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International Traffic Termination

OECD

FOREWORD

This report was presented to the Working Party on Communication, Infrastructures and Services Policy (CISP) in December 2013 and the CISP agreed to recommend it for declassification to the Committee on Digital Economy Policy (CDEP). The CDEP Committee approved the report in April 2014.

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MAIN POINTS

This report examines measures taken in countries that have restricted the ability for markets to set termination charges for incoming international telecommunication traffic by proscribing rate floors or establishing cartels offering a single tariff, mandating rates below which no market player can diverge. While many countries regulate termination charges in the absence of sufficient competition, seeking to set the maximum for rates as a form of competitive safeguard against the abuse of market power, the practices examined here is one where authorities end up entirely eliminating the role of competition.

The report concludes that these practices are not in the best interest of the countries where they have been introduced or of countries paying the higher termination rates. Furthermore, they are contrary to international agreements. The practice of a government or authorised entity fixing rates, above cost-oriented rates, for international interconnection, on behalf of all suppliers in that market, results in an officially sanctioned cartel. For those who have made commitments, it is contrary to undertakings on telecommunication services at the World Trade Organization (WTO). At the same time, there are also elements of these practices that go against recommendations in the International Telecommunication Regulations (ITRs). Moreover, the actions constrain the benefits that flow from competitive markets for the telecommunication sector as well as for the broader economic and social development they support.

The single largest change in telecommunication markets over the past two decades has been liberalisation. The opening of markets encouraged new and innovative business models that have made telecommunication services more widely available at affordable prices especially in developing countries. Liberalisation encouraged investment, creating benefits for consumers as, for example, entrants with business models such as pre-paid services flourished in these markets. Today, in many of these countries, there can be up to four, five or more mobile network operators and the cost of a domestic basket of monthly services can be lower than the price of a single three-minute international call just a few years earlier. As a result telecommunication services have become available at unprecedented levels to those with the lowest incomes, as evidenced by ever growing penetration and usage rates, and those same market forces are beginning to drive forward the development of Internet access, which will further enhance gains in areas from commerce to health and education.

There is an inconsistency, therefore, in any policy approach that recognises the benefits of markets for domestic communication services but restricts competition at the international level. Some argue that the burden of raising the international traffic termination rate is progressive in that it falls upon those with a greater propensity to pay. However, this report suggests that these practices first and foremost affect the diaspora, the source of significant financial remittances, as business and wealthier users in these countries can often bypass termination on fixed and mobile telecommunication networks by using VoIP connections. This option is often not readily available to low income users particularly in countries with low Internet access penetration. As a result, the diaspora is forced to pay higher prices or curtail their usage for communications with family and friends or to interact with public administration from abroad. This report finds that even though some claim that charging foreign operators higher termination would have no effect on retail rates – as the standard rates are much higher and, therefore, able to absorb increases – these are not the services primarily used by consumers. Rather, the market uses pre-paid international telephone cards or services such as Skype-Out. To demonstrate this, the report compares Skype retail price data collected for the years 2007 and 2013 and this clearly indicates that eliminating competition for incoming traffic raises retail rates for foreign consumers.

Moreover, an increase in these rates can lead correspondent networks to reciprocate (leading to increases for domestic users calling abroad) and raises prices for users in both developed and developing countries. In addition, fixing a government share of revenue for incoming traffic leads to double taxation, including on those least able to pay.

Finally, this report uses a sample of African countries to explore the effects of policies mandating higher international traffic termination rates with the aim of having a controlled sample of countries with similar characteristics. The report finds that for a sub-sample of African countries, the implementation of such policies has decreased incoming traffic in such a way that the expected increase in revenue, given the rise of the termination charge, may have been countervailed. That is, the revenues per user received by African countries that have introduced the policy, compared to those that have not, remain at best almost unchanged although the inflow of their traffic has drastically decreased. A reduction in traffic may cause several effects, the main one being a decrease in consumer surplus.

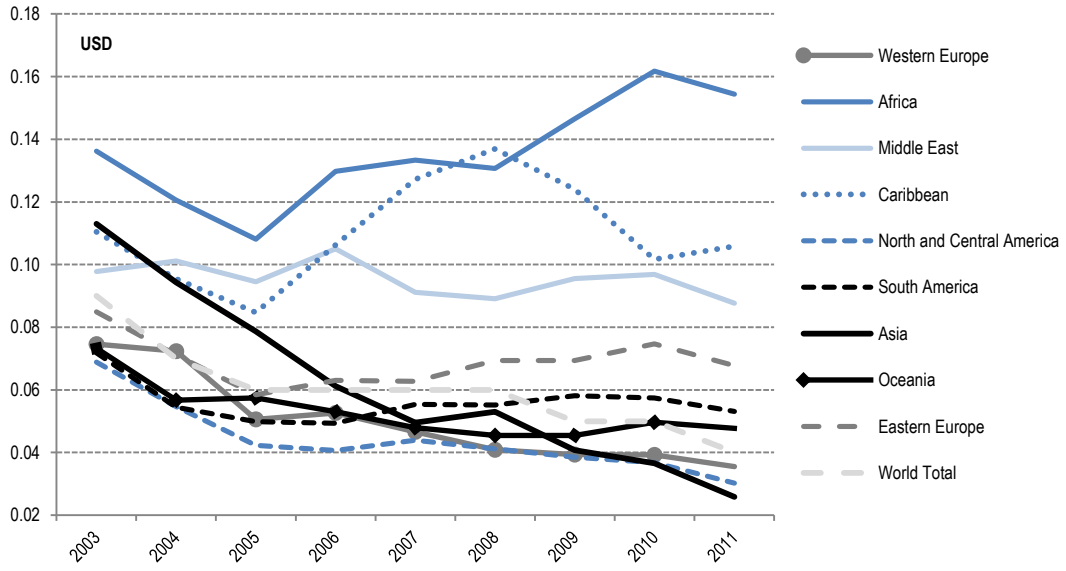
The initial regression analysis presented in this report should be interpreted with caution, as further analysis is required to take into account several empirical limitations (i.e. such as the potential endogeneity concerns). Nonetheless, these initial results allow a first glance into the effects of such policies. Bearing this in mind, the results indicate that for African countries, by way of example, that imposed a surcharge (i.e. those who introduced the policy of establishing a cartel for international traffic termination), an increase of 1% on termination rates, decreases traffic per access path by 1.34% (i.e. there is an elasticity of -1.34), whereas African countries that did not impose the surcharge the same elasticity is -0.42. As the payment received by African countries (weighted by subscribers) is dependent on the amount of incoming traffic, the increase in termination rates could potentially lead to the same levels of revenue received per user -- at best, or even a slight reduction -- depending on the sensitivity of revenues per access path with respect to traffic.

INTRODUCTION

Trends in international termination rates

Following liberalisation of telecommunication markets around the world, there has been a trend of declining rates for incoming international termination. These rates, which were previously held at artificially high levels by government-imposed monopolies, rapidly converged towards the levels available to operators in domestic markets. Between 2003 and 2011, for example, the amounts paid by telecommunication operators carrying traffic from the United States to the rest of the world halved, on a per minute basis (from around USD 0.09 to USD 0.04, Figure 1).

Figure 1: Average payment per minute to foreign carriers for outgoing traffic - United States carriers by regions



Note: The graph displays the average price per minute that United States' carriers pay foreign carriers to accept traffic for termination in their country. The data is grouped with regional averages by year. The regions are based on the FCC's classification of regions. This average payment per minute can be thought of as a proxy for international termination charges. To test this as a proxy, the FCC's data was compared to data for a major transit provider and, as expected, a close correlation (i.e. a correlation of 0.78 see Table A.1.2 in Annex 1) found for African countries (the only region for which data were available from the transit provider).
Source: OECD elaboration using Federal Communications Commission (FCC) data.

As a result of opening markets, artificial notions such as theoretical midpoints used in the international accounting rate system (Box 1), became redundant as any operator could carry traffic on an end-to-end basis. In other words, if an operator owned a network in two countries, an international telephone call between subscribers in both locations was an internal matter for that company. In cases where an operator could not terminate that traffic, over its own facilities, liberalisation enabled them to build or buy capacity that crossed international borders for final termination by an operator with local access facilities.

The wider availability of telecommunication access increased the demand for international calling. In the two decades between 1992 and 2012, Telegeography, a private consulting company, estimated that the volume of international minutes terminating on public switched telecommunication networks (PSTNs) increased by around 10 fold (50 billion international minutes per year to 490 billion).[1] The rate of growth

has decreased in recent years, which Telegeography attributes to the rise in VoIP-to- VoIP calls that are not captured in those figures but represent a further increase in the total.[2]

Box 1: Accounting rate system: Historical overview

Until the 1930s the international interconnection of telephony networks was undertaken on a bilateral basis or through the United Kingdom and its cable and wireless network. This changed with the establishment of the ITU international telecommunication accounting and settlement arrangements.[3]

The most used arrangement until the 1990s was the "Accounting-Revenue Division Method" also known as the "Accounting Rate Method" (Stern and Kelly, 1997). Under this practice two operators, often countries, agreed on an accounting rate between the two operators. This rate paid for the entire connection, of both the initiating and terminating network. The initiating network would pay half of the accounting rate to the terminating network, the so called settlement rate. In principle, the system permitted for a different distribution of settlement rates between initiating and terminating network, if this reflected the underlying costs better. In order to facilitate billing, networks would pay each other only the balance at the end of a billing period. If the customers of network A had called more to network B than vice versa, then network A would pay network B the difference between its outgoing minutes and the incoming minutes from network B times the settlement rate. Often, developed countries were net-out payers to less developed countries (OECD, 1994; Stern and Kelly, 1997).[4]

In the 1980's there was increasing demand to reform the system governing the settlement of international interconnection of telephony networks in line with broader reform aimed at developing greater access. The OECD, together with the ITU, undertook research that showed that telecommunication was not a luxury, but a necessity for the economic development of all countries, regardless of their level of economic development (ITU and OECD, 1983).

In the United States, in the 1980s, liberalisation of the market led to the emergence of competitive telecommunication operators for long distance and international services. This was closely followed by the introduction of competition in Japan and the United Kingdom. Throughout the 1990s all OECD countries liberalised their markets or announced plans to do so, though many monopolies initially remained for international termination outside the OECD area. This drew attraction to practices such as "Whipsawing", where a monopoly telecommunications operator would play off the competing networks in a foreign country against each other for terminating traffic.[5] The revision in 1988 of the International Telecommunication Regulations and the revision of ITU-T Recommendations D.1 and D.2 opened up the possibility for private (non-government) leased circuits on international routes in countries that allowed them.

Meanwhile, fibre-optic cables made international telecommunications less expensive. In 1992, the introduction of the TAT-9 cable between Europe and the United States halved the costs of telephony per minute from an estimated USD 0.04 per minute to USD 0.02 per minute. At the same time, the accounting rates for telephony from the United States to Europe ranged from around USD 1 to almost USD 2 (e.g. the rate from the United States to the United Kingdom was USD 1.06, to France USD 1.31 and to Germany USD 1.71). A call terminating in the United States would, therefore, yield the terminating network in that country, USD 0.85 from Germany, whereas the direct costs of transporting the call across the Atlantic were only around USD 0.02.

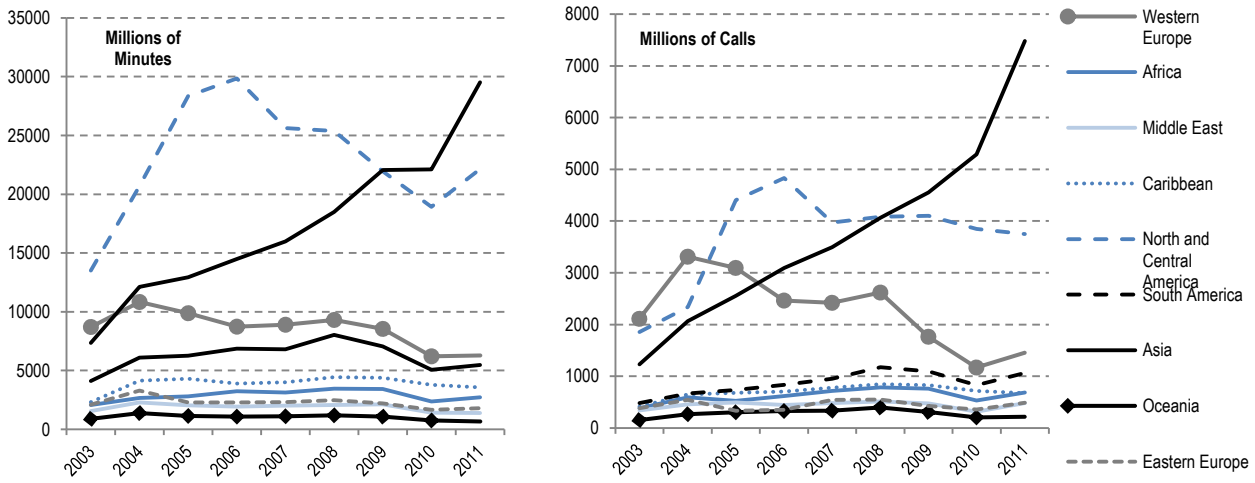
The difference could not be explained by costs, but was merely the result of the accounting rate negotiation among countries with a monopoly at one end. When competition kicked-in, retail rates in liberalised markets were brought down, alongside an increase in traffic that resulted in an increase in the amount of money carriers in countries such as the United States paid out to foreign countries. This made the monopolies, or their beneficiaries in these countries, even more reluctant to renegotiate lower accounting rates.

In 1991, the OECD examined the system of charging practices and procedures for international telecommunication services and its economic underpinnings (OECD, 1994 and OECD, 1995).[6] This work concluded that the bilateral accounting rate system contained rampant systematic and non-systematic price discrimination. Additionally, much academic literature of the late 1990's concluded that the "international accounting rate system" resulted in losses of social welfare (Mason, 1998) and had not contributed to effective development of telecommunication services, which was later accomplished via liberalisation encouraging new business models. Widespread liberalisation from that time onwards largely meant that the system was abandoned and today only a minuscule amount of traffic is settled under traditional arrangements. Instead, the World Trade Organization (WTO) negotiations on Basic Telecommunications Services, whose commitments came into force in 1998, became the main reference point governing international interconnection.

The liberalisation of international markets, with lower termination rates and transit rates, decreased the overall costs of delivering international calls. The WTO commitments on basic telecommunication services also meant that if operators did not possess their own end-to-end network, they could take advantage of the increasingly competitive markets for termination or regulatory safeguards that reduced rates where there was insufficient competition. The trend towards lower termination rates has resulted in more minutes being offered to consumers with their plans, as well as allowing operators to concentrate their commercial offers on data plans. In addition, lower termination rates also led some networks to consider VoIP peering.[7] For example, some countries with no or very low termination rates, such as Canada, Singapore and the United States, can now be called with PSTN termination for between USD 0.01 to USD 0.02 per minute on VoIP services, such as Rebtel and Skype. Furthermore, in a growing number of countries such as Austria, Ireland, France and Israel, operators include a number of international minutes or even unlimited international calls to selected countries in their bundled offers.[8]

The trend toward lower termination and increased volumes can be exemplified in the relationship between the United States and Asia. The payments made by carriers taking traffic from the United States to Asia decreased from above USD 0.11 per minute in 2003 to less than USD 0.03 per minute in 2011. Over the same time, the number of calls and minutes from the United States to Asian countries dramatically increased, a trend that was not witnessed in calls to other regions (Figure 2).

Figure 2: Number of outgoing minutes and calls (messages), United States carriers to regions



Source: OECD elaboration using FCC data

Although the spectacular rise in traffic is also undoubtedly associated with the increased telecommunication network access in Asian countries and the importance of their economies to the United States, much of this increased volume of traffic is associated with declines in international termination rates. In fact, the existence of strong competition at both ends of an international route, coupled with tremendous growth in access for people that did not previously have a telephone (i.e. calling opportunities) has transformed international telecommunication traffic between countries such as India and the United States. Most of the increase in traffic from the United States to Asia is accounted for by India: the share of minutes to Asia that India represents went from around 18% in 2003 to a share of 78% in 2011. Between 2003 and 2011, the number of outgoing calls (messages) from the United States to India rose annually by 51% (Compound Annual Growth Rate or CAGR) and the minutes consumed, in the course of these calls, rose annually by 43% (CAGR). Over the same time, for India, the average payment per minute (i.e. proxy used in the FCC data for the international termination rate hereinafter termed "termination charges") was reduced from USD 0.146 to USD 0.016, that is international termination rates were decreased ten-fold (See figures in Box 2 for China; Hong Kong, China; and India).

Box 2: The case of China; Hong Kong, China; and India

Figure 3.1: Payments and outgoing traffic, United States carriers to China

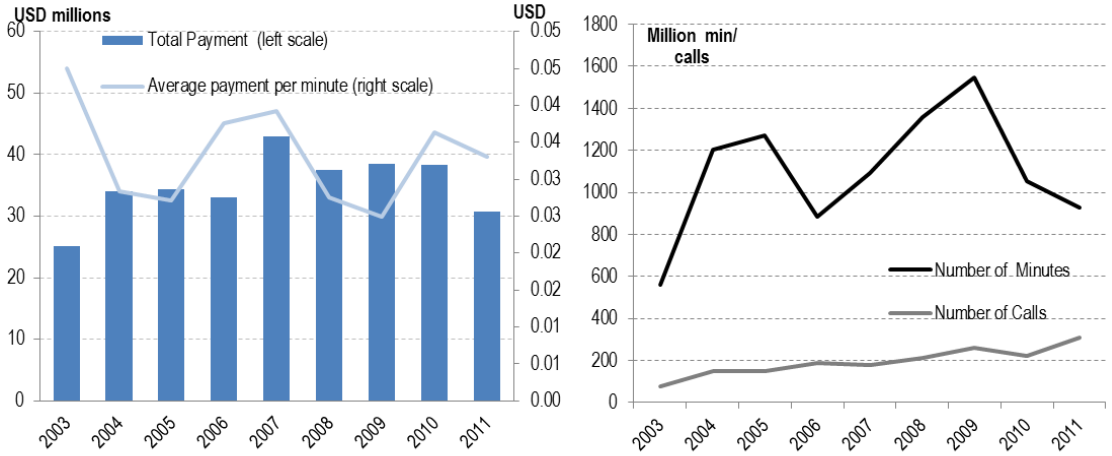


Figure 3.2: Payments and outgoing traffic, United States carriers to Hong Kong, China

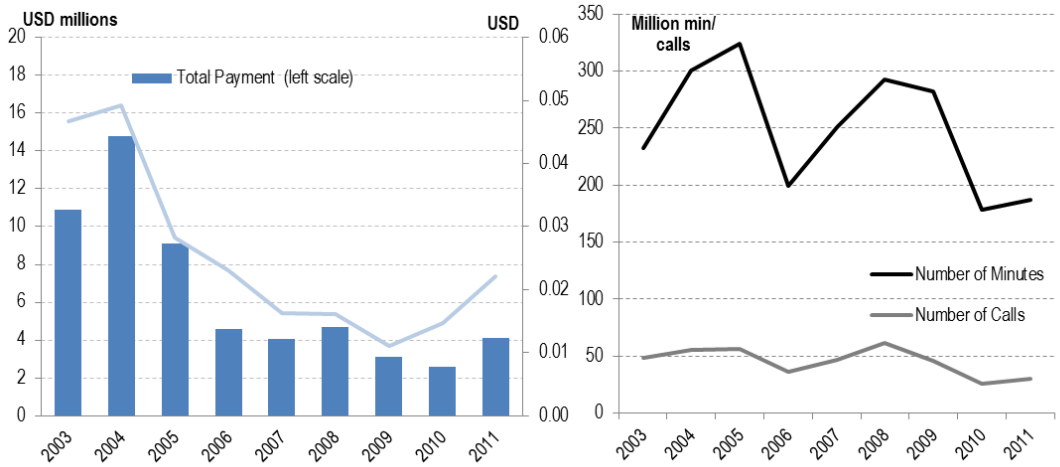
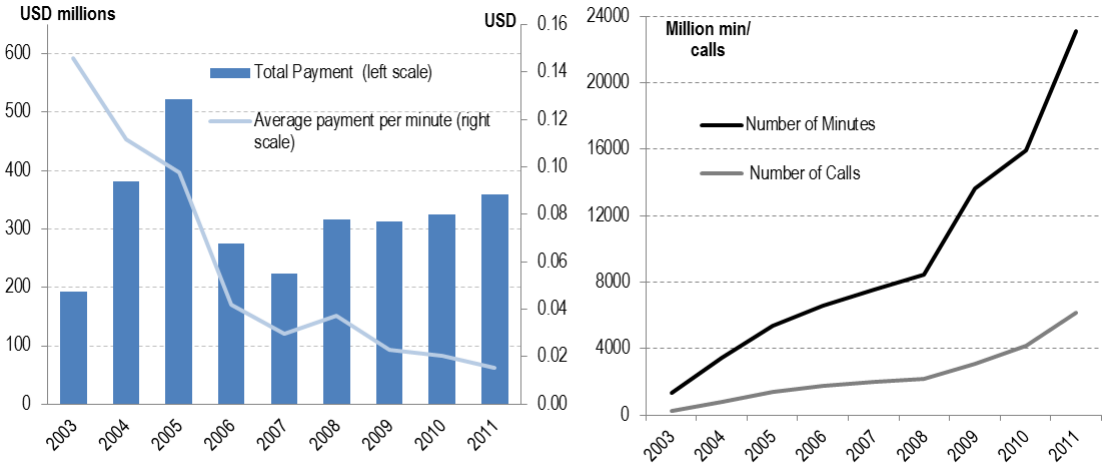


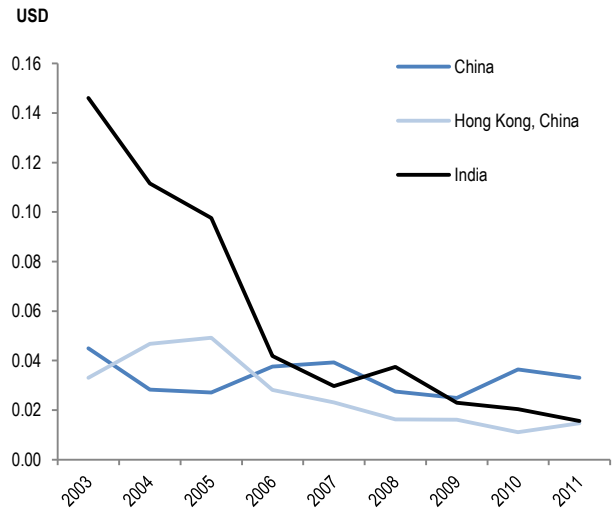
Figure 3.3: Payments and outgoing traffic, United States carriers to India



Source: OECD elaboration using FCC data

Between 2003 and 2011, telecommunication traffic between the United States and China also increased alongside lower payments per minute for calls. By way of contrast, traffic with Hong Kong, China decreased over that time, though like China, this economy has among the lowest payments per minute for traffic received from the United States. It also had relatively low payments per minute for the entire period (i.e. between USD 0.05 and USD 0.02, see Figure 4). One factor at work in all these economies – India, China and Hong Kong, China – is the substitution of PSTN traffic that takes place in part or entirely over the Internet. The most obvious substitution for the PSTN is for VoIP-to-VoIP calls or other potentially substitutable services, such as email. As a result, the increase in traffic observed for India may be related to increasing telephone penetration during this period but with much lower access to the Internet in India, than for an economy such as Hong Kong, China.

Figure 4: Average payment per minute, United States carriers to China; Hong Kong, China; and India



Source: OECD elaboration using FCC data

A further form of substitution for traditional services is VoIP calls that terminate on traditional fixed and wireless networks. This traffic may or may not be recorded in the data collected by different countries. For example, the FCC data captures only a very limited amount of such traffic. In the United States, the only outbound interconnected VoIP traffic that is currently being captured is VoIP traffic originated by the legacy carriers (e.g. AT&T and Verizon). When recorded, these carriers have converted VoIP traffic to time-division multiplexing (TDM) transmission before handing it off to foreign carriers to terminate. The major interconnected VoIP providers, such as Vonage or Google Voice, are not reporting their traffic to the FCC at present, even if it terminates on the PSTN of a foreign country. Thus, the FCC is not currently capturing most interconnected VoIP traffic, from the United States. This exclusion will be addressed when the FCC's revised reporting requirements (section 43.62) go into effect in the next year or two.

Hong Kong, China is one of the global leaders in broadband Internet access in terms of penetration and performance with an extremely competitive telecommunications market. This includes a high level of international undersea cable connectivity. This means that if a user in the United States finds it advantageous for any reason to use a substitutable service they are well placed to do so. India's connectivity to the rest of the world via undersea cables improved dramatically after the turn of the century and, just as important, this became an extremely competitive market over the next decade. Over the same time, mobile penetration hugely expanded in India and the growing competition drove down termination rates. On the other hand, India still has a relatively low domestic broadband penetration rate, meaning there

is less opportunity for some types of substitution. While PSTN substitution is occurring in Hong Kong, China and India, along with other countries to a greater or lesser extent, it is remarkable to note that the growth of outgoing traffic from the United States to India would be even more striking if captured by the available data.

Over time, with the expansion of broadband, it might be expected that the level of substitution in China and India would expand towards Hong Kong, China's experience. Nonetheless, by enabling competitive markets for incoming traffic, all three countries enable users to select the services that best suit their requirements. Competitive termination rates are a large part of this development. They ensure models for traditional telephony that enable it not to be hamstrung by new services but rather integrated as part of those services. For the present, the existence of competitive markets in Hong Kong, China, and increasingly China, enables them to maximise their broadband capabilities and, particularly in India's case, to maximise their traditional telephony via mobile networks. On the other hand, the available evidence suggests that a number of countries have raised the charges of incoming international traffic. Like India, they have witnessed a large increase in mobile penetration, which is their primary tool for receiving international telecommunication traffic. Unlike India, unfortunately, they have pursued policies that constrain or eliminate competition in this segment.

Increased international charges

In examining data for payments made by operators in the United States to the rest of the world, it is evident that they have not decreased in all regions (i.e. on a per minute basis). In the Caribbean, the average per minute payment, at the close of 2011, was roughly the same as it was in 2003. While a number of countries in that region have allowed the market to reduce rates, others have increased them. It is noteworthy that in the Caribbean, although at the close of the period the rates where roughly the same, they experienced an increase in the average payment per minute during the period 2005-2010. The increase may be linked to countries such as Jamaica, which around this period of time increased international traffic termination rates (i.e. in 2005 Jamaica imposed a surcharge on international termination such that the rate rose from USD 0.02 in 2005 to USD 0.075 in 2012, an increase of 275%).[9]

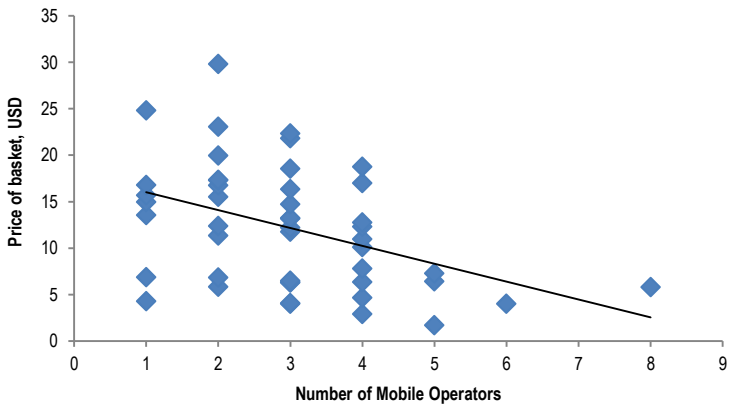
Meanwhile, the average payments per minute (proxy used in this document for international termination charges) to networks in Africa have increased over that period (2003-2011). This trend is not as the result of any increase in the cost of international bandwidth, over that time, which has in fact decreased, but rather regulatory intervention in some countries that seeks to constrain or eliminate the role of the market for incoming international traffic by imposing surcharges on termination (hereinafter termed Surcharges on International Incoming Traffic or SIIT). This has resulted in very large differences between domestic termination and international termination, which are the outcomes of regulation rather than market forces.

There seems to be a dichotomy among some African countries, on the telecommunication policies followed, for domestic and foreign traffic. For over a decade, most countries in Africa have readily embraced the importance of fostering competition domestically as it results in lower telecommunication prices and expanded access. For example, a country such as Ghana exhibits a strongly competitive domestic mobile market, while deciding in 2010 to set the floor for international inbound traffic – effectively eliminating the role of competition in determining this price.

According to data from the *Research ICT Africa* project -- which attempts to compare mobile prices following OECD methodology – Ghana ranks fourth out of 47 African countries in 2013 (one being the cheapest and 47 the most expensive country) when comparing the lowest consumption mobile service basket (40 prepaid calls in USD, for the Q3 2013).[10] The price for a 40 call basket in Ghana in Q3 2013 was USD 4.03 (and PPP 8.34). There is an inverse relationship between mobile prices and the number of

operators among the 47 African economies tracked by this project, which illustrates the benefits that competition brings in terms of price discipline (Figure 5).

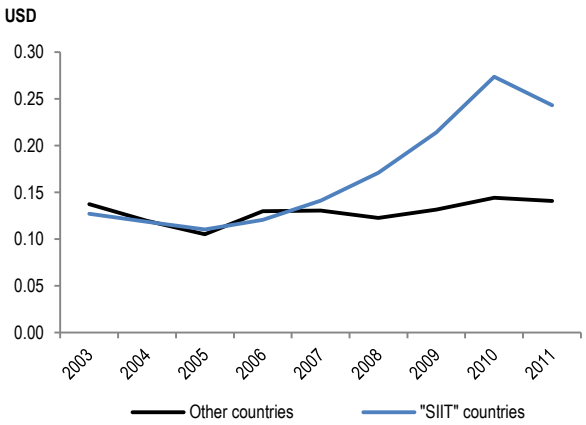
Figure 5: Price of low consumption mobile basket (40 prepaid calls) *versus* number of operators, 47 African countries, in USD for the period of Q3 2013



Source: OECD elaboration using Research ICT Africa data[11]
Note: Research ICT Africa aims to replicate the methodologies of the OECD mobile baskets in order to compare prices among 47 African economies. The price data for Seychelles was that of Q4 of 2013 because of data recollection periodicity. For some African countries the PPP exchange rate was not available, and for that reason the graph is shown in USD.

As a first step, to provide a clearer indication of trends in Africa regarding international traffic termination, it is possible to group countries in specific groups and compare outcomes. From the FCC data, one group can be identified as those for which media reports were available documenting the introduction of Surcharges on International Incoming Traffic (SIIT). This set of countries was further compared with the annual growth rates of the average payment per minute (i.e. proxy for termination charges from the FCC dataset) for the period from 2003 to 2011 from the United States (see Annex 1). The second group here is defined as all the rest of African countries. The termination charges of these two groups of countries can then be compared (see Figure 6). For example, African countries that imposed a surcharge, exhibited an increase in termination charges from USD 0.13 in 2003 to USD 0.24 in 2011, whereas the other group of African countries displayed termination charges roughly the same around USD 0.14 in the same period of time.

Figure 6: Average payments per minute (i.e. proxy for termination charge), United States carriers to African countries, period 2003-2011

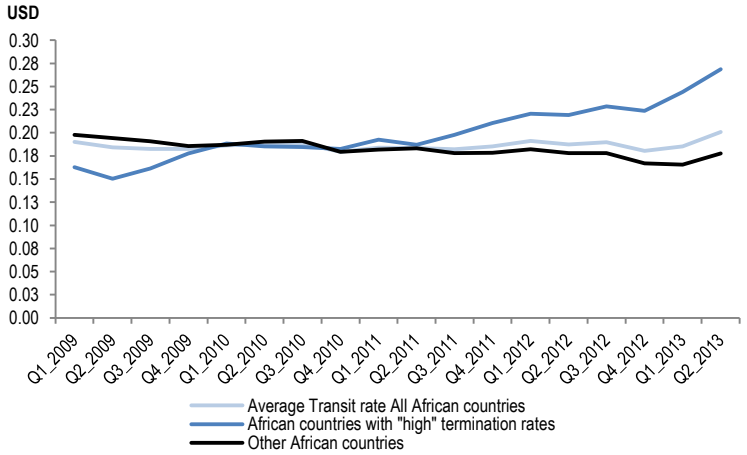


Source: OECD elaboration using FCC data
Note: "SIIT" countries based on news and official statements of increasing termination rates: Benin, Central African Republic, Chad, Congo, Cote d'Ivoire, Djibouti, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Senegal, Sierra Leone, Togo, and Zimbabwe

From 2007 to 2011, under this classification, countries that have introduced international termination surcharges have witnessed -- around the year 2007 where there seems to be a clear break in the time series among these sets of countries reflecting a change of policy -- an annual reduction of traffic per user of 29% and 27% (CAGR) measured by minutes per user and by calls per user, respectively. On the other hand, African countries that have not apparently followed this policy approach have seen a much smaller reduction in traffic in the range of 20% and 19% (CAGR), respectively (see Table A.1.1 in Annex 1). While there are many factors, including the global financial crisis to be taken into account that affect total traffic not just international traffic, the difference in performance is notable.

To further examine the trend in Africa toward higher termination rates, data were made available from a major global transit provider, for that continent, for the years 2009 to 2013. These data provide information for recent trends in termination rates for Africa, which show an increase (Figure 7).

Figure 7: Average transit prices in African countries, Q1 2009 - Q2 2013



Note: "Countries with high termination" correspond to those who exhibited a CAGR rate higher than 10% in transit prices for the period 2009-2013 and/or had an initial transit price of USD 0.20 and above. See Annex 1.
Source: OECD elaboration using data from a major transit provider.

Where the years coincide with the data for the FCC's statistics, there is, as might be expected, a remarkable consistency between the average payment per minute (i.e. proxy for termination charges in FCC dataset), and transit prices, as they exhibit a very high correlation of 0.78 for the data covering the years 2009-2011, (see Table A.1.2 in Annex 1 for details). For example, the average transit price of African countries that introduced SIIT was USD 0.26, while the approximate FCC termination rate for these countries was USD 0.25 (Table A.1.3 of Annex 1). At the same time, these figures for the rest of African countries on average were USD 0.21 and USD 0.19, respectively.

When looking into the combined FCC and transit provider data for the years 2009-2011, the length of a call for countries that introduced SIIT ("SIIT" countries in Table A.1.2 of the Annex 1) was on average three minutes and a half, whereas for the rest of the African countries this was above four minutes. In other words, users make longer calls to countries that have not witnessed significant price increases, for termination rates, in recent years. Additionally, the calls received per mobile users in countries that introduced SIIT was about 2.5, whereas in the other set of countries there were on average 3.21 calls received per mobile user. In other words, consumers make more calls per user to those countries that have not experienced large increases in termination rates. Finally, the payment that United States carriers paid to foreign carriers in countries that introduced SIIT (weighted by the size of the telecom market) was around USD 2.50 whereas in the rest of the African countries this was USD 3.40 for the time period 2009-2011. In other words, there was greater revenue per user in countries that did not experience large increases in

termination prices. These data raise the question of what regulation aimed at increasing the termination charge is designed to achieve, and the experience to date in countries that have and have not adopted this path.

The establishment of cartels

In recent years, even though they have liberalised their communication markets, a growing number of countries outside the OECD area have introduced a government mandated standard termination charge for incoming international traffic. In some cases, these termination charges can apply across all incoming traffic for fixed and mobile networks, as well as on all providers, sometimes also locking in existing market shares. In other words, they act as a government-sanctioned cartel, precluding competition and raising prices for consumers in the countries involved (as some operators in other countries take reciprocal action which raises the prices for outgoing calls) as well as for users in other countries. Unsurprisingly, those countries with independent competition authorities see the perils of such approaches and, for example, in Pakistan, have successfully challenged their introduction.

While the main constraint of following such policies in any economy is their practical effect on limiting the benefits of competition for the telecommunication sector – and its fundamental role for economic and social development – there are many related effects. One is the implication for taxation. In those countries that determine the share of the standard rate paid to the government, it can lead to taxation for the foreign countries being charged on these government-mandated fees. As a result, consumers in foreign countries pay taxes on what is essentially a tax rather than an input into the service they are purchasing (i.e. a tax in one country is applied on a surcharge in another country).

As noted by the ITU, in their report on "Taxing telecommunications services: an overview", a tax on international traffic termination may lead to double taxation, which in economic literature is denoted as the "double marginalisation' issue. Double marginalisation is a situation where retail prices exceed even the price that an integrated monopoly would set optimally. As such, the double taxation may lead to a level of taxes above that which maximises the overall tax take, and as a result "severely depress output".[12] In this case, the output would be international calls.

Meanwhile, the arbitrage opportunities between the international and domestic termination rates become so large that a "grey" market is created where some seek to bypass the official rate by terminating traffic at local levels (Box 3). This criminalises an activity that in a liberalised market would be viewed as a routine practice and creates costs in monitoring traffic and in law enforcement. For example, GSM gateways allow bypass of the international termination rates charged. Though illegal in many countries (or at least forbidden by the terms of service of many telecommunication companies), calls diverted in this way can represent a significant part of the market. For Bangladesh, it is estimated that over one third of all incoming voice minutes were handled by illegal bypass systems (Asia *et al*, 2009). In Cambodia, where a single rate for incoming international traffic has been set at USD 0.04 – a figure much higher than the competitive rate set by the market for domestic termination – similar estimates exist for the amount of bypass by so called "grey traffic".[13]

A further challenge for cartels, even when sanctioned by governments, can be their tendency for instability where they involve dominant members that set market shares. Market shares were agreed in Pakistan by members of the International Clearing House (ICH - see Box 5) based on historical shares.[14] This favoured the incumbent fixed network provider that once terminated the majority of traffic whereas today mobile networks overwhelmingly do this for incoming international traffic. The incumbent fixed network provider's share was 50% with the other 13 players sharing 50% even though estimates stated that more than 90% of incoming international minutes were being terminated on mobile networks.[15] In addition, cartel members left as it broke down because not only did grey traffic increase but also demand for

services fell in line with higher termination rates. This meant some operators said they were losing money based on the cartel arrangements with traffic and revenue being reduced by two thirds of the levels experienced prior to the ICH.[16]

In Vietnam the largest operators reportedly use their control of international capacity to enforce pre-determined market shares.[17] In 2013, acting collectively, the carriers agreed to raise the prices for incoming international traffic from USD 0.026 to USD 0.061. The two largest players were assigned 80% of the market and smaller players shared 20%. The larger players said this acted as a discipline to smaller players stepping outside the floor price set by the government for the incoming international termination rate. This led to Hanoi Telecom, a smaller operator, complaining that the two largest long distance carriers reduced the connection channels to restrict its international incoming traffic.

Box 3: Bypass by GSM gateways

GSM gateways or SIM-boxes can be used to bypass international termination rates that are not set by the market (e.g. when set by a monopoly or a government sanctioned cartel) or to bypass higher mobile termination rates and arbitrage lower on-net rates. These gateways, which are similar to servers, are connected to a fixed network, for example an IP network or leased line using an E1/T1. They contain a large number of SIM-cards and GSM antennas. The use of such gateways is forbidden in countries that do not rely on the market to set rates.

Some actors advertise them to be used as an addition to the local private branch exchange. Instead of paying termination rates to a mobile network, the PBX switches to the GSM gateway to use the lower on-net or mobile to mobile rates. In many countries, however, the use of GSM gateways is mainly aimed at bypassing international termination rates rather than domestic arbitrage.

As mobile telephony is the most commonly used form of communication in many countries, with often the highest international termination rates, the focus is mainly on terminating telephony calls on mobile networks. In countries that adopt such policies, traffic is routed via leased lines or VoIP connections to a single gateway, and then sent to a national network. To avoid surcharges, which may be added at an official gateway, the providers of "grey traffic" services set up a bypass gateway having already sold traffic termination on the international market.

Such activities are generally illegal and can be severely punished. Network operators and authorities often actively search for anomalous behaviour in calling patterns to find illegal gateways. The result is a "cat and mouse" game between enforcement authorities, mobile operators, and suppliers of anti-fraud services on the one side and manufacturers of gateways and parties offering to terminate "grey traffic" on the other.

One manufacturer of GSM gateways, SysMaster, is explicit about the use and characteristics of its product. Their website (www.sysmaster.com/products/gsm_termination.php) says:

> "*VoIP operation wants to expand the business into GSM call termination utilizing locally purchased SIM cards for cheaper termination rates. The available GSM termination solutions do not present reliable termination options because they do not address the main GSM termination problems such as SIM card suspension, number traps, number probes, blacklist management, and human behavior emulation*."

The website further elaborates the strategies of operators or authorities to detect GSM gateways and the procedure to counteract these methods. It seems to do this by creating a distributed network of gateways controlled by central servers instead of relying on simple boxes. One of the surprising elements of the product is that it can be mounted in a vehicle and run off a car battery to simulate traffic that is moving.

The rapid advance of technologies developed by the gateway manufacturers has led to an "arms race", where regulators have reacted by introducing additional fraud prevention and detection. Pakistan reportedly went as far as installing deep packet inspection technology that would block all unauthorized virtual private networks in the country. The rules and their implementation appear to have caught businesses, NGOs and Inter-governmental organisations by surprise as it was reported that these entities were left without internal Internet service and telephony systems, that often are managed from abroad over VPN connections.[18]

In some countries, bypassing the official termination can be considered a violation of local laws. For example, the National Communications Authority of Ghana regularly arrests offenders, some of whom have been sentenced to five years in prison. Other regulators, such as in Pakistan, have similar news releases on their websites. Raids on GSM gateways are common such as in Cambodia.[19] Countries that leave the market to determine the most efficient termination rates do not have the costs associated with such enforcement.

Finally, the approach can lead to "whipsawing", where an entity or cartel with a single price for incoming international traffic termination plays off operators in a competitive foreign market.[20] Consider, for example, the case of where a cartel has predetermined market shares for incoming traffic. A dominant player within that cartel can direct outgoing traffic to a specific operator in a foreign country offering it a better deal – as opposed to its own competitors – without fear of the normal consequences of such an action in a competitive market. Indeed, if any arrangement leading to a lower termination price in the foreign country were not available to other operators, in that country, there would be no incentive to pass that price reduction on to their own customers. Alternatively, the foreign country and operators may respond with their own "cartel like" behaviour resulting in a loss of consumer welfare at both ends of the international traffic relationship.

What are the effects?

There is a lack of evidence available to policy makers and regulators on the effects of such charges on markets in countries taking the decisions to impose standard termination charges. Some of the information they do receive is disingenuous or biased and they have little empirical data on which to assess the likely outcomes of these policies. There is, therefore, a critical need for an assessment of the available evidence on the effects on international traffic. This report, in part to address this gap, finds that such approaches result in lower usage and as a consequence a decrease in consumer welfare.

Proponents of setting standard rates that set floors or add surcharges make, among others, the following claims that are tested in this report:

- the burden falls only on foreign users and those with a greater propensity to pay;
- foreign operators are charging much higher retail rates that will not be affected by increased termination rates;
- there is no conflict between these policies and international agreements;
- there is no negative effect on the amount of incoming traffic and revenue for domestic operators, therefore any mandated share for governments will increase and there will be no resulting loss in domestic welfare as traffic remains unaffected;
- As governments adopting these policies expect their revenue to increase, some argue they could use these additional revenues to increase ICT infrastructure in the country (i.e. use as a so called "network externality premium").[21]

Taking each of the propositions in turn it is worth first examining the notion that such policies only raise costs for foreign operators and foreign businesses/consumers. In practice, this proposition is flawed at many levels. One example is that when a government mandates a standard termination charge, then corresponding operators in other countries may reciprocate. This, in turn, leads to rates for international calls between these countries which are not the outcome of a competitive market at either end of that relationship.

Some argue that the burden is progressive in that it falls upon those with a greater propensity to pay. This does not, however, take into account the ability for those with the greatest ability to pay bypassing the system. Business to business or consumer to consumer calls can, of course, use VoIP-to-VoIP services and the establishment of cartels for termination on public networks encourages an increase in use of these services. The standard rates only come into effect when calls terminate on a public network where the end user may be unable to afford an Internet connection. As a result the users most likely to be affected, for

example, are the diaspora calling relatives and friends in such countries. In many cases, therefore, the people most affected at both ends of the call are likely to be those least able to afford increased prices. The effects may be evident in users making fewer calls or of a shorter duration, as well as potentially affecting the level of remittances to these countries. More fundamentally, however, any tariff on the international trade of goods and services increases costs at both ends as an outcome and this is just as applicable to international telecommunication services. For example, all countries in the East African Community (EAC) region, except Kenya, have imposed SIIT, and in November 2013 the EAC issued a report advising countries in the region to stop pursuing the practice of imposing surcharges on international traffic termination as these surcharges hinder trade.[22]

A second claim made by proponents of setting a standard termination rate is that foreign service providers are charging much higher rates and, as a result, would not need to adjust retail rates as they would be able to absorb the increases at the wholesale level. To make this case they cite the list prices for major incumbent firms around the world. This claim ignores the fact that even though an incumbent would be able to absorb the increase in cost, they could potentially pass through the cost to consumers given elasticity of demand. That is, the incidence of this surcharge (or tax) may ultimately fall upon the users. Additionally, incumbent prices are not the rates most people pay in competitive markets (even though incumbent firms do, of course, offer discount plans, but even then these are generally not the rates that are paid by most consumers following liberalisation of the market). Instead, the services primarily used in the international calling market are pre-paid international telephone cards or services such as Skype-Out. The sellers of pre-paid cards and VoIP service providers set the market prices in an extremely competitive environment. Any significant increase in the cost of terminating traffic, therefore, is likely passed on to the retail rates for these services – something that can be readily tested.

A comparison of Skype-Out prices can be undertaken, between August 2007 and August 2013, for countries that have witnessed significant increases in the international incoming traffic surcharge (SIIT) measured by the payments per minute from operators carrying traffic from the United States to those countries. The countries selected were those that had witnessed a compound annual growth rate in the payments per minute (i.e. proxy for termination charges) for outgoing traffic of above 9% during this period 2007 and 2011 (Table 1). As data for the full period was not available, at the time of writing, complementary data were used between 2009 and 2013 from a major transit provider. These data simply show the direct change, as measured by CAGR for the years for transit to those countries where transit prices include termination charges. Both sets of data can be compared against the direct changes in retail Skype-Out prices (simple percentage) between 2007 and 2013.

The hypothesis to be tested here is that the increase of international termination charges will have an effect on retail prices of international calls, as would be expected in a competitive market (e.g. Skype-Out retail rates). It can be observed from the data that foreign traffic drops, thus it is likely that a price increase has occurred.

By way of example, for calls to Ghana, Skype-Out retail charges were USD 0.153 (excl. VAT) per minute to fixed lines and USD 0.166 (excl. VAT) per minute to mobile lines in August 2007. In August 2013, the retail price per minute for both services was USD 0.29 (excl. VAT) (Table 1), meaning that from 2007-2013 these retail rates exhibited a compound annual growth rate of 9.31%. At the same time, international termination rates grew 9.47% annually (CAGR) according to FCC data between 2007 and 2011, and data from a transit provider indicates an annual increase of 7% between 2009 and 2013 in transit charges. From both sets of data it is clear that an increase in the wholesale rate of delivering traffic to Ghana was reflected in an increase in the retail price. In August 2007, a Skype-Out call to both fixed and mobile networks in Congo was USD 0.18 (excl. VAT) but by August 2013 was USD 0.398 (excl. VAT), (i.e. a CAGR of the retail rate of 13.75%). During this period data from the FCC indicates a 14.34%

CAGR increase between 2007 and 2011, while the alternative transit provider source shows an annual increase of between 4% and 20% (for mobile and fixed) between 2009 and 2013.

In terms of the data from the FCC, the largest CAGR increase in termination charges was that of the Commonwealth of the Bahamas. Between 2007 and 2011 outgoing wholesale payments per minute from the United States to the Bahamas increased by 39% CAGR, meanwhile Skype-Out rates increased 36% for fixed lines and 124% to mobile services. In Africa, for instance, the prices for Skype-Out retail mobile services to Gabon increased by up to 245%, and many countries witnessed more than a double increase in fixed or mobile retail charges for international inbound calls (see Table 1). The main exception was Guinea-Bissau, which started and ended the period with amongst the highest per minute rates. These data clearly indicate that eliminating competition for incoming traffic raises retail rates for foreign consumers.

Table 1: Skype-Out prices for selected countries

	6-Aug-2007		27-Aug-2013					
Destination rates per minute	**USD excl. VAT**	**USD incl. VAT**	**USD excl. VAT**	**USD incl. VAT**	**% change Retail rates 2007-2013 (VAT excl.)**	**CAGR Retail rates 2007-2013**	**CAGR Termination charge (FCC data) 2007-2011**	**CAGR Transit price 2009-2013**
Algeria	0.17	0.19	0.18	0.20	4.2%	1%	11%	-11%
Algeria - Mobile	0.15	0.18	0.39	0.45	156.2%	17%		9%
Algeria - Mobile*	0.15	0.18	0.40	0.46	161.4%	17%		17%
Bahamas	0.09	0.10	0.12	0.14	36.0%	5%	39%	
Bahamas - Mobile	0.09	0.10	0.20	0.23	123.6%	14%		
Benin	0.15	0.17	0.27	0.31	81.2%	10%	15%	2%
Benin - Mobile	0.15	0.17	0.27	0.31	81.2%	10%		6%
Chad	0.31	0.36	0.33	0.37	3.8%	1%	18%	17%
Congo	0.18	0.21	0.40	0.46	121.1%	14%	14%	20%
Congo - Mobile	0.18	0.21	0.40	0.46	121.1%	14%		4%
Gabon	0.17	0.19	0.45	0.52	167.9%	18%	26%	18%
Gabon - Mobile	0.17	0.19	0.58	0.67	245.2%	23%		8%
Gambia	0.26	0.30	0.45	0.51	68.6%	9%	13%	8%
Gambia - Mobile	0.32	0.36	0.45	0.52	42.2%	6%		7%
Ghana	0.15	0.18	0.29	0.33	89.5%	11%	9%	7%
Ghana - Mobile	0.17	0.19	0.29	0.33	74.7%	10%		3%
Guinea	0.18	0.21	0.51	0.59	181.8%	19%	18%	22%
Guinea- Mobile	0.18	0.21	0.48	0.55	165.2%	18%		0.2%
Guinea-Bissau	1.08	1.24	1.10	1.27	0.02	0.3%	13%	-10%
Jordan	0.20	0.23	0.21	0.24	2.5%	0.4%	12%	
Jordan - Mobile	0.23	0.27	0.24	0.28	4.3%	1%		
Madagascar	0.29	0.33	0.40	0.46	38.9%	6%	10%	18%
Mauritania	0.31	0.36	0.37	0.43	18.6%	3%	17%	21%
Mauritania - Mobile	0.31	0.36	0.61	0.70	93.9%	12%		
Niger	0.18	0.20	0.23	0.26	27.8%	4%	16%	6%
Oman	0.19	0.21	0.19	0.22	2.2%	0.4%	10%	
Oman - Mobile	0.19	0.21	0.35	0.41	90.3%	11%		
Senegal	0.23	0.27	0.38	0.44	63.2%	9%	11%	9%
Senegal - Mobile	0.26	0.30	0.38	0.44	46.4%	7%		9%
Sierra Leone	0.30	0.34	0.45	0.52	50.5%	7%	16%	4%
Togo	0.24	0.27	0.42	0.48	76.5%	10%	24%	-1%
Tunisia	0.25	0.29	0.40	0.45	58.0%	8%	17%	24%
Tunisia - Mobile	0.25	0.29	0.40	0.45		8%		5%
Zimbabwe	0.09	0.10	0.21	0.24	136.0%	15%	20%	-0.5%
Zimbabwe - Mobile	0.33	0.38	0.50	0.57	52.6%	7%		-0.3%

Note: *Data were available for two mobile operators in Algeria.
Source: OECD elaboration using prices from Skype's website as collected in 2007 and 2013, FCC data, and data from a major transit provider.

A third claim made by proponents of establishing cartels or mandated standard termination rates is that they do not contravene international commitments. The two most relevant areas of international agreement are those that have been created by the members of the World Trade Organisation (WTO) and the International Telecommunication Union (ITU).

World Trade Organization commitments

By 2013, some 111 of the 158 WTO members had made commitments to facilitate trade in telecommunications services. Out of this total, 102 members have committed to extend competition in basic voice telephony services. In addition, 90 WTO members have committed to the regulatory principles spelled out in the "Reference Paper", that largely reflect "best practice" in telecoms regulation. The trade rules that apply to telecommunications services include the framework articles of the General Agreement on Trade in Services (GATS).The annex to this agreement, which is legally binding on all WTO Members, requires governments to ensure reasonable and non-discriminatory conditions for all forms of access to basic public telecommunications networks and services, which would include access in the form of termination. The Reference Paper sets out regulatory principles which are legally binding for those WTO governments which have committed to it by appending the document, in whole or in part, to their schedules of commitments.[23] The Reference Paper contains Interconnection obligations. According to the Reference Paper, WTO member countries that adopt it, commit to require major suppliers to interconnect other suppliers at any technically feasible point on a non-discriminatory, cost-oriented basis following transparent procedures and subject to dispute settlement by an independent body (Box 4).

A relevant telecommunication service case, which was resolved through the WTO dispute resolution process, involved Mexico and the United States. In this case the United States said that Mexico had failed to prevent anticompetitive behaviour, as Mexico's regulations empowered the incumbent telecommunication network, in that country, to fix rates for international interconnection on behalf of all suppliers in the market, resulting in a cartel. The United States said this was inconsistent with Section 1.1 of the WTO Reference Paper. In August 2000, the United States requested consultations, under WTO auspices, on Mexico's obligations on basic services under the GATS Annex on telecommunications and the Reference Paper. In 2002, after several months of negotiation between the parties (i.e. the Mexican and United States government representatives), the WTO constituted the Panel and it issued the final report to the parties in 2004. In essence, the Panel findings concluded that Mexico's measures requiring the incumbent to negotiate international interconnection rates for itself and applying these to all other suppliers in Mexico resulted in, and in fact required, behaviour tantamount to a cartel. It also concluded that the rates, at an estimated 70% above costs, were neither cost-oriented as required by the Reference Paper, nor reasonable, as required by the annex on Telecommunications. Although the parties claimed not to be satisfied with all aspects of the Panel findings, neither party elected to take the Panel decision to the WTO Appellate Body. As a result, the WTO's Dispute Settlement Body adopted the Panel report, by consensus, in June 2004. The parties agreed on, and submitted to the WTO, a plan to redress the underlying problems by July 2005.[24]

Box 4. Telecommunications services: reference paper[25]

2. Interconnection

2.1 This section applies to linking with suppliers providing public telecommunications transport networks or services in order to allow the users of one supplier to communicate with users of another supplier and to access services provided by another supplier, where specific commitments are undertaken.

2.2 Interconnection to be ensured

Interconnection with a major supplier will be ensured at any technically feasible point in the network. Such interconnection is provided.

(a) under non-discriminatory terms, conditions (including technical standards and specifications) and rates and of a quality no less favourable than that provided for its own like services or for like services of non-affiliated service suppliers or for its subsidiaries or other affiliates;

(b) in a timely fashion, on terms, conditions (including technical standards and specifications) and cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided; and

(c) upon request, at points in addition to the network termination points offered to the majority of users, subject to charges that reflect the cost of construction of necessary additional facilities.

2.3 Public availability of the procedures for interconnection negotiations

The procedures applicable for interconnection to a major supplier will be made publicly available.

2.4 Transparency of interconnection arrangements

It is ensured that a major supplier will make publicly available either its interconnection agreements or a reference interconnection offer.

2.5 Interconnection: dispute settlement

A service supplier requesting interconnection with a major supplier will have recourse, either:

(a) at any time or

(b) after a reasonable period of time which has been made publicly known

2.6. to an independent domestic body, which may be a regulatory body as referred to in paragraph 5 below, to resolve disputes regarding appropriate terms, conditions and rates for interconnection within a reasonable period of time, to the extent that these have not been established previously.

As can be noted, the WTO has principles and procedures that can be used to address cases in member countries where governments authorise or require a cartel or cartel-like arrangements and preclude competitive markets from setting rates. By way of example, other relevant principles are the need to provide:

- "Rates no less favourable": when governments mandate standard termination rates or establish a cartel to do so, they cause very large differences between the termination offers for domestic suppliers and foreign suppliers even when that traffic is carried to the same interconnection point.

- "Cost oriented": the charges are self-evidently not oriented towards costs when compared to domestic termination.

- "Not pay for unnecessary facilities and services": the creation of international gateways that are not technically required for the exchange of traffic or monitoring of domestic networks to fulfil obligations is added to the cost charged to foreign operators. These issues should rather be a matter between commercial networks and would be unnecessary in a competitive market.

Complaints lodged at the WTO are not taken lightly and are often pursued as a last resort after other attempts at resolution have not yielded results. In 2012, for example, an operator took a complaint to the FCC to seek intervention in a case that involved the establishment of a cartel in Pakistan (Box 5). Nonetheless, as is evident in the decisions taken by the courts in Pakistan, any such case brought to the WTO would likely have had a very predictable result against the establishment of a cartel in a manner inconsistent to WTO commitments.

Countries that are examples of increasing international traffic termination rates are Pakistan, Ghana, Tonga and Jamaica.[26] The United States Trade Representative (USTR) has called into question in their most recent report (2013) whether these countries are failing to comply with WTO commitments. (See Box 5 for the examples of Pakistan and Ghana).

Box 5. The cases of Pakistan and Ghana

Pakistan

On the 15 March 2013, the Federal Communications Commission (FCC) issued an order to stop the anticompetitive behaviour by certain Pakistani long distance international carriers that were setting elevated rate floors over previously negotiated rates for the termination of calls in the United States-Pakistan route.

The background was that Pakistani carriers established in 2012 a "*new International Clearing House (ICH) exchange for all international incoming calls to Pakistan, creating a monopoly provider of international termination in Pakistan*."[27] As of 1 October 2012 the termination rate increased from USD 0.02 to USD 0.088 (3.4 times higher than previously negotiated rates).

The FCC noted in the order it issued in 2013, that in 2011 the average termination rate to Pakistan "was USD 0.031 per minute while the United States retail calling rate was USD 0.044 per minute. Additionally, it stressed that increasing termination rates on this route from USD 0.02 to USD 0.088 more than doubled the cost for United States callers and would potentially result in curtailing demand for calling Pakistan.

Thus, the FCC ordered all United States carriers that are authorised to provide facilities-based international switched voice services on the Unites States-Pakistan route "to *suspend immediately all carrier payments to Pakistani LDI carriers for termination services that are in excess of the rates that were in effect immediately prior to the rate increase on or around 1 October, 2012.*"

Ghana

Ghana is one of a number of African countries that has adhered to the WTO Reference Paper on Telecommunications. Nevertheless, in June 2010, a surcharge on international inbound traffic that had been legislated in December 2009 came into effect, raising the termination rate from an average of USD 0.11-0.13 to USD 0.19, meaning an increase of the termination charge of 46-73% (GSMA, 2011).[28] At the same time, traffic decreased 48% from 2009-2011 (FCC data and USTR 2013). Out of the new termination rate (USD 0.19), the Ghanaian Government takes USD 0.06 and operators get the remaining USD 0.13.[29]

Data from the FCC reveals that the average payment per minute (i.e. proxy for termination charge) of a call originating in Ghana and terminating in the United States was USD 0.02 in 2011. In the opposite direction, the average payment per minute that United States carriers paid Ghanaian carriers was around USD 0.16.

An increase in the termination rate can be expected to decrease incoming traffic if it substantially increases retail rates. For instance, the Office of the United States Trade Representative (USTR) in its 2013 report states that "*according to FCC data, in 2009, the United States sent over 300 million minutes of traffic to Ghana. In 2011, however, the number of minutes was less than 170 million, a decline of over 48 percent*." Additionally, this report noted the concern "*about Ghana's obligations under the GATS Annex on Telecommunications and GATS Reference Paper*." The USTR stresses that it "*will continue to engage with Ghana to seek removal of the mandated rate increase*."

International Telecommunication Regulations (ITRs)

A further notable agreement for member countries of the ITU is the International Telecommunication Regulations (ITRs). The ITRs currently in force, for countries that have adopted them, are those that emanated from the World Administrative Telegraph and Telephone Conference held in Melbourne, 1988 (WATTC-88). In 2012, the ITU convened the World Conference on International Telecommunications

(WCIT) in Dubai, with 89 countries agreeing to sign a revised treaty. Countries that did not sign the 2012 treaty, and were parties to the 1988 treaty, remain bound by the 1988 treaty. For those that did sign, the new treaty comes into effect on 1 January 2015, though between them and those that did not sign, the 1988 treaty continues to be in effect.

The 1988 treaty, now in effect for all administrations (or recognized private operating agencies), contains among others the following articles regarding 'Charging and Accounting' (Article 6), providing that (emphasis added):

> *6.1.1 Each administration shall, subject to applicable national law, establish the charges to be collected from its customers. The level of the charges is a national matter,* ***however, in establishing these charges, administrations should try to avoid too great a dissymmetry between the charges applicable in each direction of the same relation.***
>
> *6.1.3 Where, in accordance with the national law of a country, a fiscal tax is levied on collection charges for international telecommunication service*s, ***this tax shall normally be collected only in respect of international services billed to customers in that country****, unless other arrangements are made to meet special circumstances.*
>
> 6.2.1 *For each applicable service in a given relation, administrations shall* ***by mutual agreement*** *establish and revise accounting rates to be applied between them, in accordance with the provision of Appendix I and* ***taking into account relevant CCITT Recommendations and relevant cost trends.***
>
> And in Annex 1:
>
> *1.6 Where an administration has a duty or fiscal tax levied on its accounting rate shares or other remunerations, it shall not in turn impose any such duty or fiscal tax on other administrations.*

Taking together each of these items and those on taxation, the following points can be made about the principles embedded in them:

- 6.1.1: When a government (administration) intervenes to set standard rates they run counter to the principle of this article because in competitive markets retail rates in different countries are likely to converge (even taking into account reasonable differences due to costs). It is not uncommon, where governments intervene in the market, to see retail prices diverge by more than five times in different countries. This is due to competition being excluded at one end of a bilateral relationship.

- 6.1.3 and Annex 1.6: The intention of both items is to exclude one country taxing operators or consumers in another country. In addition, the imposition of governments mandating that they directly receive a specified part of a payment, results in consumers in many foreign countries being taxed on this imposition (i.e. double taxation). Double taxation can be defined as taxation by two or more countries of the same income, asset or transaction. It can be noted that Article 6.1.3 prohibiting double taxation was retained in the 2012 ITRs.

- 6.2.1: When governments intervene to create cartels they clearly do not consult with and receive the agreement of other signatories to the 1988 treaty. In other words, the principle is that a single country should not increase wholesale rates without the agreement of other countries or their operators. In addition, artificially raising wholesale rates goes against cost

trends around the world and could impede new business models developed with a market led approach.

While the 1988 ITRs were developed at a time when liberalisation of telecommunication markets was relatively nascent, they clearly contain elements that run counter to practices designed to create standard termination rates. The 2012 treaty is more explicit in some respects and invites parties to "…promote competitive wholesale pricing for traffic carried on such telecommunication networks (6.1.1)".

A relevant point could be made that Article 6 only applies to the accounting rate system and that today the vast majority of international traffic, including termination arrangements, falls under the so called "Special Arrangements" (Article 9, 1988 ITRs), which contain the following (emphasis added):

- 9.1 a) "Pursuant to Article 31 of the International Telecommunication Convention (Nairobi, 1982), special arrangements may be entered into on telecommunication matters **which do not concern Members in general.** Subject to national laws, Members may allow administrations or other organizations or persons **to enter into such special mutual arrangements** with Members, administrations or other organizations or persons that are so allowed in another country for the establishment, operation, and use of special telecommunication networks, systems and services, in order to meet specialized international telecommunication needs **within and/or between the territories of the Members concerned,** and including, as necessary, those financial, technical, or operating conditions to be observed".

- 9.1 b) Any such special arrangements should avoid technical harm to the operation of the telecommunication facilities of third countries.

- 9.2 "**Members should, where appropriate, encourage the parties to any special arrangements that are made pursuant to No. 58 to take into account relevant provisions of CCITT Recommendations".**

When introduced to the 1988 ITRs, Article 9 was a significant step towards enabling commercial negotiations to develop as an alternative to the accounting rate system. The intent was to enable these negotiations to take place between operators that were emerging in the then increasing number of liberalised markets. A relevant point from Article 9 was that the intent was for the outcomes of 'special arrangements' to be applicable to the Members concerned and not to be unilaterally applied to others. In addition, the intention was clearly for other relevant recommendations, such as in Article 6, to be taken into account especially as they were designed for a system that was typified by monopoly provision of service.

A country that appears to be deviating from the ITR principles stated above (namely that incoming calls should not be taxed) is El Salvador. A recent USTR report (2013) noted that since 2008, El Salvador has imposed a USD 0.04 per minute tax solely on inbound international traffic. As expected, this tax is likely to be accompanied by a decrease in traffic. Indeed, according to FCC data, in 2008 El Salvador received around 960 million minutes of traffic from the United States. In 2011, however, the number of minutes was only 450 million, a decline of over 53%. The effect can also be noted when traffic is measured by calls sent from the United States to El Salvador, as these declined from 127 million in 2008 to 61 million in 2011, a decrease of around 52%.

Risk of these policies spreading to use on the Internet

The creation of cartels or applying surcharges on international PSTN traffic termination raises the concern that these types of policies may be extended to the Internet. In one sense, taxing PSTN traffic is

already an "Internet issue" as it involves the termination of VoIP, which is reconverted through boxes into PSTN traffic, but there is a risk that some countries may wish to apply similar policies to data. More immediately, however, such policies place at risk new business models at the interface between the PSTN and the Internet.

Companies such as U2opia, based in Singapore, are leveraging a new version of what was known as WAP technology, so that users in developing countries can have access to applications such as Facebook and Twitter through their 2G phones. Commencing in 2010, U2opia now has operations with 40 Telecom providers in 25 countries across Asia, Africa, Latin America and Europe.[30]

A further notable example comes from India where Airtel provides users with the opportunity to access a Google search without data charges (i.e. their so called "Free Zone" offer).[31] Following a search a user can click-through to the first page of a site found in the search. If they wish to go beyond that page they are advised that they will incur charges. Such a scheme may have a number of benefits for low income users and encourage their experimentation and use of the Internet.

Services, such as the ones offered by U2opia and Airtel, are increasingly appealing to operators in developing countries as they add value to the 2G and 3G mobile services they provide. The prevalence of these services could have important welfare benefits in developing countries, as they may sometimes represent the only window of connecting to some applications in the Internet for some users. It can be noted that the most popular content is often located in other countries (i.e. not the developing regions where these policies are being followed) and domestic users (i.e. in countries where the introduction of SIIT are being followed) are requesting the content. Therefore, taxes on traffic termination could potentially lead to higher costs for users wishing to engage in OTT services, and thus hamper their development. This could especially be the case in developing countries as increasing Internet access develops on mobile services. In other words, if the proposal for a "senders pay system" for the Internet went forward, it may constrain these new OTT business models even more, which operators in developing countries are exploring.

Finally, the points made above on innovation reinforce earlier OECD work on proposals to introduce network externality premiums.[32] This work concluded that markets are already acting to internalise network externalities and that the policy objectives proponents had for premiums were being met more efficiently by regulatory reform opening markets. It pointed out that much of the literature on network externalities ignored the dynamic nature and use of ICTs and the role innovation can play in addressing side effects. It noted that what some may see as imperfections others view as opportunities which can be creatively addressed by markets. The report concluded that attempts to use non-market methods, and distort prices, were likely to have negative implications for the provision of international telecommunication services and that competition was acting to more efficiently meet policy goals.

Comparing returns

The final claim made by proponents is that there is no negative effect on the amount of incoming international calls or duration. This claim can, at least for traffic between the United States and countries that have or have not increased rates, be empirically tested.

Using the combined FCC and transit provider data for the years 2009-2011 (Figure 7 in the previous section), a test can be conducted for the difference of means among the two samples (i.e. countries that have introduced the surcharge versus those that have not). The results show that the mean of the termination rate (i.e. average payment per minute) is significantly higher for African countries that have introduced a surcharge than for those that have not (USD 0.25 versus USD 0.19). Additionally, the mean of the average call length is lower in African countries that introduced the surcharge than in countries that

haven't. These two results are derived from comparing a t-test for the difference of means among two samples at a 5% significance level, (see Table A.1.4 and A.1.5 in Annex 1 for details). At first glance, given the traffic reduction, it would seem that countries that have introduced a surcharge on termination are not necessarily better-off in terms of payments received from foreign carriers as the calls received in these countries are being significantly affected by the increase in termination rates.

In addition, although, a more thorough regression analysis remains to be conducted to take into account potential endogeneity concerns, the initial regression results show that in the sub-sample of African countries, the implementation of the policy has decreased incoming traffic in such a way that the rise in termination cost has been countervailed. That is, the revenues per user received by African countries that have introduced the policy, with respect to those that have not, remains almost unchanged, although the inflow of traffic of those countries that introduced the policy has drastically decreased. A reduction in traffic may cause several effects, the main being a decrease in consumer surplus.

Exploring the FCC data: All regions of the world 2003-2011

When taking into account all countries of the world for the period 2003-2011, Table 2 shows the intuitive relationship that the total payment of United States carriers to foreigners is positively linked to traffic (either measured by the number of outgoing calls or the number of minutes). However, the payment received by foreign carriers is negatively correlated with the average termination rate. The total payment to foreign carriers is comprised by the average termination rate (average payment per minute) multiplied by the number of minutes. Thus, if the relationship between termination rates and total payment has a negative sign, at a first glance of the whole dataset, one may suspect that the decrease of traffic may outweigh the positive effect that an increase in termination rates would carry on the overall payment received by foreign carriers.

Table 2: Correlogram FCC International Traffic Data 2003-2011 (all countries)

	Number of calls	Total pay-out from United States carriers to foreign carriers	Average termination rate	Mobile penetration	Number of minutes
Number of calls	1				
Total pay-out from United States carriers to foreign carriers	0.5853	1			
Average termination rate	-0.1398	-0.0567	1		
Mobile penetration	0.0302	-0.0197	-0.3025	1	
Number of minutes	0.8985	0.804	-0.1535	0.018	1

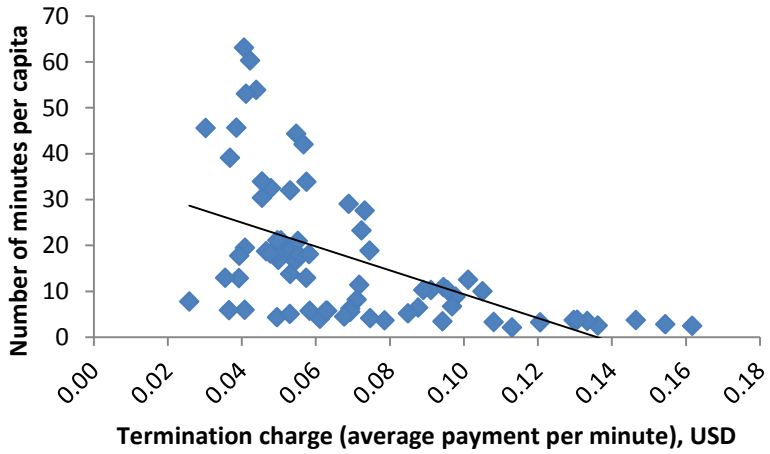
Source: OECD elaboration using FCC data.

Table 2 displays mere correlations, it is advisable to run a regression analysis in order to find the elasticity of traffic reduction when the average termination rate increases. In the final section, an initial regression analysis is carried out in one region of the world where the policy of increasing international termination rates has become most prevalent on a regional basis (Africa).

As a first step, it is useful to explore the above correlations graphically. In general when taking into account all regions of the world, there exists an inverse relationship between the average payment per minute (i.e. a proxy for international termination rates) and traffic (Figure 8). That is, as the termination charges increase, the amount of international incoming traffic from the United States to these countries

decreases (taking into account the relative size of these countries by dividing the number of minutes by population).

Figure 8: Number of minutes per capita *versus* termination charges (i.e. average payment per minute United States carriers to foreign carriers), FCC data by regions for the years 2003-2011



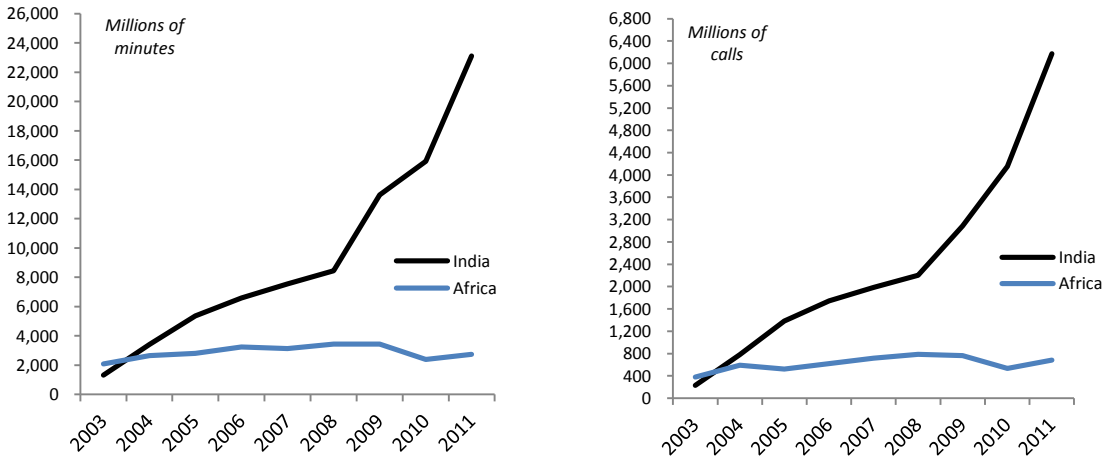
Note: Once correcting the traffic by the relative size of the population, the Caribbean is not included in the graph given that they are outliers in the region-sample given their extremely low population.

Source: OECD elaboration using FCC data

India and Africa

Africa and India are two developing regions of the world that have taken very distinct paths with regards to international traffic termination. On the one hand, many countries in Africa have in recent years introduced a tax on international incoming calls, and on the other hand India has constantly been dropping its rates since 2003. The traffic growth in India has been exponential (both measured by number of calls or number of incoming minutes), whereas in Africa, traffic has been stagnant or has decreased around the period of time that such a policy was introduced, that is, 2007-2010 (Figure 9).

Figure 9: Number of outgoing minutes and calls (messages) – from United States carriers to regions



Source: OECD elaboration using FCC data

The average termination rate in Africa has been constantly growing while India's termination rate has displayed a rapidly decreasing downward trend (Figure 10.1). For India, during the period 2003-2005 termination rates have decreased the most, and during this same period of time the total revenue received from foreign carriers in India has peaked. On the contrary, for Africa during the period 2008-2010 termination rates have increased the most, and for the same period of time, the total revenues of received from United States carriers by African countries has decreased.

It is noteworthy that although the termination rate in India has sharply decreased over the period (Figure 10.1), the total payments received in India by United States carriers is not that much different than that of Africa (Figure 10.2). In other words India has benefited from the increase in social welfare associated with the increase in traffic and the increased volume has at least in part compensated for lower rates.

Figure 10.1: Average termination charge for outgoing traffic, United States to regions

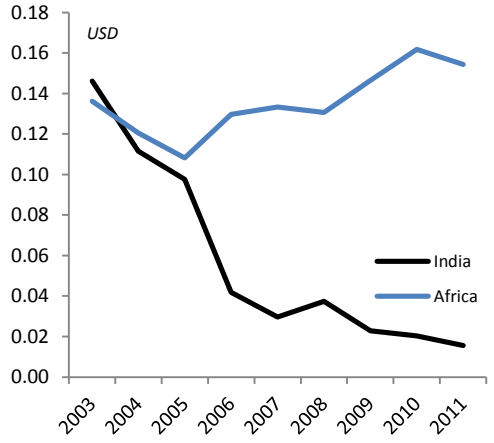
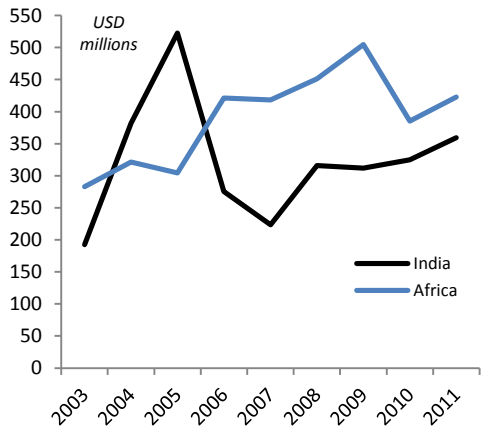


Figure 10.2: Total Payment to foreign carriers, United States to regions



Source: OECD elaboration using FCC data

The above observations that link traffic to the total retained revenues of foreign carriers in these two developing regions suggest that outgoing traffic from the United States to these regions is highly sensitive to termination rates. It even suggests that a policy seeking to expand fiscal revenues by increasing rates for international calls could even lower the revenue of carriers if the decrease in the volume of traffic is sharp enough. These stylized remarks call for the need of estimating proper regression analysis in order to properly grasp the magnitude of the sensitivity of traffic to an increase of international termination rates. Unfortunately, however, policy makers are taking decisions without ready access to such data if it exists at all.

Africa: A closer look

This final section uses a sample of African countries to explore the effects of policies mandating high international traffic termination rates with the aim of having a controlled sample of countries with similar characteristics. To provide a clearer indication of trends in Africa regarding international traffic termination, it is possible to group countries in specific groups and compare outcomes (see Figure 6 of the previous section). The empirical analysis undertaken in this section relies on classifying one group as the set of African countries for which media reported the introduction of international incoming traffic surcharges, and the other group as the rest of the countries in the region.

It is to be expected that an increase in international traffic termination rates would be followed by a decrease in traffic, since economic theory tells us that generally the increase of the price of a good results in a reduction of quantity consumed. In this case, the good is international calls from the United States to foreign countries. As the payment received per mobile user in Africa and the amount of incoming international traffic are so closely related (i.e. correlation coefficient of 0.85), an increment in the international traffic termination rate would as expected be translated into less traffic. Table 3 displays selected countries that have introduced a surcharge on international termination, and Table 4 the reduction in international traffic that certain countries have experienced after the introduction of these surcharges.

Table 3: Percentage increase of international termination rate, selected African countries

Country	"Termination Rate" Before / After policy		Date of comparison	% Increase
Guinea	USD 0.16	USD 0.34	Q12009-Q12010	116%
Chad	USD 0.12	USD 0.19	Q12009-Q12010	67%
Gabon	USD 0.13	USD 0.29	Q42010-Q42011	130%
Ghana*	USD 0.11-0.13	USD 0.19	June 2010	46-73%
Rwanda*	USD 0.09	USD 0.22	Q3 2012	144%
Tanzania*		USD 0.25	Q4 2012	126%**
Pakistan*	USD 0.02	USD 0.088	October 2012	340%

Note: (**) International retail tariffs increase from the end of 2012 to June 2013.
Source: OECD elaboration using data provided by a major transit provider; (*) from other sources: Ghana from GSMA report 2011, Rwanda from RURA data[33], Tanzania data from TCRA.[34] Pakistan data from (USTR, 2013) and PTA.

Table 4: Traffic reduction as a consequence of surcharge on international termination, selected countries

Country	Date the policy was introduced	Traffic reduction (%) following policy
El Salvador	2008 (USD 0.04 tax)	-53% (2008-2011)
Ghana	2010 (rate increase 46-73%)	-48% (2009-2011)
Rwanda	Q3 2012 (rate increase 144%)	-30% (Q32012-Q22013)
Tanzania	Q4 2012 (increase in retail rates 126% from Q2 2012-Q2 2013)	-26% (Q2 2012- Q2 2013)
Pakistan	October 2012	-26% (2012-2013)

Source: OECD elaboration using data from other sources: El Salvador (USTR, 2013), Ghana (USTR, 2013) and FCC data, Rwanda from RURA data, Tanzania from Tanzania Communications Regulatory Authority (TCRA); Pakistan data from (USTR, 2013) and PTA data.

In addition, Box 6 contains information for two examples from countries where the surcharge in international termination was introduced: Tanzania and Rwanda. It is clear that after the introduction of the surcharge in 2012, international traffic declined in both of these economies.

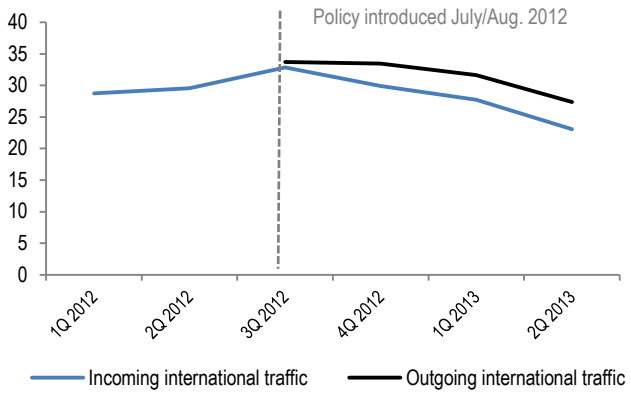
Box 6: Traffic reduction, the case of Tanzania and Rwanda

Rwanda

RURA, the Rwandan telecommunication regulator, introduced a standard termination charge of USD 0.22 per minute up from USD 0.9 in the third quarter of 2012, representing an increase in the international termination rate of 144%. The first part of the market to be affected was international incoming traffic, as can be observed in Figure 11.1 where incoming international traffic in Rwanda decreased 30% from 2012 to 2013. Subsequently, as observed elsewhere, outgoing traffic tends to decrease as other countries adjust their termination rates, which leads to an increase in retail rates for consumers calling abroad.

This experience was mirrored in Rwanda (Figure 11.1). For example, Uganda, Burundi and Tanzania followed suit (e.g. Uganda and Burundi have increased their rates to USD 0.35). Tanzania increased the termination surcharge at the end of 2012. Thus, the price to call Uganda has doubled (from RWF 60 to RWF 120), and it is almost six times more expensive to call Burundi (from RWF 60 to RWF 350).[35] This means it has become more expensive to call Burundi, which is part of the East African Community (EAC), than calling India from Rwanda.

Figure 11.1. Rwanda: Traffic to/from international, in millions of minutes, Q1 2012-Q2 2013

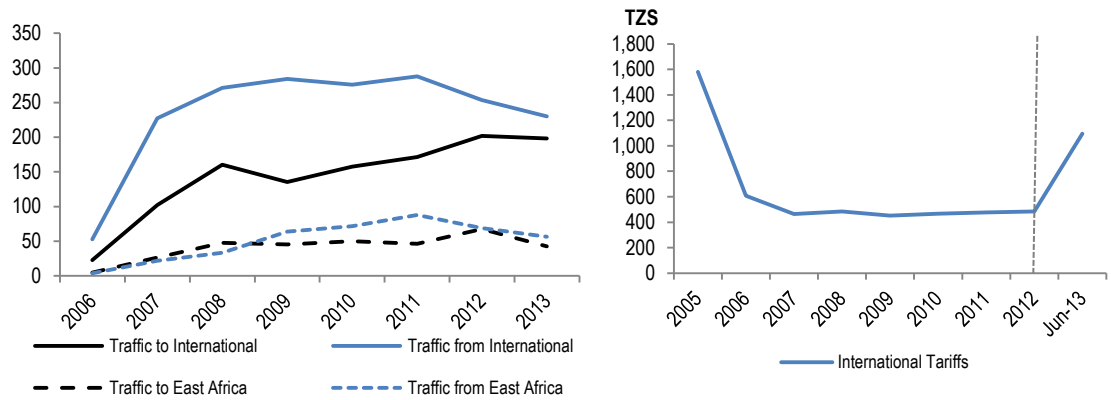


Source: OECD based on data from Rwanda Utilities Regulatory Agency (RURA).

Tanzania

In the last quarter of 2012, Tanzania introduced a surcharge of USD 0.25 per minute on all international incoming traffic, and as a result international retail tariffs increased 126% from June 2012 to June 2013 (Figure 11.2), and the yearly weighted prepaid international tariff increase was 55% in 2012-2013 (from TZS 485 to TZS 752).[36] Subsequently, international incoming traffic was reduced by 26% when comparing data from June 2012 and June 2013 (i.e. 58 million minutes in Q2 2012 in comparison to 42 million minutes in Q2 2013).[37]

Figure 11.2: Tanzania: Traffic to/from International in millions of minutes, 2006-2013* (left), and Pre-paid Tariff for Voice, in local currency, VAT excl., 2005- 2013 (right)



Note: (*) 2013 international traffic is the cumulative traffic until Q4 2013. Legend: Blue line in graphs shows the date the policy of SIIT was introduced in Tanzania (Q4 2012).
Source: OECD based on data from Tanzania Communications Regulatory Authority (TCRA)

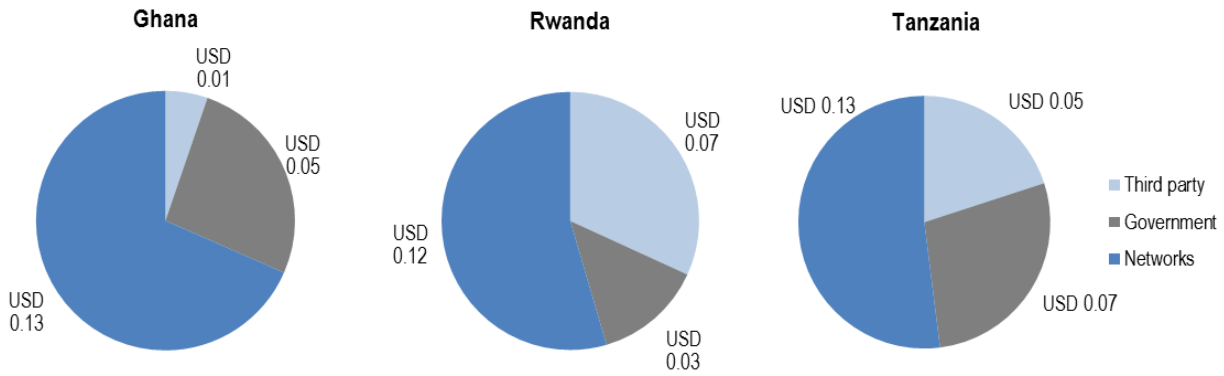
Box 6: Traffic reduction, the case of Tanzania and Rwanda (cont'd)

The division of revenue

In countries adopting standard termination rates the revenue received from all incoming calls is generally divided among several parties. These can include network operators, government authorities (e.g. fiscal bodies or communication regulators) as well as third parties (e.g. international gateway or fraud management companies). For example, in the case of Tanzania, out of the USD 0.25 standard termination charge, 28% will be remitted to the Treasury, 52% to mobile operators, and 20% to the third party managing the "Telecommunications Traffic Monitoring System (TTMS)" (Figure 11.3).[38]

The EAC report of November 2013 states the following: "*EAC Member States of Burundi, Rwanda, Tanzania and Uganda have installed a monitoring tool referred to as International Gateway Traffic Verification System to monitor all incoming international traffic. […] These countries have also introduced an additional tax to incoming traffic called Surcharge on International Inbound Call Termination ("SIIT"). The tax is prescribed by the regulator and applied by the operator. New levy informed by governments' concern that Telecommunication companies are under-reporting international calls-thus denying governments' revenue. Revenue collected is shared between Operators and National Treasuries for the System management and maintenance Charges.*"

Figure11.3: Share of revenue from standard termination among government, networks, and third party (i.e. international gateway companies): Ghana (USD 0.19), Rwanda (USD 0.22), and Tanzania (USD 0.25)



The result on revenues received in these countries, would then depend on which effect dominates: the positive effect of a price increase (i.e. given the increase on termination rate), or the negative effect of the reduction of traffic. In this sense, the sensitivity to traffic and the final effect on revenues may depend on the elasticity of demand which may vary on a per country basis, or on a subset of countries.

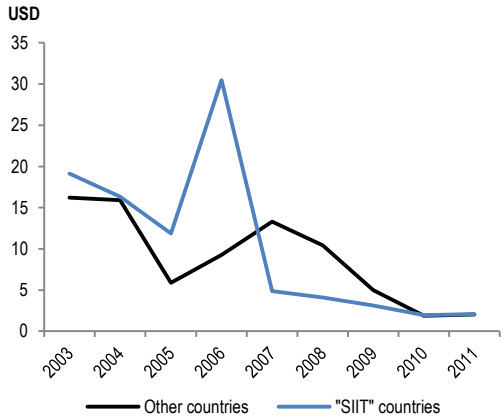
Data from the ITU, the World Bank and the FCC was combined to create a panel of the world's countries for the years 2003-2011. There was a particular focus in examining the effects of increasing termination rates in Africa, given that it represents a controlled sample of countries in this region that have or have not imposed SIIT. Often, introducing such policies is done with the aim of increasing revenues. To recall, an intuitive relationship shown in the previous section (Table 2), showed that:

- a positive relationship between payments (i.e. revenue) received and traffic existed in the whole dataset, and
- traffic and termination rates had a negative relationship.

Overall, the correlogram seemed to point out that there is a negative relationship between payments received by foreign carriers and termination rates. However, it is best to see what is happening in the particular region of the world where the increase of international termination rates has been most noticeable.

The available data below (Figure 12) appears to indicate that after the sub-group of African countries started to introduce these policies of SIIT (around the year 2007, see Figure 6 in section above) the average revenue received per access path in these regions sharply declined in that year, reaching almost the same level of the other group of African countries (labelled "other countries" in Figure 12 below) in the year 2011. Therefore, when looking at revenue weighted per access paths in these subgroups, the countries that abstained from introducing these policies seem to be as well off in terms of total payments. However, to try to account more rigorously for these apparent relationships in the time series, a preliminary panel regression analysis was conducted for African countries to see whether these relationships hold (see Annex 2).

Figure 12: Average revenue per access path, by subset of African countries



Source: OECD elaboration using FCC data and ITU subscription data.

While conducting the initial regression analysis, taking into account the whole sample of African countries, on the one hand, it can be observed that for every 1% increase of minutes used per subscriber, the payment by United States carriers to African countries (weighted by user base) increases by 0.82%. On the other hand, an increase of the termination rate by 1% decreases the minutes consumed by users in the magnitude of 0.75% (See Table A.2.1 in Annex 2).

When dividing the sample between two categories depending on whether the countries introduced the policy or not ("SIIT" countries and "other" African countries), African countries that introduced a termination surcharge seem much more sensitive to the reduction in minutes per subscriber due to the increase in termination rates (e.g. elasticity higher than one, namely equal to -1.334). For example, for African countries that introduced a surcharge, the increase of 1% on termination rates decreases the minutes per access path by 1.34%, whereas the other group of African countries the same elasticity is -0.42 (i.e. a 1% increase in termination rates reduces traffic per access by 0.42%). The difference in elasticities may be explained by the higher level of the rates that one group exposes (i.e. those that introduced the policy) in relation to the alternative sub-group.

As noted before, the payment received by countries per subscriber depends on the amount of incoming traffic (which at the same time is affected by the rates to terminate calls). To quantify this, and increase in traffic per access for African countries that introduced SIIT by 1% increases the payment per access in 0.78% (whereas the same elasticity for a "other" African countries is 0.88).

In order to illustrate these results, it is useful to use an example of a country which introduced this policy. For example, consider a country like Guinea that increased its termination rates by 116% between the years 2009-2010 (refer to Table 3 above). Guinea would have suffered a reduction in minutes per access of 155%, and thus a reduction in revenue per access path of 120% (given the above elasticities).

Thus, the initial panel regression results for African countries that implemented these policies indicate that the increase of termination rates (imposing SIIT) does not necessarily increase revenues that United States carriers pay-out to these countries (once weighted by the size of their telecom market, that is, the number of access paths).

Although the above results tend to point out that a country in Africa that introduces such a policy would experience a reduction in traffic that outweighs the benefits of an increased termination price, one should be cautious while interpreting these results because of potential endogeneity concerns. A deeper analysis would be needed for more accurate results and could be conducted in future work.

Additionally, one of the caveats of the above empirical approach is that in the general panel regression the sensitivity to traffic on a per country basis cannot be observed, and thus the potential effects of the measure at a national level are not assessed. It would be worthwhile to further explore in future work the effect of such measures on fiscal revenues on a per country basis.

Introducing international termination surcharges: Policy balance sheet

Measurement caveats noted, the initial empirical results suggest policies seeking to raise payments received from foreign carriers may leave countries at best with the same level of revenues or indeed cause a slight reduction in revenues per access path. However, even if revenues remain unchanged, what is evident is that incoming traffic to these countries is decreasing significantly and much more than in those that have not imposed such measures. Thus, regardless of the effects on payments, other spill over effects to the rest of the economy given a reduction of international traffic should also be considered.

An increase in international telecommunication traffic in developing regions may have other positive effects on the economic opportunities in terms of improving trade, developing service industries locally, or in an overall improvement of the regions' competitiveness. For example, increasing the cost of international incoming traffic can reduce the global competitiveness for countries in the developing world as it reduces trade opportunities and the openness of the country.

The Global Competitiveness Report 2013-2014 noted twelve pillars that policy makers should embrace in order to foster growth in a country (World Economic Forum, 2013). In that respect, the second pillar considered is infrastructure and the 10th pillar market size (e.g. openness to international trade). With regards to infrastructure, the report states that:

> "…a solid extensive telecommunications network allows for a rapid and free flow of information, which increases overall economic efficiency."

When referring to the benefits from globalising value chains by raising competitiveness, the report pointed out that:

> "…specific feature of value-added trade is its strong link with services trade. Transactional services -- such as logistics to transport the good to destination or telecommunications to stay in touch and obtain information -- must be available for a country to enter and move up the value chain."[39]

In this sense, it is useful to look at the rankings of the Global Competitiveness Index 2013-2014 for those African countries that imposed the International Inbound Traffic surcharge and compare them to

countries in Africa that refrained from imposing this measure. The average ranking in 2013 of African countries that introduced international termination surcharges was 130/148, where Chad and Guinea were the final two countries in the ranking. On the other hand, for the group comprised of the rest of African countries, this group exhibited an average ranking of 112/148.[40]

It is also useful to compare the performance of these countries around the time they imposed such measures and see any subsequent changes in rankings. Notably, African countries that have introduced the surcharge have not improved in this ranking (see Table 5).

Table 5: Global Competitiveness Index (GCI) 2007 and 2013, ranking of selected African countries that have introduced SIIT

Country	GCI Ranking by year (*percentile*)	
	2007-2008	*2013-2014*
Chad	131/131 (100%)	148/148 (100%)
Benin	108/131 (82%)	130/148 (88%)
The Gambia	102/131 (78%)	116/148 (78%)
Senegal	100/131 (76%)	113/148 (76%)

Note: GCI Index ranks 1 the country that is most competitive and 131 the country that was least competitive in 2007, and 148 the least competitive country in 2013.
Source: The Global Competitiveness Report 2013-2014, World Economic Forum 2013[41]

A further measure that is worthwhile taking into account is how these economies are doing with regards to the "cost of doing business". African countries that introduced the surcharge on average ranked 170 out of 185 countries with regards to the World Bank's survey of "Ease of Doing Business 2013", whereas the alternative subgroup of African countries displayed an average ranking of 126. In particular, three of the thirteen economies that introduced the surcharge, that is Congo, Chad and Central African Republic, occupied the three final places of this ranking (e.g. 183-185, respectively).

In comparing the performance of Africa to other developing regions the question can be asked as to whether countries are missing an opportunity to enhance their services industry. In recent years, India is a country that has shown outstanding growth in its international services industry. Like Africa it has tremendously expanded its telephone penetration through mobile networks and competitive markets. Like Africa, it has developed multiple undersea fibre optic cables to bridge international markets. Unlike many countries in Africa, however, it has created the market conditions for an on-going decline in the cost of international telecommunication traffic. This is reflected by India starting 2003 with lower levels of traffic received from the United States than Africa, alongside much higher termination rates, to a transformation over the last decade that has produced a burgeoning incoming call market.

The increasing surge of traffic from the United States to India is undoubtedly a combination of economic and social factors. Users, be they business or consumers, have a myriad of service providers that offer flat rate or low cost plans with unlimited calls. Many of these services, such as Vonage, connect via a broadband line in the United States and terminate on the PSTNs in India (i.e. both fixed and mobile).[42] This means that small business and consumers have some of the advantages generally only provided to larger businesses via leased lines. All are outcomes of the competitive and seamless integration of domestic and international telecommunication markets that provide the platforms for economic opportunities in services markets. A good example, from India's economic growth in services over the past decade, has been the development of the IT-Business Process Management (BPM) sector. BPM involves the outsourcing of functions to helpdesks or call centres, of simple tasks such as accounting, bookkeeping, and customer service, among others.

Several studies have pointed out the influence of the IT sector on India's economic growth and employment, and in particular, the importance of BPMs to India's development. From a negligible share of this market, prior to telecommunication liberalisation, the country is now said to handle 56% of the world's business process management/outsourcing.[43]

In 2009, according to the National Association of Software and Services Companies (NASSCOM), the IT-BPM industry in India accounted for nearly 9% of national GDP and created direct employment of 2.2 million (with indirect employment of eight million). In addition, the GDP per capita contribution of IT-BPM employees was over 80 times that of agriculture employees in that same year.[44] Meanwhile, in 2009, the Reserve Bank of India pointed out that 23% of export earnings came from ITES-BPM firms (RBI, 2009).[45]

One of the key enablers for the development of the IT sector in India has been the liberalisation of telecommunication markets. The rapid decrease of international termination reflects liberalisation and, therefore, lower termination rates can be identified as one of the enablers (together with other factors, such as human capital) for the rapid growth of the service industry in this country.

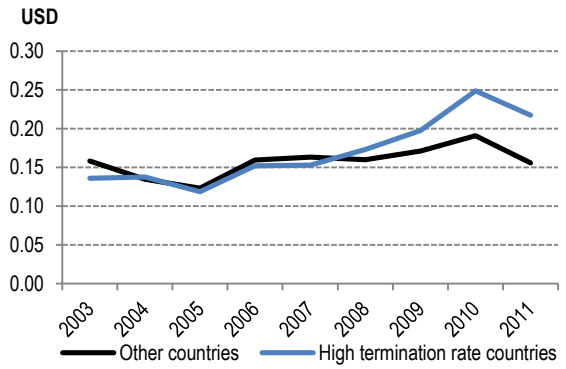
ANNEX 1. AFRICA CLOSE-UP

A. Using FCC international traffic data combined and ITU subscription data for the period 2003-2011, all African countries

As a first step, to provide a clearer indication of trends in Africa regarding international traffic termination, it is possible to classify countries in specific groups and compare outcomes. From the FCC data, one group can be identified as those that have CAGR increases in average payments per minute above 10%, in the period from 2003 to 2011. A second group can be those that had smaller increases, decreases or received payments per minute from United States carriers that were broadly unchanged. This approach assisted here by providing additional information when examined against official and media reports on changes in policy and regulation around international traffic.

In Africa, for example, the group with higher termination charges experienced a 60% rise in these charges from 2003 to 2011while the second group's charges increased in recent years but were broadly the same in 2011 as in 2003 (i.e. a slight total reduction of 2%) (Figure A.1.1 below). Both groups indicate a general trend towards increased termination charges from around 2007 onwards and a decrease for the most recent year (2011).

Figure A.1.1: Average payment per minute (proxy for termination charges), United States carriers to selected African countries



Note: The categorization of subset of African countries that seemed to have introduced a SIIT in this graph (which later helped to actually pin down the countries that introduced this policy) was based on high CAGR for increased payments per minute for the period 2007-2009, with the addition of Ghana, Libya, Central Africa Republic, Comoros and Reunion, which exhibited a CAGR of more than 10% for the period 2003-2011. Additionally, some countries such as Tanzania and Seychelles were added as they exhibited high growth rates in the period 2009-2013 using data on wholesale termination of a major transit provider. A list of countries is available below.
Source: OECD elaboration using FCC data

The list of the subset of African countries from the FCC data that exhibited high growth rates of termination charges is the following: Algeria, Benin, Burundi, Central African Republic, Chad, Comoros, Congo, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Libya, Madagascar, Mauritania, Mayotte, Niger, Rwanda, Senegal, Seychelles, Sierra Leone, Tanzania, Togo , Tunisia, and Zimbabwe.

For Figure 6 (Section "Increased international charges"), FCC data for the period 2003-2011 was used. In this case the set of African countries that introduced SIIT included only those countries, via desktop searches, being identified as having introduced a policy that raised international termination.

Table A.1.1: Annual traffic growth rate 2007-2011 for African countries, "SIIT" and "other" countries

CAGR of Traffic for African countries, 2007- 2011		
	Calls per mobile user	Minutes per mobile user
"SIIT" countries	-27%	-29%
"Other" countries	-19%	-20%

Note: "SIIT" countries based on news of increasing termination rates: Benin, Central African Republic, Chad, Congo, Cote d'Ivoire, Djibouti, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Senegal, Sierra Leone, Togo, and Zimbabwe. This is the sub sample of countries used in the regression analysis in Annex 2.

B. Major transit provider data for 2009-2013, African countries

For the data made available by a major transit provider – as the time series data came from first quarter of 2009 to 2nd quarter of 2013 – the countries that seemed to have introduced SIIT were selected according to those that had exhibited a CAGR above 10% and had a level of termination rate above USD 0.20. The list of these countries is the following: Algeria, Burundi, Chad, Congo, Gabon, Guinea, Liberia, Madagascar, Mauritania, Mayotte, Rwanda, Seychelles, Tanzania, and Tunisia.

C. Major Transit provider data combined with FCC data for 2009-2011, African countries

While combining data from a major transit provider to the FCC's data for African countries (years 2009-2011), it can be observed that the calculated average out-payment cost per minute of the FCC data is similar to the wholesale termination rate of the transit provider. The correlation matrix among the termination rate of the major transit provider and the proxy for international termination rates calculated by the FCC data (average payment per minute) is the following:

Table A.1.2: Correlation Matrix: Termination rate and average payment per minute (i.e. termination rate FCC)

	Transit rate	**Termination rate FCC**
Transit rate	1	
Termination rate FCC	0.7786	1

Using the transit provider data combined with the FCC's data for the years 2009-2011 (see Table A.1.3 below), a test can be conducted for the difference of means, among the two samples (i.e. "SIIT" and "other" countries). The results below (Table A.1.4 and Table A.1.5) show that the mean of the average payment per minute is significantly higher for African countries that introduced SIIT than for other countries (based on media reports and official statements). Additionally, the mean of the average call length is lower in African countries that introduced SIIT than in "other" African countries. These two results are derived from comparing a t-test for the difference of means between two samples at a 5% significance level.

Table A.1.3: FCC data combined with major transit provider data, African countries sub-groups, 2009-2011

Country group	Year	FCC payment per minute USD	Transit price USD	ARPM USD	Length of call	Mobile Penetration in %	Calls per user	Payment per user USD
SIIT countries								
	2009	0.23	0.26	0.22	3.53	46.65	3.43	3.29
	2010	0.27	0.25	0.27	3.53	57.17	1.77	2.03
	2011	0.24	0.27	0.27	3.51	64.68	2.19	2.18
	Three-year average	0.25	0.26	0.25	3.52	56.16	2.47	2.50
Others								
	2009	0.18	0.22	0.22	4.17	50.29	5.29	5.88
	2010	0.21	0.20	0.23	4.03	60.62	2.03	2.11
	2011	0.17	0.21	0.19	3.87	68.32	2.38	2.27
	Three-year average	0.19	0.21	0.22	4.03	59.76	3.21	3.39

Note: "SIIT" countries based on news of increasing termination rates: Benin, Central African Republic, Chad, Congo, Cote d'Ivoire, Djibouti, Gabon, The Gambia, Guinea, Guinea-Bissau, Senegal, Sierra Leone, Togo, and Zimbabwe.

Source: OECD elaboration using FCC data and major transit provider data, 2009-2011.

Table A.1.4: T-test of difference of means among two samples with unequal variance: Average payment per minute (proxy for termination rate)

Group	*Observations*	*Mean*	*Std. Error*	*Std. Dev.*	*[95% conf. Interval]*
Others (0)	113	USD 0.19	0.02	0.16	[0.1568, 0.2174]
SIIT countries(1)	42	USD 0.25	0.01	0.07	[0.2264, 0.2710]
Difference		-0.061	0.0189	-0.099	-0.0243877
diff = mean(0) - mean(1)					**t= -3.2692**
Ho: diff = 0		Satterthwaite's degrees of freedom = 148.65			
	Ha: diff < 0	Ha: diff != 0		Ha: diff > 0	
	Pr(T < t) =0.0007	Pr(|T| > |t|) =0.0013		Pr(T > t) =0.9993	

Table A.1.5: T-Test of difference of means among two samples with unequal variance: Average length of call

Group	*Observations*	*Mean*	*Std. Error*	*Std. Dev.*	*[95% conf. Interval]*
Others (0)	113	4.03 min.	0.13	1.39	[3.767, 4.2834]
SIIT countries (1)	42	3.52 min.	0.11	0.70	[3.3043, 3.7412]
Difference		0.502	0.169	0.167	0.8372
diff = mean(0) - mean(1)					**t = 2.9655**
Ho: diff = 0		Satterthwaite's degrees of freedom = 139.131			
	Ha: diff < 0	Ha: diff != 0		Ha: diff > 0	
	Pr(T < t) = 0.9982	Pr(|T| > |t|) = 0.0036		Pr(T > t) = 0.0018	

Note: "SIIT" countries based on news of increasing termination rates: Benin, Central African Republic, Chad, Congo, Cote d'Ivoire, Djibouti, Gabon, The Gambia, Guinea, Guinea-Bissau, Senegal, Sierra Leone, Togo, and Zimbabwe.

Source: OECD elaboration using FCC data and major transit provider data, 2009-2011.

ANNEX 2. REGRESSION ANALYSIS FOR AFRICA, FCC DATA COMBINED WITH WORLD BANK DATA AND ITU DATA, YEARS 2003-2011

$$Traffic_{it} = \alpha_{it} + \beta_1 Term_rate_{it} + \beta_2 Controls_{it} + e_{it} \quad (1)$$
$$Payment_{per} access\ path_{it} = \alpha_{it} + \gamma_1 Traffic_{it} + \gamma_2 Controls_{it} + \varepsilon_{it} \quad (2)$$

Table A.2.1: Fixed effect regression for the whole set of African countries, "I" indicating regression of Traffic *v.s.* Termination rates, and "II" indicating Payment per access *v.s.* Traffic (all variables in logs)

I. All African countries	Minutes per access path	II. All African countries	Payment per access path
Proxy termination rate	-0.751***	Minutes per access path	0.820***
	(-7.65)		(34.78)
GDP per capita	-2.323***	GDP per capita	-0.192*
	(-19.92)		(-2.36)
Exports	-0.423*	Exports	-0.223*
	(-2.19)		(-2.36)
Country fixed effect constant	18.65***	Country fixed effect constant	0.543
	(17.70)		(0.78)
N	426	*N*	426

t statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2.2: Fixed effect regression for the sub-set of African countries, Traffic *v.s.* Termination rates, "1" indicating regression for "SIIT" African countries and "0" indicating "Other" African countries (all variables in logs)

	(1) Minutes per access path		(0) Minutes per access path
Proxy termination rate	-1.334***	Proxy termination rate	-0.421***
	(-6.05)		(-3.87)
GDP per capita	-2.121***	GDP per capita	-2.298***
	(-5.34)		(-20.44)
Exports	0.390	Exports	-0.684***
	(0.71)		(-3.56)
Country fixed effect constant	13.08***	Country fixed effect constant	20.15***
	(4.12)		(19.34)
N	106	*N*	320

t statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table A.2.3: Fixed effect regression for the sub-set of African countries, Payment per access *v.s.* Traffic, "1" indicating "SIIT" African countries and "0"indicating "Other" African countries (all variables in logs)

	(1) Payment per access path		(0) Payment per access path
Minutes per access path	0.783***	Minutes per access path	0.880***
	(21.86)		(28.29)
GDP per capita	0.198	GDP per capita	-0.141
	(1.08)		(-1.49)
Exports Exports		Exports	-0.113
	(-1.95)		(-1.08)
Country fixed effect constant	-1.033	Country fixed effect constant	-0.393
	(-0.74)		(-0.46)
N	106	*N*	320

t statistics in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

NOTES

1 Total revenues were approximately USD 95 billion. This only accounts for international phone minutes handled by telecom operators. See "The Bell tolls for Telco's, Telegeography", 13 February 2013, www.telegeography.com/press/press-releases/2013/02/13/the-bell-tolls-for-telcos/.

2 Telegeography estimates that in 2012 Skype to Skype voice and video conversations amounted to 161 Billion minutes. Other applications have also become popular; Viber, a company from Israel, has 200 million global users and focuses on smartphone VoIP conversations. Google Hangouts, Apple Facetime, Nimbuzz, Weibo WeChat, Facebook Messenger and KaoKao Talk are also established market shares.

3 The rules governing these arrangements are set out in the D-series Recommendations of the ITU-T, which are administered by ITU-member countries in Study Group 3. The D-series Recommendations cover general tariff principles for charging and accounting in (amongst others) international public telegram services, international videotext service and international telephone service. Recommendation D.150 "New system for accounting in international telephony" was last revised in 1999 and covers international telephony. Recommendation D.150 in force today and still used in some arrangements, though it has in large part been superseded.

4 Under ITU-rules three other arrangements were also possible and were used in various parts of the world:

- "Flat-Rate Price Method": Here the terminating network receives a payment based on the number of circuits used. Though it was used between only a few networks, it became the dominant way of paying for transit services to a third network that carried the traffic between the two countries, when competition for transit became possible in the seventies.

- "Traffic-Unit Price Method": This system compensated the terminating network per unit of traffic and takes into account the facilities used and the length of the international circuit. This method was used in Europe and the Mediterranean Basin on the basis of the standard rates established by the TEUREM Group.

- "Sender Keeps All Method" or "no accounting procedure" (OECD, 1994): This was used when there was minimal or no imbalance in the traffic exchanged between terminal points and the corresponding carriers agreed no accounting was necessary. It was used between Southern African Development Council countries (i.e.) Botswana, Malawi, Mozambique, South Africa, Zambia and Zimbabwe). It was also used between countries of the former Soviet-Union, between Ireland and the United Kingdom and between Malaysia and Singapore (Stern and Kelly, 1997).

- Other procedures were used between the countries of the Commonwealth Telecom Organization, were either arrangements based on shared revenues (the Wayleave Schemes) or shared costs (Commonwealth Telecommunications Financial Arrangements) with the purpose of promoting the use and development of the world-wide Commonwealth network among nearly 30 countries of the Commonwealth (Stern and Kelly, 1997). Between the United States and Mexico, settlements were based on the distance from the United States-Mexico border.

5 In 1986 the FCC issued the International Settlements Policy, to prevent non-United States international operators from playing the operators against each other, by requiring uniform settlement rates and proportional return of traffic.

6 In 2008 the OECD examined the issue of Network Externality Premiums and International Telecommunication Traffic Exchange (OECD, 2009) and on Mobile Termination Rates (OECD, 2012).

7 In this case the operators assumed that low actual income from termination does not offset the costs of personnel and systems for rating and measuring voice minutes, calculating balances of termination rates and sometimes transit costs, that peering, zero rating or Sender Keeps All is more cost effective. See "Voice Peering: Interworking SIP and BGP", presentation by Matt Christopher – Principal Engineer, VoIP Architecture Integration, Comcast at Nanog 48, 23 February 2010.

8 The term unlimited is not completely correct as there is a fair use policy, which often limits the number of telephone numbers that can be called. Such restrictions are put in place to make the offers less attractive for use in SIM-boxes. For instance in France, the unlimited calls include only fixed numbers, which are less expensive than mobile calls.

9 See USTR Report 2013. www.ustr.gov/sites/default/files/04032013%202013%20SECTION%201377%20Review.pdf.

10 See the price comparison of mobile baskets for African countries in the following link: www.researchictafrica.net/prices/Fair_Mobile_PrePaid.php?t=a&u=u. Also an interesting report is Stork *et al* (2010), "Measuring Competitive Pressure in Mobile Telecommunication Sectors Using OECD Price Benchmarking Baskets", Research ICT Africa.

11 www.researchictafrica.net/prices/Fair_Mobile_PrePaid.php?t=&u=.

12 www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR11/documents/BBreports_Taxation_E.pdf.

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15 BR Research, "What's up, ICH?" 3 February 2014. www.brecorder.com/br-research/999:all/4093:whats-up-ich/?date=2014-02-03.

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18 See www.thenews.com.pk/Todays-News-3-234092-Responsibility-shifting-between-IT-ministry-PTA

19 Searches on the Internet return many news items on raids on SIM-boxes/illegal international gateways. A search on "GSM Gateway, raid, arrests" returns a sizeable list of results.

20 FCC, Petitions for Protection from Whipsawing on the UUS-Philippines Route IB Docket No. 03-38, 10 February 2003. http://apps.fcc.gov/ecfs/document/view;jsessionid=QhpHSl2HyDpNhWn1MbLQ1XVmc47JnNyPQ7JvlTnLscGf4GcYLG9p!-1613185479!153728702?id=6513484217.

21 In 2009 the OECD examined the issue of Network Externality Premiums and International Telecommunication Traffic Exchange (OECD, 2009). This paper looked into the economic impact of proposals to add a non-cost "premium" to international telecommunication charges and concluded that attempts to use non-

market methods, and distort prices, is likely to have negative implications for the provision of international telecommunication services. Thus, competition is acting to more efficiently to meet policy goals.

22 The EAC region is comprised of Burundi, Kenya, Rwanda, Tanzania and Uganda. See EAC (2013), "Report of the Committee on Communications, Trade and Investments on the on-spot assessment of regional cooperation in ICT," November 2013. The EAC states the following: "*The EAC Council of Ministers should urge Partner States to removal of the Surtax International Inbound Termination (SIIT) as it has a negative impact on trade in the region including high tariffs on international calls and roaming rates.*" http://eala.org/key-documents/reports/doc_details/437-on-spot-assessment-of-regional-cooperation-in-ict.html.

23 www.wto.org/english/tratop_e/serv_e/telecom_e/telecom_e.htm.

24 See World Trade Organization, (2004), "Mexico – Measures Affecting Telecommunications Services, Report of the Panel", WT/DS204/R, 2 August 2004. Paragraph 7.262 of the panel report, contained the in the Findings of the Panel:

"*We find the United States argument convincing that the removal of price competition by the Mexican authorities, combined with the setting of the uniform price by the major supplier, has effects tantamount to those of a price-fixing cartel. We have previously found that horizontal practices such as price-fixing among competitors are "anti-competitive practices" under Section 1 of Mexico's Reference Paper. We have also found that a GATS obligation "of preventing suppliers … from engaging in or continuing anti-competitive practices" cannot be unilaterally abrogated by a national regulation requiring such an anti-competitive practice within the meaning of Section 1 of Mexico's Reference Paper (see paragraphs 7.243 to 7.245 above). For the same reasons, anti-competitive price fixing by telecommunications suppliers cannot be unilaterally exempted from the scope of Section 1 by a government requirement imposing such price fixing. To find otherwise would enable WTO Members unilaterally to detract from the effectiveness of their Section 1 obligations to maintain competitive safeguards by requiring such anti-competitive practices. We find, therefore, that the uniform settlement rate under the ILD Rules requires practices by a major supplier, Telmex, that are "anti-competitive" within the meaning of Section 1 of Mexico's Reference Paper.*"

See also: Wllenius, B., Galarza, J., Guermazi B., (2005), "Telecommunications and the WTO: the Case of Mexico", World Bank: Global Information and Communications Technology Strategy Unit, World Bank Publishing.

25 www.wto.org/english/tratop_e/serv_e/telecom_e/tel23_e.htm.

26 See USTR Report 2013. www.ustr.gov/sites/default/files/04032013%202013%20SECTION%201377%20Review.pdf.

27 Federal Communications Commission (2013), "DA 13-341 Before the Federal Communications Commission Washington, D.C. 20554, In the matter of Petition for Protection from Anticompetitive Behavior and Stop Settlement Payment Order on the U.S.-Pakistan Route IB Docket No. 12-324, MEMORANDUM OPINION AND ORDER", Adopted: March 5, 2013 Released: March 5, 2013 By the Chief, International Bureau.

28 The legislation was enacted by Ghanaian authorities in December 2009; however, this was enforced in June 2010 (see GSMA report 2011, www.gsma.com/publicpolicy/wp-content/uploads/2012/03/mobiletaxationsurchargesoninternationalincomingtraffic.pdf. See also legislation where they stipulate that the tariff should be USD 0.19 and that 32% of this required interconnection rate should be kept by the Authority: www.nca.org.gh/downloads/regdocs/Ghana_Electronic_Communications_Amendment_Act_Act_786.pdf.

29 www.gsma.com/publicpolicy/wp-content/uploads/2012/03/mobiletaxationsurchargesoninternationalincomingtraffic.pdf.

30 See U2opia website: www.u2opiamobile.com/.

31 www.airtel.in/free-zone/.

32 See OECD (2009), "Network Externality Premiums and International Telecommunication Traffic Exchange", OECD Digital Economy Papers, No. 152, OECD Publishing. doi: 10.1787/222470556326.

33 See www.theeastafrican.co.ke/Rwanda/Business/Rura-raises-roaming-tariffs-by-Rwf132-/-/1433224/1446652/-/la26yvz/-/index.html.

34 See www.tcra.go.tz/images/documents/telecommunication/telecomStatsJune13.pdf.

35 Source: MTN Africa. www.itnewsafrica.com/2013/11/rwanda-mobile-users-want-roaming-rates-scrapped/.

36 For detail on international tariffs, see the Tanzania Communications Regulatory Authority (TCRA) statistics June 2013: www.tcra.go.tz/images/documents/telecommunication/telecomStatsJune13.pdf; and for details on 2013 yearly data see December 2013 TCRA quarterly report www.tcra.go.tz/images/documents/telecommunication/telecomStatsDec13.pdf.

37 See the Tanzania Communications Regulatory Authority (TCRA) international traffic data June 2013: www.tcra.go.tz/images/documents/telecommunication/telecomStatsJune13.pdf, and data for June 2012: www.tcra.go.tz/images/documents/telecommunication/telecomStatsJune12.pdf.

38 http://www.dailynews.co.tz/index.php/local-news/28662-tcra-beams-telecom-revenue.

39 http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2013-14.pdf.

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