

T H R E E

Competition by Private Carriers in International Commercial Satellite Traffic: Conceptual and Historical Background

MARCELLUS S. SNOW

The aim of this essay is to provide a historical and theoretical context from which to judge the present controversy regarding competition in North Atlantic commercial satellite services. The approach will be to supply the reader with both information and methodologies on which to base a decision about this important policy issue, rather than to make such a decision on the reader's behalf.

HISTORICAL PERSPECTIVE

This section explores important policy actions regarding competition and private entrepreneurship in the provision of telecommunications facilities and services, many of them directly involving international satellite traffic.

The Communications Satellite Act of 1962

The first artificial satellite was launched by the Soviet Union in 1957, and the United States soon followed suit. As satellites became commercially viable for communications purposes in the early 1960s, Congress considered whether private or public ownership and operation would be preferable. There was no debate about “monopoly” per se—the scarcity of the new resource made the selection of a single provider a foregone conclusion.¹ Instead, debate centered around the question of whether the monopoly should be awarded to private interests or retained by the Federal government. Arguments for Federal ownership stressed the unknown aspects of the infant technology and warned against a “sellout” to private interests.² Those favoring private ownership, in turn, disagreed with one another as to whether the satellite enterprise should belong to existing overseas carriers—AT&T, Western Union International, RCA Globcom, and ITT—or whether the public at large should own the shares. After acrimonious debate, private ownership was decided upon, and as a compromise half of the stock of the newly formed Communications Satellite Corporation (Comsat) was purchased by existing carriers, while the other half was sold to the public at large. The carriers sold their interest during the 1970s.

Comsat, then, was awarded a monopoly in U.S. commercial satellite traffic overseas. The technology was too new to consider any domestic applications, or the possibility of two or more firms competing for the overseas market. With demand and supply at very low levels, economies of scale seemed strong enough to argue for entrusting the market to a single carrier.

The INTELSAT Agreements

The original INTELSAT agreements concluded in 1964 were negotiated at American instigation among nineteen mostly industrialized countries, basically those with earth stations or the prospect of soon obtaining one.³ The dramatic successes of the early transatlantic television transmissions made possible first by experimental and then by INTELSAT satellites increased the number of countries wishing to accede to the agreements. Thus, the original agreements were made provisional in nature to accom-

modate those countries wanting to share in the technology but not desiring to perpetuate the predominant position of the United States in satellite, launch, and earth station technology. Overall policy direction as well as medium-term management was therefore temporarily vested in an Interim Communications Satellite Committee (ICSC), on which voting quotas reflected investment shares. Day-to-day operation was contracted out to Comsat, acting as INTELSAT's manager.

The permanent or definitive agreements were arduously renegotiated during the years from 1969 to 1971 and entered into force early in 1973.⁴ These replaced the ICSC with a Board of Governors which still votes by investment shares, but on which smaller users have more rights of representation and greater protection against undue influence by a small number of large users. In addition, two overarching membership structures were created for long-range policy matters, each having one vote per member: the Assembly of Parties, composed of the states that had signed the intergovernmental agreement; and the Meeting of Signatories, consisting of operating entities designated by those governments.

Two elements of the INTELSAT agreements are important for present purposes. First, INTELSAT was established along cooperative lines, in both the technical and, one can argue, the informal sense of the word. As an economic cooperative of investors and users, INTELSAT was financially structured so as to balance the investors' desire for high tariffs and the users' incentive for low tariffs.⁵ By periodically aligning investment quotes with recent past usage shares for each signatory, INTELSAT makes the tariff level technically irrelevant. For cases of temporary imbalance of ownership and usage, as well as for non-using investors and nonmember users, the tariffs are set at a level that pays INTELSAT members a cumulative annual return of 14 percent on their net investment. Reflecting dramatic advances in technology and increases in usage, the original annual rate of \$32,000 for a single voice-grade channel has now dropped to below \$5,000.

A second issue in renegotiating the agreements, crucial to the purpose of this article, involved the prohibition of systems competing with INTELSAT, Article 14(d). By the late 1960s, such

a threat had already become commercially feasible. The Canadian domestic system was already in operation, Indonesia's Palapa system was being designed, and the regional systems in Europe and among the Arab states were under consideration. In the original agreements INTELSAT's members had awarded the organization exclusive rights to operate "the" global commercial satellite system, although in the context of the mid-1960s the possibility of credible competition was still remote. This had changed five years later, and the issue of separate systems was easily the most controversial during the process of renegotiation.

The Authorized User Decision and Its Reversal

The Communications Satellite Act referred to "authorized users" and "authorized entities." Since these were further unspecified in the act, many large user groups sought to obtain access to INTELSAT directly through Comsat rather than first going through the international common carriers. The FCC determined in its 1966 Authorized User Decision not to allow this bypass, declaring Comsat's role that of a "carrier's carrier."⁶ At issue was whether Comsat would be allowed to introduce more competition into the U.S. market for overseas carriage by INTELSAT. The international carriers argued that they were at a disadvantage in any such competition, as they could not directly approach INTELSAT but had to go through Comsat. The decision reflected the extreme market segmentation orientation of the FCC in the mid-1960s, generally under the influence of the large carriers whose representatives still sat on Comsat's board of directors. Recently, in the interest of competition and deregulation, the FCC has overturned the Authorized User Decision, and Comsat can now compete directly with certain large users for INTELSAT traffic.⁷

The President's Task Force on Communications Policy

Late in the Johnson administration, the President's Task Force on Communications Policy, chaired by Eugene Rostow, issued its final report. It urged continued support of INTELSAT as a single global system. In addition, requests had been filed with the FCC since the mid-1960s to establish domestic satellite systems in the United States, and the Task Force addressed this issue. Again

on the grounds of economies of scale in production and management, it recommended that Comsat be selected as the sole purveyor of domestic satellite services.⁸

While the Task Force's report became an instant dead letter after the inauguration of the Nixon administration a month later, it is significant in being one of the first policy documents to make explicit use of the "natural monopoly" argument, at that time equivalent to the existence of scale economies, to justify prohibiting competition in satellite facilities and services.

"Open Skies" in U.S. Domestic Satellite Services

Early in 1970 the Nixon White House issued a memorandum to the FCC chairman urging exactly the opposite policy, on the basis that "no natural monopoly conditions appear to exist in the provision of specialized communications via satellite." Further, it proposed to allow "competition (in providing a domestic satellite system) to act within well-defined limits necessary to preclude anti-competitive practices and to assure that the competition works toward the public interest."⁹

As later implemented by the FCC, this policy became known as the "Open Skies" approach to domestic satellite systems in the United States. In opposition to the chosen entity approach used with INTELSAT internationally, the FCC implemented a policy of almost maximum competition in the domestic market. As a result, a number of systems have evolved gradually since the early 1970s, and by all accounts have provided a broad range of new and conventional services at acceptably low prices. This differs from the domestic policy of a number of countries, such as Canada and Indonesia, where early government entrepreneurship rather than market forces determined the pace of introduction, usually through a single entity. Other countries, however, notably Japan, Australia, and the United Kingdom, have adopted the evolutionary, market-based approach of the United States, albeit with less competition.

INTELSAT's Domestic Transponder Leasing Program

Article 8 of the INTELSAT Operating Agreement requires, or has been interpreted to require, that average-cost pricing

be the guiding rule of the global system's tariff structure. This policy was confirmed by the ICSC's Finance Subcommittee as early as 1971, before the Operating Agreement had entered into force.

INTELSAT's policy decision to begin leasing whole, half, and quarter transponders for domestic usage on a preemptible basis—a policy still essentially intact today—was adopted in the early 1970s, when the organization faced a situation of considerable excess capacity under the average-cost pricing regime. Today, INTELSAT leases transponders to thirty-one different countries for a broad range of domestic purposes, including drilling platforms at sea, communications with noncontiguous national territory, and general economic development programs.

One can interpret the purpose and motivations of INTELSAT's transponder leasing policy from a number of viewpoints. It can, for example, be seen as an exercise in marginal-cost pricing. This, incidentally, would not be consistent with the profit-maximizing behavior usually attributed to a monopolist, which is to produce at the level for which marginal cost equals marginal revenue. More plausibly, perhaps, it can be regarded as a type of value-of-service pricing (price discrimination). This means that the value of a service to the user (as measured by the price elasticity of demand of its consumers) is inversely proportional to the price charged—the assumption being that domestic customers are more responsive to price than international users.

Aside from these more technical interpretations, INTELSAT's transponder leasing decision can be seen in a broader policy context. First, it can be regarded as an effort to meet the needs of the developing and European countries, which constitute the bulk of transponder lessees; each group, for often conflicting reasons, had been critical of vestiges of United States domination in INTELSAT in the early 1970s. For purposes of this essay, the most relevant interpretation of the transponder leasing decision would be to consider INTELSAT's action as an attempt to forestall the establishment of separate domestic or regional systems that would otherwise have accommodated the traffic that INTELSAT was subsequently able to attract. Thus the threat (as opposed to the reality) of competing separate systems was able, in this view,

to galvanize INTELSAT to depart quite radically from the average-cost pricing principles enshrined in its Operating Agreement. The ability of potential competitors to enter and exit a market at relatively low cost and thus to affect the behavior of the monopolist or incumbent firm—even if actual entry does not occur—is a salient feature of the theory of contestability of market structure to be examined in part 4, where it will be applied to the North Atlantic competition issue.

Recent FCC and Congressional Attitudes

In this final section of part 2 we survey two recent committee reports which convey the mood of Congress and summarize the position of the FCC toward competition in international telecommunications. Issued during the early part of the first Reagan administration, they are indicative of the strong support that deregulation of the telecommunications industry has found in the United States. While the work of both committees was completed before the specific issue of competition for INTELSAT's North Atlantic routes arose, the reports serve to illustrate the technological, economic, political, and often ideological environment within which American policy toward such competition will be developed, chosen, and carried out.

Late in 1981, the majority staff of the Subcommittee on Telecommunications, Consumer Protection, and Finance of the House Committee on Energy and Commerce issued "Telecommunications in Transition: The Status of Competition in the Telecommunications Industry." Among its major conclusions:

There is general agreement that a more competitive environment . . . is desirable . . . Recently, because of the major changes in technology, there is the possibility that today's limited alternatives can develop to the point where competitive market forces will govern the industry.¹⁰

The Senate Committee on Commerce, Science, and Transportation issued a report in the spring of 1983 entitled "Long-Range Goals in International Telecommunications and Information: An Outline for United States Policy."¹¹ While the House report responded primarily to the domestic situation, including

attempts to rewrite the Communications Act of 1934, the Senate paper was set in a more international context and seems more defensive and ideological in nature. The report was prepared by the staff of the National Telecommunications and Information Administration (NTIA) of the Department of Commerce.

The NTIA report asserts in passing that INTELSAT is a "triumph" of U.S. foreign policy and then discusses the issue of competing "regional" satellite systems—a designation that indicates the wholly unanticipated nature of proposals for private North Atlantic satellites financed by U.S. entrepreneurs that were to reach the FCC soon thereafter. Competition today, it notes, is "a reality in the U.S. domestic, if not international, satellite market."¹²

The report does not address the apparent conflict between INTELSAT as a U.S. foreign policy "triumph" and the possible symbolic and economic damage that separate traffic and systems—supported by current American deregulatory policy—might inflict on that organization. This is a theme that is constantly used by INTELSAT officials in opposing separate North Atlantic facilities.¹³

As these policy documents suggest, there is ample evidence that in examining the North Atlantic traffic controversy, the United States will be animated more strongly by technical arguments and political beliefs regarding the efficacy of competition and free markets than by the real and symbolic achievements that INTELSAT represents for U.S. foreign policy.

ARGUMENTS AGAINST COMPETITION IN THE NORTH ATLANTIC COMMERCIAL SATELLITE MARKET

This section examines the economic and foreign policy considerations that have been advanced for maintaining monopoly against competitive entry. Some of these arguments are quite general and abstract, while others have been adapted specifically to the issue at hand. Most, however, will be discussed in the framework of telecommunications markets.

*Natural Monopoly, Economies of Scale and Scope,
and Sustainability of Monopoly*

By far the most common defense of monopoly in any public utilities market is the alleged presence of what is usually called "natural monopoly." Traditionally, this has often meant nothing more or less than economies of scale in a single output: the average cost of production declines, over the relevant range, as output increases.

A more recent concept used to define natural monopoly is that of cost subadditivity, emanating from the sustainability of monopoly/contestability of market structure literature.¹⁴ Costs are said to be subadditive when the cost of producing a total amount of a single output is less than the cost of having two firms produce that amount together.

In a single-output setting, economies of scale and cost subadditivity are the same. Rarely, however, does a firm produce only a single output, particularly in the telecommunications sector. Most large carriers, for example, provide both video and data services along with telephony. Even telephony cannot be considered a single commodity, since it can be classified into submarkets based on time of day, length of transmission, route density, and so forth. Although there is a temptation from an engineering perspective to assume that telecommunications providers supply a single output called "bandwidth" or perhaps "bits of information," a more fruitful approach is to differentiate markets and products whenever variations in the price elasticity of demand are observed, as between, for example, residential and commercial users.

For decades, policy analysis of "natural monopoly" in public utilities was chained to the unlikely assumption of a single output. Since the mid-1970s, analysis of the multi-product case has resulted in a number of striking new insights. An important one for this discussion is that of economies of scope. Natural monopoly is seen as occurring under two quite separate conditions. Either two smaller firms produce the same mix of products but on a smaller scale, or two smaller firms completely specialize in one of the two outputs. In this second case, we say that the cost function exhibits economies of scope, meaning that a single

producer can produce more cheaply than two firms, each specializing in one of the outputs.

Economies of scope, akin to the older concepts of joint and common costs, reflect complementarities in the production process. They are vital in considering the nature of the cost function and its implications for regulatory policy in the face of claims regarding the presence of "natural monopoly." Before turning to the case of INTELSAT and competing systems, we must add one final element to our conceptual tool kit, that of sustainability of natural monopoly.

In a single-output case, a firm with natural monopoly—economies of scale—need not worry about market entry by competitors. Any firm producing at a lower scale will incur higher average prices and can be undersold by the incumbent firm, thus eliminating financial incentives for small scale entry. Thus, the traditional rationale for government regulation of single product monopolists has been to protect the public from profit-maximizing behavior on the part of the monopolist rather than to protect the monopolist from entry.

In the multi-product case, however, an incumbent firm enjoying cost subadditivity or natural monopoly—and thus generally benefiting from economies of both scale and scope—might still fail to prevent profitable entry by rivals. Such competitors would typically choose to produce a proper subset of what is offered by the incumbent, for example, by specializing in one or more individual product lines. In other words, although a single firm—by virtue of cost subadditivity—is always able to offer a given market basket of outputs at least cost, there exist cases in which rival firms still have financial incentives to enter the market and compete for part of the incumbent's business. When this happens, the incumbent must cut back production, and the overall cost of the same total market output rises. This is the case of an unsustainable natural monopoly. If no such incentives for profitable entry exists, the monopoly is said to be sustainable.¹⁵ The existence of unsustainable multi-product natural monopolies is a vital public policy question for regulatory authorities and has important implications for INTELSAT.¹⁶

INTELSAT is clearly a multi-output enterprise. Its service offerings are differentiated by technical features (voice, data, video), by route, by region (Atlantic, Pacific, and Indian Ocean), by user restrictions (preemptible transponder leases), and by many other criteria. Does it have economies of scale and scope? Is it a natural monopoly, and, if so, is it a sustainable one?

One important point often cited in defense of INTELSAT is that it represents only about 10 per cent of total satellite communications costs, the remaining 90 per cent residing in earth station and various terrestrial transmission expenses.¹⁷ Reference is often made to the claim that from an engineering point of view, system "optimization" would be possible only if the same entity operated both the earth and space segments. What is probably meant by this is that there are economies of scope in providing both earth and space segments through a single entity rather than through over one hundred (INTELSAT and 108 signatories, each of the latter with its own earth segment). Because of the political and institutional impossibility of unifying the earth and space segments—which is not at issue in the North Atlantic route debate—we will neglect this rather obvious source of potential economies in what follows.

Even in the space segment, it is conceivable and perhaps probable that INTELSAT enjoys a multi-output natural monopoly and economies of scope.¹⁸ Suppose that there are three homogeneous outputs which we will call voice, video, and data service, and that INTELSAT presently supplies respective levels x , y , and z of those services. Cost subadditivity, the salient property of its natural monopoly, would then assure that no combination of two or more firms—presumably including INTELSAT—could provide output bundle (x,y,z) at lower cost. Assume, however, that INTELSAT's natural monopoly is unsustainable. One consequence of that unsustainability could be that two competing firms or systems, specializing in video and data, respectively, might find financial incentives to compete for all or part of INTELSAT's business in those services. In the case of complete specialization, we would then have the output vector $(x,0,0)$ for INTELSAT, $(0,y,0)$ for the video firm, and $(0,0,z)$ for the data enterprise. Each

would be earning a profit and would thus have a financial incentive to remain in the market. Yet cost subadditivity would assure that the same output after entry is produced at a higher overall cost, to the presumed detriment of users as a whole. The important public policy issue is whether, under such circumstances, INTELSAT's unsustainable natural monopoly should be artificially sustained by entry restrictions and/or moral suasion by INTELSAT's membership, based on positive findings of "significant economic harm" under Article 14(d). To be sure, we have established a case for economic harm to satellite users as a whole. A case for harm to INTELSAT itself would have to be based on the consequences of losing certain categories of traffic to higher cost competitors as well as on a lack of diversification of output. This might be difficult to do in an environment of exponentially rising traffic.

There are other possibilities as well. Even though technical properties of the geostationary orbit or the earth's terrain may afford economies of scope in multi-region or global satellite services, the natural monopoly on which such economies are based might be unsustainable.¹⁹ Subglobal systems, perhaps specializing in particular ocean regions or other geographic areas, would then have financial incentives for market entry, even though subadditivity would assure that any given combination of regional outputs would be more expensively provided by two or more systems than by the global system alone.

Finally, in a cooperative of owners and users, such as INTELSAT, the threat of competition can come from within as well as from outside. Individual user groups within an unsustainable natural monopoly can secede and create their own facilities or systems more cheaply for themselves but to the detriment of users as a whole. This may well have been the cost dynamic behind the establishment several years ago of INMARSAT, the global maritime satellite system. Perhaps heavy users of maritime communications, consisting of a small subset of INTELSAT members plus the Soviet Union, perceived that it was possible to specialize in the maritime satellite market profitably, although INTELSAT may have been able to provide any given vector of both maritime and public services at a lower price. Similar considerations might explain INTELSAT's disinclination or inability

to specialize in other areas, such as aeronautical or land-based mobile services.

It should be clear that any of the questions posed regarding the existence and extent of natural monopoly, economies of scale and scope, or sustainability of natural monopoly for INTELSAT must depend for their answers on the existence and availability of complete, reliable, and accurate cost data and on the correct specification and estimation of the relevant cost functions. This is a task of urgent priority if important policy issues are to be resolved on a reasonably objective basis. Economies of scale, for example, have been estimated for the first decade of INTELSAT operation; in addition, more recent studies are extant.²⁰

Competition in Services Rather Than Facilities

INTELSAT may find it in its interest to make facilities available for lease to firms that resell them, providing what are called value-added or resale services in a slightly different domestic context. This would be an alternative to establishing separate transmission facilities to furnish such services. In this way INTELSAT would retain its facilities monopoly but would move down the marketing chain to the status of a wholesaler in some of the services for which its facilities were ultimately used.

While the economic issues are difficult to sort out here, one might argue as follows. By providing circuits to wholesalers for later resale as value-added services, INTELSAT could retain the benefits of economies of scale. If separate facilities were established, by contrast, this would cause a loss of economies of scope. If INTELSAT has a natural monopoly that is strongly unsustainable, it might be possible for competitors to invest heavily in duplicate or parallel facilities and still have a financial incentive for entry. Perhaps an analogue of the indefeasible rights of usage provided to cable users could be established for certain categories of INTELSAT customers wishing to resell their circuits over an extended period of time.²¹

If separate facilities are uniformly opposed by INTELSAT members, the concept of value-added circuits is unacceptable to most telecommunications providers outside the United States.²² This might pose a political barrier to their accommodation on

INTELSAT facilities and a greater spur to completely separate systems, again to the detriment of the user community as a whole.

Habit, Preference, and Stability

Recent studies of international telecommunications deregulation have included conjectures about preferences for the status quo based upon plausible organizational and psychological motives. In Australia, for example, a substantial measure of price stability and predictability may well be preferred by most of the population to prices that fall erratically in an environment of deregulation.²³

Distributional matters are also paramount in deregulatory questions. Even when economic welfare as a whole increases, the welfare of certain individual user groups (the poor, rural customers, low-volume users) may well decline. Explicit subsidies to correct these difficulties are often proposed by economists. Direct assistance is more efficient in a purely technical sense than is the retention of the subsidy pattern implicit in most telecommunications pricing schemes, but is often politically impracticable.

Part of INTELSAT's unanimous opposition to competing North Atlantic facilities may well come from the fact that most of its signatories are either PTT administrations or other entities in telecommunications ministries, with various organizational and psychological motives for opposing change. These motives may very well have validity in terms of human and material resources, and should be considered to the extent possible in the overall calculus of costs and benefits brought to bear on the ultimate policy decision.

Cooperation Instead of Competition

Among the many non-Marxian socialist approaches to economic organization, the cooperative movement still retains some of its nineteenth-century appeal and following. INTELSAT, as noted, is technically an economic cooperative of owners and users.

Spokesmen for INTELSAT have argued against the introduction of competition, citing the harmony and cooperation

that INTELSAT has displayed in its twenty years of efficient and apolitical existence.²⁴ Indeed, there is a sentiment toward INTELSAT among its members and many American proponents much akin to the supportive attitude toward AT&T before the first big competitive incursions by Microwave Communications, Inc. (MCI) in the 1960s or before its recent divestiture.²⁵ Part of this attitude can be summarized by the aphorism, "If it works, don't fix it."

Nonetheless, however strong the verbal appeal of the argument for cooperation instead of competition, it does not have anywhere near the theoretical buttressing of the natural monopoly arguments set forth above.

The Cream-Skimming Argument

Another defense of INTELSAT against competitive incursions, one employed with particular frequency on the high-traffic North Atlantic route, is that of cream-skimming. It goes like this: INTELSAT, obliged by treaty to engage in globally averaged pricing, will lose its highly profitable dense traffic routes to entrants not so constrained, who will underprice INTELSAT on those routes and ignore the thin traffic routes INTELSAT must serve at a loss.

This is a quite accurate summary of the dilemma faced by INTELSAT. It is not qualitatively different from the arguments used by American communications and transportation carriers when faced with domestic deregulation.

Much has been written about cream-skimming in the regulatory and other literature,²⁶ but the essence of the problem is easy to state. Cream-skimming is made possible by competitive entry to markets which were previously part of a cross-subsidizing monopoly. Competition, however, forces costs to be aligned with prices in each market; otherwise, the incumbent firm would either be underbid and lose customers (in markets where its prices exceeded costs) or lose money (in markets where its costs exceeded prices).

By interpreting its agreements regarding global and non-discriminatory pricing strictly,²⁷ INTELSAT has indeed made itself vulnerable to cream-skimming by competitors planning to enter its lower cost, high traffic routes such as the North Atlantic. Pre-

liminary INTELSAT cost studies, at least those during the 1970s, do indeed indicate a subsidy of the Pacific and particularly of the Indian Ocean regions by the Atlantic.²⁸

More research is needed if INTELSAT wishes to foreclose the option of "cream-skimming" to potential competitors. More complete and sophisticated cost studies should be conducted to determine whether potential competitors would have the same technology and, therefore, the same cost function, as INTELSAT; and whether INTELSAT's current global tariff structure sets prices above costs in the North Atlantic region. With the continuing rapid evolution of launcher and satellite technology, the answers to these questions may well change every few years.

U.S. Foreign Policy Considerations

Fear of damage from competition to INTELSAT is fed by many concerns other than those that can be expressed in a "technical" (engineering, economic, legal) framework. INTELSAT is regarded by most of its member countries and proponents as the embodiment of an apolitical, nonideological international organization that has harnessed a new technology for the good of mankind. Developing nations have gained access to telecommunications services they could not otherwise afford, and the industrialized world has shared in the technology and aerospace contracting needed to maintain the system. While there were complaints from both European and developing countries about American domination during the early years of INTELSAT, they have become less numerous and strident since the renegotiation of INTELSAT's agreements and with the decline of American usage from over one-half to less than one-fourth of the system. One is hard pressed indeed to find a similarly successful international organization anywhere in the world; there is certainly none providing commercial services on the scale that INTELSAT does.

Global cost averaging was mentioned in the preceding subsection as the potential cause of cream-skimming on the North Atlantic route. Symmetry and fairness demand that positive aspects of this implicit subsidization now be discussed. The net flow of benefits to the (mostly developing) countries of the Pacific and Indian Ocean regions can be seen from one perspective as an

extremely successful and unprecedented exercise in multilateral telecommunications development assistance, the kind of "foreign aid" that both donor and recipient nations dream of but seldom achieve through conventional assistance mechanisms, whether bilateral or multilateral. The precise ways in which telecommunications can accelerate economic development—or is itself in part a consequence of such development—are as yet poorly understood.²⁹ Nevertheless, it is clear that a minimum level of telecommunications infrastructure, including both domestic and international links, is a prerequisite to sustained economic development.

ARGUMENTS FOR COMPETITION IN THE NORTH ATLANTIC COMMERCIAL SATELLITE MARKET

This section examines reasons advanced for allowing competition with INTELSAT on its North Atlantic routes. As with the arguments opposing competition, the arguments below are generalizable to other satellite markets and often to other enterprises or industries.

Diversity of Services and Other Dynamic Considerations

It has been seen that once multi-product output is considered, traditional conclusions regarding economies of scale and other cost relations had to be modified in a qualitative way. This point applies with particular force when we take so-called dynamic factors into account.

Most economic reasoning is cast in a static mold for mathematical tractability and ease of theorizing. There are at least two aspects of competition in telecommunications, however, which cannot receive adequate appreciation in a static framework. The first point is that, over time, new services emerge and existing services can become better and more reliable. Thus, analysis based on a fixed set of outputs as the arguments of a cost function cannot do justice to the importance of new services and technologies. The list of new services and techniques in telecommunications is long and varied, including, of course, satellite transmission itself. Second, technological change causes the cost function to shift over

time, allowing more output to be obtained from a given set of inputs. These dynamic efficiencies due to changes in the cost function (technology) are to be distinguished from the static cost savings made possible by economies of scale and scope within a given technology.

The burden of economic evidence to date is that these kinds of dynamic efficiencies emerge more naturally and easily in a regime of competition than one of monopoly. This can be seen in the pressure from the business user community, consisting often of multinational corporations as prime movers, to have European PTTs introduce new services vital to conducting international business.³⁰ User groups and others have argued that national telecommunications monopolies do not have adequate financial incentives to offer such services. In addition, incentives to pursue and adopt more efficient, cost-saving technologies are generally greater in enterprises facing competition or at least having a break-even constraint than in monopolies that can count on taxpayer subsidies to cover their losses.

Contestability of Market Structure

A succinct description of market contestability theory is beyond the scope of this essay.³¹ The basic idea, however, is that if markets dominated by a monopolist are relatively easy (inexpensive) to enter and exit, the mere threat, if not necessarily the reality, of entry by rival firms will exert discipline on the incumbent firm to innovate and to price according to cost rather than to earn monopoly profits. Much of the theory of contestable markets centers around the question of how high entry and exit costs are for potential rivals in monopoly markets; what assumptions the incumbent and rival firms make about each other's potential behavior; and what the effects of both entry and the threat of entry are upon the incumbent firm if a market is truly contestable.

In the absence of comprehensive, reliable, and accessible cost studies, we cannot determine whether the North Atlantic is a "contestable" market for commercial public satellite communications. There is some behavioral evidence, however, that it is. Consider first two of INTELSAT's recent service innovations,

Vista service for developing countries and INTELSAT Business Service (IBS) for international business applications.³² Certainly IBS approximates to some degree the types of services proposed by potential North Atlantic entrants. And the introduction of Vista, along with earlier INTELSAT concessions on domestic transponder leasing and small earth stations, is surely not unrelated to the threat of entry by domestic or regional satellite systems into markets oriented to the needs of developing nations.

There exist data suggesting that telecommunications markets in the United States and the United Kingdom are contestable. The Competitive Carrier proceeding of the FCC, begun in 1979, had the effect of facilitating competitive entry into the U.S. domestic satellite market, making it easier for "non-dominant carriers" to "institute or discontinue service," i.e., to reduce entry and exit costs.³³ The private Mercury consortium was established in the United Kingdom, it seems, precisely to provide a competitive check on the monopolistic power of British Telecom (BT). Although Mercury's incursion into BT's market share has been quite modest to date, evidence suggests that the mere threat of such entry has galvanized British Telecom management to new levels of efficiency and customer awareness.³⁴

Optimal Pricing to Maximize Economic Welfare

The discussion of cream-skimming noted that competition has the effect of forcing prices to align themselves with costs market by market and, thereby, following accepted canons of neoclassical economics, to maximize economic welfare. Given what INTELSAT perceives to be an absolute prohibition against relaxing its global pricing policy, competitive entry into its low cost North Atlantic market could indeed inflict "significant" economic harm upon it—harm so extensive, in fact, as to constitute an argument against allowing such competition. Thus, discussion of cream-skimming was included in the arguments above opposing competition. From a broader perspective, however, the creation of welfare-maximizing prices afforded by competitive entry is obviously a consideration in favor of competition.

Measures of global welfare, however, ignore distributional aspects of pricing, as we noted in discussing the devel-

opment externality features of INTELSAT's globally averaged tariff. Much of the current European coalition opposing deregulation there is composed of groups that would probably become new losers (the poor, the rural, large and well connected contractors) in any redistribution of telecommunications costs and benefits, even though the overall welfare level would increase as a result.³⁵

In case a telecommunications monopoly is retained, however, tariff structures are still available that can greatly increase the level of overall economic welfare above that provided either by global averaging or by political compromises.

Stimulation of Overall Traffic by Competition

The claim has been made that in today's overall context of exponentially increasing traffic, competition on the North Atlantic route might actually increase INTELSAT's own traffic, other things being equal. A less extreme version of this argument is that this high rate of traffic growth would quickly compensate any absolute loss suffered by INTELSAT due to competitive encroachments.

Much of this reasoning depends upon assumptions about what market niche is being targeted by competitors. Such markets must include: (1) services that INTELSAT has no intention or capability of offering in any case; (2) services that INTELSAT would offer only if they were offered competitively; (3) services that INTELSAT would offer only if there were a credible threat of their being offered competitively; or (4) services that INTELSAT would offer in any event, regardless of competitive consideration. Naturally, perceptions by INTELSAT and its potential competitors as to what markets would be involved in the case of competition differ widely and are interdependent, and one is tempted to suggest a game-theoretic approach as the most appropriate analytical perspective.³⁶ In any event, only the actual process of competition, as opposed to a priori reasoning, could determine with certainty how markets, demand, supply, and prices would interact. At this stage the claim that alternative competitive offerings on North Atlantic satellite routes would stimulate rather than depress INTELSAT's traffic, *ceteris paribus*, is speculative indeed.

Competition as an Efficient Discovery Procedure

This final argument offered in favor of competition is general enough to encompass all the rest as special cases. It derives ultimately from the insights of F. A. Hayek, the Nobel laureate economist of the Austrian school.

While closely allied with the neoclassical outlook, Austrian school economists regard the process of competition as uniquely beneficial and efficient, aside from its effects on prices and resource allocation.³⁷ Hayek considers competition as a decentralized, non-bureaucratic, efficient "discovery procedure" or information system. For example, the best way to determine what market-clearing price and quantity would prevail if competition were to exist would be simply to allow competition to exist, rather than to estimate supply and demand curves and determine where they intersect.

In the context of the North Atlantic satellite market, this argument would go as follows. Neither INTELSAT nor any potential competitors should be excluded from competition on a priori grounds, assuming that routine technical and financial safeguards were enforced. The ensuing competition itself would reveal the underlying cost relationships in the most efficient manner. Several facts, indeed, could be "discovered" by such competition.

First, INTELSAT might not be a natural monopoly at all, given its current level of output. In other words, it might not exhibit cost subadditivity. Diseconomies of large scale organization, for example, might make it possible for INTELSAT and one or more competitors to produce a given output vector more cheaply than could INTELSAT itself. Second, INTELSAT might have a natural monopoly that is sustainable, perhaps by using Ramsey pricing instead of average-cost pricing. In this instance "competition" would consist of the failure of competitors to attain long-term economic viability at prices they must charge to attract customers from INTELSAT; they would ultimately exit the market. Third, INTELSAT might have an unsustainable natural monopoly. Here, as in the first case of no natural monopoly, competitors would be able to enter successfully. Thus, the mere presence of successful competitors would be unable to distinguish between lack of natural monopoly and presence of unsustainable natural monopoly;

additional information, perhaps including cost function estimation, would be necessary. The most important public policy decision would be whether to provide artificial "sustenance" to an unsustainable natural monopoly, for example by prohibiting entry. This would appear to be the theoretical basis of the debate surrounding the economic coordination mechanism of Article 14(d).

Finally, we note that ease of market entry and exit, a prerequisite for market contestability, also contributes to the process of competition as an efficient discovery procedure and information system. The more cheaply rival firms can enter and exit previously monopolized markets, the more quickly information regarding underlying competitive conditions can be "discovered."

CONCLUSIONS

There exist powerful arguments both for and against allowing competition. The strongest reason for prohibiting competition with the global system is the necessity of protecting an unsustainable natural monopoly, if natural monopoly cost conditions (subadditivity) are indeed found to exist. Wise public policy in such a situation would dictate the protection of users' interests by favoring the lowest cost production option, namely a single service provider. This is a static argument which may need to be refined to take into account dynamic factors such as service diversity and stimulation of new technologies. U.S. foreign policy considerations also have a strong appeal but will probably not be decisive.

The strongest pro-competitive arguments cited here include the greater product diversity and attention to users' needs that seem to flourish when competition—or perhaps merely the threat of competition, following contestability theory—is allowed. INTELSAT, however, was seen to be increasingly responsive to special user needs even without actual competition. Another benefit of competition—its role as an efficient and autonomous discovery procedure and information system—also provides a persuasive case for its adoption under quite general circumstances. Most of the arguments pro and contra that have been assembled here—and indeed most of the historical policy decisions as well—

depend for their validity on certain theoretical propositions that can be corroborated or refuted only by empirical evidence. The empirical element, however, has been conspicuously absent in this essay, because so few comprehensive, reliable, and accessible studies have been undertaken. It seems almost certain that U.S. policy toward competition in international satellite markets will be decided upon in the absence of any such studies. The "technology" for this kind of empirical inquiry—theory, methodology, and data gathering and analysis—exists today as the economist's state of the art. What is lacking is the political will to make resources available to conduct studies of this nature.³⁸

It was promised at the outset that no decision about the issue of competition on INTELSAT's North Atlantic route would be made on the reader's behalf, and we trust that this has been the case. Theoretical arguments and historical precedents have been adduced, but empirical studies still remain to be conducted. Will competition itself—which we have not hesitated to characterize as an efficient information system—provide the only information about the consequences of a fateful public policy decision?

NOTES

1. Y. Ito suggests that as technological advances reduce the scarcity of telecommunications capacity, there is a natural evolution from monopoly to regulation. "Telecommunications and Industrial Policies in Japan: Recent Developments," in M. S. Snow, ed., *Telecommunication Regulation and Deregulation: An International Comparison*.

2. M. Kinsley, *Outer Space and Inner Sanctums: Government, Business, and Satellite Communication* (New York: Wiley, 1976).

3. U.S. Department of State, Treaties and Other International Acts Series 5646, "International Telecommunications Satellite Consortium. Agreement Between the United States of America and Other Governments" (Washington, D.C., 1964).

4. U.S. Department of State, Treaties and Other International Acts Series 7532, "International Telecommunications Satellite Organization (INTELSAT). Agreement Between the United States of America and Other Governments, and Operating Agreement" (Washington, D.C., 1971).

5. M. S. Snow, *International Commercial Satellite Communications: Economic and Political Issues of the First Decade of INTELSAT* (New York: Praeger, 1976).

6. R. W. Nelson, "Domestic Satellite Communications: Economic Issues in a Regulated Industry Undergoing Technical Change," in J. N. Pelton and M. S. Snow, eds., *Economic and Policy Problems in Satellite Communications* (New York: Praeger, 1977), pp. 31-61.
7. U.S. Senate, Committee on Commerce, Science, and Transportation, "Long-Range Goals in International Telecommunications and Information: An Outline for United States Policy," 98th Cong., 1st Sess. (Washington, D.C., 1983).
8. M. S. Snow, *International Commercial Satellite Communications*.
9. U.S. Office of the President, "Memorandum for the Honorable Dean Burch, Chairman of the Federal Communications Commission," Washington, D.C., 1970. (Mimeo.)
10. U.S. House of Representatives, Committee on Energy and Commerce, Majority Staff of the Subcommittee on Telecommunications, Consumer Protection, and Finance, "Telecommunications in Transition: The Status of Competition in the Telecommunications Industry," 97th Cong., 1 Sess. (Washington, D.C., 1981).
11. U.S. Senate, 1983. For a complete reproduction of this document with accompanying policy discussion and analysis, see C. H. Sterling, *International Telecommunications and Information Policy* (Washington D.C., Communications Press, 1984).
12. *Ibid.*
13. R. R. Colino, "Statement of Richard R. Colino, Director General-Designate of INTELSAT, Before the Subcommittee on Arms Control, Oceans, International Operations and Environment. U.S. Senate Foreign Relations Committee" (Washington, D.C., GPO, 1983). Mimeo.
14. The most complete single compilation of sustainability and contestability theory is W. J. Baumol, J. C. Panzar, and R. D. Willig, *Contestable Markets and the Theory of Industry Structure* (New York: Harcourt Brace Jovanovich, 1983). An accessible introduction to this subject is in W. W. Sharkey, *The Theory of Natural Monopoly* (New York: Cambridge University Press, 1982).
15. Panzar, and Willig, Baumol, et al., *Contestable Markets*.
16. It is not yet possible to give general criteria for prices that will insure sustainability. Ramsey prices, however, have been shown to assure sustainability under quite broad conditions. See Sharkey, pp. 100-102.
17. Colino, "Statement of Richard R. Colino."
18. The claim has been made (see Colino "Statement," p. 32) that "INTELSAT is not a monopoly" since it does not behave like a monopoly; that is, it does not earn monopoly profits by restricting output, for example. In discussing whether INTELSAT is a natural monopoly we will use a property of the cost function, namely subadditivity, rather than a behavioral criterion.
19. Such global unsustainability is suggested by the statement that "on individual routes or satellites, due to concepts of global interconnectivity . . . the INTELSAT system is highly inefficient." Colino, "Statement," p. 13.
20. M. S. Snow, "Investment Cost Minimization for Communications Satellite Capacity: Refinement and Application of the Chenery-Manne-Srinivasan Model," *Bell Journal of Economics* (1975), 6:621-642.
21. "Statement of Richard R. Colino."
22. E. M. Noam, "Telecommunications Policy on the Two Sides of the Atlantic: Divergence and Outlook," in M. S. Snow, ed., *Marketplace for Telecommunications: Regulation and Deregulation in Industrialized Democracies*, (New York: Longman, 1986).

23. D. M. Lamberton, "Australian Regulatory Policy," in M. S. Snow, ed., *Telecommunications Regulation and Deregulation: An International Comparison*.
24. "Statement of Richard R. Colino."
25. E. M. Noam, "Telecommunications Policy on the Two Sides of the Atlantic."
26. A. E. Kahn, *The Economics of Regulation: Principles and Institutions*, 2 vols. (New York: Wiley, 1970 and 1971).
27. U.S. Department of State, Treaties and Other International Acts Series 7532. "International Telecommunications Satellite Organization (INTELSAT)."
28. M. S. Snow, "Investment Cost Minimization for Communications Satellite Capacity."
29. R. J., Saunders, J. J. Warford, and B. Wellenius, *Telecommunications and Economic Development* (Baltimore, Md.: Johns Hopkins University Press, 1983).
30. E. M. Noam, "Telecommunications Policy on the Two Sides of the Atlantic."
31. Baumol, Panzar, and Willig, eds., *Contestable Markets and the Theory of Industry Structure*.
32. J. N. Pelton, "Communications: Developing Nations Faster," *Satellite Communications* (July 1984), pp. 19–22; and L. Perillan, "The International Switchboard," *Satellite Communications* (August 1984), pp. 27–32.
33. A. D. Lipman "The Rise and Fall of Nineteenth-Century Satellite Regulation," *Satellite Communications* (February 1984), pp. 48–51.
34. C. Jonscher, "Telecommunications Liberalization in the United Kingdom."
35. E. M. Noam, "Telecommunications Policy on the Two Sides of the Atlantic."
36. W. W. Sharkey, *The Theory of Natural Monopoly*.
37. F. A. Hayek, *Der Wettbewerb als Entdeckungsverfahren*. (Kiel, Kieler Vontrage, 1968), n.F.56.
38. Similar frustration has been expressed about the difficulty of attracting funds for international collaborative studies of telecommunications policies. See Snow.