

P
91
C655
G567
1986

2/ REGULATION OF CANADA'S SATELLITE COMMUNICATIONS SECTOR/

Report Submitted to the Department of Communications

by

1/ Steven Globerman/

Simon Fraser University
Faculty of Business Administration
Burnaby, British Columbia

March, 1986

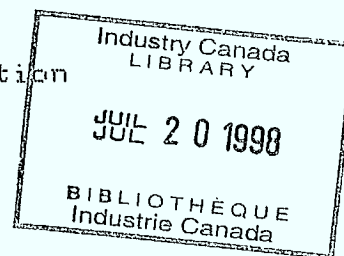


TABLE OF CONTENTS

ACKNOWLEDGMENTS	i
INTRODUCTION	1
OVERVIEW OF MAJOR PUBLIC POLICY ISSUES	4
BACKGROUND TO TELESAT'S REGULATORY ENVIRONMENT	12
SUPPLY AND DEMAND CONDITIONS IN THE SATELLITE SECTOR	18
OPTIMAL PRICING OF SATELLITE SERVICES	28
NON-PRICE RELATED CONDITIONS OF EXCHANGE	38
OTHER REGULATORY ISSUES	40
CONCLUSIONS	47
APPENDIX A	49

Acknowledgments

Numerous individuals and organizations provided extremely helpful assistance to the author. I would like to thank especially Mr. Peter Smith of the Department of Communications for his continued encouragement and guidance and for critical suggestions on earlier drafts. Financial support from the Department of Communications underwrote the cost of this study.

Other individuals who gave generously of their time and knowledge include Mr. Marcel Boutin of Telesat Canada, Mr. Norman Nault of the CBC, Mr. Paul Crowder of Crowder Communications Ltd. and Dr. Leland Johnson of the Rand Corporation. Others too numerous to mention individually participated in our survey interviews. To them and their organizations also go my thanks.

My research assistant, Larry Olson, deserves a special acknowledgment for his perseverance and diligence.

INTRODUCTION

The primary purpose of this study is to identify and evaluate arguments for liberalizing the regulatory environment surrounding the satellite sector in Canada and to consider a number of specific directions for public policy in this sector of the telecommunications industry. Regulatory issues in the satellite sector have received no where near the same degree of attention as has been paid to the terrestrial sector of the telecommunications industry. In part this may reflect the relative sizes of the two sectors. It may also reflect the relatively small number of direct "stakeholders" in satellite communications (to date). In any case, there is a serious dearth of economic and public policy research in this area, and there have been very few systematic efforts to identify and estimate important economic relationships affecting supply and demand conditions for satellite telecommunications.

The dearth of research obviously makes the investigator's job more difficult, since it increases the burden to generate original data and to speculate about the nature of economic relationships that are important to drawing policy conclusions. At the same time, the policy issues in this sector are relatively focussed, albeit certainly not easy to address, which facilitates a concentration of resources on specific research questions. Nevertheless, given the extremely underdeveloped literature concerning the regulatory environment for satellite telecommunications, this study adopts a relatively broad approach to the subject. Specifically, it seeks to identify the main regulatory issues and to place those issues in an economic context. That is, the demand and cost conditions influencing the relative net social benefits of alternative policy approaches are described, and the available evidence bearing on these relevant conditions is discussed. Since the available evidence in many cases is quite sparse, the policy suggestions offered herein should be seen as tentative and contingent on additional research.

Description of the Sector

At present, Telesat Canada is the only domestic satellite communications operator in Canada. It provides two main types of services: one geared to voice and data traffic for businesses, and the other to carry audio and voice signals for broadcasters. More specifically, the Company owns six Anik satellites (four of which are active) carrying broadcast, voice and data communications, including national television and long distance telephone traffic. The company also sells earth stations and earth station subsystems, and provides consulting services in

satellite communications in Canada and to the international market. The bulk of Telesat's business continues to be broadcast carriage.

Telesat endeavours to make available a full spectrum of space and earth segment services which will satisfy a broad range of service applications by its customers. Currently within the 6/4 and 14/12 GHz operating systems, space segment services are offered under three principal tariffed service offerings: Full period, Occasional Use and Partial RF Channel Services. The Company's 6/4 and 14/12 GHz earth segment services are offered through special assembly tariffs and reflect services individually designed and engineered to meet the specific service requirements of the customer.

The large majority of space segment services leased from Telesat are full period service offerings. For rate-making purposes, these service offerings are based on a "bulk usage" basis in that they reflect actual service costs and forecast utilization over a study period. A relatively small amount of Telesat's total space segment services are leased on a metered use basis or occasional use basis as defined by the Company's tariff.¹ In its 1984 Annual Report, Telesat indicates that it operated twenty-two 6/4 channels and ten 14/12 channels for broadcast applications; three 6/4 channels and twelve 14/12 channels for voice/data applications, and three 6/4 channels plus 10 14/12 channels for U.S. to U.S. applications. The largest single customer for Telesat's services is the Canadian Broadcasting Corporation (henceforth CBC). The second largest customer is CANCOM. The latter company leases transponders from Telesat to provide television signals to its affiliates for a fee. It also acts as an audio "subcarrier" of radio voice services such as news or sports reporting.²

CANCOM came into existence to extend broadcasting services to the remote and underserved regions of Canada, i.e. regions

1. Letter from J. Langlois, Manager of Regulatory Matters and Corporate Policy to the author, dated February 13, 1985.

2. Within the past year and a half, CANCOM has been successful in marketing 18 of its audio subcarriers to 6 different radio entertainment programmers or news services for distributing these services to radio stations in all parts of Canada. See Submission by Canadian Satellite Communications Inc. to Federal Task Force on Broadcast Policy, November 15, 1985, pp.13-14. Potential direct competition from Telesat in this subcarrier market has been raised as an important regulatory issue by CANCOM spokespeople.

perceived by the company to be receiving two or fewer off-air television signals. The Company's perception of the CRTC's policy goal setting the context for CANCOM's activities is to provide equal access for communities throughout Canada to high quality TV and radio services. As of August 31, 1985, the Company was serving a total of 604 communities across Canada representing approximately 850,000 people. For policy purposes, an important feature of the Company's corporate strategy is to move into other branches of satellite services making use of the subcarrier capacity existing in the transponders it leases from Telesat. These include point to multi-point audio and data services.³ It can be expected that moves in this direction that bring CANCOM into competition with Telesat will give rise to concerns about the existence of "fair competition."⁴

Telesat is a private commercial company. Its ownership is shared by the Government of Canada and Canadian common carriers. The Connecting Agreement between Telesat and the common carriers made Telesat the tenth member of the consortium but restricted Telesat's business to that of a wholesaler in return for the telephone companies guaranteeing Telesat a minimum rate of return on common equity. The telephone companies would do the marketing of satellite services to end users, including the broadcasters. A rate-of-return equal to the weighted average of Bell Canada's and B.C. Tel's rates-of-return was guaranteed to Telesat. More recently, an amendment to its Connecting Agreement with the nine major telephone companies allows Telesat to sell and market its domestic satellite services directly to business customers. The change is subject to approval by the federal regulator. Since 1981, broadcasters have been allowed to deal directly with Telesat for satellite channels.⁵

Following changes in the federal government's earth station licensing policies, Telesat's monopoly position as a provider of receive earth stations was terminated. Its monopoly position as a provider of transmit earth stations is due to end in April 1986. This is a potentially significant concern for Telesat, since it has earned approximately 36% of its revenues from this sector. As a means of protecting this revenue base, Telesat is emphasizing related services such as systems engineering, procurement, installation and maintenance services for customer-owned earth stations.

3. Ibid.

4. The issue of potential cross-subsidization and predatory behaviour on the part of Telesat will be identified and explored more fully in a later section.

5. See Larence Surtees, "Telesat receives permission to sell directly to businesses," The Globe and Mail, July 16, 1985, B.11.

OVERVIEW OF MAJOR PUBLIC POLICY ISSUES

The foregoing broad description of the satellite sector suggested a number of potentially important public policy issues surrounding the sector. In this section, we identify and briefly discuss the major regulatory issues that will constitute the primary focus of this study. In broad terms, there are two overriding issues surrounding the regulation of the satellite sector: 1. Which facilities and activities should be regulated and which unregulated?

2. What should be the precise nature of the regulations that are put in place or maintained?

Representatives of Telesat as well as other observers have argued that the common carrier regulatory environment in which Telesat operates is inappropriate given ostensibly substantial differences in the technical and operational environments of a satellite carrier and a telephone company. In particular, they point to the "block investment" characteristics of Telesat's capital requirements; that is, substantial "sunk" costs must be incurred associated with preparing for a satellite launch and with launching the satellite. These sunk costs increase the risks associated with capital investment and enhance the value of pre-selling capacity, especially through long-term contracts with customers. Investments in satellite capacity are also alleged to be fairly indivisible giving rise to an inordinately high ratio of fixed costs to total costs. By contrast, terrestrial systems are presumed to be characterized by relatively constant incremental growth, once the basic infrastructure is in place.⁶ This latter characteristic emphasizes the importance of "filling out" capacity through stabilizing demand for satellite services. Equivalently, it suggests that there will ordinarily be a gap between average and marginal costs of satellite service. As a result, it may be efficient to charge prices, in the short run, that fail to cover the fully allocated costs of a service but which more than cover the incremental costs of providing that service. Given the current substantial excess capacity that characterizes Telesat's operations, the flexibility to fill in capacity through promotional pricing is seen by some to be very important.

The Scope of Regulation

The broadest regulatory issue surrounding Telesat is what limits (if any) should be placed on the scope of economic regulation affecting the company. At one extreme, any service offered by Telesat would be subject to review by the CRTC, including the rates charged, the capital investment and the

6. See CRTC, The Costs Of Choice, Ottawa, Minister of Supply and Services Canada, 1985.

service alternatives. At the other extreme, Telesat would be free to negotiate rates with customers outside of any approval process and would be free to offer service alternatives without review by the regulator. Telesat argues that the current system of regulation seriously restricts its ability to market its services in a responsive and competitive fashion. Its major customer, the CBC, has also expressed dissatisfaction with the inflexibility of the current regulatory environment, especially when attempts are made to depart from approved general tariffs.⁷ On the other hand, smaller customers of Telesat, as well as subcarriers such as CANCOM, argue that Telesat already has too much regulatory scope to abuse its monopoly position and that restrictions on Telesat's freedom to market services should be further tightened.

One broad area in which the issue of the "optimal" degree of regulation arises is in the marketing of services. As noted above, under current regulations, Telesat can market its services directly to broadcasters. Under an amendment to the Connecting Agreement with Telecom Canada, Telesat is free to market its services directly to business customers, rather than function strictly as a wholesaler of such services to the telephone companies. Telesat argues that direct marketing will be more efficient than marketing indirectly through the telephone companies. For one thing, it will allow the removal of one level of managerial bureaucracy with an attendant cost savings. In interviews that we conducted, and that we will describe in a later section, the cost of leasing transponder space was frequently cited as an obstacle to using satellite capacity in Canada. Hence, any change that facilitated lower costs of satellite services, and a corresponding lowering of prices, could contribute to a more intensive use of Telesat's capacity. For another thing, direct contact with the market should allow Telesat's management to more quickly identify market opportunities and shape and implement strategies to respond to those opportunities.

One does not encounter many objections to direct marketing by Telesat. Some observers have expressed scepticism about Telesat's commitment to the aggressive marketing of satellite services as long as the terrestrial carriers remain major equity owners.⁸ But CANCOM has raised a further objection: namely, that its ability to compete in the marketing of new business communication services will be severely hampered by Telesat's direct marketing efforts. Since Telesat has indicated a

7. Author's discussion with Mr. Norman Nault of the Canadian Broadcasting Company.

8. See Lawrence Surtees, "Non-Carrier buyer is urged for Teleglobe", The Globe and Mail, January 9, 1986, B8.

commitment to introduce a national data distribution system via satellite, with a customer profile that is similar to CANCOM's, at least in terms of the latter's planned business services, the objection has potential policy relevance.⁹ The basis for CANCOM's objections appear primarily rooted in a concern that Telesat will act in a predatory fashion to disadvantage CANCOM in the marketplace. By itself, this would seem to have less to do with Telesat's direct marketing and more to do with the flexibility that Telesat has to set prices and conditions of service. The possibility does exist, however, that Telesat will be able to engage in price and non-price forms of predation more effectively through direct marketing, since it can presumably respond more quickly and flexibly to competitive threats by negotiating directly with customers being wooed by competitors. This consideration, while potentially relevant, is certainly secondary to the broader issue of Telesat's incentives and capabilities to engage in predatory behaviour, especially predatory pricing.

Perhaps of more direct concern in considering Telesat's marketing environment is whether the company should be free to market any services it deems appropriate. Again, we encountered few explicit objections to Telsat's marketing of new services or services being currently marketed by other carriers or subcarriers. However, CANCOM raised the possibility of an inefficient duplication of services. In particular, it points to Telesat's intention to proceed with using the KU band for direct-to-home service, notwithstanding that it will be competitive with CANCOM's C band service. CANCOM argues that the proposal would lead to duplication in the use of satellite capacity by two competing network satellite services, a luxury which Canada can ill afford.¹⁰ CANCOM's argument might be dismissed as self-interest pleading. However, similar arguments were made to justify the ownership of Telesat by the telephone companies; namely, that the planning and expansion of Canada's overall telecommunications facilities would proceed more efficiently if representatives of the major carrier modes cooperated rather than competed. Hence, it would seem appropriate to address potential efficiency arguments for regulating Telesat's entry into new service markets, as well as its withdrawal of services from the market.

A more extensive set of issues are associated with Telesat's lack of pricing flexibility. Under current regulation, Telesat must support its tariff structure through economic evaluation

9. See, "Telesat", The Globe and Mail, July 20, 1985, B6.

10. See Submission by Canadian Satellite Communications Inc. to Federal Task Force on Broadcast Policy, November 15, 1985, p. 34.

studies submitted to the CRTC. Telesat accepts the need for regulation of prices charged on its space segment services. However, it argues that no such regulation is required for its earth segment services, especially in view of the liberalization of restrictions on uplink earth station ownership. Telesat further argues that if regulation of the earth station segment is to be continued, all earth services should be combined into a common category which must pass an overall "burden" test.¹¹ On the other hand, opponents of the deregulation of earth station services pricing argue that deregulation would free Telesat to predate in the earth station segment through cross-subsidies from its space segment monopoly.

Deregulating prices in any segment of Telesat's activities should involve a consideration of whether the Company has both the incentive and the ability to use its freedom to price in order to predate against competitors in either the same or related businesses. This consideration, in turn, can be shown to hinge critically on the issue of whether the sector affected by deregulation is contestable. It will also depend upon whether Telesat regularly enjoys a rate-of-return that exceeds its cost-of-capital. Both of these empirical issues will be explored in a later section.

Currently broadcasters are allowed to resell and share transponder capacity. And following the CRTC's recent decision regarding the interconnection of CNCP's long distance facilities with the local switching systems of Bell Canada and B.C. Tel., non-regulated businesses can also presumably resell non-MTS services. Telesat has consistently argued against unrestricted reselling and sharing given its regulated status. More specifically, it has argued that it is at a competitive disadvantage in that its rates are regulated, while the rates charged by resellers are not.¹² Telesat has no objection to pure reselling, i.e. buying a full channel and parcelling it out to different customers. What it wants is the right to do the same thing on the same basis as its competitors, i.e. sell full channels among a number of different customers at any rates it wants to charge. Telesat also wants the freedom to "rebalance" its full channel and partial channel rates.¹³

Telesat's concern about resellers' arbitraging artificial

11. Author's interview with Marcel Boutin of Telesat Canada, October 28, 1985.

12. See Telesat Canada, Evidence on Interexchange Competition and Related Issues, CRTC Telecom Public Notice, 1984-6, April 27, 1984.

13. Author's interview with Marcel Boutin of Telesat Canada.

price differences between full and partial use channels parallels arguments against unrestricted reselling that have been made by the telephone companies. It constitutes a relevant potential argument for deregulating the pricing behaviour of common carriers, since entry that is encouraged by inefficient prices is, itself, likely to be inefficient. At the same time, the prior cited risk of predatory pricing must be weighed against this potential benefit.

The Nature of Regulation

Given the continued regulation of various aspects of Telesat's activities, a number of specific procedural and operational issues arise, particularly with respect to Telesat's approach toward pricing.

Prices

One issue is whether prices should be set in strict accordance with allowable costs or whether Telesat should be allowed the flexibility to incorporate other criteria into its pricing policy. The current system of regulation effectively ties rate changes in one sector to rate changes in other sectors. Furthermore, customers taking similar services must be charged similar prices.

This issue featured prominently in the debate surrounding Telesat's proposed bulk discount offering to large users, most notably the CBC. Telesat argued that the promotion of increased utilization of satellite services was the principal objective of offering bulk discounts. The increased revenue as a result of encouraging utilization would provide a strong "backbone" of stable revenues which, in turn, would permit Telesat to charge lower rates to other customers than would be possible without this support. Most of the intervenors argued that the bulk discount rate structure for full period RF channels incorporated in Telesat's proposed general tariff was discriminatory, in that it conferred an unfair advantage on large users, and on the telephone companies in particular, and thereby discouraged utilization by smaller users.¹⁴

The underlying issue facing the regulator was whether a departure from strict cost-based pricing could be justified by higher net revenues. While not framed explicitly in terms of demand sensitivities, the regulator rejected the view that bulk discounts would promote higher net revenues for Telesat. Rather, it expressed the view that setting uniform rates would result in added demand from new users that more than offset any reduced

14. Telecom (CRTC) Decision 81-13, pp.172-173.

revenues from existing users.¹⁵ While demand sensitivities were recognized as one possible rate-setting criterion, the CRTC also objected to the fact that there was no cost justification for the bulk discount. Furthermore, it expressed concern about the possibility that new customers might be unable to obtain bulk discounts for full period RF channels due to limitations of capacity.¹⁶ Hence, a concern about "undue" discrimination remained a decisive criterion in evaluating departure from cost-based pricing. Under the Railway Act, undue discrimination might be viewed as charging different price-cost markups to similar classes of subscribers.

In the absence of any efficiency gains from price discrimination, an insistence upon cost-based pricing would seem to be reasonable. However, under specific conditions, price discrimination could be an efficient approach to pricing. Among other things, where marked economies of scale exist, such that marginal costs ordinarily lie below average costs, price discrimination represents a way for the firm to recover its costs while producing a positive rate of output. In the context of a regulated firm facing a rate-of-return constraint, a specific pattern of price discrimination is socially efficient. This pattern involves imposing price-cost markups that are inversely proportional to elasticities of demand, i.e. so-called Ramsey prices. In evaluating the issue of criteria for pricing, several important questions arise. One is whether Telesat's operations are characterized by conditions that make Ramsey pricing a relevant consideration. A second is whether the pattern of price discrimination that is likely to result will be consistent with Ramsey prices. A third is whether other policies exist that offer a way to cover costs (under conditions of increasing returns to scale) but that have more desirable distributive properties than do appropriate Ramsey prices. For example, one such approach could involve imposing an "entrance fee" on users that is independent of their usage rates and then imposing a marginal cost pricing regime. Another potential approach could involve direct (from government) or indirect (from terrestrial telco subscribers) subsidies combined with marginal cost pricing.¹⁷ We shall evaluate these issues in a later section.

Non-Price Related Conditions of Exchange

A number of industry participants (including Telesat) have

15. Ibid. pp.179-180.

16. Ibid., p.181

17. A number of alternative pricing approaches are discussed in P. Passell and L. Ross, "Communications Satellite Tariffs for Television", Monograph #3, International Broadcast Institute, 1972.

of satellite channels, to sell channels or to sell entire satellites. The issue of flexibility also extends to pricing conditions. For example, in 1983, Telesat's attempt to offer pay-television companies a deferment-of-payment plan for satellite time was denied by the regulator. Telesat had asked the CRTC to allow the infant industry to ease cash flow problems in their first few years of operation by using a sliding scale of deferred payments on satellite costs. In the companies' start-up years, Telesat would have charged only half the going rate. Five years later, the rate would have been 150%, and the pay-TV companies and other new subscriber television services would have paid interest on what amounted to a loan in their first few years. The CRTC denied Telesat's application on the grounds that approval of the scheme may have led to undue preference or advantage in the satellite rates provided to the broadcasters compared with those provided to other Telesat customers. In particular, the regulator was concerned that, pursuant to terms of the Connecting Agreement, any losses on business with the pay-TV companies would be made up in higher rates to telephone subscribers. Subsequently, the deferred payment plan was worked out with the regulator by making it available to all subscribers.

To some extent, the issue of flexible non-price related conditions of exchange is tied to the issue of flexible pricing. Specifically, the more varied the allowed terms of exchange, the easier it would be (presumably) for Telesat to price discriminate along Ramsey-pricing lines. Thus evaluation of this issue hinges, at least in part, on our evaluation of the Ramsey-pricing argument. Another consideration is whether flexible terms of exchange would enable Telesat to earn revenue that it would not otherwise earn. The presumption here must be that voluntary exchange would make both the buyer and the seller (Telesat) better off. However, the regulator's concern is that large users could "tie-up" capacity through long-term leases at guaranteed prices or outright purchases of transponder capacity, thereby creating artificial scarcity conditions for smaller users and create a profitable resale market for transponder capacity. We will evaluate this "market power" concern against the obvious transactional gains from allowing parties to a free exchange to define the structure of that exchange.

Other Issues

There are several other regulatory issues that merit examination. One is the efficiency implications of Telesat's current ownership structure. Specifically, there is a seemingly legitimate concern that the existing ownership structure might significantly constrain effective competition between terrestrial and satellite communications carriers in Canada. On the other side is an argument that the ownership structure facilitates an orderly expansion of capacity in a sector marked by network economies of scope, including planning economies.

It is relatively obvious that, at least on the margin, Telesat's shared ownership structure mitigates against intermodal competition, notwithstanding attempts to provide Telesat with some measure of structural and behavioral independence from other regulated common carriers.¹⁸ The ownership issue therefore turns more strongly on the existence (or nonexistence) of specific economies associated with Telecom Canada's partial ownership of Telesat, including planning economies. An evaluation of this issue might include an assessment of whether the expansion of satellite capacity in Canada has proceeded in a more "orderly" fashion than in the U.S., where ownership of satellite capacity is far more atomistic.

A second auxiliary issue is whether Telesat should be regulated subject to an overall rate-of-return target or subject to return targets on individual services, such as the 14/12 GHz service, as is the case at present. The terrestrial carriers are regulated on the basis of an overall target return on the rate base, which allows for considerable flexibility in the returns earned on individual services. In principle, the simplest form of regulation is preferable, all other things constant. For example, where there are significant shared common costs, an overall rate-of-return target may make more sense. However, if a significant number of sectors are contestable, they should arguably be exempt from rate-of-return regulation, and the regulation that is applied should presumably be focused on individual services. Where costs of these services are largely separable, return targets on individual services might be appropriate. We will examine the nature of this tradeoff in the context of Telesat's operations.

Overview of the Study

The remainder of this study will proceed as follows. The second major section provides a very brief history of Telesat, including the emergence of key features in the regulatory and ownership environment surrounding the company. The general rationale for regulation will be reviewed and applied to the Telesat case. Then Telesat's regulatory environment will be briefly contrasted with the environment facing the terrestrial carriers.

The third section of the report will review supply and demand conditions in the satellite sector. On the supply side, evidence of the existence of economies of scale and scope will be considered, along with evidence of the direction these economies have taken over time. We will also review evidence on short-run and long-run supply and demand elasticities. All of this

18. One such attempt is the recent Amendment to the Connecting Agreement which allows Telesat to market directly to businesses.

evidence is relevant to a consideration of whether flexible prices and conditions of sale are appropriate in the context of Telesat's operations. The potential for and implications of unrestricted resale and sharing will also be briefly considered in this section.

Against the background of the preceding section, the fourth segment of the report will evaluate alternative approaches to the pricing of Telesat's services. The basic distinction is between allowing Telesat to price discriminate or requiring Telesat to charge prices that are compensatory with costs. An important consideration in evaluating this distinction is the applicability of Ramsey prices to the satellite sector. The deregulation of Telesat's pricing also requires consideration of the risk of anti-competitive pricing, which includes the potential for cross-subsidies between regulated and deregulated sectors and for predation in competitive markets. Against these risks must be balanced the risk that regulation will perpetuate inefficient prices that, in turn, result in chronic excess capacity and undue delays in introducing new services. The fifth section will discuss and assess these risks and draw some general conclusions regarding the deregulation of Telesat's pricing.

The next segment of the paper will review the main issues surrounding the deregulation of non-price related conditions of sale. Examples of alternative supply arrangements will be suggested along with their potential advantages and disadvantages. Relevant evidence from the U.S. experience will be discussed, and general conclusions regarding the deregulation of non-price conditions of supply will be drawn.

Section seven of the study consists of an analysis of other significant regulatory issues surrounding Telesat including direct selling by Telesat; restrictions on Telesat's freedom to allocate capacity by use and/or by users, and the imposition of rate-of-return constraints on individual services, rather than on Telesat's overall rate base. The final section of the report contains our major conclusions and a set of policy recommendations.

BACKGROUND TO TELESAT'S REGULATORY ENVIRONMENT

In 1966, Bell Canada expressed the first public interest in utilizing the characteristics inherent in satellite technology for commercial applications by applying for a license to operate two experimental ground stations. The ground stations would be capable of providing telephone, data and television broadcasting receive services to Northern communities. This application (approved July 1966) and a later brief submitted to the Science Council of Canada suggested that the primary application of a domestic satellite communications system in Canada, in the eyes of the principal terrestrial common carriers, would be to provide

reliable communications services to remote Northern areas. The second license applied for envisioned satellite technology being dedicated to TV broadcast distribution across all of Canada, including Southern Canada.

Several key issues were debated in Canada prior to the launching of Telesat. They included:

- (i) who would own and operate the organization;
- (ii) what was the optimal relationship between the space and earth segments;
- (iii) what relationship should the existing terrestrial common carriers have to the potential development of satellites for domestic communications purposes;
- (iv) which public policy objectives would the system most attractively accomplish.

The cooperation of the terrestrial common carriers was seen as obvious for interconnection purposes. At the same time, the common carriers perceived themselves as being threatened by the potential use of satellite technology for specific microwave and long-haul cable applications. This was especially so in the case of terrestrial carriers in the prairie provinces, where a significant portion of the carrier revenues were generated by carrying TCTS toll traffic across their microwave facilities. Other TCTS members also expressed concern about the potential for Telesat to become a direct competitor for revenues on the profitable long-haul, high density routes which the terrestrial carriers claimed subsidized other services. The concern about Telesat acting as a "cream-skimmer" in lucrative terrestrial carrier markets was the rationale for restricting Telesat's marketing to two classes of customers: the television broadcasters and the TCTS carriers.¹⁹

The Telesat Canada Act, followed by the incorporation of Telesat Canada, defined the satellite communications system to include earth stations as well as satellites. The ownership of earth stations was limited to Telesat, and thus the potential existed for Telesat to become a direct competitor with the terrestrial companies at some future date. The concern of the terrestrial carriers was allayed considerably by Department of Communications public statements indicating that Telesat would operate not as a competitor, but as a complement to the terrestrial carriers. It also indicated that the only customers of satellite channels, other than the TCCs (terrestrial common carriers), would be purchasers of undivided television channels. As a consequence, Telesat started in 1973 as a wholesaler of services to the TCCs which owned 50% of its shares. The other

19. A concern about non-economic "cream-skimming" has also been featured as a rationale for restricting resale applications of satellite and terrestrial capacity.

50% was held by the federal government. The CBC was expected to take 50% of capacity with Bell Canada taking most of the rest. The latter, in turn, would sell to end users.²⁰

In 1976, Telesat became a full member of the (then) Trans-Canada Telephone System (TCTS). The major advantage that Telesat sought from this membership was the opportunity to participate as an equal partner in the planning and investment decisions affecting the future development of the major telecommunications networks and, in particular, to make the case for the optimum use of satellite facilities and their full integration with the terrestrial systems operated by the other members. Telesat's position was that the association with TCTS had been developed in order to obtain sufficient assurance of selling its service on a scale large enough to permit lower rental rates. This would further attract new users and ensure that Telesat would be operating a competitive system at an economic level.²¹ In the Connecting Agreement that was signed between Telesat and TCTS, the latter guaranteed the former a certain rate-of-return on Telesat's entire capital base (including earth stations). Specifically, Telesat was to get the weighted average of Bell Canada's and B.C. Tel's returns. TCTS would make up Telesat's revenue shortfalls with straight cash transfers. The former also had the option to take more satellite services. It was anticipated that over a ten year period, payments back and forth through the Connecting Agreement would about even-out. However, Telesat's forecasts didn't materialize, so that there were larger than anticipated shortfalls.

The restriction that made Telesat a "carriers' carrier" was strongly opposed by existing and potential satellite customers. It was also objected to by the CRTC, whose position was that Telesat's membership in the TCTS would make regulation more difficult and also would threaten competition. The CRTC tried to overturn the Connecting Agreement but was overruled by the federal Cabinet. The Government's position was that the regulatory problems could be handled and also that the integration of satellite and terrestrial facilities would be enhanced by the association. However, in a compromise ruling in 1981, the federal Cabinet allowed broadcasters, but not business users, to deal directly with Telesat for satellite channels.

The main point that emerges from a review of Telesat's formation and early history is that policymakers had a distinct perspective of satellite technology as a specialized medium that should be fit into existing terrestrial systems. It was not seen

20. Author's interview with Marcel Boutin of Telesat Canada.

21. Department of Communications, "Review of Satellite Communications and the Role of Telesat Canada", mimeo, pp.8-9.

as a competitive alternative, nor as a potentially broad-based source of telecommunications services. As a result, limitations on Telesat's ability to anticipate and respond in a flexible manner to market needs were not seen as a relevant policy issue. Rather, these limitations were viewed as necessary to "optimize" the use of satellite technology within Canada's overall telecommunications structure. Within this heavily planned approach toward capacity expansion and utilization, there was not a great deal of scope for autonomy and entrepreneurship on the part of Telesat's management.

While Telesat was directed to operate as a viable commercial venture by the government, its position within the telecommunications structure (described above) did not facilitate achieving this objective. Furthermore, a primary policy goal for satellite technology was to provide reliable and economical communication services to Northern remote communities. Hence, Telesat's first contract with the CBC involved the leasing of channel capacity primarily for the delivery of signals to Northern communities. This latter activity could not be expected to be commercially viable on its own, nor was it ever intended to be so.

Telesat's pricing arrangements also suggested its narrowly viewed and relatively marginal perceived role within the Canadian telecommunications sector. Specifically, in its early years, Telesat had no reviewable rate structure. There were no filed contracts. As its single largest customer, the CBC essentially defined Telesat's rate structure. In a major contract negotiation hammered out with Telecom Canada in 1976, a bulk discount feature was incorporated in Telesat's tariffs. Concern on the part of small broadcasters, among others, with the treatment received by the CBC led to a requirement for Telesat to file general tariffs. While the bulk discount feature was a provision in the general tariff, the CRTC disapproved of this provision a year and a half later. In effect, Telesat's role was being redefined from that of a specialized wholesale carrier to a common carrier with obligations to justify its rates as being fair and reasonable. This was true not only for its space segment services, but also for its earth segment services, where Telesat was found by the CRTC to be charging non-compensatory prices.

The past few years have seen Telesat's environment turn increasingly more competitive with a liberalization of ownership restrictions on down-link earth stations and the prospective liberalization of up-link station ownership in April 1986. Furthermore, the amending of the Connecting Agreement which allows Telesat to market directly to business customers will put Telesat in a potentially competitive position with Telecom Canada for certain services. This represents yet another change in Telesat's environment suggesting a possible need for changes in

the way Telesat is regulated. Specifically, while the terrestrial carriers under federal regulation must file tariffs for local service and for switched long-distance service (including bulk rate service), private network services, e.g. building a microwave network for a provincial government, are approved under special assembly tariffs. It is acknowledged that such assembly tariffs provide for substantial flexibility in pricing. Furthermore, the use of an average rate-of-return target allows the terrestrial carriers some flexibility in the net revenues they earn in different service categories. Against this background, Telesat has less flexibility to promote specific projects or services. In particular, it must cost-justify its tariffs in each space segment category with each category subject to a rate-of-return constraint. If Telesat is meant to see its current role as a commercially viable retailer of telecommunication services to broadcasters and to businesses, it is legitimate to ask whether this can be accomplished without giving Telesat greater scope to "deal" with customers outside of the regulatory framework.

The point to emphasize here is that the regulatory environment that is appropriate for Telesat depends partly upon the policymakers' objectives vis-a-vis Telesat. Traditional regulation was seen as a way to protect consumers' interests in an environment of "natural monopoly." Over time, it has come to be recognized that regulation can have a much broader set of objectives. In particular, it is often designed to effect transfers of income among different groups in society. This, in some cases, may include transfers from consumers to producers.²² Liberalizing restrictions on price-setting and conditions of sale may intrude on the regulator's ability to transfer income. At the same time, however, it may allow the regulated firm to become a more commercially viable entity with an enhanced ability to market new services. Whether liberalization is advisable in this context depends, in part, on what the regulator wants to accomplish.

The Telesat Canada Act, the Act establishing the Company, defines the objects of the Company as follows:

1. to establish satellite telecommunications systems providing, on a commercial basis, telecommunications services between locations in Canada;
2. to utilize, to the extent practicable and consistent with its commercial nature, Canadian research design and industrial personnel, technology and facilities in research and development

22. An overview of the different, complex and often conflicting criteria that underlie regulation in different settings is found in R.E. Olley, "Regulation and Deregulation: The Use of Economic Power", paper delivered at the 1985 National Economic Conference, Ottawa, March 22-23, 1985.

connected with its satellite telecommunication systems and in the design and construction of the systems.²³

From the interactive role that Telesat played with the CBC in promoting broadcasting to the Northern Communities, one might also infer that an implicit objective of the Company has been to bring Canadian broadcasting content to "underserved" regions. In sum, it would seem fair to conclude that commercial viability has been a long-standing and major concern about the operations of Telesat. Nevertheless, the Company has been expected to serve potentially non-commercial functions. Insofar as the application of criteria to evaluate the issues confronting this study, we adopt the stance that, all other things constant, any regulatory changes that enhance the commercial viability of Telesat (in terms of its ability to achieve a rate-of-return commensurate with its risk to shareholders) are desirable; however, where these changes have the added result of disadvantaging specific groups in society that are seen to merit preferable treatment, the commercial benefits must be correspondingly larger, or policies must be devised to compensate the disadvantaged groups.

It should be explicitly noted that acceptable conditions under which Telesat Canada can be commercially viable may not exist. At least one consulting group has taken that position in a study of potential demand for Telesat's services. Specifically, Peat Marwick argued that the private line market for large business use was the main area in which Telesat might compete for TCTS traffic, especially given the regulator's continued reluctance to allow competition in the market for switched message toll service. Peat Marwick observed that the U.S. experience is that forecast private line and specialized markets for satellite services have not materialized. Furthermore, tapping this market in Canada is likely to be more problematic than in the U.S. given potential problems in interconnection with non-Bell, non-B.C. Tel terrestrial carriers. For these and other reasons, Peat Marwick argues that the proper role for Telesat is to continue to serve as a complement to the terrestrial carriers under terms of the Connecting Agreement. Implicitly, they are arguing that providing some increased regulatory flexibility to Telesat will not make any significant commercial difference.²⁴

While our primary objective is not to evaluate Peat Marwick's analysis, their evaluation of demand and cost

 23. Telesat Canada Act, c. 51, art. 6., 1968-69, Chap. T-4, p. 7231.

24. See Peat, Marwick and Partners, LARGE BUSINESS SATELLITE DEMAND STUDY, Report prepared for the Department of Communications, mimeo, May, 1983.

conditions facing Telesat is certainly relevant to the research objectives of this study. Hence, we will provide and discuss our own research on the economics surrounding satellite usage in the following section. But regardless of the demand and cost conditions currently surrounding Telesat's operations, increased regulatory flexibility might still be desirable in the absence of significant attendant social costs. More specifically, given the opportunity to approach the market in an innovative fashion, Telesat might be able to alter the cost, but especially the demand conditions that constrain its commercial viability.

SUPPLY AND DEMAND CONDITIONS IN THE SATELLITE SECTOR

Demand and supply (or cost) conditions in the satellite sector are relevant for several reasons. One reason relates to the issue of whether or not cost-compensatory pricing is feasible and desirable. Another reason relates to whether regulation itself is justified on the basis of "natural monopoly" conditions.

Pricing Theory

It is conventional wisdom among economists that in industries characterized by a single seller providing a single product under decreasing cost conditions, or by a single seller providing multiple products under conditions of high joint production and fixed overhead costs shared by the products, marginal cost pricing will cause the firm to run financial deficits. Put in other words, when average cost is falling with respect to output, marginal cost must be less than average cost. So if marginal cost pricing were applied to this dimension of service, total revenue would not cover total cost, and the deficit would have to be offset with surplus revenue obtained from other activities.²⁵

Under the foregoing conditions, prices can do no better than fit some "second-best" pattern, since the "first-best" pattern, i.e. marginal cost pricing, is not economically viable without direct subsidy. One particular second-best approach involves charging different customers different prices for the same service and (or) applying different price-cost markups for different services. In these pricing systems, marginal cost sets a base price for a given service or customer; however, the ratio

25. For a fuller treatment of these issues, see William G. Shepherd, "Sustainability, Deregulation and Separate Subsidiaries", in Harry M. Trebing, ed., Challenges for Public Utility Regulation in the 1980s, East Lansing: Michigan State University Public Utility Papers, 1981 and Wesley J. Yordon, "Telephone Rate Structure: Theory and Issues", in L. Lewin, ed., Telecommunications: An Interdisciplinary Survey, Dedham, Ma., Artech House, Inc., pp.303-345.

of price to marginal cost can vary across customers or service offerings. The resulting price structure may be discriminatory in the strict sense that ratios of price to marginal cost are not constant across all classes of buyers. However, under the conditions described in the preceding paragraph, the resulting pattern of pricing might be the second-best solution.

A specific pattern of price discrimination designed to be a second best solution to pricing in public utilities is known as Ramsey pricing. We shall discuss this pattern of pricing in detail in the next main section. At this point, it is useful to address an issue that is fundamental to the relevance of Ramsey-type pricing in the satellite sector. Namely, do significant differences exist in elasticities of demand across categories of actual and potential customers? As we shall see in the next section, Ramsey prices are set on the basis of price sensitivity, with elasticity of demand being a summary measure of price sensitivity. Specifically, the relative magnitude between price and marginal cost will be lower, the more price sensitive is demand confronting the supplier, or, equivalently, the higher the price elasticity of demand. If elasticities of demand differ significantly across classes of customers, Ramsey pricing is a potentially viable second-best pricing approach.

Unfortunately, there is very little formal statistical evidence on elasticities of demand facing Telesat. As a generalisation, Telesat has stated that moderate changes in its rates do not result in changes in demand.²⁶ This price inelasticity results from different reasons for broadcast and message services. Telesat notes that around two-thirds of its satellite RF channels are used by the broadcasting industry. Most of those who find the use of the satellite system suitable to meet their coverage are doing so. Furthermore, the introduction of new broadcasting undertakings requiring national or regional coverage is determined through the CRTC licensing process. Since satellite distribution costs are a relatively small part of the operating cost for a broadcasting undertaking (compared to programming) and since the CRTC licensing of broadcasting undertakings is made primarily on grounds other than

26. This general assessment is supported by a statistical study of the price elasticity of demand for long-haul (i.e. international) telecommunications. In examining telephone demand patterns for traffic going from the United States to the United Kingdom, Craver estimated the price elasticity of demand to hover around $-.40$. That is, a 10% reduction in overseas telecommunications prices to the U.K. could be expected to increase overseas calling by 4%. See, R. Craver, "An estimate of the price elasticity of demand for international telecommunications", Telecommunication Journal, Vol. 43, 1976, pp671-675.

distribution costs, the market is considered relatively inelastic with respect to Telesat's prices.²⁷

For message services (using around one-third of satellite RF channels), a much larger part of the service cost is associated with the earth segment, compared to television distribution. This results from the fact that most message services are point-to-point rather than point -to-multipoint and that a greater expense is incurred in signal processing (e.g. multiplex, echo cancellers and so forth). Recently, for message services, space segment revenues in the 14/12 GHz and 6/4 GHz band constituted around 30% of total earth and space segment message revenues, contributing to a condition whereby a net change in space segment rates has a much smaller change in overall service costs for message services compared to broadcast services. The relatively low component of costs that are space-segment oriented leads Telesat to believe that message service demand is also inelastic with respect to space segment prices.²⁸

While the demand for broad categories of service may be price inelastic, there is reason to believe that price elasticities differ across categories of customers. For example, Telesat believes that while conventional broadcasters may be relatively price inelastic, new distributors, especially pay-TV distributors, may be put out of business by higher rates.²⁹ The structure of Telesat's "seat sale" also reflects a belief that elasticities of demand differ across customer categories. Specifically, the seat sale called for a 50% reduction in satellite channel rates to current full-period users and a 75% reduction in regular rates for those not currently using services. The 50% reduction was made available to customers that were subscribing under the full period, full channel option. It was not applicable to partial channels, nor to occasional use of full channels. A minimum subscription of one year was required. The seat sale concept itself reflects a belief that demand would respond, to some extent, to lower satellite channel rates. But perhaps more fundamentally, it reflects a sensible presumption that new users are more price sensitive than existing users.

There is also reason to believe that elasticities of demand for satellite utilization are increasing, especially among business users. Specifically, we have been informed that a big hindrance to satellite utilization are restrictions on who can operate uplinks. These restrictions are due to be removed in

27. See Telesat Canada, Response to Interrogatory; Telesat (DIR) Sept. 7, 1983- 8(B), dated October 5, 1983.

28. Ibid.

29. Author's interview with Marcel Boutin of Telesat

April 1986.³⁰ Furthermore, multipoint to multipoint applications in message service are becoming increasingly important, and these applications are especially amenable to satellite. At the same time, the costs of earth stations relative to transponder circuit costs appear to be rising.³¹ An implication is that price reductions on the earth station side related to greater competition in this segment will boost demand for satellite use.

In order to gain some additional insight into the issue of price sensitivity, we conducted an original survey of two broad categories of subscribers and potential subscribers to Telesat's services. One category included the broadcasters, including conventional broadcasters, pay-TV services and specialized broadcasters of educational signals. The second category encompassed non-broadcast companies drawn from different sectors of the economy. This set included resource and manufacturing companies, financial institutions, a cable operator, a newspaper company, an independent telco, and a value-added reseller of Telesat capacity. Altogether there were 21 interviews conducted—primarily by telephone.³² The interview was kept relatively simple. Specifically, respondents were asked six open-ended questions inviting them to identify the major factors influencing their use of telecommunications facilities, and satellite in particular. One question focussed specifically on the influence of price.

As might be expected, it was difficult for respondents to be precise about the relationship between prices for satellite services and their demand for those services. However, in almost all cases, price was mentioned as the most significant factor inhibiting greater use of Telesat's facilities. Specifically, every one of the broadcasters interviewed mentioned Telesat's "high" tariffs as being a major deterrent to greater use. This condition was emphasized especially for occasional use channels. Only two broadcasters were able to provide some indication of the sensitivity of their demand to tariffs charged. They indicated that rate decreases in the order of 30% to 50% would be required before any significant increase occurred in their demand for satellite. This tends to confirm a view that demand is relatively inelastic.

30. Author's interview with Mr. Paul Crowder of Crowder Communications.

31. See Harvey Levin, "Latecomer Cost Handicap in Satellite Communications", Telecommunications Policy, Vol. 9, June 1985, p. 128.

32. A list of interviewees is provided in Appendix A, along with the sample questionnaire.

Three of the broadcast respondents mentioned that Telesat's lack of pricing flexibility was a barrier to their use of satellite. Two of these were specialized broadcasters of educational subject matter. One respondent mentioned Telesat's poor marketing and service functions as a problem, while two others indicated the desirability of liberalizing uplink ownership regulations. Two of the broadcasters mentioned the emergence of high resolution television as a potentially significant development. Specifically, satellite is seen as the only feasible way of delivering signals for high definition TV, and the emergence of a significant demand for this service could be a significant stimulant to satellite utilization.

The responses of the non-broadcasters tended to be less explicit and comprehensive than those of the broadcasters. This was not surprising given the fact that the former are much less intensive users of satellite than the latter and may not have thought through the issues as carefully as the latter. Several noted explicitly that they compare the cost of satellite to the cost of microwave hops and that this relative price relationship is a critical determinant of their demand for satellite. This factor was also mentioned by the telecommunications consulting company respondent and the value-added reseller. The latter two respondents also mentioned the high cost of Telesat's uplink facilities as a prominent barrier. A few of the respondents also mentioned problems with interconnecting with non-federally regulated terrestrial carriers as an issue. Demand for data and video is seen by some as the most prominent long-run exogenous factor influencing their demand for satellite in the future.

It is difficult to summarize the results of our survey with any precision given the small size of our sample and the open-ended nature of the responses. However, several tentative conclusions seem justified. One is that if the complete deregulation of the earth station segment raises no competitive issues, it could be an important factor encouraging increased use of Telesat's space segment services. Another is that non-broadcasters have a different demand environment for satellite than do the broadcasters. In particular, microwave is ordinarily a more attractive transmission medium than satellite, and their use of satellite (to date) is largely restricted to specialized data and video applications. The emergence of fiber optics as a major transmission medium over short and medium-haul hops adds an important competitor to satellite for wideband applications. On the other hand, broadcasters have a more limited range of alternatives for transmission purposes, especially those broadcasting nationally. Within the broadcasting sector, the specialized (i.e. pay-TV) carriers give the impression of being more price sensitive than the conventional carriers.

Perhaps the primary implication of our survey is that by selectively discriminating across potential customers, both in terms of price and conditions of sale, Telesat could expect to increase its capacity utilization and its gross (and net) revenues. To be sure, this is likely to be the case for any firm that is able to keep its markets segmented and prevent arbitrage across differentially priced markets. This observation is particularly relevant from a policy perspective in the case of Telesat to the extent that cost conditions mitigate against Telesat's recovery of its full costs by following marginal cost pricing rules. It is to this latter issue that we now turn.

Cost Conditions

There is extremely limited evidence in the literature on economies of scale and scope in the satellite sector, and we have seen no "hard" statistical evidence on this issue for Telesat. Nelson cites FCC evidence bearing on the estimated costs of satellites with different capacities. Cost estimates showed a great deal of variation, the highest and lowest estimate of unit costs equaling, respectively, 30% above and 60% below the average. The relatively low cost of the largest system was consistent with the hypothesis of considerable economies of scale. However, since the largest satellite system was most ambitious in terms of the use of advanced technology, which also may have been incorporated in smaller systems, the low cost of the largest system could be attributed to the achievement of the possibilities for technical change as well as economies of scale. Excluding the largest of the proposed systems, there was still some tendency toward a decline in unit costs with increasing scale. However, the range of variation was small, none of the proposals showing unit costs even close to that of the very largest system, and the variation with scale was erratic.³³

Given the nature of these cost estimates, Nelson interpretes the evidence as failing to provide strong support for the existence of significant economies of scale within the range of output covered. However, he interpretes the INTELSAT record as showing a significant decline in unit costs with increasing capacity, and engineering considerations support the appropriateness of assigning a large part of the observed cost variation to economies of scale.³⁴ Snow provides some statistical support for Nelson's interpretation of the INTELSAT

33. See Richard Nelson, "Domestic Satellite Communications: Economic Issues In A Regulated Industry Undergoing Technical Change", in Marcellus Snow, ed., Economic and Policy Problems in Satellite Communications, New York: Praeger Publishers, 1977, pp.5-30.

34. Ibid., pp.49-50.

evidence. Specifically, he estimates a long run cost function for INTELSAT. He argues that, aside from the influence of technical progress, static economies of scale in the long run are such that each doubling of capacity increases total cost by a factor of around 1.635

Further indirect evidence on the existence of economies of scale is provided by data given in Table One. The table shows fixed common resources assigned to the 14/12 GHz RF channel services as a percentage of Telesat's total company general and administrative expenditures. A significant percentage of fixed costs in total overhead costs would be consistent with the existence of economies of scale. The data in Table One suggest that fixed overhead costs are significant, at least in relative terms.

TABLE ONE

FIXED OVERHEADS AS A PERCENTAGE OF TOTAL OVERHEADS

<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>36</u>
41.4%	46.7	48	44.4	40.7	37.4	35.1	

There is no indication in the literature as to whether economies of scale and scope are becoming more or less pronounced over time. The evidence does suggest that real costs may be coming down. For example, investment costs per circuit year (in 1983 U.S. dollars) for INTELSAT declined from \$32,500 (in 1965) to \$662 for INTELSAT VI (in 1986). By the same token, real costs per transponder year (in 1983 dollars) for U.S. domestic satellites declined from \$500,000 in 1972 to \$280,000 in 1982. Crude industry estimates are that perhaps half of this cost decline is due to innovation (extending transponder capacity and design life) and half due perhaps to greater familiarity with the technology in use (learning curve).³⁷ Declining real costs of satellite circuits would diminish the economic significance of economies of scale, all other things the same, since the absolute cost inefficiencies of operating at less than optimal scale would be reduced. However, it appears that switching from C band to KU band will increase power requirements (a major cost component) substantially.³⁸ Furthermore, insurance associated with launch

35. See Marcellus Snow, "Price Discrimination and Economies of Scale In International Satellite Communications", in Marcellus Snow, ed., op. cit.

36. Interrogatory Response (NW Tel) 07 Sept 83-16(A).

37. Harvey J. Levin, op. cit., p.127.

38. Ibid. p.127

have increased substantially in recent years.

In short, available evidence suggests that Telesat's cost function is characterized by decreasing average costs over the relevant range of output. This suggests further that marginal cost pricing is not a viable strategy if Telesat is to cover its full costs, including an acceptable rate of return. Therefore, a second best pricing strategy is appropriate. In the following section we consider some alternative second best pricing strategies, including Ramsy pricing. Before doing so, however, it would be useful to review more thoroughly existing regulations regarding Telesat's pricing practices.

Telesat's Approach To Pricing

Prior to the filing of its proposed general tariff, Telesat's offerings of satellite services had always been in the form of a special assembly tariff or a particular service agreement entered into with a specific customer. The proposed general tariff represented the first general offering of specified space and earth services. Satellite services offered under the proposed general tariff were divided into two main categories: space services and earth station services. These were then subdivided into various classes and types. All space services to be provided under the general tariff were described generically as RF channel service. The space services comprised full period RF channel service and occasional use RF channel service. Full period channel service is dedicated to the customer 24 hours per day, 7 days per week for a minimum period of one year and is available in three types: fully protected, unprotected non-preemptible, and unprotected preemptible.

Under occasional use, customers must use at least one RF channel for a minimum of one half hour (or one hour in some cases) per occasion. The proposed tariff offered 24 different service alternatives covered by more than 100 different rates. Service alternatives were defined by the type, option class of service and the presence or absence of a minimum use commitment. The two types of occasional use service included: 1. reserved scheduled service, with Telesat confirming the availability of service at the time the order is placed and 2. unreserved scheduled time service, for which confirmation takes place less than 24 hours prior to the transmission. These options were further subdivided into three different classes depending upon the time when the transmission takes place: Prime Time, Non-Prime Time and Night Owl Time.

The earth station services to be offered under the proposed general tariff were set out in two tariff items. The first dealt with frontier television receive service offered on either a full period or occasional use basis. The second item, identified as special assembly No. 1, covered earth station services furnished by Telesat to TCTS for resale to CBC. This tariff included three

grades of service- network, remote and frontier- providing video transmit and receive service and associated audio channels.³⁹

In support of its proposed rates and charges in its general tariff filing, Telesat described a number of rate-making principles and objectives. Pursuant to its obligations under the Telesat Canada Act and the Railway Act, Telesat stated that it recognized two rate-making principles:

1. Recognition of costs: Rates should generate sufficient revenues to cover total operating costs and permit an appropriate rate of return to investors. The earth and individual space segments should each recover their associated costs;
2. Value of Service: Differences in rates should reflect differences in the intrinsic value of each service. For example, non-preemptible service has a higher value to customers than preemptible service.

Within this set of principles, Telesat's pricing objectives were: to respond to and satisfy customer demand; to optimize plant utilization; to meet competition; to ensure the tariff is easily understood by customers; to provide appropriate revenues for the company; to provide stability of revenues.⁴⁰ The CRTC ruled that the same basic rate should apply to all customers for full period RF channel service, with lower (but uniform rates) for unprotected non-preemptible and preemptible services. Rates for occasional use channels were based on full period RF channel rates prorated over an estimated number of hours of usage per year and taking into account the time when the transmission takes place.⁴¹

Under Telecom Decision CRTC 84-9, Telesat proposed to continue treating each of its two space services, its earth station services and its consulting services separately for costing and rating purposes. Earth stations would continue to be covered by special facility tariffs, each of which is designed to be compensatory. The regulator accepted that rates for Telesat's individual services should be established using economic evaluation studies over a multi-year test period in contrast to the use of accounting costs for a single year forward test period.⁴² In its application, Telesat applied the principle of independent cost recovery and proposed that rates for each of its space services should be based on costs and that value of service

39. Telecom (CRTC) Decision 81-13.

40. Ibid. p.170

41. Ibid. p183.

42. See Canadian Radio-television and Telecommunications Commission, Telecom Decision CRTC 84-9, Ottawa, Feb. 20, 1984.

principles were a secondary concern. The Company argued that value of service principles are appropriately applied to rates within but not between space services. Thus, Type I 6/4 GHz service stands in the same rate relationship to Type II 6/4 GHz service as does Type I 14/12 GHz service to Type II 14/12 GHz service. Under this approach, there would not be any specific rate relationship between Type I services in either band. Notwithstanding this, however, the rates contained in the application resulted in a constant relationship between the two services.⁴³

The Commission continued to hold the view, expressed in Decision 81-13, that rates for space services should recover the costs of those services and that rates for earth services should also recover their associated costs. The Commission indicated that each space service should be separately costed but that, in setting rates for each service, factors such as value of service and rate relationships should also be taken into account. Specifically, while rates should be set primarily with a view toward recovering costs, rate relationships should not result in undue migration between space services.⁴⁴

CRTC Telecom Decision 84-9 can be seen as having established the general regulatory framework for Telesat. It established the need for Telesat to cost-justify its rates for all individual services on the basis of economic evaluation studies. It also established that Telesat apply for a return on average common equity for 14/12 GHz service only. A determination as to the appropriate return on equity for the company as a whole was not requested.

43. Ibid. p62.

44. Ibid., p.65.

OPTIMAL PRICING OF SATELLITE SERVICES

The preceding review of Telesat's cost structure suggested that the Company's marginal costs may well lie below average costs over its relevant range of output. If financial viability of utilities requires that services be priced above marginal cost, the decision of which services should bear the burden of above marginal cost pricing need not be made according to the average cost of each service. Instead, the burden could be allocated in such a manner that the total resource misallocation through above marginal cost pricing is minimized. An approach to achieving this objective is Ramsey pricing.

The basic objective of Ramsey pricing is to minimize the loss of consumer welfare (or surplus) associated with charging higher prices. Shepherd explains the concept of Ramsey pricing in the following equation:

$$(P_i - MC_i)/P_i = k/E_d$$

where P is the price of a customer service offering; MC is the marginal cost of the service offering and E_d is the elasticity of demand for the customer service offering. The parameter, k , is a scaler that establishes the price-cost markup as something short of full monopoly price discrimination.⁴⁶ Ideally, the regulator would establish differential price-cost markups according to the Ramsey rule sufficient for the utility to cover its total costs.

In practice, there are several potential objections to the Ramsey pricing approach. One is that the regulator may lack sufficient information about price elasticities to establish the "appropriate" prices. This objection seems quite relevant; however, it is possible that the utility itself will iterate to Ramsey prices through a process of trial and error. Specifically, the utility might lower rates for new customers, while raising rates for established customers with limited substitution possibilities. It might also charge lower rates for new services than for incremental increases in existing services. While it is unlikely that the utility will iterate quickly to an optimal set of prices, it can be argued that any movement in that direction brings about an improvement in efficiency.

A second objection to allowing the utility to attempt price discrimination along Ramsey lines is that it will exploit monopoly power in specific markets; i.e. the k parameter will be unacceptably high in specific markets. One concern here is that certain users will be treated "unfairly" in being made to carry a relatively large share of the responsibility for covering Telesat's costs. Another is that Telesat might be able to earn "monopoly" returns in specific markets or thwart the emergence of competition by price discriminating in a predatory fashion. The relevance of this objection is related to the competitiveness or

46. William Shepherd, op. cit., p.313.

contestability of the various market segments in which Telesat operates. Shepherd notes that if a utility faces a moderate risk of entry by new competitors, the unrestricted prices it sets may well approximate welfare maximizing prices. The issue is whether the forces of a "weak" invisible hand are sufficient to constrain monopoly pricing abuses. In a later section, we consider whether Telesat can be said to operate in workably competitive markets.

General predictions have been made about the likely direction of price changes given a movement toward Ramsey pricing. Specifically, it has been suggested that the elasticity of demand for satellite circuits varies with distance: highly elastic on short routes and relatively inelastic on longer routes. This is apparently an interpretation of elasticity held by COMSAT officials, and they claim that usage and revenues are greater under a system of price discrimination that recognizes these differences in price elasticity than they would be under an alternative approach of a single system-wide rate. The notion that elasticity varies with distance has been challenged by several researchers, however.⁴⁷ Yordon questions whether it can ever be unambiguously established whether price discrimination is socially beneficial or harmful, since it requires detailed information on both the cost and demand functions for the services in question.⁴⁸ This information is largely unknown or, at least, highly uncertain. It is therefore difficult to predict *ex ante* which user groups would benefit and which would be disadvantaged if Telesat were allowed to price discriminate, presumably along Ramsey lines. One's intuition, along with the impressions drawn from our survey, is that established broadcasters might be disadvantaged compared to specialized users of business communications services and to specialized broadcasters. Further insight into this issue may be gained from a review of competitive conditions in these various sectors.

An alternative second best pricing approach that has been suggested involves charging each customer an "entrance fee" based on his estimated demand curve and the utility's revenue needs, and in addition a price for each unit of service set equal to the marginal cost of that service. While some authors claim that this solution is less complicated than the Ramsey approach, it would only be so if the entrance fee charged each customer was independent of the customer's price sensitivity and intensity of demand for the service. One group of researchers acknowledges that discrimination by categories (e.g. news broadcasts, data transmission, etc.) can approximate Ramsey prices, but, in

47. See Kenneth Stanley, "Economic Issues In International Telecommunications: A Public Policy Dilemma", in Marcellus Snow, ed., op. cit. pp.83-84.

48. Yordon, op. cit., p.330

practice, this kind of price discrimination is difficult to implement and manage. They recommend the entrance fee approach, and suggest that the transmission service owners (satellite, earth station, land-line) could perhaps jointly agree on an annual revenue requirement and set annual system "entry fees" on some basis independent of usage patterns.⁴⁹ The authors offer no justification for their claim that an entrance fee system would be easier to implement and administer than a Ramsey approach. Nor do they deal with a concern that some users might drop their telecommunications usage entirely in the face of an above-average entrance fee being imposed on them. But of greatest concern, perhaps, are the collusionary implications of having potentially competing sellers agreeing on a common rate structure. In short, we do not see the entry fee approach as being superior to Ramsey pricing. We see the relevant policy choice as being between direct subsidy of the utility versus an approach that allows for Ramsey prices to be established. The objective of making Telesat commercially viable mitigates against direct subsidy of Telesat.

Deregulating Pricing

As noted above, one major concern with deregulating Telesat's pricing is that the Company will take advantage of a liberalized pricing environment to set "excessively" high prices. The relevance of this argument depends critically upon the contestability of the various segments in which Telesat operates. The evaluation of contestability, in turn, rests upon a set of characteristics related primarily to elasticities of demand and supply in relevant markets.

In particular, contestability will be related to consumers' willingness and ability to switch suppliers. The latter, in turn, are related to the availability of actual and potential alternative sources of supply, and to the concentration of buyers. Specifically, a concentration of buyers implies that only a small number of customers need to switch away from Telesat's services to have a major impact on the company's sales. The availability of alternative potential sources of supply is related to the willingness and ability of competitors to expand their services to satisfy demand. When a firm is confident that prices will remain above its costs of supply, expansion is likely. This condition is more likely to be satisfied when market growth is rapid, since: a) there is a greater likelihood that a new supplier could make investments in additional capacity without depressing prices below its incremental costs; and b) there is less chance that the incumbent supplier has sufficient capacity to raise its output and thereby depress prices in response to investment by the expanding firm.

Where there is significant uncertainty about whether future

49. Passel and Ross, op.cit., pp.25-26.

prices will cover the incremental costs of providing service, the magnitude of sunk costs will be an important conditioning influence on the willingness of competitors to expand their output. Sunk costs are those costs that the firm would have to absorb fully, even if it were to withdraw from the market (barring bankruptcy). When sunk costs are large and a firm expands unsuccessfully, it will incur large losses since, regardless of how much revenues decline, it will continue to bear costs. Conversely, when these costs are low, the risk of expansion or entry will be low, and the threat of entry is likely to be strong. At the extreme, when sunk costs are zero, expansion is riskless.

The costs sunk in investment in additional capacity will tend to be low risk when there is rapid market growth, since even if the incumbent supplier dropped its prices to the level of its incremental costs, the competing firm could use its extra capacity to serve the increased demand resulting from overall market growth. Risks associated with capacity expansion can also be mitigated by inducing consumers to sign long-term contracts before incurring the sunk costs of expansion.⁵⁰

Evaluation of contestability

Telesat's earth and space segments constitute the two main sectors of interest in a consideration of market contestability. Evaluation of the earth segment is somewhat more straightforward. Simply put, evidence appears to indicate that the retail, distribution and manufacturing components of the earth segment are "contestable markets."

A potential entrant to the downlink Television Receive Only (TVRO) retail sector requires neither a large amount of capital, nor a high level of technical expertise. The relatively large number of firms operating in this sector attests to relatively easy entry conditions. In the Vancouver area alone, a minimum of twenty firms can provide individuals or establishments with downlink capability starting at less than \$1000.

It should be noted that the degree of technical complexity and expense involved increases consistently as one moves from earth stations for individual use to those for the cable industry and on to transmit and receive stations for broadcasters and

⁵⁰. Contestability conditions are rigorously derived in W.J. Baumol, John Panzar and Robert Willig, Contestable Markets and the Theory of Industry Structure, New York: Harcourt Brace Jovanovich, Inc., 1982. The logic and practical relevance of the contestability concept is explored in William G. Shepherd, "Contestability vs. Competition", The American Economic Review, Vol. 74, September 1984, pp.572-587.

telecommunications firms.⁵¹ Firms providing earth stations to the cable industry, broadcasters and the telecommunications industry, in most cases, also provide technical consultation. Nevertheless, there are a significant number of firms supplying satellite earth stations to the cable industry. A partial list is provided in Table Two (below):

TABLE TWO
Specialized Earth Station Distributors

<u>Firm</u>	<u>Ownership</u>
Incospec	Canadian
R.F. Communications	Canadian
Source Communications	Canadian
Destain Sales	Canadian
Anixter-Microsat	U.S.
Texscan	U.S.
Crowder Communications	Canadian
Channel One Video	Canadian
Sigmacom	Canadian

Source: Department of Communications, Suppliers of Equipment and Services to the Cable Television Industry in Canada, Ottawa: mimeo, 1984.

For the most part, the firms listed in Table Two are relatively small which again is suggestive of relatively easy entry conditions. Furthermore, while there are relatively few manufacturers of specialized earth station equipment, there is no indication that distributors have difficulty in obtaining supply. The fact that purchasers of specialized earth station equipment are likely to be large and relatively sophisticated firms increases the elasticities of demand confronting manufacturers, distributors and retailers of that equipment. It would seem that the only significant barrier to contestability in the earth station segment are government regulations restricting private ownership of uplink facilities. This assessment was indirectly confirmed in our survey research. Specifically, limitations on the ownership and maintenance of satellite uplinks were mentioned by several respondents as a significant deterrent to their utilization of satellite facilities.

On the surface, the space segment of Telesat's business would not seem to be contestable. In particular, Telesat is the only licensed satellite carrier in Canada. Furthermore, an inter-governmental agreement providing for restrictions on the

51. See K.W. Power, "The Development of Modern Satellite Receive Systems", Cable Communications Magazine, Vol.2, April 1984, pp.22-25.

use of U.S. satellite transponders limits the viability of direct competition from outside the country. Nevertheless, the practical meaning of contestability is related to the notion that, if prices rise "excessively" above costs, new entry will occur quickly to erode the incumbents sales and profits. In this respect, the degree of contestability in the satellite sector merits closer examination.

In the United States, the FCC has moved to a conclusion that supranormal profits could not be maintained in the satellite sector because such prices would only attract new entrants, which in turn would drive down the price of transponders. The FCC pointed to the entry of new firms and the rapid expansion of capacity of both old and new firms as evidence of the competitiveness of this industry.

Whitener argues that how well competition functions in the satellite industry depends largely upon how formidable the barriers to entry are. He suggests that the economies of scale in the satellite industry are much greater than in microwave communication, and entry on a small scale is unfeasible. Establishment of a "foothold" in the industry by launching a small-scale satellite is precluded. Along with the barrier to entry posed by economies of scale, barriers to entry would be raised by the long - term agreements under which satellite service (in the U.S.) is usually contracted. As long as a particular customer's contract is in effect, that customer is precluded from switching to the services of another satellite operator.⁵²

Whitener goes on to note, however, that since the life expectancy of a satellite is only 7 to 12 years, a particular customer would be in the market for alternative suppliers at regular intervals. More importantly, expectations of strong growth in demand among new customers of telecommunications services would create an expanding market, tending to reduce the contractual barrier to entry. Also, because the satellite industry is still in its infancy, new firms can be expected to advance quickly the state of the art, giving them an advantage over established firms that might be burdened with fixed investments in obsolete technology.⁵³

Without passing judgement on the technical merits of Whitener's arguments, it is unlikely that an "open skies" policy will be implemented in Canada in the foreseeable future.

52. Michael L. Whitener, "Condominium Satellites: Competitive Market Inroads into a Common Carrier Industry", Communications and the Law, Vol. 7, April 1985, pp.61-83.

53. Ibid. p.76.

Therefore, while current excess capacity in the satellite sector can be expected to restrain Telesat's pricing behaviour, in the long-run, the likely effective competition to Telesat must come indirectly from the terrestrial sector. The relevance of this source of competition is called into question immediately by Telecom Canada's ownership stake in Telesat. Beyond the potential restrictions to competition induced by the ownership structure, it might be argued that for major services, the substitutability between satellite and terrestrial media are quite limited.

In general, satellite systems make efficient use of the radio spectrum for applications such as long-haul transmission, communications to remote communities and multi-point distributions of common-use signals such as TV and radio programs. These types of services normally require a large amount of spectrum where they are provided by conventional microwave radio relays. T-1 carrier systems have enhanced the substitutability of microwave for satellite in wider-band carriage applications over medium routes. As well, fiber optics technology promises to be an economical transmission mode for medium-haul voice and data circuits between major market centres, even where microwave and satellite facilities have historically been the main transmission backbone system.⁵⁴ In sum, substitutability between terrestrial and satellite transmission may be a relevant potential constraint on Telesat's pricing power for a variety of medium-haul and non-broadcast related applications. However, for transmissions to remote communities and for long-haul broadcasting applications, Telesat might continue to have a good deal of pricing power. Offsetting the technological barriers to competition, to some extent, is the market power enjoyed on the buyers' side by CBC and CTV. The networks might use threats of suspending specific broadcast applications or refusing to introduce new broadcast services to restrain the average level of prices it needs to pay Telesat.

While it is difficult to be unequivocal on the issue, it would appear that the space segment is sufficiently contestable for many potential applications to warrant some significant degree of pricing flexibility. However, specific applications of satellite have limited substitution possibilities. One possible approach to the dilemma is for the federal government to directly subsidize satellite users for the latter applications to assist them to meet Telesat's higher prices. However, regulatory review might still be required to ensure that Telesat was not "gouging" the Canadian taxpayer. It might also be argued that the

54. Observers of the industry have begun to raise concerns that the rapid installation of fiber optics systems will eventually lead to a glut of telecommunications transmission capacity.

anticompetitive status of major space segment applications necessitates continued regulation of the earth station segment given a threat of predation in the earth segment through cross-subsidization. We turn now to a consideration of the predation issue.

Predation Concerns

Common carrier provision of some services as a "natural monopolist" and of others as part of a group of competitors has raised substantial concerns about potential cross-subsidization of competitive services by monopoly services. In the literature and the surrounding policy debate, this concern has been identified as the threat of predation. This concern is summarized by McKie:

If certain sectors of the firm are unregulated, the control authority needs some devices for preventing inflation of the regulated rate base or of expenses attributed to the regulated activity-- and hence improper inflation of prices there-- by improper transfer of costs and revenues within the firm.

Regulation must also restrain the monopoly sectors of the firm from "subsidizing" other activities, e.g. intentionally or inadvertently pricing some of its goods and services below marginal costs, and recouping from inflated revenues within the monopoly sector. The regulator must prevent the utility from subsidizing

its affiliate or favoring it when buying from or selling to it and in this way extending its protected monopoly into adjacent markets.⁵⁵

While economists have generally been wary about embracing the relevance of predation theory in antitrust and Combines litigation, there is a disposition to credit the theory with greater relevance when considering the behaviour of regulated firms. Specifically, there is a fairly widespread notion that regulated firms enjoy an enhanced ability to predate compared to non-regulated firms.

The impact of regulation on the ability to predate can be illustrated by considering a firm that produces two kinds of output. The first (q_1) is produced subject to common carrier regulation, while the second (q_2) is produced and sold in unregulated markets. In the conventional model of price predation, the firm lowers the price it charges for q_2 below the marginal costs of producing that service in order to drive rivals out of the market. Of course, this strategy would only make

⁵⁵. James W. McKie, "Public Utility Regulation: Structure and Performance," in Milton Russell (ed), Perspectives in Public Regulation, Carbondale: Southern Illinois University Press, 1973, p.90.

sense if the firm could expect to more than recoup its losses associated with predating after it has driven its rivals from the market.

If the unregulated markets are contestable, the predator will be unable to sell the second output at prices above marginal cost for any length of time. Thus, it will be unable to recoup its earlier losses on q2 with higher profits on q2 in later periods. Nor will it be able to raise prices directly on q1 to offset the costs of predating, if it is earning the target rate of return in its regulated activity. However, the firm can indirectly transfer income from its regulated activity to its unregulated activity by purchasing q2 from its unregulated division at a price above marginal cost and incorporating the cost into its regulated rate base. Where the allowable rate of return on the rate base exceeds the firm's cost of capital, the regulated division will find it profitable to pad its rate base. At the same time, the unregulated division can employ the implicit subsidy on its intra-firm sales to subsidize below-cost prices on its arms-length sales.⁵⁶

While this argument is superficially plausible, it has nothing directly to do with predation. Specifically, if the q2 markets are, in fact, perfectly contestable, the only benefit to the firm from taking the actions described above derive from the Averch-Johnson effect. This follows from the notion that the firm would never be able to sell its q2 output at prices above the q2 divisions true marginal costs. Thus, it would never be able to recoup the implicit subsidies it passes on to its customers. It would be better off to engage in the implicit transfer described and use the profits on sales made to the regulated division to pay dividends to a holding company, rather than subsidize customers of its unregulated division.

A second model of potential predation might be briefly considered in which both the q1 and q2 outputs are produced and priced subject to an overall rate-of-return constraint. In this case, a reduction in the price of q2 that caused a decline in the firm's overall return below the allowable rate would permit the firm to apply for an increase in the price of q1 to restore the firm's overall return to its allowable target. Presuming that the price elasticity of demand for q2 was significantly greater than the price elasticity of demand for q1, the overall volume of

56. This "rate-padding" phenomenon is commonly identified in the literature as the Averch-Johnson effect. The relationship between the A-J effect and predation is briefly discussed in William A. Brock and David S. Evans, "Predation: A Critique of the Government's Case in U.S. vs. AT&T," in D.S. Evans (ed.), Breaking Up Bell: Essays on Industrial Organization and Regulation, New York: North Holland, 1983, pp.41-59.

output produced would presumably increase, as would the firm's overall rate base. Once again, if the firm's allowable rate of return exceeds its cost-of-capital, it presumably has an incentive to expand its rate base. In this case, predation might prove to be a profitable long term strategy for common carriers, even if the underlying structure of the q2 markets was contestable.

The implication of this second model is that "flawed" rate-of-return regulation can create incentives for below-cost pricing in specific markets, even when those markets are not "naturally" amenable to monopolization. But in the stylized model illustrating this point, it seems more effective to deregulate the q2 market rather than to introduce a costly administrative apparatus to monitor the reasonableness of the q2 prices. The main conclusion insofar as satellite regulation is concerned is that incentives to predate in the earth segment would exist only if Telesat's allowed rate of return exceeded its cost-of-capital. In fact, we are unaware of any studies which document the relevance of the A-J effect to Telesat. It might be argued that the substantial excess capacity facing the Company is, itself, indirect evidence of a capital-expansion bias associated with the presence of an A-J effect. However, the largely unregulated domestic satellite sector in the U.S. is also suffering from excess capacity. Furthermore, Telesat's allowed rate of return is based on the average allowable returns for Bell Canada and B.C. Tel. The existence of an A-J bias has not been documented for these companies.⁵⁷

Conclusions

In summary, we conclude that concerns about Telesat using its market power in the space segment to predate in the earth station segment are speculative and (in our view) not very credible. They do not offer a compelling rationale for continuing to regulate the earth station segment or for maintaining pricing restrictions in the space segment. Our interpretation of available evidence suggests that Telesat's pricing in the earth station segment can be deregulated, presuming that ownership restrictions on uplink facilities are eliminated as planned. Indeed, after the preparation of this report, the CRTC approved an application from Telesat Canada for permission to charge tolls for its commercial earth station services without filing tariffs. The evidence is less supportive of the benign competitive effects of deregulating pricing in the space segment. Specifically, Telesat will continue to enjoy market power in specific

57. For a further discussion of predation concerns in the Canadian telecommunications context, see Steven Globberman, "Predation and Foreclosure Issues in the Telecommunications Industry," Telecommunications Policy, December 1985.

applications for the foreseeable future. However, this latter concern could be substantially mitigated if the government was willing to subsidize these applications directly for higher rates paid for transponder capacity. It would also be mitigated by subjecting Telesat to an overall rate-of-return constraint. In this case, allowing Telesat to move away from cost-based pricing in the space segment would facilitate the Company's move toward Ramsey pricing with the adverse distributional effects taken care of through direct subsidies.

NON - PRICE RELATED CONDITIONS OF EXCHANGE

A number of participants (including Telesat) have argued that flexible conditions of exchange should exist, so that Telesat would be allowed to offer options such as long-term leases at guaranteed prices, and to sell transponders, or even entire satellites. In this section, we review the various issues relevant to evaluating this argument and make specific recommendations.

The Issues

Many of the arguments surrounding the liberalization of non-price conditions of exchange were articulated during the FCC's deliberations regarding the sale of transponder capacity in the United States. In 1982, the FCC voted to permit carriers to sell transponders on a noncommon carrier basis. After several court challenges, a U.S. Court of Appeals upheld the FCC's decision. Initially, the FCC had been unfavorable towards transponder sales. In particular, it was concerned about the possibility of large users tying up capacity and preventing smaller users of satellite services from competing effectively against them. In reversing its initial stance, the FCC indicated that it was more impressed with the efficiency advantages attached to policy liberalization in this area. Under the new policy, domestic satellite companies will be allowed to sell satellite resources at a price set by the market. Ownership rights are vested in the buyer, with the satellite operator only providing the service.

Several adverse consequences were posited by critics of a policy allowing transponder sales. One concern was that barriers to entry faced by potential new competitors would prevent meaningful competition from taking place among users of satellite facilities. A second, and related concern was that only purchasers with enormous financial resources would have access to transponders; smaller users, unable to obtain the necessary financing to buy transponders, would be cut out of the market. A third concern was that purchasers of satellite capacity would take advantage of resulting shortages to resell capacity at exorbitant rates. Furthermore, these resellers would not reinvest in additional satellite capacity, thereby perpetuating

capacity shortages.⁵⁸

The FCC ultimately rejected the claims of shortages, since even if all of the transponders whose sales had been approved were sold for non-common carrier use, they would total only around 22% of the total stock of authorized transponders.⁵⁹ In addition, the FCC was persuaded that allowing transponder sales would have important economic benefits for both the carriers and their customers. For example, by being able to presell capacity, investors in satellite capacity could reduce their risks which, in turn, could be expected to encourage additional investment in satellite facilities. Customers could also lock-in a long-term price for their transponder requirements which would enable them to better plan the expansion of their communications networks. With a relaxed regulatory environment for reselling and sharing, the risk of being stuck with unwanted satellite capacity would be substantially reduced. In short, there are significant and identifiable potential advantages for both suppliers and customers.⁶⁰

The issue of whether shortages of transponder capacity would create hardships for small users was a key concern of the FCC. A recognition that technological change was alleviating shortages was one factor that encouraged a liberalization of policy. Specifically, spacing requirements for satellites were being reduced over time. As well, necessary bandwidths were being compressed. These technological trends combined with the potential for "preselling" capacity to stimulate entry into the sector persuaded the FCC that long-run shortages of capacity were unlikely. In any case, the FCC reserved the right to review all transponder sales agreements and to suspend the policy if future conditions warranted such action.

Conclusions

In reviewing these arguments, there are no strong reasons to believe that a similarly liberalized policy would be inappropriate for Canada. Technological conditions are similar in the two countries, and there is (if anything) even greater excess satellite capacity in Canada than in the U.S. One

58. See Whitener, op. cit., p.71.

59. Ibid., p.72.

60. For some additional analysis of the FCC decision, see Michael Whitener, "Crowded Skies: Comparative Hearings for Awarding Satellite Licenses," Communications and the Law, Vol. 6, December 1984, pp.23-31.

difference of potential importance is that the "open skies" policy in the U.S. increases the likelihood that the threat of competitive entry will restrain anticompetitive abuses of temporary satellite capacity shortages. In Canada, the discipline must come indirectly from the threat of expansion by terrestrial carriers. However, it should be noted that to the extent that resellers are reaping the primary benefits of extraordinary prices for transponder space, Telesat would have an incentive to expand capacity. A relaxed policy toward sharing transponder capacity would also enhance the ability of small users to lease or buy long-term capacity.

On balance, we see the benefits of liberalizing non-price related conditions of exchange along U.S. lines outweighing the potential costs. A related question is whether Telesat should have to receive regulatory approval of each individual contract it signs. A number of individuals interviewed for this project complained about long delays in receiving regulatory approval of agreements with Telesat, and stated that these delays impacted on the commercial viability of the agreements. On the other hand, a review of all agreements would be a regulatory safeguard against small users being "victimized" by temporary shortages of transponder capacity. With a fully liberalized environment for reselling and sharing, however, we would not see the latter contingency being of substantive concern and would recommend that long-term agreements of the type discussed in this section be reviewed only on an exception basis. One exceptional basis for review might be related to capacity utilization in the satellite sector. For example, reviews of agreements might be triggered when capacity utilization approaches a specific critical percentage, e.g. 90%.

OTHER REGULATORY ISSUES

Several other features of Telesat's regulatory environment have emerged as policy issues. One issue outlined in an earlier section is whether Telesat should be allowed to market its services in direct competition with subcarriers such as CANCOM.

Direct Marketing

We acknowledged in an earlier section, that direct marketing by Telesat would enhance the carrier's commercial viability. A number of users interviewed in our survey work confirmed that, as a result of its assumption of marketing functions, Telesat was an easier and more attractive supplier to deal with. There seems little doubt that allowing Telesat full scope to market directly to broadcast and non-broadcast customers is a significant step toward improving Telesat's potential commercial viability. Only very compelling offsetting efficiency concerns would mitigate against the implementation of this policy.

As we have already treated the issue of predation at length in an earlier section, we shall be relatively brief in addressing the issue of whether Telesat should be allowed to compete

directly with subcarriers. The main point to make in this regard is that unless Telesat has some durable competitive advantage in subcarrier applications, it would have no incentive to foreclose entry into these applications by other firms. Since Telesat already enjoys the status as a "quasi-monopolist" at the wholesale level, it should have no particular incentive to gain a "quasi-monopoly" status at the retail level as well. Indeed, its incentive should be to promote as many applications at the retail level as possible. The latter set of actions should include encouraging the development of the subcarrier market by others more qualified to deliver the relevant services.

The economics literature does recognize the possibility that downstream integration by a monopolist might facilitate price discrimination at the retail level, which might be one incentive for Telesat to foreclose entry into the subcarrier market. While superficially plausible as a motive for downstream integration, the price discrimination argument is not compelling. The main reason is that broadcasters receiving the radio signals carried by subcarriers are likely to have fairly homogeneous demand curves, and (therefore) similar price elasticities. In this case, there would be no anti-competitive motivation for Telesat to foreclose entry into the subcarrier market.

The growth in the market for subcarrier signals combined with a liberalization of reselling restrictions should also substantially mitigate any reservations about allowing Telesat to market its services directly. The competitive opportunities raised by a growing demand for radio signals, along with an enhanced opportunity for non-broadcasters to "resell" a portion of the transponder space taken would make it extremely difficult for Telesat to exclude competition at this level through conventional forms of predation. In short, as long as broadcasters and non-broadcasters enjoy access to transponder facilities, it is difficult to imagine how Telesat could act as a predator in its direct marketing activities. And as long as Telesat has substantial price flexibility at the wholesale level (as we are recommending), there is no compelling reason for why Telesat would want to foreclose competition at the retail level.

Another argument that has been made for restricting Telesat's ability to market directly is that it will prevent a "costly" duplication of services. It may well be true that restricting Telesat's ability to bring new services to the market would occasionally prevent excess capacity from emerging in specific activities. However, it would also reduce Telesat's incentive to initiate technological change, since the set of market opportunities over which technological breakthroughs could be capitalized will be reduced. The argument also presumes that duplication, rather than cooperation will be the rule. But this is not likely to be true in an industry where there are relatively few firms.

Telesat's Anikast Radio Net serves as a case in point. On August 15, 1985, Telesat announced the introduction of an evolutionary new service designed for the needs of Canadian radio broadcasters- Anikast Radio Net 1. Using Single Channel per Carrier (SCPC) technology and Telesat's 6/4 satellites, this service will provide an economical means for broadcasters to have national or regional coverage independent of television services. The system uses Narrow - Band Frequency Modulation combined with a technique known as companding to provide a good quality audio signal, while minimizing the power and bandwidth required in the satellite transponder. The advantage of such a system is that a customer can utilize the existing transponder capacity, similar to adding subcarriers, but with the added benefit of being totally independent as to source location from the video signal. Because of power sharing and intermodulation effects, very few carriers can be carried in this manner in each transponder; however, the next stage of SCPC is a complete satellite channel dedicated to carrying single channel per carrier audio program services. This transponder could have up to 100 similar carriers, each taking a small proportion of bandwidth and power.⁶¹ This technology was developed by Telesat in conjunction with the CBC.

Telesat's Freedom to Allocate Capacity

This issue has been linked to the question of whether Telesat should have a substantially expanded regulatory scope to establish non-price conditions of exchange. Specifically, small users have expressed concern that unless Telesat is constrained to act as a common carrier, i.e. to make capacity available to all buyers who are willing to pay the established tariffs, they may find themselves unable to acquire any capacity in competition with large users. We have already addressed this concern, and (hence) will not treat it in much more detail here. While we do not share this concern for reasons expressed earlier, there is a basis for putting some restrictions on Telesat's freedom to choose certain customers over others. Namely, Telesat's position as the sole satellite carrier in Canada is at least partially based on the premise that it must assume certain social obligations along with its exclusive franchise. In particular, it has a mandate to ensure that communications services are provided to remote and Northern communities.

Presumably, if the "appropriate" prices are paid to Telesat, the requisite amount of transponder space will be forthcoming for Northern and remote services, at least in the long-run. But it is at least conceivable that short-run shortages of transponder capacity may materialize in the future, although probably not in

61. See Linda Rankin, "Telesat's Anikast Radio Net 1," Broadcaster, October 1985, pp.7-12.

the near-future.⁶² In this case, it would be consistent with broad public policy goals to ensure that high priority broadcast activities are not jeopardized by unfavourable rationing of satellite capacity. One possible solution would be to require Telesat to receive approval for dropping specific services when the broadcasters involved are willing to pay the relevant tariffs. With this safeguard in place, there would seem to be no special need for regulatory approval of Telesat's decisions regarding the allocation of facilities.

Rate-of-Return Regulation Procedures

As noted earlier, Telesat's space segment services and individual earth segment services are subject to regulatory approval as regards allowable tariffs and conditions of exchange. Tariffs must be cost justified and provide the Company with its allowable rate-of-return. Unlike the federally regulated terrestrial carriers, however, there is no explicit overall return on equity (ROE) target for Telesat. Rather, individual services are assigned allowable rates-of-return, although all services must earn between 13.5 and 15.5%.⁶³ Obviously, given a set of forecasts about the services Telesat plans to provide, an implicit overall rate-of-return "falls out" of the set of allowed rates - of - return for individual services. Indeed, under the Connecting Agreement, Telecom Canada guaranteed Telesat the weighted average of Bell Canada and B.C. Tel's rate-of-return on Telesat's entire capital base. Telecom Canada would make up any revenue shortfalls with straight cash transfers; however, the transfer was outside of Telesat's rate agreements.

With the planned termination of the Connecting Agreement, Telesat wants the flexibility to make different profit rates on different services and would like to be regulated on an overall ROE target basis. At a minimum, Telesat has requested that the regulator allow the Company to combine all earth services into one category which must pass a "burden" test.⁶⁴ Telesat's request is consistent with a regulatory stance that allows Telesat to charge differential markups on services in order to facilitate the Company's commercial viability.

In principle, the simplest form of regulation is preferable,

62. For a view that shortages of capacity may emerge before the end of the decade, see Lawrence Surtees, "Satellite owners offer discounts to fill unused channels," The Globe and Mail, March 1, 1986, B1.

63. Author's interview with Mr. Marcel Boutin of Telesat Canada, October 28, 1985.

64. Ibid.

all other things the same. In particular, where opportunities to predate or otherwise price discriminate in an anti-social fashion are limited, aggregating different categories of service under one overall rate-of-return target seems preferable to subjecting each category of service to a rate-of-return constraint. In this respect, it would follow from our assessment of the contestability of the earth station segment that all earth services be combined into one overall category for regulatory purposes.⁶⁵ Indeed, our discussion of the limited relevance of predation through cross-subsidization leads us to recommend that the earth segment be free of any rate-of-return constraint. And given the significant portion of overhead costs that are common to sets of individual space segment services (see Table One), an overall rate-of-return target for Telesat's space segment business also seems appropriate. The validity of this position is enhanced by the CRTC's recognition that demand patterns for 14/12 and 6/4 GHz services are somewhat interdependent and that Telesat is entitled to acknowledge this interdependence in its tariff-setting. Therefore, we would recommend that Telesat be subject to one overall rate-of-return target comparable to treatment given the terrestrial carriers.

Reselling and Sharing

Broadcasters and regulated common carriers have been allowed to resell and share transponder capacity for years; however, the potential for non-broadcasters to resell and share capacity for non-MTS traffic was established only recently in the CRTC's decision to deny CNCP interconnection with Bell Canada's switches for purposes of providing Message Toll Service. In our interpretation of the CRTC's decision, the liberalization of reselling and sharing restrictions extended to satellite carriage, and this is the interpretation of a number of companies in the Vancouver area that are renting transponder space on Telesat satellites in order to provide private line business communications services. On the other hand, several industrial respondents to our survey expressed uncertainty about the status of allowable reselling and sharing of Telesat's capacity.

In view of the established status of reselling and sharing (for anything other than switched message service) and the lack of any strong objections to reselling of which we are aware, it does not seem necessary to undertake an extensive evaluation of this issue. The one concern that has been expressed by Telesat is that the limited flexibility it has to alter relative prices might put the Company at a handicap vis-a-vis resellers. In particular, the relationship between partial and full channel rates extant at any point in time might encourage "arbitrage"

⁶⁵. It should be recalled that our conclusions regarding contestability presume that restrictions on the ownership of uplink facilities will be removed.

operations, whereby a reseller takes a full channel service and subdivides it for partial channel services. Where the incentive to do so is created by price differences that reflect regulatory rigidities, the arbitrage process is unlikely to improve allocative efficiency; that is, the same result could presumably be accomplished (with a smaller outlay of resources) by allowing Telesat to adjust relative prices between partial and full channel services to reflect changing demand patterns.

In an environment whereby Telesat enjoys the flexibility to set prices on a basis other than strict cost-justification, a concern about "uneconomic" arbitrage is not a compelling one. In an earlier section, we made the recommendation to liberalize Telesat's pricing environment. Consistent with that recommendation, we see no valid objections to reselling and sharing of Telesat's capacity proceeding along the same lines as that for terrestrial common carrier capacity. In the event that existing restrictions on Telesat's pricing flexibility are maintained, it seems appropriate to subject resale and sharing activities to regulatory review to ensure that they are not motivated solely by regulation-induced arbitrage opportunities, notwithstanding the additional regulatory burden that would be imposed on resellers.

Resale and sharing are likely to stimulate the use of satellite capacity for several reasons. One is that they reduce the risks faced by full channel users that some portion of the capacity taken up under longer-term contracts will be unused and (therefore) constitute a sunk cost. Another is that they facilitate the entry of small firms offering value-added services involving the use of satellite transponders. The greater the number of firms that are able to offer such services, the higher the probability that innovative uses will be identified for satellite facilities, thereby enhancing Telesat's commercial prospects. Since greater price flexibility for Telesat enhances the likelihood that reselling and sharing will be directed toward value-added activities, a liberal environment for reselling and sharing should be seen as a complement to a more liberal environment for Telesat's pricing.⁶⁶

Ownership of Telesat

The final issue we will identify in this report is Telesat's ownership structure. The issue is relatively straightforward: does Teledom Canada's ownership position in Telesat constrain

66. For a more detailed analysis of motives for reselling and sharing telecommunications facilities and the distinction between economic and uneconomic reselling, see TRU Techno-economic Research Unit, Economic and Market Analysis of Brokerage and Resale in the Telecommunications Industry, Report submitted to Department of Communications, March 1, 1985.

effective competition between terrestrial and satellite communications carriers in Canada? Given that terrestrial carriage is the competitive alternative for many of Telesat's actual (and prospective) services, the issue is of critical importance. Its relevance is enhanced by the fact that CNCP also has an ownership position in Telesat Canada.

Notwithstanding the fact that Telesat's management is nominally free to make independent decisions, it is obvious that, at least on the margin, Telecom Canada's ownership position gives management of the terrestrial carriers an ability and incentive to explicitly acknowledge the competitive interdependence between terrestrial and satellite carriage. This includes an ability to anticipate major competitive initiatives originating in Telesat. While in some cases, Telecom Canada management might see it to be advantageous to the group's profits to allow Telesat to assume a competitive initiative, in other cases it may not, especially if such initiatives lead to a more rapid (than planned) depreciation of terrestrial capital facilities.

All other things constant, maximal separation of management in the terrestrial and satellite sectors seems desirable. Maximal separation in this context involves separate ownership. In this respect, two objections have been raised. One is that it would be extremely difficult to sell Telecom Canada's equity shares in the capital markets. It is difficult to credit this argument too seriously. What is at issue is the price at which this equity position could be sold. Given that Telesat has the capacity to be commercially viable in a restructured regulatory environment, equity investors should not be expected to shun completely share ownership in the Company. Prospects for a tightening of supply conditions relative to the demand for satellite capacity enhance the likelihood that Telesat's shares would be of potential interest to private investors, especially international investors seeking the benefits of geographic diversification.

Another caveat against maximal separation of ownership is the suggestion that the current ownership structure facilitates technological cooperation between satellite and terrestrial transmission media, as well as the orderly expansion of capacity in these two sectors. While superficially appealing, this hypothesis receives little empirical support. For one thing, the common ownership structure obviously did not prevent the emergence of substantial excess capacity that has characterized Telesat's operations over the past few years. A substantial portion of current excess capacity is a function of planned demand from Telecom Canada that did not materialize. Furthermore, there is no evidence that Canadian satellite capacity expansion has proceeded in a more "orderly" fashion than capacity expansion in the more atomistic U.S. satellite sector. Another relevant observation is the fact that technical

coordination between CNCP and Telecom Canada has been achieved quite successfully without common ownership. The experience of the interconnect industry offers an even more outstanding case study of how disparate firms can coordinate technical requirements while engaging in active rivalry with affiliates of the common carriers.

In sum, the maximal separation of ownership of terrestrial and satellite facilities holds important potential benefits with no obvious offsetting potential costs. If for non-economic reasons, such a separation of ownership is impractical, steps should be taken to ensure that Telesat's management operates in a completely autonomous fashion from management of the terrestrial common carriers.

CONCLUSIONS

This study has addressed a number of regulatory issues surrounding Telesat's activities. The primary issue is whether Telesat should have the flexibility to depart from strict cost-based pricing. Within the spirit of the Railway Act, this flexibility would presumably encompass Telesat's freedom to price discriminate across classes of customers. A related issue is whether all of Telesat's prices should be subject to regulatory review. Telesat has argued for an exemption from regulatory review of its earth segment tariffs.

The key consideration in evaluating the price-flexibility issue is whether the expected efficiency gains from price discrimination outweigh the expected costs, including higher communications costs for "socially preferred" users. Unfortunately, available information does not permit a precise evaluation of this potential tradeoff. In our view, the evidence does suggest that the satellite sector is sufficiently "contestable" to encourage Telesat to charge so-called Ramsey prices; i.e. prices that are socially optimal in the presence of economies of scale. It also suggests that concerns about predatory pricing are largely irrelevant in this context.

As a specific policy approach, we recommend that Telesat's pricing in the earth segment be deregulated. Pricing in the space segment should be liberalized so that non-cost justified prices can be charged subject to Telesat meeting an overall rate-of-return constraint. The social desirability of taking these steps toward deregulation would be enhanced if several complementary policy changes were also implemented. One such change involves a maximal (i.e. ownership) separation of Telesat from Telecom Canada. Another is direct subsidization by the federal government of satellite users that would be especially adversely affected by price changes and that "require" income subsidies.

Our analysis also leads us to recommend that non-price

related conditions of exchange be relaxed so that Telesat can enter into long-term leases at guaranteed prices, or even make outright sales of transponder capacity. Telesat should generally enjoy the ability to market its services directly and to allocate its capacity as it sees fit; however, the regulator should ensure that high priority broadcast activities are not jeopardized by unfavourable rationing of satellite capacity. Finally, we recommend that an overall rate-of-return constraint be established for Telesat's space segment business.

APPENDIX AOrganizations Interviewed By The Author

1. Alcan
2. Bank of Montreal
3. B.C. Tel
4. Canadian Broadcasting Corporation
5. CANCOM
6. Crowder Communications Ltd.
7. CTV
8. Esso Resources
9. First Choice
10. Global
11. The Globe and Mail (Newspaper Division)
12. Infoglobe
13. Knowledge Network
14. Maclean Hunter (Cable)
15. Merrill Lynch
16. Memorial University
17. Northwestel
18. Superchannel (Allarcom Pay TV)
19. Tele-Consult
20. TV Ontario
21. Western Broadcasting

TELESAT QUESTIONNAIRE

1. WHAT ARE YOUR MAJOR CONCERNS REGARDING TELESAT'S OPERATIONS AND REGULATORY ENVIRONMENT FOR SATELLITE SERVICES?
2. WHAT CHANGES IN THE ABOVE WOULD YOU LIKE TO SEE AND WHAT EFFECT WOULD THESE CHANGES HAVE ON YOUR BUSINESS ACTIVITIES?
3. WHAT ARE YOUR MAJOR RESERVATIONS IN UTILIZING SATELLITE SERVICES MORE INTENSIVELY?
4. IF PRICES OR TERMS FOR THE SPACE SEGMENT IMPROVED WOULD YOU USE MORE TRANSPONDER CAPACITY? (by what percentage would they have to improve)?
5. IF PRICES OR TERMS FOR EARTH SEGMENT SERVICES IMPROVED WOULD YOU USE MORE SATELLITE SERVICES?
6. WHAT CONDITIONS WOULD ENCOURAGE YOU TO USE SATELLITE SERVICES MORE INTENSIVELY? (This may include conditions surrounding Telesat; conditions in your own industry, and so forth)