Taxing telecommunications/ICT services: an overview

November 2011

Telecommunication Development Bureau

This paper on “Taxing telecommunications/ICT services: an overview” was prepared by Professor Martin Cave from Imperial College Business School, and Dr. Windfred Mfuh, Associate Fellow from Warwick Business School, under the direction of the Telecommunication Development Bureau (BDT). The comments and suggestions made by ITU officials, in particular from the BDT Regulatory and Market Environment Division (RME) and the TSB Study Group 3 were very useful in preparing this document.

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Executive summary

This paper contains a general, introductory discussion of the effects of imposing special taxes on telecommunications equipment and services in addition to the general run of taxes, such as VAT, which apply to most or all goods and services. It does not present new data on tax rates. Its aim instead is to provoke a discussion by members of the ITU and other organisations about the pros and cons of taxing telecommunications/ICT services.

Interest in the subject is derived from two sources in particular – evidence that special taxes have been imposed in several jurisdiction, and evidence that the spread of telecommunications/ICT services – both voice and broadband - may be an important engine of growth in economies of all types, the benefits of which taxes might impede.

After setting out the range of possible tax-like instruments, which include taxes on handsets and services, customs taxes on handsets and telecommunications and equipment, and even excessive spectrum charges and universal service funds not applied to their stated purpose, the paper shows the substantial variation across countries and regions in the proportion accounted for by taxation in the total cost of ownership of a mobile connection.

A standard method of analysing the effects of taxes is to look at: their distributional consequences; their costs of collection, which include the degree of avoidance and evasion to which they are subject; whether the incidence of the tax falls on the purchaser of the taxed service, or whether it is at least partially assimilated by the producer; and the degree to which the tax distorts the pattern of consumption and, for this reason, imposes an additional cost on the economy (sometimes known as the 'excess burden').

Seen from these perspectives, telecommunications taxes will have distributional consequences, but when services are fully diffused, they are difficult to establish, partly because voice calls in particular are normally paid for by the caller but enjoyed by the receiver as well. In the case of telecommunications taxes levied on large national or international operators, collection costs are likely to be low compared with many other taxes. The incidence of the tax on equipment may fall on consumers, but the incidence of service taxes may be shared with operators. And there does not appear to be a conventional reason for generally favouring or disfavouring telecommunications taxes on grounds of an 'excess burden', or because the services are luxury goods or because they have adverse social consequences. The paper also discusses the special case of taxes on incoming international calls, noting that this may lead to 'double taxation' if taxes are levied at both ends.

There is growing evidence that the diffusion of telecommunications/ICT services - both voice services and broadband - has a spill-over effect on economic growth, though there is less agreement about the size of the effect. In these circumstances, a tax which slows down the diffusion of telecommunications/ICT services defers the arrival of these benefits; it may also reduce, rather than increase, tax revenues by causing the economy to grow more slowly. This depends on some key parameters ,the values of which vary from country to country, and about which there is as yet no certainty.

Simplifying a complex set of issues, the paper concludes that the choice of a level of taxes on telecommunications/ICT services is likely to depend on three factors in particular:

- whether the apparently low cost of collection of telecommunications taxes is a strong enough consideration to justify a special tax;
- how much weight is placed on the exceptional macro-economic benefits of the spread of telecommunications/ICT services, as a ground for not taxing them;
- whether there is any other factor which argues for the application of an especially low or an especially high tax rate on telecommunications/ICT services, as against the standard 'default rate.'

1 Introduction

This paper is about the desirability of taxing telecommunications/ICT services, especially in developing countries. It is a subject hotly debated and contested by governments, which often see telecommunications as a one of only a few sectors which are both thriving and served by large, often international, firms from which taxes can fairly readily be collected; and by operators, who argue that, in terms of economic growth, the sector is 'the goose which lays the golden egg', and should not be stunted by taxation. (The fact that the operators' primary motive may be to maximise profits does not invalidate this public policy argument.)

General and special taxes on telecommunications/ICT service are not the only direct or indirect interaction between the finance ministry and telecommunications/ICT operators. In addition, customs taxes on telecommunications equipment or devices have an impact. So do the arrangements for the licensing of spectrum. For example, if the government restricts the supply of spectrum, it raises its price (whether paid at auction or as an annual administered price) and this acts as the equivalent of a tax on a necessary input in telecommunications. If the government imposes a universal service levy and redistributes the proceeds, it is running essentially a sector-specific tax and benefit regime within the telecommunications/ICT sector. If it does not disburse the revenues, or if they support in one way or another different forms of expenditure, the contributions are hard to distinguish from a tax. Finally, in advanced countries constructing new fibre networks particularly, financial flows go in the other direction, from governments to operators – either in public ownership, such as Australia's NBN, or in public/private partnerships. In this paper we consider in one way or another only the flows from the sector to government, not those in the other direction.

The goal of this paper is not to present new data.[5] Its aim instead is to provoke a discussion by members of the ITU and other organisations over the pros and cons of taxing telecommunications. Because, according to Benjamin Franklin, 'in this world, nothing can be said to be certain, except death and taxes', occasional reversion to the topic is inevitable. But there are two other reasons. Firstly, the variety of taxing options is growing; and secondly, the attention which has been drawn, by the World Bank and the ITU amongst others, to the link between first mobile and then broadband penetration and economic growth raises the stakes over any discussion of taxes.

The organisation of the paper is as follows. After

- Section 1) the present Introduction;
- Section 2) reviews the range of tax and tax-equivalent instruments to be considered;
- Section 3) describes the level of overall taxes imposed in certain jurisdictions;
- Section 4) sets out an analytical framework for establishing the incidence and direct effects of taxation;
- Section 5) applies this framework to the taxation of telecommunication services;
- Section 6) considers issues associated with taxing international calls;
- Section 7) reviews the macro-economic effects of taxing telecommunications/ICT services;
- Section 8) presents some case studies of tax policy in sub-Saharan Africa; and
- Section 9) sets out conclusions.

An annex sets out the tax analysis diagrammatically.

[5] For an updated study on taxation in the mobile sector see

2 A taxonomy of telecommunications/ICT taxes

The focus of this paper is on taxes, including customs taxes, which are specific to telecommunications/ICT, rather than general taxes and customs taxes on goods and services, factors of production and assets. Of course, the general economic climate in a country depends on the overall tax take and share of public expenditure (which, particularly at the moment, are not the same thing), but the focus here is specifically sectoral.

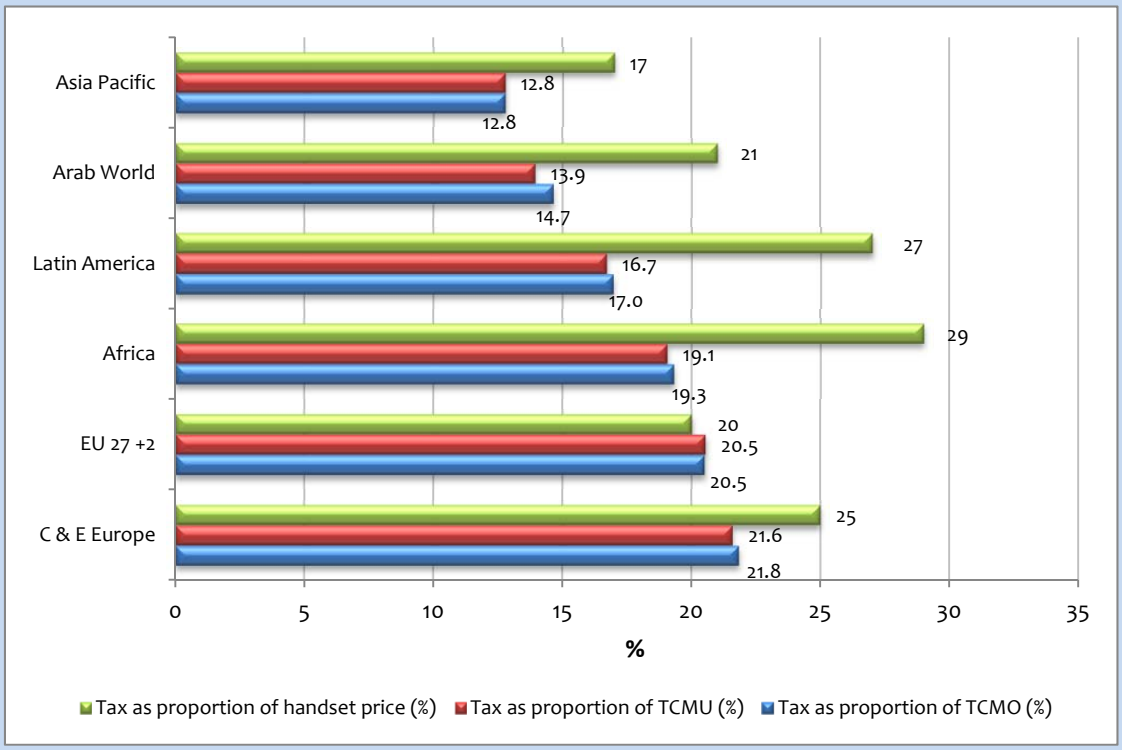
This leaves quite a lot of latitude for governmental ingenuity, as the following list of sector-specific taxes indicates.

1) Many countries have a specific ad valorem (percentage) tax on telecommunications bills. There are lots of options here: mobile, fixed, or both sorts of bill can be targeted; particular components of the bill could be targeted, such as a monthly charge, or calls (perhaps of a particular type). These options will have different effects .
2) A fixed charge tax per time period can be imposed on a bill. This might be so much per month on post-pay mobile contracts.
3) A specific tax on handsets.
4) Sector-specific taxes on hand-sets and devices such as computers, tablets, or game consoles.
5) Taxes on wholesale telecommunications services, notably on the termination of incoming international calls.
4) Customs taxes on the import of devices or telecommunications equipment more generally, such as switches or antennae.
5) Tax or excessive charges for spectrum. If a spectrum tax were imposed, it would fit clearly into the category. But suppose a government or spectrum regulator from one day to the next simply raised spectrum usage charges by, say, 20%. Or suppose (more probably) it withheld available spectrum in an auction in order to raise the price. Both effects would be the equivalent of a tax. This may be a particularly important form of the government appropriating revenue from the sector, but it largely escapes notice as a fiscal measure.

3 Tax levels in different jurisdictions

There is quite a wide variation in the level of telecommunication taxation across the world. A study by Deloitte[6] has calculated taxes as a proportion of the total cost of ownership (TCMO)[7] of a mobile telephone to end users, defined as the monetary sum required to be connected to telecom services, taking into consideration the price of the handset, services (calls and SMS) and taxes. Deloitte has also calculated the total cost of mobile usage (TCMU)[8] as well as the tax as a proportion of handset price. Using 2011 data from a sample of 111 countries in Europe, Central and Eastern Europe, Africa, Latin America and Asia for pre-pay and post-pay mobile users the TCMO breakdown into these three categories is as shown in figure 1.

Figure 1



Data source: Deloitte, Global Mobile Tax Review (2011)

The data show that Central and Eastern Europe records the highest tax as a proportion of TCMO - 21.84%, including all direct taxes applicable to handsets and services, i.e. VAT, import duties, various sales taxes and extra telecom taxes, followed by European Union (20.50%). Africa records the highest tax as a proportion of handset cost - on average 29% - closely followed by Latin America with 27%. Asia Pacific records the lowest figure for tax as a proportion of TCMO (12.77%) thanks to low VAT rates and limited mobile-specific taxation.

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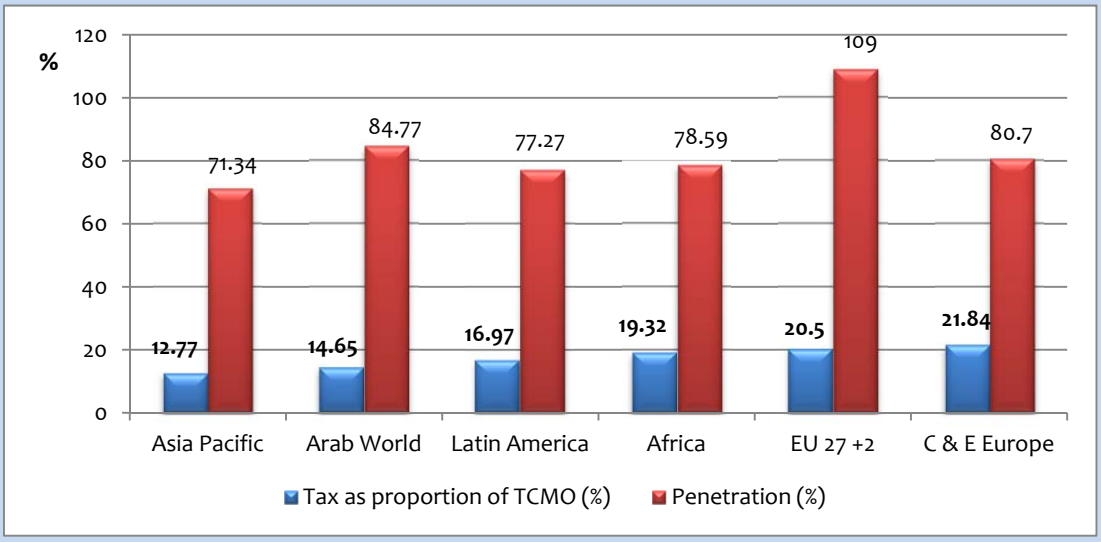
6 Deloitte, Global Mobile Tax Review (2011); for earlier data see also Deloitte, Taxation and the Growth of Mobile in East Africa, 2008, and Frontier Economics, Taxation and the Growth of Mobile Services in Sub-Saharan Africa, 2008.

7 An estimate of how much it costs annually to own and use a mobile line consisting of handset, connection, rental and usage costs.

8 An estimate of the total cost of rental and usage.

Figure 2



Data source: Deloitte, Global Mobile Tax Review (2011) and Wireless Intelligence (2011)

Figure 2 shows tax as a percentage of TCMO, and mobile penetration. The relationship between penetration and tax percentage is clearly a complex one, involving many other variables as well, including particularly prices, income levels, ICT regulation and the dynamics of competition.

Having established the types of tax of telecommunications/ICT services in use, and shown the substantial differences across regions in tax rates (which are themselves accompanied by much larger differences across countries, within and across regions), we now go back to first principles concerning the effects of taxes.

4 The impact of taxation: an analytical framework

Policy on telecommunications/ICT taxes is embedded within a much broader range of questions concerning the desired structure of taxes (on income, consumption, wealth, etc), the appropriate level of public expenditure, either on goods and services or on transfers within the population, the best means of financing public expenditure (by taxes or borrowing), which is itself linked with overall macroeconomic and growth policy.

At various points in the paper some of these linkages are noted or discussed, but the aim of this section is to set out some basic propositions about the effects of taxing particular goods and services purchases by end users; the effects of taxing inputs; and the effects of imposing customs taxes. This section tries to provide an intuitive analysis of all these points.. Annex A contains a fuller diagrammatic analysis.

Choosing what to tax involves a range of considerations of which the following five are of particular importance:

A. the effect on income distribution;
B. the cost of collection;
C. the incidence of the tax;
D. the efficiency cost of the tax (sometimes called the deadweight loss or excess burden);
E. input taxes and customs taxes;
F. Overall approaches to commodity taxation.

This section first makes some general observations on these issues, and the next considers taxes on the telecommunications/ICT sector in particular.

A. Distributional effects of taxes.

Taxes are levied to finance public sector non-marketed services (such as defence, health and education), to subsidise particular marketed commodities (such as food or health insurance), to transfer income from one group to another (such as child benefit, unfunded pension payments); and to pay off accumulated deficits. This means that distributional impacts of taxes are fundamental to their evaluation. Sophisticated models have been built of the distributional effects of the tax system as a whole, showing for example how it impacts upon the different deciles, from the top 10% in the income distribution to the bottom 10 %. To this can be added an analysis of how the same groups benefit from monetary benefits and public services to give an overall indication of the redistributive effect of the tax, expenditure and benefit system.[9] This approach can be used to show the effects of a new tax, for example on telecommunications/ICT services; the effects of how that revenue is spent can also be incorporated.

B. The cost of collection.

The 17th century French statesman (and tax collector) Colbert once remarked that the art of constructing a good tax regime was to find a way of extracting the maximum volume of feathers from the goose with the minimum amount of hissing. Unfortunately tax payers have a wider repertoire of responses to taxes than just hissing. This underlines the importance of the cost of collection as an important consideration in tax policy.

It is clearly unrealistic to assume that taxes cost nothing to collect. In developing countries, levying taxes on rural activities operating to some degree in a non-monetary economy is notoriously difficult. In any country, taxes create incentives for legal tax avoidance (use of loopholes), for illegal tax evasion, and for cross-border activities such as smuggling.

What kind of costs do these activities impose? All of these activities require the perpetrator to devote resources (lawyers' fees, money transfer costs, etc) to getting out of paying tax; absent the tax, the resources could be put to an alternative productive use. On the government side, additional tax collectors have to be hired, which eats into the net revenue of the tax. Avoidance and evasion may also raise the effective rate on tax payers. Suppose that a target revenue is required of a telecommunications tax. I f everybody paid, it would be 5%. But only half do, having to pay at the higher rate of 10%. As is shown in the Annex (section A, figure 3), the efficiency cost of a 10% tax is about four times that of a 5% tax. With evasion and avoidance, half of the population is paying the avoidance and evasion costs (and imposing greater costs of collection on the state), the other half are suffering from distorted prices to four times the extent they would if everyone paid. A very unsatisfactory situation – quite apart from the corrosive social and political effects of tax dodging.

Which tax revenues are cheapest to collect (purely in terms of low tax administration costs and the absence of evasion and avoidance costs)? The ideal situation may well be one in which an input or expenditure tax is imposed on a large and manifestly thriving corporation with a need to retain a (possibly international) public reputation, whose transactions are subject to a clear audit trail. Quantifying this effect is difficult however, it may be an important factor in the overall judgements about telecommunications taxes and customs taxes.

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[9] For an example of work of this kind, see James Browne, The impact of tax and benefit changes to be implemented in April 2011, Institute of Fuscal Studies, January 2011, retrieved from http://www.ifs.org.uk/publications/browse/page/3/subject/17

C. The incidence of the tax.

Who actually pays the tax? This might seem a trivial question, but it is not – because there is a major distinction between who hands the cash over to the authority (usually a service provider in the case of expenditure taxes on telecommunications) and who actually suffers in terms of higher prices or lower profits from the imposition of the tax. The one is the formal incidence of the tax, the other is the effective incidence.

There is significant economic analysis of this issue. The key question is the effect of a tax on the supply side of the market. For example, it would be natural to suppose that a 10% tax on a service would cause its price to go up by 10%. But this does not necessarily happen. The supplier of the service (in this case a telecommunications operator) may choose to assume half the burden of the tax, by cutting its own pre-tax price by 5%. In this case the customer will only shoulder a 5% price rise and the incidence of the tax has fallen equally on supplier and and consumer.

How does the government view this outcome from the economy's point of view? We consider this in more detail in the next section, but intuitively it depends on how it evaluates reduced prices paid by consumers in comparison with profits lost by suppliers or operators. In practice this probably depends on whether the operators were making excess profits in the first place, or whether, faced with lost profits, they might withdraw from the market. If the position of excessive profits obtained, then the government's view might also be coloured by whether the profits remained in the country or were repatriated to overseas shareholders.

Returning to the question of what happens when part of the effective incidence falls on the operator, the economic analysis goes like this. If a particular form of competition prevails in which the supply can be indefinitely expanded or contracted at a constant and uniform price, then that price will be driven down to minimum average cost, so there is no scope for providers to sacrifice revenue if a tax is imposed. This means that the incidence of the tax will be fully passed on to consumers.

But if, still within a competitive framework, a reduction in output is associated with a lower marginal cost of supply, then when a tax is imposed and less is bought, producers will be prepared or be forced to make a sacrifice in their pre-tax prices. This effect will be strongest when a rise in price cuts demand back a lot; in this case the loss of demand puts sellers under greater pressure to cut pre-tax prices.[10]

Turning to cases where supply is not fully competitive, because a relatively small number of producers recognise their interdependence and their strategies take this into account, the situation gets too complicated for a simple forecast of incidence to apply. But in some cases,[11] a particular dysfunction may apply: the small number of operators or the monopolist may add more than the tax to the price of the service. This is known as over-shifting, and cases have been found in which it appears to have occurred, for example in cigarette pricing. This is clearly a poor outcome for a government focussing on consumer welfare, as the tax simultaneously increases the operators' margins.

Looked at from a general point of view, the key factors determining tax incidence are:

i) how sensitive demand is to price;

ii) whether the imposition of a tax, and consumers' responses to it noted above, taking into account the market structure, puts pressure on, or permits, the providers of the good or service to cut pre-tax prices.

[10] This is illustrated in a diagram in Annex, figure 4.

[11] Because it also shows a defect in the competitive process, operators are understandably reluctant to use this possibility as an argument against taxation.

The answers to the question of where the effective incidence of a tax falls might be quite different in application to imposing a tax on equipment or handsets, which are traded in an international market, than in relation to domestically produced telecommunications/ICT services themselves.

D. Efficiency effects of taxes.

The classical economic approach to the effects of taxation is to examine the degree to which taxes involve departures from the production and consumption outcomes which would emerge in a competitive economy absent the taxes. The focus is not on the 'income effects' of taxes – that after taxes, households have less to spend – but upon the distortive effects of taxes being imposed on some goods, services and inputs but not on others.

For example, if a 100% tax were imposed on mobile calls, some users would keep their consumption intact. They would be worse off, but for whatever reason they would not have been led by the tax to change their pattern of consumption – except to the degree that they may have had to cut back marginally on all forms of expenditure. And the extra amount they are paying would go to the government as tax revenues, so there would be no leakage there.[12] However, other users would stop making calls or curtail their consumption of them. These people would be deprived of some of the benefit which they got before: for example, if calls cost 10 cents before, then a consumer might have made 10 calls per day which he or she valued at 10, 11, 12, 13, ….19 cents - a total surplus of benefit over price of 40. When the price rises to 20 cents, all that so-called consumer surplus disappears. Simple arithmetic shows that if the consumer's response to the tax had only been to cut back on one call valued at 15 cents, the lost consumer surplus would only be 5 cents.

The moral for taxation is therefore: impose calls on services or resources whose demand or supply is not very sensitive to price. In terms of general taxation policy, this might lead to a situation in which a government chose to impose not an income tax, which might discourage labour effort, but a uniform per head tax – a 'poll tax'. (As the well off or more able would pay the same as the less well-off and less able, this tax would be very regressive – so it is only rarely adopted as the major source of tax revenue.) A common estimate of the distortionary effect or excess burden of taxes in the United States is 33%. In other words, when a dollar of tax revenue is raised, the additional distortionary cost or excess burden is 33 cents.

A selection of estimates of the excess burden is given in table 1. It should be noted that these are marginal rates – i.e. the excess burden associated with a small change in taxes. This is appropriate for major categories of tax (sales tax, income tax) which cannot easily be eliminated. Specific telecommunications are, however, sometimes imposed from scratch, so the relevant increment may be the specific tax as a whole.

[12] Here we abstract from the collection and evasion costs discussed above.

Table 1 . Selected estimates of the marginal excess burden.

Country	Year	Tax on	Marginal excess burden
UK	1999	Cigarettes	0.11
		Alcohol	0.24
		Petrol	1.00
USA	1973	Consumer sales	0.25-0.39
Canada	1961	Commodities	0.25
New Zealand	1971-1991	Consumption	0.05-0.14
		Imports	0.02-0.04

Source: Bev Dahlby, The Marginal Cost of Public Funds, MIT Press, 2008, pp. 79-81.

E. Input taxes and customs taxes.

The frame of reference of most of the discussion above has been on commodity taxes imposed on consumption of goods and services. However, taxes can also be imposed on capital equipment such as antennae. These may also be restricted to a levy on imports, or a customs taxe. But if there is no domestic production, all relevant items are subject to the levy; there is no trade-reducing protective effect on domestic production.

There is a powerful argument[13] which states that customs taxes on inputs are always inferior to taxes on final goods and services, since taxes on inputs distort input prices and therefore encourage firms to move away from efficient production decisions. Thus in the case of a customs taxe on transmission equipment, an operator might be provoked into substituting more spectrum for fewer base stations equipped with transmission equipment. As a result the customs taxeswould deprive other spectrum users of an input which, absent the customs taxe, they would have access to. As a result, inefficient production techniques would be chosen both in the telecommunications/ICT sector and elsewhere, and the inefficiency associated with those would be added to the distortion of consumption noted above.

How material this is clearly depends on the degree of latitude providers of telecommunications/ICT services have over their inputs, and the cost share of the taxed input.

F. Overall approaches to commodity taxation.

From the standpoint of the government, taxation has a macroeconomic aspect and a microeconomic aspect. The former includes three key questions : the use of taxes to control demand, and hence control the economic cycle; the use of taxes to enhance the productive potential of the economy[14]; and the broad question of the overall tax take in the economy, partly a function of the country's social values: compare, for example, the high tax/high spend Nordic economies with other low tax, low spend advanced economies. In developing countries, the choices in the latter regard are far starker, conditioned by very limited discretionary income on the part of the population and limited capability in tax administration.

The microeconomic aspect includes the balance among different types of taxes and the setting of rates within each type. Our focus is on the wisdom of a special tax on a particular good or service (telecommunications/ICT) rather than on the balance between, say, income, expenditure and consumption taxes.

[13] See Annex, Section B.

[14] See Section 7 below.

In this regard, the orthodox approach is set out by Tanzi and Zee[15] – the former for many years the head of the International Monetary Fund's (IMF) fiscal affairs department.[16] They note (writing in 2000) that in recent years, one of the most visible tax reforms which has taken place is the introduction in developing countries, as earlier in developed countries, of a value-added type tax. They observe that the beneficial effects of the system are reduced by leaving too many sectors out of the VAT net and by the existence of multiple rates, which are 'politically attractive by ostensibly serving – though not necessarily effectively – an equity objective'. The thrust of their argument thus favours a wide tax base with a uniform rate. Since the harm taxes do rises more than proportionately with the increase in rates, and assuming that we have no or very limited detailed knowledge of the relative price elasticities of demand to construct a system of differentiated overall rates, a uniform inclusive rate scores well.

Discussing special or 'excise' taxes, they note that these should be reserved for particular goods or services with a detrimental externality, such as tobacco or alcohol; hence the name: 'sin taxes'. While the general tax should be as broad-based as possible, the special taxes should be designed to accomplish their task, which is precisely to distort consumption.

Let us examine more closely the arguments for uniformity of rates. According to Ahmed and Stern, there are several of these.[17] First that we lack the information to discriminate among rates on the basis of different elasticities; second that a single rate system is easier administratively; thirdly that having separate rates leads to the waste of resources in lobbying activities; and fourthly that it is wrong to discriminate against certain people because of their tastes.

Ahmed and Stern note that these arguments are not conclusive, and themselves seem happy to contemplate a couple of general rates combined with special taxes on luxuries such as golf clubs or air conditioning equipment.

The orthodox recommendation is thus of a single or possibly two general rates, and special taxes on luxuries or goods which are seen as harmful. There is no third class of 'special taxes'.

5 The impact of taxation: telecommunications/ICT sector effects

In this section we offer some observations about applying the above results to the various forms of taxes applied to the telecommunications/ICT sector (see Section 2 above). Further special issues are treated in the sections which follow.

A. Distributional considerations.

We are not aware of any studies which focus on the direct distributional effects of telecommunications taxes. It is possible, however, to make some very general observations about how they might affect different groups. We cannot, of course, say anything about how the revenues are spent.

Typically, access to telecommunications services[18] trickle down through the income distribution in any age group, but may also trickle up through successive vintages of consumers – an important distributional point because in many countries wealth, in particular, is held particularly by older generations. The link with income suggests that at the start of the diffusion process, and to a decreasing extent as it continues,

[15] V Tanzi and H Zee, Tax policy for emerging markets: developing countries, IMF Working paper WP/00/35, pp 21-24.

[16] See also:Tax by design, the Mirrlees Review, Oxford University Press, 2011, Ch. 6.

[17] E Ahmed and N H Stern, The Theory and Practice of Tax Reform in Developing Countries, Cambridge University Press, 1994, pp 67-72. Here we omit one of the authors' more theoretical arguments.

[18] Usage is considered separately below.

a tax on access to telecommunication may fall upon the better off, and be progressive.[19] Is this desirable? Clearly it depends on the government's and the society's social values, but it is important here to recognise that telecommunication service are both a production and a consumption good. A tax on inputs, as shown above, risks causing productive inefficiency. A tax on consumption may be justified by distributional considerations, but achieving one goal but not the other may be impractical.

A further point is that a one-off payment such as a tax on a handset or a charge to activate a SIM card may also bear down particularly heavily on those with limited cash resources and poor access to capital markets, as compared with a continuing tax on usage.

The situation with usage of telecommunications/ICT services is more complicated. Better-off people are likely to spend more on using the service, suggesting that a tax on usage is progressive. Conversely, as all subscribers may pay the same access charge, a tax on access is likely to be regressive. This is, of course subject to the same point made above – that a tax on use for production should be considered differently from a tax on consumption uses. But there is a further point, relating to voice call usage. In most jurisdictions, the caller pays the whole price of the call, even if the person called benefits too (i.e. it is 'calling party pays'). In any cases, a call made by a rich urban dweller benefits a poor rural inhabitant.[20] The 'two-sided' – caller and receiver – nature of the usage market has implications for its distributional effects.

In the case of many developing countries, significant migration has taken place to richer economies and the expatriate community or diaspora makes frequent calls to the home country, typically using low cost calling cards. Taxes on incoming international calls fall directly on richer expatriates rather the home community, and the imposition of such taxes is unlikely to redirect the flow. If the revenues are spent effectively, the home community benefits. But we must not forget the benefits accruing to the domestic receivers of the calls. They suffer if calls become shorter or less frequent. Other aspects of taxing international calls are considered in section 6 below.

All of these considerations make the distributional effects of taxes on telecommunications/ICT services both country-specific, and difficult to unravel. Of course if the impact of telecommunications/ICT taxes as a proportion of the tax system overall is small, then it may not be worth worrying about too much. But if the taxes are large, and account for a significant part of disposable income and public expenditure, then distributional issues should be considered.

B. The cost of collection.

Controlling the cost of collecting taxes was flagged above as a very important factor in developing economies, highlighted by the question: what tax revenues are cheapest to collect (purely in terms of low tax administration costs and the absence of evasion and avoidance costs)? The ideal situation may well be one in which an input or expenditure tax is imposed on a large and manifestly thriving corporation with a need to retain a (possibly international) public reputation, whose transactions are subject to a clear audit trail. In many countries, mobile telecommunications firms are some of the very few meeting these conditions.

On the same argument, imposing customs taxes on imported devices and on network capital equipment may seem attractive, as compared with extracting it from resourceful and well-connected farmers, professionals, business people, politicians, etc.

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[19] The meaning adopted here of 'progressive' and its opposite 'regressive' taxation is that a progressive tax has a smaller proportionate effect on the incomes of the less well off than on those of the better off, while a regressive tax has the opposite effect.

[20] For example, a Mexican mobile operator reports that fully one quarter of its subscribers make no outgoing calls, but pay a small monthly amount to receive them.

C. Incidence.

This is a neglected aspect of discussions of telecommunications taxes, and one with a range of possible outcomes. Which will eventuate depends on circumstances and is hard to predict. At one extreme, the incidence of the tax might fall largely upon the shareholders of the service provider. This might arise if the tax reduced consumption to the point where output fell, forcing operators down their supply curves. [21] The result would be a small rise in prices, and a significant loss of profit. Would the government take account of the loss of profit?[22] This may depend on the nationality of the shareholders; if they were from abroad, the government might not much care. This might be short-sighted, however, if the operator lost all incentive to invest in the sector.

The contrasting malign outcome for the government is for the firm not only to pass on the tax but also to add some more; i.e. to over-recover the tax.

In relation to service providers, our starting point is that the firms in the market place are likely to be few in number. Some of them in the mobile sector will have interactions with competitors in other countries. Some of the service markets in which they operate will be mature, others will be at earlier stage of diffusion. Despite this variation, pricing decisions, and decisions about how to respond to taxes, are likely to take place within a tight oligopoly, likely to be characterised by strategically aware behaviour. This has two contrasting consequences. On one hand, the operators are likely to have the capability to concert their actions in a manner which ensures that the full incidence of the tax falls on consumers. On the other hand, if the price has been elevated to at or about the level which would be charged by a profit-maximising monopolist, then it is likely that the incidence of the tax would be shared by producer and consumer. More empirical work is needed in this area.

The incidence of customs taxes involves similar considerations. If a country is a relatively small purchaser of telecommunications/ICT equipment, it is not likely to be able to 'beat suppliers down' by imposing a customs taxe. If its operators were 'large' in relation to the relevant market as a whole, then the incidence of a customs taxes might fall on the exporter. If it had domestic manufacturing capability, then the prospect that the customs taxe might not only reduce overall demand but switch production to domestic suppliers would impose additional pressure on the exporter to shoulder some of the cost of the customs taxe.

In the case of most countries, the 'small country' assumption seems natural; also many countries lack any manufacturing capability. It thus seems likely that they lack bargaining power and that the customs taxe would fall on the importer.

D. Efficiency effects of taxes.

The principal question to be addressed here is whether the demand for and supply of telecommunication services have characteristics which would predispose a government to impose a tax on them rather than on some other service, because the distorting effect of such a tax would be less than elsewhere.

As noted above, tax advisers often suggest that commodity taxes in a country be structured to have a broad base of expenditure on which a standard rate or rates of tax apply. The broader the tax rate, the lower the rate of tax required to raise a given amount of revenue. This is important because the efficiency cost of a tax as discussed here is not proportionate to the rate but increases roughly in proportion with the square of the rate. [23] This means that doubling the rate will quadruple the damage done.

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[21] A diagrammatic version of this argument can be seen in Annex, figure 4.

[22] In terms of Annex, figure 7, would the government value the loss of an area of producer surplus (shown in blue in figure) as being equally detrimental to society as the loss of the same area of consumer surplus (shown in red)?

[23] See Annex A, figure 3.

Particular goods and services may be singled out for a lower rate, normally on distributional grounds or to encourage consumption. Some goods are subject to higher taxes, either on distributional grounds or to reflect either or both of society's disapproval of them or of their being associated with a harmful 'spill-over' effect.

The account above shows that telecommunications/ICT services are often subject to special tax, despite the apparent evidence (if anything) of a beneficial 'spill-over' effect, discussed below. Telecommunications/ICT services are no longer a luxury. They are also a key productive input. Accordingly, they are unlikely candidates for inclusion in a list of goods and services singled out for exceptionally harsh tax treatment .

Within the universe of telecommunications/ICT services, are there efficiency grounds for taxing some services more than others, based essentially on the low sensitivity of their demand to price changes? In the case of fixed networks, access to the network (the line rental) was seen as less responsive to price changes than, say, long distance calls. Yet the apparent implication – a low mark-up on calls and a high mark-up on access – was resisted because of its distributional effect and deterrence of network connections. In the case of mobile networks, the distinction between access and calls is lost in the pricing system, partially replaced by a distinction between usage and a mobile device. As noted above, taxes can be variously imposed on one or combinations of the mobile bill, acquisition of the SIM card, and the device. We note that a tax on devices may discourage the spread of smart phones, and thus hold up mobile data services.

E. Input taxes.

As noted above, input taxes are potentially bad for productive efficiency. If that is a concern, they should be avoided. We conjecture that telecommunications/ICT operations basically require inputs in fixed proportions. If so the distorting effect of production would not be serious.

We return in Section 9 to consider the interplay of the arguments set out above.

6 Taxation of incoming international calls

This is a special case of taxation. By taxing the termination of an incoming international call, the government may be exploiting the relatively low responsiveness of price to an increase in the price of call to the overseas caller, or it may face supply conditions such that the operator accepts much of the incidence of the tax (see Section 3 above and Annex, figure 4).

The caller's sensitivity to price will depend upon the nature of the call. Thus a worker overseas calling his or her family may respond to a price hike by making fewer or shorter calls. Calls made in the furtherance of international investment or business may be relatively insensitive to demand, essentially because they are a relatively small part of the total cost of a business project. [24]

There is also the issue of evasion or avoidance. An incoming international call might evade the tax if it is mistaken for or concealed as a national call. Enforcement may require monitoring of calls, which may lead to legal and other problems which we do not consider here – beyond repeating the point made above that cost of collection is an important point element in choosing which tax to employ.

[24] One way of looking at this is to recognise that international telecommunications services are an input into producing an output for which there will be a particular responsiveness to price of customers' demand. According to the so-called Hicks-Marshall rule of derived demand, under certain conditions the responsiveness to price of demand for an **input** is equal to the responsiveness of demand for the **output** multiplied by the input's share of total costs. If international telecommunications account for, say, 1% of the total costs of the production, then the price elasticity of the derived demand for them is likely to be very low, except in the case of a highly competitive industry. This would mean that they could be taxed without imposing too large an efficiency cost; see Annex, figure 2 A & B.

The revenue raised from elevated termination charges can be recycled to the sector. This is acknowledged in ITU-T Recommendation D.156 adopted in 2008, which proposes that developing countries consider imposing a network externality premium on termination rates to create funds to promote network build-out. The suggestion drew criticism from the OECD.[25] This focussed particularly on the use to which the funds would be put, casting doubt on the existence of a market failure in the form of a network externality which would be large enough to justify a network expansion subsidy.[26] It was suggested that many network externalities were in practice internalised.

Our focus is on the taxation side of the equation. Is there a case for special treatment of incoming international calls, depending, for example, on their cost of collection, the possibility that their incidence might fall on overseas companies or other factors. We do not think that it can necessarily be ruled out, but it would have to be carefully argued.[27]

The discussion above has focussed on taxation of the incoming call by the receiver's government. It it is also open to the caller's government to impose a tax. If both governments decided to act, this would lead to 'double taxation' – a phenomenon which, if done in an uncoordinated way, can produce a very high combined rate which might choke back demand to a degree which not only distorted consumption but also reduced revenues.[28] This is clearly undesirable, but it may prove difficult for the two governments to get out of such a situation, if it arose.

7 The indirect impact of telecommunications/ICT taxation: macro effects

One of the most interesting and important aspects of the debate concerns a feedback mechanism which is widely considered to be particularly important in application to telecommunications/ICT. The feedback works as follows. A government levies a tax on telecommunications. As a result, the roll-out of services is delayed. This has a direct effect on national income, which includes telecommunications/ICT output. However, there is also a spill-over effect. This arises because telecommunications/ICT services are used in many other sectors, and can increase productivity there. Accordingly, the tax has a broader effect on the growth of national income, and hence on future tax revenues from other sectors.

Let us examine the variables which determine how powerful this argument is. They are

1. the level of the tax;
2. the incidence of the tax;
3. the impact of the resulting price increase on the purchase of services;
4. the impact of the changed level of purchases on GDP growth;
5. the direct tax revenue (taking account of leakages, evasion etc).

[25] OECD Digital Economy Paper No 152. Network Externality Premiums and International Telecommunications Traffic Exchange, DSTI/ICCP/CISP(2008)4/FINAL

[26] Such premia have been applied by national regulators in Europe and elsewhere on domestic termination rates.

[27] A case against such taxes is put in Deloitte/GSMA, Impôts sur la téléphonie mobile: surtaxes sur le trafic international entrant, 2011.

[28] See Annex, figure 9.

The process could stop there, but there may be a specific focus upon the direct and indirect effects on tax revenue, in which case two extra variables would be helpful:

6. the marginal tax rate on the income which the imposition of the tax has eliminated;
7. the discount rate used to make tax revenue accruing in the future commensurable with tax revenue available now.[29]

The key new element is variable 5 . Here we first discuss the 'transmission mechanism' from use of telecommunication services to the rest of the economy, and then examine quantification.

What we are dealing with here is a direct effect and a spill-over. The direct effect arises because the purchase of telecommunications services adds to final demand – whether in the form of demand if it is a consumption use, or as an intermediate input which adds value to consumption, investment or exports if it is a productive use. The same would be true if the discussion were about steel or plastic.

The additional element is the capacity of communications services to transform other sectors as well. This has been recognised since the famous study of the impact of mobile telephony on the South Indian fishing sector, and work by Waverman and others on mobile telephony.[30] Since then a process of enumeration of benefits has taken place. A typical classification includes the following:

- enhanced speed and quality of information flows: sometimes it is suggested that the combination of more information processing and faster communications are necessary to deliver the benefits, with one alone producing less spectacular results;
- better access to markets: due to lower barriers to entry, an increase in the geographical scope of markets (the 'death of distance'), better job matching, better access to customers via the web etc.;
- new business processes and organisational structures: better stock control, quicker contracting, just-in-time production etc. (For example, a large grocery company operates in the US and in several Latin American countries. It is reported that the lack of reliable broadband in one of the Latin American countries leads to an entirely different approach to logistics than is applied in the USA.);
- more innovation in general: made possible by the availability of new telecommunications/ICT services; examples can be multiplied – social networks being a particularly significant one.

This is a plausible story, and a great deal of effort has gone into substantiating it. We approach it here by examining studies which link increases in the penetration of telecommunication services and changes in economic growth, sometimes separating direct and spill-over effects.

The reason for focussing on spill-over effects is that, as noted above, expansion of every sector will have direct effects. What may distinguish the telecommunications/ICT sector is the externality which it generates. The presence of an externality signifies a market failure, which a well-structured intervention can correct. Normally, a positive externality might imply a subsidy. Here it might imply a level of taxes reduced from the average, or alternatively, an argument opposing the imposition of a specific tax on telecommunications/ICT services.

In relation to broadband, there is a definitional issue which relates especially to mobile service. Many subscribers with smart phones have packages which allow them to download data. Is this a broadband

[29] This is clearly an important factor. The discount rate of a politician facing an election may well be higher than that of a representative consumer.

[30] R Jensen, 'The digital provide: information (technology), market performance and welfare in the South Indian fisheries sector.' Quarterly Journal of Economics, 122 (3), 2007, pp 879-924; L Waverman et al. The Impact of Telecoms on Economic Growth in Developing countries, 2005

connection? Official bodies collecting data wrestle with this issue. The European Commission collects data separately for:

i) all available services, SIM cards and mobile broadband dedicated data services;

ii) mobile active users (access to dedicated data services via modems/cards and other active 3G equivalent advanced data users using mobile terminals);

iii) mobile broadband data services cards/modems/keys only.

At the end 2009, in the EU there were 200 million type i) users; 95 million type ii) users; and 25 million type iii) users.[31]

The OECD makes a distinction between:

i) standard mobile distinctions, with advertised speeds in excess of 256 kbits/s, which have been used in the last three months. Access to the greater Internet must be available via HTTP;

ii) dedicated data subscriptions, purchased separately from voice services.[32]

It is clearly important to establish the threshold capability which a mobile data connection must have in order to deliver the growth spill-overs alleged to be available. This may vary from time to time and from location to location. As more data are collected on the effects of the spread of mobile broadband in developing countries, we may get a better understanding of this issue.

We now turn to consider the results of the studies. By way of introduction, consider first studies of the impact of information and communications technologies (ICT) on productivity growth. Most of these studies cover the USA, or alternatively, USA/European comparisons. Thus a study by Jorgenson et al. concluded that ICT was responsible for 50% of US labour productivity growth between 1995 and 200 and 33% between 2000 and 2005.[33] Timmer and van Ark conclude that higher ICT investment explains more than half the US advantage over Europe in labour productivity growth from 1995 to 2001.[34]

Focussing more closely on diffusion of telecommunications/ICT services, Waverman et al. led the way with studies of the mobile sector.[35] A recent study of this technology by Gruber and Koutroumpis[36] found that mobiles had a rather smaller effect. Similar studies have been done of the impact on growth of a 10% increase in the diffusion of broadband. A summary of results of some recent results is shown in table 2.

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[31] http://ec.europa.eu/information_society/policy/ecomm/doc/implementation_enforcement/annualreports/15threport/15report_part2.pdf at p. 94.

[32] See http://www.oecd.org/document/46/0,3746,en_2649_34225_39575598_1_1_1_1,00.html

[33] D Jorgenson et al. A Retrospective Look at the US Productivity Growth Resurgence, Federal Reserve Bank of New York, 2007.

[34] M Timmer and B van Ark, 'Does information and communication technology drive US/EU productivity growth differentials?', Oxford Economic Papers, 57(4), 2005, pp 693-716.

[35] L Waverman et al. The Impact of Telecoms on Economic Growth in Developing Countries, 2005

[36] H Gruber and P Koutroumpis, Mobile Telecommunications and Economic Development, Economic Policy, 2010.

Table 2. Estimates of the effect on growth of increased penetration.

Authors	Countries	Effect on growth of 10% additional broadband penetration
Czernich et al[37]	OECD, 1996-2007	0.9-1.5%
Katz &Avila[38]	24 Latin American and Caribbean countries	0.2%
Koutroumpis[39]	EU15, 2003-2006	0.26-0.38%
OECD[40]	EU countries, 1980-2009	1.1%

We report separately the results of a recent ITU/UNESCO study[41] in table 3.

Table 3. Estimates of the effect on growth of increased penetration of telecommunications services.

% increase in economic growth per 10% increase in penetration, in:	Fixed	Mobile	Internet	Broadband
High income countries	0.4	0.6	0.8	1.2
Low income countries	0.7	0.8	1.1	1.4

There are thus a range of studies finding a correlation between enhanced economic growth and broadband penetration, but considerable disagreement about its likely scale. In relation to broadband, if we take the mid-point between the highest or the lowest figure, we get an impact of 0.85%. If we average the figures in tables 2 and 3, we get a figure of 0.9%. Working with this figure, we can then reason as shown in the following 'back of the envelope' calculation:

[37] N Czernich et al., 'Broadband infrastructure and economic growth', Economic Journal, 121, May, pp. 505-532.

[38] R Katz, Estimating Broadband Demand and its Economic Impact in Latin America, retrieved from http://unpan1.un.org/intradoc/groups/public/documents/gaid/unpan036761.pdf

[39] P Koutroumpis, The economic impact of broadband on growth: a simultaneous approach', Telecommunications Policy, 33, 2009

[40] OECD, Economic Impact of Internet/Broadband Technologies, 2011, DSTI/ICCP/IE(2011)i/Rev1.

[41] ITU/UNESCO, Broadband: a Platform for Progress, a Report by the Broadband Commission for Digital Development, June 2011.

Suppose that a country's GDP is 100, and broadband revenues at 30% penetration are 2.

A tax of 20% of the total annual costs of broadband services is imposed, the full incidence of which falls on end users.

The price elasticity of demand for access to broadband is -1.2 (alternatively -0.6)[42]*, causing output to fall compared with what it would otherwise be by 24% (12%) - lowering penetration to 22.8% (26.4%).*

Tax revenues (on the reduced output) are 0.30 (0.35).

The decline in penetration of 7.2 (alternatively 3.6) percentage points from 30% to 22.8% (26.4%) reduces growth by 7.26/10 x 0.85% or 0.61 units (3.6/10 x 0.85 or 0.31 units).

If the marginal tax rate is 35%, tax revenues are 0.30 – (0.35 x 0.61), or 0.09 (alternatively 0.35 – (0.35 x 0.31), or 0.22).

At the same time, as a result of the tax 0.61 (alternatively 0.31) units of GDP are sacrificed.

The results are summarised in Table 4:

Table 4. Calculation Results

Overall effect of a 20% tax increase on -	Price elasticity of demand	
	A. Low (-0.6)	B. High (-1.2)
GDP	**- 0.31**	**- 0.61**
Tax revenues	**+ 0.22**	**+ 0.09**

Table 4 shows only one sensitivity, in the price elasticity of demand for broadband services. As shown above, moving from a high to a low price sensitivity increases the direct tax take and has a lower indirect adverse effect on tax revenue because the tax stunts GDP to a lesser extent.

This and other sensitivities (from the starting point set out above) are set out in table 5 below.

Table 5. Sensitivities

Sensitivity	Adverse effect of tax on growth	Effect on tax take
Higher price elasticity of demand	**+**	**-**
Higher share of broadband in GDP	**0**	**+**
Higher tax rate on telecommunications/ICT	**-**	**?**
Higher marginal GDP tax rate	**0**	**+**

+, increases; -, decreases; 0, no effect; ?, ambiguous.

[42] For studies of the price elasticity of demand for broadband, see R Cadman and C Dineen, Price and Income Elasticity of Demand for Broadband Subscriptions: a Cross-Sectional Model of OECD Countries, 2008; A Goolsbee, The Value of Broadband and the Deadweight Loss of Taxing New Technology, 2006; P Srinuan et al., The Mobile and Fixed Broadband Battle in the Swedish market: Complementary or Substitution, 2011. The lack of reliable evidence on demand for mobile broadband in developing countries is major handicap.

The conclusion which we draw from these simple calculations is that the macro effect of a tax on communications services is quite capable of sacrificing significant output and even, when very strong indirect effects are in place, of lowering tax revenues.[43] But there will also be lags in the process, so that, as noted above, discounting is required to make the loss of direct revenue commensurate with higher tax revenues from growth.

We consider in section 9 below how much weight should be ascribed to this macro argument.

8 Case studies from Sub-Saharan Africa

The sample

In this section, we examine the tax environment in five Sub-Saharan African countries – Cameroon, Democratic Republic of Congo, Nigeria, South Africa and Uganda.[44] Our discussion focuses on the causes and consequences of the different tax rates applied across the five countries. The data used in this section are extracted from Wireless Intelligence databases and tax studies by Deloitte[45]. These data are supplemented by information received from operators and regulatory authorities of the case study countries.

Figure 3 shows for the five countries tax as a proportion of total cost of mobile ownership (TCMO), tax as proportion of the total cost of mobile usage (TCMU) and tax as a proportion of handset price. TCMO varies from 5.4% in Nigeria to 29.1 % in the Democratic Republic of Congo. The average for Africa is 19.3% and global average is 18.4%. Cameroon records the highest tax as proportion of handset cost (49.3%) mainly accounted for by high custom duty imposed on handsets at 30%[46] closely followed by the DRC. Nigeria records the lowest (10%) in the sample.

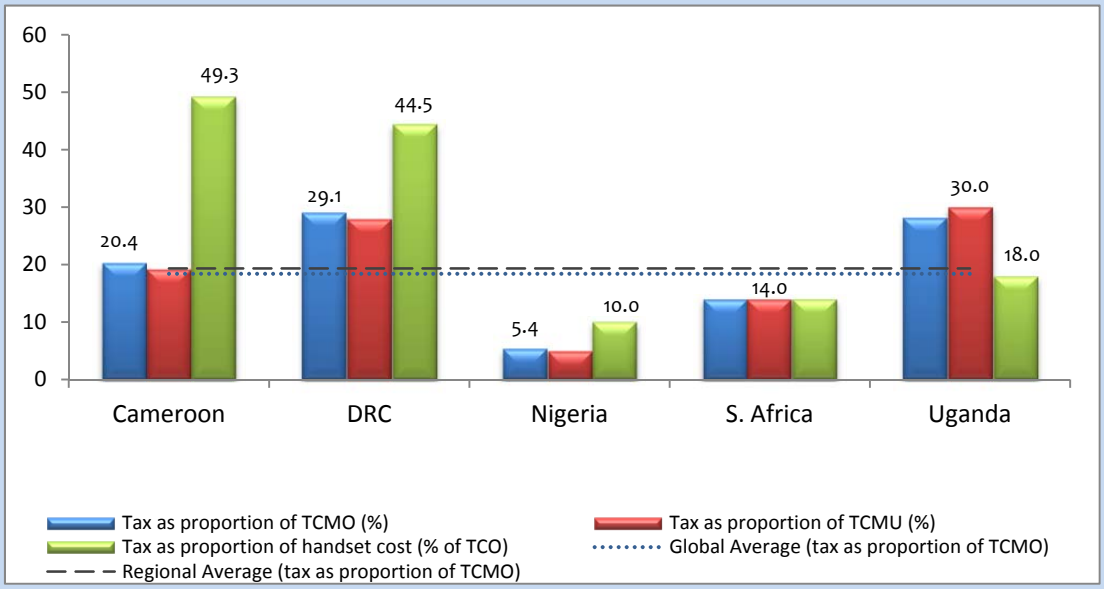
[43] R Katz et al., The Impact of Taxation on the Development of the Mobile Broadband Industry, undated, estimate the impact on tax revenues in five countries of cutting tax rates to reduce the tax component of the Total Cost of Mobile Ownership by one percentage point (eg from 15% to 14%). In four of the five countries the mid-point of the range of results represents an increase in tax revenue; only in one is it negative.

[44] Sub-Saharan Africa was chosen by agreement with the ITU because of the wide range of experience observable there.

[45] Deloitte, Global Tax Mobile Review (2011).

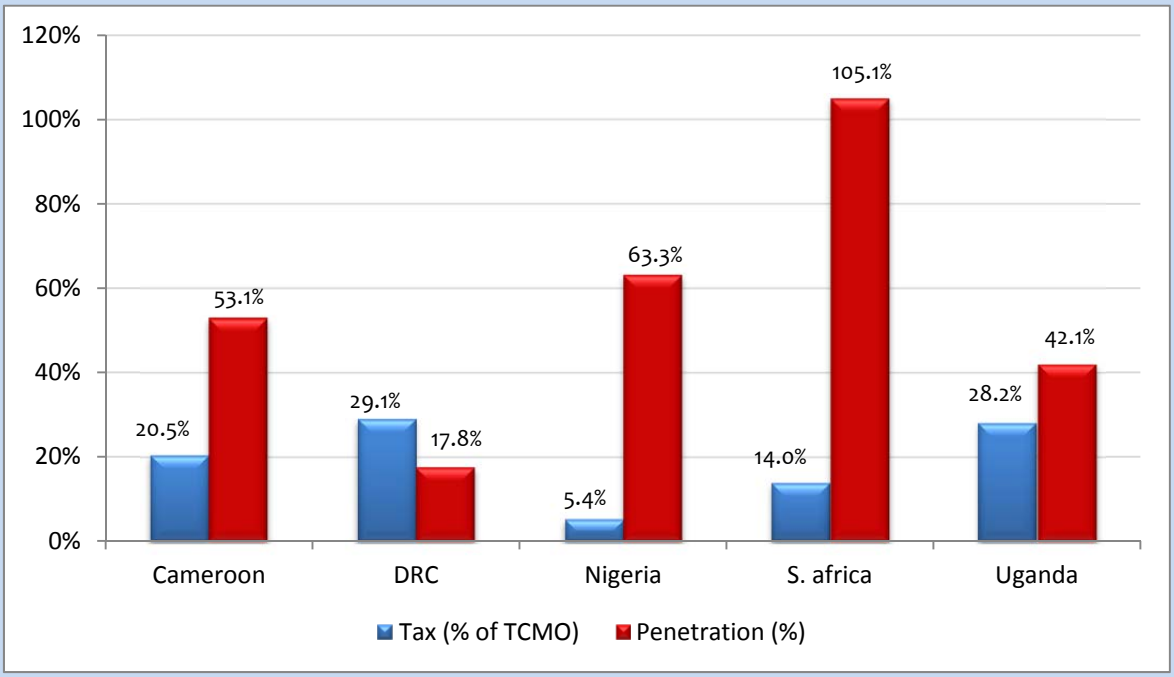
[46] In Kenya and Senegal, the governments have recently abolished VAT and custom duties on handsets. Total handset related taxes in Kenya is just over 2% of handset cost while in Senegal it is 0.00%.

Figure 3



Data source: Delliotte Global Mobile Tax Review (2011)

Figure 4: Penetration (Q4, 2010), Tax as % of TCMO (2011)



Data source: Wireless Intelligence, Delliotte global mobile tax review

Figure 4 shows, for each country, tax as percentage of total cost of mobile ownership and service penetration, in the form of lines per 100 population. South Africa has the highest service penetration level in the sample (105.1%) nearly six times higher than that of the DRC. the DRC and Uganda have comparatively higher tax rates, 29.1% and 28.2% respectively and they also have the lowest penetration rates. But as noted in section 3 above, penetration rates are affected by many other factors than tax rates.

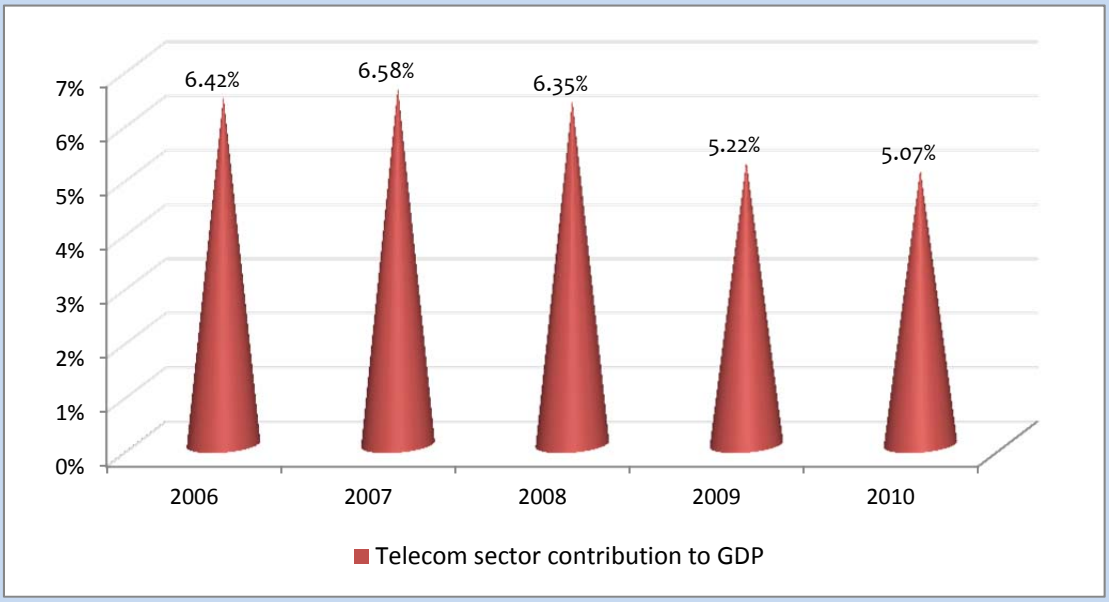
Telecommunications operators in many countries including the case countries are subject to all regular business taxes[47] plus some sector specific taxes. In the Democratic Republic of Congo for example, in addition to regular business taxes, the telecom sector is subject to two other types of taxes:

- Direct contributions (paid by operators)
  - Annual operation tax: 2% of revenue (estimated)
  - Frequency charges: 2.4% of revenue (estimated)
  - numbering charges: 2% of revenue (estimated)
  - Tax on profits: 40%
- Indirect contributions (usually paid by the consumer)
  - Network access and usage rights: 2%
  - International in-bound surcharges (also known locally as regulation tax): 0.05%
  - Tax on consumption: 18% (in 2012, this is set to be replaced with VAT at 16%)
  - Excise duty on airtime: 10%

Despite the impressive contribution made by the telecoms sector to DRC's GDP, many operators in the DRC are of the opinion that the high level of taxation not only distorts investment in the sector, but also stifles telecommunication consumption and penetration. Figure 5 suggests that telecommunications contribution to GDP in the DRC has been falling steadily since 2006 from 6.4% to 5.1% in 2010. A relatively sharper drop (1.13% points) was observed between 2008 and 2009, which corresponds to the period when many sector specific taxes were either introduced or increased. DRC's current very low mobile penetration rate (17%) may be adversely affected by taxation.

[47] These are taxes paid by any other business such as VAT, business rates and corporation tax

Figure 5: Telecommunication contribution to GDP in the DRC



Source: Posts and Telecoms Regulatory Authority of the DRC (ARPTC)

In Cameroon, the telecommunications sector is also subject to both general business taxes and sector specific taxes. Two GSM network almost equal operators, MTN and Orange, combined market share of 86% are the main actors in the Cameroonian market. A third operator, the fixed line incumbent Cameroon Telecoms Company (CAMTEL) holds just 14% of the mobile market and operates a CDMA mobile network and a fixed line network. In 2010, the sector contributed XAF 74.6 billion, 5.1% of total taxes paid in Cameroon.

The following main taxes are paid by the telecoms companies:

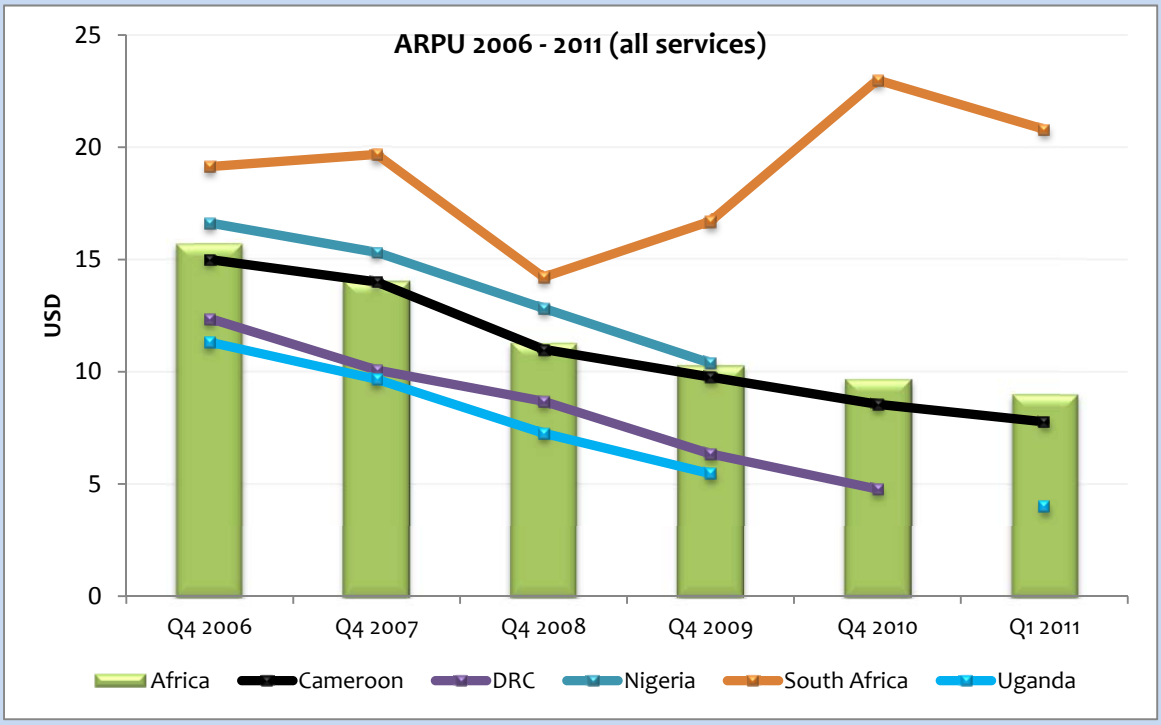
- General Business taxes:
  - VAT: 19.25% of turnover before tax
  - Company Tax: 35% - 38.5%
  - Business Licence tax: 25% - 35% depending on income
- Sector specific taxes:
  - Spectrum fees: Annual flat-fee of XAF 200 million (for a 8MHzs or 42 channels)
  - Contribution to special telecom development fund: 3% since Q4 2010, up from 2% since 1998
  - Regulatory fees: 1.5% of turnover.

In the sample, Nigeria appears as the economy with the lowest taxes. Nonetheless, the following sector specific taxes have been instituted as percentage of operating income

- Frequency fees: 0.14%
- Numbering fees: 0.15%
- Technology and research and development fee: 0.04%
- Regulatory fees: 2.9%

Data traffic has also been experiencing growth within the five countries, with South Africa leading the way. In Q2 2011, South Africa reached 3.2 million data-enabled connections, Vodacom having over 2.2 million WCDMA HSPA connections and MTN over a million. Recent advances in smart phone technology and the emergence of new and cheaper ways of providing internet access to those without access to computers will continue to fuel growth in this sector.

Figure 6: Average Revenue per User (Q4 2010 to Q1 2011) for all services (voice and data) in USD



Data source: Wireless Intelligence, 2011

Figure 6 shows Average Revenue per User (ARPU) levels in the five countries between Q4 2006 and Q1 2011, expressed in USD per month, together with the continental average. ARPU has been falling across the continent. South Africa has the highest ARPU, which rose sharply between 2008 and 2010. Nigeria's ARPU was greater than the continental average until Q4 2009. Uganda's ARPU is just a quarter of South Africa's. Clearly, the lower the ARPU, other things being equal, the lower the tax base and the lower the expected revenues.

Handset and service taxes

Table 6 shows the major taxes paid in 2008 by operators in our case study countries.

Table 6. Handset and service tax rates

	Taxes on handset			Taxes on services	
	VAT or similar taxes	**Customs duty**	**Other taxes**	**VAT or similar taxes**	**Other taxes**
Cameroon	19.3%	29.9%	-	19.3%	-
DRC	13.0%	26.5%		18.0%	10
Nigeria	5.0%	5.0%	7.5%	5.0%	8.0%
South Africa	14.0%	7.60%	-	14.0%	-
Uganda	18.0%	-	-	18.0%	12.0% excise duty on airtime

Source: GSMA data

According to Table 6, Cameroon has the highest import duty and VAT rates on handsets and services, suggesting that the government should generate relatively higher revenue from this activity than the South African government for example. But this is hardly true. A high tax drives up tax avoidance and cost of collection. Cameroon like Nigeria traditionally has a very broad informal economic sector from which it is very costly to collect taxes. We understand that about four fifths of all handsets in Cameroon are procured from the informal sector and about 6% from families and friends in the diaspora in the form of gifts (almost no tax is collected on these gifts). The formal handset sector consisting of operators and registered dealers from whom taxes can be collected relatively easily and cheaply constitutes only 12% of the market.

The reverse is observed in South Africa where the economy is largely formal. Evidence suggests that end-user handset procurement from the formal sector covers 65% of handsets as compared to Cameroon's 12%; in South Africa 4% was procured from families and friends in the diaspora and about 30% from informal dealers. While it was difficult to get the exact revenue figures collected in the form of VAT and import duties from handsets, common sense suggests that the South African government would, in relative terms, generate more revenue into the future than Cameroon although Cameroon has the highest rates of VAT and import duties.

Another consequence of Cameroon's high VAT and import duties on handsets is the emergence of poor quality pirated handsets. Table 7 below presents Deloitte's data on handset cost as percentage of TCO. Interestingly, Cameroon has one of the lowest handset (% of TCO) of 4.33% despite its high VAT and import duties on handset. This could be the result of poor quality handsets or it may arise because the observed market price of a handset does not include the VAT and import duty rates supposedly paid on them.

Table 7: Handset cost as a proportion of Total Cost of Ownership (TCO)

	Cameroon	DRC	Nigeria	South Africa	Uganda
Handset (% of TCO)	4.33%	6.68%	3.82%	5.28%	6.73%

But what could be the impact on revenue if Cameroon lowered VAT and import duties on handsets? The likely effect would be the broadening of the formal handset sector at the expense of the informal sector, the diffusion of more quality handset and, more importantly, a fall in the cost of collecting the VAT and import duties and (probably) an increase in revenue for the government. It should also increase the productive efficiency of the mobile sector and its positive spill-over effects to the wider economy.

Turning to taxes on services, Table 6 shows that Uganda has the highest overall airtime tax rate in the sample while Cameroon's VAT is the highest and Nigeria's the lowest. A study by Frontier Economics indicated that Uganda would experience an increase of about 14% in average annual total minutes of usage and a fall of about 9.2% in annual average usage costs if all airtime specific taxes in that country were to be removed.[48]

A similar analysis of Uganda showed that, if in 2009 the government had reduced excise duties on usage, then the government would suffer revenue losses for a few years, but revenue neutrality would have been achieved by 2014, with tax revenue rising by about 14.5% by 2019.

Trends and prospects

Our initial analysis of the data shows that:

- Many tax administrators are beginning to understand that telecommunication services are somewhat different from other services and products within the economy due to their higher capacity to stimulate economic growth and social development. And for that reason some sector specific taxes that impact negatively on penetration and usage are either being reduced or completely eliminated. In Cameroon for example, the government on the recommendation of the Head of State is considering 0% VAT on all ICT products including handsets and computers. Outside our sample countries, Kenya recently removed taxes on telecommunications; it is claimed that this led to a sharp increase in penetration.[49] Recent surtax charges on incoming international traffic in Senegal have been suspended. And tax holidays have been granted and are currently being extended in many countries such as Nigeria to enhance infrastructure investment.
- To some degree, this is in contradistinction with what is happening in other countries where the telecommunication sector with its generally favourable cash flow looks a relatively easy source of revenues to drive down deficits. Examples can be found in Croatia, Hungary, Mexico and elsewhere. In Africa, operators in Mozambique have reported that local interconnection revenue is subject of a double taxation: on one hand, taxed as part of the outgoing call revenue of the calling operator and on the other hand, taxed as part of the interconnection revenue of the receiving call operator.
- Understanding of the consequences of very high telecommunications taxes may be growing. High tax rates or tax increases for the sake of revenue generation may be counterproductive, as our example above of handset taxes which drive out official sales. Reducing handset VAT and import

[48] Frontier Economics, 2008, Taxation and the growth of mobile services in Sub-Saharan Africa.

[49] Deloitte and GSMA, Téléphonie mobile et impôts au Kenya, 2011.

duties can push the market out of the informal sector into the hands of licensed operators and exclusive dealers from whom it is cheaper to collect taxes and whose products are more likely to be genuine.

- The incidence of tax increases and decreases can vary. An instance has been reported in South Africa where a tax cut was not translated into an equivalent fall in the retail price of services (although one operator however argued that the cut was translated into a higher quality of service). Elsewhere, some operators have had to absorb tax increases just to keep their market share. This is reported to be happening in Mozambique where an operator is currently absorbing some of the consumer tax burden imposed on SIM ownership.
- For the telecommunications/ICT industry to yield the maximum benefits as a source of growth, tax authorities, regulatory authorities and operators need to work together. For example, having a tax consultation with major stake holders before essential tax decisions are made can be quite helpful in assessing potential distortionary effects of each tax on the quality and quantity of services as well as potential welfare losses. The organisation responsible for setting the majority of taxes paid by operators (VAT, import duties, corporate tax, excise duties, etc.) is in many countries the central tax authority, often located at the ministry of finance. Our observations suggest that tax-related communication between the tax authority and operators is not always as interactive and rewarding as are communications between the regulator and operators. While operators can be relied on to oppose taxes in general, their views might usefully inform and improve the structure of any given level of taxes.
- It is complex to explain the differences in tax rates across the sample countries as it is a combination of economic, political and social variables. Telecommunication taxes generally mirror the national tax environment which the World Bank has been able to track in their annual ''*Ease of doing Business*'' [50]series. A country like Cameroon has one of the highest VAT rates in Africa across all sectors, not just telecommunication. Regional economic groupings such the European Union, UDEAC and SADC also account for on-going tax rates as common VAT and import duties are often applied across all the countries.

9 Discussion and conclusions

A. The effects of taxation on firms and consumers.

Affected firms and consumers, unlike governments, tend to have an unambiguous response to specific taxes on the services they produce and consume, although analysis of tax incidence suggests that according to circumstances they may suffer in different degrees. There is also one case where firms might actually benefit from a tax. This occurs when they over-recover it: the tax is $1 per unit, but they raise prices by more than $1. It would be comforting to think that such an outcome is rare or pathological. The discussion in section 3 above suggests that it does occur in the case of certain well-known products; but there is no obvious reason why telecommunications/ICT services should be among them.

Achieving equity for consumers within a telecommunications tax is a tall order. Richer users for both consumption and business purposes are likely to purchase more expensive devices and to make heavier use of their network for both voice and data. Many poorconsumers, including particularly those in rural areas, mostly receive calls on a very inexpensive handset. There may be no general pattern of redistribution.

Finally, the effects of customs taxes must be considered. Most economic analysis regards the imposition of customs taxes on imports alone as inferior to a sales tax or VAT. This is, in fact a special case of the

[50] http://www.doingbusiness.org/

argument in Section 4 and the Annex against taxes on inputs, which add distorted production to the distortion in consumption which just about any feasible tax policy brings in its wake. In the case of customs taxes, an additional distortion in production follows from the protection of domestic producers against more efficient importers.

But this argument depends upon the presence of domestic producers to be protected. We suspect that, in the case of many countries imposing customs taxes on network equipment and devices, there is no domestic capacity to produce them, even with a customs taxe. This arises because of the economies of scale accruing to the Nokias, Samsungs, Ericssons, Ciscos, etc. of this world, and because only a few countries can match these producers' technological level.

n such circumstances, a customs tax defaults to a general tax – with two differences. First, a special rate can be set, and second, the unpopularity associated with a tax can be replaced with the better reception often accorded to protective measures.

B. Relevant considerations for governments and conclusions.

As noted above, the orthodox microeconomic recommendation for tax policy is for a general inclusive rate (or rates), and special taxes on luxuries or goods and services which are to be discouraged. There is no third class of 'special taxes'. In a dialectical process of argument, we describe this as the 'thesis'.

It must be acknowledged, however, that this approach takes no account of particular problems of tax collection in certain economies. The obvious solution to this problem – a sensible long-term one – is to improve the system of tax administration. In the discussion above, we drew particular attention to problems of tax collection, pointing out that if they were acute, the resulting avoidance and evasion had two adverse effects: it sucked up resources in the socially harmful activities of avoidance and evasion; and, avoidance and evasion by some, if it were successful, increased the rates other paid, leading to accelerated distortionary consequences. The implication is that preference should be given to taxes which could be collected without such effects. One such set of taxes are those which are imposed on the telecommunications/ICT sector, which contains a small number of firms, operating in a relatively transparent manner, which – because they participate in many markets and are subject to regulation their home markets – are less likely to engage in illegal activities.

Thus if the thesis is that a special tax on communication services appears to cut across orthodox tax policy; the antithesis is that such a tax may have certain advantages from a tax collection point of view.

There is, however, a third consideration in play – the linkage between the communications sector and the macro-economy. As noted, this has two aspects – a direct effect, arising from the fact that the telecommunication sector is a component of the economy, so that an increase in its activity (or a reduction, due to the impact of a tax) has a macro-economic consequence. The second effect is a spill-over effect arising from the impact which communications technologies have on productivity in other sectors.

The telecommunications/ICT sector is not the only one in respect of which similar spill-overs are claimed. Several years ago, a new theory of economic growth hypothesised that investment could change the long-run equilibrium growth rate. [51] A considerable amount of effort was devoted to identifying the appropriate levers on which governments could pull in order to realise its benefits through suitably chosen investment projects. Two examples were expansion of the transport system or of the educational system. In both cases there was a substantial historical record upon which the hypothesis could be tested, and a substantial lobby of supporters.

[51] N Crafts, 'Post-neoclassical endogenous growth theory: what are its policy implications?', Oxford Review of Economic Policy, 1996 (2), pp. 30-47.

It is important to draw attention to the fact that there are several sectors which claim to be an engine of growth within the economy. Of course, they can all be right, but the true claims must satisfy an adding up constraint – when the contributions of each sector are combined with general improvements in human capital and advances in science and technology, they must not over-exhaust actual growth. Claims must satisfy a sense check.

It does not mean to imply that the claims reported in Section 7 above fail to satisfy such a check. Take the ITU/UNESCO estimates in table 2 above. They imply that a low income country first advancing to a 90% mobile penetration rate and then to a 50% broadband penetration rate would find its GDP enhanced over a period of, say, 10-15 years by 14%. In our view this is easily within the bounds of the possible.

There is, however, a wide range of statistical estimates of the effects. In our partial review of literature above, table 2 cites four studies of the impact on GDP growth of a 10% increase in broadband penetration. Two of the studies suggest 0.2 to 0.3%. The other studies hover above 1%. We lack in particular almost any estimates of the impact of the growth of high speed mobile broadband in developing countries, although that lack will soon be made up. It also has to be remembered that most of the studies of the effect are made by organisations with some sort of vested interest in the importance of the communications sector. These include the ITU and the communications divisions of the World Bank and of the OECD. We must be aware of the possibility of unconscious bias in research objectives and methodology.

Our own interpretation of the results is that they show the existence of a special 'telecommunications/ICT effect', but it may not be the only such sectoral effect, and its size is still uncertain. As our illustration in Section 7 shows, it is not difficult to produce calculations which suggest that a tax on telecommunications/ICT services cuts growth but does raise more revenue. In such cases abstaining from the tax may not be a free lunch – generating more growth **and** more tax revenue. The two effects can be alternatives: **either** more growth **or** more tax revenue.

In arriving at a possible synthesis, we now have at least three effects to weigh up[52]

- a presumption based on general reasoning about tax policy in favour of no telecommunications exceptionalism;
- a concern about differential costs of tax collection; and
- the distinct possibility that imposing a tax will generate more tax revenue at the cost of growth.

Balancing them is likely to be a case-specific process. It will not always be mistaken to impose a special tax. Circumstances can be envisaged when it may be the least worst policy available. But governments should think carefully before imposing new telecommunications (or other) taxes, and only do so when there is no alternative way of increasing tax revenue which is less damaging.

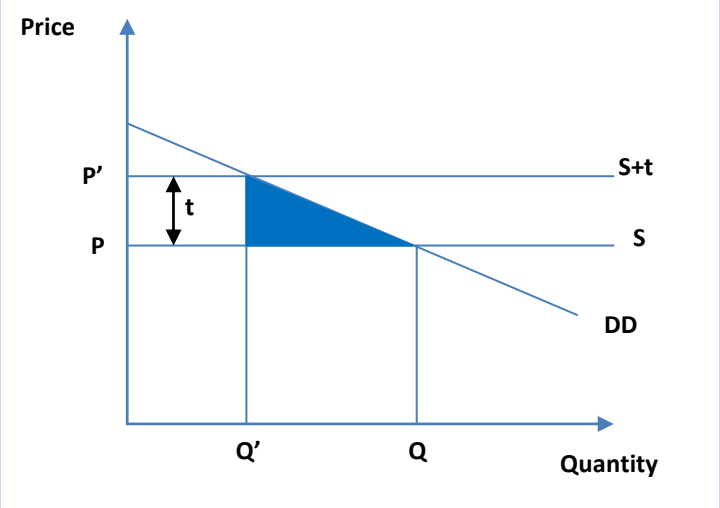
[52] This formulation does not rule out the existence of other possible factors assuming importance in particular cases.

Annex: A diagrammatic exposition of the effects of tax

A. The welfare effects of service taxes.

The simplest case is one in which a tax is applied to a service which is supplied competitively. This is shown in Figure 1. The supply can be increased at a constant price, so that the supply curve S is horizontal. The demand curve is DD. The pre-tax price and quantity are P and Q.

Figure 1



A tax of a specified percentage is now imposed on the service. The supply curve after the tax is now shown by S+t. The new price and quantity are Ṕ and Q́ respectively. What harm has been done to the economy in consequence? One way of looking at it is to say that the consumers who continue to buy the service, up to output Q́, are paying what they used to, but now plus the tax which goes to the government. In total, no change, if the tax revenue is valued at par.

But there is another change too. The consumers who used to buy segment Q́Q no longer do so at the higher post-tax price. As a result they lose out in the following sense: before the tax was imposed, these units were bought at price but purchasers actually valued them at somewhere P and Ṕ. Now the units are no longer bought, the former buyers lose out on this excess of their valuation of the service over what they have to pay for it (known as consumer surplus). Accordingly, from this perspective, the welfare loss of the tax is the shaded triangle.

Note that this has nothing to do with which particular consumers were affected. The welfare loss is thus not based upon paying particular attention to particular consumers. It is simply a consequence of the loss of 'surplus' by any consumer.

Now look at figure 2. Figure 2A reproduces figure 1; and figure 2B differs from 2A solely in the slope of the demand curve, which in 2B shows much lower sensitivity to price. It is clear that the lost triangle in 2B is smaller. This reflects the fact that the tax in Figure 2B has a lesser distortionary effect on consumption than 2A. In fact, if in the limit the demand curve in 2B were completely vertical, indicating that the tax had no effect on consumption, then the welfare loss triangle would disappear altogether; there would be no distortionary effect on consumption and the welfare loss would be zero.

Figure 2A

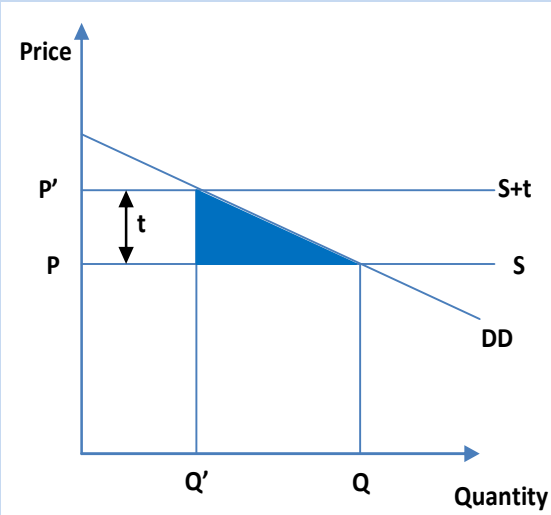
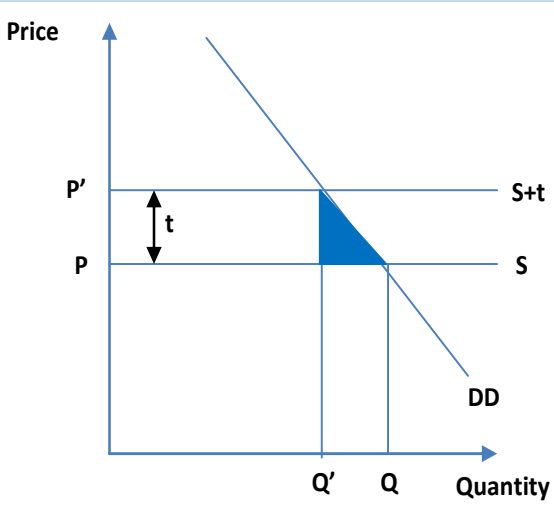


Figure 2B



This has a major implication: it suggests that taxes should be imposed on services where the tax has a limited effect on demand. For example, if a rise in the price of renting a fixed telecommunications line has little effect on demand for lines, while a rise in the price of calls cut back demand for them significantly, then tax on lines should be preferred.[53] This might be distributionally harmful, if poorer people spend more proportionately on lines than on calls, but this factor is not taken into account. We consider the usefulness of this rule below.

This method of measuring the welfare loss of a tax has another important implication: as is apparent from Figure 2 A and B, the area of the triangle corresponds to the welfare loss. Suppose the tax rate is doubled, as shown in Figure 3. The consequence is not to double but to quadruple the initial welfare loss. Or to put it more generally, the welfare loss increases with the square of the tax increase, so that , for example, trebling the rate will increase the welfare loss by nine times.

[53] More formally this is known as the so-called Ramsey rule, which says that the rate of tax should be inversely to the price elasticity of demand. So if the level of demand for X is twice as sensitive to price as the level of demand for Y, the tax rate on Y should be twice the tax rate on X.

Figure 3

The above idea is applied to telecommunications services below. But several economists have made estimates of the so-called excess burden of taxes – i.e. how much it costs in total to raise one euro of tax revenue after taking account of the above welfare cost. Some of these estimates are given below. Generally we expect that the excess burden will be higher.

B. Taxing input

The above example shows the welfare cost of a tax on services. The other option is to tax an input into producing a service. With competitive sectors producing the input and the service, the tax will be passed on into service prices, leading to the same distortion as that noted above. But the input tax will have another effect: it will influence the input composition used to make the service, and thus increase the cost of making it.

Suppose that a special tax were placed on steel used to construct towers used in mobile communications. If it were large enough, it would encourage the use of particular relatively low frequencies (say 800 MHz rather than 2.1 GHz spectrum), simply because the latter has a lower radius of the area covered by one base station. The tax would thus distort the way in which the service was produced, adding to its costs.

If a tax were placed on spectrum as an input, the opposite effect would be observed – a preference for installing more base stations transmitting at lower power and requiring less spectrum.

This example illustrates a general rule in designing tax policy, which can be summarised in the injunction 'don't mess with input prices'. It is known more formally (after two winners of the Nobel prize in economics) as the *Diamond-Mirrlees efficiency theorem*, which says that taxes on intermediate inputs should be avoided. It applies only within its own framework, which includes no problems of evasion etc. If it turned out that taxes on an input could be enforced but taxes on services could be evaded, then one would in practice have to take this into account.

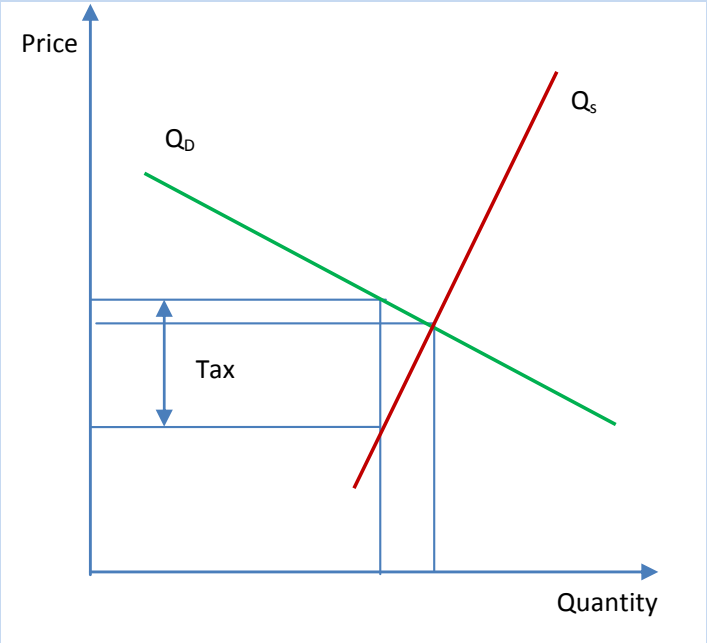
C. The incidence of a tax.

The next crucial question to consider is: who pays the tax? At first sight, this might seem obvious – it is either the producer, who adds it into the price, or (less often) the consumer pays a tax directly to the tax collecting agency. It is true that, in certain circumstances, this distinction makes no fundamental difference. But another consideration is very important.

Suppose a tax is imposed on a service. If it is fully passed on, it will reduce demand by the full amount. But the producer could in fact mitigate this effect by accepting some of the tax burden itself. As an example, a handset tax of €5 might drive a mobile operator to cut its price by €2.5, and add the tax to this smaller sum. In other words, the operator might assume some (or even all) of the burden of the tax. From a government point of view this might be a good outcome, especially if the operator were in foreign ownership.

This is illustrated in Figure 4. The key difference lies in the supply curve, SS. In figure1 it was horizontal, reflecting the fact that conditions of production were such that the (marginal) cost of production was constant. In figure 4, by contrast, it is upward-sloping, reflecting the fact that at lower levels of output, marginal cost, shown by the supply curve Qs is also lower. It is this fact which encourages producers to accept some of the burden of the tax.

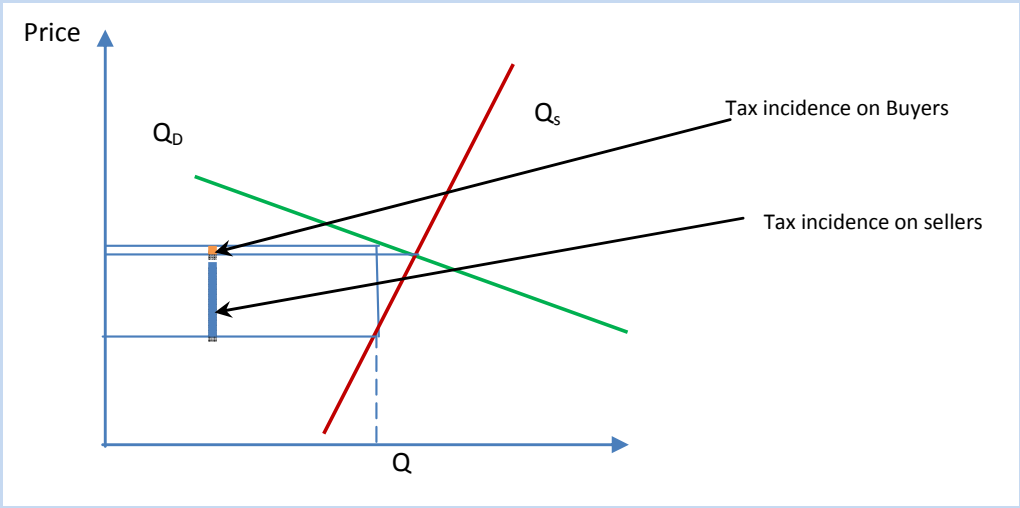
Figure 4



The way in which the burden is split depends on the slopes of the demand and supply curves, as Figures 5-6 show:

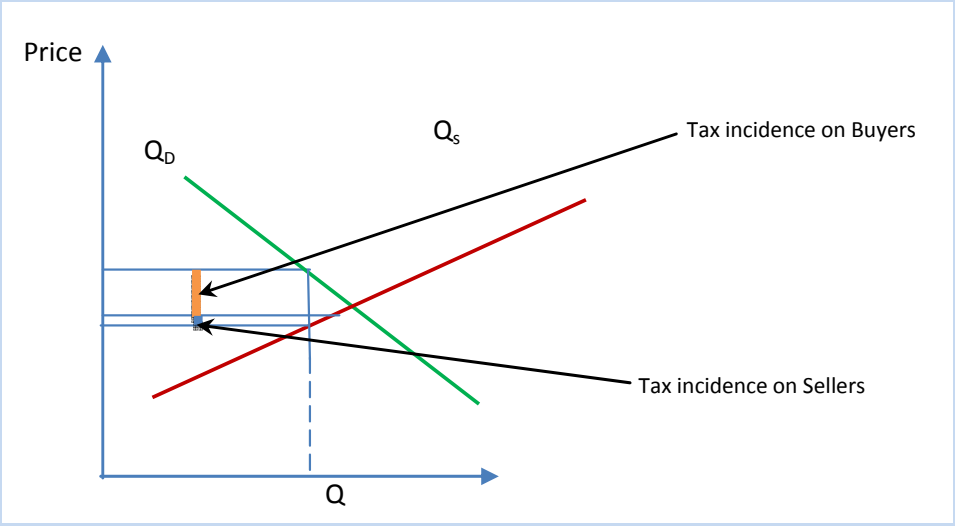
- In figure 5, where demand responds strongly to price (the demand curve is flat), the producer carries most of the burden;

Figure 5



- In figure 6, where supply responds strongly to price (the supply curve is flat), the consumer bears most of the tax.

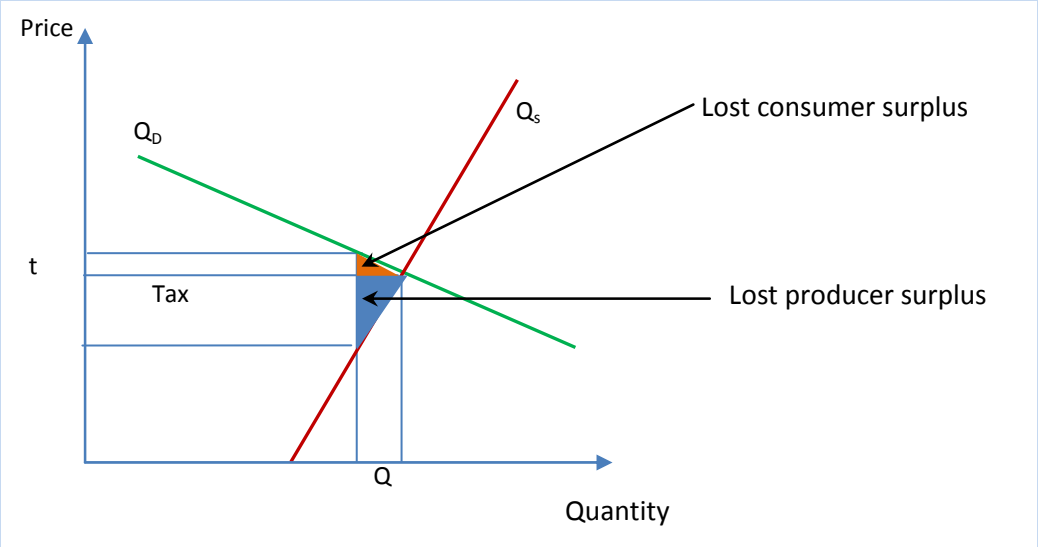
Figure 6



The supply response now gives us another consideration to take into account in the effect of a tax. If the supplier accepts some of the burden of the tax, it forces the supplier to cut its pre-tax price and deprives it of a profit of 'producer surplus' which it had before.

This is shown in figure 8, where the now smaller loss of 'consumer surplus' is replaced by a new component of lost 'producer surplus'. The tax raises revenue, but the decline in output leaves a 'deadweight loss' shown in the figure 7.

Figure 7



The above models have assumed that the markets where taxes are imposed are competitive. But many mobile telecommunications markets are imperfectly competitive and many fixed ones contain an underlying monopoly (which is often regulated).

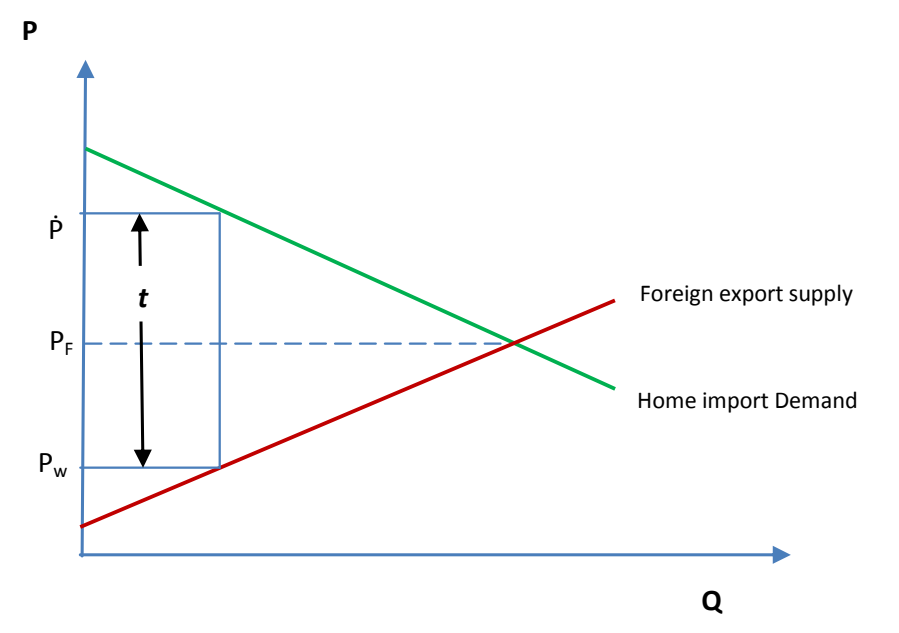
The results here are fairly specific to particular sets of assumptions, but the existence of market power and strategic behaviour by firms does lead to the possibility of over-shifting – the situation which arises if a tax is passed on more than 100%. Empirical studies have found evidence of over-shifting in the Japanese market for televisions, the US market for cigarettes, and the US markets for bread, shampoo and underwear. In other imperfect markets, some of the burden of the tax was found to rest with producers.[54]

D. Analysis of customs taxes.

A customs tax is confined to imports, which inevitably favours domestic producers. Telecommunications services are consumed in a particular location, typically a national market, but some network components can be located elsewhere. For example, in fixed networks, a call can be sent overseas for switching. This is comparatively rare, so that the imposition of taxes is often confined to capital inputs or devices. Where there is no domestic production, a customs taxe is in effect a universal tax on a particular input. This is shown in figure 8.

[54] See D Fullerton and G Metcalf, 'Tax incidence', in A Auerbach and M Feldstein (eds) Handboook of Public Economics, Volume 4, Elsevier, 2002, pp 1823-1828.

Figure 8



It is well known that if one country is the major purchaser of another's products, by imposing a so-called optimal customs taxe it forces down its supplier's price – in effect, it collects the tax revenue and enforces a lower price on the supplier.[55] However, if the supplier retaliates, they can both end up worse off.

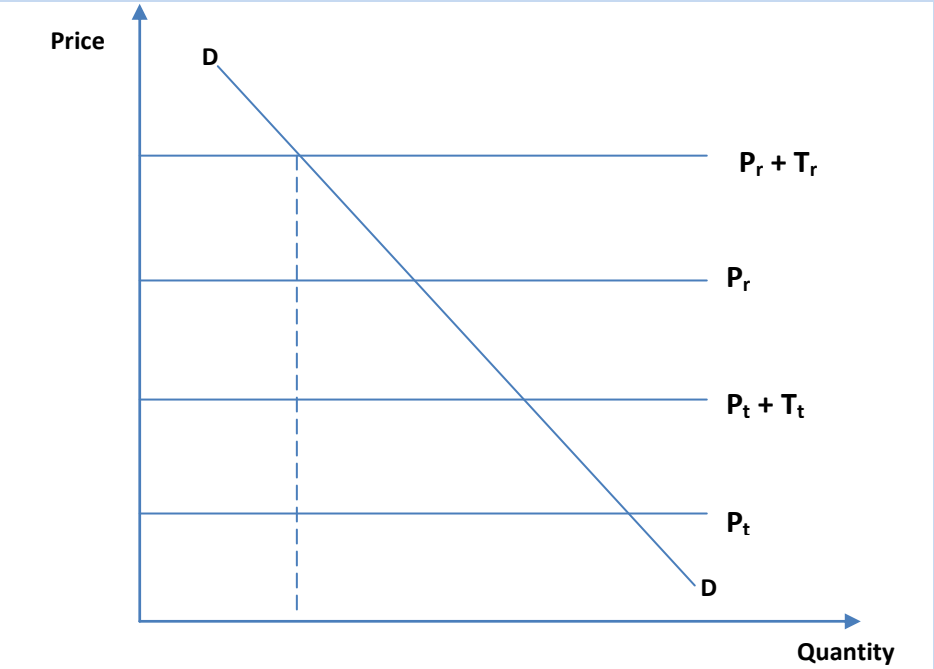
Where imports compete with domestic production, a customs taxe can protect domestic industry as well as reduce the supply price of exports. A large emerging economy might find itself in this position.

E. Double taxation.

What happens if two tax authorities have the power to levy a tax on the same service? This is likely to occur in the case of an international call, where the caller in the originating country can be subject to a tax, and the operator in the country where the call is terminated can also be subject to a tax. The situation is illustrated in Figure 9, which shows the termination price subject to a tax, which is fully passed on to the originating operator which sets the retail price of the outgoing international call, which is also taxed.

[55] One market in which any country is likely to have market power is the termination of calls to its own numbers – see Section 6 above. But this power can be undermined by the equivalent of smuggling – concealing the international origin of the call.

Figure 9 . The effects of double taxation



P_t = termination price; T_t = termination tax;
P_r = retail price of international call; $P_r + T_r$ = retail price plus tax on retail price

The outcome is akin to that found in a production process in which the supplier of an input has market power, which it exercises in setting the input price. The downstream or retail supplier then takes that as given and sets a retail price which reflects a mark up associated with its own market power. It is well known that the outcome of this uncoordinated 'double marginalisation' process can lead to prices which exceed even the monopoly price which would be charged by an integrated operator.

Similarly, in the double taxation case, the two taxes may independently and in aggregate be above the level which maximises the overall tax take. As a result, excessive tax rates severely depress output and tax revenue is not maximised.