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Telecommunications Reform and Performance – A Global View*

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This article briefly compares for developed and developing countries the effects of two of the main reforms implemented in the telecoms sector during the 1990s: the introduction of an "independent" regulator and the opening to private capital in fixed lines operations. It draws on new econometric evidence, which is, however not explicitly reported here.[1]

The main "macro" reforms in telecom

The typical telecoms operator before the 1990s was a monopolistic state-owned company. This monopoly was often self-regulated or regulated by the government rather than by an independent agency. The regulation was generally not service oriented, e.g. prices were often intended to generate fiscal revenue with some concern for equity through complex cross-subsidy schemes.

This changed with the major technological improvements of the 1990s. Besides the unbundling of the sector into its various business lines (e.g. fixed vs. mobile; local vs. long distance), most countries opened to private telephony and the competition it allowed. Because there is no reliable measure of the degree of competition for a large sample of countries[2], the existence of private capital investment in fixed telephony is used here to approximate the commitment to increased competition. It is clearly not perfect since the opening to private sector participation (PSP) is necessary but not sufficient to increase competition – supporting legislation such as access rules matter as well. According to the data from the International Telecommunications Union (ITU) on whether a country has at least some private ownership in their telephone companies, the share of countries with private capital in fixed telephone lines operators increased from 9 to 53 percent in developing countries and from 17 to 82 percent in developed countries between 1990 and 2003, as shown in Table 1.[3]

The regulatory environment has also changed significantly. One of the most directly observable reforms may be the establishment of an independent regulatory agency (IRA) for telecommunications. This is a strong public signal of the commitment to end self-regulation and to emphasize economic concerns in regulation.[4] This choice to proxy for the commitment to reform the regulation system allows for a simple classification of countries into those that have an IRA and those that do not. The existence of IRAs is being monitored and documented by ITU as well. [5] Table 1 shows that the share of countries with an IRA increased from 5 to 65 percent in developed countries and from 12 to 57 percent in developing countries.

Table 1 also shows that among developing countries there are more countries with IRAs than countries with private involvement in the local loop in 2003 while the opposite is true for developed countries. This implies that a country does not need a regulator to attract private operators and a regulator does not guarantee that the government will be open to PSP in its local loop. The table also shows that the introduction of PSP and IRA was, on average, simultaneous in developed countries (in 1997); while in developing countries, the introduction of PSP briefly preceded the creation of IRAs.

Telecom performance and its dimensions

To account for multiple performance dimensions, we have selected six ITU indicators. The proxy for

* The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the institutions they are associated with.

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[1] For the details of our econometric analysis see Estache, Goicoechea and Manacorda (2006).

[2] In addition to the coverage problem; data on the existence of competition often refer to the "legal" status but not to the "de facto" situation.

[3] See Estache and Goicoechea (2005) for a more detailed discussion of the data.

[4] The concept of independence is to a large degree subjective. Estache et al. (2002) define independence as having financial autonomy (because if the minister influences the budget to cover the regulator's expenses there is a potential conflict of interests). But independence might also be considered in terms of capacity to make decisions. However, Wallsten (2003) states that regulators may have incentives to report their independence even if they are not fully so.

[5] ITU considers that an agency is independent if it is separate from the ministry and from the incumbent in its structure, financing and decision-making process.

Table 1

Evolution of reform implementation from 1990 to 2003

	% of sample		Sample size		
	Developing	Developed	Developing	Developed	Total
Privatisation/competition					
Number of countries with PSP as of 1990	9%	17%	129	35	164
Number of countries with PSP as of 2003	53%	82%	129	34	163
Average year of privatisation*	1997	1997	57	23	80
Regulation					
Number of countries with IRA as of 1990	5%	12%	153	51	204
Number of countries with IRA as of 2003	65%	57%	153	51	204
Average year of establishment of IRA*	1998	1997	93	23	116

*Average among countries that reformed between 1991 and 2003.

Source: Own calculations using ITU data.

access is the number of telephone subscribers. The proxies for affordability are the price of a 3-minute local phone call and the monthly subscription fee (for residents and for business). The proxy for quality is the number of reported telephone faults per 100 mainlines; and the proxy for productivity is the number of telephone mainlines per employee.

These indicators are the best available in terms of coverage but they are far from perfect. Regarding access, Wallsten (2001) argues that the number of subscribers may over or understate access because it does not differentiate multiple lines per person with multiple persons per line. Regarding affordability, the information does not account for many of the "informal" alternatives available to phone users (e.g. calling cards), or for pricing in the mobile segment. Finally, our proxy for quality may be misleading in two ways. First, reporting faults might depend on the rules, regulations and dynamic of the sector in the country. Second, reforms may result in improvement in reporting systems, which could record a larger number of the faults missed earlier.

Table 2 summarizes the basic statistics for these indicators. As expected, there are pronounced differences in the access rate between developed and developing countries, with the former displaying an average access rate approximately 6 times higher. Local phone call normalized to GDP per capita was about 30 times higher in developing countries than in developed ones, while the annual cost of a residential or business line (normalized in the same way) was about 14 times larger in developing coun-

Table 2

Average performance 1990–2003

	Means		Number of observations		
	Developing	Developed	Developing	Developed	Total
Telephone subscribers per 1000 population	123 (171)	709 (363)	2,073	647	2,720
Price of local phone call (US cents/ 10,000 GDP pc)	169 (466)	6 (6)	1,570	446	2,016
Annual residential subscription fee (US$/10,000 GDP pc)	958 (1,891)	76 (38)	1,650	461	2,111
Annual business subscription fee (US$/10,000 GDP pc)	1,387 (2,632)	101 (60)	1,623	453	2,076
Phone faults (reported faults/100 mainlines)	73 (96)	19 (17)	1,094	328	1,422
Telephone mainlines per employee	68 (57)	175 (111)	1,787	600	2,387

Source: Own calculations using ITU data. Countries were classified in developing and developed according to their 2001 GNI per capita. Standard deviations in parenthesis.

Table 3

Performance vs. reform in 2003 – averages for different country groups

	Mean (standard deviation, number of observations)				
	(1) without IRA without PSP	(2) with IRA without PSP	(3) without IRA with PSP	(4) with IRA with PSP	(5) all countries
Telephone subscribers/1000 people in…					
Developing	181 (158.16)	191 (214.30)	226 (205.10)	412 (367.46)	290 (300.115)
Developed	960 (272.2)	1049 (378.2)	1171 (254.5)	1360 (175.20)	1277 (276.36)
All countries	268 (300.18)	245 (303.32)	541 (508.15)	700 (543.66)	526 (514.151)
Price of local phone call in…					
Developing	87 (138.9)	95 (147.21)	58 (68.4)	60 (97.37)	75 (114.84)
Developed	0 (na.1)	6 (na.1)	0.9 (1.2)	6 (3.12)	5 (5.20)
All countries	78 (133.10)	91 (145.22)	39 (60.6)	47 (87.49)	62 (106.104)
Annual residential subscription fee in…					
Developing	630 (577.10)	464 (364.19)	253 (212.3)	392 (410.38)	499 (533.84)
Developed	57 (na.1)	99 (na.1)	91 (65.2)	83 (32.14)	79 (32.22)
All countries	578 (574.11)	446 (363.20)	188 (177.5)	309 (376.52)	412 (504.106)
Annual business subscription fee in…					
Developing	830 (706.10)	650 (533.19)	438 (310.3)	629 (633.37)	759 (726.83)
Developed	132 (na.1)	99 (na.1)	134 (95.2)	94 (32.12)	97 (41.20)
All countries	767 (703.11)	623 (534.20)	316 (279.5)	498 (596.49)	630 (702.103)
Phone faults in…					
Developing	64 (47.6)	26 (32.10)	53 (na.1)	27 (25.16)	38 (39.39)
Developed	4 (na.1)	– –	23 (na.1)	21 (30.9)	17 (23.16)
All countries	55 (49.7)	26 (32.10)	38 (21.2)	24 (26.25)	32 (36.55)
Mainlines per employee in…					
Developing	66 (31.10)	107 (87.9)	110 (66.3)	108 (63.16)	98 (70.43)
Developed	– –	146 (43.2)	441 (120.2)	192 (50.10)	215 (96.19)
All countries	66 (31.10)	114 (80.11)	242 (197.5)	141 (71.26)	134 (95.62)

Notes: Coverage for 2003 is not as good as that for previous years. Thus, for some groups samples are too small to draw significant conclusions.
na.1 means not applicable. Used when there is only one observation in the group, which makes impossible to calculate the standard deviation.
IRA refers to independent regulatory agency, and PSP refers to the existence of private capital.
The price of a 3-min local call is expressed in 2000 US cents/10,000 GDP pc; while annual subscription fees are expressed in 2000 US dollars/10,000 GDP pc.
Phone faults correspond to reported faults per 100 mainlines.

Source: Own calculations using ITU data. Countries were classified in developing and developed according to their 2001 GNI per capita.

tries than in developed countries. As measured here, quality seems to be remarkably worse in developing countries, with an average failure rate of 73 percent, compared to 19 percent in developed countries. Labour productivity is (on average) 2.5 times higher in developed than in developing countries. However, for both country groups, the expected correlation between productivity and reform policies is positive.

Table 3 also reports basic statistics but compares countries that have committed to reforms with those that have not as of 2003. The sample in the first column includes countries that have not reformed, in the sense that they neither have an IRA, nor any private ownership. The sample in the second column includes countries that have an IRA, but in which firms are state-owned. The third column presents countries with private capital but without a regulator. Together, columns 2 and 3 refer to those countries that have implemented some reform policies. Finally, the fourth column includes countries that have committed the most to reforms, as they have both an IRA and at least some private capital.

The big picture that emerges from this very basic data analysis seems to confirm some of the expectations about reforms, but it also hints at some unexpected correlations. In general, countries with private capital and independent regulators have better performance indicators.[6] In other words, the basic data analysis tells us that countries with private capital and an IRA have, on average, more subscribers, lower price of local call, lower fixed costs, lower faults, and higher labour productivity than countries without private capital and IRA (compare columns 1 and 4 for all countries).

Additionally, this basic analysis reveals significant differences on the correlation between performance and reform policies between developed and developing countries. Regarding access, the gap between reformers and non-reformers (absolute difference between column (4) and column (1)) is bigger in developed countries than in developing ones. This already hints at the need to look into the relevance of other factors such as governance, which may work differently in developed and developing countries.

Regarding affordability and quality, developing countries that have committed to reforms in some way (PSP, IRA or both) enjoy better performance than those without these reforms. An exception is observed in the price of a local call, where an IRA is correlated with an increase the price. These conclusions cannot be validated for developed countries mainly because some samples are too small to draw any conclusions. However, reforms in developed countries seem to bring about lower business subscription fees. Moreover, PSP improves labour productivity (while an IRA is on average correlated with lower productivity). Note that some developed countries that have not reformed seem to be doing better than the reformers, at least in terms of the price of a local call and of quality.

Empirical evidence on the impact of telecom reforms

The reliance on simple indicators of reforms tends to suggest that privatisation combined with other reforms has more benefits in terms of performance than having privatisation alone. For example, Wallsten (2001) explores these effects for 30 Latin American and African countries in the period 1984–97 and finds that privatisation has more benefits if it is combined with the existence of a separate regulator. Fink et al. (2001) confirm this with respect to Asian countries in 1985–99. With a larger sample of countries (86 developing countries during the same period), Fink et al. (2002) show that complete liberalisation has a positive effect on mainlines penetration and mainlines per employee; that both privatisation and competition improve performance; and that the later reinforces the former. They also conclude that the sequence matters. Finally, using panel data for 200 countries from 1985–99, Wallsten (2003) finds that establishing an IRA before privatisation improves telecom investment and penetration.

Assessments focusing on more detailed indicators of reforms draw very similar conclusions. D'Souza and Megginson (1999) model firm based exclusivity periods for 85 companies in 28 countries (to capture more information on competition) and find that it is correlated with capital expenditures in telecoms. Li and Xu (2004) use variables like the share of private capital, the existence of exclusivity periods, and the procedure of privatisation. The privatisation sample includes 166 countries during 1981–98 and the competition sample includes 42 countries during 1990–98. They find that privatisation and competition positively affect performance and that if they work together the gains are bigger; also, that exclusivity periods reduce the gains from privatisation. Wallsten (2004) uses data on 32 privatized telecom firms representing 28 countries and finds that exclusivity periods are associated with significant decreases in the incumbent's investment in telecom network

[6] It is important to keep in mind that this is a statement about correlation, not about causality.

and in the number of payphones, mobile subscribers, and international outgoing minutes.

A final issue to be considered is double causality between reforms and performance. Gual and Trillas (2004) takes this into account by first estimating two policy indexes (one for openness and one for the existence of an IRA) and then analyzing their impact on performance. They find that pro-entry policies and the creation of an independence agency have positive effects on network penetration and negative effects on productivity. However, after accounting for endogeneity, results are not very robust statistically.

Even though there is "political" and conceptual consensus about the importance of institutions and governance for sector performance, a very limited number of studies have included such variables in the analysis. Only Wallsten (2001) includes a governance control – i.e. the expropriation risk. More recently, Gutiérrez (2003) used a governance index as an explanatory variable to analyze the effects of telecom reforms on performance in 22 Latin American countries during the period 1980–97. However, the components of his governance index refer more to particular characteristics of reform policies in the sector than to governance structures per se. He finds that regulatory procedures influence network expansion and efficiency.

Including governance in the picture is precisely the value added of our empirical work. Our econometric analysis explicitly accounts for the interactions between governance (corruption and investment risk) and reform policies (introduction of private capital and establishment of an IRA) when analyzing performance.[7] We used an unbalanced panel data for 204 developing and developed countries during the period 1990–2003.

We find that countries with PSP have more subscribers, lower local call price, lower faults, and higher labour productivity. However, PSP is actually associated with an increase in residential and business subscription fees, which is consistent with the tariff rebalancing that typically takes place when ending direct subsidies as part of most reforms. We also find that countries with an IRA have lower local call price, higher labour productivity and more telephone faults; but the regulator does not have a statistically significant effect on the number of subscribers and fixed costs.

Regarding governance, we find that corruption has, on average, statistically significant beneficial effects on performance in terms of access and labour productivity in countries that have not reformed. However, in countries that have reformed, reform policies offset the beneficial impact of corruption on performance. Overall, the main result is that even though corruption may lead to some performance improvements in the presence of red tape and resistance to change, reform policies would lead to stronger and better performance outputs in a much more ethical way.

Finally, while these results are important for policymakers, they also hint at complex issues and tradeoffs that deserve a much more refined analysis. Possible extensions to the econometric work include a better assessment of reform processes and sequences as well as a much less simple modelling of the degree of reforms from a cross-country perspective. At the more technical level, it would be interesting to generate *good* instruments to weaken the assumption that reforms are exogenous to sector performance.

[7] See Estache, Goicoechea and Manacorda (2006).

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