International Trade in Telecommunications Services: An Economic Perspective

by

Henry Ergas

Working papers in this series are initial releases of research conducted under the auspices of The Centre for Research in Network Economics and Communications (CRNEC) at The University of Auckland. CRNEC is a research and teaching based interface between business and academia which focuses on the economics, law and management of network based industries. We offer written independent expert advice on matters related to network economics but require that any such work be published in this working paper series.
For further information please contact:

The Centre for Research in Network Economics and Communications
School of Business and Economics
The University of Auckland
Private Bag 92019
Auckland, New Zealand
Tel: +64 9 373-7688
Fax: +64 9 308-2317
Email: crnec@auckland.ac.nz

I am grateful to Telstra (Australia) for making available the data referred to in this paper. The work reported on has received financial support from the Department of Communications and the Arts (Australia), the Department of Foreign Affairs and Trade (Australia), and the BellSouth New Zealand Research Fund at the University of Auckland. Emma Clarke provided excellent research assistance. I am indebted to Eric Ralph, Siva Sivakumar, Jean Ergas, Deena Shiff, Lionel Taylor, Ramin Marzbani, John Hibbard, Joshua Holmes, Suzanne Campbell and John Stanton for discussions of these issues. However, the views expressed in this paper are entirely my own, as is the responsibility for any remaining errors.

International Trade in Telecommunications Services An Economic Perspective

Henry Ergas

Abstract

This paper is structured around six propositions. These are:

Historically, international telecommunications services have been provided cooperatively by national telecommunications entities each supplying service on a monopoly basis within its national territory.

While these cooperative arrangements have made some sense as a means of reducing transactions costs, they have been vulnerable to severe distortions, notably in terms of the process of international settlement.

It is misleading to view these distortions as being mainly associated with differing levels of economic development. Rather than being statistically associated with per capita income, they are most pronounced in countries in which consumer interests are given little weight and in which there are widespread impediments to the operation of market forces.

These distortions currently impose substantial economic costs; and while they are to some extent being removed by the opening of markets to competition, the likelihood that many countries will retain monopoly arrangements for the international service means that they will not vanish of their own accord.

There could be high returns to efforts to achieve reform through multilateral negotiation. But substantial difficulties remain to be overcome with the main approaches proposed to date.

Looking to the future, it seems clear that the traditional cooperative arrangements which have characterised international telecommunications are giving way to new forms of

globalisation; what is fundamentally at issue is whether the mechanisms forged in the past can be adapted to the new realities.

Subsequent sections deal with each of these propositions in turn.

1. The prevalence of cooperation

Historically, international telecommunications services have been provided cooperatively by national telecommunications entities each supplying service on a monopoly basis within its national territory. Cooperation has occurred primarily at three levels: cooperation in service provision; joint supply of some of the major facilities used for international service; and cooperation in the setting of technical standards and operating procedures. Cooperative provision has reflected the constraints arising from the regulatory framework: these have made it impossible for a carrier in any one country to provide service on an "end-to-end" basis to a customer in another. But more narrowly economic factors have also have been at work.

1.1 Cooperation in service provision

Central to the pattern of cooperation has been the joint provision of service. Thus, for switched services which are billed at the point of origination, such as international direct dial (IDD) voice telephony, the carrier in whose country the call initiates "buys" from the carrier in the country being called the service of call termination: that is, of carrying the call from a notional point outside its national territory to the called party[1]. This transaction, provided under the terms of a "Correspondent Agreement" between these carriers, results in the originating carrier incurring a "settlement liability" towards the terminating carrier. The amount of this liability has generally been fixed in terms of a notional "Accounting Rate", agreed to by the carriers in their Correspondent Agreement, with the actual amount payable by the originating carrier normally being set at one half of that Rate (an amount frequently referred to as the "Settlement Rate")[2] multiplied by the number of net outbound

[1] Agreements between carriers generally stipulate that the handover should occur at the mid-way between the countries concerned, with this point being referred to as the "half-way point".

[2] This discussion abstracts from the complexities involved in the settlement of third party charging (for example, under automated reverse charging arrangements) or in respect of

minutes[3]. As a result of this "settlements process", the carrier in the terminating country secures some share of the amount billed to the originating caller, without itself needing to enter into a contractual relation with that caller or having to charge a termination fee to the called party.

In contrast, in dedicated services, such as the provision of leased lines between points in two countries, the customer has generally had to order the service at both ends, obtaining a "half-circuit" from each carrier, and being billed by both carriers. The actual provision of the circuit has involved technical cooperation between the carriers; however, this has not required one carrier to act as the billing agent for the other.

From an economic point of view, this distinction between switched and dedicated services has had some sense to it.

Consider first switched services. Assume that the terminating carrier (the "B" carrier) in a switched connection could have entered into a contractual relation with the originating caller (for the recoupment of its termination costs) without violating the exclusive franchise of the originating carrier (the "A" carrier). Even then, it is likely that the transactions costs the "B" carrier would have incurred in attempting to establish direct relations would outweigh the gains these relations might provide. And the "B" carrier would still have had to ensure that the revenue the "A" carrier secured from the service was sufficient to give it incentives to provide the capacity required to carry the traffic in question. Given (i) the complexities which would have been involved in billing large number of customers in foreign countries, (ii) the difficulties inherent in working out a revenue division between the carriers at the two ends, and (iii) the reluctance to bill the called party for the service of call termination, the traditional arrangements (with a simple, reciprocal termination charge paid in this case to the "B" carrier by the "A" carrier and ultimately recovered from the originating caller) would seem to effect a considerable reduction in transactions costs.

Consider now dedicated services. These have involved far fewer customers than their switched counterparts. Moreover, providing service

---

Operator Assisted Services. It also assumes that only two carriers are involved in the transaction; this is clearly inaccurate when the call transits through a third country. In this event, the transiting carrier would usually also secure a share of the settlement payments.

[3] Settlement, in other words, only occurs in one direction, with the carrier "sending" more calls than it "receives" incurring a settlement liability on the volume of the net traffic.

to each of these customers has generally involved ear-marking specific capacity at either end of the link for the purpose of that customer's international telecommunications. Each carrier has consequently had to enter into a direct relation with the customer at its end of the link specifically for the purpose of international telecommunications[4]. As a result, it has been fairly easy in operational terms to effect billing arrangements in which each carrier bills for the service at its end of the link without any financial settlement between the carriers.

1.2 Cooperation in the provision of facilities

Carriers have also cooperated in the provision of some of the major facilities required for international telecommunications.

Submarine cable systems have generally been provided through consortia of carriers, with each carrier covering a share of the costs of the cable system more or less proportional to its expected two-way traffic on that system. Carriers have also funded the two major global satellite systems -- INTELSAT and INMARSAT -- within the framework of broader inter-governmental agreements. In each case, the facilities have typically been structured as "user cooperatives", with only carriers being able to obtain service directly and in return incurring a liability based on actual or anticipated usage.

As with the settlements process, cooperation in the provision of facilities has clearly reflected the constraints imposed by regulatory realities: it is unlikely, for example, that a carrier could have built, owned and operated a cable system landing in a country outside its service area without violating the exclusive franchise at the foreign end. Moreover, it seems clear that these constraints have created economic costs: operating these facilities as user cooperatives has entailed penalties in terms of the efficiency with which the facilities have been designed and managed.

Nonetheless, the structures which have emerged have had some economic rationale -- in this case in terms of spreading the risks involved in lumpy, technically complex and highly applications-specific[5] investments. Whatever their defects, user-funded cooperatives have ensured that at least some part of this risk is allocated to those best

---

[4] In contrast, in switched services, international facilities are only devoted to each customer for the duration of that customer's call.

[5] In the sense that the assets involved could not readily be re-deployed to other uses, and hence had a low salvage value relative to their original cost of deployment.

placed to assess and control it -- the carriers at each end of an international link. This was especially important when the technologies involved were relatively unknown, when only the carriers could estimate with any degree of accuracy the costs they entailed and the demand for their services, and when private capital markets were in any event excluded from or reluctant to invest in telecommunications-related ventures.

1.3 Cooperation in standards setting

Finally, carriers have cooperated extensively in setting technical and operating standards for international telecommunications. The subordinate bodies of the ITU[6] have been an especially important forum for standardisation efforts, in areas ranging from the design of numbering plans (essential for ensuring world-wide addressability) through to the signalling systems used for setting up, controlling and clearing down connections. At the same time, the Telecommunications Regulations of the ITU (which in contrast with its technical recommendations are binding on Signatories to the ITU Convention) have provided a "standard form" framework for Correspondent Agreements and for the architecture of the settlements process.

The persistence and relative success of international standards-setting in this field has reflected four inter-related factors.

The first and most obvious is the lack of workable alternatives: given the regulatory arrangements, carriers could not provide service on an end-to-end basis; hence, communications between countries required agreement between carriers about technical and operating standards.

Second, the fact that the parties to these agreements have not competed directly with one another and have each had a clear negotiating mandate (that is, an ability to credibly enter into commitments on behalf of the customers at its end) has reduced the costs and difficulties of reaching agreements.

Third, the ability to design technical standards has been enhanced by the fact that technological developments, although far-reaching, have been essentially predictable, have had long lead times to implementation and

---

[6] The International Telecommunications Union, a specialised agency of the United Nations.

have in any case been under the control of the negotiating parties. The prevalence of a strong engineering culture among the major carriers has also been a significant factor in this respect.

Fourth, it has made sense to seek these agreements on a multilateral basis so as to avoid the negotiating costs of a large number of bilateral agreements, secure the benefits of global any-to-any connectivity (benefits which in economic terms amount to demand-side scale economies), and achieve supply-side scale and scope economies[7].

2. The rise of distortions

While the traditional cooperative arrangements have made some sense as a means of reducing transactions costs, they have been vulnerable to severe distortions. These distortions have been most acute in the area of international settlements.

All cooperative ventures raise issues about the distribution of the gains from cooperation -- what economists refer to as "the surplus" generated by the cooperative effort. These issues are frequently contentious: the greater the ability of a party to threaten to withdraw its cooperation, and the higher the costs in terms of loss of available surplus which such a withdrawal might entail, the larger the share of the surplus it can seek to claim.

In international telecommunications, the bargaining game surrounding the distribution of the surplus has been broadly bounded by three factors: the requirement to provide international service under the Telecommunications Regulations; the formulae set down in the Regulations for the form settlements agreements may take; and although not binding, the widespread acceptance of the reciprocal, 50/50 split of an agreed Accounting Rate as the norm for Correspondent Agreements. However, these bounds have not proven sufficient to avoid acute distributional conflict.

The issues are best understood historically. When the current institutional structure was becoming widespread -- in the period from the late 1930's through to the 1950's -- the agreed Accounting Rate on a bilateral link

---

[7] These economies would clearly have been foregone if carriers had to make substantial stream-specific investments --for example, having to provide dedicated switching systems merely so as to be able to interwork with a particular country.

was generally intended to more or less equal the amount which would be charged to the subscriber at each end of the link. As a result, the settlements process came close to straight revenue sharing, with the rough equality in charges being likely to generate relatively balanced traffic streams[8].

However, the parties to the agreements never bound the amounts they would actually charge customers -- an amount usually referred to as the "collection rate" and which, under the terms of the Regulations, remains under the exclusive control of the carrier at each end. As a result, for a given Accounting Rate, a carrier could seek to alter its share of the joint revenue through the setting of its charges relative to those at the foreign end: since this affects the amount of outgoing traffic relative to the incoming traffic it receives and hence the net settlement liability. The freer a carrier is from effective constraint over the level of its charges, and the greater the discretion it enjoys in the ability to withhold or limit service provision (for example, by under-dimensioning outgoing trunks at its international exchanges), the greater its ability to so manipulate the share of the surplus accruing to it.

These issues have become especially acute under the impetus of two broad trends.

To begin with, *the surplus available for distribution has increased greatly*.

Beginning in the mid-1960's, rapid technological change in international telecommunications sharply cut the costs involved in providing service. The transition to automatic working (customer-initiated dialling) in the early 1970's marked a watershed in this respect: at one stroke, it reduced the cost of international calls by over a third[9] while shifting the structure of costs from one in which variable, call-related charges dominated, to one centred on capital outlays. The immense reductions in the unit costs of transmission capacity resulting from the use of fibre optic undersea cable brought a further rise in effective capital intensity[10], while making distance

---

[8] The effects of income differences between countries on traffic patterns were of somewhat less significance in this period, since links primarily involved high income countries.

[9] See the estimates provided in Australian Post Office Commission of Inquiry: Supplementary Material Submitted by the Post-Master General's Department, Dated 13/8/73 at page 10.

[10] This is because of the highly lumpy character of the investments involved.

much less significant as a determinant of call costs -- a trend accentuated by falls in the cost of satellite capacity, notably in the INTELSAT system.

At the same time, the falls in real charges and improvements in service quality[11] made feasible by rapid technological advance, on the one hand, and generally rising incomes and the greater integration of the world economy on the other, have combined to generate very substantial increases in traffic volumes. In Australia, for example, two-way telephony traffic increased ten-fold in the decade from 1965 to 1974 -- before then increasing some thirty-fold over the next twenty years. Worldwide, trend compound annual rates of growth for intercontinental traffic have rarely fallen below 10 per cent. These sustained increases in volumes have allowed the reaping of economies of scale, further reducing unit costs; they have also greatly increased the absolute magnitude of the revenue flows associated with the international service, encouraging efforts to seize some share of the surplus available for distribution.

Second, *the positions of the parties bargaining over this surplus have become increasingly dissimilar*.

This is partly the result of shifts in demand. The progressive extension of economic growth to the developing world, the substantial flows of population from developing to the advanced economies, and improvements in the telecommunications infrastructure of many developing countries, have increased traffic volumes between countries at sharply different levels of economic development. Although theory suggests no simple mapping, these differences may translate into differing preferences for current as against future income, for consumer versus producer surplus, for income in foreign as against domestic currency and for visible versus less visible taxes.

However, even more important have been changes in the regulatory environment. In several countries, the provision of international telecommunications services has been opened to competition. These countries account for over half of outgoing intercontinental traffic minutes; but even so, the bulk of their traffic terminates in countries where monopoly provision remains the order of the day.

[11] Including in terms of the enhanced customer convenience associated with automatic dialling.

Liberalisation would, in any event, alter the distribution of the surplus between domestic producers, domestic consumers and foreign producers. Unilateral liberalisation may do so in ways likely to increase the share of the producer surplus being captured by the foreign monopolist. This is most simply because competition will drive prices in the liberalised market towards costs (including in these the net settlement liability): this reduces domestic producer surplus and (given relatively elastic demand) increases the volume of outgoing traffic -- which, at a given Accounting Rate, increases the foreign carrier's revenue in absolute terms and its share of the total revenue accruing to producers. Total domestic welfare may well rise (because the consumer benefits from lower prices outweigh the loss of profits to the domestic carrier[12]); but there is also an apparent income transfer to foreigners which is likely to be highly contentious as far as the domestic carrier is concerned, and may equally be of concern to the liberalising government.

Two features characterise the pattern emerging from these conflicting trends.

First, *especially, but not solely, in the countries where service provision remains a monopoly, charges for international telecommunications remain extremely high relative to underlying costs.* The pattern of charges for calls to and from Australia provides some insight in this respect. Although analysis is complicated by the lack of a good data set on foreign-end charges, two points are worth making on the basis of the data available: first, the median foreign-end collection rate is nearly ten times unit costs[13]; second, foreign-end charges tend to be highest relative to Australian outgoing charges in countries which are relatively distant from Australia and in countries which do not have competition in the provision of international service[14]. The distance-dependence of foreign-end

---

[12] Domestic consumers value the foreign termination services at no less than the effective Accounting Rate, so they are not worse off as a result of liberalisation. But of course they would be even better off if the effective Accounting Rate were brought closer to cost and prices to consumers further lowered.

[13] Costs are defined for this purpose as excluding net settlements; including these would make the price-cost even greater. Costs are estimated on a stream-by-stream basis and are defined as including domestic reticulation, international switching and carriage. All data refers to the Australian network for 1994-95.

[14] The simple correlation coefficient between an indicator of the extent of competition at the foreign end ("compind") and a dummy variable which takes on a value of 1 if the ratio of the foreign end price to the Australian outgoing price is in excess of the median value for this ratio is -0.2651.

charges contrasts sharply with the structure of costs: analysis of stream-by-stream unit costs (excluding settlements) for Australian traffic suggests that distance does not play a statistically significant role in cost determination. This is borne out by the estimates presented in Table 1, which show unit costs as dependent primarily on traffic density and on the technology level at the foreign end (a variable proxied by the number of main lines per 100 population).

Table 1 Explaining Network Unit Costs

(a) Regression for Outgoing Unit Network Costs:

R- squared = .32
Adjusted R-Squared = .30
F (2,78) = 18.4
P-value for F-test = .000

Variable	Coefficient	P-value for t-test	Elasticity at means	Transformed Coefficient
ln(traffic density)	-.096391	.000	.9323	-1.5890
ln(mainlines per 100 population)	-.066052	.010	.0947	-1.1401
constant	.042085	.909	-.0270	.24617

(b) Regression for Incoming Unit Network Costs:

R-Squared = .31
Adjusted R-squared = .29
F(2,78) = 17.5
P-value for F-test = 0.000

Variable	Coefficient	P-value for t-test	Elasticity at means	Transformed Coefficient
ln(traffic density)	-.095948	.000	.9067	-1.5397

ln(mainlines per 100 population)	-.065880	.011	.0923	-1.1070
constant	-.0016606	.996	.0010	-.0094562

Note: All variables have been transformed so as to protect the confidentiality of the underlying data.

Second, *high collection charges are underpinned and perpetuated by Accounting Rates which are extremely high relative to long run incremental costs*. Again using Australian data, the median nominal Accounting Rate[15] is some five times network unit costs; the median effective Accounting Rate is some 1.4 times network unit costs, with some 25 per cent of these rates being 4 or more times network unit costs. Moreover, the higher the rates, the higher foreign-end collection charges tend to be, both in absolute terms and relative to the competition-constrained Australian prices[16]: a 1 per cent increase in the nominal Accounting Rate is associated with a .7 per cent increase in the foreign-end price[17] and only a .5 per cent increase in the Australian collection rate; a 1 per cent increase in the effective Accounting Rate is associated with a .2 per cent increase in the foreign-end price and a less than .1 per cent increase in the Australian price. In monopoly markets, nominal Accounting Rates, collection charges and effective Accounting Rates are best viewed as being set jointly; the data suggest that those carriers which set the nominal Accounting Rates high, also set collection charges high, thereby affecting the traffic balance[18] and securing a high effective Accounting Rate.

[15] The "nominal Accounting Rate" refers to the outpayment per minute of outgoing traffic. The "effective Accounting Rate" refers to the outpayment per minute of net outgoing traffic. The latter is the amount of interest to the negotiators, since it is the amount actually flowing to the foreign carrier net of the payments it makes to the Australian carrier.

[16] Analysis of the effect of Accounting Rates on collection charges faces obvious problems of identification and simultaneity bias. Negotiators set Rates with some expectation of the post-negotiation price-setting behaviour of the foreign carrier. Hence, the regression of charges on Rates is not identified, and the estimates presented in the text need to be read with this in mind. In contrast, the structural variables discussed below can be taken as fully exogenous; and so long as the negotiating game is sub-game perfect, the reduced form equations presented are identified.

[17] Which, it should be noted, are in any case substantially higher on average than Australian outgoing charges.

[18] Holding per capita GDP constant, a 1 per cent increase in the ratio of the foreign price to the Australian price reduces the ratio of inbound to outbound switched minutes by -.35 per cent.

3. The pattern of distortions

It is misleading to view these distortions as being mainly associated with differing levels of economic development.

At a first level of analysis, there does appear to be an association between per capita GDP[19] on the one hand, and nominal and effective Accounting Rates (lnOPpM2 and lneffAR2[20]) on the other -- see Table 2. Taken as they stand, these results suggest that a 1 per cent increase in the relevant units of GDP reduces the nominal Accounting Rate by close to 2 per cent and the effective Accounting Rate by .6 per cent. It is worth noting the significant impact of the competition variable, notably in the determination of the nominal Accounting Rate; private versus public ownership seems less significant in explaining the pattern of settlement charges.

Table 2 Determinants of nominal and effective Accounting Rates: the role of per capita GDP

Number of obs = 35
F(3, 32) = 11.06
Prob > F = 0.0000
R-squared = 0.51
Adj R-squared = 0.46
Root MSE = 1.7873

lnOPpM2 |	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDP2 |	-1.94898	.6703042	-2.908	0.007	-3.314345	-.5836149
lncomp2 |	-.5726132	.2503671	-2.287	0.029	-1.082594	-.0626321
private |	-1.087891	.6598183	-1.649	0.109	-2.431897	.256115
_cons |	10.67548	2.408885	4.432	0.000	5.768743	15.58222

Number of obs = 27
F(2, 24) = 5.44

[19] This is measured as 1994-95 per capita US dollar GDP at nominal exchange rates.

[20] So as to protect confidentiality of the data, all data have been transformed so as to be effectively dimensionless.

Prob > F = 0.0113
R-squared = 0.31
Adj R-squared = 0.25
Root MSE = .67618

lneffAR2 |	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lnGDP2 |	-.6262783	.2681669	-2.335	0.028	-1.179748	-.0728092
lncomp2 |	-.1191891	.0983609	-1.212	0.237	-.322196	.0838178
_cons |	1.831138	.9801066	1.868	0.074	-.1917024	3.853979

Note: The dependent and independent variables have been transformed so as to protect the confidentiality of the underlying data.

However, these results need to be interpreted with caution. In particular, the seeming propensity of economies with lower levels of per capita GDP to secure higher nominal and effective Accounting Rates would need to be explained. Two sharply contrasting accounts are typically given by industry participants.

A first view stresses the investment needs of the poorer countries, and asserts that the higher charges are intended to cover the costs of expanding the telecommunications infrastructure. Although simultaneity makes this a difficult model to test, it does not sit comfortably with the data. In particular, holding other structural factors constant, investment per main line is negatively related to the level of nominal and effective rates: in other words, countries which are expanding their network most rapidly tend to have significantly *lower* (rather than higher) nominal and effective Accounting Rates. Even taking simultaneity bias into account, this result appears inconsistent with an explanation of high Accounting Rates in terms of the investment needs of developing economies.

A second, more compelling, view emphasises the "cash cow" aspect of international telecommunications. In this explanation, some countries view high Accounting Rates as a way of imposing a hidden tax on domestic and foreign consumers. The fact that this tax is paid in foreign currency makes it all the more valuable, notably in economies with misaligned exchange rates. This in turn suggests that nominal and effective Rates are likely to be highest in countries (1) where domestic consumer preferences receive little weight (so that carriers can impose relatively high charges); and associated with this (2) where market

distortions increase the value of foreign currency earnings relative to their value at the official exchange rate.

This hypothesis receives considerable support from the data. Thus, Table 3 sets out a model of the nominal Accounting Rate which includes three variables obtained from a recent study of patterns of economic development[21]: a variable capturing extreme political instability ("extremel"); one capturing the repressive nature of the political regime ("repressi"); and a dummy variable ("freeT") which takes a value of 1 for countries which have open trade regimes. Together with the competition variables, these indicators do a better job than per capita GDP in explaining the pattern of nominal rates.

Table 3 Determinants of nominal Accounting Rates: the role of structural variables

Number of obs = 32
F(4, 27) = 3.28
Prob > F =.0000
R-squared = 0.78
Adj R-squared = 0.74
Root MSE = .19083

OPperM2 |	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
extremel |	.2956735	.0982577	3.009	0.006	.0940654	.4972816
repressi |	.9203826	.1506512	6.109	0.000	.611272	1.229493
freeT |	-.0761413	.0713587	-1.067	0.295	-.2225573	.0702747
compind2 |	-.0040409	.0012699	-3.182	0.004	-.0066465	-.0014354
_cons |	.9367051	.0708873	13.214	0.000	.7912563	1.082154

Note: The dependent and independent variables have been transformed so as to protect the confidentiality of the underlying data.

Although not displaying as high a degree of explanatory power, a subset of these structural variables still provides a statistically compelling explanation of the pattern of effective Accounting Rates, as set out in

[21] See J. Sachs and A. Warner "Economic Regulation and the Process of Global Integration" in Brookings Papers on Economic Activity number 1, 1995 pages 1 - 118.

Table 4. It is worth noting that the GDP variable drops out of these models on the standard variable exclusion tests.

Table 4 Determinants of effective Accounting Rates: the role of structural variables

Number of obs = 22
F(3, 18) = 5.88
Prob > F = 0.0055
R-squared = 0.50
Adj R-squared = 0.41
Root MSE = .59642

lneffAR2 |	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
lncomp2 |	-.203973	.0925026	-2.205	0.041	-.3983137	-.0096323
repressi |	.6653007	.6634296	1.003	0.329	-.7285131	2.059115
extremel |	.865743	.3956064	2.188	0.042	.0346047	1.696881
_cons |	-.153364	.7286514	-0.210	0.836	-1.684204	1.377476

Note: The dependent and independent variables have been transformed so as to protect the confidentiality of the underlying data.

In short, the pattern of nominal and effective Accounting Rates appears to be more significantly influenced by a country's political environment and broad economic policy choices than by its level of development. The highest Rates (and collection charges) are typically imposed in countries which have repressive political systems and severely distorted markets.

4. The cost and sustainability of the current distortions

The distortions associated with high Accounting Rates and collection charges impose substantial economic costs; and while these distortions are to some extent being undermined by market forces, the likelihood that many countries will retain monopoly arrangements for the international service means that they will not vanish of their own accord.

Three points need to be made in this respect.

First, demand for international telecommunications is relatively price elastic. Even in Australia, where collection rates are relatively low, the price elasticity of demand for switched outbound minutes is above 1. For those streams out of Australia on which Accounting Rates are highest, and hence collection rates are also high, the price elasticity of demand lies in a range around 1.5. At the same time, long run incremental costs, excluding outpayments, are extremely low; so that it is primarily the effective Accounting Rate which sets a lower bound on price reductions. With capacity abundant, the foregone consumer surplus is pure waste. Demand elasticities are certainly well above Australian levels at the foreign end of many of the streams with the highest charges; so that the combined effect must amount to a considerable loss of social welfare (in the economist's sense of the sum of consumer and producer surplus). Future transmission and switching systems have even lower long run incremental costs; so that left uncorrected, the burden these distortions induce can only rise.

Second, on the streams with competition at both ends, market forces are bringing Accounting Rates down; and they are likely to bring collection charges down even more rapidly as competitive rivalry intensifies. In part, this simply reflects the interest which carriers in a competitive market have in reducing and controlling their input costs. But several additional factors are at work:

1. As regulatory constraints are being lifted, Accounting Rates are increasingly being by-passed by carriers operating on an end-to-end basis. In some cases, these carriers own facilities at both ends of an international connection (for example, Sprint on the transatlantic and now transpacific routes); in others, they obtain capacity from a facilities-based carrier and resupply international services over that capacity (for example, Esprit, ACC and WorldCom on the UK-US route). Strong competition in the supply of international capacity keeps these entrants' costs down; as a result, they can substantially undercut the charges set by incumbents operating within the framework of the international settlement system[22].

[22] In London, for example, resellers effective average charges per minute of switched traffic to the US have been about one-third lower than the charges set to corporate customers by BT. Similarly, according to a recent market survey, highly price-competitive resellers are gaining substantial market share in the US: see ACM A Profile of the US Resale Market, Boston 1995. And in Australia, switched and switchless resellers are the most rapidly growing force in the international services market.

2. At the same time, entrants are exploiting anomalies in the structure of Accounting Rates and of international charges. Accounting Rates have typically been set on a relatively discriminatory basis: so that a carrier in country "A" may charge a carrier in country "B" more to terminate its traffic than it charges one in country "C", even though the costs caused by "B" are at least no higher than those caused by "C". Similarly, the "A" carrier may charge consumers more for calls to "B" than to "C", even though costs are not higher on the "B" stream. This results in manifold anomalies, including: substantial differences in charges in the two directions of a stream; gains from triangulation (that is, where it is cheaper to call "C" from "A" via "B" rather than calling directly); and scope for Accounting Rate arbitrage (where a saving in effective Rates can be secured by transiting traffic from "A" to "C" via "B", claiming to the "C" carrier that the traffic it has received originates from "B" -- a practice known as "refile"). Digital technology -- which allows complex routings and charging reversals without substantial additional costs or any loss of service quality -- makes these anomalies easy to exploit; market forces are proving effective in identifying these opportunities and translating them into commercial advantage.

3. Entrants and consumers are also proving adept at exploiting emerging opportunities for substitution between services -- including the transfer of traffic between public switched, private virtual and fully dedicated networks. The very rapid growth of e-mail over the Internet must be causing some loss of traffic to other services, notably fax; and with Internet access prices set to stabilise at around $1 per hour (as against an average collection charge for IDD still in excess of $1 per minute), the potential impact of TCP/IP[23] voice is clearly far-reaching[24]. The fact that the international leg of TCP/IP services is typically provided over dedicated circuits or through frame-relay networks, which do not fall within the current settlement arrangements, makes these potential impacts all the greater. And as existing frame relay networks are upgraded to cell relay, they too will

---

[23] Transmission Control Protocol/Internet Protocol: the technical standard used in the Internet.

[24] The number of commercial Internet customers in Australia is increasing by some 8.5 per cent per month. Internet capacity to the US from Australia has gone from some 3Mbps in August 1994 to over 22Mbps now, and is rapidly approaching the capacity used for the switched voice service. For a comprehensive survey, see Strategic Innovation Group Internet Access Providers in Australia, Sydney December 1995 at page 33.

pose a direct and very substantial threat to the existing voice services.

4. Combined, these factors are forcing the incumbent carriers to respond, notably by positioning themselves for substantial falls in charges. This in turn is leading to renewed efforts by these carriers to bring costs under control, including by reducing the termination charges they pay to foreign carriers.

Third, although having some effect on monopoly markets, these pressures cannot completely counteract foreign-end market power. These pressures are, in particular, more effective in eliminating anomalies in the structure of rates than in forcing down the average level of those rates[25].

1. Consider, for example, call-back operations, which exploit the difference between charges in the two directions of a stream. The simplest way for a foreign-end carrier to protect itself against call-back is to post an increased Accounting Rate -- since this ensures that the losses it makes in terms of foregone collections are offset by revenues from additional in-payments. The result is to raise the equilibrium price in the competitive country rather than to lower the price in the monopoly country[26].

2. Refile may also make anomalies in the triangular patterns of rates and charges difficult to sustain; and this is likely to help eliminate discrimination. But the more uniform effective Rate will not necessarily be lower than those now in place; indeed, it could be higher, if such an increase did not reduce the revenue accruing to the monopoly carrier.

---

[25] It is tempting to view these pressures as somewhat akin to smuggling. Like smuggling, they reflect the distortions induced by the wedge between domestic and world prices. And also like smuggling, they involve a real resource cost, because the "smugglers" need to be compensated for their costs and risks -- which may well be higher than those of the incumbent operator. The difference is that the "smugglers" in this context still need to use roads which, in the monopoly countries, are under the sole control of the party whose end-user prices they are trying to undermine. As a result, that party can at least partly counteract the effect by increasing the tolls its charges.

[26] It is important to bear in mind that what is at issue here is not the absolute level of the rate, but its level relative to costs (which are falling rapidly). Hence, these outcomes could be achieved simply by slowing the pace at which charges and Accounting Rates were reduced.

3. Equally, carriers with monopoly power can guard against inter-service arbitrage by eliminating anomalies in their charging structures -- for example, as between switched and dedicated capacity.

4. Finally, absent effective regulatory constraints, carriers from monopoly markets can increase the effective Accounting Rate by taking advantage of by-pass opportunities in the markets open to competition. In Australia, for example, one foreign carrier whose home market is protected from competition has leased capacity from its home base into Australia; there it will deliver traffic to an out-WATS service[27], incurring charges substantially below the Accounting Rate. As a result, it will escape settlements payments, while Australian carriers will have to pay the established Rate on a much higher level of imbalance minutes.

Overall, liberalisation doubtless provides substantial benefits to consumers in the markets being opened to competition. But it is not going to eliminate, and may even increase, the distortions arising from the conduct of monopoly carriers.

5. The scope for a negotiated solution

Given that these distortions are otherwise likely to persist, there may be high returns to efforts to address them through multilateral negotiation.

As matters currently stand, carriers are free to set Accounting Rates as they choose, both in terms of their average level and in terms of their structure. In selling termination services to foreigners, carriers -- even if they are effectively operating as State Trading Agencies -- may, in other words, depart as they please from the GATT principles of transparency and non-discrimination. Mounting concern about this situation has led to the search for ways of bringing the sale of termination services within the disciplines of the multilateral trading system.

In particular, the Australian authorities have proposed that an agreement be reached in the context of the GATS replacing the current Accounting Rates by a nationally-determined non-discriminatory termination charge. Under this arrangement, countries would post a single rate at which they

---

[27] Out-WATS services involve the provision of carriage from one point to any destination within a region or country at a fixed, distance-independent rate.

would terminate traffic originating overseas within their territory -- regardless of precisely where that traffic originally came from. Charges for transport to and from that territory would be settled separately, presumably on the basis of commercial negotiation[28].

This proposal has much to commend it. In the countries where markets are being opened to competition, such a cost-based termination charge system seems to be emerging -- with resellers, for example, purchasing termination services (such as out-WATS) from their international gateway to the called party. There might well be gains from replicating this experience at an international level. But there are at least four issues which need to be addressed.

First, it is by no means apparent that implementation of this proposal would lead to a fall in the amount paid for termination services, at least in the short term. Thus, if the termination charges posted by carriers in competitive markets are set relatively close to cost, while those at the foreign-end reflect the current median Accounting Rates, net out-payments per minute of traffic would rise substantially. Indeed, for Australia, assuming (1) that traffic volumes are fixed and (2) that the Australian termination charge is set at cost, then simple simulation shows that (3) unless foreign termination charges are set at less than half current settlement rates (that is, a quarter of the current Accounting Rates) outpayments per minute will be substantially higher than they are at present. Absent some explicit constraint on the level of the termination charge, it is only the transparency associated with the new system -- the "shaming" effect of the disclosure of high Termination charges -- which could lead these rates to fall[29].

---

[28] In the Australian proposal, carriers would be free to deliver traffic directly to the designated international gateway -- they would not have to obtain the terminating international half-circuit from the carrier at the foreign-end. Given the abundance of international transmission capacity, the prices charged for the unbundled transport component should rapidly move towards costs.

[29] Transparency, it is worth noting, is not desirable for its own sake. Thus, posted price requirements (in which carriers competing in a market are forced to file tariffs) generally facilitate price coordination and keep charges to consumers high. Substantial problems also arise when the transparency requirements do not apply uniformly. For example, until recently, only the United States disclosed its Accounting Rates (OFTEL has recently published UK Accounting Rates with OECD countries). As a result, Accounting Rate negotiators from other countries could use the US rates as a benchmark and always seek a "cut" off those rates -- with the bargaining parties knowing that the US negotiators would not become aware of any such discount they might decide upon. There is some evidence that this has allowed foreign negotiators to secure more favourable terms: thus, in the regression of Australian effective Accounting Rates, a

Second, if some cap were set on the level of the termination charge, it is by no means apparent why the countries whose carriers now have the highest Accounting Rates would enter into such an agreement. The immediate loss of revenue is an obvious obstacle; but so too is the concern, in many countries, to ensure that the incumbent carrier is an attractive prospect for privatisation -- a goal unlikely to be advanced by reducing the claims it can place on foreign income. The difficulties recently encountered in the privatisation of the Indonesian telecommunications carrier PT Telkom and of Spain's Telefonica have highlighted the very great degree of income assurance that investors are now seeking in developing country asset sales[30].

---

term picking up the gap between the actual US Rate, and the Rate predicted on the basis of structural variables, has a sign indicating that Australian Rates tend to be lower than US Rates when US Rates are above their predicted value:

Source |	SS	df	MS	Number of obs = 34 F(4, 29) = 11.13
Model |	2.88415947	4 .	721039868	Prob > F = 0.0000
Residual |	1.87890063	29	.064789677	R-squared = 0.6055 Adj R-squared = 0.5511
Total |	4.7630601	33 .	144335155	Root MSE = .25454

lnOPpM2 |	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
lnGDP2 |	-.1351902	.0401762	-3.365	0.002	-.2173598	-.0530207
private | -.	1621046	.0970404	-1.670	0.106	-.3605745	.0363653
lncomp2 |	-.1847004	.0797333	-2.316	0.028	-.3477733	-.0216276
lnUSard3 |	.6224815	.1989522	3.129	0.004	.2155785	1.029384
_cons |	2.248824	.4168119	5.395	0.000	1.396348	3.1013

[30] The result, reported above, that privatisation has no effect on foreign-end collection charges, and only a weak effect on effective Accounting Rates lends support to the view that competition is more important than ownership in determining at least allocative efficiency.

Third, it may be that countries can be induced to enter into such an agreement by creating linkages: but the nature and content of these linkages would need to be defined. Two broad options have been canvassed:

1. The first is to create the linkages within telecommunications itself: for example, by making market access by foreign carriers conditional on commitments with regards to domestic market conditions. This approach has been used by the United States; it remains to be seen whether it could work elsewhere or be generalised to a multilateral level[31].

2. In the second option, reductions in termination charges would be treated as "concessions" within a multilateral trading round. For this to be effective, the termination charges would need to be subject to some form of tariffication[32] -- which raises substantial, but certainly not insuperable, technical difficulties. The countries "buying" the reductions in charges might need to overcome resistance on the part of the areas where they would make matching concessions for this "horse trading" to occur.

Fourth, complicated issues would arise in implementing such a scheme in any country where the international service was provided by private entities and/or under substantially competitive conditions. Even assuming governments were willing to legislate to impose a requirement that carriers post a termination charge, it is not apparent how such a requirement would be implemented in a multi-vendor environment. One approach might be to make this requirement conditional on market dominance (so that only a dominant carrier had to provide non-discriminatory termination); but this raises complex issues about the definition of dominance and such asymmetric regulation may in any case impose severe costs[33]. Even greater problems could arise when imposing a requirement to post a non-discriminatory termination charge involved changing the license granted to a carrier at the moment of its

---

[31] It is worth noting that several of the carriers with the highest effective Accounting Rates are not seeking access to foreign markets, and hence may not be especially vulnerable to this form of linkage.

[32] That is, expressed as an ad valorem tariff imposed on the sale of termination services to foreigners.

[33] It is well-known, for example, that requiring a dominant carrier to post its charges is likely to facilitate price coordination in imperfectly competitive markets and hence raise prices to consumers.

privatisation: notably if it substantially altered the value of the license, such a change could create demands for compensation, requiring further "side deals" to be struck among domestic interest groups.

Viewed as a whole, these considerations highlight the difficulties which still need to be addressed to make a multilateral approach workable. Clearly this should not be taken to mean that such approaches are not worthwhile -- rather, it indicates the length of the road that remains to be travelled.

6. Trends and prospects

Looking to the future, it seems clear that the traditional cooperative arrangements which have characterised international telecommunications are giving way to new forms of globalisation; what is fundamentally at issue is whether the mechanisms forged in the past can be adapted to the new realities.

The most obvious factor underpinning this change is the opening of markets to competition. The regulatory constraints which previously forced cooperative provision are being steadily removed; the liberalisation of markets in the European Union will be a further, very major step in this direction. Barring an unlikely rise in barriers to foreign direct investment, regulation will no longer be as potent a factor impelling carriers to cooperate in providing service, building and operating facilities, and setting technical standards.

At the same time, many of the transactions costs efficiencies associated with the traditional forms of cooperation may be waning. Consider the *joint provision of service* through correspondent relations: the costs which a foreign-end carrier would need to incur to provide service on an end-to-end basis are clearly far smaller than they were[34]. Moreover, by thus expanding its customer base, the foreign-end carrier can exploit opportunities to sell a broad range of services into the host market and secure fuller utilisation of its home country facilities at times when they would otherwise be lightly loaded[35]. The very high quality of current

[34] This does not only apply to the cost of facilities and network services: in billing and collection, the widespread use of credit and payment cards (such as VISA and MasterCard) has substantially reduced the costs servicing customers overseas.

[35] For example, by using switching systems in the home market to control calls in a country in a different time zone, and hence with a non-coincident traffic peak.

transmission and signalling networks, which allows complex call routings with no loss of quality, means that carriers do not secure any particular advantage from locating key service control facilities near the point of their primary use. As a result of all of these changes, the classic model of joint service provision is giving way to new arrangements in which foreign carriers have a substantial direct presence in the home market.

Similar trends are at work in the *joint provision of facilities*:

1. Although the consortium approach to undersea cable provision remains dominant, investor- (rather than carrier-) funded systems are likely to play an increasingly important role. Within these new financing arrangements, ownership, control and use will be more unbundled than in the current structures.

2. Equally, the argument that there are strong transactions cost reasons for retaining the current structure of INTELSAT and INMARSAT seems less compelling than in the past -- especially given the private sector's demonstrated willingness to invest in ventures such as PANAMSAT and the next wave of Low Earth Orbit global satellite systems. Rather, the issue is how the strengths of the cooperative systems can be preserved in a more competitive environment. While this is a matter of lively debate -- most notably in respect of the new INMARSAT commercial subsidiary and of the proposed restructuring of INTELSAT -- it seems likely that the traditional cooperative arrangements will play a diminishing role in providing the facilities of the future.

Finally, the rise of end-to-end service; the ever more competitive nature of the relations between carriers; and the increasing pace and complexity of technical advance; are all undermining the traditional *cooperative approach to standard setting*. There is a strong demand for inter-operability; but even with the recent reforms, the mechanisms provided for in the ITU clearly face substantial difficulties in meeting it. As a result, *de facto* and proprietary standards -- some of which may be technically open (in the sense of allowing transparent interconnection of diverse systems) are likely to become ever more important in the provision of international service.

Many of these changes are already well underway -- the development of global alliances between carriers being a symptom of the pace at which developments are unfolding. Already now, the major alliances -- BT/MCI,

Atlas and the WorldPartners group -- include carriers accounting for over 60 per cent of international traffic minutes; and although some of these (notably WorldPartners and its affiliates) are now loose groupings, they are indicative of a broader shift from cooperative arrangements to integrated, transnational operation.

However, these changes do not mean that the correspondent relation -- the "Accounting Rate system" -- will disappear, at least in the near to medium term; rather, in the markets open to competition, it is evolving in two directions.

First, in some instances, correspondent agreements are moving from their traditional form to something closer to a joint venture. Compared to their predecessors, these new forms of agreement involve cooperation on a broader set of issues and allow a wider range of mechanisms for the sharing of revenues and risks.

Second, there are many cases where it is not worthwhile for a foreign carrier to become closely and directly involved in the home market: where all it really needs, in other words, is a set of services close to those traditionally provided for in the correspondent relation. In these cases, home carriers increasingly compete to provide these services -- to carry out the functions involved in settlement -- on a commercial basis. One important result of this competition is the progressive unbundling of the out-bound, in-bound, and transit and refile functions, into elements which are separately contracted for. Even more important for consumers is the fact that this competition drives charges for these services progressively closer to cost, allowing further reductions in end-user prices.

Viewed as a whole, the shift from joint provision to more competitive arrangements cannot but substantially alter the nature of trade in international telecommunications services. Traditionally, carriers had no option but to buy termination services from each other; and the exchange of these services constituted the core, if not the entirety, of trade in telecommunications services. Now carriers do have a range of other options; and the services they provide to foreigners go well beyond domestic termination. As a result, trade patterns will be increasingly determined by underlying comparative advantage -- most notably by the ability of service providers to generate innovative, cost-effective services. While the transition to such a world will take some time, the opportunities it offers are apparent.

Standing aside from this wide array of changes are the countries which remain committed to the old way of doing things. The reluctance to open markets to competition and the persistence of high Accounting and collection rates all insulate these countries from the new developments. This strategy may reap short term rewards but its long run costs are likely to be considerable.

Most importantly, the countries in question are likely to be isolated from the rapid development of new services occurring in the more open markets. With relatively small traffic volumes, and constraints on the range of service providers, there is little likelihood of new services being introduced. There is already evidence that these countries are lagging behind: thus, Table 5 shows that -- even correcting for per-capita GDP -- the countries with network competition are 13 times more likely than others to offer international ISDN service.

Table 5: Determinants of the likelihood of a country having international ISDN service

Logit Estimates — Number of obs = 85
chi2(2) = 48.92
Prob > chi2 = 0.0000
Log Likelihood = -24.144149 — seudo R2 = 0.5033

ISDNdum2 |	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
GDPec	1.000211	.0000476	4.440	0.000	1.000118	1.000305
netcomp	13.03164	18.16504	1.842	0.065	.8481904	200.2186

Note: The dependent and independent variables have been transformed so as to protect the confidentiality of the underlying data.

Ultimately, the limited range and high cost of the services they offer cannot but handicap these economies; so that is on them, rather than on the rest of the world, that the greatest burdens of their policies will lie.