maximize his profits at point b of

the diagram 1.a using OA and OB units of the competitively produced inputs to produce OX units of the end-product and charging a price p^X for the latter and making monopolistic profits Π^{max}.

Figure 1

Monopolized output and competitive input

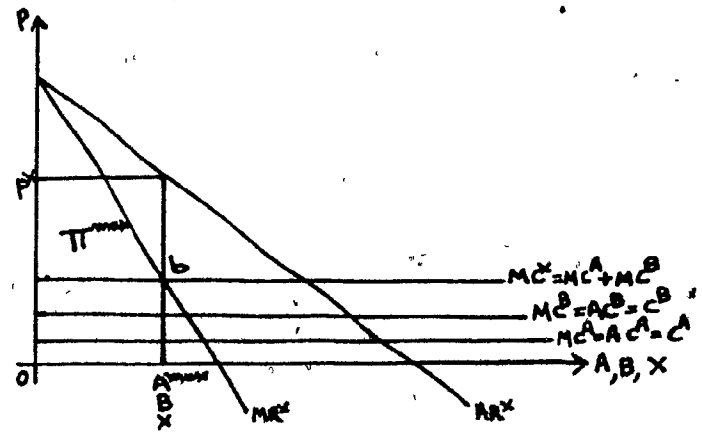


Fig. 1.a

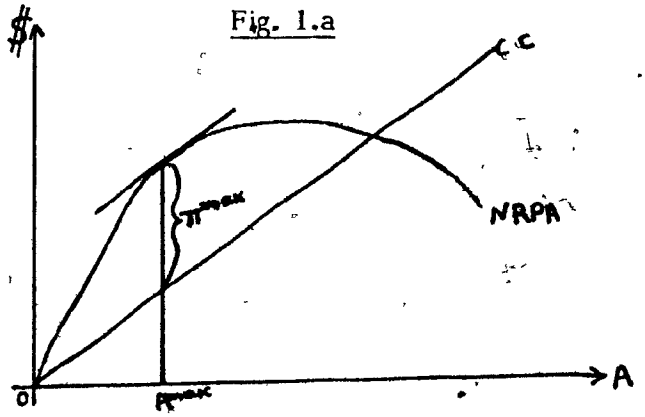


Fig. 1.b

In this chapter and the ones that follow, one of our concerns will be the

response of the X firm to changes in the costs of acquiring the capital input (A) as well as to the imposition of external constraints on the firm as expressed through that same input. It is therefore convenient to simplify the goemetric exposition and illustrate the operation of our models in the $-A plane, i.e., of a plane in which dollars per year are depicted on the vertical axis while capital A in physical units is depicted on the horizontal axis. Namely, it is a diagram expressed in terms of the capital input A alone, innovated and utilized by Westfield in 1965. (From now on it is called the "Westfield diagram")[17].

Before demonstrating the relationship of the results obtained in the diagram 1.a with that of 1.b, it is useful to say some more words on the latter. The curve depicted in the "Westfield diagram" as NRPA is the net revenue product of capital input A obtained by adjusting optimally for each value of capital input A the quantity of labor B so as to satisfy the condition that the marginal revenue product of labor input B is equal to the unit cost of that input[18]. The curve labelled CC is the cost of capital input A curve. The vertical distance between the NRPA and CC gives the maximum unconstrained profit the firm could earn. That is, the point where these two curves have the same slope gives the maximum profit. This point also shows the profit maximizing quantity of the capital input A which is purchased by firm X[19]. Thus, in our model, as figure 1.b depicts, the quantity of the capital input A which the firm X purchases in order to maximize its profits is A^{max}, while its profits are given by the vertical distance between NRPA-CC and they are Π^{max}, the same as in the figure 1.a[19].

3.6 SUCCESSIVE MONOPOLY

Successive monopoly exists when A and X firms in the above example are both monopolists. Thus, the X monopolist buys its input requirements from the A monopolist. An example would be the case in which a manufacturing monopolist A of tele-

communications equipment, Northern Telecom for example, sells to a local "natural" monopolistic retailer of telecommunications services, Bell Canada for example. Indeed in figure 2.a the consumer demand curve which faces the retail monopolist, Bell Canada, is

Figure 2

Successive monopoly

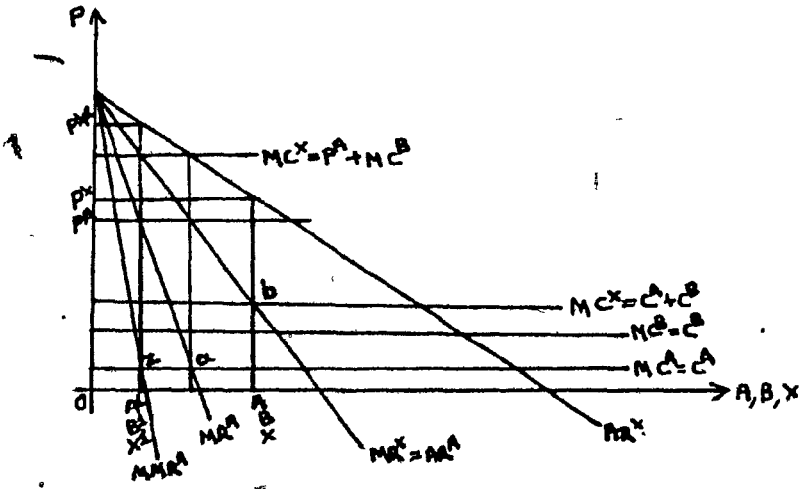


Fig. 2.a

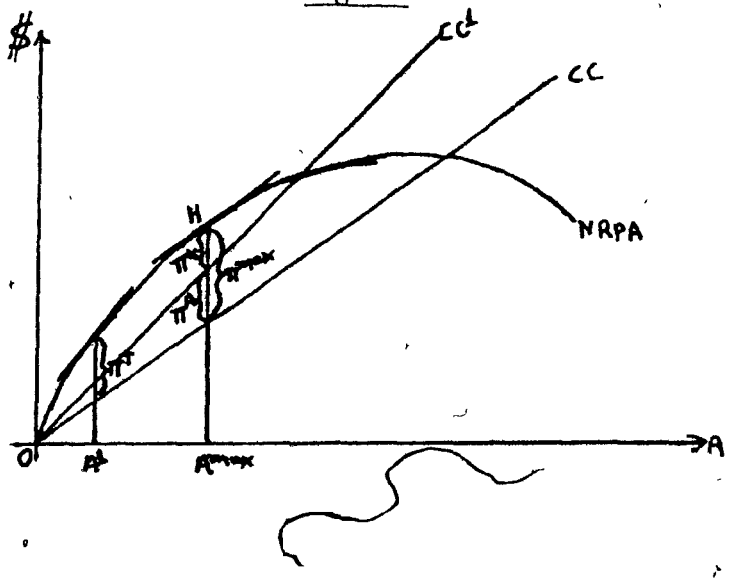


Fig. 2.b

AR^X and its corresponding marginal revenue curve is MR^X. The latter is also the demand curve of the retailer X (Bell Canada) for the product of the manufacturer A (Northern Telecom), assuming that X has no monopolistic buying power. Point a is the point where $MR^A=MC^A$, therefore, the firm A will be in equilibrium at that point charging a price p^A for the capital equipment A. Firm X in turn will equate MR^X to p^A+MC^B, since MC^X is now equal to p^A+MC^B, and charge a price p^{X1} to final consumer. The production of A, B, X falls to OA^1, OB^1, OX^1 respectively.

The A monopolist will still set a price of p^A. His effective demand curve[20] is now his old marginal-revenue curve MR^A and the intersection of this new marginal revenue curve MMR^A with MC^A at point Z will result in sales OA^1 at price $p^{A\,21}$. Thus, the result in a myopic chain monopoly situation (it is myopic because it is assumed that the X monopolist takes price p^A as a parameter (see Scherer 1970, p. 243) is a higher price and a lower output and hence lower input usage OA^1 compared to the previous case because of the repeated "marginalization" of the revenue curves of successive monopolists in determining their profit maximizing. (Machlup and Taber 1960)[22].

These results can be depicted in the "Westfield diagram" too. Since now the X monopolist accepts p^A as a parameter and since p^A is greater than MC^A the cost of capital (CC) curve of the diagram 2.b will shift to the left taking the CC^1 position, thereby, reducing the total profits from Π^{max} to Π^T. Also, the profit maximizing quantity of the input A purchased by firm X from the firm A in the absence of any constraint is given by OA^1.

3.7 VERTICAL INTEGRATION

It is now assumed that the A and X monopolies are joined under common ownership. That is, firm X (Bell Canada) integrates backwards into A (Northern Telecom). The resulting firm will be in equilibrium at point b equating

$MR^X=MC^X=MC^A+MC^B$ (see diagram 2.a). The final product price will be p^X and the output levels will be OA, OB, OX. The result is the same (the same output and price levels) one we obtained when X was a monopolist while A and B competitive.

It is easy to show these results in the "Westfield diagram" too. Looking back at the lower part of diagram 2.b we see that the vertically integrated firms will be at equilibrium at point H giving profits of the Π^{max} magnitude which are greater than Π^T (Π^{max} Π^T) and the output will be greater than before, A^{max} is greater than A^1 (A^{max} A^1). The transfer price p^A is immaterial to the optimization problem. It is simply used as an accounting device to allocate the joint profits between the two stages.

It is therefore the conclusion of this section that vertical integration is an improvement over successive monopoly since it results in a lower price and higher output for the final product as compared to the output and price of successive monopoly.

3.8 BILATERAL MONOPOLY

Bilateral monopoly exists when a single monopolist seller, a firm producing good A, telecommunications equipment for example, faces a single monopsonist buyer, a firm producing a good X, telecommunications services, for example. In this bilateral monopoly situation the result will depend on the relative bargaining power of these two firms. If the X and A firms cooperate perfectly then, their bilateral monopoly profits will be Π^{max} by equating $MR^X=MC^X$, and the price of the final output will be p^X. However, the unit price p^A of the intermediate good A will be indeterminate within the range p^X-MC^X (see diagram 2.a). The monopolist firm A prefers the high price $p^A=p^X$ and the monopsonist firm X prefers the low price $p^A=C^A$. Because they recognise that their profitability depends on their cooperation both A and X jointly restrict the output to $A^{max}=X^{max}$ (Scherer 1970, p. 243-245). Firms X and A jointly restrict output to A^{max} because they recognize that any higher output will be absorbed in the end product

market at reduced prices, and after the price reduction is taken into account, marginal revenue product would be less than the cost of producing the marginal unit. The price p_A only serves to divide the total profits Π^{max} between the two cooperating firms.

If the A and X do not cooperate perfectly and the X firm has monopsony power which can be used as "countervailing power"[23] against the monopoly position of the A firm, then the X firm can unilaterally set the transfer price and if it can convice the A monopolist to accept it as a parameter, then the output levels and joint profits will be the same as if the A monopolist were a competitive firm.

If the A and X integrate vertically then the situation is unambiguously an improvement over bilateral monopoly or successive monopoly as was mentioned above[24].

Thus, it has been shown that, within a static partial equilibrium framework, vertical integration between monopolistic end-product stage and an input producer exhibiting some market power is an unambiguous improvement over the multistage relationships and is equivalent to that of a single-stage monopoly buying its inputs competitively.

It should be noted however, that the above results depends on the assumption of fixed proportions technology. Another important conclusion resulting from the fixed proportions production function assumption is that a monopolist firm does not have any incentive to integrate vertically forwards into a competitive industry since neither the level of monopoly profits nor the price of the final good will change. In this case society should not oppose vertical integration since it is due to cost reductions resulting from improved control, and information flows. In such a case integration unambiguously increases welfare. This argument has been used for the defence of vertical integration. But, this important conclusion depends on the fixed proportions production function assumption and on the simplistic manner in which the model is presented[25]. If instead of fixed proportions the variable proportions assumption is adopted, the above results no longer hold. In that case the incentive of the monopolist to integrate vertically into the

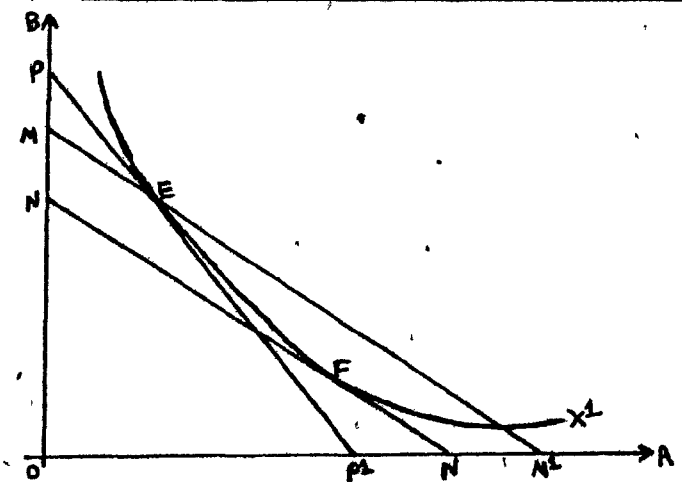
competitive industry exists and it is strong. This is the next step to which we now turn.

3.9 VERTICAL CONTROL WITH VARIABLE PROPORTIONS

Vernon and Graham in their 1971 article[21] showed graphically the incentives for a monopolist to integrate into a competitive industry whose production function is of variable proportions. They assume that there is an input monopolist and two competitive firms; one producing an input B used in the production of X, and the other producing X employing variable proportions production function. If the monopolist charges a supra-competitive price for the input A to X industry, the X industry can reduce the demand for A and increase its demand for B since its production function is of variable proportions. Graphically the slope of PP^1 curve gives the ratio of the monopoly price of A to

Figure 3

Vertical integration with variable proportions



the price of B. The MM^1 curve gives the ratio of marginal cost of A to the price of B and since the NN^1 is parallel to the MM^1 curve it gives the same ratio. The distance PM on

the vertical axis is the monopolist preintegrated profit measured in units of B. When vertical integration takes place the point E is moving to point F and profits are increased by MN. If we had fixed proportions production function this increament would not exists.

Thus, under the assumption of variable proportions production function a monopolist has a strong incentive to integrate forwards into a competitive industry for the mere fact to increase its monopoly profits.

Warren-Boulton[27] in his 1974 article examines the welfare effects of vertical control under the assumption of constant elasticity of substitution (CES) production function for the downstream producer and constant elasticity of demand for the final product. The monopolist input can be used in variable proportions with other inputs. The conclusion that he derives is that the welfare effects are not determined a priori. They depend on the particular paremeter values. Hence, the expected combined welfare effects of vertical control on monopoly profit receivers, consumers of the final products, and on producers of the competitive inputs may be positive or negative. But if we know the values of the parameters it is possible to determine the welfare effects. Thus, if the elasticity of substitution is just above zero or greater than one and if the cost of producing an input is constant then the combined welfare effect will always be positive, while it becomes negative at some range of elasticity of substitution less than one. He ends up saying that "in general the less elastic the demand for the final product and the less important the monopolized input, the greater the magnitude of the welfare effect and the wider the range for elasticity of substitution over which the combined welfare effect is positive". (Warren-Boulton 1974).

3.10 SUMMARY - CONCLUSIONS

In an attempt to shed more light on the complicated and long disputed issue of the effects of the vertical ties between Bell Canada and Northern Telecom the most

representative models attempting to explain the phenomenon of vertical integration have been reviewed, integrated and extended. It has been mentioned that these models are too restrictive due mainly either to the special assumption of fixed proportions production function or to their inability to explain the behaviour of the vertically and regulated firms. Even if we relax the first assumption, it is not possible to get definite results on an a priori basis. They are, therefore, unable to give policy guidance to the complex problem which we are facing here. The need for an alternative theory is obvious. But this will be done in the next section.

Nevertheless, despite the naivete of the models some of their results are worth mentioning. It was argued that the unconstrained profit maximizing firms have a motive to reduce their costs to their minimum level. This possibility of cost reductions is a sufficient condition to induce a firm to exercice some control over earlier stages of production. Thus vertical integration may lead to cost economies which originate either from the domination of market power costs (monopolistic profits) included in the price of inputs formerly paid to firms in the earlier stages, or from the elimination or reduction of certain costs of using the market, i.e., information and transaction costs, thereby reducing the cost of performing the successive stages when these are combined under one management. Information and/or transaction costs may fall on one or both of two separate firms performing vertically related activities. As an example of information costs, a firm at an earlier stage of production may undertake sales promotion activities directed at a later stage, or the technology interfacing the two stages may be so complex as to require continued and open exchange of information, the latter being particularly relevant to high technology industries such as electronics or telecommunications.

The free flow of information as if it was the main factor contributing to the success of Bell-Northern group was recently highlighted by Bell's executive vice-president Roy Inns. He argues that

> "the wide knowledge base and the free flow of information within the vertically integrated entities (Bell, Northern Telecom, and BNR) were extremely important, especially when "massaging" a new technology or when a long period of development is required. The coordinated R & D program, Bell's influence over the technology design process, forecasting advantages, operating efficiencies, assurance of supply, total project management control, quality assurance, technical support and documentation, and repair services are the advantages that had contributed to Bell's ability to develop its telecommunications network in an effective and economic manner. These resulted in a good service at a low costs"[28].

Thus, according to Bell's executive, the wide knowledge and the free information flow of Bell-Northern coming from their tight vertical ties have contributed to a good service system at a low cost. These are the "efficiency gains" resulting from the vertically integrated complex. If these really are benefits derived from the vertical structure of the complex then any decision for divestiture will bring about considerable efficiency losses. However, this is only one side of the coin. The other side alleges that the vertical structure is mainly used as a means of exercising price discrimination, and as a means to foreclose competitors, thereby protecting its affiliate Northern Telecom and giving to it an unfair competitive advantage. If these really are detrimental effects derived from the vertical structure of the complex then any decision to divest them will bring about considerable efficiency gains. However, not only advantages or only disadvantages emanate from the vertical structure. Usually a combination of the two is the outcome in the real world. The extensive literature on vertical integration give to us an important lesson. That is, before drawing any general conclusion about the effects of vertical integration one must first examine the incentives for vertical integration and the structure of the markets. In other words, it is necessary to examine each case on its merits. There is no a priori case for or against vertical integration. Nevetheless, the problem is not so simple. The analysis of vertical integration is extremely complicated in a regulatory context. Because our case-study is a vertically integrated industry under regulatory constraint, it

is necessary to examine the relevance and usefulness of the results obtained so far, through an illustrative application of the above models to an industry exhibiting both elements of regulation and a vertically integrated structure. We might gain better insight and the results that will be obtained might shed more light on the confused issue at hand.

3.11 RATE OF RETURN REGULATION

Vertical integration may be due to regulation. Vertical integration is a device used by regulated firms for shifting income to a level where the regulatory constrainst are not stringent or nonexistent. Rate of return regulation encourages vertical integration in order to internalize the costs which determines the firm's rate base. One model has been developed by Dayan[29] incorporating vertical integration with rate of return regulation. This, as well as the regulatory problems created by vertical integration, and especially these in telecommunications, is the subject of the next chapters.

The regulated natural monopolies[30] may use the vertical integration structure as a device for shifting income to a stage where it is not regulated or the regulatory constraints are not severe. The analysis of vertical integration in a regulated context seems to be complicated by what has become known as the Averch-Johnson (A-J) effect[31]. Briefly, the A-J proposition is that regulation causes inefficient substitution of capital for other productive factors. That is, excessively capital-intensive production will be the outcome, if some maximum rate of return of a firm's capital greater than the cost of capital is imposed. Thus, the profit maximizing capital-labor ratio will be distorted towards excessive use of the capital factor. Moreover, in general, the closer is the allowed rate of return to the cost of capital, the greater the factor-ratio distortion. (Baumol and Klevorick 1972). If vertical integration is used as a means of reducing the tightness of regulation, then increase in efficiency of production might be expected.

Thus, the analysis of vertical integration under regulatory constraint raises issues both of efficiency and of avoidance. Dayan has developed a model incorporating vertical integration with rate of return regulation (RRR)[32]. Since the aim of this section is to explore briefly the conditions under which regulation may lead to vertical integration, we will focus attention on Dayan's models.

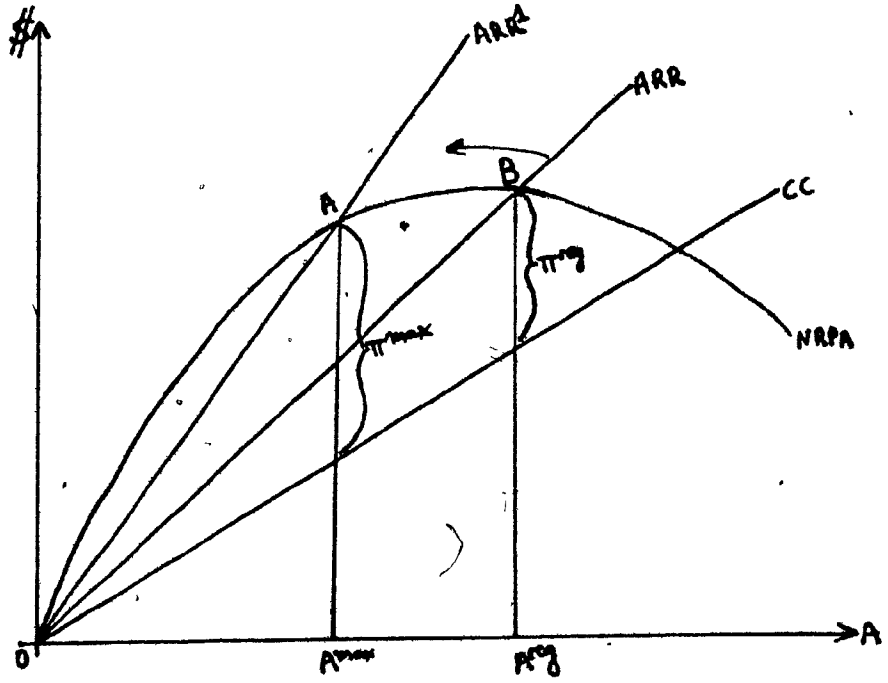
3.12 PARTIAL REGULATION[33]

Previously, it was shown that where successive monopoly conditions exist, an incentive for vertical integration is present. More specifically, it was shown that the end-product firm has an incentive to integrate backwards. The vertically integrated firm follows an efficient expansion path along which equilibrium implies equating marginal factor cost with marginal revenue product and producing monopolistic output and employing the maximum capital factor input A^{max} (see diagram 2.b). In these vertically integrated firms the transfer price p^A is simply used as an accounting device to allocate joint profits between the two stages. If now in the above model we limit rate of return regulation (RRR) to end-product stage X only then can the firm avoid regulation completely. This will be so, since the transfer price p^A remains unregulated and it is under the exclusive discretion of the management of the vertically integrated firm. By raising the transfer price p^A sufficiently and thus inflating the end-product firm's rate base, the integrated firm succeeds in raising the constraint, so that it achieves the unconstrained maximum profit Π^{max} by using capital input A^{max}. In the diagram 4.a the cost of capital curve is labelled as CC while the allowed rate of return curve is labelled as ARR. The regulator imposing his constraint restricts the regulated firm to operate at point B. At that point the at the end-product regulated firm X's profits are of the Π^{reg} magnitude while the utilization of the capital input A increases to the magnitude of OA^{reg}. Thus, the regulated firm's profits are lower than that achieved without constraint

(Π^{reg} Π^{max}) while its capital input utilization is greater than that would be utilized in the absence of any constraint ($A^{reg} > A^{max}$). However, the integrated firm X can avoid the regulatory constraint by wise manipulation of the transfer price p^A. In other words the vertically integrated and at the end-product regulated firm producing the good or service X can raise artificially the transfer price p^A thereby inflating its rate base and thus increasing the constraint. In this way the unconstrained maximum profit Π^{max} and the utilization of the capital input A^{max} is achieved. This can be shown diagrammatically. In the figure 4.a below the ARR^1 curve represents the allowed rate of return

Figure 4

Partial regulation



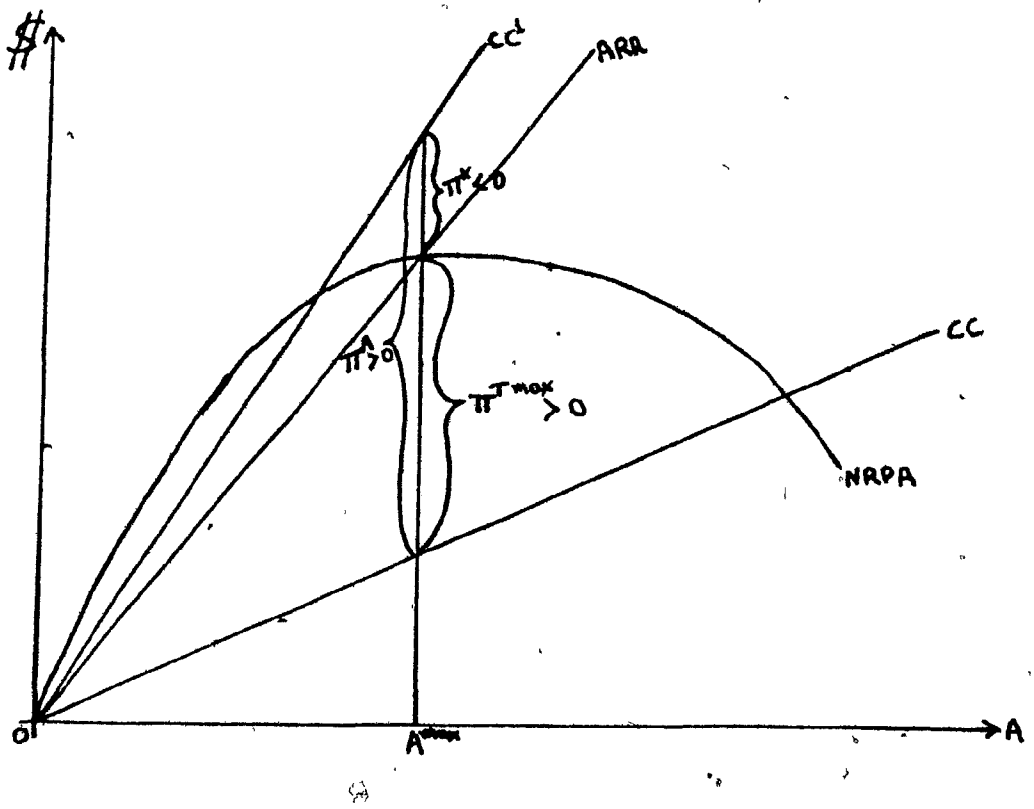
curve when the transfer price p^A has been inflated (increased artificially). Thus by increasing artificially the transfer price p^A the end-product firm achieves its

unconstrained profits Π^{max}.

It is assumed that the end-product firm X has accessibility to its input requirements which it can buy in unlimited quantities at fixed price per unit. It is assumed that the X firm pays a fixed wage rate W for labor input and a fixed price per unit C^A for the capital input A which is acquired at the beginning of the production period and paid out over its life time at a rate rC^A, where r is the annual rate of interest (the financial cost of capital). When the X firm is integrated and regulated at its end-product

Figure 5

Partial regulation when $S^X < r$



only then the price per unit C^A for the capital input A is not fixed but varies according

to the will of the integrated complex since the per unit cost of the capital input C^A is becoming now p^A, the transfer price of the complex. When we symbolise the allowed rate of return at the end-product firm by S^X then an interesting case exists when the allowed rate of return S^X is less than the financial cost of capital r (i.e. $S^X < r$). When the difference of net revenue product of capital and the total cost of capital is greater than zero but the allowed rate of return for the end-product firm X is less than the financial cost of capital ($S^X < r$) then the end-product firm is incurring a loss $\Pi^X < 0$ (see the diagram 5) but the profits from producing the capital input A are positive $\Pi^A > 0$, leading to positive total profits of the integrated firm. The diagram shows that, although division X exhibits a loss $\Pi^X < 0$ due to the fact that the allowed rate of return permitted by the regulator is less than the cost of capital (ARR < CC!), this loss is more than made up by the affiliate A's profit $\Pi^A > 0$ (i.e. $\Pi^A - \Pi^X = \Pi^{T\max} > 0$). Thus, the net result is, in fact, the achievement of the unconstrained joint profit maximizing level. $\Pi^{T\max}$. Therefore, the maximization of joint unconstrained profits can be achieved even if the end-product firm is operated at a loss, since the vertically integrated firm is subject to rate of return regulation solely on its end-product.

3.13 INCENTIVE TO "GOLD PLATE" OR TO "RATE PAD"[34] UNDER THE PARTIAL REGULATION REGIME

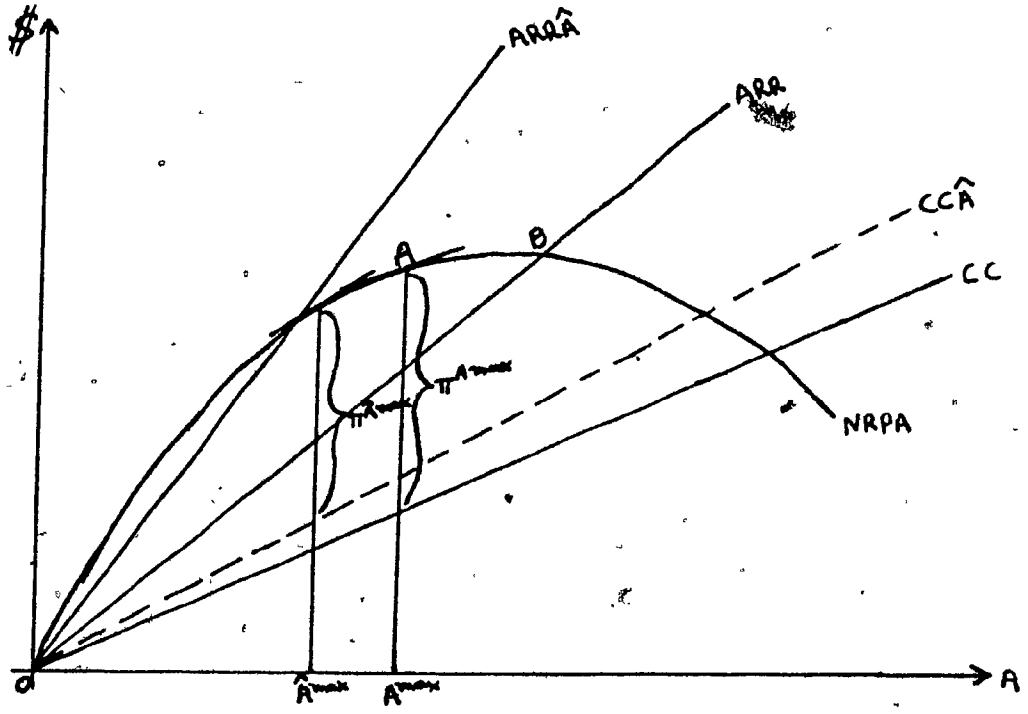
The behavior of the single-stage firm subject to a rate of return constraint towards "gold plating" has been examined extensively in the literature on regulation[35]. It has been shown that the single stage firm always prefers overcapitalization to the acquisition of nonproductive capital i.e., of physical padding of the rate base.

The attitude of the firm towards "gold plating" in the context of the model of vertical integration is examined here. If we symbolise the acquisition of redundant capital by $\hat{A}$ then in the diagram the $CC\hat{A}$ curve is the cost of capital curve when redundant

capital $\hat{A}$ has been acquired. The ARR$\hat{A}$ is the allowed rate of return curve when redundant capital $\hat{A}$ has been acquired. The regulator restricts the X firm at point B. Since the constraint is not effective as it was shown before the regulated firm will increase the

Figure 6

Partial regulation and "gold plate"



transfer price p^A in order to achieve the unconstrained maximum profits $\Pi^{A\max}$. If we suppose now that the X firm has acquired redundant capital $\hat{A}$ then its cost curve is now the CC$\hat{A}$ while its allowed rate of return curve is now the one symbolized as ARR$\hat{A}$. But such an acquisition of the redundant capital $\hat{A}$ will reduce the end-product firm's profits from $\Pi^{A\max}$ to $\Pi^{\hat{A}\max}$ where $\Pi^{\hat{A}\max} < \Pi^{A\max}$. Since this acquisition reduces the firm's

maximum profits it follows that the vertically integrated firm will never acquire redundant capital Â. Instead of this, it will always prefer the rise of the transfer price to any padding of the rate base. This is so, because the transfer price manipulation increases the value of the rate base without increasing real costs while "gold plating" increases these costs.

Thus, in this section it is demonstrated that if rate of return regulation is limited to the end-product only, the profit maximizing firm will have an incentive to integrate backwards because by doing so, it can circumvent regulation and achieve the unconstrained profit maximization level even if the regulated stage is operated at a loss. Moreover, the firm uses the efficient capital-labour ratio mix and is never engaged in wasteful behavior. Therefore, by restricting regulation to the final stage only the regulatory constraint remains ineffective and the firm's efficiency is achieved.

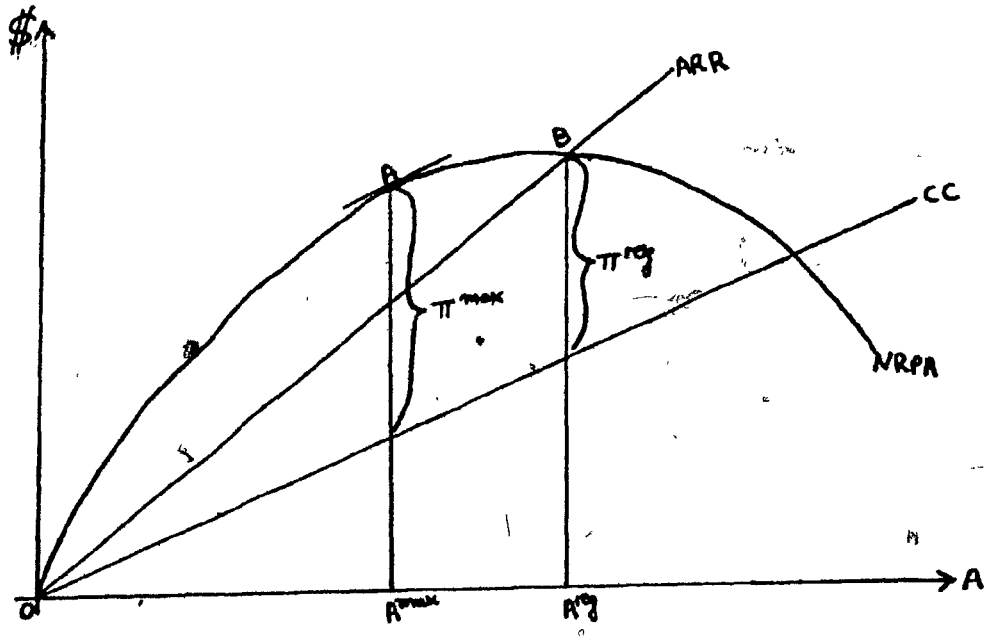
3.14 TOTAL REGULATION[36]

It is still assumed that the objective of the multistage (successive monopoly) firm is to maximize total profits (profits originating from all stages of production, subject to a single constraint). More interestingly, even in the event that regulation is extended to include all stages of production under a single rate of return constraint the choice of inputs by the regulated firm will still be inefficient. This can be seem diagrammatically. Figure 7 illustrates the operation of the model in terms of the capital input A. If there is no regulatory constraint the profit maximizing quantity of capital produced by division A and supplied to division X is A^{max}. The vertical distance between the net revenue product of capital (NRPA) and the cost of capital (CC) rays gives the maximum unconstrained profit Π^{max} achieved by the firm as a whole. At point A the two curves have the same slope. Point B is the point of intersection of NRPA and that of the allowed rate of returns ARR rays. At this point the regulated firm is in equilibrium when

a regulatory constraint is imposed. From the diagram it is clear that the reaction of the firm to the regulatory constraint is consistent with that of A-J effect, i.e., the variable capital input A is increased from A^{max} to A^{reg} until the allowed rate of return is equal to the net revenue product of the capital input. However, as we will see in a moment as long as the regulated firm is free to manipulate its transfer price p^A the unconstrained maximum profits Π^{max} can be achieved.

Figure 7

Total regulation



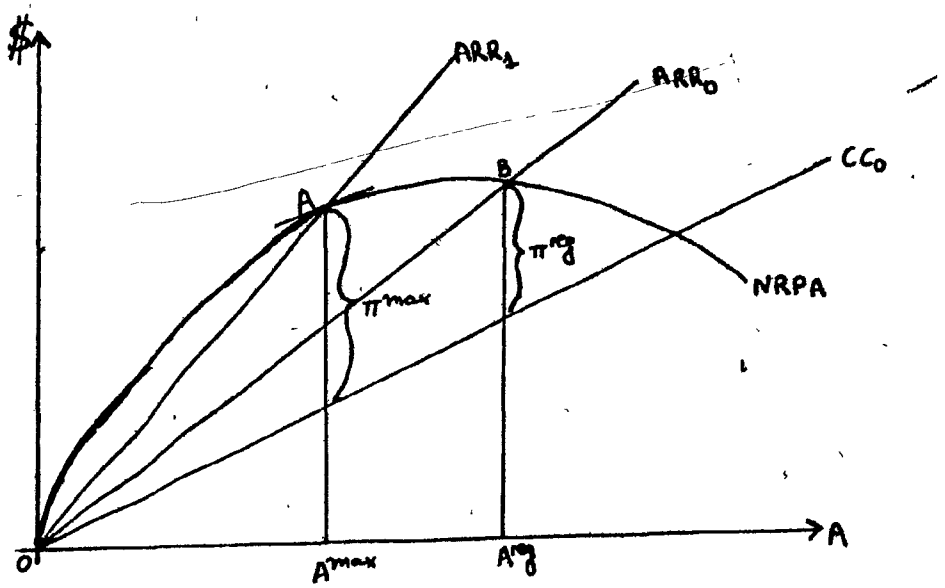
3.15 INCENTIVE TO INTEGRATE UNDER TOTAL REGULATION CONSTRAINT

The incentive to integrate always exists as long as the internal or transfer price p^A is greater than the cost of capital. The relaxation of the constraint will be achieved and the firm's profit maximizing objectives will be accomplished as long as the

management is free to manipulate the transfer price p^A and especially to increase it sufficiently among the two production stages. The relaxation of the constraint by increasing the transfer price can be seen diagrammatically. The curve labelled CCo is the cost of capital curve and the ARRo is the allowed rate of return curve when the transfer price is at $p^A o$. The ARR_1 is the allowed rate of return curve when the internal or transfer price is at $p^A{}_1$ where $p^A{}_1 > p^A o$. Therefore, when the regulated firm increases its transfer price at the $p^A{}_1$ level then the allowed rate of return constraint (ARR_1) is passing through point A, the point of unconstrained profit maximization. Thus, the firm can negate the constraint simply by increasing the transfer price p^A and setting it greater that the cost of capital thereby achieving the Π^{max} unconstrained profits. In this way the firm adds to its rate base more than it incurs in costs.

Figure 8

Incentive to integrate under total regulation



If the firm sets the transfer price equal to the cost of capital as a result of self-control or as a result of limit pricing strategy designed to maintain barriers to entry in the input market the incentive to integrate still remains strong. This is illustrated by Dayan's argument that

> "under total regulation the firm will always find it profitable to integrate backwards even if, before its acquisition, the independent upstream supplier were selling the intermediate product at its marginal cost".[37]

The downstream firm X will find it profitable to acquire its supplier A even if the latter is operating at a loss. This is so because by integrating the firm will be able to increase its rate base by a positive amount without increasing the real cost of producing final output X.

Thus, the firm even though totally regulated can avoid the constraint by organizing its internal production operation in such a way to exercise its monopoly power completely by inflating its rate base through the simple device of transfer price manipulation. Indeed, any firm that can arrange such an internal transfer of capital input can effectively avoid regulation and achieve its unconstraint profit maximizing objective.

3.16 REGULATION OF THE FIRM'S INTERNAL OF TRANSFER PRICE: EFFECTIVE REGULATION[38]

Effective regulation of a vertically integrated firm requires that

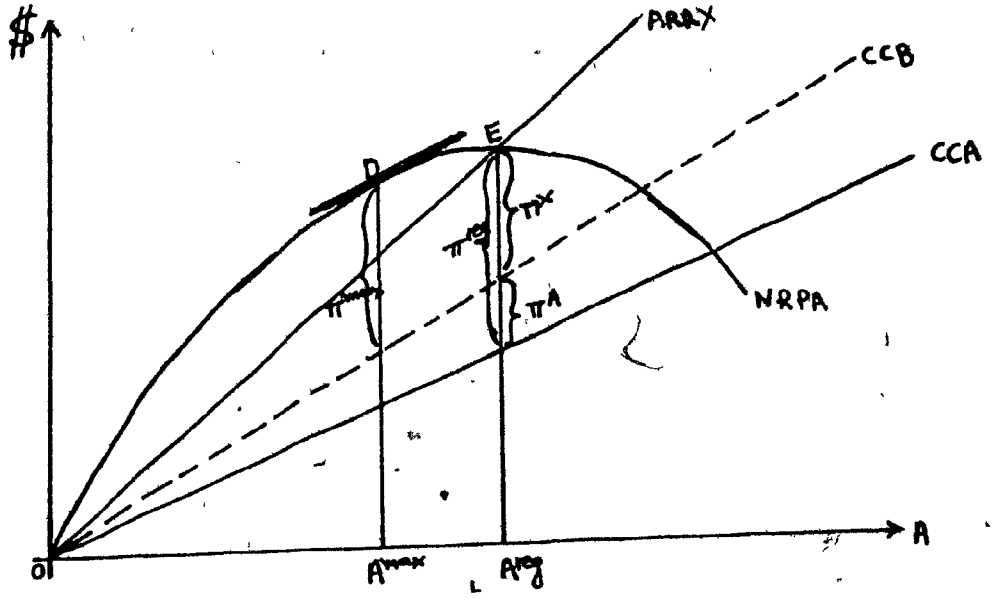
> "the firm's internal or transfer price, or equivalently that each stage of production, be individually regulated".[38-39]

Only by simultaneously constraining each stage of production can the regulator effectively prevent the firm from resorting to the device of raising the transfer price p^A. Thus, by limiting separately the return that the upstream stage of a vertically integrated firm can earn, the regulator finally succeeds in constraining effectively the downstream division's profit and hence the profit of the entire firm. The diagram below shows the

firm under multiple constraints, in the $-A plane. The CCA ray is the cost of capital input to division A and to the integrated firm as a whole. The CCB ray stands for the cost to division X of the capital input A and hence the amount charged for capital A by division A. In other words, the ray CCB is the allowed rate of return for division A and

Figure 9

Effective regulation



ARRX is the allowed rate of return for division X. The rate of return constraint of division A serves to set the transfer price between the two stages. Thus, in this model both the allowed rate of return of the X division and the transfer price p^A of the division A are determined externally by the regulatory board. Therefore, if the regulator sets simultaneously the allowed rate of returns for both X and A divisions then be can succeed to induce the firm away from its profit maximizing point D (see the diagram 9). Indeed, as we can see from the above diagram, the integrated and effectively regulated firm is

constrained at point E by the regulator and thereby its profits are reduced from Π^{max} to Π^{reg}. Moreover, in the process the integrated firm is induced to produce and use an amount of physical capital other than A^{max}, thus following an inefficient expansion path.

3.17 THE INCENTIVE TO INTEGRATE OR TO DIVEST UNDER EFFECTIVE REGULATION

The incentive for integration (or for divestiture if the firms are already integrated), depends on the discretion of the regulator. If the regulator permits the firm to set the level of the transfer price for the capital input A in excess of its marginal cost of production, the vertically integrated firm is able to reap additional profits and reduce output and increase price compared to the single-stage regulated monopolist. Moreover, the effectively regulated firm will follow the same efficient behavior with respect to the choice of inputs as the single-stage regulated firm.

If the allowed rate of return of the upstream division, exceeds the cost of capital or equivalently the transfer price exceeds the cost of producing the intermediate product, then the firm finds it profitable to integrate backwards.

The firm will be indifferent with respect to integration or divestiture if the allowed rate of return of the upstream stage is set to equality with the cost of capital or equivalently the transfer price is set equal to the marginal cost of production.

If the transfer price happens to be less than the marginal cost of capital or equivalently the allowed rate of return of the upstream level is set below the cost of capital, then the firm will prefer not to integrate backwards or if it is already integrated will prefer divestiture.

Thus, the only way to effectively regulate a public utility is to set simultaneously individual constraints on each stage. But this will succeed only at the expense of

allocative efficiency. The result will be inefficient production of the vertically integrated firm due to the A-J effect.

3.18 CONCLUSIONS

In this section we have attempted to join the theory of vertical integration with that of rate of return regulation. The purpose is to enlarge and to make more applicable the models of vertical integration presented in the preceeding section. Equiped with the "partial, "total" and "effective" regulation models we are better able to assess the conclusions reached by the "Green Book" relating to the effect of the vertical links between Bell Canada and Northern Telecom.

CHAPTER 4

THE POSSIBLE EFFECTS OF THE RECENT CRTC DECISION ON COMPETITION ON THE CANADIAN TELECOMMUNICATIONS EQUIPMENT INDUSTRY

4.1 INTRODUCTION

The market conditions of the Canadian telecommunications equipment industry and the effects of existing vertical structure upon competition in that industry have been described above. A brief exposition of the Material presented by the Director followed. Then, some models incorporating both vertical integration and regulation have been presented and evaluated in connection with our case-study.

This chapter starts with the presentation of the actions restricting competition followed by the Bell-Northern group as alleged by the Director in the "Green Book". In contrast to these allegations the recent evidence is presented. The conclusion derived is that the inquiry of the Director which originated 15 years ago is now largely outdated. It has been overtaken by events. One of the very important events that have changed significantly the importance of vertical structure of the complex is the recent decision issued by the CRTC (August 5, 1980). However, it is further argued that another important decision remains to be taken, in order to complete the one that has already been taken. Such a decision is the reduction of the tariff imposed on the imported telecommunications equipment.

4.2 RESTRICTION OF COMPETITION AND THE CHANGED BEHAVIOUR OF THE COMPLEX SINCE THE APPEARANCE OF THE "GREEN BOOOK"

Competition is generally regarded as desirable in that it tends to reduce product prices, to increase the range of products available and to increase the rate of technological and organizational innovation. Therefore, given the importance of tele-

communications for Canada as a whole it is a paramount task to keep a substantial degree of competition in the Canadian telecommunications equipment market. However, the vertical integration itself may raise important barriers to competition. Given the importance of the major telephone company, Bell Canada, as a purchaser of telecommunications equipment in Canada, and given its natural preference to buy its own equipment, there was less incentive for competitors to enter this industry. Putting it differently, much of the Canadian market was "captive" and as a result potential competitors showed little interest for that market.

Barriers to competition may of course be raised and supported by the existence of the Canadian tariff on telecommunications equipment. Competition from foreign suppliers in the telecommunications equipment market in Canada may be reduced by the existence of substantial tariff on imports. Therefore, a reduction in the prevailing tariff would be in the public interest. As will be argued later, an important decision on tariff reduction remains to be taken, which would complete the one recently taken (August 5, 1980) by the CRTC concerning the liberalization of the terminal equipment market.

The regulatory status itself is also another important aspect of restricting competition and therefore, preventing the effective entry of firms. When vertical integration is the fundamental market structural characteristic as it is with Bell-Northern group while at the same time the parent company (Bell Canada) is regulated, then the only firm which could enter the industry and effectively compete with existing firms is one entering as an integrated company. That is an equipment manufacturer in order to be able to compete with the equipment subsidiaries or affiliates of Bell Canada must be integrated with another telephone company. But it seems impossible for such a potential entrant to establish a telephone company in Canada and obtain integration on that basis. Similarly it doesn't seem likely that such a potential entrant could purchase an existing telephone company. Consequently, effective entry is foreclosed by the regulated status

of vertically integrated telephone companies. In addition, the regulatory status creates a number of public policy issues. That is, important public policy issues arise when vertical integration exists between a regulated (Bell Canada) and an unregulated (Northern Telecom) firm.

Vertical integration induces the regulated firm (Bell) to be extremely dependent on its own equipment supplier (Northern Telecom) with the result that it doesn't take advantages of other equipment options. CTC and CRTC scrutinized this matter with regards to the operation of British Columbia Telephone Company. The CRTC has also considered at length whether regulated firms like Bell Canada, and British Columbia Telephone are paying too much for equipment and passing the costs on the telephone subscribers. It was found that there is no evidence of this effect[40].

Considering the effects of vertical integration between a regulated and an unregulated firm on the performance of the unregulated firm, a number of concerns should be taken into account. It is possible, that the unregulated firm having taken for granted the availability of a "captive" customer, which accounts for a substantial portion of its total output, may be risk adverse and may have less incentive to develop products and markets.

Furthermore, the dimensions of anti-competitive effects and market foreclosure increase as the vertically integrated firms are expanding into new areas of activities. As was argued by the Director, this is the case with Bell Canada which is engaged in a number of activities other than telecommunications, such as computer, data transmission, and even satellite transmission. As Bell expands its products and services in this fashion, it is important to note that, the implications of vertical integration for competition in the equipment market increase. In effect, vertical integration is extended into new technologies and new areas and it becomes even more important that entry into the equipment market be open and not foreclosed by vertical integration structure.

It is also extremely important to keep in mind that telecommunications technology has substantial implications for the Canadian economy as a whole, when we consider the effects of vertical integration on the state of competition in the telecommunications equipment market. This is so, because, the potential effect of telecommunications throughout the economy is very great on the one hand, and on the other hand, telecommunications itself is an industry which is experiencing a particularly high rate of technological change. In such circumstances, it is important that the Canadian consumer have access to a wide range of competitive products as consumer demand will act as an incentive for technological change and to the achievement of the full cost-reduction potential of new technology. Realization of these cost savings is important if the Canadian economy is to compete effectively in world markets.

Another aspect which will be considered in detail in a later section and which in the past has reduced competition are the terminal attachments and systems interconnection policies employed by the common carriers. Both these practices followed by the major regulated telephone companies impeded the entry of competitors in the telecommunications equipment market.

Analysing each of the above cases the Director of Investigation and Research Combines Investigation Act, on December 20, 1976 filed the statement of material collected for submission to the RTPC in the course of an inquiry under section 47 of the Combines Investigation Act "relating to the manufacture, production, distribution, purchase, and supply and sale of communication systems, communication equipment and related products".

In this submission the Director after analyzing the structure of the telecommunications equipment industry, the conduct and performance of Bell Canada and Northern Telecom from the mid-sixties up to 1974, concluded that

"the public interest might best be served by dissolution of the

ownership ties between Northern Telecom and Bell Canada"[41].

As will also be argued below this is no longer the case, particularly given the CRTC's terminal attachment decision.

From the evidence indicated by the Director published in the "Green Book" it could be seen that Bell's ownership of Northern Telecom was damaging the effective competition in the Canadian telecommunications equipment market. Bell Canada's practices, such as, acquisition policy, its buying procedures, its terminal attachment policy, its interconnect policy etc..., had given further potency for the establishment of its manufacturing subsidiary, Northern Telecom, in the telecommunications equipment market. Subsequently, these practices reinforced Northern Telecom to retain over time a market share in excess of 70% of telecommunications equipment manufactured in Canada.

With regards to Northern Telecom's conduct the evidence presented by the Director indicated that its behaviour was similar to that of a regulated firm rather than to one in a non-regulated environment. It was also observed that the pricing behaviour and the profit performance of Northern Telecom was directed towards securing the structure in which it and its parent company operate on the one hand, and on the other hand to make it defensible before the regulatory board. As a result of this attitude, regulatory goals were transmitted to a non-regulated industry with undesirable effects on the performance of this industry. It has been further demonstrated that in the area of R & D, various conflicts have emerged between Bell Canada and Northern Telecom with regards to the level of product quality and over the degree of product specialization.

The Director further examined the impact of the vertically integrated structure of Bell-Northern complex, on a number of manufacturing sectors. More specifically, he examined the effects of utilizing an increasing amount of computer and electronics hardware by Bell-Northern group and the anticompetitive and regulatory problems this

policy had on the electronics industry. Because in the field of elecronics technology, rapid changes are taking place it is of paramount importance that the telecommunications industry makes full and efficient use of these new developments and it is also as open as possible to the innovative developments and accepts and utilize them whether they are produced abroad or in Canada. In the statement of Material the presented evidence indicated that the vertically integrated structure was very rigid to perform in this manner. Furthermore, this structure and its foreclosure behaviour therein, posed a barrier to the development of a fully effective Canadian electronics industry.

Finally, the conclusion of the statement was that

> "the Canadian telecommunications equipment market can operate most efficiently under conditions of open market competition. The existing vertical integration between the regulated carriers and equipment manufacturers has resulted in a highly concentrated equipment market with a limited degree of competitive activity. For these reasons the Director recommends that consideration be given to the dissolution of the vertical ties between Bell Canada and Northern Telecom[42].

Since this inquiry originated 15 years ago (in September 1966), it is important to examine whether or not it has been overtaken by the events. It was argued above that Bell's practices, such as, buying procedures, its acquisition policy, its terminal attachment, its interconnect policy had anticompetitive effects on the telecommunications equipment market. Taking first the acquisition problem it can be seen from the evidence of the Material that the acquisition of Bell Canada gave to its supplier, Northern Telecom, a captive market, thereby foreclosing the market for other equipment manufacturers. Bell between 1954-68 had purchased 448 independent companies. However, between 1968-79 it purchased only 30 ones. These recent acquisitions had a negligible effect on the market for telecommunications equipment in Canada.

With respect to the service agreements the Director argued that such agreements by providing information and advice to other Canadian telephone companies on all

phases of the telecommunication business including engineering operations and plant operations as well as a whole variety of additional operating information, was to the detriment of other operating telephone companies and to the advantage of Northern Telecom. This availability of information from Bell Canada has reduced the impetus of other Canadian Telephone Systems to conduct R & D.

However, Bell's vice-president, Roy Inns, recently argued that such service agreements allow the other telephone companies to have access to Bell's skills, experience and resources which benefits the entire telecommunication industry[43].

With regards to the purchasing policies the statement of material indicated that Northern Telecom has long acted as a purchasing agent of Bell Canada, as an inspector of non-Northern Telecom equipment, and as an agent for the disposal of used equipment. But these functions were removed from Northern Telecom's responsibility as early as in 1969. Thus, Bell had tried to eliminate some of the more overt non-competitive aspects on Northern Telecom's functions with respect to purchase, inspection, and disposal of equipment. It remains, however, difficult to determine if these organizational changes made any real difference to the conduct of the integrated complex.

As to the allegation of the Director that Bell Canada has exerted undue influence over Northern Telecom and impeded its progress it is necessary to present the recent evidence and the achievements of Northern Telecom in the international field. Previously, at an early stage, we presented the international activities of Northern Telecom. Table 4.1, indicates the Canadian exports of telecommunications equipment to a number of selected countries for the years 1977-79. The major part of the exported equipment is directed to the U.S. Northern Telecom has managed to penetrate the market of the independent of the U.S. Bell System Companies[44]. This independent system operates 24 million telephones and represents a market twice the size of the

entire Canadian market. However, AT & T, the parent firm of operating companies accounting for 80% of the 170 million telephones in the U.S. recommended that its operating thelephone companies use DMS-10_S, the production of which is undertaken by Northern Telecom. Indeed, a three year contract was signed by AT & T and Northern Telecom for the provision of DMS-10 equipment. Thus, Northern Telecom has been established as a world leader in the telecommunications equipment industry. Today, Northern

Table 4.1

Exports of telecommunications equipment

	Years ($ .000's)		
Major Markets Countries	1977	1978	1979
United States	35,666	51,165	79,429
United Kingdon	1,675	2,239	3,882
Greece	166	6	30
Yugoslavia	4,201	1,831	5,776
Iran	10,634	1,420	2
Libya	91	4,651	10,909
Saudi Arabia	4,576	2,496	10,527
Subtotal			

Source: Statistics Canada - Exports by Commodity and Country

Table 4.2

% of Northern Telecom sales to Bell Canada

Years	% of Bell Canada purchases from Northern Telecom
1975	45.3
1878	38.0
1979	34.3

Source: Bell Canada's and Northern Telecom's Annual Reports.

Telecom is the second largest telecommunication manufacturer in North America with consolidated sales over $1,5 billion. It is one of the few successful, profitable, Canadian owned multinational company and it provides directly in excess of 18,000 manufacturing jobs in Canada of which more than 2,500 can be attributed to its international operations.

It has been alleged by the Director that such an improvement in the performance of Northern Telecom was mainly due to the fundamental changes in the ownership of Northern Telecom and to the significant changes in the operations of Bell-Northern complex that have occured since 1973. It was argued that the decision of Bell to offer common shares of Northern Telecom for sale to the public in 1973 and 1975 consecutively, has had the effect of improving the performance of Northern Telecom. And this was so, it was argued, because from then on a market check has been introduced in Northern Telecom's dividend policy since Northern Telecom had to meet dividend requirements outside Bell Canada. Previously, Northern Telecom's incentives for good performance came from within the complex which was weakened by internal contracts. Therefore, it was concluded that as Northern Telecom was becoming more independent of Bell Canada, its performance was improving. However, this conclusion is not warranted, since there is no evidence about cause and effect. On the contrary, it can be argued that the close working relationship permitted both supplier and carrier to work together in the innovative R & D activity and to produce both a system offering high quality service at low cost thus serving the national interest satisfying the Canadian needs and a internationally competitive telecommunications manufacturing company. Thus, the Northern Telecom's ability to compete successfully, both domestically and internationally with the giants in the telecommunications equipment business is mainly

due to its size and its relationship with what is internationally recognized as one of the best telephone systems in the world. That system in turn is uniquely effective because of its relationship with
Northern Telecom.

With respect to the issue of market foreclosure due to vertical structure, the relevant data to consider is the percentage of equipment Bell Canada continues to purchase from Northern Telecom. As long as the Bell Canada market remains closed there exists little scope for the equipment manufacturer to compete with Northern Telecom. However, there is clear indication that Bell Canada has significantly reduced its reliance on Northern Telecom. While Northern Telecom's sales to Bell Canada were 45.3% in 1975, in 1978 and 1979 were 38% and 34.3% respectively. Thus, they exhibit a declining trend. (See table 4.2) Therefore, Northern Telecom's increasing sales outside the Bell Canada market and Bell's changed attitude towards its purchasing activities indicates their desire to keep the market as open as possible, thereby eliminating any market foreclosure, if such a thing had occurred in the past. Similarly, it can be argued that Bell Canada's changed attitudes towards its purchasing activities may have been due to the threat of separation from its affiliate Northern Telecom. Thus, the publication of the Director's Investigation might had an important effect in changed behaviour of the most important supplier, Bell Canada.

4.3 THE SUBSCRIBER MARKET

It was mentioned above that the subscriber market in Canada is not as well developed as that of the U.S., due to both statutory restrictions and to administrative policies of operating telephone companies towards the attachment of subscriber owned equipment. There is no doubt that such restrictive policies will disappear in the very near future and that the subscriber market, both residential and business, will grow to become

a significant and a dynamic segment of the telecommunications equipment market. It has been reported by Chris Box-Grainger, group telecommunications manager of Telephone Rentals, London, England, that Canada's policy on foreign attachments or terminal interconnection, is roughly at a point equal to where the U.S. was in 1966 and Great Britain in 1953. Because of the existing similarities in the structure of telecommunications between U.S. and Canada (the U.S. telecommunication market is dominated by a very large monopolistic private industry (AT & T) and it is vertically integrated with its manufacturing affiliate Western Electric) the U.S. case bears some brief examination. In the U.S., terminal interconnection has been characterized by a series of independent Federal Communications Commission (FCC) decisions, which subsequently upheld by the courts. Liberalization of foreign attachments restrictions, has occurred very rapidly. Unlike CRTC's behaviour, the American FCC, from the start was approved to attempts by the large carrier's to present the advent of foreign attachments. It was both very receptive and sympathetic to the then forthcoming liberalization of terminal attachments. The important Carterfone case in 1968 was the first significant case ruled on by the FCC. The effects on this case are noteworthy. The Carterfone decision opened the way to interconnection. It gave to private individuals the right to interconnect almost any kind of telephone equipment to the carriers' network, subject to minor regulations. One of the regulations required that interconnection with "foreign" equipment would utilize a protective coupler supplied by the telephone company. This requirement was dropped by the FCC in 1975 and today any equipment except private branch exchanges (PBX), or key telephone sets (KTS) may be attached by means of a simple connector to the carriers' network. However, this equipment, before being attached must be either certified and registered with the FCC unless it qualifies under an elaborate "grand father clause" applicable to equipment installed before the enactment of the 1975 ruling.

In Canada by contrast, the liberalization of foreign attachment has progress

very slowly. Bell and other carriers, as result of the CTC's Schulman decision in 1975[45], exercised control over all foreign attachments. Indeed, in Canada the carriers, following Bell's lead, controlled the rate and the direction of foreign attachments, through the Terminal Attachment Program limiting how and what may be interconnected. Although Bell indicated as early as in 1972 that it could support a liberalization of terminal attachments policy, its actions indicated that it deliberately slowed down the program until it would be fully ready to compete in the open market place. Nevertheless, although both Canada and the U.S. have certification programs, Canada has much stiffer standards, the government monitoring by the DOC is very close, and the number of non-network addressing equipment which can be attached without protective couplers is only thirteen (13). It appears that Bell's policy towards attachment of subscriber owned equipment is motivated by a concern that it not be as unprepared as AT & T to meet open competition.

Bell's position on terminal attachment has been challenged since 1975. The first blow occurred in 1975 when a Quebec Court granted Harding Communications an injunction enjoining Bell to stop interfering in Hardings business of selling call-forwarding equipment[46]. In December 1978, Bell's appeal of the Harding case was rejected unanimously by the Supreme Court. After this first challenge to Bell's monopoly over terminal attachment, others followed. In May 1978, the Supreme Court of Canada supported a December 1977 CRTC decision in favour of Challenge Communications Ltd. This case, involving mobile telephones, has been characterized as the Canadian equivalence to the U.S. Carterfone decision. This was the first time the CRTC went beyond a simple tariff ruling, and undertook a directive role. The final blow to Bell's right to monopolize terminal attachment came on August 5, 1980. At that time, the CRTC authorized on an interim basis, attachment of customer owned terminals to Bell's switched network[47].

Bell's reaction was sharp. It directly set up a subsidiary for marketing telephone equipment to business. Its subsidiary called Bell Communications System Inc. (BCSI) which currently is based in Montreal and Toronto, will offer installations and maintenance of the switchboards and other equipment it sells[48]. But members of the Canadian Business Equipment Manufactuers' Association (CBEMA) are concerned that Bell and other carriers may engage in a competitive business under the cloak of a regulated monopoly. The opportunity for cross-subsidization exists[49]. It is possible that the revenues derived from the regulated operations over which Bell has a monopoly will be used to subsidize the competitive ones. The position taken by the CBEMA is that

> "if the carriers want to be in the equipment business, then they should be required to set up a separate subsidiary, with full separation of accounting, management services and so on."[50]

While Bell has established its BCSI subsidiary it continues to repeat the well known arguments about the public telecommunications network. These are:

> "1) The integrity of the public switched networks must not be impaired by consequences of the application of any possible rules and procedures; 2) As a result of a liberalization policy designed to benefit those requiring greater choice and innovation, there must be no significant increase in the cost of basic and essential services. At a minimum, this would include one line residence and business. Also, there must be no impairement of the quality of service generally; 3) No person must be unjustly or unreasonably discriminated against in the matter of rates for basic and esential telecommunications services; 4) The existing degree of Canadian control of telecommunications must not be diminished. Control refers to instruments such as corporate ownership, management, planning and design, engineering and supply. It involves the viability of the domestic industry in the context of domestic and world markets."[51]

Bell believes that these substantial policy issues must be considered before any decision is taken concerning the permission given to residential subscribers to own and connect to the network their own private branch exchanges (PBX), key telephone system (KTS) and telephones behind such exchanges and systems. This is significant because important and complex public policy questions are raised not only for the tele-

phone companies in Canada, and for those who wish to own or to lease terminal equipment, but for users of telephone services, the manufacturers of such equipment, the federal and provincial department of communications and of trade, the regulators of the telephone companies, the whole industry, the provinces and the federal government. Many aspects of public policy are involved on this issue. This issue includes but is not limited only to the issue of competition policy. Thus, it is very important for the RTPC to examine the consequences that the advent of customer owned terminals will introduce in Canada relating to the "manufacture, production, distribution purchase, supply and sale of communication systems, communications equipment and related products." Bell believes that this introduction will have some undesirable effects on the industry and this liberalization would not be beneficial to the public interest. This is so, Bell argues, because many people who are presently satisfied with the cost, variety and level of service may be forced to pay more to support those who want more innovation and choice. Moreover it is believed that the costs of R & D, the development of standards, the certification of equipment, the licencing and inspection might be higher. An impairment of service and failure to provide full service to the whole community it is also believed to be one potentially detrimental effect. It is also believed that there will exist some problems for the network. Additionally it is argued that the liberalization of terminal equipment policy would result in a loss of Bell revenues. Thus the issue here is the broad question of benefits and costs of a general ownership by the terminal equipment.

Although the preceeding arguments of Bell about the costs incurred by the common carriers and their customers from liberalization of terminal equipment are to some extent understandable and should be given some sympathy the analysis will show that these concerns are greatly exaggerated and even distorted by the telephone companies. This is so because the benefits which are expected to come from the liberalization of terminal attachments will be greater than the costs. These benefits are

believed to be: 1) the equipment will be better tailored to the needs of the subscriber; 2) greater availability of alternative sources of supply (i.e., choice of suppliers); 3) the pace of introduction of new products will be faster; 4) the price of equipment will be reduced; 5) more innovation and technical improvements; 6) encouragement of more supplies; 7) the financial position of the carriers will be improved by the increased competition. Each of these is discussed in turn.

4.3a Some Benefits resulting from Customer Ownership of Terminal Equipment

1) Equipment more adapted to the needs of the Subscriber

When there is only one telephone carrier and it is responsible to provide equipment and universal service on a rental basis, it will have an incentive to limit the variety of products available. But this supplier becomes unable to cater adequately to the specialised needs of every businessman as more and more features and feature packages become available. Thus, the supplier is not able or doesn't want to market all the available alternatives. The satisfaction of the customers precise needs is argued to be the prime advantage of subscribers from the existence of several competitive suppliers in the market place. Therefore, the existence of more suppliers will enhance their ability to tailor their products more closely to individual needs.

2) Availability of wider range of products

It is natural that certain customers are not satisfied by some suppliers. And this is the case with Bell Canada. For example, CP Air and Royal Trust are not satisfied with Bell's offerings and therefore they would prefer an alternative source of supply were it available. In such a situation the subscribers would not be able to complain that they are forced to accept what a monopoly supplier supplies. But, it is Bell Canada's belief that a very high percentage of the new installations will be captured by it, if it is allowed to compete on an equal basis with all other market suppliers. Thus, the satisfac-

tion of the perceived needs of customers and the relation of a substantial market share it is believed by Bell to bring about the liberalization of terminal attachments under the condition that its competitive operations remain unregulated.

3) Faster pace of introduction of new products

It is widely accepted that when there is only one carrier in the market then due to lack of pressures the introduction of new products will not be rapid. That is, the retardation of the introduction of new products is mainly due to lack of competition. A great advantage occuring to the customer ownership of terminals is therefore the reduction in time for the introduction of new products.

4) Reduction of the terminal equipment prices

The experience of many users in the U.S. shows that in a COAM (Customer Owned and Maintained equipment) environment the equipment cost is lower than under the present regime environment[52]. Thus, many business subscribers have benefited from the reduction in equipment prices.

For Canada, it is also believed that for many subscribers the cost of the terminal equipment will significantly be reduced. It is argued that the PBX terminals contribute significantly to Bell's revenues. Bell Canada argues that terminal equipment contributes to its revenues over and above the 12% allowed on equity[53]. This conclusion was also reached by P.E.I. (Prince Edward Island) Public Utilities Board in the Garden Gulf Case. Thus, judging from evidence that PBX terminals are more profitable than the average line of business, it is anticipated that some of the new entrants in the field will be willing to accept a lower rate of profits and therefore prices will be lower than those presently charged. The expected reduction in price would indicate that the carrier of PBX equipment is meeting the demands of competition. It is also Bell Canada' belief that such an outcome is likely to occur. It also supports the view that initially the impact of new entrants, will reduce prices but subsequently price will rise. For meeting the chal-

lenge from new entrants, the existing firms will also reduce their prices. Thus, the net outcome will be the reduction of terminal equipment prices.

5) Increased innovation and technical improvements

It is widely recognised that technological advances mainly depend on the competitive environment. Competitive environment permits the proliferation of unusual and exotic feature-filled systems and these features are becoming more available as the number of competitors increases. Thus, competition is considered to be an important and desirable element in contribution to the production and rapid introduction of technical improvements. That is, more innovation and more stimulation to innovate exists in a competitive environment. It is Bell Canada's belief that there is no such dependence between competitive environment and technological advances[54].

6) More Suppliers due to liberalization of terminal attachments

It was also argued above that one of the beneficial effects of the liberal attachment policy is the entrance of more suppliers into the Canadian market having as a result the reduction in the price of the terminal equipment. It is Bell Canada's belief that the new entrants will be branches of foreign parents companies or sales agents for imported systems. Their contribution to the national economy will depend on the nature of the products they will introduce. If these new entrants introduce unique products that satisfy an otherwise insatiable Canadian need, their contribution will be to the good, but if on the contrary they intoduce products similar to those that Canadian suppliers provide, there are serious questions as to the future of Canadian balance of trade and domestic employment.

7) Carriers' improvement of financial position due to increased competition

It was argued above that investment in the production of terminal equipment results in a positive contribution to revenue. This positive revenue generation has some

multiplier effects in conributing to raise capital and to conduce to shareholders' equity.

Moreover as Box-Grainger has indicated, the telephone companies will certainly gain if the customer ownership of terminals stimulate increasing use of these facilities by customers and in consequence generate more revenues for the telephone companies. This gain will depend on the increase of usage-sensitive services and this may induce the telephone companies to introduce usage sensitive pricing for the local loop. Thus, in the case where increased network usage is coming from the increased traffic usage of the trunk facilities due to the adoption of customer ownership of terminals, the carriers either may raise trunk rates generally or may have to introduce usage sensitive pricing. Therefore, "customer utilization of the network may change with the ownership of equipment." A study to determine the impact on carriers revenue of usage sensitive pricing were adapted has not yet been undertaken by Bell Canada.

4.3.b The Canadian Telecommunications Industry and the Maintenance of its Viability

It is Bell Canada's belief that apart from the effect which the liberalization of terminal attachment would have on itself, it is important to assess the impact of liberalization on the viability of the Canadian industry as a whole. It is generally believed that introduction of liberal attachment rules will create significant problems in the ability to maintain the present degree of Canadian participation in the terminal attachment industry. Some losses will occur in the competence of Canadian firms and Canadian technology to serve the terminal industry, once terminal interconnection is introduced. Bell believes that some measures must be taken to give to the Canadian industry a reasonable chance of continuing the success which it presently enjoys. One of these measures, Bell argues, is that it be permitted to compete freely in the terminal market. This is an essential precondition to the opening of the terminal supply market to competion. Thus, Bell argues that only by permitting it to compete in the terminal

market on an unregulated basis, will the industry remain viable and will the future growth of the Canadian telephone industry as a whole be assured. The argument is based on the premise that Bell is the only Canadian entity with market experience to compete immediately with those who are likely to enter the Canadian market. Bell has already announced the creation of a subsidiary, the Bell Communications Systems Inc. (BCSI), with the aim of selling terminal equipment to prospective purchasers[55]. Indeed, only by permiting Bell to compete on an unregulated basis in the terminal suppliers market, will Canadian designed and manufactured products continue to maintain a dominant position in the domestic market. If, however, Bell is selectively regulated in its competitive marketing activities, Canadian products will have difficulty in both domestic and foreign markets.

Briefly Bell Canada submits that

> "deregulation of its competitive operations in the terminal equipment area will have a major impact on the ability of the Canadian telecommunications industry to compete successfully with the influx of foreign products which in the absence of tariff barriers will follow in the wake of a liberalization of the terminal attachment policy."[56]

It is also submitted that this is important to Bell subscribers.

Bell in order to support its view of not regulating its competitive operations cites the views of CBEMA (Canadian Business Equipment Association) saying that regulation should only be applied in those areas where they were not well served by competition. It is the CBEMA's belief that competition itself is a regulator, and the public interest is well served by having as free an environment as possible[57]. It is also Mr. Green's belief that terminal devices should be manufactured, supplied or distributed in a competitive market environment[58]. But Bell Canada overlooks that these arguments refer to the case where every participant in the market place have more or less the same market shares and are not dominated by one big firm. This last point is argued by Mr. Spievack

in a speech on behalf of the North Americain Telephone Association (NATA), and association of terminal suppliers, who stated that

> "where there is one participant in the market place which has a dominant share of the market, it is essential that there be some continuing regulatory juristiction to set the terms and conditions of competition."[59]

Cross - Subsidization Problem

It is argued that serious problems may be encountered if Bell is allowed to compete on an unregulated basis in the terminal attachment market. One of these is the cross-subsidization problem. In simple terms the argument is that if Bell's behaviour in the terminal attachment market is not controlled, then it may be able to use revenues derived from its regulated monopoly operations to subsidize its activities in the competitive terminal market. Thus "unfair competition" with the other terminal suppliers is a possible outcome of the competitive strategy. Mr. Spievack, for example, has suggested that price wars of infinite duration are possible if an unregulated Bell Canada is allowed to subsidize its competitive offerings with revenues derived from its regulated services. Nonintegrated suppliers would be in a relativity disadvantage position[60].

"Separate Corporation": a tentative vehicle solving the cross-subsidization problem

Several solutions have been proposed for solving the cross-subsidization problem. One is the establishment of a separate corporation. Mr. Green has suggested that

> "the carrier should be allowed to compete only through a separate arm's length affiliate with appropriate safeguards built into the system to assure complete separation of the carrier's regulated operations from the unregulated operations of the affiliated."[61]

Canadian National Telecommunications (CNT) also agrees with this policy arguing that a separate corporate vehicle is a feasible method of allowing carriers to compete in the market, while at the same time guarding against cross-subsidization. From the accounting point of view, this would ensure that everything is separably identifiable. On this

issue CBEMA also agrees. Its president, Grant Murray, is quoted as saying

> "our position is that if the carriers want to be in the equipment business, then they should be required to set up a separate subsidiary, with full separation of accounting, management services, and so on."[62]

But the agreement on this issue does not seem to be unanimous. Mr. Spievack argues that the cross-subsidization is not solved by simply revising the carrier's accounting system or by establishing a separate subsidiary corporation to conduct the terminal operations entirely independently of the regulated operations.

Bell's belief is that there is no real danger of so-called cross-subsidization. It argues that the regulation of its activities in a competitive terminal market is not justified on the grounds of an alleged potential for cross-subsidization. Those who are concerned believe that Bell can use the regulated monopoly profits to subsidize the competitive operations thus following a pricing policy to eliminate competitors. It is Bell's belief however, that if such a situation occurs the existing Canadian laws can protect the competitors as they prohibit sales on terms designed to injure competition. Moreover, the regulation of monopoly service rates by the CRTC gives the juristiction to this Commission to investigate any cross-subsidization between monopoly and competitive services. In addition the suggestion that Bell can engage in anticompetitive activities in the terminal equipment market indicates a lack of confidence in the effectiveness of the CRTC as the regulator of monopoly service rates. It is Bell's belief that such regulators can ensure the interests of monopoly service subscribers. Furthermore, Bell believes that the problem of cross-subsidization is essentially an accounting problem. Indeed as such, no threat is posed to the competitive terminal equipment environment so long as the separation and identification of cost and revenues associated with regulated and competitive operations is possible. Bell argues that there is an inherent contradiction in a decision to open the terminal interconnection market to other suppliers on the grounds

that such an action will benefit the public interest while at the same time arguing that the competitive activities of the largest operator in Canada should be regulated on the grounds that only anticompetitive effects will flow from its activities.

Regulation of Bell's terminal operation and its alleged disadvantages

There are at least two competitive disadvantages Bell Canada will incur if its competitive operations are regulated. The first one will be its inability to adapt quickly and freely to the changing circumstances of the marketplace. It is argued that reduced flexibility would apply at least to Bell's pricing of its products. Some period of time is required by the regulator to assess the materials introduced and to make a decision. This will work to the detriment of Bell for which the ability to adapt rapidly to market conditions is essential for effective competition. This also will be unfair for Bell since its competitors are free to adjust prices at will in response to market factors or otherwise. Indeed, there is always a possibility that when Bell makes a change for competitive reason and has it approved, the change may no longer be appropriate. The competitor knowning Bell's plans will try to meet its initiative since he has the appropriate time in his disposal.

There is a second competitive disadvantage which Bell is likely to experience as a result of regulation of its competitive market. This is the need to file certain information with the regulator such as an economic analysis. This is harmful for Bell since its competitors are not required to make a similar action. For Bell it means that many confidential decisions may become known to competitors where in a competitive environment the secrecy is vitally important. Moreover, an additional burden is levied on Bell by spending time and money to prepare information required by the regulator. The competitors by contrast would not bear such cost burdens.

4.3c Some concerns in other areas

In this section some other effects which the liberalization of terminal market is believed to have on: a) the future technological development of the network; b) on the overall quality of service provided by the network; and c) on actual rates and on rate making theory will be examined.

The network and its technological development

It is widely recognised that the Canadian telecommunications network is technologically advanced. The pace with which technological change is taking place is very rapid. Indeed, the old technologies are gradually replaced by new ones and these new levels of technology are superseded more quickly than the previous ones. Bell argues that this speed must continue for the viability of the Canadian industry. Mr. Ibey highlights the speed of technological change saying that

> "In the 1970's, digital technology began supeseding analogue technology in the trunk network and switching machines. In the 1980's, digital technology will move into the loop plant and terminal equipment with the introduction of fibre optics, digital telephone sets and intelligent terminals. These changes once again necessitate the replacement of terminal equipment to match the technological requirements of the network. Just as the 300 type set is not compatible with many customer loops in today's environment, a change in signal systems may make today's 500 type set incompatible in the future."[63]

This type of technological evolution has to continue if the Canadian network is to remain technologically advanced. It is Bell's belief that the customer ownership of terminals will slow the pace of technological change. It argues that a liberal attachments policy may result in new pressures to slow the speed of technological change. And this is a likely outcome, because more applications will be addressed to regulators alleging insufficient notice, defects in Bell's economic studies, etc. It is Bell's belief that only six months notice of minor changes should be given to customers and two years notice for major changes. Any delays caused by the regulatory process should be minimized if Canada wants to stay in the forefront of technological change. It is very important that the in-

troduction of liberal attachment rules will not weaken the capacity of BNR, NT and Bell to make such progress.

Another related and important point is the method of providing services. This is addressed by Mr. Ibey as follows:

> "The network is also changing in terms of how services and features are provided. This change is related to the location of "intelligence" in the network. In the telecommunications field, this intelligence refers to the ability to respond to requests for service, to correct route calls, and to collect required call details or billing information. In the 1950's and 1960's most of the network intelligence required to perform these functions resided in central office switching machines. Terminal equipment located on customers' premises was relatively unsophisticated, with intelligence being provided by a human operator such as a PBX attendant. Today, development of Large Scale Integrated (LSI) circuit technology and advances in computer software techniques are making available microprocessor system, providing sophisticated intelligence in very small physical packages... whether telecommunications services and features should be terminal based or network based will depend, to a large extent on the particular of each customer's service requirements..."[64]

It is Bell's belief that the provision of service features to the customer should be made in the most economical manner technologically, whether that will be in the terminal or in the network.

Quality of the service provided by the network

The issue concerning the quality of service can be divided into four separate questions: 1) harm of the network; 2) degradation of service to the customer owned and maintained equipment (COAM) user; 3) to third parties degradation of service; 4) long term maintenance of the service.

With respect to the first issue it is Bell's belief that the harm of the network or injury to individuals is not really an important issue. It is believed that the adopted standards are adequate to protect the network from electric harm. Furthermore, Bell believes that, the second question is not an issue either. This becomes an issue only if

third parties are affected. That is, only when the utility of somebody else is affected by the degradation of service to COAM users. Therefore, only the last two questions - the degradation of service to third parties and the long term maintenance of the service -are the important issues according to Bell. Although in the U.S. the FCC has largely ignored the question of third party degradation, in Canada, the issue is considered important although Bell does not think it is necessary to adopt very high standards to meet this problem. It is believed that DOC would be an acceptable authority to issue such standards.

The impact on actual rates and on rate making theory

Bell is a regulated monopoly. The CRTC currently allows it to charge the rates on the basis that 12% rate of return is earned on shareholders equity. The CRTC has also stated that it can foresee some circumstances in which rate of return objective of 13% or 13.5% might not be unreasonable[65].

It has been shown by Bell that competitive services, long distance services and optional services contribute to revenue, over and above the 12% allowed on equity, while local services do not[66].

In the Garden of the Gulf decision the conclusion was reached that optional services, make an over and above 12% on equity contribution to revenue. But these optional services will be the area which will be affected by terminal attachments. If there is competition then it may mean that a net loss of revenues will occur. This loss must be made up somewhere else if the 12% average return on equity were to be maintained. This problem poses at least two important question: a) what is the extent of the loss revenue likely to be; and b) where would it be made up?[67]

From an impact study which was undertaken by Bell it is shown that if there were 10% or 20% penetration of the existing total market within five years, then a 50

and 110 million dollar reduction of revenues can be expected by 1985[68]. To compensate for this loss a $1 increase per main station per month is necessary[69]. Another study undertaken by Dr. Roseman indicates that a 35¢ increase is necessary[70]. Thus, the $1 increase is not an accurate number. Therefore, it is not possible at this time to be precise about what the exact impact on rates will be. This inability to assess the impact accurately complicates the policy decision as to what action should be taken. But if it turns out that rates must increase then there is the question of whether it is appropriate to increase local rates or make adjustments in other service rates. Mr. Ibey suggested that the loss of revenues could be made up by charging an additional access charge to those who own their terminal equipment. It is Bell's belief that if the decision is to be made between local or toll tariffs then the increase in local rates seems to be more appropriate. This is so because a) the local loop is already a money loser; b) contrary to the major U.S. cities local rates, Bell's are relatively low, while its long line rates are relatively high compared to those of U.S.; c) the increase of local rates in some representative U.S. cities have increased faster since 1968, while in Canada the local rates charged by Bell over the last decade have not been excessive.

Eventually, this problem is left to the regulator to decide whether business or residence customers will bear the burden or whether large business should bear more of the burden than small business, or whether customers who own their terminals should pay a higher access charge. The CRTC indicated in a 1978 rate case that it is appropriate for small business to pay less than the large business, and residential subscribers to pay less than the small business.

Bell has concluded that since the introduction of liberal attachment rules will bring about an increase in the rates charged, then it is advisable that such introduction not take place.

4.3d Conclusions

So far, in this chapter, the fundamental changes that have occurred in the Canadian telecommunications equipment industry since the appearance of the "Green Book" have been presented. The likely effects of the recent CRTC decision concerning the liberalization of foreign attachment (foreign interconnection) on the Canadian telecommunications equipment industry have analysed as well. The examination of the alleged anticompetitive effects resulting from the tactic that the complex has followed in the area of system or network interconnection remains to be presented. As it will be seen in the following section the major telephone company, Bell Canada, was opposed to network interconnection mainly due to its interest to protect its dominant market, on the one hand, and to its desire to exclude competitors from the market of its affiliate Northern Telecom, on the other hand. That is, the practices followed by the complex impeded the entry of competitors in the telecommunications equipment market. Nevertheless, although some of the problems concerning system interconnection have already been resolved, however, other new ones have appeared or old ones have recently re-emerged (see below pay-TV trial problem). But the analysis of these problems is the subject of the section that follows.

4.4 System or Network Interconnection

4.4a The case of CN/CP Telecommunications

Network or System interconnection is the type of interconnection allowing private or competing networks or special carriers to use parts of any one carrier's network. Bell Canada and the other common carriers were traditionally opposed to such interconnection on the grounds that if such a policy is permitted then the new entrant, will primarily locate in the most profitable markets, in this way skimming the cream and thereby forcing the telephone companies to raise rates and/or reduce services to other customers. This was mainly the argument provided by Bell when in June 1976 CP, the

privately owned associate in CN/CP Telecommunications, filed an application with the CRTC requesting the Commission to order Bell to permit CN/CP Telecommunications to interconnect with its local switched network. CP's application emphasized that the main issue was competition between the T.C.T.S. and the data transmission services of CN/CP Telecommunications. CP's argument was that without reasonable access to the local switched networks of the carriers such competition cannot exist. Thus, only if such access is granted would its shares in these markets not continue to decline to the benefit of the other common carriers. In May 1979 the CRTC issued its decision totally rejecting Bell's argument that system interconnection will be to the detriment of Bell's local subscribers. Bell argued that interconnection would necessitate an increase in rate in onder to compensate for its lost revenues. The CRTC decision permitted CN/CP to have direct access to Bell's local switched network for the purposes of providing long distance data transmittal and private line services. The CRTC accepted CN/CP's arguments on the ground that Bell's revenue loss would not be $235 million as Bell had claimed but only $46 million. Also the CRTC suggested that

> "... any rate increases resulting from the granting of the application can be distributed among Bell's subscribers in the variety of ways, including those users most likely to benefit from interconnection bearing the greatest burden, thereby reducing to a minimum any impact on residential telephone subscribers. In addition... the Commission considers that CN/CP ought to bear its fair share of the costs of Bell's local exchange facilities."[71]

Thus, residential subscribers would not have to bear the whole burden of the lost revenues.

The CRTC thus opened the way to system interconnection. The existence of more than one common carrier to produce transmission facilities would encourage the speed of innovation in various non-basic telecommunication services such as mobile telephone service and would improve the overall efficiency of telecommunications industry. It is widely believed that the existence of only one carrier providing transmission facili-

ties would not be in the public interest. The lack of competition would make the company complacent and would not respond quickly to public needs or wants. Only

> "with more than one common carrier supplying transmission facilities and more than one common carrier of distribution facilities there would be full and open competition by those taken place. For this to take place then, there must be interconnection."[72]

The increased future telecommunications needs of all customers will not be satisfied by a single integrated distribution network but only with an increase in competition in the industry. The existence of competition is desirable because it is sensitive to demand elasticity and it is more prone to innovative activity. But it is important for the regulatory commission to assure that the new competition will be restricted only to the areas facing a changing technology; that is, the new competition will be introduced in those aspect of telecommunications where neither economies of scale or scope justify the existence of a "natural monopoly". Therefore, only in the area ripe for competition, such as data transmission and long distance messages, should this new competition be introduced. In other areas such as local network services and switching aparatus the duplication of the network would be very expensive and unprofitable. Thus, it is necessary that this type of services will remain in the domain of the franchised monopolies.

Moreover, another important issue commanding the attention of the regulatory commission is how the new competition should take place. But this is an extremely difficult task for the commission to achieve, since its ability to regulate effectively is reduced because both competitive and monopoly services are provided by the same carrier. One possible solution to this, as was mentioned above, might be the establishment of a separate subsidiary. This is also supported by CN/CP's argument that

> "the most effective means of guarding against harmful cross-subsidization is accounting separation and structural separation of the monopoly and competitive service sectors."[73]

Thus, the establishment of a totally separate subsidiary might be a means to assure that

the basic service will not cross-subsidize the non-basic service.

4.4b The CATV Companies

Another course of anticompetitive effects followed by Bell was its policy towards cable television firms (CATV Companies). This policy had as a result the exclusion of competitors from NT's market.

Due to the existence of municipal restrictions on the erection of redundant utility poles the CATV firms had been forced to use the already existing ones. Thus, an agreement with Bell was sought for this purpose. However, Bell forced the CATV firms to accept a most burdensome agreement, despite the existence of more favourable agreement in Western Canada and in the U.S. and the insistance of CATV firms for acquiring similar agreement[74].

It was not until 1976 that the policy changed. After a number of CATV firms applied to the CRTC demanding that Bell be ordered to negotiate a more favourable agreement with the CATV firms. In the meantime Bell announced a change in its policy.

Recently another old problem reemerged. It is the pay-TV trial problem. Bell in March 1980 applied to the CRTC for approval of pay-TV trial in order to assess such things as the demand for pay-TV, program packaging, sensitivity to subscription rates, and methods of payment. Bell's recently developed terminal that allows for "per view" billing will be used in this trial. CATV Companies criticize Bell's proposals arguing that since the pay-TV trial will use only one kind of hardware, Bell's hardware, the trial would be biased, that is, it would preclude competition "for pay-TV management". According to Bell's system

> "the telco would undertake and pay-out revenues to pay-TV organizers for a fee or commission. Cable does not like this idea at all."[75]

4.4c Communications Satellites: the case of Telesat Canada

In 1977 a crown corporation Telesat Canada, applied to CRTC for permission to join the T.C.T.S. The proposed Agreement was strongly opposed by some provincial governments, the Consumer's Association of Canada (CAC), CN/CP Telecommunications and others who believed that an independent Telesat would be in the public interest. The major argument of CN/CP against the affiliation of Telesat with TCTS was that it would put CN/CP at a competitive disadvantage. The CAC argued that such an agreement will reduce competition thereby restricting the potential for introduction of new methods of delivering programming services particularly appropriate to Satellites.

The CRTC adopted the arguments of CN/CP and CAC in opposing the proposed Agreement. It further argued that the Agreement would lead to regulatory complication.

Although the CRTC decision was based on careful consideration of the issue, the decision was overturned by the Federal Cabinet. Many affected parties have strongly objected to the anticompetitive stance taken by the Cabinet. The Cabinet taking such a decision wanted to reduce competition in the satellities field because it probably has been threatened by the potential competitive advantages of other telecommunication companies.

4.5 The Reduced Importance Of The Vertically Integrated Structure In The Canadian Telecommunications Industry Due To Both Technological Change And Regulatory Decisions

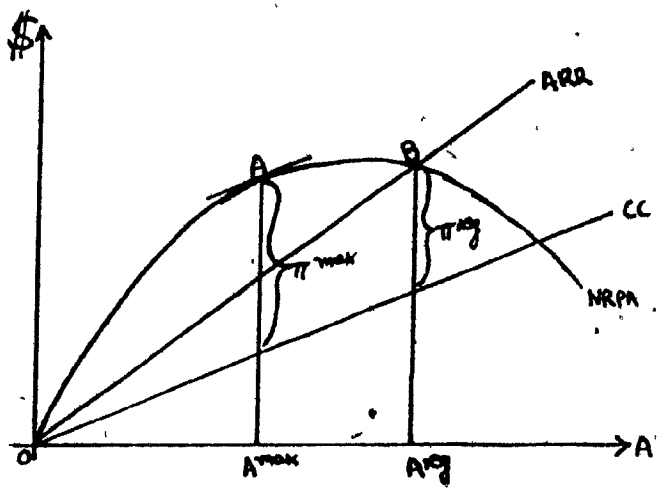
Having described the industry structure of the Canadian telecommunications market and the supply and demand conditions of this market, it is important to make the necessary link between the case-study presented in this and previous chapters and the theoretical models presented in chapter 3.

Much of the discussion of the present chapter has been focused on the in-

creased competition in the Canadian telecommunications industry mainly due to both technological change and regulatory decisions. The relation between these two issue remains to be indicated. More specifically, it is important to see whether or not the problem of vertical ties between Bell Canada and Northern Telecom with which the

Figure 10

Partial regulation model and the Bell-Northern group



RTPC is concerned is as important as it was before the introduction of the significant changes in this vertical structure and especially the issuance of the recent CRTC decision concerning the liberalization of attachment rules in the terminal equipment.

As it becomes clear from the analysis presented in chapters 2, 3 and 4 and especially from the exposition of the market structure conditions prevailing in the Canadian telecommunications industry, the "partial regulation model" is that model appropriate for application to our case-study. The CRTC applies rate of return regulation to the end-product firm (Bell Canada) while it is vertically integrated with its upstream manufacturing subsidiary Northern Telecom. A competitive fringe in that

industry structure exists but it is of minor importance for the present time. According to our terminology and geometric exposition, the capital equipment produced by Northern Telecom and purchased from Bell Canada is depicted on the horizontal axis of the "Westfield diagram". On the vertical axis the amount of $ is depicted. If the cost of capital for Northern Telecom is represented by CC while the allowed rate of return permitted by CRTC on Bell's rate base is labelled as ARR, then the equilibrium point will be at B the point imposed by the regulator. The regulated profits achieved by Bell Canada are Π^{reg} while the capital output produced by Northern Telecom and purchased by Bell Canada is A^{reg}. This purchase of capital equipment is greater than that which would otherwise be purchased if Bell were not regulated (A^{max}). This is the A-J effect to which regulated public utilities are theoretically subject according to the only-existing Canadian empirical evidence undertaken by Dobell, Rodney A., et. al.[76] Bell Canada as a regulated public utility exhibits such an effect. He states that

> "the capital/labour ratio measured in dollars of net capital stock per man-hour increased from 12.5% in 1952 to 41.7% in 1967 (a growth of 23% percent). The annual percentage increases in the measured capital stock averaged 17.7% in the 1952-1960 period and 9.5% in the period 1961-1967."[77]

Thus Bell Canada has undertaken heavy capital investments. Therefore, its behaviour is consistent whith the predictions of the model. Another prediction of the model is that the vertically integrated firm by raising the transfer price and thus inflating the rate base increases the constraint for achieving its unconstrained maximum profit. However, this prediction (of inflated transfer price) does not apply to the Bell-Northern complex as it was demonstrated by a CTC and CRTC investigation on that matter. Thus, due to self-control behaviour or to fear of anti-combines actions the manufacturing subsidiary tried to keep the prices for telecommunications equipment as low as possible for its parent company. This was also the conclusion derived by the Director arguing that

> "Northern Telecom's pricing and profit performance have been

> directed towards ensuring that its parent's position, especially in respect to the vertical integration would be defensible before the regulatory board."[78]

Thus, due to such behaviour, it has been argued by some of Bell's and Northern Telecom's executives that efficiency gains have resulted from this vertically integrated structure such as high quality service at reasonable cost and the creation of an internationally competitive telecommunications manufacturing company. These alleged efficiency gains are repeated again in the Bell Canada's 1981 Annual Report arguing that

> "the Bell-Northern relationship has placed Canada in the forefront of technology. The recognition by the international community, which seeks our expertise, is evidence that the existing relationship has served the national interest well, producing jobs, making possible high quality service at reasonable cost, creating an internationally competitive telecommunications manufacturing company and providing a positive contribution to Canada's balance of payment position. The Bell-Northern complex is of striking advantage for Canada and an essential base for any kind of Canadian technological sovereingty. Canada has maintained a relatively strong, competitive and progressive presence and the indications are that this trend is, under the right conditions, capable of continuing. The Bell-Northern group is by far the most significant participant in the Canadian telecommunications industry. This is undoubtedly due largely to the nature of the market in which they have operated. The accomplishments of Bell and Northern Telecom are exemplary and are largely responsible for the relative success of our telecommunications industry as a whole. The Bell-Northern relationship has created what is virtually a unique situation in Canada - high technology industry in which Canada is succeeding".

Nevertheless, in their effort to highlight the efficiency gains resulting from the vertical integrated structure of Bell Canada and Northern Telecom complex their executives "forget", to mention some of the anticompetive effects emanating from this structure. Thus, they totaly ignore the anticompetitive effects of the restrictive connection of terminal equipment and/or the system interconnection. The recent change in their policy was due to a number of factors as was mentioned also above. Thus, after all, important technological changes have taken place in the telecommunications market. Moreover, various factors, including consumer demands pressures from both domestic

and foreign manufactuers, and regulatory decisions have opened the terminal attachment portion of Bell Canada's busines to outside competitions. Prior to the CRTC's decsion on August 5, 1980, issued on an interim basis permitting the connection of terminal equipment, the carriers had exclusive control over attachments to their networks. Using this exclusive control they either allowed a small group of products to be atached through a coupler provided by the carrier or they didn't allow such attachments at all. Moreover, the vertically integrated carriers (Bell Canada, British Columbia Telephone) didn't allow subscribers to purchase equipment from the carriers' own equipment suppliers. Thus, due to these statutory restrictions and administrative policies of operating telephone companies towards the attachment of subscriber owned equipment, the Canadian subscriber market remained largely undeveloped. But this restrictive attachment policy followed by the carrier did not have any economic justification. The recognized existence of some technical problems could easily be solved. Thus, the appearance of the technical problems themselves did not support any restrictive attachment policy. Such a policy was followed by the carriers as an attempt to foreclose their competitors and to protect their traditional markets. By protecting their traditional markets the telecommunication firms deprived their subscribers of a wider range of products and therefore they restricted consumer choice. Furthermore, the introduction of new products and the pace of their introduction was at the discretionary power of the monopolist carriers. Such policies had harmful effects in the competitive environment in the telecommunications industry particularly in the telecommunications equipment industry, since important markets to competitors of Bell's subsidiary Northern Telecom were foreclosed and therefore such policies operated to the detriment of the public interest. Only a more liberal attachment policy could attract more manufacturers to the equipment industry and introduce a larger variety of terminal equipment than is now available on the Canadian market. This added competition is also necessary to give a higher rate of innovation in the telecom-

munications equipment industry. In addition, more competition will reduce the monopoly power of the carrier and the rate of progressiveness will depend on the pressure of competition. Thus, the benefits that will be brought about by a more liberal attachment rules are: the availability of a wider range of products, the adaptation of equipment to the needs of the subscribers, the faster introduction of new products, the reduction of terminal equipment prices, the attraction of more suppliers and increased innovation and terminal improvements and finally the improvement of financial position of the carrier. These benefits will be great whether or not the vertical ties of carriers and equipment manufacturers remain even after the introduction of liberal attachment policies. At least this is the evidence from the U.S. experience.

If the introduction of more liberal attachment rules, increase competition in the terminal attachment market, as expected, then one can anticipate that Canada's experience will be similar to that of the U.S. as long as Bell Canada continues to buy a high percentage of its required equipment from its affiliate Northern Telecom. That is, if the purchases are remaining linked to vertical ties, the above mentioned benefits derived from the introduction of liberalized rules will be deprived or partially neutralized. But even accepting this point of view, the partial neutralization of benefits will not be possible to be kept over time, since the introduction of competition through the liberalization of attachment rules and a reduction of Canadian tariffs will make the vertical links of Bell-Northern group less and less important thereby neutralizing the complex's ability to foreclose the market for its competitors.

It is very important that the viability and competence of the Canadian telecommunications industry be maintained and that Canada remains in the vanguard of the technological developments in the telecommunications. One of the results flowing from the extremely important CRTC decision on terminal attachments, is the reduction of the market power costs emanating from the vertically integrated structure of Bell-Northern

complex. Neverhteless, for such an outcome, a reduction of the Canadian tariff is indicated.

It is most important that the CRTC's decision be viewed as an instrument for reducing market power via competition while at the same time accepting the vertical integrated structure and the efficiency gains from that structure if we admit that such gains are in existence. We have to note here that recently some doubts have been expressed about the efficiency gains resulting from the vertical structure. More specifically, in a recent (March 1981) article by Babe it is argued that the Vertically Integrated structure is the most important factor giving efficiency losses to the Bell-Northern Complex.

In his study he develops an indirect method of assessing the relative efficiencies of the vertically integrated and non-vertically integreated telecommunications firms in Canada. The conclusion of his analysis is that

> "nonintegrated telephone companies can achieve and do achieve productivity (efficiency) gains substantially in excess of those attained by integrated companies... The evidence suggests that among the factors which tend to give this outcome the most important is considered to be vertical integration."[79]

However, Babe recognises that:

> "There may be of course, benefits attributable to the existence of vertical integration... Northern Telecom possesses Canada's largest private R & D capability, and it has been argued that a large captive market is required for significant expenditures in that area. There may also be associated issues of employement and balance of trade entailed in vertical integration."[80]

Therefore, he accepts that despite the important finding that vertical integration appears to induce considerable inefficiencies in telephone operations, however, important benefits are also result from the vertical structure of the industry. Thus, any public policy decision should take the full range of benefits and costs attributable to vertical integration.

From the above analysis it is clear how important is the recent CRTC decision and how crusial it is in deriving policy guidance solutions in the much debated vertically integrated structure of the Bell-Northern complex. Thus, since this decision of the CRTC is on an interim basis, it becomes extremely important that the Federal Cabinet uphold such a decision and not overturn it as it did in the Telesat case. It is the introduction of competition in the increasingly important terminal attachment market that will reduce the importance of Bell-Northern group ties.

CHAPTER 5

SYNOPSIS OF THE MAIN RESULTS, SOME FURTHER EXTENSIONS, AND IMPORTANT IMPLICATIONS FOR THEORY, PRACTICE AND PUBLIC POLICY

We have focused on the issues arising from the vertical structure of the Canadian telecommunications industry, which are further complicated by the presence of regulatory constraints. We examined the vertical ties of Bell-Northern complex and the likely effects which these ties have on competition in the Canadian telecommunications equipment industry and upon the regulation and supplies of telecommunication services in Canada.

The aim of this chapter is to further extend the policy implications of the models presented in the previous chapter (chapter 3) and to derive additional insight from these models. However, before undertaking this task a recapitulation of the main findings from the previous exposition might be useful.

In chapter 2, the examination of vertical links of Bell-Northern complex was undertaken. Particularly, the supply and demand conditions of the Canadian telecommunications industry were examined and the effects of the vertical structure upon competition in the Canadian telecommunications equipment industry and upon the regulation and provisions of telecommunication services in Canada were examined. In addition, the main findings of the "Green Book" concerning the effects of the vertical ties of the complex on competition on the Canadian telecommunications equipment market were briefly presented.

In chapter 3, having examined the various theories of vertical integration under different market structures important conclusions were derived, which are useful in giving policy guidance in the area of vertically integrated and regulated industries.

Thus, the main indication derived from the theory was that the policy must be based not on the form of vertical control but on its motivation. It is very important, in any particular case, to know the special incentive or group of incentives behind vertical control. However, such an identification is very difficult to make further, complicating the policy makers task in forming their policy.

If vertical integration is only used to reduce costs by improving information flows or control, reducing risk, internalizing externalities, or eliminating market power at a related level then we can argue on this ground that vertical integration is both privately and socially optimal. According to a Bell Canada executive, these efficiency gains are achieved by Bell-Northern's vertical relationships since the

> "...close corporate relationships between Bell Canada, Northern Telecom and BNR, contribute significantly to the low cost telephone service which Canadians enjoy."[81]

Bell's executive vice-president Roy Inns continues arguing before the RTPC that the actual rates of Bell Canada's telephone service is among the lowest of 14 countries surveyed, Sweden and Canada having the least expensive and France the most expensive. This achievment he said

> "is a result of the structure, the conduct and the ability to perform of the total Bell Canada group (Bell Canada, Northern Telecom, BNR)."[82]

Thus, important efficiency gains according to Bell Canada's executive, emanate from the vertically integrated structure.

Nevertheless, while from the one side Bell's and Northern Telecom's executives highlight the uniqueness of the telecommunications industry achieved by the group, from the other side some studies conducted by themselves disclose that their production gains over the period 1967-76 are much less than those achieved by nonintegrated telecommunications firms. The following table sets forth the results of the studies of two major public utilities in Canada - Bell Canada a vertically integrated complex and

Alberta Government Telephone a non-vertically integrated firm.

Table 5.1

Total factor productivity gain comparisons,

Bell Canada and Alberta Government Telephone 1967-76

Year	Bell Canada	Alberta Government Telephone
1967	100.	100.
1968	104.6	106.9
1969	108.2	114.3
1970	112.4	120.6
1971	111.4	126.3
1972	117.3	140.8
1973	123.5	153.4
1974	132.0	175.1
1975	143.3	189.8
176	146.0	190.0

Source: Babe, E. Robert, "Vertical Integration and Productivity: Canadian Telecommunication JEI March 1981[83].

Furthermore, in chapter 3 the theory of regulation in the context of vertical control was set out. The case of partial regulation where the constraint was applied solely to the end-product stage and the firms' attempt to evade the constraints of direct regulation by employing vertical integration as a means of transfering monopoly power from one stage to another was presented. In the case of total regulation where regulation is extended to include all stages of production under a single constraint, regulation still proved to be ineffective. In this case the firm employs different methods of transfering unexercised market power from its protected markets. That is, the firm acquires the assets of its input suppliers and operates them at no profit or a loss if necessary. Finally in the case of effective regulation where individual constraints were imposed on each

stage, the evasion of regulation is no longer possible. The acquisition of downstream or upstream subsidiaries and their operation at zero or negative profit is no longer profitable for the effectively regulated firm. Its optimal policy is to divest itself of such subsidiaries. Also, "gold plating" or physical padding is not profitable behavior for the effectively regulated firm. The substitution of capital for labour and the pursuance of the inefficient (A-J) path of the regulated single-stage firm is the optimal policy for the multiple constrained firm.

In chapter 4 the vertical relations of Bell-Northern complex were examined. Firms in regulated industries do not as a rule confine themselves solely to a single stage of production or distribution such as, say, the final distribution of gas, electricity or telephone service. Usually they extend their operations in other non-regulated fields as it is the case with Bell Canada. In examining the extension of Bell Canada operations to its non-regulated subsidiary Northern Telecom, a number of important conclusions were derived, with respect to increasing competition in this vertically integrated structure. A significant observation was that important changes have occurred in the structure, conduct and performance of the telecommucation complex of Bell-Northern since the publication of the statement of Material by the Director of Investigation and Research Combines Investigations Act. ("Green Book") These important changes combined with the increasing competition due to both technological change and regulatory decisions such as the recent one (August 5, 1980) taken by CRTC allowing the connection of terminal equipment which meets Bell Canada standards, or which is of the same class and manufacture as that provided by Bell to its subscribers or which meets the requirements of the FCC in the U.S.A., make the vertical ties of Bell-Northern group much less important so far as the issue of market foreclosure is concerned. Thus, any decision taken to divest Northern Telecom from its parent Bell Canada must be gauged against the background of important technological and structural changes in the telecommunications

equipment industry. The changed environment leads to a conclusion which contrasts with that of "Green Book" in which it is said

> "the best policy solution to the issues raised in this statement is the introduction of increased competition in the telecommunications equipment industry. Furthermore, the most effective long term method to achieve this goal is through the divestiture of Northern Telecom from Bell Canada as a means of reducing barriers to entry into the telecommunications equipment industry."[84]

It is important to note here the significant implications of the above proposed by the Director solution in terms of the models depicted in chapter 3.

5.1 SOME IMPLICATIONS DUE TO THE SEPARATION OF NORTHERN TELECOM FROM BELL CANADA

It was repeatedly mentioned above that the Director of Investigation in his inquiry concerning the problem of vertical links between Bell Canada and Northern Telecom believed the solution resided in increased competition achieved through the separation of Northern from its parent Bell Canada. In the previous chapter the implications and the evaluation of our own proposed solution have been discribed. In this section it is essential to evaluate and to gauge the implications of the proposed solution by the Director and to make a comparison to this which we have proposed. In this way the merits and drawbacks of each proposed solution will be disclosed and a judgement may be more easily made.

5.1a Separated complex: Northern Telecom a competitive firm

We start with the assumption that the wish of the Director has been fulfilled and a separation of Northern Telecom from Bell Canada has been occurred. It is still assumed that Bell is a regulated natural monopoly as before such a separation has occurred, and that Northern Telecom consists part of competitively organized telecommunications equipment industry. This is happening, say, because of a reduction of the

Canadian tariffs. There is no doubt that the existence of a Canadian tariff serves to limit considerably the competition in the Canadian equipment market. Therefore, a reduction of the prevailing tariff would significantly increase competition in that market. Indeed, a reduction of the tariff would be in the public interest under the condition of no separation of the Bell-Northern's vertical links. Thus, in this way the two policies i.e., of liberalization of terminal attachment market and a reduction of Canadian tariffs will increase considerably the competition in the telecommunications equipment market, while since no separation occurs, the efficiency gains (if really exist) emanating from the close coordination of the vertically organized complex will be maintained. There have been expressed some fears concerning the viability of Northern Telecom after it has been separated from its parent and a reduction of tariffs has occurred. Some others they have argued that Northern Telecom has now become a leader in telecommunications equipment in Canada and abroad with substantial market shares throughout the world and therefore it doesn't make much difference to it if a reduction of tariffs occurs with or without separation from Bell Canada. They argue that the most probable outcome of a reduction of the tariff it might be at the detriment of the existing competitive fringe and to a lesser degree will affect Northern Telecom. In any event, it is the advocacy of this thesis that the first step to increase competition in the Canadian telecommunications equipment market has already been taken (liberalization of terminal attachments). However, the second one (reduction of Canadian tariff on telecommunications equipment) has not yet happened and it still remains to be made.

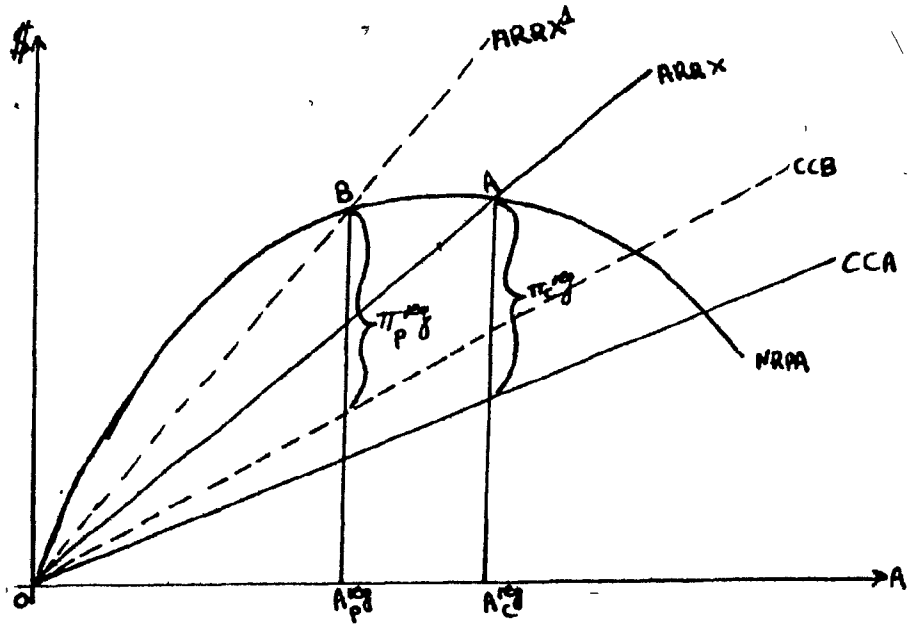
Thus, although the liberalization of terminal attachments is a solution to the existing problem, however, it is a partial one. For completing this piecemeal solution the reduction of tariffs remains to be introduced.

In any case, we assumed above that the end-product natural monopoly and regulated firm, Bell Canada, purchases its capital input (A) at a competitive price C^A at

arm's length from a competively organized A industry. If the allowed rate of return for Bell Canada (the X monopoly according to our terminology of chapter 3) is ARRX, then the equilibrium reached will be at point A of the diagram. Thus the capital purchased from Northern Telecom and used by Bell is A^{reg} and its profit Πc^{reg}. However, it will be shown in a moment that point A is also the point of equilibrium when the two firms Bell-Northern are linked with vertical ties and the regulator sets a maximum transfer price equal to the cost of capital C^A i.e., he applies effective regulation.

Figure 11

Comparison of alternative market structures



5.1b Extension of Regulation to Northern Telecom: Effective Regulation

It is now assumed that the Bell-Northern complex remains as it is now, but in addition the regulator extends his regulatory function to include Northern Telecom in his

domain. He sets maximum transfer price (p^A) equal to the marginal cost of the capital input (c^A) or put it differently he sets the fair return of the upstream division (S^A) equal to the cost of capital (r), (i.e., $S^A=r$ or $p^A=c^A$) namely, Northern Telecom is effectively regulated.

If the transfer price p^A is not regulated the vertical integrated complex is in equilibrium at point B. However, if the above assumptions are made (i.e. that Northern Telecom is effectively regulated) then the equilibrium point is A (see previous diagram). But this is also the point of equilibrium of a regulated Bell Canada facing a competitive and an independent Northern Telecom. Thus, the point A is the point of equilibrium of both a regulated single-stage firm (Bell Canada) buying its input from a competitively organized industry (Northern Telecom) and an effectively regulated multistage firm (Bell-Northern complex), thereby establishing the equivalence of the results under these two alternative structures.

Thus, a single-stage firm regulated to its end-product and facing a competitive input market and a multistage firm constrained to earn zero profits from its upstream level (i.e. the regulator sets the allowed rate of return equal to the cost of capital) end-up producing the same output, utilize the same amount of inputs, pay the same price for the prices of the inputs and gain the same amount of profits. Thus, establishing the equivalence of the results under these two market structures. Stating it differently we can say that regulating the transfer price of a vertically integrated complex will induce it to behave as if it were a single-stage end-product monopolistic regulated industry facing a perfectly competitive input industry.

However, if the intermediate product stage instead of being perfect competitive exhibits elements of market power, then the end-product regulated firm faced with the increased cost of the capital input will tend to curtail its production and thus less output will be produced with the same level of expenditure. This is likely to be the case

with the proposed-by-the-Director solution of vertical dissolution of Bell-Northern complex. That is, if such separation occurs, then since the regulated end-product stage firm will be faced with increased cost for its capital input due to the market power enjoyed by the independent nonregulated intermediate product stage Northern Telecom, Bell Canada will tend to curtail its production, and less output will be produced with the same level of expenditive. That is why it was suggested previously that the increased competition (liberalization of terminal attachments and reduction of the Canadian tariff) should be introduced while keeping the vertical ties of the complex.

5.2 CONCLUSION

Thus, the conclusion from the above analysis is that the vertical dissolution of Bell-Northern group will result in an end-product regulated firm and an independent non regulated one supplying the capital input to it either under monopolistic power or competitive conditions. This is at least as desirable from the point of view of public policy as the extension of regulation to the intermediate supplier of the capital input (Northern Telecom) as long as the regulator restricts the allowed rate of return to be equal to the financial cost of capital. However, such a dissolution or extension of regulation to Northern Telecom is not necessary to the public interest as the analysis of chapters 4 and 5 makes clear. The most viable solution would be a liberalization of terminal attachment equipment market and a reduction of the Canadian tariff on telecommunications equipment. Thus, it is of extreme importance that the Cabinet uphold such a decision taken by CRTC concerning the liberalization of terminal attachments and will not be overturned as it has happened with the Telesat decision. Moreover, the other side of the solution (reduction of tariffs) remains to be done. Its introduction should be quick. Therefore, ending we can say that the important technological changes and regulatory decisions have changed or more specifically have reduced the

importance of the vertical structure in the Canadian telecommunications industry. The viable solution to the existing problems is no longer the separation of Bell Canada - Northern Telecom links as it was suggested by the "Green Book", but the support by the Cabinet of the recent CRTC decision concerning the liberalization of terminal equipment market and a reduction of Canadian tariffs.

FOOTNOTES

1. Commanor, W.S., "Vertical Mergers, Market Power and The Antitrust Laws" AER 1967.

2. They mainly argue that there is an incentive for vertical integration or for a tying contract if the competitive downstream producer of a commodity X exhibits variable proportions technology and it faces an input monopolist selling A and a competitive market for input B. If the A monopolist wants to extract monopoly rents then will integrate downstream into the competitive industry or it will use a tying contract. That is, the input monopolist can purchase the competitive input B at its competitive price and tie the purchase of B to the purchase of A, namely, under this tying arrangement the purchaser (downstream competitive) agrees as a condition of purchase of A to buy the seller's (monopolist's) supplies of the other input B. That is, the monopolist of A forecloses competing sellers of B from the chance of selling that input to the purchaser of downstream competitive producer of X. Under these conditions the monopolist enjoys its monopoly profits and the firm is operating on its expansion path. For more on this subject see Roger D. Blair and David L. Kaserman, "Vertical integration, tying and antitrust policy" AER 1978.

3. For a more extensive treatment of the various forms of vertical control see: Green, C., Canadian Industrial Organization and Policy, (McGraw-Hill Ryerson, 1980) and Scherer, F.M., Industrial Market Structure and Economic Performance (Rand McNally College Publishing Company, 1970 and 1980)

4. Williamson, Oliver E., "The Vertical Integration of Production: Market Failure Considerations, AER 1971.

5. See Bell Canada's Annual Reports 1979-80-81.

6. Financial Post, Special Report, June 10, 1976 and Exhibit T-1160.

7. Ibid, p. 6 and Electronics Sector Study, Exhibit T-623.

8. Moody's Public Utility Manual 1980 p. 3007-9.

9. Bell's Annual Report 1981.

10. See Moody's Industrial Manual 1980, p. 5755.

11. Moody's Public Utility Manual 1980.

12. See Financial Post, 24 February 1979, p. 2.

13. See Northern Telecom's and Bell's Annual Reports 1976-1981.

14. See Moody's Public Utility Manual 1980.

15. The Telecommunicator, March 31, 1980.

16. Canada, Director of Investigation and Research Combines Investigation Act "The Effects of Vertical Integration on the Telecommunications Equipment Market in Canada", Ottawa 1976. From now on will be called the "Green Book", p. 184.

17. See Westfield, F.M., "Regulation and Conspiracy" AER 1965.

18. Mathematically it can be written as NRPA=max ($R^X(A,B)-WB$) where $R^X(A,B)$ is the revenue function of the firm X in terms of the inputs A and B (capital and labor) and W the fixed wage rate for labor. (See Westfield op. cit. p. 430.)

19. It is assumed that the X industry is the only purchaser of A.

20. See Fritz Machlup and Martha Taber, "Bilateral Monopoly, successive Monopoly and Vertical Integration" Economica 1960.

21. Ibid. Also Scherer, F.M., Industrial Market Structure and Economic Performance 1970, p. 243.

22. Machlup Fritz and Martha Taber, op. cit.

23. See Galbraith, John K., American Capitalist: The Concept of Countervailing Power, (Cambridge Houghton, Mifflin, 1952) ch. 9; and Scherer, F.M., op. cit. p. 21, 241-52.

24. If A and X firms integrate vertically then the resulting firm will be in equilibrium at point b where $MR^X=MC^X$ (see diagram 3.2a) with final product price being p^X and the output levels will be OA, OB, OX.

25. For an extension of the argument see Roger D. Blair and David L. Kaserman, "Uncertainty and the Incentive for Vertical Integration" SEJ 1978-79.

26. See John M. Vernon and Daniel A. Graham, "Profitability of Monopolization by Vertical Integration", JPE 1971.

27. Frederic R. Warren-Boulton, "Vertical Control with Variable Proportions" JPE 1974.

28. See The Telécommunicator, March 31, 1980.

29. Dayan, D. Vertical Integration and monopoly Regulation: Unpublished Ph. D. Dissertation, Princeton University 1972.

30. For more on Natural Monopolies see Green Christopher, op. cit. pp. 201-4, 233-34.

31. For an extensive literature of regulation see: Averch Harvey and Johnson L. Leland, "Behavior of the firm under regulatory constraint" AER 1962; Zajac E.E. "A geometric treatment of Averch-Johnson's Behavior of the Firm Model" AER 1970; Baumol William and Klevorick K. Alvin, "Input choice and rate-of-return regulation: an overview of the restrained firm" AER 1969; Bailey E.E. and Malone J.C. "Resource Allocation and the Regulated Firm" Bell Journal 1970; Bailey E.E. Economic Theory of Regulatory Constraint Heath-Lexington, 1973.

32. Dayan, D. op. cit. p. 200.

33. The rate-of-return constraint when is applied solely to the end-product division X (partial regulation) can be written in mathematical terms as following:

$$\frac{R^X(A,B)-WB}{P^A{}_A} \leqslant S^X$$

where: A and B are two inputs, A capital and B labour; $R^X(A,B)$ is the revenue function in terms of the inputs A and B; W is the wage rate per labour input; p^A is the transfer or internal price that is, the price division X pays for division A for the A input; S^X is controlled by the regulator and it is the allowed rate-of-return.
The above expression says that the regulator constraints the firm's earnings on investment, i.e., the ratio of gross revenue less operating costs, to at most a return S^X.

34. We can distinguish between "cost-padding" and "physical padding". The former refers to an over payment for the capital input while the latter to an acquisition of non-productive quantities of the capital input or to the acquisition of wasteful capital that is capital that contributes to a firm's costs but not to its revenues. Therefore the base padding is different than the A-J effect.

35. See Baumol William and Klevorick K. Alvin, op. cit.

36. The rate-of-return constraint when it is applied to both stages-divisions A and X (total regulation) can be written in mathematical terms as following:

$$\frac{(R^X(A,B)-WB)+(rp^A{}_A)}{P^A{}_A+C^A{}_A} \leqslant S^T$$

where: A and B, $R^X(A,B)$, WB and $P^A{}_A$ as they defined above and $rp^A{}_A$ are the annual revenues of the equipment-supplying division (division A); $C^A{}_A$ is the amount of primary capital equipment required by the A division to produce intermediate product A, the former being valued at that division's cost per unit C^A; $P^A{}_A$ is the amount of invested capital A required by the X division to produce end-product X and valued at that division's acquisition price p^A.
The above expression says that the regulator constraints the ratio of the integrated firm's total gross revenues less current expenses from operating both stages over total invested capital valued at its "acquisition price" per unit not exceed the single "fair" rate (Dayan 1972).

37. Dayan, D. op. cit. p. 190.

38. Under the effective regulation method the number of constraints required depends on the number of firms connected with vertical ties. In our example in addition to the constraint employed under the partial regulation method

$$\frac{R^X(A,B)-WB}{P^A{}_A} \leqslant S^S$$

one more constraint is required. This is the constraint of the transfer or internal price. This is taken into account by simply adding a constraint which limits the ratio of net revenue over capital stock, or the permitted return, of the upstream divsion A to a specified value, i.e.,

$$\frac{rp^A{}_A}{C^A{}_A} \leqslant S^A$$

Thus, is this model we have two constraints: one for the downstream division X (S^X) and another for the upstream division A (S^A).

39. Dayan, D. op. cit., p. 200.

40. See in the "Green Book" and Canada, Department of Communications (1975).

41. Ibid. p. 184.

42. Ibid. p. 184.

43. The Telecommunicator, March 31, 1980.

44. As independent of the U.S. Bell System Companies we mean the telephone companies that are not members of the AT & T system.

45. For more on this case see the "Green Book" pp. 163-69.

46. Ibid. p. 183.

47. See Exhibit T-1767.

48. See the Financial Post, Special Report, November 1, 1980.

49. More about the cross-subsidization problem see p. 66.

50. See The financial Post op. cit.

51. See "Reply to Director's New Submission on Terminal Attachment" Bell Canada November 3, 1980.

52. See Vol. 18 p. 2663-72.

53. Maley Vol. 103 and Bakas Vol. 122.

54. See Vol. 31, p. 4832-35.

55. See at p. 58-59.

56. Argument as to the prohibition order sought by the Director, Bell Canada October 1980.

57. See Murray, Vol. 25.

58. See Green, Vol. 46.

59. See Spievack, Vol. 89.

60. See Green, Vol. 25 and Murray in the Financial Post, op., cit.

61. See Green, Vol. 25.

62. The Financial Post, Special Report, November 1, 1980.

63. See Vol. 201, p. 30258

64. Ibid.

65. See Bell's Statistical Report 1978-1979.

66. See Vol. 8, p. 1018-34.

67. See Janish, "Telecommunication, Regulation and Competition: A Consumer Perspective", p. 20.

68. See, Vol. 200, p. 30140.
We have to note here that the results depend on the hypothetical numbers used. If different assumptions are made, of course different results will be obtained.

69. See, Vol. 199.

70. This outcome is different than the one above because it is based on different assumptions.

71. Janish, op., cit., p. 9.

72. Ibid. p. 10.

73. Ibid. p. 14.

74. See in the "Green Book", op., cit., p. 159.

75. The Telecommunicator, March 31, 1981.

76. Dobell, Rodney A., et. al. "Telephone Communications in Canada: Demand, Production, and Investment Decisions" Bell Journal 1972.

77. Ibid.

78. See in the "Green Book" op. cit. p. 175.

79. Babe, E. Robert, "Vertical Integration and Productivity: Canadian Telecommunication" JEI March 1981.

80. Ibid. op. cit.

81. The Telecommunicator op. cit.

82. Ibid.

83. Babe, E. Robert, op. cit.

84. The "Green Book" op., cit., p. 189.

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