

# Telecommunication Reforms in Developing Countries

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**Abstract:** Major innovations have pushed telecommunication costs down and demand up since the mid-1980s. The new segments of the mobile and the internet markets are hence suitable for oligopolistic competition. Reforms of the former public monopoly have been necessary to accommodate the entry of new operators. It is important to disentangle the effect of market liberalization that occurred in response to technological change and demand growth from the effects of privatizations resulting from structural adjustment programs. In line with popular opinion, privatization per se did not benefit consumers much. The biggest improvements for consumers have been driven by competition from mobile telecommunication firms. Governments should concentrate on liberalizing the mobile and internet segments. For the incumbent telecom operator, allocative inefficiency combined with the critical budgetary conditions found in most developing countries favour public ownership. This is an effective way of combining the regulation of the firm with a maximum level of taxation.

**Key words:** telecommunication, privatization, liberalization, regulation, developing countries.

The percentage of countries that allowed private shareholders to own stakes in their incumbent telecommunication operator rose from 2% in 1980 to 56% in 2001 (International Telecommunication Union, ITU 2002). Simultaneously, markets worldwide have opened up to new entrants in the mobile and the internet segments. In the mobile market 78% of the 201 countries included in the ITU database had adopted some degree of competition by 2001; while this figure was 86% in the internet market. The massive trend towards privatization and liberalization should not mask the fact that almost half of the countries in the world still have a public incumbent operator and that roughly 20%, mainly developing countries, have no private operator in their telecommunication industry at all. Similarly poor countries have limited their liberalization reforms to the mobile and internet segments. In the fixed telephony market over 60% of the world's countries have a monopoly.

The differences between telecommunication industrial policies from country to country raise the issue of how optimal reforms have been. Are poor countries lagging inefficiently behind, as is sometimes argued by the advocates of privatization, or is there a rationale for keeping the incumbent telecommunication operator public and monopolistic? The answer to this question is not clear. Assessment of reforms varies widely depending on the assessor. Since they have led to improvements in the financial and operating performances of divested firms, and in many cases also to network expansion, specialists tend to think that the reforms have been successful. This positive appraisal contrasts sharply with the popular view among consumers in developing countries, where there is a widespread perception that the reforms have hurt the poor, notably through increases in prices and unemployment, while benefiting the powerful and wealthy. In a 2001 survey of 17 Latin American countries 63% of participants disagreed or strongly disagreed with the statement: "The privatization of state companies has been beneficial" (*The Economist*, July 28th-August 3rd 2001, p. 38). Similarly in Africa, reforms have been qualified as "re-colonization" due to the participation of foreign investors in many cases. It seems hard to reconcile consumer dissatisfaction with specialists' contentment. On the other hand, the unpopularity of the reforms cannot be disregarded by those who promote decentralization and democracy. This paper thus aims to clarify this issue. It analyses the advantages and drawbacks of telecommunication privatization and market liberalization in developing countries.

## ■ Privatization and consumers' surplus: allocative versus productive efficiency

### *Productive efficiency*

Transfer of public ownership to private ownership has generally been grounded in the poor economic performance of public enterprises. A critical problem induced by public ownership, first identified by KORNAL (1980), is the lack of any commitment on the part of the government not to bail out or subsidize money-losing firms. This commitment problem is referred to in literature on the subject as the soft-budget constraint (interesting surveys are available in KORNAL, 2000; KORNAL, MASKIN & ROLAND, 2002):

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"The softening of the budget constraint appears when the strict relationship between expenditure and earnings of an economic unit (firms, household, etc.) has been relaxed, because expenditure will be paid by some other institutions, typically the paternalistic state." (KORNAI, 1980).

The author shows that soft-budget constraints explain many inefficiencies occurring in socialist economies such as shortages or low price responsiveness. KORNAI (2001) provides evidence of the use of soft-budget constraints by state-owned enterprises (SOEs) in developing countries. Since less efficient firms have been allowed to rely on the government for funding, they lack the financial discipline required for efficient management (DEWATRIPONT & MASKIN, 1995; SCHMIDT, 1996). In DEWATRIPONT & MASKIN (1995) and MASKIN (1999) the soft-budget constraint is caused by the contract incompleteness between governments and firms. In these two papers soft budget constraints affect the level of un-contractible investments made in firms by managers. By hardening the firm's budget constraint, privatization helps to restore appropriate investment incentives and improves production efficiency. Another part of the theoretical literature stresses that public ownership is associated with a lack of economic orientation in governments' objectives. For instance, in KORNAI & WEIBULL (1983), SHLEIFER & VISHNY (1996), DEBANDE & FRIEBEL (2003), governments are described as adopting 'paternalistic' or political behaviour as they seek to protect or increase employment; in SHAPIRO & WILLIG (1990), governments are simply malevolent.

The main conclusion of this theoretical literature is that privatization improves the internal efficiency of firms. Empirical evidence supports this result. MEGGINSTON & NETTER (2001) offer an extensive review of the literature available on the subject covering 61 empirical studies at a company level (both within and across countries). They conclude that privatized firms are more productive and profitable than public firms in both developed and developing countries. This result, which is theoretically robust and empirically grounded, seems incontestable <sup>1</sup>.

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<sup>1</sup> This does not mean that privatization always improves firm performance. In three studies, looking at 204 privatizations in 41 countries, between 1/5 and 1/3 of privatized firms have registered very slight to no improvement, and even occasionally, worsening situations (MEGGINSON & NETTER, 2001).

### ***Allocative efficiency***

It is indisputable that privatization tends to improve firms performance. In contrast the assumption made by advocates of privatization, namely that efficiency gains are automatically transmitted to consumers, merits further discussion. Let us assume for a moment that the social objective of government is to maximize the surplus of trade. In a perfectly competitive market where price equates marginal cost, it is true that consumers benefit from the efficiency gain generated by privatization. However, in increasing return to scale industries, moving from public to private ownership does not offer a solution to the lack of competitive pressure. In the absence of government intervention, the number of firms that survive in equilibrium is small. Their rent seeking behaviour leads to high prices and allocative inefficiency and such market imperfections hurt consumers. Empirical studies hence reveal that privatization results in lower prices and higher output in competitive industries, but not in oligopolistic ones (see NELLIS, 1999). For instance, NEWBERY & POLLITT (1997) estimate the welfare consequences of the privatization of the UK electricity sector. They conclude that there were permanent gains equal to 5 percent of previous total generation costs, but at least in the first few years following privatization the new private shareholders reaped most of the gains, and both government/taxpayers and consumers lost out<sup>2</sup>.

The fixed line telephone is characterized by large economies of scale. Since WALRAS (1936) such infrastructure industries have been referred to as natural monopolies. According to traditional regulation literature, a legal monopoly should be set to prevent wasteful duplication of investments. It thus seems natural that over 60% of the world's countries maintain a monopoly in the fixed line telephone segment (44% fully public and 16% with private participation). Moreover the legal monopoly should be regulated to avoid the deadweight loss created by monopoly pricing. Under the complete contract approach adopted in literature (see LAFFONT & TIROLE, 1993), there is no difference between public ownership and private ownership under regulation of entry and price. The result is important because it illuminates that ownership is not the key to the allocative efficiency problem; in increasing return to scale industries regulation is the key. Empirical evidence supports this result. Using a sample of 30 African and Latin

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<sup>2</sup> The authors argue that the government underpriced the shares in order to ensure political success. The outcry in Britain concerning the windfall gains to shareholders in this privatization helped Tony Blair's Labour party regain power. It also led to the imposition of a special tax on the profit of the shareholders (see BIRDSALL & NELLIS, 2002).

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American countries, WALLSTEN (2001), for instance, finds that privatization alone is uncorrelated with improvements in the telecommunication sector, and, in fact is negatively correlated with mainlines per capita and connection capacity. However, privatization combined with a separate regulator is positively correlated with connection capacity and payphone penetration. Similarly the experience in industrialized countries shows that regulation, especially the regulation of access pricing to bottleneck facilities (for example, the fixed distribution network) is a key component of successful liberalization reforms. The result is worrying because governments in developing countries, which used to control prices and production in telecommunication through public ownership, have not been very successful in establishing regulatory institutions. They usually lack the human resources, the experience and the credibility necessary to control large corporations. A major concern with privatization reforms has been government commitment ability. According to a World Bank database on Latin America, the concessions that were granted to private operators following the divestiture of public firms were renegotiated after an average of only 2.1 years (see LAFFONT, 2001; GUASH, LAFFONT & STRAUB, 2002). This problem is reinforced by the fact that, in practice, governments in developing countries are not focused on consumer surplus.

### **Opportunity cost of public funds**

Government pursues multiple objectives, such as the production of public goods, the regulation of non-competitive industries or the control of externalities, under a single budget constraint. Since the latter usually binds the opportunity cost of the public funds (i.e., the Lagrange multiplier associated with the constraint) is strictly positive. Concretely increasing investment in infrastructure such as a telecommunication network means decreasing the production of essential public goods such as national security, law enforcement, or commodities that generate externality such as health care and education, or alternatively, increasing the level of taxes or debt. All these actions have a social cost, which must be traded off with the social benefit. Symmetrically when the government is able to tax an industry such as the telecommunication industry it can increase its investment in education, health care or other areas. The social benefit generated by this investment must be compared with the reduction in consumer surplus generated by taxes. Contrary to the price mechanism, government intervention is not, and cannot be, anonymous; it depends on the opportunity cost of public funds.

The opportunity cost of public funds, defined as the Lagrange multiplier of the government budget constraint, is higher when, everything else being equal, government revenue is lower<sup>3</sup>. Tax revenue as a proportion of GDP is typically much lower in developing countries than in rich countries. The tax revenue-GDP ratio for 1995, for example, was 36.1 % for OECD countries (see official statistics on the OECD website) versus 18.2 % 1995-1997 for developing countries (TANZI & ZEE, 2001 based on a sample). The difference in taxation level reflects the fact that taxation is a non-convex activity (see WARLTERS & AURIOL, 2005). Drawing the first euro involves sunk cost. For instance, to transform the informal sector into a formal one firstly requires investment in education, so that all firms' managers are able to keep records. The government must also provide incentives for firms to register officially, train inspectors to control corporate activities etc. Developing countries are too poor to invest heavily in education, or even in their tax administration. They cannot match OECD countries' direct taxation level. Other sources of public funds are crucial to them. This includes revenue from public firms. The following sections examine how macro-economic budgetary constraints affect privatization decisions.

## ■ Privatization and government revenue: the fiscal argument

AURIOL & PICARD (2002) study the impact of poor public budgetary conditions on the privatization decisions of infrastructures and public utilities. Their paper offers a theoretical analysis of the relationship between the financial constraints of a country and its industrial policy. The opportunity cost of public funds summarizes the tightness of government budget constraints, with larger costs stemming from tighter constraints. Utilitarian governments maximize the sum of net consumers' surplus and of transfers to the firm weighted by the opportunity cost of public funds. The paper then focuses on the impact of the opportunity cost of public funds on the privatization decision. It shows that the privatization of natural monopolies

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<sup>3</sup> The opportunity cost of public fund is different from the marginal cost of public fund (i.e., the dead weight loss created by increasing marginally a specific tax). The MCF is a general equilibrium concept. It is relevant in the long run because it indicates the social cost (or benefit) of tax reform (for more on the MCFs in developing countries see WARLTERS & AURIOL, 2005). However in the short run the taxation level is more or less fixed. The Lagrange multiplier of the government budget constraint, referred to as the opportunity cost of the public funds, then is the relevant parameter for cost benefit analysis.

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with price liberalization depends on firm profitability and on the tightness of the government budget constraint. This implies that optimal industrial policy is generally different in rich and in poor countries.

In the model the government assumes responsibility for a public firm's profits and losses. It subsidizes the firm in case of loss and sizes its profit in case of benefit. Disturbed by the situation of incomplete information, the government can hardly discriminate between high and low cost firms. This creates an incentive problem. *Ex-post*, it transfers too many resources to firms (through subsidies, for example). In contrast managers and/or owners of privatized firms assume responsibility for the firm's cash flows. One benefit of privatization is that it reduces government subsidies to money losing firms. For instance, the privatization commission of Burkina Faso, reported that government subsidies to SOEs dropped from 1.42 percent of GDP in 1991 to 0.08 percent of GDP in 1999 as a result of privatization (OECD-BAD, 2003). However, privatization has a price. On the one hand, the government is not able to take advantage of positive cash flows in profitable firms. On the other hand, it abandons direct control of the firm's operations, especially prices, which has a cost to consumers. Indeed empirical evidence shows that the output prices of natural monopolies increased as a result of privatization<sup>4</sup>.

Prices are sometimes increased ahead of privatization in order to reduce the SOEs financing gaps and attract buyers. This, for instance, was the case with electricity tariffs in Zimbabwe, Kenya and Senegal, which the government increased by 10% after reaching an agreement with Vivendi Universal (see OECD-BAD, 2003). An unaccounted part of price increases stemmed from the termination of illegal connections (BIRDSALL & NELLIS, 2002; ESTACHE *et al*, 2002; OECD-BAD 2003). Privatization in developing countries should be treated as the move from public ownership with regulation of entry and price to private ownership with price liberalization. It not only involves a transfer of ownership, but also includes price deregulation. Nevertheless it is not equivalent to *laissez-faire* because entry remains regulated (through licence and entry fees).

One question addressed in the paper is whether the elimination of subsidies to unprofitable firms and the cash-flow generated by the sale can compensate for the price distortion associated with privatization and the loss

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<sup>4</sup> "Steep price increases following privatization have been quite common in divested network or infrastructure industries, e.g. electricity and water and sewerage, and common but not universal in telecommunications." (BIRDSALL & NELLIS, 2002).

of revenue from profitable public firms. The answer is positive. This result is not obvious because a benevolent regulation should be able, at worse, to mimic the private monopoly outcome. This is at least what the revelation principle suggests. However, because of the *ex-post* profitability constraint in SOEs (and not in private structures), this intuition turns out to be false. When public finance matters, privatization without price control can dominate a benevolent regulation. The optimal decision depends on the profitability of the industry.

### ***Low profitability segment***

When the profitability of a market segment is low, the optimal industrial policy is monotone in the opportunity cost of public funds. For low opportunity cost public ownership dominates privatization, while the reverse is true of high opportunity cost. This implies that governments in developing countries should get rid of their unprofitable public firms, which in practice they do. One third of the privatizations to end 1996 in Africa, for example, were liquidations or asset sales of unprofitable firms (SARBIB, 1997). The result also applies to investment with low anticipated profitability. For instance governments with abundant fiscal resources subsidize the construction of a new infrastructure and let consumers use it at marginal cost. This policy maximizes the consumer surplus, which in the case of low opportunity cost of public funds, is equal to utilitarian social welfare. On the other hand, when the opportunity cost of public funds is high, the government objective function is tilted towards transfers. Subsidizing the infrastructure is socially costly. Privatization is an appealing alternative to the scarcity of public funds. To illustrate this point consider the limit case where the government cannot finance an extension of the fixed-line telephone network, for instance in a rural area. If a private company is eager to expand the network in exchange for the freedom to charge monopoly pricing it is optimal to let the firm do so. Indeed, it is better to have a privately owned and operated infrastructure, even with the monopoly distortion, than no infrastructure at all. By continuity the result still holds when the government is able to finance the infrastructure. The drawback of this policy is that it increases inequality (the rich have access to new services while the poor are deprived from them). To avoid popular outcry the government should consider subsidizing access for the poorest segment of the population. The subsidies can be financed with public funds when there are enough of them (see AURIOL & PICARD, 2005) or by the wealthiest segment of demand (namely cross-subsidies). It is worth noting that OECD countries have traditionally relied on cross-subsidies. The U.S. Congress, for example,



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directed the Federal Communications Commission to subsidize internet services to schools and libraries in the Telecommunications Act of 1996. The internet access discount, estimated at USD 2.25 billion per year, was funded by an increase in the price of interstate telephony services. HAUSMAN (1997) estimated that this indirect taxation cost USD 2.36 billion (in addition to the USD2.25 billion granted to schools and libraries). Taxation by regulation arises because Congress wants to implement social programs, but is unwilling (unable) to increase general taxes. Implementing cross-subsidies calls for close monitoring of firms' pricing policy. Governments in developing countries eager to do perform this task first need to establish an efficient regulatory authority.

### ***Profitable monopoly***

When the public utility is profitable in the natural monopoly segment of the service, the optimal industrial policy is non-monotone in the opportunity cost of public funds. The result is a consequence of the difficulties encountered by developing countries in attracting investors while auctioning off their profitable state owned enterprises (SOEs). Indeed, country risk analysis is very important in today's global investment strategies because it forms the basis of determining future expected returns on investment. Since the perception of business risk is higher in poor countries, as for instance illustrated by the International Country Risk Guide, this negatively affects the supply and cost of international capital flows for these countries. Empirical studies thus show that SOEs are generally sold at a discount (see BIRDSALL & NELLIS, 2002). With under priced public assets, AURIOL & PICARD (2002) show that the optimal policy is non-monotone in the opportunity cost of public funds<sup>5</sup>. When the opportunity cost of public funds is low, the government sets prices close to marginal cost and subsidizes the regulated firm to cover fixed costs. Rises in the opportunity cost of public funds increase the social cost of such transfers. The government prefers to let a private firm take over for intermediate values. Finally, for large values the government, which focuses on revenue, prefers to keep profitable firms public rather than to sell them off. Prices are set close to the private monopoly level in order to maximize profit and thus government revenue. For low and high value opportunity cost scenarios (i.e. when bailouts are cheap or when 'hold-up' on profitable industries are valuable) public

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<sup>5</sup> On the other hand if a government is able to sell a SOE for its full expected profits, the optimal industrial policy is monotone in the shadow cost of public funds.

ownership is preferred to privatization. The reverse holds true for intermediate opportunity cost.

The non-monotonicity result has important policy implications for the telecommunication industry. In other words, while divestiture of the profitable public firm may be optimal in developed countries, it is not necessarily ideal in developing countries, where budget constraints are tight and market institutions weak. This result is especially relevant for the traditional local and international segment of telecommunication industry.

"A PTT [Post and Telecommunication Company]'s yearly revenues (especially charges from international calls) were used by governments to subsidize mail services, or ease yearly budget deficits. Given this public convenience and necessity, the interests of third world governments are often diametrically opposed to telecom policies of privatization and the network deregulation favoured by wealthy nations." (ANANIA, 1992).

It is wrong to believe that the governments of advanced economies do not care for the revenues generated by the telecommunications industry and focus on consumer surplus. The fiscal argument works for every country in the world. The difference between them lies in the weight that this argument assumes. In the USA, for example, a federal excise tax on local and long distance telephony services was created in 1898. It has been repealed occasionally and re-enacted ever since. The tax's opponents argue that it is regressive and distortive; while its proponents insist on the need for revenues in order to reduce federal budget deficits. It is hard to get around this argument: at a tax rate of 3% tax collection reached USD 5.185 billion in fiscal year 1999 (reported in the *Budget of the United States Government, fiscal year 2000*)<sup>6</sup>. It would be unfair and stupid to ask developing countries to focus on their consumer surplus, while advanced economies have always relied on the telecommunications industry for fiscal resources<sup>7</sup>. As they are not able to tax as efficiently as advanced economies, developing countries need the additional revenues more badly. For instance, over the period

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<sup>6</sup> Similarly in Australia the communication industry has the highest company tax to profit ratio equal to 0.49. In company tax alone each firm in the industry paid on average Australian \$40 millions (2002-03 income year), more than the double of the average of the second largest contributors (i.e., the mining industry). Finally in 2000 the UK mobile sector alone generated £1.3 billion in tax revenue. See:  
[http://www.intellectuk.org/sectors/sector\\_telecommunications\\_1.asp](http://www.intellectuk.org/sectors/sector_telecommunications_1.asp)

<sup>7</sup> Until recently telecommunications companies were public in virtually all countries in the world (with the important exception of the US). The telecom public utility being traditionally profitable, it provided a steady flow of public funds throughout the years.

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1990-1995, revenues collected from public firms (among them the telecommunications industry is traditionally a large contributor) amounted to 8% of GDP in Bolivia, 2.2% in Brazil, 5% in Chile, 1% in India, 3% in Mexico, 3% in Peru (World Bank, 1998).

"On the whole this non-tax revenue is more important for developing than opposed to industrial countries, comprising about 21 percent compared to 10 percent of total revenue." (BURGESS & STERN, 1993 p. 782).

### ***Profitable duopoly***

When *ex-ante* profitability rises substantially, the market allows for the entry of more than one firm. AURIOL & PICARD (2002) show that the advantage of private unregulated structures disappears. Indeed, when a second firm is introduced, the costs of information and of *ex-post* profitability constraint in regulated firms diminish more than the costs of excessive prices and entry to private oligopolies. In other words, market liberalization, which corresponds to the divestiture of an historical monopoly and the introduction of new entrants, is not equivalent to *laissez-faire*. In the framework of our model the divestiture of the historical monopoly is motivated by smaller fixed costs and/or by larger product demand. The mobile and the internet segment of the telecommunication industry are a good illustration of these changes. Indeed, with wireless technology sunk costs fall. Depending on the size of demand (i.e., country population and wealth) several suppliers can efficiently compete in the same market. Hence in the mobile segment 78% of countries had adopted some degree of competition in 2001 versus 86% in the internet segment.

The paper suggests that privatization and liberalization reforms in these segments of the market cannot succeed without effective regulation of entry and prices. The result is counter intuitive. It would seem more natural to regulate the outcome of the private monopoly (i.e., in the low profitability case) than that of the duopoly (i.e., in the high profitability case). Indeed, with several firms one could expect competitive pressure to push prices down. This is true to some extent: prices decrease when the industry moves from a private monopoly to a private duopoly. However, unregulated competition (e.g. Cournot) is inefficient compared to regulation. The privatization outcome is obviously worse when operators collude or are granted exclusivity periods, as is often the case in developing countries. To avoid the dead-weight loss created by monopoly pricing, it is necessary to regulate the market, especially access to bottleneck facilities (e.g. the fixed

line network). Indeed new entrants need to be able to interconnect with the incumbent telecommunication firm in order to reach their customers. If the latter is privatized, it has every incentive to prevent competition from mobile operators. This is a major concern because recent empirical studies show that the biggest improvements in the telecommunication sector have been driven by competition from mobile telecommunication firms, not by privatization reforms (see LI & XU, 2001; McNARY, 2001; PETRAZZINI, 1996; ROS, 1999; WALLSTEN, 2001). Since the revenues generated by the telecommunication industry represent over 2% of world GDP, inefficient entry and high prices in the mobile segment generate large social costs. FUSS, MESCHI & WAVERMAN (2005), for instance, estimate that in a typical developing country, an increase of ten mobile phones per 100 people boosts growth by 0.6 percentage points. The growth dividend is similar to that of fixed-line telephones in developed countries in the 1970s.

## ■ Empirical assessment of reforms

To make a general appraisal of the reforms LI & XU (2002) calculate the difference between pre- and post-privatization mean of key performance variables and test whether the difference is zero based on a sub-sample of some 60 countries that experienced full or partial privatization in the telecommunications sector. Based on this simple test privatization is associated with a substantial reduction in employment (nearly 50 percent) and with a sharp increase in investment. Interestingly it is also associated with a 38 percent reduction in real output.

This result is consistent with the finding by BIRDSALL & NELLIS (2002) that the output prices of infrastructure industries increased as a result of privatization. Since the reduction in real output is lower than the reduction in employment, privatization is associated with a significant increase in labour productivity (42 percent). The pre and post-privatization mean testing does not establish causality, it shows correlation. However, the results do help to reconcile the experts' positive evaluation with the unpopularity of the reforms. Indeed, privatized telecommunication firms seem to be more productive and to invest more in network coverage. This is an improvement for the population, which in turn gains access to the service. Yet they also get rid of redundant employees, increase prices and disconnect those who cannot afford their bills. Prices rise decreases the surplus of consumers who

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had access to the service before privatization. Disconnections and labour downsizing hurt the poor<sup>8</sup>.

So far the empirical results are consistent with both efficiency and the fiscal theory<sup>9</sup>. This raises the question of what triggers the privatization decision in the first place. The question is empirically relevant because the conduct and performance of the reforms vary with their objectives. The few empirical papers that study this problem do not focus on the telecommunications industry. They suggest that the macro economic rationale put forward in AURIOL & PICARD (2002) plays a significant role in the decision whether to privatize. Based on a data set from privatizations in China, LI, LI, LUI & WANG (2001), for instance, test whether government privatizes in order to enhance production efficiency or to increase its revenue. They conclude:

"Our tests based on the data set from China reject the efficiency theory and yield support for the revenue theory."

Similarly BORTOLOTTI, FANTINI & SINISCALCO (2003) analyze panel data for privatization around the world. They consider all types of industry (competitive and oligopolistic) and all kinds of countries (rich and poor). The authors find that privatization is more likely in wealthy democracies with right wing governments, high debt, liquid stock markets and a legal system that protects shareholders. Finally WARLTERS (2004) studies the determinants of infrastructure privatization using probit regressions with panel data covering 155 developing countries for the years 1984-1998. He shows that the introduction of a VAT system positively influences the probability of infrastructure privatization. This result illuminates the link existing between taxation and privatization reforms. WARLTERS (2004), who interprets the introduction of a VAT system as an improvement in the tax system, concludes that:

"Infrastructure privatization is more likely when the shadow cost of public funds falls."

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<sup>8</sup> As BIRDSALL & NELLIS (2002) put it: "Most privatization programs have done much more to enhance efficiency than equity. At least initially, and on average, privatization has worsened wealth distribution (highly likely) and income distribution (likely)."

<sup>9</sup> That is, after the privatization firms use more efficiently their inputs. They also pay franchise fees and make more investment than the financially strapped governments. Finally, they increase prices so that output decreases.

The three papers support the idea that macro-economic concerns influence the decision to privatize. However, with the exception of LI, LI, LUI & WANG (2001), they do not control for efficiency. To test which theory prevails requires micro-economic data on public firms on top of the usual macro-economic data. These data are usually not available. A notable exception, which is exploited in AURIOL & TUSKE (2005), is the data on the telecommunications industry.

AURIOL & TUSKE (2005) estimate the probability of telecommunication privatization in developing countries using data from three primary sources. Firstly, the International Telecommunication Union maintains a rich panel data set on the worldwide telecommunication industry. The database contains detailed information for every country in the world on telephone service revenue, quantity, annual telecom investment, infrastructure quality such as teledensity, the number of telephone mainlines etc.. The data are industry based. Since the public firm used to be in a monopoly position, the data provide detailed company information before privatization. Secondly, the World Development Indicators (WDI) maintained by the World Bank provide the matching macro economic panel data required to test the relevance of the fiscal argument. Finally, the dependant variable is constructed by extracting information relative to the telecommunication industry from the World Bank's Private Participation in Infrastructure (PPI) database. The probability of privatization is estimated with random effects probit models. The panel data covers 153 developing or transition countries for the year 1985-2003. It contains privatization data from PPI, industry level information from the ITU, and macro-economic information from the WDI. The theoretical predictions differ depending on which theory prevails. If the efficiency argument is determinant firms with poor economic performances should be privatized first. On the other hand, if AURIOL & PICARD's (2002) fiscal argument is relevant, macro-economic variables measuring the tightness of government budget constraints should significantly influence the probability of privatization. A more subtle implication of AURIOL & PICARD (2002) arises while focusing on the incumbent operator of the telecommunications industry. Indeed the fixed-line and the long distance segment traditionally constitute a profitable monopoly. Depending on the opportunity cost of public funds, privatization of the incumbent operator might be the optimal policy in a rich country, while the same does not necessarily apply to a poor one. AURIOL & PICARD (2002) show that the optimal decision depends on a critical value of the opportunity cost of public funds. Under the paper's assumptions, the critical value lies in the range of the opportunity cost of public funds generally retained for developed

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economies (i.e., it varies between 0.35 and 1.10). If the model assumptions are empirically grounded the probability of privatizing the fixed-line and the long distance segment in developing countries should decrease with the opportunity cost of public funds <sup>10</sup>.

AURIOL & TUSKE (2005) found that the probability of privatization of the fixed access and long distance segments decreases with country risk rating, with the level of multilateral debt service, or alternatively, with the level of public and publicly guaranteed debt. As predicted by the theory, the probability of privatization declines when the opportunity cost of public funds, measured by the level of debt service for example, rises. The result is robust when the characteristics of firms are analysed. In this case it is worth noting that the probability of privatization increases with the level of teledensity, the percentage of digital mainlines and the level of annual investment, but decreases with the level of the telephone waiting list. To confirm these results regressions were run with the micro-economic variables alone. They yield the same qualitative results. The probability of privatization increases with teledensity, annual telecommunication investment and the percentage of digital main lines, but decreases with the size of the telephone waiting list. In other words developing countries privatize efficient incumbent telecommunication firms first. It is doubtful that the firms' efficiency is at the heart of the privatization decision. On the other hand, the results are consistent with governments maximizing sale revenues. Developing countries, which are coping with critical financial problems, rationally regard privatization as a fiscal instrument.

Whether governments privatize public assets to unbind their budget constraints or to increase industry performance and consumers' surplus is crucial to the conduct of reforms. For instance, in privatization of public utilities governments have the choice between auctioning off the operator on the basis of the highest royalty payment, or waiving the royalty payment and auctioning off the service to the party who bids the lowest service tariff (see ESTACHE, FOSTER & WODON, 2002). In a survey of 600 concession contracts from around the world, GUASCH (2000) shows that, in most cases, contracts are tendered for the highest transfer or annual fee. In practice, governments in developing countries are more concerned with relieving fiscal constraint than securing tariff reductions. The proceeds of

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<sup>10</sup> The prediction is reversed for advanced economies as suggested by BORTOLOTTI, FANTINI & SINISCALCO (2003) where the probability of privatization increases with the level of debt.

privatization in non-OECD countries, which account for over one third of the worldwide proceeds of privatization (MAHBOOBI, 2000; GIBBON, 1998, 2000), have hence been used to alleviate fiscal pressure on the public sector<sup>11</sup>. Using a panel of 18 developing countries, DAVIS *et al.* (2000) show that the budgetary proceeds of privatization have been used to reduce domestic financing on a roughly one-for-one basis. Since the transfers are higher the greater the expected profitability of the industry, governments committed to privatize choose policies that are likely to increase the firms' profitability.

Privatizations initially often come with exclusivity periods (i.e., temporary monopoly power). To study the impact of the exclusivity period on privatization price, WALLSTEN (2000) focuses on the privatization of twenty telecom firms in fifteen developing countries. In this small sample 2/3 of the countries chose to allocate exclusivity periods for an average of 7.42 years. They apparently had a very good reason for doing so. According to the author's computations, granting a monopoly in fixed local service would more than double the price private investors pay for the firm. Granting an international long distance service monopoly would be even more valuable than a local monopoly. The advantage of exclusivity periods seen in the sale price comes at the cost of reducing network growth relative to privatization without exclusivity periods. A one percent increase in the length of the exclusivity period is associated in the sample with a 0.05 to 0.08 percent decrease in network growth. Doubling the exclusivity period should consequently reduce network growth by five to eight percent. When the sample is broadened to include advanced economies, the proportion of countries that choose to allocate an exclusivity period is lower. For instance in the LI & XU (2002) sample, which covers 116 countries from 1981 to 1998, of all countries that privatized in 1998 one-third offered investors exclusive access to certain segments of the market. Consistently with WALLSTEN (2000), their calculations show that the impact of exclusivity periods on the number of fixed line and mobile telephones per 100 inhabitants is negative and significant.

Secondly governments often restructure public firms in an attempt to increase privatization prices. CHONG & GALDO (2003) analyse the impact of labour policies, such as downsizing, pay cuts, or employment guarantees, on the privatization prices in 84 telecommunications privatizations. The

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<sup>11</sup> A review by the IMF (2000) of 18 privatizing countries reports that the net receipts from privatization account for 1 percent of GDP.



sample covers 75 percent of the privatizations worldwide that occurred between 1984 and 2000. In their sample 73% of the firms experienced labour downsizing in the three years prior to privatization. When checking for endogeneity, the authors show that restructuring, in the form of specific labour policies before privatization, is not conducive to higher net privatization prices. On the contrary, in the particular case of voluntary downsizing, it significantly decreases prices (by 15 percent). This result is consistent with the lemon problem studied by JEON & LAFFONT (1999) and RAMA (1999): The best employees, who are aware of their productivity, are the first to take severance packages and leave voluntarily. This theory is supported by the fact that many exiting employees were re-hired after the privatizations. The authors also find that, firms' characteristics such as the presence of unions and of negative net liabilities, decrease like expected net privatization prices. More interestingly, the type of method used in the sale seems to matter. Public offerings and direct sale are associated with an increase in the privatization price; shares sold are associated with lower prices. Foreign participation is not significant. The authors conclude that governments eager to privatize their telecommunication industry should concentrate on the privatization process, as the method of sale seems to matter. On the other hand, they should avoid restructuring the public firm. This is a costly process, especially in developing countries where labour downsizing hurts the extended family of those who are fired. Since reforms had either a negative impact or no affect on privatization prices, restructuring prior to privatization has proven bad policy. Yet it occurred in nearly 3/4 of the telecommunication privatizations covered by the authors and its poor results partly explain the unpopularity of reforms.

## ■ Conclusion

Among network industries, telecommunication has undergone the most dramatic change since the mid-1980s. Major innovations, embodied in the wireless technology or the internet, have pushed costs down and demand up. The new segments of the mobile and the internet markets are hence suitable for (oligopolistic) competition. Network externalities in telecommunications oblige entrants to interconnect with the incumbent operator in order to reach their customers. Major reforms of the former public monopoly have been necessary to accommodate the entry of the new operators. These liberalization reforms, which occurred at an industry level, have been intertwined with structural adjustment programs. Indeed,

international donors and creditors, like the World Bank or the IMF, made privatization programs a condition for economic assistance in the 1980s context of explosive debt crisis. As shown by AURIOL & TUSKE (2005), the macro-economic rationale is at the heart of the decision to privatize in the telecommunication industry. In this context it is hard to disentangle the effect of market liberalization that occurred in response to technological change and demand growth from the effects of privatizations resulting from global government restructuring.

A careful review of existing empirical literature reveals that telecommunication privatization in developing countries came, at least initially, with a substantial employment reduction, price increases and a reduction in real output. Since output decreases were generally lower than job cuts, labour productivity rose as predicted by the efficiency theory. The owners of the firms seem to have been the main beneficiaries of the productivity gains. In line with popular opinion, privatization per se did not seem to benefit consumers much. On the contrary, WALLSTEN (2001) finds it to be negatively correlated with mainlines per capita and connection capacity. Similarly CHONG & GALDO (2003) show that restructuring public firms before privatization, as has often been the case in developing countries, has proved bad policy. Not only is labour downsizing been conducive to higher net privatization prices, but in the particular case of voluntary downsizing, it significantly decreases prices. In the end, the biggest improvements for consumers have been driven by competition from mobile telecommunication firms, not by the privatization of the incumbent firm (see LI & XU, 2001; McNARY, 2001; PETRAZZINI, 1996; ROS, 1999; WALLSTEN, 2001).

To conclude, privatization reforms must take into account the fiscal argument. In profitable, increasing return to scale industries, such as the fixed line telephone or the long distance segment, allocative inefficiency combined with the critical budgetary conditions found in most developing countries favour public ownership. This is an effective way of combining the regulation of the firm with a maximum level of taxation. AURIOL & TUSKE (2005) thus found that the probability of privatization declines in the fixed line segment when the opportunity of public funds rises. Instead of rushing into the privatization of their incumbent telecom operator, governments should concentrate on liberalizing the mobile and internet segments. Indeed, increasing the competitive pressure from mobile operators is the best way to increase consumer surplus and growth. This concretely means avoiding allocating exclusivity periods to private operators in the mobile segment and creating an efficient regulatory authority to avoid overpricing of bottleneck

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facilities (such as the fixed line network) and collusive behaviour from mobile operators. China and Viet Nam followed this winning strategy. They chose to keep the fixed line operator public and monopolistic while fostering (regulated) competition in the mobile segment. According to the ITU (2002), these two countries experienced the highest change in ranking for total teledensity (the sum of fixed lines and mobile users per 100 inhabitants) in the world with China moving up from a ranking of 159 in 1990 to 95 in 2000; while Viet Nam jumped up from 189 to 141. They are also countries where the government gains maximum revenues from the telecommunication industry.

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