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Madden, Gary G and Savage, Scott J

Curtin University of Technology, Perth, Australia, Interdisciplinary  
Telecommunications Department, University of Colorado, Boulder,  
USA

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# *Regulation and International Telecommunications Pricing Behaviour*

GARY MADDEN<sup>a</sup> and SCOTT J. SAVAGE<sup>b</sup>

(<sup>a</sup>Communications Economics Research Program, School of Economics and Finance, Curtin University of Technology, GPO Box U1987, Perth, Western Australia 6845 and <sup>b</sup>Interdisciplinary Telecommunications Program, University of Colorado at Boulder, Campus Box 530, Boulder, CO 80309-0530)

*Recent technology change and market liberalization have substantially reduced the costs of providing international message telephone services (IMTS). However, the full extent of these cost reductions have generally not been reflected in lower prices. This paper reviews the recent literature on international telecommunications markets, and examines regulation and IMTS pricing behaviour. Particular attention is given to the accounting rate system (ARS), uniform settlement policies, and asymmetric competition. Several market behaviour scenarios are described where regulation has resulted in carriers implementing inefficient pricing rules for both accounting and collection rates. Finally, economic and political strategies are put forward that could supplant the current outmoded and uneconomic ARS, and bring about the full benefits of a freely functioning marketplace to telecommunications users.*

## 1. *Introduction*

Recent technology change and market liberalisation have substantially reduced the costs of providing international message telephone services (IMTS). The full extent of these cost reductions have generally not been reflected in lower prices that match the falling cost of service provision. For example, whilst the per minute cost of using transatlantic cable fell from US\$4.87 in 1956 to US\$0.05 in 1996, US consumers presently pay an average of US\$0.85 per-minute for international calls (FCC, 1997a). Estimates from Einhorn (1997) suggest the actual incremental costs of these calls are between US\$0.06 and 0.09. In Australia, the Productivity Commission (1997) estimates the average price of an international call is five

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times the long-run marginal cost of providing service. The Commission argues that regulation, restricting domestic market competition, accounts for a large proportion of the price–cost margin, and that regulatory reforms from July 1997 should force prices towards cost. However, evidence from countries with deregulated international telecommunications sectors suggests that whilst increased competition may reduce prices, it may not necessarily lead to economically efficient pricing (Johnson 1991, Stanley 1991, FCC 1997a).

This paper provides a historical review of international telecommunications markets, and examines regulation and IMTS pricing. The purpose of the study is to highlight issues relevant to policy formation when considering telecommunications reform. The paper is structured as follows. Section 2 describes the institutional framework in which international telecommunications markets are organized. The pricing of IMTS within the current accounting rate system (ARS) is examined in Section 3. Section 4 defines asymmetric competition in international telephone markets and describes several strategic behaviour scenarios between facilities-based (FB) carriers. Section 5 examines economic and political strategies that could supplant the current outmoded and uneconomic ARS. Concluding remarks are provided in Section 6.

## *2. Institutional Framework of International Telecommunications Markets*

International telecommunications has been strictly regulated at the national and international level since the latter half of the 19th century. In most countries, statutory regulations created a single publicly owned telecommunications operator to provide local exchange, long-distance and international services. Mandated supply was typically justified by natural monopoly arguments and often tied to an obligation to provide universal service—commonly interpreted as the promise to supply basic telephony to customers even when it is not economically viable to do so. This process of domestic monopolization means that telecommunications carriers cannot provide international messages over their own facilities from the point of origin to the point of destination (Ergas and Patterson, 1991; Frieden 1996).

National monopolies have traditionally provided international service by connecting their domestic networks to international half circuits.<sup>1</sup> The resulting international network comprises of three distinct segments jointly

<sup>1</sup> The half circuit concept operates on the presumption that corresponding carriers achieve a 'whole circuit' by linking two half circuits at the theoretical midpoint of a submarine cable, or at the satellite providing the transmission link (Frieden, 1996).

operated by the carriers from both countries. The domestic (or tail) segment transfers the call from the originating handset through the domestic country local exchange to the international gateway. International interconnection occurs via the two international half circuits linking the home country gateway to the foreign country gateway. The call then travels along the foreign country international gateway through their local exchange to the end recipient. This final segment is commonly referred to as the foreign tail.

Typically, the facilities used for the two tails are separately owned and operated by the domestic and foreign carriers. The domestic carrier bears all costs associated with traffic along the domestic tail while the foreign carrier bears all costs along the foreign tail. The international whole circuit is assumed jointly owned by both the domestic and foreign country FB carriers, who equally share the costs of transmission.<sup>2</sup> Thus, the marginal cost of an outgoing call ( $c_o$ ) from the domestic to the foreign country is:

$$c_o = c_d + c_{int} + c_f \quad (1)$$

where  $c_d$  is the marginal transmission cost for the domestic country tail (incurred by the domestic carrier),  $c_{int}$  is the marginal transmission cost for the international whole circuit (shared between the domestic and foreign carrier), and  $c_f$  is the marginal transmission cost for the foreign country tail (incurred by the foreign carrier).

Since the retail price (collection rate) charged for an international call is collected by the originating carrier, a mechanism is needed to allow the originating carrier to compensate the terminating and transit carriers for any costs incurred in handling incoming traffic.<sup>3</sup> The ARS was developed during the 1930s and 1940s to facilitate the division of revenues for telephone calls between origin, destination and transit countries. Under the system, the two carriers (i.e. domestic and foreign) negotiate a bilateral agreement which describes the cost-sharing arrangements and technical details of interconnection. The domestic and foreign carrier agree upon an accounting rate (usually denominated in US dollars), which is the internal price between the carriers for the jointly provided international service (ITU, 1997). The ARS implicitly regulates market entry as only designated carriers are allowed to establish operating agreements for the exchange of international telephone

<sup>2</sup> For example, international carriers jointly own, operate, and maintain the international satellite co-operative INTELSAT.

<sup>3</sup> Countries without accounting rate agreements or transmission links can complete calls by transiting the traffic through a third country. In return for providing a through circuit, the transit country is paid a share of the accounting rate between the originating and terminating countries (typically 40:40:20) (ITU, 1996).

calls at the agreed accounting rate. Any other party must acquire capacity for international telephony by paying the collection rate or interconnection tariff charged by an authorized international carrier (ITU, 1996).

The accounting rate is the basic unit of account from which international settlements payments are made between the domestic and foreign carrier in a bilateral market (O'Brien, 1988). The two carriers mutually determine the accounting rate, and bargain over the division of the accounting rate into the settlement rate. Division of the accounting rate into distinct outgoing and incoming settlement rates determines the amount that each country pays for access to the other country networks. For example, for US outgoing calls to the UK, the US carrier obtains the collection rate from its domestic customer and pays the UK carrier the outgoing settlement rate for access to the UK network. For US incoming calls, the US carrier bears the initial cost of terminating the call and is reimbursed by the UK carrier with the incoming settlement rate. Accordingly, outgoing (incoming) settlement rates represent an intermediate cost (revenue) in the production of IMTS, while collection rates are the final price charged to consumers.<sup>4</sup>

The ARS was designed for bilateral markets with monopoly partners providing IMTS. However, unlike most countries, international telegraph and telex services have traditionally been provided by several carriers in the US. Asymmetric market entry regulations on US bilateral telex and telegraph markets therefore ensured an oligopoly (or 'competitive') structure at the US end of the market and a monopoly at the foreign end. Competition at the US end of the market provided foreign monopoly carriers with an advantage that is harmful to the US carriers (otherwise known as whipsawing). For example, the monopoly carrier may promise a larger proportion of its outbound (telegraph and telex) traffic to a particular US competitive carrier in exchange for a lower accounting rate, an accounting rate division other than 50:50, or better technical interconnection arrangements (Kwerel, 1994; Kennedy and Pastor, 1996). The remaining competitive carriers are forced to match these concessions, otherwise the monopoly carrier may divert all its return traffic towards the compliant competitive carrier.

To prevent whipsawing, the FCC implemented a uniform settlement policy (USP) whereby US carriers providing telegraph, telex and telephony services had to accept the same settlement arrangements with the foreign monopoly.<sup>5</sup> The 'equal treatment for all carriers' and '50:50 accounting rate division' rules

<sup>4</sup> Settlement payments are made on a net traffic basis. When traffic is balanced, and settlement rates are the same for incoming and originating calls, then no settlement payments are made between carriers.

<sup>5</sup> Precedence was established in the 1936 case, *Mackay Radio & Telegraph Company v. FCC* 97 F. 2d 641.

require that all US carriers accept the same accounting rate for a particular bilateral market, and that the accounting rate is divided equally (so that settlement rates are the same for terminating incoming calls and originating outgoing calls). This arrangement removed the incentive for a single competitive US carrier to accept less favourable conditions as they will apply to all carriers (Cave, 1995). Further, by forbidding price discrimination, and requiring a 50:50 accounting rate division, the foreign monopoly is prevented from creditably threatening to take actions that adversely affect the US carrier (O'Brien, 1988). While these rules have been successful in preventing the widespread use of whipsawing, they are criticized for introducing additional *de facto* regulations which impede competition and impose a downward rigidity in accounting and collection rates.<sup>6</sup>

For USPs to be effective, they must be accompanied by rules directing the monopoly carrier to return traffic to competing carriers in proportion to incoming traffic received. Proportionate return regulation has two main aims: to support the 50:50 rule by reducing the incentive for competitors to secure additional return traffic through a unilateral reduction in accounting rates; and to provide an incentive for unilateral collection rate reductions as an increase in market share will generate a corresponding higher share of incoming calls. While the motives of proportionate return are sound, the rule can lead to inefficient pricing when carriers price collection rates below marginal cost. An outgoing call entitles the carrier to receive a return proportion of incoming calls, and to make profits from the excess of the settlement rate over the cost of terminating incoming calls. As collection rates decline at the competitive end, the number of outgoing calls increase. Such divergence in collection rates may encourage call reversion (Cave, 1995).

### 3. *The Accounting Rate System and Pricing of International Services*

The 50:50 accounting rate rule has important implications for IMTS pricing and revenue sharing between carriers. Such a rule is consistent with the joint ownership of network facilities and the sharing of investment and risk between carriers. The rule allocates costs in a manner that is both transparent and simple to administer (Ergas and Patterson, 1991). Further, the rule is

<sup>6</sup> For instance, Cheong and Mullins (1991) argue that parallel accounting protects the incumbent's market power as new entrants are unable to exploit their (newer) technology induced cost advantage by negotiating a lower settlement rate. Both the FCC and the UK regulatory agency OFTEL have recently relaxed this aspect of international settlement arrangements. The FCC and OFTEL have allowed BT and Mercury to agree to non-uniform accounting rates with US carriers for two way US-UK traffic.

consistent with the assumption of cost symmetry between countries. The assumption was appropriate in the early years of the ARS as international telecommunications faced limited technology change and market liberalization. These factors combined with low traffic volumes kept costs relatively stable across countries. Given that the settlement rate for outgoing calls is an intermediate production cost that feeds into the setting of collection rates, the 50:50 rule provided a basis for collection rate symmetry at both ends of bilateral markets. Symmetric collection rates helped balance outgoing and incoming traffic, and importantly, balanced international settlement payments between countries.

Lafont and Tirole (1995) develop a telecommunications pricing model that provides a benchmark from which to evaluate the efficiency of the international ARS. The model assumes constant marginal costs and the absence of entry costs and market power. Marginal cost pricing gives the first-best collection rates:

$$P_O = c_d + c_{int} + c_f \quad (2)$$

$$P_I = c_f + c_{int} + c_d \quad (3)$$

where  $P_O$  is the collection rate for outgoing calls from country d to country f, and  $P_I$  is the collection rate for incoming calls from f to d. Equations (2) and (3) imply that collection rates are the same for outgoing and incoming calls. This result is expected since transmission costs do not change with the direction in traffic, aside from billing and marketing costs.<sup>7</sup> As shown by Alleman and Sorce (1997), marginal cost pricing gives the first-best settlement rates:

$$sr_O = c_{int} + c_f \quad (4)$$

$$sr_I = c_{int} + c_d \quad (5)$$

where  $sr_O$  is the settlement rate paid on outgoing calls from d to f, and  $sr_I$  is the settlement rate received on incoming calls from f to d. Alleman and Sorce suggest that substantial divergences in collection rates at either end of a bilateral market are prima-facie evidence that pricing is inefficient, and the

<sup>7</sup> US local exchange carriers may charge different access prices for originating and terminating traffic. In this case the cost of outgoing calls is likely to be slightly higher than the cost of incoming calls, however, the difference is negligible when compared to the collection rate.

division of the accounting rate into 50:50 settlement rates is only appropriate when  $c_d = c_f$ .

Collection rate and cost symmetry ensure an equal distribution of international revenue between the domestic and foreign country within the bilateral-monopoly model. In this model, the bilateral telephone market is characterized by natural monopoly provision of services at both ends. Should the long-run average cost curves decline for both the domestic and foreign carrier, even when their respective market demands are entirely satisfied, then the unregulated carriers produce at the equilibrium collection rate–quantity combination where marginal revenue equals marginal cost:

$$P_O > mr_O = c_O \quad (6)$$

$$P_I > mr_I = c_I \quad (7)$$

where  $mr_O$  and  $mr_I$  are the marginal revenue for an outgoing and incoming call, respectively. While unregulated carriers earn supernormal profits, the regulated carriers, governed by an average cost pricing rule, set collection rates at a level sufficient to cover all costs of production plus a normal profit allowance:

$$P_O = ac_O > c_O \quad (8)$$

$$P_I = ac_I > c_I \quad (9)$$

where  $ac_O$  and  $ac_I$  are the average cost of an outgoing and incoming call, respectively.

Although monopoly pricing is inefficient, the ARS remained, in a sense, 'equitable' so long as price–cost margins are reasonably similar across countries. When collection rates for outgoing and incoming calls are uniform, balanced traffic flows ensure that the domestic and foreign carriers generate similar revenue streams from the bilateral market. Whilst monopoly carriers accrue rents from their respective domestic customers, the rents remained within the home country, reinforced by strict regulations preventing foreign ownership of telecommunications carriers. Average cost pricing is equitable when the rate of return (ROR) required for a normal profit allowance is similar across countries. The ARS can tolerate the inefficient pricing of settlement rates, under both monopoly and average cost pricing rules when settlement



rate margins (above cost) are the same for incoming and outgoing calls. Although consumer surplus is transferred from customers to carriers, there is no international transfer of economic surplus between the domestic and foreign carriers.

In the immediate post-war period the ARS provided a stable basis for IMTS pricing and carrier settlements. The system encouraged investment, and facilitated the rapid expansion of the global network and associated traffic flows (Ergas and Patterson, 1991; Kennedy and Pastor, 1996). In particular, this distribution of revenues financed network growth in areas of the world that might otherwise be restricted from developing telecommunications infrastructures. The ITU (1997) suggest the ARS is reasonably effective in achieving its objectives provided the following criteria are satisfied for each bilateral relationship: international services are jointly provided by monopoly partners; collection rates are approximately equal for the same call made in different directions; settlement rates reflect the actual costs of terminating incoming traffic; exchange rates are relatively constant between countries; and incoming and outgoing traffic are approximately in balance.

These conditions have become increasingly less relevant in a modern telecommunications environment characterized by rapid innovation and associated market deregulation. Recent technological advance in the transmission of long-distance telephone calls has substantially reduced the costs of providing international service. Between 1956 and 1996 the investment cost per minute of using transatlantic cable systems declined by over 95% (FCC, 1997a). Although cost reductions have been generally widespread, the degree to which savings have been passed on to consumers has varied greatly over bilateral markets. For instance, US–UK collection rates have declined by approximately 70% from 1956 to 1996, while US–Japan collection rates have fallen by approximately 60% for the same period (FCC, 1997a). Many national carriers have preferred to retain the efficiency gains and so maintain high collection rates. The additional profits generated through cost reductions are often used to subsidize domestic telecommunications activities, develop infrastructure, and contribute to government's consolidated revenue (Cave, 1995).<sup>8</sup>

The reluctance of many carriers to reduce collection rates has carried over to international access charges. Accounting rates, initially intended to reflect the costs of terminating incoming calls, have remained high relative to (falling) costs. For example, Ergas (1995) estimates an average mark-up of approximately 400% between the settlement rate and the cost of handling

<sup>8</sup> Estimates from Scanlan (1998) and TeleGeography (1998) suggest the 1996 average world-wide collection rate-cost margin is 60%.

traffic on Australian international routes. Similarly, the ITU (1996) surveyed 11 inbound routes into the US and found an average mark-up of approximately 490%. Such high mark-ups suggest that terminating international telephone calls can be highly profitable, allowing rents to accrue to carriers receiving more incoming calls than it originates (Cave 1995). Under the 50:50 rule, carriers with a incoming call surplus have a strong incentive to inefficiently price settlement rates, maintaining them significantly above the actual cost of termination.

#### 4. *Deregulation, Asymmetric Competition and Strategic Behaviour*

By the mid-1980s several national governments began to deregulate their telecommunications sectors. Market reforms recognized that competition could be induced by the erosion of natural monopoly, through technological change, and that competition is more likely to increase efficiency and service quality, and lower collection rates. However, such national reform can exacerbate the divergence in collection rates when competition on bilateral telephone markets is asymmetric, e.g. when a bilateral market is characterized by a monopoly market structure at one end and an oligopoly structure at the other.<sup>9</sup> Assuming outgoing and incoming calls are less than perfect substitutes, the carrier at the monopoly end faces little competitive pressure from foreign carriers and will continue to monopoly price when unregulated. In contrast, carriers operating at the competitive end of the market are spurred by regulatory initiatives, rivalry and the threat of entry (Stanley, 1988). They have a strong incentive to improve operational efficiency, lower collection rates, and introduce more flexible services, or risk loss of market share to existing competitors, new entrants and service providers.

The presence of call reversion and reciprocity between outgoing and incoming traffic suggests that the carriers in a bilateral monopoly may have to consider the strategic behaviour of one another through the term  $dQ_O/dQ_I$ , where  $Q_O$  and  $Q_I$  are the total quantity of outgoing and incoming calls, respectively.<sup>10</sup> When competition is introduced into either end of the bilateral monopoly then competitive carriers need to consider  $dQ_O/dQ_I$ , as well as make assumptions about the strategic behaviour and market share of the other. Suppose carrier  $j$ 's output is  $q_{Oj}$  and total industry output is

<sup>9</sup> At 1996, 19 countries had allowed FB competition in IMTS markets (ITU, 1997).

<sup>10</sup> Larson *et al* (1990) define substitution between incoming and outgoing calls as call reversion ( $dQ_O/dQ_I < 0$ ), whilst complementarity between incoming and outgoing calls is call reciprocity ( $dQ_O/dQ_I > 0$ ).

$$Q_O = \sum_{j=1}^n q_{Oj} \quad (10)$$

Then carrier  $j$ , operating in the competitive end of the market, is concerned with the 'conjectural variation' derivative  $dq_{Oj}/dq_{Ok}$  for all  $j \neq k$ . Similarly,  $dQ_O/dQ_I$  can be viewed as a conjectural variation across countries, based here on assumptions of bilateral reversion and/or reciprocity. Several scenarios describing strategic behaviour between carriers are presented below.

#### 4.1 Loss-leading Collection Rates

Carriers may price collection rates below the settlement rate because of competitive pressure to maintain market share and generate additional settlement rate revenue. For instance, Johnson (1991) shows the average per minute collection rate for US carrier calls to Brazil was US\$1.17 in 1986, while the corresponding settlement payment was US\$1.25 per minute. Although US carriers lost revenue of US\$1.6 million for setting the collection rate below the settlement rate, the lower collection rate increased outgoing traffic which, in turn, stimulated additional incoming traffic through the reciprocity effect. Consequently, the loss in domestic collection revenue was more than compensated for by the US\$33.6 million settlement revenue earned for terminating incoming calls from Brazil.<sup>11</sup>

#### 4.2 Different Profit Maximands

Collection rates in other countries are high relative to the US because different telecommunications carriers consider vastly different profit maximands. This has been largely brought about by the inefficient ARS (price not matching costs), and its influence through the conjectural variations term across countries, which adversely affects demand. Stanley (1991) suggests that collection rate reductions in foreign countries would help alleviate the US telephone traffic deficit by stimulating incoming US traffic. However, administrations in other countries may be reluctant to reduce collection rates, introduce more efficient rate structures, and liberalise market structure, particularly if they believe the price elasticity of demand for calls is inelastic. Here, a collection rate reduction would lead to decreased revenue from service originating in the foreign country (and terminating in the US), and would also cause net settlement revenue to decrease as the traffic imbalance declines.

<sup>11</sup> Examination of 247 US outgoing telephone markets for the period 1991–1994 shows that average collection rates were less than average settlement rates for seven markets in 1991, five in 1992, 12 in 1993, and 11 in 1994 (FCC, various issues).

This decline in revenue may be offset against consumer surplus gains generated by lower collection rates. However, even when the consumer surplus outweighs the lost service and settlement revenue, many lower income country administrations are unwilling to sanction lower collection rates and forego valuable foreign currency (Cheong and Mullins, 1991).

### 4.3 Satisficing Carrier Behaviour

Stanley (1991) argues that AT&T's high earnings and large settlement payments from 1985 to 1990 may have resulted in accommodating behaviour between the joint international suppliers. Whilst AT&T realized that lower settlement rates would increase its net revenue, when they actively refrained from pursuing settlement rate reductions. During this period of rapid growth in the US IMTS traffic deficit, AT&T's overall earnings were subject to ROR regulation. Excessive earnings could have invited regulatory review, a reduction in collection rates, or a revised lower rate of return. High settlement rates, however, are easily passed on to consumers. A settlement rate reduction also sends a signal to the FCC that transmission costs had declined. The regulator would then have grounds to pursue lower collection rates and settlement rates across all bilateral markets.

Co-operative behaviour may continue when competition is introduced into one end of the bilateral market. While entrants are inclined to reduce collection rates below that of incumbents to gain market share, this action has the potential to trigger a price war and stimulate additional outgoing traffic. When total outgoing traffic from the competitive country exceeds incoming traffic, the monopoly country will have a favourable surplus of incoming calls. The monopoly country will then accrue the excess returns from the margin between the outgoing settlement rate paid by the competitive carrier to the monopoly carrier, and the actual costs of termination on each of those surplus minutes. Therefore, while a low price strategy serves the interests of the new entrant and consumers at the competitive end of the market, there exists a strategic dilemma. Should all competing carriers follow such a strategy, the net benefit to the country may be negative. The economic rewards for promotion of competitive behaviour are transferred to monopoly countries. As such, governments and regulatory bodies in competitive countries may paradoxically prefer less zealous price competition.

### 4.4 Collection Rate Rigidity

A competitive carrier that reduces the collection rate without a corresponding

reduction in the settlement rate will suffer a reduction in surplus and may incur an economic loss. Under the previously agreed settlement rate, the domestic carrier would have to pay this rate on each additional outbound minute of traffic generated by the price reduction. Given that the domestic carrier's own price elasticity of demand for outgoing calls is close to or less than  $-1$ , and a negative or small positive value for  $dQ_O/dQ_I$ , a unilateral cut in the collection rate would see incoming minutes rise only slightly and total outgoing minutes rise relative to incoming minutes (Ergas, 1995). This would be reflected in increased settlement out-payments relative to in-payments and lower profits for the competitive carrier. In these circumstances, competitive carriers would be reluctant to reduce collection rates unilaterally, dampening the divergence of collection rates in asymmetrically competitive markets.

### 5. *Alternative Calling Procedures*

The anecdotal evidence above suggests FB competition can lower collection rates, but that collection rates are still well above cost. Artificially high accounting rates and asymmetric FB competition have created arbitrage opportunities in many IMTS markets. Resale, call-back (CB) and refile providers take advantage of price–cost differentials within the ARS to provide cheaper calls. International simple resale (ISR) service providers also rely on price–cost differentials to provide lower priced service, but bypass the ARS. Such alternative calling procedures may provide another source of downward pressure on collection and accounting rates.

#### 5.2 Pure Resale

Pure resellers purchase capacity from FB carriers at wholesale rates and resell it to smaller volume users at a price between the retail and wholesale price. Resale was introduced into US IMTS markets in the early 1980s. New FB entrants MCI and Sprint were authorized to resell switched services, purchased from AT&T, while constructing facilities and negotiating operating agreements with foreign carriers. More recently, resale has allowed service providers, with no intention of owning or leasing international facilities, to enter IMTS markets. Between 1991 and 1996 the number of US carriers reporting pure resale traffic to the FCC grew from 69 to 313, whilst pure-resale minutes increased from 495 to 7125 million minutes (or 37% of FB and ISR minutes) (FCC, 1998).

Regulation prevents the underlying FB carrier from charging resellers a wholesale rate which prohibits the reseller from entering the market.

Nevertheless, even without regulation, some degree of resale may be desirable to the FB carrier. For instance, rapid growth in US IMTS traffic during the early to mid-1990s to some extent reflects FB carrier's use of resellers to provide service to subsegments of the market. Until recently, dominant carrier regulation, which obligated AT&T to meet all market demand at published rates, made it unattractive for AT&T to supply market segments at lower rates. However, by establishing a large margin between its retail and wholesale rate, AT&T may increase (or maintain) profits by retaining its more price-inelastic customers, while allowing resellers to (indirectly) serve its more price-elastic customers (Mitchell and Vogelsang, 1991). Such *de facto* price discrimination is outside of Department of Justice anti-trust legislation and FCC dominant carrier regulation. Resale traffic is also attractive because it is bundled with the switched traffic of the underlying FB carrier, and can indirectly increase the FB carrier's share of outgoing traffic. Increased market share guarantees a greater proportion of incoming traffic and settlement revenue under the proportionate return rule.

## 5.2 Call-back

The growth in resale traffic is also attributed to CB. Resellers provide customers outside the US with a US telephone number to call when they wish to make an international call. The customer in the foreign location places a (free) call to the US number and the reseller identifies the caller before a connection is established. The customer is then called back by the reseller and provided with a remote dial tone from which to place a call to the US, or another country. Like resale, CB typically operates within the public switched telephone network (PSTN) and ARS—the settlement out-payment is simply reversed from the foreign country to the US. When capacity is scarce, CB operators may lease international private lines (IPLs), exploit the difference between outgoing and incoming collection rates, and/or carry traffic via a third country (ITU, 1996).

The FCC (1998) argues that CB can initiate competition for traffic at the foreign end of the market, even when foreign regulations support monopoly supply. When setting relatively low collection rates, US CB operators compete with foreign monopoly carriers and lower the amount of direct calls from the foreign to the US network. Foreign monopoly carriers may be forced to bargain down accounting rates, and/or lower collection rates, to attract CB customers back to traditional routing methods. Foreign carrier collection rate reductions, in addition to attracting some users away from CB, can stimulate additional foreign billed demand which may reduce the US traffic and

net-settlement imbalance. However, many high cost carriers are reluctant to authorize CB, and/or prevent the reorigination of traffic through CB operators by reducing their collection rates, as these strategies are perceived to undermine the incumbent carrier's financial position (Propp, 1996; Scanlan, 1998). Given USPs prevent price (settlement rate) competition for incoming traffic, smaller FB carriers in competitive countries may use CB to capture a larger share of profitable incoming calls. The increase in outgoing traffic entitles the underlying US FB carrier to a greater share of incoming traffic, and the accompanying settlement revenue compensates the carrier for the relatively small margin on the facilities made available to the CB operator (OECD, 1997).

### 5.3 Refile

When settlement rates differentials are large across routes, carriers and service providers have incentive to refile calls through another low-cost country. TeleGeography (1998) estimate that 5% of world-wide traffic was refiled through third countries in 1997. By bypassing expensive routes, refile has the potential to reduce accounting rates. However, destination country carriers do not consent to the re-routing of traffic, and are generally unaware of the traffic's origin. Many competitive country carriers are therefore reluctant to bypass expensive routes completely and risk damaging bilateral relationships with monopoly PTOs (OECD, 1997; Scheele and Woodall, 1997). Further, when traffic is refiled there is no guarantee the high-cost country will agree to lower settlement rates to remove the differential across routes. A carrier with bargaining power may equalize rates by raising settlement rates with the transit country.<sup>12</sup> Finally, refile may distort prices and traffic flows when the transit carrier provides below cost refile services so as to maximize its share of incoming traffic and accompanying settlement rate revenue.

### 5.4 International Simple Resale

Recent unbundling of international telecommunications networks provides low-cost entry opportunities for providers of ISR. By acquiring an IPL, and connecting the line to the PSTN, ISR providers can compete in markets previously reserved for FB carriers and resellers. Although some ISR carriers may also be pure resellers, there are several important distinctions

<sup>12</sup> Given the FCC's (1997b) settlement rate Benchmarks Order, this scenario will become less likely when the US is the transit country. The Benchmarks Order sets limits on the settlement rate payable by US carriers to their foreign counterparts. FCC provisions are activated in the event of petitions by US carriers.

(TeleGeography, 1996). Since ISR carriers interconnect their IPL to the PSTN at both ends, they are able to originate and terminate international traffic. More importantly, an ISR carrier pays a flat monthly rate for its international transmission capacity. By leasing IPLs, ISR carriers completely bypass the ARS and are not obliged to pay the settlement rate to the terminating carrier in the foreign country. Accordingly, ISR shifts the regulatory and policy focus from international to domestic access charges, and network unbundling.

ISR carriers provide service by exploiting the difference between the retail collection rate and the sum of the access costs for underlying network elements (i.e. the domestic and foreign country local networks and the international circuit). As such, the rate the ISR pays to interconnect to the originating and terminating ends of the circuit is critical for profitability (Cave, 1995). ISR providers generally suffer a cost disadvantage when accessing the local PSTN as they have to pay the FB carrier the above cost access charge (OECD, 1999). However, international transmission and foreign termination costs are still likely to be substantially less than the settlement rate.<sup>13</sup> Despite an abundance of IPL capacity, ISR traffic volumes provide a relatively small share of world-wide traffic. In 1997, approximately 1500 million minutes of ISR traffic accounted for only 2% of world-wide IMTS traffic. Most of this traffic was carried over the US–Canada and US–UK routes (FCC, 1998; TeleGeography, 1998). Whilst the FCC (1999) supports ISR, entry is restricted to bilateral markets where ‘equivalent’ opportunities exist at the foreign end, i.e. two-way ISR.<sup>14</sup>

Two-way ISR can undermine the ARS in the same manner as do unregulated access rates between competitive carriers. Because ISR traffic is not subject to ARS arrangements, competition from ISR providers can force FB carriers to reduce collection and settlement rates to prevent network bypass, and the loss of settlement revenue. FCC (various issues) data suggest that ISR entry could generate substantial price reductions. The average US → UK collection (settlement) rate has fallen by 46 (65)% since ISR was first proposed for this market in 1992. During the period, average collection (settlement) rates for total US IMTS traffic declined by 33 (41)%. The price decline between 1992 and 1994 is particularly surprising given that ISR was not officially authorized until 1994. More recently, US → New Zealand and

<sup>13</sup> At 1997 network access costs for an ISR carrier providing service from the US to Australia were US\$0.11. The corresponding collection rate, offered through MCI’s ‘One International Calling Plan’ is US\$0.47 (TeleGeography, 1998).

<sup>14</sup> FCC approved countries are: Canada, UK (1994); Sweden, New Zealand (1996); Australia (1997); Netherlands, Luxembourg, Norway, Denmark, France, Germany, Belgium, Austria, Switzerland, Japan, Italy, Ireland, Hong Kong and Spain (1998). Australia, New Zealand, Sweden and UK authorities permit ISR carriers to provide service on any bilateral market (ITU 1996).



US → Sweden collection rates declined by 50% and 29%, respectively, following the authorization of two-way ISR in 1996. Such anecdotal evidence suggests that potential entry by ISR carriers may be enough to force prices down.

## 6. Conclusions

International telecommunications has been extensively regulated since the latter half of the 19th century. Most countries have prevented several FB carriers from providing IMTS, and placed restrictions on both private and foreign ownership. The ARS has also constrained the development of IMTS markets, and their pricing, generally. Market entry is restricted as only designated carriers are allowed to establish operating agreements for the exchange of traffic at the agreed accounting rate. Recent telecommunications liberalization has recognized that competition and private ownership can improve efficiency and service quality, and lower prices. However, relatively high accounting rates and asymmetric competition have prevented the setting of price to the cost of service provision in many bilateral markets. Further, USPs prevent new entrants from exploiting their technology advantage by negotiating lower settlement rates to compete for incoming traffic. Recent estimates suggest collection rates and settlement rates are set as high as 60% and 500% above cost, respectively.

The FCC (1996) and WTO (1997) have called for the opening of markets to private and foreign investors, increased competition in infrastructure service provision, direct access to foreign networks, and the development of alternative calling arrangements for carrying IMTS. The ability of alternative arrangements, such as resale and CB, to instigate price reductions is limited as they operate within the PSTN and ARS framework. The provision of capacity to pure resellers and CB operators provides an opportunity for an FB carrier to obtain highly profitable incoming minutes from a competing FB carrier. CB minutes can also substantially add to a low-cost country's traffic imbalance. In particular, when low collection rates stimulate outgoing traffic, and return traffic declines as more incoming traffic is substituted into CB. When settlement rates exceed the cost of termination, the reoriginated CB traffic increases the high-cost carrier's profits. Naturally, these carriers will be reluctant to bargain for lower settlement rates. By contrast, ISR traffic completely bypasses traditional settlement arrangements, and can undermine the ARS in a similar manner to unregulated settlement rate negotiation between competitive carriers. US price data suggests that US–UK collection

and settlement rates have fallen by 46% and 65%, respectively, since ISR was proposed in 1992.

Finally, the WTO (1997) agreement authorized carriers to negotiate more commercially orientated agreements for access to foreign networks and international circuits. The Australian IMTS provider Telstra recently announced that commercial deals, which include accounting rates (a one-way price which is agreed by both parties) or termination rates (a one-way price set by destination), cover over half of their IMTS business (Telstra, 1999). As ISR, commercial arrangements and new technology (such as the internet) become more widespread, settlement rates and the ARS will become less important to many carriers and developed countries. Developing countries that use settlement revenue to upgrade domestic networks and improve universal service will be disadvantaged by the move to cost based settlement rates or the elimination of the ARS. Here, FCC (1996) and WTO initiatives should be accompanied by World Bank programmes that directly target network development and access.

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