

Technological Change and Multinational Growth in International Telecommunications Services

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Revolutionary technological and institutional changes, introduced in the mid-1970s, are drastically altering the quiet functioning of international telecommunications markets. These markets have traditionally been characterized by a strong multilateral oligopoly in which firms had little opportunity for any form of international growth. Since the early 1980s, however, the scope of international growth of telecommunications carriers has emerged as a critical issue in international telecommunications. The economics of multinational firms and international trade make it possible to assess the role of technology gaps in the modernization process, international telecommunications tariff asymmetries, and global outsourcing in determining multinational growth of telecommunications carriers and their international strategies.

1. Previous Limits to Growth and Factors of Change

In the telecommunications industry, the three standard forms of international growth, that is, exporting, direct foreign investment, and nonequity agreements, have long been barred by the institutional setup of national markets.¹ International telecommunications was treated as an extension of domestic telecommunications, and a tight, heavily regulated international oligopoly was established. The international telecommunications oligopoly was based upon bilateral trade cartels among the monopolists serving each national market. In most cases, the network of each country was managed by just one firm, was heavily regulated, and, most important, had a strong "national" character. In fact, in most countries telecommunications services were managed either by state-owned companies or directly by public agencies. As a result, in telecommunications services markets the three standard forms of international growth were barred. Specifically,

- exports of telecommunications services were de facto barred by the levels of tariffs both for switched services and especially for international leased lines, which were bilaterally fixed so that the outflows (or imports) and the inflows (or exports) of telecommunications services were automatically balanced. No country or national firm could take advantage in the bilateral traffic by means of market competition;
- foreign direct investments were barred by strong institutional barriers to entry. The takeover of national companies could take place only rarely worldwide, and at least in advanced OECD countries, no such takeovers occurred after World War II. Even more

rare was entry by means of the creation of new firms. Actually, the few cases of multinational companies in telecommunications services were the consequence of the international captive-market strategies of multinational telecommunications equipment companies such as ITT and Ericsson, who tried to secure markets for their products in Latin America and southern Europe, respectively. In the years 1945-85, a process of foreign direct disinvestment and the exit of a number of multinational telecommunications services companies took place both in Latin America and southern Europe. In most colonial possessions, the state telecommunications agencies of such countries as Portugal, France, and the United Kingdom (the "old" Cable & Wireless) relinquished the management of the local telecommunications services of their former colonies; and

- nonequity arrangements, beyond the intense bilateral contracts finalized to establish the coordination of bilateral traffic, were also rare, although a number of technical agreements and management assistance contracts can be found.

According to a well-established tradition of analysis, firms become multinational when they operate with affiliates located in many countries. Firms become multinational when:

- (1) the advantages of operating on international markets from a variety of international sites is higher than from one domestic location and
- (2) firms' specific advantages are such that entry with foreign direct investments in new markets is likely to overcome the local barriers to entry that domestic incumbents have been able to take advantage of.²

Such a twin multinational advantage stems from four classes of factors:

- access to production factors that are not available in the domestic markets or that cost more or technological know-how and opportunities to learn in the interaction with other firms and other nonbusiness institutions (universities). The creation of affiliates abroad makes it possible for a firm to incorporate the endowment advantages of the new location, especially in terms of reducing production costs and operating at lower costs than in production sites located in domestic markets;
- transaction costs associated with the sale of technological and commercial know-how on international markets. By means of a variety of tacit learning processes such as learning by doing, learning by using, and learning by interacting, firms acquire relevant localized knowledge that is often implemented and elaborated into generic knowledge by means of formal research and development expenditures. Both localized and generic knowledge constitute the knowledge capital of a firm. It is difficult to transfer such knowledge capital to third parties. In market transactions of knowledge capital among independent parties, the risks of involuntary disclosure are high, as are the problems associated with the definition of a fair price: the two contracting parties have in fact asymmetrical information on the real market value of the knowledge that is traded. Finally, the transfer of localized knowledge based on informal know-how acquired by

means of tacit learning procedures is often hindered by the high costs of training and codification, which is less relevant when it takes place within the same organization. The tacit transfer of know-how is in fact possible for a workforce that belongs to a single firm. In such conditions, the arm's-length transfer of knowledge capital is limited, and coordinated transfer within a single corporation becomes a more reliable tool. The multinational corporation is an essential institution for securing the international transfer of knowledge capital while retaining full command of property rights for the original owners of knowledge capital. The creation of affiliates abroad makes it possible to capitalize on intangible assets and acquire a competitive advantage in new markets with respect to local incumbents;

- imperfect tradability. Many products have a strong locational content that makes it impossible to deliver them internationally: this is the case of perishable goods such as vegetables but also, and most important, of a large variety of services. Most services cannot be manufactured in one country and delivered in another as is the standard case for most manufactured goods. The locational content of the goods pushes firms that have acquired a relevant technological advantage to pursue multinational growth in order to exploit international markets; exports are not feasible.
- barriers to entry and high levels of international transaction costs. Legal barriers to entry or high levels of custom rights and transportation costs may prevent firms from taking advantage of their competitive advantage by means of exports. The price for their products on international markets is in fact higher, because of international transaction costs, than that of domestic products. In such conditions, the entry in that market and the local manufacturing of products make it possible to combine the incentive to exploit the stream of quasi rents associated with the already accumulated knowledge capital and the obstacles to exports.

When we apply these four general categories to international telecommunications we see that the merging of telecommunications, informatics, and electronics and the new data communications facilities has played a major role in pushing the international growth of telecommunications services firms. In analyzing the factors behind the multinational growth of telecommunications carriers, our technology-push approach emphasizes such factors as:

- the technological gap between firms that have already modernized their own domestic networks as well as other less advanced firms. More advanced firms had consequently acquired intangible assets that could be valorized only by means of foreign direct investments in countries where the network was still based on electromechanical technologies and where cellular technologies had not yet been introduced. The intangible assets in terms of competence and learning acquired by domestic carriers that have already mastered the new technology in updating their own domestic barriers -- as well as the new opportunity to capitalize on such technology in modernizing other networks in other countries -- appear to be the major determinants of the multinational growth of domestic carriers;³

- a rapid process of globalization of multinational firms based on high levels of international integration, both horizontal and vertical; enhanced division of labor between affiliates and local suppliers; systematic reliance on outsourcing for specialized intermediary products and services that generates increased flows of intrafirm and intraindustry international exchanges of goods and services; and a consequent unparalleled increase in international telecommunications traffic;⁴
- the persistent growth of the arm's-length international trade of manufactured products and commodities relying on high levels of telecommunications intensity and the "new" exportability of service products that can be delivered by means of data communications such as financial services, software, and data processing;⁵ and
- the new opportunities for international diversion of telecommunications traffic offered by new satellite communications capacity and emerging traffic asymmetries that offer major incentives to domestic carriers to operate on the new international telecommunications services market.

2. The Empirical Evidence

2.1. The Multinational Growth of Telecommunications Carriers

The growing globalization of the international economy and the strong increase of the telecommunications intensity of international business make the demand for international telecommunications services larger and larger and consequently more and more attractive for telecommunications carriers. As table 1 shows, the average share of international telecommunications revenue for the large telecommunications carriers is on the order of 15 percent of total revenue, and in some cases, such as Dutch PTT or Swiss PT, is already much more significant.

The actual role of international activities is far more important when we consider the rapid multinational growth of telecommunications carriers. As table 2 shows, multinational growth of telecommunications carriers since the mid-1980s has increased at an astonishing pace: the overall number of main acquisitions of foreign telecommunications companies, as calculated by the U.N. Program on Transnational Corporations⁶ has increased twentyfold, from \$399 million to \$16.5 billion in 1990. In this context, the United States has been especially active, so that the outward stock of foreign direct investments increased nearly eightfold between 1989 and 1991, from \$560 million to \$4.4 billion. In the same years, the overall stock of outward U.S. foreign direct investment has increased only 23 percent.

The evidence regarding the main foreign direct investments in telecommunications services since the early 1980s has been collected in table 3. Foreign direct investments involve three technologies: the basic network, cellular telecommunications, and telecommunications outsourcing.

The data show a clear cluster of destination countries in Latin America and Eastern Europe and a cluster of originating countries in Northern America and Western Europe with respect to investments in the basic network. When attention is focused on cellular telecommunications, the flow of investments originates mainly from the United States and is directed toward Latin America and Western Europe. Finally, foreign direct investments in

Table-1
Major International Telecommunications Companies

Company	International Revenue (millions of U.S. \$)	Share of Total Revenue (%)
AT&T	5500	14
DBP Telekom	4500	16
BT	3146	14
France Telecom	3058	15
C&W	2095	46
STET	1846	13
KDD	1787	100
Dutch PTT	1358	26
MCI	1300	15
OTC	1281	100
Telefonica	1198	12
Telmex	1163	22
Swiss PTT	1093	20
STENTOR	1000	0.8
Saudi telecom	912	36

Source: Data for 1991 are drawn from Dieter Elixman and Thomas Schnoring, "Internationalization of the German Telecommunications Service Market and Strategic Behavior of DBP," paper presented at International Telecommunication Society, European Conference, Stenungsbaden Yacht Club, 1993.

Table-2
Telecommunications Carriers: Multinational Growth

Year	No of Acquisitions	Value (\$US Millions)
1985	5	399
1986	7	132
1987	7	63
1988	11	117
1989	50	2694
1990	67	16539

Source: U.N.C.T.D., "Transnational Corporations and Integrated International Production," World Investment Report 1993. (New York: United Nations Program on Transnational Corporations, 1993).

telecommunications outsourcing are clearly concentrated in a few advanced countries in North America, Japan, and Western Europe and originate in the same area.

The empirical evidence concerning the determinants of the multinational growth of telecommunications carriers can be organized around four groups of factors:

- liberalization and privatization schemes;
- technology gaps;
- international tariff asymmetries and multinational outsourcing; and
- liberalization and privatization.

Multinational growth of telecommunications services firms has received a strong push since the late 1980s as a result of the entry opportunities generated by the international swarming of privatization and liberalization schemes. By the mid-1990s, privatization and liberalization schemes had been implemented in all the countries of destination of foreign direct investments in the basic network.

The liberalization and reregulation process that has characterized the domestic markets in a growing number of countries has led to a process of vertical and lateral disintegration of the telecommunications market with the growing specialization of firms in specific segments of the broad array of telecommunications services. Telecommunications services firms now tend to specialize in such products as local telecommunications, long distance telecommunications, data communications services, and cellular telecommunications. Each of these provides new opportunities for specialized entries in foreign markets with a flow of foreign direct investments.

In most Latin American and Eastern European countries, privatization opened up the way to the full-fledged entry into domestic markets of affiliates of large incumbents in other domestic telecommunications services markets. Telecommunications services firms from the United States, France, Italy, and especially Spain have acquired important stakes in the national telecommunications services industry as a whole of such countries as Argentina, Chile, Venezuela, Mexico, Greece, Poland, Hungary, and Ukraine (see table 3).

Moreover, the new multinational growth has a strong, distinctive flavor in that it is fully based upon telecommunications services firms that now operate a plurality of general purpose and specialized networks in different countries. At the same time, there is little evidence of major foreign direct investments of telecommunications equipment companies in telecommunications services. Within the broad array of telecommunications services, the new wave of multinational growth takes place within a strategy of international product differentiation and horizontal integration as opposed to the previous wave, which was characterized by international vertical integration.

In the case of the Spanish firm Telefonica the aggressive strategy of multinational growth is based upon the vertical disintegration of the manufacturing capacity, which has been sold to the French manufacturing company Alcatel-Alsthom in order to increase the financial capability needed to enter the Latin American markets. The international competitive advantage of new multinational, multidomestic telecommunications services firms lies in fact in the combination of strong financial and technological capabilities. The financial capability is an essential complementary condition because of the high levels of dedicated investment needed to make possible the transition from electromechanical to digital networks.

Table-3
Entrants, Products, and Markets

<i>Entrant(s)</i>	<i>Product(s)</i>	<i>Market(s)</i>
Bell South, Bell Atlantic	Cellular	Mexico
FranceTelecom, SWBell, Carso	Basic network (40% Telmex)	Mexico
FranceTelecom, Vodaphone	Cellular	Greece
STET (80%), NYNEX (20%)	Cellular	Greece
PacTel (26%), Mannesman	Cellular	Germany
BT	Outsourcing	Germany
Bell Atlantic, PacTel,	Cellular	Italy
Mannesman with Olivetti		
PacTel, Bouighes	Paging	France
BT	Outsourcing	France
Bell South	Radio data	France
BT	Outsourcing	Italy
Cable & Wireless	Basic network	Sweden
PacTel, Bell South	Cellular	Sweden
Cable & Wireless	Teleport (Gdansk)	Poland
FranceTelecom, Ameritech	Cellular	Poland
U.S. West, AT&T, DBT	Basic network	Russia
U.S. West, Bell Atlantic	Cellular	Czech Republic
U.S. West	Basic network	India
PacTel, SWBell, GTE	Cellular	South Korea
BT	MCI (20%)	United States
France Telecom, DBP	Sprint (20%)	United States
BT	Packet-switching (TYMNET)	United States
AT&T	Worldsource	Worldwide
BT	Outsourcing (Concert)	Worldwide
MCI (INFONET)	Outsourcing	Worldwide
FranceTelecom, DBP	Outsourcing (Eucom)	Europe
AT&T, FranceTelecom, KDD	Data comm (Nippon Express)	Japan
AT&T	UNITEL (20%)	Canada
AT&T	Data communications (Istel)	United Kingdom
KDD	Outsourcing	United Kingdom
Bell Atlantic, Ameritech	Basic network	New Zealand
Cable & Wireless, Bell South	Basic network: Optus Comm	Australia
Cable & Wireless	Outsourcing	Australia
BT	Outsourcing	Australia

2.2. The Technology Gap

A comparison of the data collected in table 3 concerning foreign direct investments in the basic network and the data collected in table 4, which show the penetration of digital lines on total telecommunications lines in 1987, provides the basic insight into the role of technology gaps in explaining the flow of foreign direct investments. Foreign direct investments in the basic network, shown in table 3, are systematically associated with the technological gap between country of origin and country of destination: all countries of origin had already high levels of penetration of digital lines, while all countries of destination, with the exception of Ecuador, had not yet started their modernization process or were still in the first steps. Conversely, all firms that originated such investments had already completed a large portion of the diffusion process.

The same pattern applies to foreign direct investments in cellular telecommunications. In all countries of destination, cellular technology had not yet been introduced at the time of new competitors' entry. All foreign direct investments were consistently originated by firms that had already introduced cellular technology in their own domestic markets. In cellular telecommunications, in fact, technological capability is essential to providing entrants with a competitive advantage with respect to general purpose incumbents.

As table 3 shows, specialized entry in cellular telecommunications constitutes the bulk of the total number of the main international entries in telecommunications markets. The primary factor of international competitive advantage is the technological capability that makes it possible to update technically obsolete networks formerly managed by state agencies. Previously, these agencies had been unable to meet the new requirements in terms of both technical competence and the heavy investments needed to adopt the new digital technologies.

The transition from electromechanical to digital technologies is in fact a factor of discontinuity in the technological and managerial know-how of the old state-owned firms and is consequently a cause of the rapid obsolescence of their specific knowledge. The specific factor in the international competitive advantage of telecommunications carriers seems to consist in the experience acquired in managing the transition from analog to digital networks and the consequent accumulation of a distinct technological and managerial competence in handling the telecommunications softwares for traffic control, intelligent networks, billing, and other administrative procedures that are specific to telecommunications services firms. In contrast to such experience, the control of telecommunications equipment manufacturers was much less of a factor in carriers' international competitive advantage.⁷

2.3. International Tariff Asymmetries and Multinational Outsourcing

A comparison of the data in table 3 concerning foreign direct investments in outsourcing and the data in table 5 showing the international telecommunications tariffs suggest that a third factor in the multinational growth of telecommunications carriers is the strong international telecommunications services tariff asymmetry. In fact, telecommunications outsourcing investments appear to be attracted by countries, such as Italy, France, Japan, and Germany, where the levels of international tariffs are higher as well as countries, such as the United States, Japan, and the United Kingdom, whose foreign direct involvement measured in terms of location of multinational corporations and shares of international trade is stronger.

Still, in 1993, international tariff asymmetry remained important. As table 5 shows, international calls initiated in Italy and Ireland to the United States are much more expensive

Table-4
Countries with Foreign Direct Investments in the Basic Network
and Penetration Levels of Digital Switches (1987)

Country of Destination	Penetration (%)	Country of Origin	Penetration (%)
Ecuador	25	United States	76
Brazil	12	Japan	36
Venezuela	8	Canada	56
Argentina	6	United Kingdom	48
Greece	0	Italy	13
Mexico	15	France	60
Portugal	10	Spain	16
Hungary	0	Singapore	64
Poland	0		
Ukraine	0		
Czech Republic	0		
India	0		
Philippines	42		
Thailand	50		
New Zealand	29		
Australia	0		

Table #-5 International Telecommunications Tariffs as of June 1993
(in E.C.U. per minute before taxes)

Country	<i>Toward United States</i>		<i>From United States</i>	
	<i>Full</i>	<i>Reduced</i>	<i>Full</i>	<i>Reduced</i>
Belgium	0.99	0.83	1.10	0.83
Finland	0.67	0.50	1.17	0.90
France	0.89	0.76	1.05	0.80
Germany	1.01	1.01	1.06	1.06
Greece	1.13	1.13	1.23	0.93
Ireland	1.40	1.05	1.00	0.79
Italy	1.27	1.13	1.06	0.78
Norway	0.72	0.57	1.05	0.80
Netherlands	0.91	0.57	1.02	0.79
Portugal	1.14	0.92	1.10	0.83
Spain	1.36	0.95	1.10	0.83
Sweden	0.78	0.60	1.02	0.78
Switzerland	1.03	0.76	1.10	0.80
United Kingdom	0.55	0.55	0.90	0.69

Note: U.S. rates are AT&T's.

Source: SIP.

than vice versa, and international tariffs of U.K. carriers are among the lowest worldwide. Such differences were much stronger in the early 1980s after the first unilateral reduction of tariffs, especially by U.S. and U.K. telecommunications carriers. As Noam⁸ has shown, the international tariffs from Europe to the United States exceeded those from the United States to Europe by 34 percent.

After AT&T's reduction in 1981, the average foreign tariff was almost 95 percent higher than the American. The contradiction between a complementary production process where both telecommunications carriers must necessarily cooperate for the international communication to take place and alternative products that are almost perfect substitutes because they perform the same function of establishing the communication irrespective of its origin becomes here extremely relevant. Through the 1980s, tariffs declined rapidly in countries where liberalization was already ahead and remained higher on the monopolistic side. The decline in tariffs was also the consequence of strong technological advances that made it possible, mostly in liberalizing countries, to reduce the actual delivery costs of telecommunications services and to introduce a broader array of product services as well as satellite transmission facilities. Satellite transmission technology is in fact such that the marginal costs with respect to distance are very low, so that communication flows can be rerouted in order "to circumvent regulatory barriers and restrictive prices."⁹

When the tariff for an outgoing international telecommunications call to country B from country A diverges appreciably from the tariff for an incoming telecommunications call to country A from country B, the opportunity to solicit a call instead of making it becomes relevant. The same communication in fact costs much less when it is initiated from abroad in country B than when it is forwarded to country B from country A. Such an asymmetry in the cost condition for the two strictly alternative and yet interdependent products -- such as the international telecommunications calls originated in country A and the international communications call initiated in country B (which is the same communication depending upon the market of origin) -- generates an important opportunity for the inversion of telecommunications flows. International telecommunications will flow from the cheaper country to the more expensive one irrespective of the actual origin of the call.

The consequences of this fact for international carriers are important. The carriers located in the country where tariffs are lower will take advantage of growing flows of traffic so that actual exports of telecommunications services take place. It seems clear also that such a dynamic in the creation of an international market for telecommunications services is also the cause for an apparent paradox, namely, the growing divergence between growth of traffic and growth of actual traffic revenue and the rapid deterioration of the terms of trade of international telecommunications for countries that are able to gain larger shares of international traffic.

International telecommunications traffic exporters in fact remain obliged to pay hefty international access charges to high-tariff countries. The share of added value on total revenue that remains in the hands of traffic exporters is consequently lower the smaller the asymmetrical tariff reduction. From the viewpoint of economic analysis, each international communication in fact consists of either one of two distinct products, such as the call from country A to country B and the call from country B to country A. Each of these alternative and well-specified products performs the same function, that is, the communication between two ends located in two different countries. Customers can take advantage of the price differentials of the two products, which are almost perfect substitutes, and switch from one

market to the other according to the levels of tariffs. Consequently, firms located in country A benefit from the larger demand for their products as well as from the lower equilibrium prices as they have been determined by the evolution of their domestic markets on international markets. They can therefore claim an increasing market share. In such conditions, an opportunity for enhanced levels of division of labor emerges, based upon professional, specialized arbitrage, and a new industry as well as new products can be created. Finally and most important, the diffusion of international resale and access agreements to international leased lines services favors large carriers because of the powerful role of density economies. Density economies are based upon the systematic loading of the leased capacity and consequently the negative slope of unit costs of traffic for given levels of tariffs for establishing a leased line.

Specialized firms can enter the international telecommunications market, lease international circuits, and supply that expertise that makes possible the diversion of international telecommunications flow to third parties at lower costs. The costs of leasing an international circuit and acquiring and implementing the large amount of information and technical expertise required can be spread over a larger number of customers so that the circuit's average costs decline. When added to the costs of a diverted international call, this spreading of costs makes the circuit's average costs lower than the tariff of the direct international call. Such capabilities and expertise can be sold unbundled in the marketplace, mainly to larger operators. They then take the form of a service. If they are sold bundled, they are sold together with the actual complementary good that is the international communication. Multilateral telecommunications flow diversion and, to a lesser extent, bilateral telecommunications flow inversion not only give rise to growing export opportunities (because of the lower requirements of expertise that need to be implemented) but also, most importantly, to the creation of a new market and new products and consequently new entries in international telecommunications markets. Such entries can take the following forms:

- "direct entries," that is, new standalone firms created just to take advantage of these new opportunities;
- "cross-entries," that is, entries of other firms that are already incumbents in other telecommunications services markets;
- "spillovers," that is, entries in this specialized market as part of a process of product diversification by divisions or units of other firms that for internal reasons had already acquired such an expertise and now find it profitable to sell overcapacity to third parties. In this case, overcapacity can be relevant because the main asset is information, with a low content of exclusivity and high levels of reproducibility; and
- finally, such entries can be domestic and international, that is, they can come from the domestic market and from abroad. In the latter case, they are the result of foreign direct investments.

In sum, tariff asymmetry both for international switched services and for international leased circuits as well as the international resale agreements of leased lines capacity create new

opportunities for division of labor, specialization, and international telecommunications services trade. However, most importantly, tariff asymmetry also provides significant opportunities for the international entry of multinational telecommunications services firms, which search actively to divert telecommunications flows and reroute them via their country of origin. Here, there is a perfect complementarity between foreign direct investments and exports of telecommunications services. The larger the number of specialized affiliates abroad active in soliciting the diversion of new flows of international traffic, the larger in fact is the amount of international traffic that is delivered by the telecommunications carrier located in the country with the lower levels of international traffic.

Locational advantages seem to be the primary factor of the international competitive advantage that makes possible specialized entry in the new market for the provision of new alternative routes for international traffic. In fact, it is clear that the lower the level of tariffs in country A, the larger the opportunities for international traffic diversion will be and consequently the larger will be the opportunities for a specialized multinational growth of the telecommunications carriers located in country A. In this case, affiliates in third countries can in fact be considered as complementary assets in a global strategy of growth in the international telecommunications services markets. It is in this context that the provision of specialized dedicated telecommunications management services to multinational corporations is becoming a fast-growing market. Such a process is a consequence of two distinct factors:

- the generalized reliance by multinational companies on global outsourcing.¹⁰ The new global strategies of multinational firms in both manufacturing and services markets are characterized by a careful management of the international chain value by means of increased levels of international division of labor among affiliates, local arm's-length procurement of specialized intermediary products that are available at lower prices in each local market, and increased flow of international intracorporation trade so that affiliates export worldwide-specific products and inputs to the global production process. Hence, global strategies push toward outsourcing strategies based upon the systematic use of local and global specialized suppliers of specific intermediary and complementary products of the international production process; and
- the increased telecommunications intensity and fast growth of the international market with the consequent steep increase in the amount of resources that are necessary to pay for international telecommunications services.

3. Alternative Modes of Multinational Growth

A careful analysis of the behavior of the major European multinational carriers reveals that they pursue different strategies. We can make a distinction between multidomestic strategies, global strategies, and cooperative strategies.

The multinational growth of the Italian STET group and of Spain's Telefonica supplies substantial evidence regarding the distinctive features of a multinational growth based upon a collection of affiliates specialized in serving products to local markets. Such a mode of international growth, based both upon foreign direct investments in either the general purpose telecommunications network or specialized segments such as the cellular telecommunications

network, is likely to lead to the transplantation of the multidomestic firm into the telecommunications services industry. The multidomestic firms are in fact characterized by low levels of interaction between affiliates, each of which specializes in serving a well-defined product market. The affiliates of the multidomestic firm share the process technology that has usually been elaborated first in the home country by the headquarters and subsequently transferred internationally. At this point in the multidomestic firm there is little complementarity between exports and multinational growth. The multinational growth is essentially a mode for securing the international technology transfer and is consequently a tool to make possible the valorization of intangible assets that have been acquired and accumulated in the process of implementing and technologically updating the home networks.

A telecommunications services company that has been able to follow a multidomestic growth approach has a strong incentive to keep internally elaborating the process technology that is specific to the management of the network, such as the implementation of dedicated softwares for intelligent networks, billing, and accountancy procedures. The web of foreign affiliates in fact provides a captive market for these technologies once they are successfully applied in the home markets. So far, multidomestic telecommunications carriers are likely to remain on the forefront of technological advance at below average costs because of the number of lines -- far more than that of the home telecommunications network -- on which they can spread the strong sunk costs of dedicated softwares.¹¹

British Telecom's (BT) growth strategy in international markets provides strong evidence about the interplay of locational and firm-specific advantages. BT's international strategy is in fact characterized by the following factors:

- low levels of direct investments in foreign telecommunications networks. Entry takes place mainly by means of minority equity partnerships as in the case of the 20 percent stake BT acquired in MCI; and
- a web of international affiliates specialized in serving international business by means of a few telecommunications nodes that interface the local networks with the international one and that are especially active in the commercial activity.

The dynamics of global supply are characterized by a strong evolutionary process, with the rapid interaction of learning and product innovation. Global growth is based upon recursive interaction between the growth of demand, the opportunity for increased levels of division of labor, the introduction of technological and commercial innovations, and the creation of new markets with new demand as well as the entry of new affiliates. BT's strategy seems to be to replicate in many ways the distinctive features of the global multinational strategy through a surprising, mimetic process of learning in dense, user-producer relationships with global multinational corporations. The strategy seems to affect not only BT's capacity to generate specific product and process innovations but also the organizational structure of the telecommunications carrier.¹²

As a telecommunications carrier located in a country crowded with multinationals, BT in fact had the opportunity to spot the new potential demand for telecommunications outsourcing both domestically and internationally. BT's first outsourcing contracts have usually been elaborated for domestic telecommunications traffic and were based upon leased

lines and in some cases dedicated switching centers. On the basis of such domestic telecommunications outsourcing contracts, BT acquired general telecommunications outsourcing capabilities, and new international outsourcing supply capabilities could eventually be elaborated and successfully marketed. In so doing, BT had the advantage of fully benefiting from the interaction among learning, economies of scale, and economies of scope. The availability of an international network of complementary affiliates specialized in soliciting the diversion of international telecommunications traffic and built in order to sustain international telecommunications services exports became in fact an essential complementary asset in BT's strategy for entry into the new international telecommunications outsourcing market and consequently a prerequisite for successful multinational growth. BT's location in the United Kingdom, a low international tariffs country, was also a complementary and essential asset in this process of multinational growth.

Three factors play a major role in defining the international competitive advantage of firms with respect to multinational growth:

- locational advantages in terms of learning opportunities from user-producer interaction and consequently in terms of the capability for product innovation;
- locational advantages in terms of lower levels of international telecommunications tariffs in the home country; and
- firm-specific advantages in terms of technological and commercial know-how.

In this mode of international growth, there is a strong complementarity between exports and multinational growth that is both static and dynamic because of the powerful effects of network externalities. In fact, it is clear that the larger the network of affiliates, the larger the flow of traffic diversion and, consequently, export. But it is also clear that the larger the network of affiliates, the larger the global reach of the international telecommunications carrier and consequently the better and more competitive the supply of outsourcing services. Similarly, the larger the supply and the market share of international telecommunications outsourcing services, the larger the amount of international traffic that can be diverted and consequently exported.

A careful inspection of the main foreign direct investments in international telecommunications services in the last decade reveals that most of them are based upon joint ventures between telecommunications carriers and information technology corporations as well as among incumbent telecommunications carriers. For example:

- Eucom and Eunetcom. These two joint ventures between Deutsch Bundes Telecom (DBT) and France Telecom were created to target the international value-added network (IVAN) and the international outsourcing markets. The joint ventures were implemented by the acquisition of a 20 percent stake in Sprint;
- Infonet. This joint venture between MCI, DBP, Telefonica, and France Telecom centers on managed network services, transmission services, and transaction services;

- Unisource. This joint venture between PTT Netherlands, PTT Switzerland, Telefonica, and Telia (Swedish Telecom) was implemented by an alliance with AT&T that in turn covers the Far East with a network of alliances with Telstra (Australia), KDD (Japan), Singapore Telecom, and South Korea Telecom;
- "Concert." This was a cooperative arrangement between BT and MCI in global outsourcing;
- the joint arrangement by STET and France Telecom to take over the northern network of the Republic of Argentina;
- the arrangement by France Telecom and Southwestern Bell to take over part of the Mexican telecommunications network;
- the awarding of the first license to operate the cellular network in Greece to STET, which operates it in a joint venture with NYNEX. The joint venture between France Telecom and the British Vodafone group received the second such license; and
- the consortium among Telecom Denmark, Telecom Finland, and Norwegian Telecom. It is especially active in the Baltic states.

Together with the multidomestic and global strategies, a third strategy for international growth seems to have emerged: a cooperative networking mode based upon a variety of nonequity agreements such as joint ventures and commercial alliances where each partner swaps access to its own domestic network and its own installed base of international companies. These companies consist of both exporters and multinationals and are large and sophisticated customers of advanced telecommunications services with a significant international exposure. Underneath and parallel to the rivalrous market relation among large telecommunications carriers traditionally established in domestic markets there is a growing trend toward the creation of an international network of domestic networks based upon selective alliances.

The economics of a global strategy based on alliances and networks, both intra- and inter-industrial, rest on the dynamics of network externalities: the larger the network, the greater the benefit of belonging to it and the greater the number of services that can be provided at lower costs to multinational and international corporations. With respect to the global telecommunications carrier based on a central hub and located in a low international tariff country and web of affiliates, the network of networks can rely on the higher coherence and mutuality among partners that are large, established incumbents in their own domestic markets. Hence, the network of networks is likely to provide its members with an easier access to domestic markets both in terms of information and technical infrastructure. Moreover, the network of networks is likely to provide dramatic savings in terms of dedicated investments in equipment and commercial facilities. In fact, the network of networks seems able to offer the advantages of a multinational global telecommunications carrier without actual foreign direct investments. Finally, the networking strategy makes it possible to integrate the variety of competencies that are found in the broad array of industries affected by the merging of electronics, informatics, telecommunications services, and equipment technologies.¹³

This third mode of international growth in the new international telecommunications services market closely parallels the last developments in the strategy of "standard" multinational corporations, which rely more and more on the creation of networks of specialized and selective agreements among firms that are complementary in terms of product markets and or process technology.¹⁴

4. Conclusions

A new economics of international telecommunications services is emerging out of the revolutionary technological and institutional changes that drastically reshaped the domestic telecommunications services industry in the United States in the early 1980s and in many other countries thereafter. These changes in fact generated important new opportunities for exports of international telecommunications services as well as for the multinational growth of telecommunications service firms.

Both exports and multinational growth are new to this international market, which has been characterized for many years by a strong institutional cartel based upon symmetrical bilateral relationships organized into a global oligopolistic framework that provided consistency and stability. The demise of the natural monopoly in many domestic telecommunications markets and the new opportunities provided by low-cost satellites in delivering international telecommunications services have fragmented the established structure and led to a growing asymmetry in the levels of international telecommunications service tariffs. In turn, the growing asymmetry among countries with respect to the levels of international telecommunications service tariffs is acting as a destabilizing factor that feeds a recursive process of change. Together with the liberalization of domestic telecommunications markets this asymmetry provides the basic incentive for the international growth of telecommunications carriers.

My analysis has shown that the diversity of the telecommunications services industry with respect to other service industries has been rapidly vanishing. The multinational growth of domestic telecommunications carriers is emerging as a critical issue in the new economics of international telecommunications services. Domestic telecommunications carriers are growing multinational through three distinctive strategies: the multidomestic, the global, and the networking of alliances. Each strategy has its own weaknesses and strengths.

Multidomestic strategies require high levels of foreign direct investments but are very efficient tools for valorizing technological and commercial knowledge acquired while managing the transition to digital technology in the home networks and consequently for valorizing international technology transfer. Second and most important, multidomestic strategies make possible entry into domestic markets, with a strong share of final demand from households, which are likely in the future to exhibit trends of rapid growth with low levels of rivalry. Hence, the overall demand of such households is likely to be highly revenue-elastic and low price-elastic with good prospects for future profitability. Specialized entry in the cellular network requires lower amounts of dedicated investments. Moreover, the technological prospects for reintegration of mobile and fixed telecommunications networks give multidomestic firms that have chosen a selective entry into cellular telecommunications long-term possibilities for operating in the fixed telecommunications market as well -- and consequently to diversify their markets with lower entry costs.

Global strategies take advantage of the strong complementarity between exports and multinational affiliates and of the dynamics of network externality. They require low levels of resources for funding foreign direct investments but high levels of the technological competence needed particularly for product innovations to retain the derived demand of such competent customers as multinational corporations. Global strategies offer important opportunities to accumulate specific know-how in international telecommunications services that are especially suited for international business but very little scope for the international transfer of the telecommunications services technology acquired in home markets. Their limits lie first of all in the high levels of price elasticity of their demand, mainly a derived demand, and second in the key role played by international resale agreements for leased circuits and international tariff asymmetries. Consequently, they are exposed to three dangers:

- a reduction in the spread of international tariffs because of the attempt by monopolistic carriers to stop the flows of traffic diversion and inversion. The data in table 5 show in fact that the strong asymmetries that emerged in the mid-1980s are now much smaller;
- the continual reduction of the margins between the low and decreasing levels of tariffs and the high and stable levels of international access charges; and
- the introduction of international regulation on resale agreements because of the high levels of cream-skimming they are de facto based upon.

Networking strategies make it possible to minimize dedicated investments and yet maximize the variety of competencies, the opportunity of access to local demand niches and facilities, and hence the returns from the dynamics of network externality. So far, networking strategies offer the opportunity to blend the advantages of both accumulation of international telecommunications service for international business know-how and international transfer of telecommunications services know-how acquired in the home markets. Opportunistic behavior by members and the risks of collusive behavior are the main potential drawbacks.

The international growth of telecommunications carriers both by means of multidomestic entries and especially as a result of the self-feeding interaction of export capability and global multinational growth is likely to spur further competition and hence to further "normalize" the international telecommunications services industry. The emergence of a global telecommunications network can be the ultimate outcome of such a process of enhanced division of labor, product and process innovation, accrued competition, and globalization of telecommunications carriers. However, fragmentation of the universal network of each country and the rapid spread of supply-rationing strategies can also result.

The dynamics of the new international telecommunications services economics stresses the key role played by international asymmetries in international tariffs and international resale agreements in destabilizing the "old market structure." All assessments of the future prospects for change and the chances for success of both export and the global strategies of multinational growth depend upon the evolution of the international institutional arena. The prospects for success of global telecommunications carriers are closely linked to the international political economy of telecommunications services.

The global telecommunications market of a few multinational telecommunications carriers, epitomized by the strategy of BT, can face the risks of a foreclosure of the international telecommunications arena as a result of the progressive reestablishment of regional barriers to entry. Such is the case in the growing contraposition between the European Community and the United States at the level of the General Agreement on Tariffs and Trade where there is a strong conflict between, on the one hand, the United States and, to a minor extent, the United Kingdom, who push for a generalized reduction of the international access charges, and, on the other hand, the continental European countries, who resist such reduction. It seems clear that alternative regional scenarios would privilege the networking strategy implemented by multidomestic foreign direct investments, especially when that strategy is based upon integrated regional telecommunications networks such as those of the European Community.

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Endnotes

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