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**PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS:
MEASURING THE PHENOMENON AND ANALYSING THE IMPACTS**

By

Laurent Besançon

A Thesis

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

MASTER OF ARTS

Telecommunications Department

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ABSTRACT

PRIVATE SECTOR PARTICIPATION IN TELECOMMUNICATIONS: MEASURING THE PHENOMENON AND ANALYSING THE IMPACTS

By

Laurent Besançon

Most countries have introduced private sector management in their telecommunication service industry and there is a growing number of studies attempting to assess the impact of a shift in the ownership structure on the efficiency of the telecommunications service sector. This thesis describes the involvement of the private sector and provides an analytical framework to address the above issue. It raises suggestions, which are put to test using three different statistical tools (T-Test, regression analysis and contextual analysis).

The efficiency of the telecommunications service sector is likely impacted by factors other than ownership. These include the competitive structure of the market, the effectiveness of the regulatory framework, and the availability of other communications means. This broader framework influences operators, and generates a unique system of incentives which influences the level and growth of selected performance indicators. It is therefore suggested that to foster the efficiency of the telecommunication service sector policy-makers have to make sure the proper sets of enforceable incentives are in place.

To Marie-Thérèse and André Besançon

ACKNOWLEDGMENTS

My deepest thanks to Dr. Johannes M. Bauer for his insights, advice and patience throughout the particularly long gestation of this piece of work, to Dr. Charles Steinfield without whom I would not have been in MSU in the first place, to Dr. Tim Kelly for his support while I was working at the International Telecommunication Union (and for his continued support ever since), to Cathy O'Brien for these long discussions on our respective thesis back at MSU and finally to my parents who have witnessed the delivery of this thesis in Michigan, Geneva and London.

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INTRODUCTION

0.1 Looking at the past

Whereas telecommunications often started with private entrepreneurship, most countries had nationalised this sector by the beginning of the 20th century, except for some countries such as the United States or the Philippines which favoured a tradition of private ownership throughout. During the 19th and 20th century a few giant multinationals such as ITT of the United States, France Cable & Radio of France, and Cable & Wireless of the United Kingdom were going international, negotiating directly with governments to set up a private telecommunication business. In the latter two cases, the area of interest was closely tied to their home government political interest. Therefore, Cable & Wireless did mainly develop in British colonies, and France Cable & Radio in French colonies. ITT expanded predominantly in the Americas where the United States' influence was great.

After World War II, a wave of independence swirled on former British and French colonies. The perception of the telecommunication sector emphasised the national interest. Telecommunications were viewed as a strategic sector, similarly to the power-generation (electricity) sector. Many countries went through a telecommunication sector consolidation period. Small private telecommunications companies were typically consolidated into a public, state-owned telecommunication company. From the 1980s on, it seems that the telecommunication sector has entered still another era with many countries

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privatising their Public Telecommunication Operator (PTO) and encouraging private participation in this sector.

0.2 Purposes of the thesis

The shift towards private ownership is taken for granted by most economists as well as policy makers (though not for the same reasons) and few question this fact. Nevertheless, with over 40 countries having partially or totally privatised their telecommunication service sector in the last 12 years, it is now high time we looked back.

The main focus of this thesis is dual: it is aimed at measuring the latest trend of increased private sector participation in telecommunications as well as analysing the possible relationship between changes in the degree of private sector participation and changes in the telecommunication sector efficiency.

Chapter 1 provides a descriptive analysis of the shift of the telecommunication sector from public ownership to private ownership in the last 12 years. This chapter is based on research carried out while I was an intern and later on a young professional at the International Telecommunication Union (ITU). The increasing private sector participation in telecommunications is analyzed through an overview of two current phenomena: privatisation and a specific form of public/private partnerships, namely Build/Transfer schemes. Chapter 2 provides the reader with the necessary analytical framework designed for the analysis of the impact of changes in the ownership structure on the

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efficiency of the telecommunications service sector. Chapters 3 and 4 present the findings, using three different tools (T-Test, regression analysis and contextual analysis) to test the results for significance.

While Chapter 1 gives the necessary background on the phenomenon, Chapter 2, 3 and 4 more specifically address the research questions as defined below.

0.3 Research questions

The following research questions guide the analysis:

Research question 1 (R1)

Is a shift in the ownership structure likely to have an impact on the efficiency of the telecommunications service sector in a given country and to what extent can such a shift explain variations of the main telecommunication performance indicators?

This will then lead us to address still another research question:

Research question 2 (R2)

What are the other issues to be taken into account when looking at the evolution of the telecommunication sector?

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Chapter 1

DESCRIBING AND MEASURING THE SHIFT FROM THE PUBLIC TO THE PRIVATE SECTOR

1.1 Privatisation: Public Telecommunication Operators for sale

By the early 1980s, a few of the countries with a state-owned telecommunication sector had begun to consider privatisation of their PTOs. As early as 1981, Cable & Wireless of the UK was privatised with a second tranche being sold in 1983 and a first stake in British Telecom was sold through a public offering in 1984. NTT of Japan, CTC and ENTEL of Chile were soon to follow in the mid-1980s. By the end of 1989, a total of seven economies including Belize, Gibraltar and Jamaica had engaged in a privatisation process. By December 1996, some forty countries had done so, cashing in approximately US\$ 158 billion as shown in Figure 1 (Table 21 in Appendix A gives an overview of privatisations for the 1984-96 period). It should be noted nevertheless that the floatations of NTT (sold in 1986, 1987 and 1988 for a total of US\$ 70.4 billion) and of British Telecom, now BT (sold in 1984, 1991 and 1993 for a total of US\$ 22 billion) account for approximately 70 per cent of the overall privatisation revenue. The number of privatisation transactions has surged in the early 1990s (see Figure 2), but the amounts involved have rarely exceeded US\$ 2.5 billion at any one time.

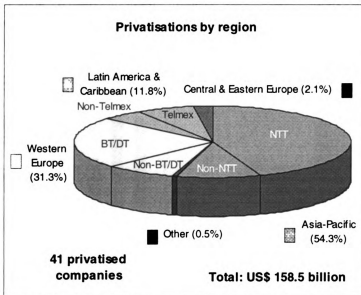
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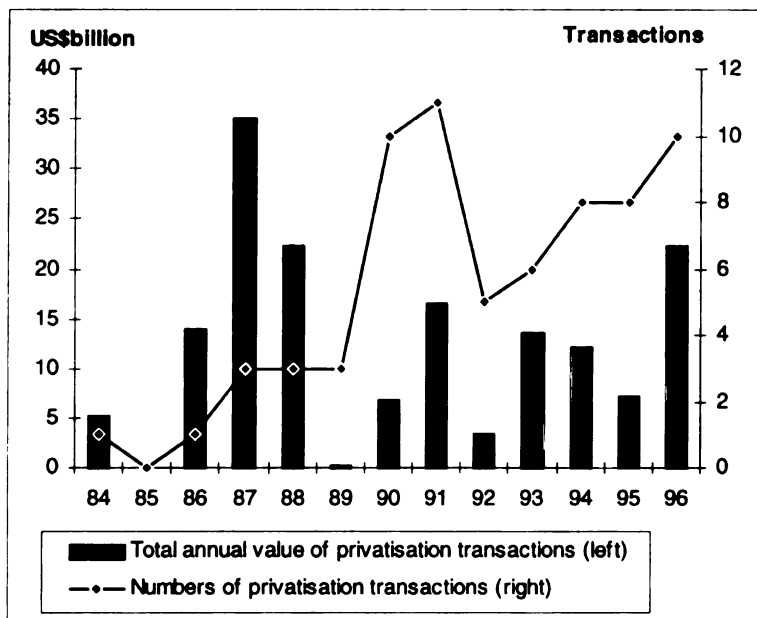
Figure 1



Notes: Telecom privatisations, breakdown by region 1984-1996.
Percentages based on amount raised. Historical US\$;
BT = British Telecom; DT = Deutsche Telekom.

Source: Data adapted from ITU PTO Database.

Figure 1 - Is there any money left in the purse?



Note: Telecom privatisations, by transaction and by value 1984-1996.
Source: Data adapted from ITU PTO Database.

Figure 2 - Increased activity in the 1990s.

When it comes to privatisation, investors and governments typically have expectations of their own. This is all the more likely when foreign investors are involved (Table 1).

A privatisation process generally involves three parties: the buyers or investors, the sellers (usually the country's government) and the privatised telecommunication operator itself. As telephony delivery has long been considered as a public utility, the privatisation of a national telecommunication operator takes time, requiring a governmental decision and often parliamentary approval. In many cases, as in Germany and more recently in Brazil, it may also require a change in the constitution. Even when the decision to proceed is granted, the choice of the actual method—sale to a strategic partner, placement

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of shares with institutional investors, public sale—may extend the overall timetable further.

Taking a closer look at the privatisation process, one can identify two common options: a sale to strategic equity partners (SEPs) or a public offering. Opting for one or the other of the two modes is not an insignificant matter: it usually reflects the primary motivation of a particular government, as shown in Table 2. Where technology transfer is the main objective, a partnership scheme is more likely to be chosen whereas a government hoping to raise as much cash as possible will probably opt for a public offering. A government with no time restriction willing to optimise both objectives will bring in an SEP first (selling a stake of the operator) and proceed with a public offering a couple of years later.

Sections 1.1.1 and 1.1.2 explain the different alternatives available to governments, along with current examples of privatisation processes.

Table 1 - Opposing expectations?

Foreign investors's viewpoint	
<p><u>Legal and regulatory expectations:</u></p> <ul style="list-style-type: none">1 A clearly defined regulatory scheme.2 Safety of assets.3 A continuation of certain monopoly privileges.4 Ability to negotiate tariffs with government or to set them freely. <p><u>Opportunity expectations:</u></p> <ul style="list-style-type: none">1 Extend the range of action outside of the home market to compensate a possible loss of revenue due to the introduction of competition.2 Entry to non-saturated markets (generally at a lower level of development and therefore with richer potential than the home market).3 Building a regional or global market presence, along with a regional or global strategy.4 Portfolio diversification.5 Market positioning, if new licenses are to be awarded or if new opportunities are to be made available in the country or in the region.	<p><u>Business requirements:</u></p> <ul style="list-style-type: none">1 Majority voting control or at least decision-making control.2 Capital required beyond initial investment to be financed on a stand-alone basis (no more cash to be injected later on).3 Return on investment expected (increasing the value of the privatised PTO, therefore increasing their own shareholder value).4 Local partners to provide guidance on the political and regulatory front.5 Peaceful relations with labor sought.

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Table 1 (cont'd).

Host countries's viewpoint	
<p><u>Financial expectations:</u></p> <ol style="list-style-type: none">1 Immediate cash income to reduce the short term deficit or the public debt and debt servicing costs.2 Injection of fresh capital in the operator in order to increase its investment capacity.3 Meeting the requirements of multilateral development banks. <p><u>Network development expectations:</u></p> <ol style="list-style-type: none">1 Transfer of technology, know-how.2 Upgrading, modernising and developing the network, as well as the available services.3 Bridging the efficiency gap (reducing the waiting list, satisfying business customers' specific needs).4 Improving service quality, capacity of innovation and network performance. <p>Improving the operator's general efficiency.</p>	<p><u>Economic expectations:</u></p> <ol style="list-style-type: none">1 Hoping the dynamised network will stimulate business development and attract additional foreign investment.2 Encouraging general public ownership (retail ownership to improve liquidity of the local market), foreign ownership (to initiate foreign investors' interest for the country).

Source: Adapted from ITU World Telecommunication Development Report 96/97.

Table 2 - Strategic Equity Partner or Public Offering?

<i>Chosen method</i>	<i>Potential consequences</i>
<i>Strategic Equity Partnering</i>	<p><u>Possible benefits:</u></p> <ol style="list-style-type: none"> 1. The investors are eager to add value to the PTO they are buying into. Upgrade and development of the network, as well as improvement of quality and efficiency, should follow. 2. Strategic equity partners bring in expertise (technical as well as managerial expertise); PTO should benefit from technology transfers. 3. A greater opportunity for staff training. 4. Enables a “carrot and stick” approach by the regulator (if the strategic partner does not fulfil its commitment, the transaction may be reverted). <p><u>Possible drawbacks:</u></p> <ol style="list-style-type: none"> 1. The PTO may become foreign-owned or at the least foreign-controlled. The fact that the national operator has been sold to a foreign company could be badly perceived by public opinion. 2. If nothing is specified in the contract/licence, the new shareholders may preferentially develop the network in money-making areas rather than in others (e.g. rural areas). 3. Staff reductions may follow (e.g. Telecom Corporation of New Zealand had its staff cut by half in the four years following privatisation). 4. The strategic equity partner(s) may require that the monopoly status is assured for a given period. This may put the government at odds regarding the position adopted for the WTO agreement 5. When technology transfer is involved, there may be a risk of “technology stripping”.

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<i>Chosen method</i>	<i>Potential consequences</i>
<i>Sale to Public/ Employees</i>	<u>Possible benefits:</u> <ol style="list-style-type: none">1. If employees are given favourable share purchase options, the potential opposition of the unions should be minimised.2. This does not give the impression that the company has been sold off to a foreign operator.3. The company should see the benefits generally attributed to private ownership (higher efficiency, better quality,...) <u>Possible drawbacks:</u> <ol style="list-style-type: none">1. No foreign expertise is brought in.2. Financing the operation is riskier than the first method (it assumes financial markets, whether domestic or international, will be ready to participate actively; the date of the operation has to take into account other public offerings worldwide).3. Diffusion of control may weaken efficiency improvement.

Note: Examples of issues to be taken into account when privatising a Public Telecommunication Operator

Source: Adapted from ITU World Telecommunication Development Report 96/97.

1.1.1 Private sale: Looking for a resourceful partner

A privatisation which involves a strategic equity partner is commonly called a **private sale**, although the process of choosing an investor often involves a public tender in which several applicants compete. The term strategic equity partner usually implies a foreign telecommunications carrier, typically from a developed country. The criteria applied in selecting a partner vary between countries.

- **Private sale with no request for bids:** In Jamaica, Cable & Wireless privately negotiated with the Jamaican government in 1989 and in 1990 the purchase of 20 per cent (each time) of **Telecommunications of Jamaica**

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(TOJ). Cable & Wireless had previously been the main shareholder of Jamintel which had been incorporated into TOJ in 1987, along with the Jamaican Telecommunications Company (JTC), thus making Cable & Wireless a TOJ shareholder.

- **Bidding process:** In the privatisation of Belgium's state-owned operator, **Belgacom**, the private sale of 49 per cent of the company in early 1996 went through a rather classical bidding process with nine international carriers lining up when the tender started but with only two competing consortia left as negotiations progressed. The alliance Ameritech/TeleDanmark/Singapore Telecom was the final winner, against an alliance of PTT Telecom Netherlands/Swiss PTT.
- **Multiple steps:** the two-step privatisation of **MATÁV**, the Hungarian PTO, followed a mix of these routes. An alliance between Deutsche Telekom and Ameritech—called the Magyarcom consortium—was granted 30.2 per cent of the Hungarian company in December 1993 and another 37 per cent in February 1996. The first private sale had been concluded through a tender process whereas in the second round there were few doubts about the identity of the potential buyer.

Whether through a bidding process or a private negotiation, the winner is given a stake in the privatised PTO as well as management control over the company even if the **size of the stake** varies from one case to another and may be under the usual 50 per cent controlling shares (see Table 21 in Appendix A).

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A minority stake may still imply the control of the company as in the case of MATÁV between 1993 and 1996, or of CANTV in Venezuela. Rarely is the state-owned company wholly sold to the strategic partner. This happened in New Zealand where Ameritech and Bell Atlantic bought 100% of **Telecom Corporation of New Zealand**. Nevertheless as part of the agreement, they were obliged to sell half of their shares within three years. Keeping a stake (whether a minority or a majority stake) enables the government to retain some control over the company, or at least a veto over major decision. This can also be done even if the government owns no shares in the privatised company, by creating a so-called “*golden share*”. In the case of New Zealand, the government created a “*Kiwi share*”, despite having no stake in the new company. Another, more practical, reason to sell only a part of the PTO, is the possibility of selling further stakes of the company at a higher price through public offerings later on, once the strategic equity partner has brought in its expertise and developed the company.

- The case of **Telefónos de Mexico** (Telmex) speaks for itself: the government made more money selling two small stakes in public offerings (4.7 per cent in April 1992, 3.3 per cent in December 1993) raising respectively some US\$ 1.5 billion and US\$ 1 billion, than when initially selling 20.4 per cent of the company to the consortium led by Grupo Carso, SBC and France Télécom (the transaction amounted to US\$ 1.76 billion in December 1990).
- A similar situation is to be noted for **Telecom Argentina** and **Telefónica de Argentina** whose public offerings of 30 per cent raised much more than the

initial 60 per cent sale to the strategic partners (see Table 21 in Appendix A for more details).

The **mode of payment** is another factor to be considered. The PTO being previously state-owned, the government usually expects that the full cash sum will go to the state, typically the Finance Ministry. Nevertheless, the strategic equity partner might be obliged to commit to invest in the company over and above the amount paid to the government. For instance, in the privatisation process in Peru, Telefónica de España was asked to pay some US\$ 1.4 billion to the government as well as to provide CPT, one of the companies now part of the new **Telefónica del Perú**, with a cash injection of US\$ 610 million. Apart from the cash transaction with the government, the buying party may also be asked to defray some governmental foreign debts as was the case in the Argentine privatisation process. COINTEL, the consortium (led by Telefónica de España), which became a 60 per cent owner of **Telefónica de Argentina**, made a cash payment of some US\$ 114 million in addition to assuming US\$ 2.72 billion of Argentine's foreign debt with a secondary market value of US\$ 517 million (meaning COINTEL actually paid US\$ 631 million as a total for its stake, as the value of the debt papers was approximately 19% of the face value at the time of the sale). This offers a way for governments of developing countries to pay off part of their foreign debt.

1.1.2 Public offering: Attracting investors

A **public offering** proceeds by placing previously state-owned shares on a stock exchange, usually dividing the capital released in several tranches aimed at **different types of investors**, such as:

- **State-owned holding companies.** They are favoured when shortage of local private capital is expected but the main reason is often to keep governmental, or at least domestic, control over the company via other state-owned or state-controlled businesses. Obviously, those investors will be eager to share the future benefits of having shares whose price will skyrocket.
- **Small local investors** are usually included in the privatisation process. They may not buy large numbers of shares but may nevertheless be numerous. For instance **France Telecom** claimed as many as 4 millions private shareholders after its October 1997 public offering. They help to anchor the company's capital in domestic hands. Popular shareholdership programmes help to ease public acceptance of privatisation. Therefore, special programmes are typically set up to attract small investors. They include special discounts as well as incentives to keep the shares over a long period of time such as attributing a share, free of charge, for every ten shares kept during one or two years. For instance, during the second round of **Portugal Telecom's** privatisation, in June 1996, small investors were granted a 10 per cent discount on the tranches set aside for them. This call for small investors may not always be viable, especially in countries without a stock exchange.

- **Employees** are another category of investors and not one to be overlooked, especially if the government wants to win the trade unions's acceptance of the privatisation process. Privatising a PTO is often perceived as resulting in layoffs and both the government and the unions are fully aware of this potential outcome. Having the employees take part in the privatisation process as investors is used to help overcome resistance. Specifically, employees are given special discounts. In the case of **Telefónos de México**, the tranche sold to employees for US\$ 325 million and accounting for 4.4 percent of the company was totally financed with a loan programme. Compared to what the consortium led by Grupo Carso paid for its stake at the same time, employees were granted an approximate 15 per cent discount. Similarly, **Portugal Telecom's** employees gained a 10 per cent discount in the second public offering in June 1996. **France Telecom's** employees gained a 20% discount in the October 1997 offering, should they retain their shares for a minimum of two years.
- Where the domestic market is not thought to be able to absorb the capital that is to be released (for instance, due to a lack of private capital liquidity in the country), or when local regulations encourage foreign investment, the domestic public offering can be complemented by an international public offering, aimed at **foreign investors**. This takes place through the placement, registration and listing of the company's shares on several specific stock exchanges—typically the main ones are New York, London, Paris, Frankfurt and Tokyo. The company can choose to issue **ADSs** or ADRs (American

Depository Shares or Receipts). These are securities that physically remain in a foreign country. They allow the issuer's shares to be traded on overseas exchanges or privately and may be at some point converted in to actual shares. Those specific shares are usually held by **foreign institutional investors** such as banks or pension funds. Recent example of public offerings where foreign participation is invited, was the partial privatisation of **OTE** of Greece in March 1996 whereby 6 per cent of the company's capital was offered to domestic investors and 2 per cent to international investors. The Portuguese government also chose a combination of domestic and international offerings in June 1995 and June 1996, selling a total of 49 per cent of **Portugal Telecom** in the process.

A public offering has to be carefully timed. This is all the more important if an international tranche is released. Domestic and international financial indicators have to be favourable. Simultaneous major offerings have also to be taken into account as they may be more attractive to potential investors. For instance, during the privatisation process of **PT Telkom** of Indonesia, the government had to downgrade its sale expectation: it had been planning to sell up to 15 per cent of the company to international investors, the government had to step back and eventually reduce this tranche to 6.5 per cent due to nervousness on the part of the investors.

The privatisation process may also be a combination of both modes (a private sale combined with one or more public offerings), and it may take several

years until the PTO is entirely privatised. For instance, it took five years, and seven steps, to privatise **Telmex** (Teléfonos de Mexico), including a private sale to a strategic partner as well as several public offerings and a sale to the company's employees. Similarly, the next step in the privatisation of **Portugal Telecom** after two successful public offerings in 1995 and 1996, was said to be the search for an international strategic partner which would acquire some 20-25 per cent of the company.

Many countries have declared an interest to privatize their PTOs in the near future but experience has shown that announced or likely privatisations are often delayed if not postponed for an undetermined period of time. The privatisation of **Turk Telecom** has been debated for several years and is still under discussion.

1.2 Build/Transfer arrangements

Build/Transfer (B/T) arrangements are used in infrastructure sectors as a means of attracting and allowing private investment (both foreign and domestic). Toll highways, water supply projects and power plants have been financed in this way for some time. The introduction of B/T arrangements in telecommunications has only occurred since the late 1980s. One of the largest was a 2.6 million line project in Thailand, worth some US\$ 4 billion which is handled by TelecomAsia on behalf of the Telephone Organisation of Thailand (TOT).

Table 3 - Build/Transfer arrangements: selected schemes

Type	Description	Selected examples
BOT	<u>Build-Operate-Transfer:</u> The private partner is given a license to operate the network during a number of years, after which it hands over the network to the public partner (the government or the national PTO). The license contract usually includes annual royalties.	<u>Lebanon</u> (Public partner: Government) - LibanCell GSM cellular network: Telecom Finland 15%, along with Lebanese entrepreneurs (10 year concession with a possible 2 years extension), - FTML Cellis GSM cellular network: France Telecom, along with Lebanese entrepreneurs (10 year concession with a possible 2 years extension).
BTO	<u>Build-Transfer-Operate:</u> The private partner constructs, hands over the network to the public partner (the government or the national PTO), then operates under a contract the network during a number of years. The license contract usually includes annual royalties. From its first day of operation, the network is gradually handed over to the public partner.	<u>Thailand</u> (Public partner: TOT) - 2.6 million fixed lines project: TelecomAsia (25 year concession), - 1.5 million fixed lines project: Thai Telephone and Telecommunications (25 year concession).
ROT	<u>Rehabilitate-Operate-Transfer:</u> Same as BOT except that instead of building a new network, the private partner upgrades and extends an existing one perhaps by adding a digital overlay.	<u>Indonesia:</u> The country has been divided in 6 regions and five of them have been awarded to five consortia for 15 years. Each consortium has to upgrade the existing network and add up to 500 000 new lines. Those projects are known as KSOs.

Table 3 (cont'd).

<i>Type</i>	<i>Description</i>	<i>Selected examples</i>
<i>BLT</i>	<u>Build-Lease-Transfer:</u> The private partner builds the network and leases it to the public partner (government or national PTO) which is the operator in this case. At the end of the contract, the public partner becomes the owner.	<u>Lebanon:</u> MCI is building an international gateway, which is being operated by the Lebanese government. Assurance of future outgoing traffic is the incentive for MCI.
<i>BMT</i>	<u>Build-Maintain-Transfer:</u> Same as BLT except that the private partner is obliged to maintain the network leased by the public partner until the latter becomes the owner.	This type of contract is common on the equipment side of telecommunications.

Source: Adapted from ITU World Telecommunication Development Report 96/97 and Van den Dries (1996).

B/T arrangements provide an alternative way of raising capital (other than by privatising or contracting debts with bond issues) to finance the expansion of national telecommunication networks. B/T arrangements are typically called concessions; many variations on several basic types can be found. The main schemes are identified in Table 3. The principle is similar in each case: the foreign (or domestic) investor, also called the concessionaire, is allowed to build or rehabilitate the network, then to operate or maintain it during a limited period of time (typically between ten and fifteen years) before or after turning it back to either the host government or the national public operator (the PTO). Two examples of B/T arrangements are discussed in more detail below.

1.2.1 Thailand, the B/T pioneer

Thailand has adopted the B/T concept in telecommunications as a philosophy and applied it to every aspect of the telecommunication sector (see Table 4). In the mid-1980s, the Thai government was eager to develop the telecommunication sector to become a significant hub in Asia as well as to bring the country's teledensity closer to that of other Dynamic Asian Economies (DAEs) such as Korea (Rep.) and Singapore. The Telephone Organization of Thailand (TOT, the domestic telecommunication operator) and the Communications Authority of Thailand (CAT, the international telecommunication operator), both state-owned, did not generate sufficient cash flow (60 per cent of the profit was going to the government) to be able to engage in a significant development programme. The government was therefore looking for a way of injecting private capital, without infringing upon the law which stipulates that the provision of basic telecommunication services has to remain under state control. The Build-Transfer-Operate concept appeared to be a way of overcoming this problem since the network, once built, is owned by a state-owned company (either TOT or CAT).

The concessionaire (the private investor) operates the network for a specific period on behalf of the state. Each year the concessionaire has to pay royalties. These fees are calculated as follows: the concessionaire has to pay an annual guaranteed minimum revenue as specified in the agreement (typically to be paid in four quarterly installments) or a percentage of the gross profit also

specified in the agreement (it typically increases over time), whichever is the greater. For the year 1995, for instance 10.8 per cent of TOT's revenues came from those royalty arrangements. In addition the private partner has a specific timetable to respect: TelecomAsia, for instance, was to build its 2.6 million lines before September 30, 1996. TelecomAsia was to pay a late fee for any uncompleted line. The public partner is not without obligation either: the 2.6 and 1.5 million lines projects awarded respectively to TelecomAsia and Thai Telephone and Telecommunications (TT&T) (see Table 4) involved, for instance, that TOT was to buy back the networks from the concessionaires segment by segment as the projects went on.

Foreign investment is playing a significant role in the Thai Build/Transfer schemes as half of the projects involve one or more foreign partners. Most of those foreign partners are based in the Asia-Pacific region (Singapore Telecom, Hutchison Whampoa of Hong Kong, Matrix Telecommunications and Telstra of Australia, NTT and Itochu of Japan). As well as financial participation, foreign partners also bring their expertise, when solicited, as the local partners connected with main Thai families were not necessarily involved in the telecommunications business before winning the concession. The Sino-Thai Chearavanont family, owner of Charoen Pokphand, Thailand's leading agribusiness conglomerate, first entered the telecommunication business when setting up TelecomAsia which was granted a 25-year concession to build-transfer and operate 2 million lines (later raised by 600,000 lines). While foreign partners may provide expertise, local partners obviously bring political connections. Cases

where the foreign investor is the leader, like Matrix, are rare. This Australian operator is specialised in radio-paging, operating in Indonesia, the Philippines and Malaysia and leads its Thai operation with 49 per cent of the venture. International players are generally minority shareholders: Nynex (13.5 per cent of TelecomAsia), NTT (18 per cent of Thai Telephone and Telecommunication Company), Singapore Telecom (20 per cent of Shinawatra Paging, but 49 per cent of Shinawatra Datacom). Though some of the concessionnaires only entered the telecommunication business recently when negotiating their first B/T arrangement with TOT or CAT, they are now the ones who are currently going abroad. Shinawatra is trying to replicate the B/T format in other Asian countries such as the Lao PDR or Cambodia.

Table 4 - Build/Transfer as a philosophy: BTO concessions in Thailand.

Service	Project	Concessionaire	Duration (year)	Awarded by	Signed / Launched	Foreign Partner
Telephone lines	2.6 million fixed lines	TelecomAsia	25	TOT	1991/1992	Nynex (USA)
	1.5 million fixed lines	TT&T	25	TOT	1992/1994	NTT, Itochu (Japan)
Public phones	Card Phone	AIS (Shinawatra)	10	TOT	1990/1991	X
	International Credit Card Phone	Phonecard	15	CAT	NA/NA	X
Rural Telephony	Rural Public Long Distance Telephone Project	Rural Telephone Services (Shinawatra)	5	MTC	1993/1993	X
Long Distance	Optical Fibre (land)	Com-Link, Railways Authority of Thailand	20	TOT	1990/1992	Com-Link (Canada)
Data	Optical Fibre (submarine)	Jasmine Submarine Telecommunications	20	TOT	1991/1993	X
	Thaicom (satellite)	Shinawatra Satellite	30	MTC	1991/1993	X
	DataNet	Shinawatra Datacom	10	TOT	1989/1990	Singapore Telecom
Videotex		Lines Technology	15	TOT	1992/1994	France Télécom, Matra (France)
Cellular	Analogue NMT 900	AIS (Shinawatra)	20	TOT	1990/1990	X
	Analogue AMPS 800- B	TACS (UCOM)	15	CAT	1990/1991	Motorola (USA)
	Digital GSM 900	AIS (Shinawatra)	20	TOT	NA/1994	X
	Digital DCS 1800	TACS (UCOM)		CAT	1993/NA	X

Table 4 (cont'd).

Service	Project	Concessionaire	Duration (year)	Awarded by	Signed / Launched	Foreign Partner
Paging	PhoneLink	Shinawatra Paging	15	TOT	1989/1990	Singapore Telecom
	PacLink	Percom Service	15	CAT	1990/1991	AirTouch (USA)
	PacLink	Pacific Telesis	10	CAT	1986/1987	AirTouch (USA)
	Pagephone	Loxley/Hutchison	15	TOT	1990/1991	Hutchison Whampoa (Hong Kong)
	EasyCall	Matrix	15	CAT	1990/1992	Matrix (Australia)
	WorldPage	WorldPage	15	TOT	1993/1993	X
CT2	Digital Paging	Samart Corporation	20	PTD	1995/1995	Telstra (Australia)
	Fonepoint	Shinawatra	10	TOT	1990/1991	Hutchison Whampoa (Hong Kong)
Trunked Mobile Radio	Common Base Radiotelephone	RadioPhone	15	TOT	1992/1993	X
	WorldRadio	TACS	15	CAT	1992/1993	X
Satellite Services	Data	Compunet	15	PTD	1988/1989	Cable&Wireless (UK)
	Data	Samart Telecoms	15	PTD	1988/1989	Telstra (Australia)
	Data/ISBN	Acumen	15	TOT	1991/1991	X
	Data/Voice/Video	ThaiSkycorn	15	CAT	1992/1993	X
	Voice/TDMA	Acumen	15	TOT	1990/1991	X
Directory Publishing	Shinawatra Telephone Directories	Shinawatra Directories	10	TOT	1995/1995	X

Notes: As of July 1996.

AIS = Advance Info Service; CAT = Communication Authority of Thailand; MCOT = Mass Communications Organization of Thailand; MTC = Ministry of Transport and Communications; PTD = Posts and Telegraph Department; TACS = Total Access Communications; TOT = Telephone Organization of Thailand; TT&T = Thai Telephone and Telecommunication Company.

Sources: ITU World Telecommunication Development Report 96/97.

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The results of this Build/Transfer-based policy have been quite spectacular in Thailand. While TOT barely managed to build 140,000 lines per year from 1985 to 1990, some 700,000 new lines were added to the network in one year's time, in 1995 (see Table 5). Despite the rapid growth in telephone lines, the waiting list for main lines boomed just the same way, multiplying by 4.4 since 1985. Another consequence of the introduction of private capital in the Thai telecommunication sector is the amazing development of mobile communications. By December, 1995, almost a quarter of all telephone subscriptions were mobile telephones. Moreover, four out of ten new subscriptions added during the year were mobile. Last but not least, revenues accompanied the investment boost in telecommunications, showing a sixfold surge since 1985 (see Table 5).

Table 5 - BTO policy: Achievements in Thailand (1985-1995)

Comparative selected indicators as a showcase for the B/T concept.				
Indicator	1985	1990	1994	1995
Main lines in operation Thailand	626'498	1'324'522	2'751'776	3'453'108
Main lines in operation per 100 inhabitants				
Thailand	1.23	2.4	4.69	5.88
ASEAN*	1.22	1.79	3.12	3.67
Cellular mobile subscribers Thailand		63'223	643'000	1'087'504
Cellular mobile subscribers per 100 inhabitants				
Thailand		0.114	1.095	1.852
ASEAN*		0.073	0.512	0.864
Public pay phones per 1000 inhabitants				
Thailand	0.28	0.40	0.72	
ASEAN*	0.19	0.29	0.65	
Waiting list for main lines				
Thailand	359'923	992'496	1'597'800	
ASEAN*	1'096'500	2'031'169		
Radio-paging subscribers per 1000 inhabitants				
Thailand			0.650	
ASEAN*			0.450	
Telecom revenue (US\$ million) Thailand	295	1'047	1'808	

Note: For the purpose of this study, Vietnam has not been included in Association of South East Asian Nations, although, as of July 1996, ASEAN includes Brunei, Indonesia, Malaysia, Philippines, Singapore, Thailand, Vietnam.

Source: ITU World Telecommunication Indicator Database.

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As Thailand prepares for the privatisation of its two national operators, serious questions lie ahead over the future of the Build/Transfer arrangements. Some concessionaires, such as Shinawatra or TelecomAsia, have become *de facto* PTOs. Even if they are still linked to TOT (through a concession) with revenue-sharing agreements, they have become TOT's direct competitors. Once TOT is privatised, it may not be so benevolent towards Shinawatra or its peers. In order to improve their profitability, TOT and CAT will typically engage in their own network development programmes. The fact that their "competitors" operate 75 per cent of the main lines will not help. TelecomAsia and TT&T are building (and will operate) a total of 4.1 million lines whereas TOT is expected to operate not more than 3 million lines by the year 2000 if it continues to build at an average of 140,000 lines per year. In mobile communications, the same problem will arise, once the concession comes to an end and the competing networks are transferred to TOT and CAT. What to do with two competing networks? Should the Build-Transfer arrangements be transferred to a third company to maintain competition? Should they be completely integrated with TOT's and CAT's own networks (making both companies more attractive)? These are the questions which lie ahead.

1.2.2 B/T: A regulatory illusion?

Build/Transfer schemes are typically adopted to get around local restrictions (typically stipulating that provision of telecommunication services should be under state control) to allow both private and foreign investment. Due

to the national regulation, the domestic operator is often barred from engaging directly in partnerships with private companies. Many governments are sensitive about handing over control to the private sector. Setting up private joint ventures or partnerships is considered as a first step towards partial privatisation or strategic partnering. Setting up a B/T scheme is sometimes presented as a panacea in that the state, or a state company will ultimately recover the ownership of the network. Nevertheless, several points that make B/T agreements less attractive should be taken into account:

- The duration of any agreement should be compared to the depreciation cycle typically used by telecommunication operators for their own networks (Table 6). In many cases, the duration specified in B/T arrangements exceeds the lifetime of the telecommunication equipment. Thus, according to this comparison, when the network is handed over to the government or to a state-owned company, it has become effectively worthless.
- The duration of the B/T arrangements should be similarly compared to the duration of the cycle of technology renewal. For instance, a state-owned company that in 1996 inherited a mobile network set up one decade earlier would have a low-capacity analogue network which is ill-suited to compete with modern digital networks. Indeed, most technologies used in today's telecommunication networks were not available ten or fifteen years ago. The case is even more sensitive in Thailand where TOT and CAT will be buying back networks from their concessionaires progressively over the period of the

Build/Transfer agreement. The networks they will be paying for could be obsolete by the time they are recovered.

- When a private company is given the right to operate a network for a particular period, for example ten years, after which it will lose ownership rights, there is little incentive for the company to maintain or upgrade the network from the seventh or eighth year on, unless a clause in the arrangement specifies such an obligation.
- Finally, the state-owned company typically argues that it could have set up on its own partnerships with private companies if it had been allowed to do so. Setting up 50/50 joint ventures, it would have been able to reap much more benefit than the current situation allows (typically between 10 and 25 per cent of the gross profit).

Table 6 - Who gets the best deal?

<i>Selected project</i>	<i>Duration of the concession</i>	<i>Useful life for telecommunication equipment</i>
TelecomAsia, 2.6 million fixed line project	25 years	Cable: 15 to 20 years Circuit: 7 to 11 years Digital switching: 11 to 12 years
LibanCell, cellular network	10-12 years	Mobile network equipment: 10 years
Advance Info Service (Shinawatra), cellular network	20 years	Mobile network equipment: 10 years
EasyCall (Matrix), paging network	15 years	Paging network equipment: 10 years

Note: Duration of selected B/T arrangements, as compared to useful life estimated for selected telecommunications equipment: Examples from Thailand and Lebanon.
Useful lives have been estimated, based upon what is actually used by telecommunication companies in their financial statements.

Source: Besançon (1997).

1.3 Conclusions

The involvement of the private sector is growing fast in the telecommunications field. Governments have been eager to explore new ways of financing the telecommunications development in order to substitute for the public funding, much needed in other sectors of the economy. The involvement of the private sector has materialised in the award of stakes in national telcos, or in the award of network building and operating contracts.

This chapter has provided a descriptive background on privatisation and Build/Transfer schemes, based on research carried out at the ITU. At this point the reader should be familiarised with this two main types of private sector participation in the telecommunication service industry.

The next three chapters deal more specifically with the research questions introduced in the introductory chapter:

(R1): Is a shift in the ownership structure likely to have an impact on the efficiency of the telecommunications service sector in a given country and to what extent can such a shift explain variations of the main telecommunication performance indicators?

(R2): What are the other issues to be taken into account when looking at the evolution of the telecommunication sector?

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Chapter 2

ANALYTICAL FRAMEWORK

The previous chapter has provided the reader with an overview of how the privatisation of the telecommunication sector has taken place in various countries.

This chapter introduces and presents the approach which has been adopted in order to answer the two research questions. The working methods for this analysis are discussed, based on data available (the main performance indicators of the telecommunication operators).

This chapter serves three purposes:

- Proposing performance indicators measuring the efficiency of the telecommunication sector.
- Identifying the factors which are likely to have an influence on the performance indicators.
- Discussing the working methods.

2.1 Performance indicators for telecommunication operators

The first research question (R1) focuses on how the efficiency of the telecommunication industry is impacted by a change in the ownership structure. What characterises the efficiency of this industry has first to be looked at. The efficiency of the telecommunication services industry can be addressed with the

assessment of the performance of single telecommunications operators. The work presented by Dr. Tim Kelly in the OECD report “Performance Indicators for Public Telecommunications Operators” (1990) is particularly valuable in this respect. The report is conceived as a tool for regulators and decision-makers to assess the performance of public telecommunications operators. Various indicators are therefore introduced and discussed in four key areas: pricing, quality of service, productivity and efficiency. These indicators are presented in Table 7.

Table 7 - Performance indicators for public telecommunications operators (OECD suggestions).

<p>Pricing</p> <p><u>Price level</u></p> <ul style="list-style-type: none"> • OECD basket of national telephone charges (business subscribers, residential subscribers) • OECD basket of international telephone call charges (business subscribers, residential subscribers) • OECD basket of mobile communications charges • OECD basket of leased lines charges • OECD basket of packet-switched data communications charges <p><u>Charge structure</u></p> <ul style="list-style-type: none"> • The ratio of connection costs to rental charges (from PTO revenue patterns, trends over time) • The ratio of fixed to usage charges (from PTO revenue patterns, from subscriber bills) • The ratio of local to long-distance charges (from subscriber bills, trends over time) • The ratio of national to international calls (in volume of calls, in relative cost of call, trends over time) • The ratio of mobile to PSTN calls (business subscribers) 	<p>Quality of service</p> <ul style="list-style-type: none"> • Waiting time/delivery precision • Effective payphone density per 1000 inhabitants • Call failure rates during the busy hour • Fault reports per 100 main lines per year • Fault clearance by the end of the next working day • Response times for operator services <p>Productivity and efficiency</p> <ul style="list-style-type: none"> • Number of PSTN main lines (per capita, growth per year) • Volume of calls in minutes per year • Value of telecommunications revenues (as a percentage of GDP, growth per year) • PTO cost structure (interest payments, taxation, profitability) • Value of capital investment (per capita, per main line, as percentage of revenue, as percentage of GFCF, growth per year) • Value of R&D investment (as a percentage of revenue) • Measures of network utilisation (revenue per line, revenue per capita, growth per year) • Measures of productivity (main lines per employee, growth per year)
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Source: Adapted from Performance Indicators for Public Telecommunications Operators (OECD, 1990).

Similarly, building on the OECD report and based on the indicators actually tracked (with more or less success) by the International Telecommunication Union, the performance of telecommunication operators can be assessed looking at the availability, affordability, and quality of the service offered by the operators as well as their productivity as shown in Table 8.

Table 8 - Performance indicators for public telecommunications operators (based on indicators computed by the ITU)

<p>Availability of the service</p> <ul style="list-style-type: none"> • Network growth (does not take into account population growth) • Teledensity growth (takes into account population growth) • Waiting list/Waiting time <p>Quality of the service</p> <ul style="list-style-type: none"> • Degree of digitisation • Underutilised capacity • Local call completion rate 	<p>Affordability of the service</p> <ul style="list-style-type: none"> • Residential installation fees and monthly subscription • Business installation fees and monthly subscription • Rate for a three minute local call • Rate for a three minute international call to the top destination <p>Productivity</p> <ul style="list-style-type: none"> • Revenue per line • Revenue per employee • Main lines per employee
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Source: Adapted from Performance Indicators for Public Telecommunications Operators (OECD, 1990).

Our analysis will focus on the first and the last series of performance indicators highlighted above: the availability of service and the productivity of operators. Indeed, the data available to us regarding affordability and quality of service were not consistent enough to proceed with our analysis (lack of continuous data for the operators considered).

2.1.1 Availability of service

At first sight, the most widely used indicator to measure the availability of service is “Teledensity”: the penetration rate of telephone services measured by the number of main lines in operation per 100 inhabitants. When looking at a country, it makes sense to use such an indicator. It allows elaborating on the notions of public service and universal service, looking from the user’s side at how easily the average citizen has access to telephone services. When analysing the performance of the operator however, this indicator may not be the most appropriate indicator. Indeed, “Teledensity” combines the notions of network size (number of main lines in operation) and population (this is a “penetration” ratio). While the operator should have control on the evolution of the network size, it does not have any control on the growth of the population. Therefore, in the course of our analysis, both indicators (network growth and teledensity growth) will be used when appropriate.

“Waiting time” and “Waiting list” are two notions that should be handled particularly carefully. Indeed, the waiting time indicator only measures the expressed unmet demand but not the actual unmet demand. The actual unmet demand can be described as the combination of two components:

- The expressed unmet demand: people who can afford a telephone line and are willing to wait as long as it takes to get it.

- The hidden demand: people who could afford a telephone line and would apply for it if the waiting time was insignificant. Data on hidden demand is not available.

The “Waiting time” is computed as follows: “Waiting list” at a given point of time (expressed unmet demand) divided by the number of new operating main lines added to the network during the current given year (hence, given the current network growth, how long it takes to meet entirely the expressed demand).

Another issue not to be overlooked when considering the waiting list as a performance indicator lies in the way an operator can improve it. The first way one can think of is to meet demand, building additional main lines to the network particularly in areas where demand is high. Another way to improve the waiting list indicator is to have demand decrease. Increases in connection charges or in call charges will have this impact. We do not argue here that operators will deliberately rise their rates in order to decrease the waiting time for a telephone connection. Nevertheless, setting up subscriber bond schemes, rebalancing the rate structure (increasing local charges versus long-distance and international rates)—which are also ways to raise the needed capital to develop the network at a faster pace—will have an impact on people’s desire to request a telephone line. If the service is perceived as more expensive or if the connection barrier is raised, people may think twice before signing up for the service. This should be expected in the case of subscriber bond schemes whereby the future subscriber

is asked to contribute to the cost of his/her connection to the network whether or not this contribution will be given back, through discounts or convertible bonds programmes.

Therefore, “Waiting list” and “Waiting time” will be mentioned in our analysis but the main focus will be on the telecommunication operators’ ability to develop their fixed-line telecommunication network.

2.1.2 Productivity

The most commonly used indicators to measure a fixed-line operator’s productivity are “Revenue per Employee” and “Revenue per Main Line” indicators (adaptations to the telecommunication sector of the usual economic ratios: Income/Assets and Income/Labour). Another indicator frequently used when comparing (or benchmarking) telephone companies is “Main Lines per Employee”.

The approach used in the analysis is a country-specific approach as opposed to a cross-country approach. The main concern when handling revenue data was therefore not to have comparable country data but rather to have data comparable throughout time for each given country. Thus, local currency rather than US dollars is used when available and revenues are compared at 1990 constant local currency. In so doing, the impacts of variations of exchange rates as well as of inflation rate are eliminated. The adjustment was carried out using the 1990 Consumer Price Index as provided by the International Monetary Fund.

2.2 Ownership does not explain it all

Reviewing business opportunities in the telecommunication sector in developing countries, Ambrose et al (1990) give a good flavour of the reasons typically pointed out to fuel the rationale advocating a shift from public ownership to private ownership. Those reasons, supposedly based on observations of the telecommunication sector in developing countries where the PTO is state-owned, include:

- A lack of funds available for investment: developing countries often have limited fiscal resources, and telecommunication earnings are likely to be diverted to remedy this fact or to fund other sectors (Ambrose et al suggest the postal sector and the electricity utilities sector as they are typically under the responsibility of the same government authority); moreover, having to deal with some urgent needs (such as paying back foreign debts) the government is not likely to allocate new funds to the telecommunication sector, although needed to engage in network expansion programmes. Ambrose et al argue that funds are not even made available for proper maintenance of the telecommunication network, shortening therefore the life of capital investment.
- A lack of efficiency observed within the telecommunication operators, organised as “bloated bureaucracies”, which results in unresponsiveness vis à vis customers' needs. According to Ambrose et al, shortage of trained staff,

little accountability by management and staff, as well as poor incentives to motivate managers or staff members are to blame.

- A lack of technical and managerial resources that prevent operators from taking advantage of new technology developments.

The combination of these factors materialises in:

- A low penetration of telephone services, especially in non-urban areas.
- Poor service: long waiting time (after a request for a telephone line has been issued by a customer) and low call completion rates.
- Underutilised capacity.
- Overstaffed telecommunications operators.

The ideas developed by Ambrose et al seem interesting and meaningful except when it comes to illustrate them with figures. Although published by a respectable organisation (the International Finance Corporation of the World Bank), it turns out that points are made by the authors on no clear grounds, as if figures were produced to fit the arguments (See Appendix B).

Table 9 - Efficiency measured in terms of lines per employees in selected countries, in 1988.

Country	Data year	Main lines in operation	Employees	Main operating lines per employees
State-owned operators in 1988				
Tanzania	1988	66,058	4,907	13
Ecuador	1988	383,589	5,931	65
Hungary	1989	915,900	21,000	44
Indonesia	1988	828,812	41,567	20
Malaysia	1988	1,247,687	28,168	44
Venezuela	1988	1,457,771	17,913	81
Austria	1988	3,001,319	18,471	162
India	1988	4,174,278	362,000	12
Netherlands	1988	6,466,000	29,142	222
Korea (Rep. of)	1988	10,306,028	52,073	198
Partially or fully private operators in 1988				
Vanuatu	1986	2,047	115	18
Saint Kitts and Nevis	1988	7,057	100	71
Belize	1989	15,254	335	46
Barbados	1987	65,076	883	74
Jamaica	1987	81,713	2,345	35
Philippines	1988	570,643	14,586	39
Telefonica de Espana	1988	10,971,600	66,062	166
Nynex (USA)	1988	14,807,000	97,400	152
NTT (Japan)	1988	49,900,000	283,294	176

Notes: Countries are ordered according to the size of their network (Number of main lines in operation);
Countries in bold have been added as compared to Ambrose's table (see Appendix B).

Source: Data adapted from ITU World Telecommunication Indicators Database, ITU PTO Indicators Database.

For instance calculations measuring the efficiency of public telecommunication operator appear to be partly wrong and compare private operators in developed countries (the US, Japan and Spain) with state-owned operators in developing countries (Ecuador, Hungary, India, Indonesia, and Malaysia) as shown in Appendix B. I prefer to provide the reader with a more balanced sample (see Table 9). As suggested in Table 9 the problem may not lie only on the consideration of ownership. Efficiency, measured in “main lines in operation per employees”, in the Philippines or Jamaica does not plead in favour of private ownership.

Table 10 - Main lines per employee in 1985 and 1995, selected companies.

Company	Main lines per employee in 1995	Rank in 1995	Main lines per employee in 1985	Rank in 1985	Change	Privatisation Date	State-owned % in 1995
Korea Telecom	312	1	137	7	128%	1993	71.2%
RBOCs*	276	2	168	3	98%	<1985	--
KPN	266	3	202	1	31%	1994	45%
NTT	264	4	152	4	74%	1986	65.4%
Telefonica (Spain)	217	5	130	8	67%	<1985	20.2%
Swiss PTT	214	6	179	2	20%	State	100%
OTE	210	7	102	11	106%	1996	100%
BT	209	8	90	13	132%	1984	--
TeleDanmark	194	9	149	5	30%	1994	51%
France Telecom	191	10	138	6	38%	State	100%
Deutsche Telekom	184	11	120	9	54%	1996	100%
Telmex	180	12	94	12	90%	1990	--
Belgacom	178	13	110	10	62%	1996	100%
Turk PTT**	134	14	31	20	332%	State	100%
TOT	132	15	37	18	257%	State	100%
CANTV	128	16	70	14	83%	1991	60%
Telstra	125	17	66	15	89%	State	100%
Telekom Malaysia	116	18	33	19	254%	1990	77.4
Telecom Eireann	112	19	43	16	157%	1996	100%
PT Telkom (Indonesia)	88	20	17	21	426%	1995	81%
PLDT	61	21	41	17	49%	<1985	--

Notes: Companies are ordered according to their rank in 1995. Companies in bold are companies where the majority of voting shares is privately owned. Note that private investors had 40% of the capital in CANTV (Venezuela) in 1995 but 51% of the voting shares, which explains why bold has been used for this company.

* RBOCs: Regional Bell Operating Companies except US West (for which aggregated data was not available in 1995).

** 1985 and 1994 data.

Source: Data adapted from ITU PTO Indicators Database.

Table 9 displays yet another set of data which prevents from reaching rapid conclusions: in 1995 among the 10 most efficient telecommunication entities (main lines per employee), five are state-controlled, five are controlled by private investors. Between 1985 and 1995, the same indicator has dramatically increased for both categories.

Therefore, taking a closer look at Ambrose et al's discussion paper highlights the fact that ownership should not be the only variable we may want to look at. When observing the impacts on the telecommunication sector efficiency of policy changes regarding the ownership of the telecommunication services operator, we should not overlook the influence of other variables.

This section has therefore provided practical and intuitive examples which convey the same idea, that is, *ownership does not explain it all*. The following section looks at this issue in yet another manner, introducing the notion of incentives. It presents the different influences or, one should say, incentive-generating sources which should be taken into account when looking at the evolution of performance indicators of telecommunication operators.

2.3 A matter of incentives

2.3.1 Ownership-specific incentives

When exploring the privatisation issue in the United Kingdom, Vickers and Yarrow (1988) apply the Principal-Agent theory whereby the Principal “seeks to establish incentives for an Agent, who takes decisions that affect the Principal, to act in ways that contribute maximally to the Principal’s own objectives”. The telecommunications operator can be identified with the Agent and the owner (whether public or private) with the Principal. For instance, when privately owned, incentives to the Agent can materialise in stock options for the top management. Indeed, maximising the latter’s benefits (that is maximising the profitability of the firm in order to maximise the share price) will contribute to the objectives of the Principal (here, the private shareholders whose main objective is to maximise their return on investment). More generally speaking, the current trend aiming at indexing the management’s salaries and bonuses on specific variables such as the EVU reflects this concern.

The nature of the incentives for the management will depend on the nature of the ownership. In the case of private ownership, Vickers and Yarrow (1988) argue that the management’s behaviour will be driven by the shareholders’ profit expectation but also by the management’s unwillingness to lose control over the company (this loss being caused by a take-over for instance if the company is thought to be weakened). In the case of public ownership, the

management's behaviour will be driven based on government incentives. The government may be pursuing social objectives or political objectives (keeping prices low to please voters) or may be subject to external lobbying.

One might think that a state-ownership protects the firm from external influence. Actually, as McCormick mentions it, powerful corporate users can pressure the political sphere enough to have the telecommunication operator engage in business-oriented reforms. For instance, a threat by multinationals to relocate their business in another country or to completely bypass the national network is no small issue. This can be serious enough for a government to force the national telecommunication operator to provide high-speed data transmission capabilities, satellite teleconferencing or VSAT services, all of which are key communication services required by multinationals. McCormick (1993) mentions that major corporations in South-East Asia consider the availability of value-added telecommunication services in their home country as a component of their competitive advantage in the global market. Therefore, they put pressure on their national government to facilitate the introduction of new telecommunication services, to retain a high service quality. This pressure is also often said to push for privatisation as well as liberalisation of the sector.

As underlined by Vickers and Yarrow, a change in the ownership structure will affect and modify the structure of incentives for the management. This in turn should result in a different behavior at the top of the firm as well as in a change in the company performance. Indeed, a different ownership structure will bring a

different definition of what the firm's performances should be. The method used to assess these performances will also change.

However, the behaviour of public utilities operators (telecommunications, energy industries, transport industries and water industry) responds or reacts to incentives provided by various sources. The nature of ownership is only one of them. Vickers and Yarrow actually define three sets of influences — ownership, competition and regulation. Their analysis indicates that “the effects of privatization cannot properly be assessed in isolation from these additional influences”. Although they find that “ownership matters”, they conclude that managerial incentives structures [and therefore the behavior of the firm as a whole as well as its performances] are determined via a complex set of interactions among factors that include these three sets of influences. Our analysis goes in the same direction.

Thus, other variables than the nature of ownership which may have a significant combined impact in term of incentives on the development of the telecommunication sector include:

- The structure of market competition,
- The effectiveness of the regulatory framework,
- The availability of other communication means as well as
- The organisational changes affecting the operator.

2.3.2 Competition-specific incentives

As competition is introduced or about to be introduced, the behaviour of the incumbent is expected to change and adapt to the new environment whether its ownership structure changes or not. Petrazzini (1996) even argues that the introduction of competition in a telecommunication service sector other than the basic telecommunication services sector actually gives the incumbent telecommunication operator a flavour of what is finally going to happen in the short or medium term for sectors currently under monopoly regime. It does give the PTO incentives to prepare for potential competition in its major business area. The actual (or foreseeable) degree of competition should therefore be a variable to look at when monitoring changes of the telecommunication sector overtime.

2.3.3 The regulator as an “incentive provider”

Vickers and Yarrow (1988) describe the relationship between the operators and the government as a game where the players have their own objectives, strategies and where information on each other's behavior as well as who is in the position of “first-move” is determinant. The regulator takes decision based on information made available to it. The presence of several players will therefore fuel a benchmarking process whereby the coherence of information from the different players can be compared. From the point of view of the

operator, decisions taken by the regulator have strong implications as they may affect long-term decision or behavior. The presence of a strong regulator committed to competition has visible implication. For instance, in the United Kingdom, BT has so far been barred from buying the 40%, that it does not already own, of Cellnet, its mobile telecommunication arm. Similarly, it cannot engage in broadcasting activities and part of its price list is subject to strong obligations (such as prices to be reduced by the inflation rate minus a productivity offset of X per cent every year).

Recent experiences in both France and Germany show that the incentives generated by the regulator cannot be overlooked. In France the Autorité de Régulation des Télécommunications (ART) has been in place prior to the 1998 liberalization of the telecommunication sector. Rules have been established in advance and, for instance, France Telecom has had to submit and negotiate an interconnection catalogue. Although, the French operator is advancing carefully in this new regulatory environment, there are already some certainties which its management has taken into account. Referring to Vickers and Yarrow, we could say that the French regulator is in a position of "First move" (for example, ART asked France Telecom to submit an interconnection price list).

In Germany, we are witnessing a totally different story. The regulatory function has been kept until the very last day within the government. The independent regulatory agency has been set up the very same day the liberalisation of the telecommunication sector took effect in January 1998. Deutsche Telekom cannot count on relative certainties as its French counterpart.

Having set up arbitrarily a “switching fee” for the customers willing to switch to another network, it had to negotiate harshly before dropping it as the issue had not been handled in advance. In this case, Deutsche Telekom has to make the first move and then adjust its position following the regulator’s reactions.

2.3.4 Availability of mobile communications as a source of incentives

The availability (or non-availability) of alternative communication means is another variable to look at. Mobile communications have become popular in many countries including developing countries and provide the customer with an alternative to fixed line services. While connection to the fixed network can take years (see Table 11), a mobile connection can be made as soon as the subscriber has signed up. Indeed, once the terrestrial antennas are in place as well as the mobile telecommunication switches, all what is needed is a handset (no need to lay out physical cables to get wired). As such, the presence of mobile operators, not owned by the fixed-line incumbent, can be considered as a threat for the latter or at least as an incentive to adapt its business doings (for instance laying out faster the fixed line network to reduce the waiting time) even though fixed line services are still under a monopoly regime.

Table 11 - Waiting time to get a telephone connection (main line services)

Country	Data Year	Waiting List	New Lines Added	Waiting Time (Years)
Argentina	1995	110,566	697,629	0.2
Belize	1995	724	755	1.0
Czech Republic	1995	691,961	266,205	2.6
Hungary	1995	421,955	161,389	2.6
Israel	1995	119,72	204,718	0.1
Jamaica	1993	170,158	41,229	4.1
Latvia	1995	109,564	37,380	2.9
Malaysia	1994	121,991	453,034	0.3
Mexico	1994	196,850	871,641	0.2
Puerto Rico	1995	57,041	65,683	0.9
Venezuela	1995	644,594	128,947	5.0

Notes: Waiting time is calculated using the following formula:
$$WT (\text{year } N) = WL (\text{Year } N) / NLA (\text{Year } N)$$

where WT = Waiting time
WL = Waiting List (subscribers having signed up for a telephone line but whose request is not met yet)
NLA = Number of lines added to the network in that year.

Source: Data adapted from ITU World Telecommunication Indicators Database.

2.3.5 Organisational incentives

External changes are not the only changes that may have a significant impact on the incumbent's behaviour. Changes affecting its very status are not to be discarded. Such changes include:

- Corporatisation whereby the operator has no longer the status of a government administration but the status of a private company, even though it is still fully state-owned (the state is then considered as the sole and unique

shareholder). Corporatisation is often a signal of forthcoming privatisation when not an actual first step towards it;

- Separation from another line of business. When placed under government authority telecommunications operations were handled along with postal, broadcasting or electric operations in many countries with interdependent financial accounts (cash-making operations funding cash-losing operations). Separation increases sector transparency and sector-specific allocation of funds.

2.4 Discussing the working methods

McCormick (1993) defines privatisation as “any shift in activity from the public to the private sector, be it the introduction of private capital or management expertise or the actual transfer of ownership of public enterprises to the private sector”. Thus, McCormick broadens the common definition of privatisation which is typically limited to actual shift in the ownership structure of a (partially) state-owned enterprise. The broadened definition will be used in the following. Therefore, by “Privatisation”, we will from now on mean “increased private ownership in a telecommunication operator, or/and increased private sector participation” (so that schemes such as Built/Transfer schemes be included).

When this research was initiated, the temptation to carry out a cross-national regression analysis was put aside. Indeed, this type of analysis assumes

that the parameters defining the collected data are identical. This assumption proved not to be true with the data used for the Analysis (ITU World Telecommunication Indicators Database). Although, this is, with little doubt, the most authoritative telecommunication source, the data contained in the database is provided by as many individual sources that there are countries. Although ITU staff is extremely careful at designing detailed questionnaires for its yearly survey as well as double-checking (or triple-checking) data, it cannot substitute itself for the persons who actually provide the data in a given country. Therefore, a given indicator may end up not having the same definition from one country to another.

The issue can be best understood reproducing the warning note displayed in most ITU Reports (such as the World Telecommunication Development Report 1996/97) to describe the 'Telecommunication Staff' indicator:

"Telecommunication staff refer to the total number of staff (part-time staff converted to full-time equivalents) employed by telecommunication enterprises providing public telecommunication services. In some cases where posts and telecommunication organisations are combined, no breakdown of telecommunication staff is available. Note that this figure would generally not include sub-contract staff. Main lines per employee is computed by dividing the number of main lines by the number of employees. Caution should be used in interpreting this figure as some countries may subcontract a proportion of the work, in which case the number of main lines per employee would be overstated". World Telecommunications Development Report 1996/97.

Hence, the telecommunication staff figure may also include staff involved in postal services, or even broadcasting services in some cases. When comparing revenue per employee indicators, or main lines per employee indicators for different countries, conclusions could therefore be drawn based on misleading figures. According to the note, the actual subcontracting policy of a

given company may flaw interpretations. In these conditions, using the data for a cross-national regression analysis did not seem to be fair.

The analysis was therefore meant to be mainly based on country-based regression analysis (as opposed to cross-national regression analysis): running regression for each country. Nevertheless, it appeared clearly in the research process that the number of observations available for our dependent variables (typically no more than 16 sets of data as we cover the period between 1980 and 1995) would not enable us to run more than one independent variable at a time in order to obtain trustworthy results. Our focus being the degree of private ownership, one might think that only this variable is needed as an independent variable. The following section gives insights on this assumption.

2.5 Conclusions

This chapter has highlighted the following points:

- The analysis of how the efficiency of the telecommunication industry is impacted by various factors can be carried out looking at the variation of the telecommunication operators corporate performance indicators.
- The performance indicators of fixed-line operators are likely to be impacted by a number of factors including not only the nature of the ownership but also the structure of the market competition, the effectiveness of the regulatory framework, the availability of other communications means, etc.

- Any comparison of performance indicators between countries should be carried out with most care, especially when such a comparison is used as a basis to voice a judgement on the impact of the nature of ownership.
- Due to the data available to us, the T-Test and regression analysis tools cannot be run with more than one independent (explanatory) variable.

The next chapter introduces T-Test and regression analysis as used to explore the first research question:

(R1): Is a shift in the ownership structure likely to have an impact on the efficiency of the telecommunications service sector in a given country and to what extent can such a shift explain variations of the main telecommunication performance indicators?

Chapter 3

T-TEST AND REGRESSION ANALYSIS

3.1 Designing the private sector participation variable

As stated in the previous chapter, T-Test and regression analysis are used to roughly assess the influence of a change in the ownership structure.

Therefore, the first task will be to design an appropriate coding scheme which captures the degree of private ownership (or public ownership) of basic telecommunication services operators.

At first sight, the following coding scheme seemed to be appropriate. A fully state-owned telecommunications service operator would be attributed the code 0. A fully privately-owned telecommunication service operator would be attributed the code 1. Where an operator is partially privately owned at X%, the operator would be attributed the code 0.X (see Table 12).

Table 12 - Coding scheme used to capture the private sector Participation (1).

<i>Characteristic</i>	<i>Coding scheme</i>
<u>Percentage of private ownership in given telecommunications service operator:</u> 100 % state-owned: 0 X % privately owned: 0.X 100 % privately owned: 1 (Gradual scale)	0 → 1

Taking a closer look, it appears that the percentage of ownership may not be the only issue to look at when analysing the impacts of private ownership. What will also matter is the management control over the company. As highlighted in Chapter 1, the management control may not always materialise in a majority stake. For instance, the consortium led by GTE of the US that bought 40 per cent in Venezuela's CANTV in 1991, did actually control 51 per cent of the controlling vote. Similarly, in 1990, the Mexican government sold 20.4 per cent (out of the 56 per cent owned by the State) of Teléfonos de Mexico (TELMEX) to South Western Bell (SBC), France Télécom and Grupo Carso. Through a complex share conversion (a class of shares being non-voting shares), the consortium was actually given a majority stake in terms of controlling vote. Other examples include Czech Republic's SPT Telekom and Hungary's MATÁV where investing consortia were given management control even though their stakes were respectively 27 per cent and 30.2 per cent.

Consequently, rather than reflecting the exact percentage which is in private hands, the coding scheme should reflect the type of management (public or private) and should take into account the fact that:

- A minority stake without control over management is expected to have a far less significant impact than a minority stake with control over management; it should nevertheless not be identified with a fully state-owned regime (100 per cent state-owned);
- A minority stake with control over management is expected to have almost the same impact as a majority stake;

- A majority stake is expected to have almost the same impact as a 100 per cent private stake as control over management is secured.

Table 13 displays the coding scheme corresponding to this second approach.

Table 13 - Coding scheme used to capture the private sector participation (2).

<i>Characteristic</i>	<i>Code (0-1 scale)</i>
Fully state-owned operator	0
Less than 50% private ownership without control over management	.2
Over 50% private ownership diffused in general public hands*	
Less than 50% private ownership with control over management	.7
More than 50% private ownership including strategic equity partner**	
More than 50% private ownership owned by a strategic equity partner	.85
100% owned by a strategic equity partner	1

Note: * No strategic equity partner;
 ** The strategic equity partner owns less than 50% but has managerial control.
 A strategic equity partner can be a consortium.

3.2 T-Tests

In this analysis, T-Tests are used to assess the possibility of a significant difference between the growth of a given variable before and after an event P materialising a change in the nature of ownership of the operator (typically a privatisation).

Data input comes from the World Telecommunication Indicators Database published on a quarterly basis by the International Telecommunication Union in Geneva, Switzerland. Data has been adapted in order to produce variables, which match the needs of our analysis. For instance, the “number of main lines in operation per employee” for a given telecom operator was computed using the “number of lines in operation” divided by the “number of employees” as found in the World Telecommunication Indicators Database. Based on these variables (“main lines in operation per employee” in our example), growth rates have been calculated before and after the event P. T-Tests are then applied to the growth rates.

For instance, when looking at the growth rate of the indicator “Main lines in operation per Employee”, growth rates are computed each year for the years prior to the event P (Years A) and posterior to the event P (Years B). The sets of growth observations for Years A and Years B are then used as the two sets of variables in the T-Test. The example of Argentina is provided below in Table 14.

Table 14 - Running the T-Test for the “Main lines in operation per Employee yearly growth rate” indicator.

Example with Argentina for the years 1981-1995.					
Years A		Years B		T-Test: T	-3.07
1981	2.9%	1991	26.2%	Critical T: Tc	2.16
1982	15.7%	1992	19.7%	Significance	YES
1983	-0.6%	1993	11.9%	Number of data	15
1984	-0.4%	1994	19.5%	Degree of freedom	13
1985	12.8%	1995	27.4%	Level of significance	5%
1986	6.7%				
1987	21.7%				
1988	-26.2%				
1989	7.7%				
1990	6.0%				
Average growth before the event	4.6%	Average growth after the event	21.0%		

Notes: The event P (privatisation of ENTel, the main telecommunications service operator) occurred in December 1990. Years 1981 to 1990 therefore constitute the set of data “Years A”. Years 1991 to 1995 constitute the set of data “Years B”.
The privatisation of ENTel, the main telecommunications service operator in Argentina, occurred in December 1990. The company was divided into two companies thereafter (Telefonos de Argentina and Telecom Argentina). Data post privatisation was computed aggregating data for the two companies.

The interpretation of Table 14 requires some explanations. The difference between the two groups of data (growth rates for years A before the event P as opposed to growth rates for years B after the event P) is considered significant only if $|T| > T_c$. The value of T_c is provided in tables to be found in publications such as “Using econometrics: A beginner’s guide” by Henry J. Cassidy (1981). T has been calculated as follows:

$$T\text{-Test value} = \frac{AV_1 - AV_2}{SE(AV_1 - AV_2)}$$

$$\text{Where } SE(AV_1 - AV_2) = \sqrt{\left(\frac{VAR_1}{N_1 - 1} + \frac{VAR_2}{N_2 - 1} \right)}$$

$$\text{And } VAR_1 = \frac{\sum (X_1 - AV_1)^2}{N_1 - 1} \quad VAR_2 = \frac{\sum (X_2 - AV_2)^2}{N_2 - 1}$$

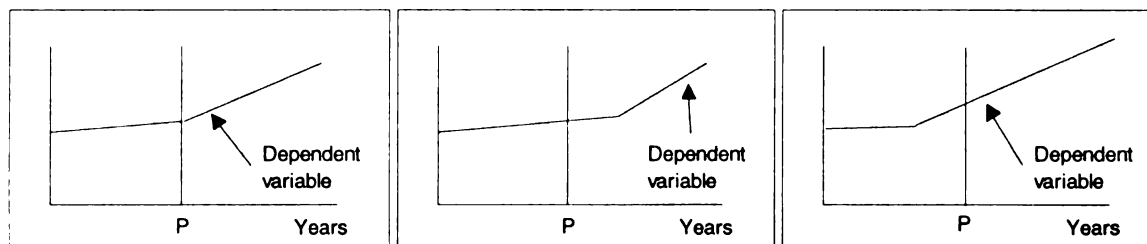
$$\text{And } AV_1 = \frac{\sum X_1}{N_1} \quad AV_2 = \frac{\sum X_2}{N_2}$$

Where N_1 is the number of data X_1 before the Event P and N_2 is the number of data X_2 after the Event P.

In the case of Argentina, the difference between the growth rates in years A and years B is deemed significant at the 95% level of confidence.

T-Tests have also been run with lagged data (one or more years ahead of, or prior to, the event) so that situations highlighted in Figure 3 are taken into

account. Results with lagged data are presented only when there is a significant difference as compared with results obtained with non lagged data.



Note: Changes in the dependent variable if any may occur simultaneously with, posterior to or prior to the event P.

Figure 3 - Expected situations to be taken into account

For instance, the impact of privatisation may not be simultaneous with the privatisation itself. Prior to the privatisation, governments may want to “prepare” the operator so that it looks more attractive to potential investors. When looking at the dependent variable one will observe that a significant change actually took place before the privatisation. Similarly, in some cases, the impact will be visible after the privatisation. It is then argued that some time is needed before reaping the benefits of new managerial behaviour.

Countries used for T-Tests and regression analysis were chosen based on the availability of data as well as to reflect different situations. As this is not a cross-national analysis, the choice of countries was not aimed at building a unique model that could be generalised to any country.

The tables presented hereafter (Table 15 and Table 16) display T-Test findings.

Table 15 - T-Test Results: Network growth

Country	Average growth before P	Average growth after P	T-test	Critical T	Significance	P
Argentina	5.0%	12.5%	-2.93	2.306	95% confidence	Privatisation
Australia	4.7%	3.4%	4.59	2.306	95% confidence	Privatisation/ Liberalisation
Chile	7.7%	14.2%	-1.07	2.306	No significance	Bond
Chile	6.1%	19.5%	-2.5	2.306	95% confidence	Telefonica
Hungary	9.8%	13.6%	-1.39	2.447	No significance	Privatisation
Hungary	5.4%	13.6%	-5.99	2.306	95% confidence	Separation from Posts
Indonesia	9.2%	25.2%	-4.56	2.228	95% confidence	BTO contracts
Indonesia	17.9%	32.0%	-3.52	2.571	95% confidence	Privatisation
Israel	6.6%	7.6%	-0.73	2.306	No confidence	Privatisation
Jamaica	6.0%	23.0%	-5.93	2.306	95% confidence	C&W taking over control
Japan	2.6%	3.8%	-2.56	2.306	95% confidence	Privatisation/ liberalisation
Korea	12.7%	6.1%	3.03	2.447	95% confidence	Privatisation
Mexico	7.7%	10.5%	-1.36	2.306	No significance	Privatisation
Mexico	5.8%	11.7%	-10.91	2.306	95% confidence	Lag of 2 years prior to privatisation
New Zealand	2.6%	3.2%	-1.26	2.306	No significance	Privatisation
New Zealand	2.7%	2.3%	1.52	1.397	80% confidence	Liberalisation
Venezuela	3.9%	11.5%	-3.11	2.365	95% confidence	Privatisation

Note: Data in bold is **non acceptable** data, leading to a "NO" in the significance column.

Source: Data adapted from ITU World Telecommunication Indicators.

Results for the T-Test analysis on a per country basis, provide an insight concerning Research Question R1 (Is a shift in the ownership likely to have an impact on the efficiency of the telecommunications service sector?). Wherever difference between pre-event and post-event growth rates proved to be significant, the answer to research question R1 would be positive.

Table 16 - T-Test Results: Main lines in operation per employee (growth)

Country	Average growth before P	Average growth after P	T-Test	Critical T	Significance	P
Argentina	4.6%	21.0%	-3.07	2.16	95% confidence	Privatisation
Chile	6.4%	15.9%	-1.70	1.356	80% confidence	Bond taking control
Chile	9.2%	14.6%	-0.82	1.356	No significance	Telefonica taking control
Hungary	2.8%	19.8%	-11.55	2.179	95% confidence	Separation from Posts
Hungary	7.5%	17.4%	-2.71	2.179	95% confidence	Privatisation
Indonesia	4.7%	26.4%	-3.96	2.179	95% confidence	BTO
Israel	4.4%	14.4%	-3.20	2.16	95% confidence	Lag of 2 years after privatisation
Malaysia	12.3%	20.3%	-4.76	2.16	95% confidence	Privatisation
Mexico	1.1%	10.9%	-3.73	2.16	95% confidence	Privatisation
Mexico	-1.3%	10.8%	-7.21	2.16	95% confidence	Lag of 2 years prior to privatisation
New Zealand	8.1%	14.0%	0.90	2.16	No significance	Privatisation
New Zealand	3.3%	16.7%	-2.75	2.16	95% confidence	Liberalisation Law

Note: Data in bold is **non acceptable** data, leading to a “NO” in the significance column.

Source: Data adapted from ITU World Telecommunication Indicators Database.

The findings of the T-Test are interesting to look at, although they only provide observations rather than explanations:

- The difference between growth rates in the years before (years A) and after (years B) the privatisation in **Argentina** is deemed significant for both

indicators considered (“Network growth” and “Main lines in operation per Employee”).

- The case of **Chile** provides an intriguing set of findings. The privatisation of the main operator (Alan Bond taking control of the company in 1988) seems to have no significant impact on the “network growth” indicator. However, it seems to have some impact on the “Main lines in operation per Employee” indicator (the positive difference between years A and B is significant at the 80% level of confidence). The arrival of Telefonica de España in 1990 seems to have the opposite impact (95% level of confidence significant difference for the “Network growth” indicator and no significant difference for the “Main lines in operation per Employee” indicator). At this stage, the T-Test tool does not provide us with an explanation of this observation.
- In **Hungary**, the difference between growth rates in the years before and after the separation from the Posts is deemed significant for both indicators considered. When the event considered is the privatisation itself, the difference between the two sets of growth rates is deemed significant for the “Main lines in operation per Employee” indicator but not for the “Network growth” indicator.

In this analysis, T-Tests provide an observation on the evolution of a given indicator: is the evolution of this indicator significantly different before and after a given event? However T-Tests do not allow concluding that this specific event was the factor of change. Analysing the results presented in Table 15 and

Table 16, it seems that sometimes the evolution of the indicators looked at is affected and some other times it is not. One cannot draw from these results more specific conclusions.

3.3 Regression analysis

In this analysis, regressions are used to assess how much of the growth variation of our dependent variables (Number of main lines in the network, revenue per main line and revenue per employee) is explained by a change in the ownership structure. As for T-Tests, results obtained with regressions using lagged data are displayed when significantly different.

Data input comes from the World Telecommunication Indicators Database published on a quarterly basis by the International Telecommunication Union in Geneva, Switzerland. As for T-Tests, data has been adapted in order to produce variables, which match the needs of our analysis. The dependent variable data (for instance data reflecting the network growth) is used as the first set of data. The independent variable data is computed for each given year using the rules as explained in Table 13. The validity of the hypothesis (to what extent a shift in the independent variable can explain the evolution of the dependent variable), is confirmed or rejected looking at the value of parameters, which are the “P Max” variable, the “F” statistic and the “Durbin-Watson” statistic. The theoretical rationale behind regression will not be explained here in detail and for more guidance, the reader should refer to econometrics publications such as “Using

econometrics: A beginner's guide" by Henry J. Cassidy (1981). The regression formula is as follows:

$$Y = \alpha + \beta X + \varepsilon$$

Where Y is the dependent variable and X the independent variable and where α is the constant and β the slope coefficient with ε assimilated as the regression residuals.

The example of Argentina for the Network growth rate dependent variable (Y) is provided below, using the private ownership indicator as the independent variable (X).

Table 17 - Running the Regression Analysis tool for the “Network growth rate” indicator.

Example with Argentina for the years 1981-1995.						
Year	Private ownership	Private ownership indicator*	Network growth			
1981	0%	0	17.0%	Lag		0
1982	0%	0	7.4%	Coefficient		8.7
1983	0%	0	-3.8%	Constant		5.01
1984	0%	0	14.4%	Impact	Positive	
1985	0%	0	4.3%	Adjusted R ²		24.8%
1986	0%	0	5.5%	P max		0.029
1987	0%	0	3.7%	F		5.95
1988	0%	0	7.1%	Durbin-Watson		2.1
1989	0%	0	4.6%	Validity		No
1990	0%	0	-7.1%	Significance		--
1991	60%	0.85	3.6%	Growth variation		--
1992	100%	0.85	15.1%	explained		
1993	100%	0.85	11.1%			
1994	100%	0.85	18.1%			
1995	100%	0.85	14.4%	* as defined in Table 13		

Notes: The privatisation of ENTel, the main telecommunications service operator in Argentina, occurred in December 1990. The company was divided into two companies thereafter (Telefonos de Argentina and Telecom Argentina). Data post privatisation was computed aggregating data for the two companies.

Results for the Regression analysis on a per country basis, provide an insight concerning Research Question R1 (To what extent can a shift in the ownership structure explain variations of the main telecommunication performance indicators?).

Although the number of telecommunications operators looked at is rather limited, several points can nevertheless be drawn upon the results displayed in Table 18, Table 19 and Table 20:

- Where the regression analysis tool provide valid results, the change in the operator's ownership structure appears to explain at a 95% level of confidence a significant part of the growth variation of the "Network growth" indicator (ranging from 47.5% to 79.1%: see Table 18). It should be noted that the valid results are obtained mostly when data is lagged. In the case of Hungary, the event therefore taken into account is the separation from the Post Office services (Lag -3 and Lag -4) rather than the privatisation itself. This conclusion was already highlighted with the results of the T-Test (see Table 15). In the case of Mexico, the results are only valid when data is lagged 2 years prior to the privatisation. It therefore appears that the preparation towards privatisation had more impact than the privatisation itself. This conclusion was similarly already highlighted with the results of the T-Test (see Table 15).
- For most operators looked at, regression analysis does not detect significant impact of a change in the operator's ownership structure on the growth variation of both revenue-related indicators (see Table 19 and Table 20).

- Where regression analysis provides valid results (Mexico and Venezuela, both with a lag of 2 years prior to the privatisation in the case of the “Revenue per Employee” indicator), it appears that a change in the ownership structure explains no more than a third of the actual growth variation of the “Revenue per Employee” indicator (32.5% in the case of Mexico and 29.8% in the case of Venezuela: see Table 20).

3.4 Conclusions

Thus, based on the cases looked at, the impact of a change in an operator’s ownership structure is not easily assessed neither using the T-Test tool nor running the regression analysis tool. Where these tools provide sound results, the same conclusions can be derived as seen in the cases of Mexico and Hungary. Interestingly, in these very cases, the results suggest that it is not the privatisation event itself that actually explain the growth variation of the chosen indicators.

At this stage, it seems therefore all the more important to engage in a contextual analysis in order to grasp a wider understanding of the operators’ incentives at work. As noted in the analytical framework (see chapter 2), the ownership structure does not explain it all and other factors (or set of incentives) should be looked at. The next chapter is dedicated to this task, focusing on a limited number of countries.

Table 18 - Regression Analysis: Network growth explained by the private sector participation indicator

Country	Lag	Coeff	Const.	Impact	Adj. R ²	P (Max)	F	Durbin- Watson	Validity	Significance	Growth variation explained
Argentina	0	8.70	5.01	+	24.8%	0.029	5.95	2.10	NO	n/a	--
Hungary	0	7.32	7.35	+	8.1%	0.149	2.33	0.54	NO	n/a	--
Hungary*	-3	11.90	5.38	+	72.7%	0.000	40.97	1.39	YES	YES	72.7%
Hungary**	-4	11.20	5.04	+	69.9%	0.000	35.79	1.66	YES	YES	69.9%
Israel	0	2.06	6.92	+	0.0%	0.684	0.17	1.00	NO	n/a	--
Jamaica	0	21.40	1.22	+	57.4%	0.000	21.22	1.49	YES	YES	57.4%
Jamaica	1	25.40	0.34	+	79.1%	0.000	57.63	1.57	YES	YES	79.1%
Japan	0	1.61	2.70	+	0.0%	0.515	0.45	1.16	NO	n/a	--
Mexico	0	7.08	5.55	+	25.0%	0.028	6.00	1.06	NO	n/a	--
Mexico	-2	8.62	4.47	+	47.5%	0.002	14.53	1.31	YES	YES	47.5%

Notes:

Data in bold reflects **non acceptable** data and leads to the mention "NO" in the validity column and "n/a" (non applicable) in the significance column;

Lag: the regression is run with a lag in selected cases in order to assess the impact of an anticipated privatisation (negative lag) or the delayed impact of privatisation (positive lag).

With k = 1 (number of regressor) and n = 15 (number of observations in a given regression), F should exceed **4.67** and Durbin-Watson should exceed **1.23** for a five per cent level of significance.

*, ** In the case of Hungary, regression results are also shown with Separation from Post and Broadcast as an input (lag +1: *; lag 0: **).

Sources: Data adapted from ITU World Telecommunication Indicators Database and computed with MiniTab.

Table 19 - Regression Analysis: Revenue per line growth explained by the private sector participation indicator

Country	Lag	Coeff	Const.	Impact	Adj. R^2	P (Max)	F	Durbin- Watson	Validity	Significance	Growth variation explained
Hungary	0	-2.52	-1.84	-	0.0%	0.781	0.08	1.24	NO	n/a	--
Israel	0	24.1	3.6	+	0.0%	0.775	0.09	2.59	NO	n/a	--
Jamaica	0	-31.8	22.9	-	0.0%	0.455	0.59	2.59	NO	n/a	--
Korea	0	-1.5	-1.59	-	0.0%	0.951	0.00	2.28	NO	n/a	--
Malaysia	0	-12.0	-1.10	-	0.9%	0.307	1.13	2.1	NO	n/a	--
Mexico	0	-11.8	9.42	-	0.0%	0.476	0.54	1.58	NO	n/a	--
New Zealand	0	-3.75	4.11	-	1.6%	0.287	1.23	1.6	NO	n/a	--
Venezuela	0	11.5	-2.59	-	0.0%	0.445	0.63	2.25	NO	n/a	--

Notes:

Data in bold reflects **non acceptable** data and leads to the mention "NO" in the validity column and "n/a" (non applicable) in the significance column;
Running regressions with a lag (positive or negative) did not improve significantly either validity or significance of the regressions.

With k = 1 (number of regressor) and n = 15 (number of observations in a given regression), F should exceed **4.67** and Durbin-Watson should exceed **1.23** for a five per cent level of significance.

Sources:

Data adapted from ITU World Telecommunication Indicators Database and computed with MiniTab.

Table 20 - Regression Analysis: Revenue per Employee growth explained by the private sector participation indicator

Country	Lag	Coeff	Const.	Impact	Adj. R ²	P (Max)	F	Durbin-Watson	Validity	Significance	Growth variation explained
Chile	0	14.8	5.06	+	6.1%	0.232	1.64	3.01	NO	n/a	--
Hungary	0	11.7	4.99	+	2.8%	0.265	1.37	1.6	NO	n/a	--
Israel	0	-5.6	7.6	-	0.0%	0.947	0.00	2.50	NO	n/a	--
Korea	0	-25.5	7.35	-	1.5%	0.299	1.19	2.30	NO	n/a	--
New Zealand	0	2.08	12.6	+	0.0%	0.732	0.12	2.09	NO	n/a	--
Malaysia	0	0.4	11.1	+	0.0%	0.986	0.00	1.36	NO	n/a	--
Mexico	0	7.0	7.32	+	0.0%	0.741	0.11	1.39	NO	n/a	--
Mexico	-2	+43.3	-8.89	+	32.5%	0.016	7.74	1.65	YES	YES	32.5%
Venezuela	0	24.5	0.08	+	16.9%	0.103	3.23	2.03	NO	n/a	--
Venezuela	-2	28.1	-4.04	+	29.8%	0.038	5.67	2.05	YES	YES	29.8%

Notes: Data in bold reflects **non acceptable** data and leads to the mention "NO" in the validity column and "n/a" (non applicable) in the significance column;

Running regressions with a lag (positive or negative) did not improve significantly either validity or significance of the regressions except for Mexico and Venezuela where validity could be improved.

With k = 1 (number of regressor) and n = 15 (number of observations in a given regression), F should exceed **4.67** and Durbin-Watson should exceed **1.23** for a five per cent level of significance.

Sources: Data adapted from ITU World Telecommunication Indicators Database and computed with MiniTab.

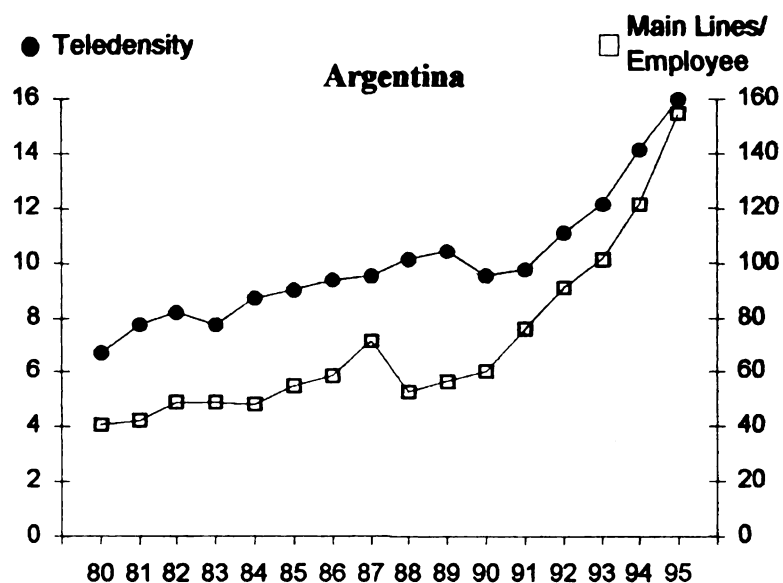
Chapter 4

CONTEXTUAL ANALYSIS

T-test analysis and basic regression analysis do not enable us to have a comprehensive understanding of the full set of incentives which defines the background for the telecommunication operators. We believe the growth and the performance of the telecommunication sector result from a complex framework of incentives as well as compromises and are not simply depending on the degree of private ownership. In order to grasp part of this framework, a contextual analysis for a limited number of countries is provided in this section. Countries were chosen depending on the availability of information and were aimed at reflecting both the privatisation phenomenon and the Build/Transfer phenomenon. Those countries are Argentina, Chile, Hungary, Mexico (privatisation), Indonesia and Thailand (Build/Transfer schemes).

4.1 Argentina

The arrival in late 1990 of strategic equity partners at the helm of both Telecom de Argentina and Telefónica de Argentina (previously part of one company, ENTel) seems to have jump-started the development of the Argentine telecommunication network with teledensity skyrocketing to reach 16 main lines in operation per 100 inhabitants in 1995 (See Figure 4).



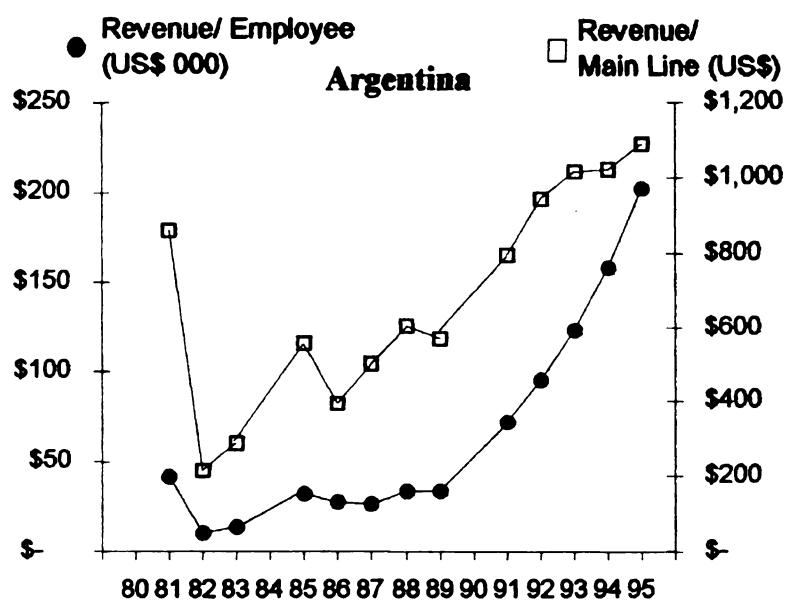
Note: Teledensity: main lines in operation per 100 inhabitants.
Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 4 - Teledensity and Main Lines per Employee in Argentina (1980-95)

Petrazzini (1995) reports that the management of the company was strongly affected by the country's political instability prior to the privatisation. Executive directors, appointed by the country's head of state, spent little more than one year at the command of the company: in the thirty years preceding the privatisation, some twenty-eight different executive directors headed the company—there were twelve different heads of state over the same period (Petrazzini, 1995).

Along with the come-and-go of the top management, contracts with equipment manufacturers were subject to close political attention, leading to cancellation of previous contracts and appointment of new suppliers whenever a government would fall and be replaced. This provided high incentives for corruption which was passed on the cost of the equipment—paid by ENTel as much as twice or three times the international price (Petrazzini, 1995).

Meanwhile, call rates were kept low to meet social and political goals such as contributing to government's anti-inflation plans. Mairal (1994) reports that telephone rates in Argentina were one-fourth of those in Chile and one-third of those in Uruguay in 1989. This eroded ENTel's revenues and limited its ability to raise cash and secure resources to fund the network development.



Note: Amount in US Dollars were used in the case of Argentina; local currency data could not be exploited.

Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 5 - Revenue per Employee and per Main Line in Argentina (1981-95)

With the Argentine government desperate to meet its privatisation agenda, private investors were able to benefit from the previous poor situation. The government took under its responsibility ENTel's debt, which doubled to US\$ 2.2 billion in the year of the privatisation as contracts with suppliers were signed just before the takeover to sweeten the deal (Petrazzini, 1995). The government also raised dramatically the telephone rates prior to the privatisation. The two privatised companies were also able to reduce equipment prices by one third, compared with what ENTel was used to pay for the same equipment from the same suppliers (Mairal, 1994). Both privatised companies were thus able to boost their revenues (See Figure 5) and reduce their expenditures. In addition, the government secured a monopoly license for seven years for each privatised company (in its geographic coverage), renewable for another three years if criteria on quality of the service and on number of lines installed are met by 1997 (Mairal, 1994). This provided strong incentives to both improve what used to be a poor service, and develop quickly the telecommunication network while the obstacles for investment as described above have been removed.

Once privatised, the set of incentives at work could be described as:

- *Ownership-specific incentives*: the business should be profitable.
- *Competition-specific incentives*: the perspective of an additional three year period without competition if the quota of installed lines is met is definitely a great incentive for a faster development of the network. The two telecommunications companies are to comfort their position before competitors step in.

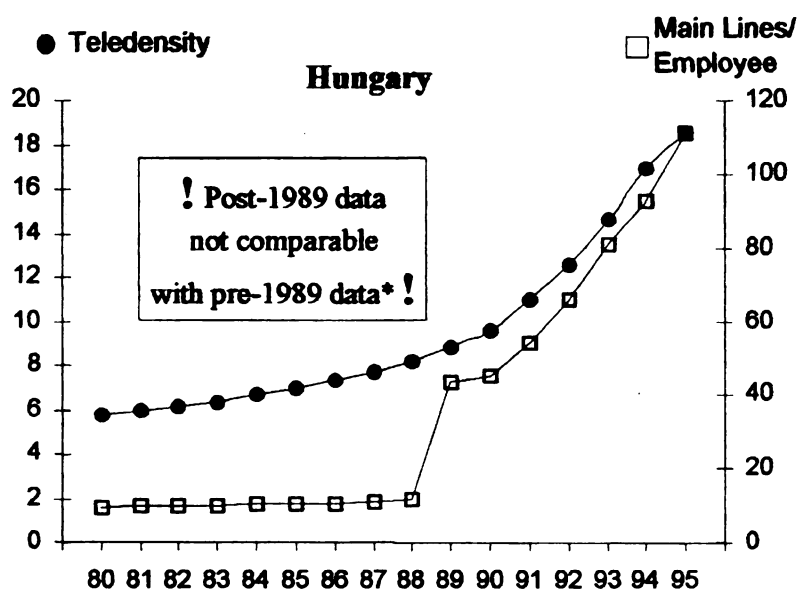
- *Organisational incentives*: neither the duration of directors's mandate nor the business decisions are any longer dictated by the political agenda but mirror the need for continuity in running the business.

The privatisation in the Argentine telecommunications is therefore a case in point illustrating the importance of the context in which it took place. One could not conclude that the arrival of private investors *per se* was the only factor explaining the change observed in our performance indicators series. The very fact that the government, with its own political agenda, had decided that private investors should take over, was determinant. The sudden change in the performance indicators after the privatisation had been prepared and facilitated by the following incentives:

- Political pressure to stick to the privatisation agenda
- Realisation at the political level that the telecommunications company cannot be privatised as such (lack of attractiveness for private investors : huge debt, prices kept low, prohibitive procurement costs).
- In order to become attractive, the company's ability to generate cash (lower debt, higher rates) has to be restored.

4.2 Hungary

In the case of Hungary, a measurable change in the growth of teledensity can be observed before the privatisation actually took place (see Figure 6). In 1989, Hungary's communist regime converted to a Western democracy and in 1990 the telecommunications operations were separated from the postal service. The network was growing steadily in the 1980s at an average annual growth rate of 3.75 per cent between 1980 and 1986. From 1987 on, growth exceeded 5.5 per cent, booming to 8.7 per cent in 1990, 13.3 in 1991, 14.5 in 1992 and peaking at 16 per cent in 1993, the year the operator was partially privatised. Following the privatisation, the growth declined (a 15.6 per cent growth in 1994 but a 9.32 per cent growth in 1995).



Notes: Teledensity: main lines in operation per 100 inhabitants;
 * Employee data is not consistent before and after separation from Post and Broadcasting (officially as of January 1, 1990, but 1989 data is affected): prior to separation, telecom employees were not differentiated from non-telecom employees in the available data.

Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 6 - Teledensity and Main Lines per Employee in Hungary (1980-95)

As early as 1986, the Hungarian PTT started to fund the network development through subscriber bonds. Partnerships with local communities were made possible whereby municipalities would contribute to the cost of the network construction in their localities on behalf of their citizens (Nulty, 1994).

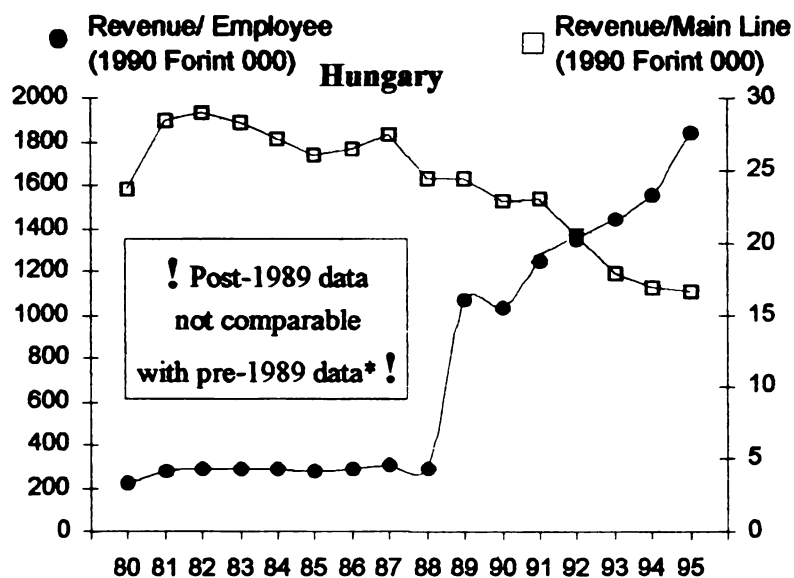
In 1987, Hungary was able to secure a US\$ 70 million loan from the World Bank. More than the cash provided, the loan brought organisational and administrative changes. Heller (1994) reports that telecommunications started to be accounted separately from the postal operations, with an audit of the financial statements of telecommunication operations being implemented as of 1988. What used to be subsidies to fund postal services became available for investment in telecommunications even though the official separation had not occurred yet.

Another administrative change could be observed in the fact that from that time on procurement was subject to public bidding (Heller, 1994). Previously, protectionism for local industries enabled Hungarian manufacturers to get a 10 to 15 per cent price advantage on tenders in international biddings (Mueller and Nyevrikel, 1994). With 80 per cent of the telecommunication equipment provided by local manufacturers, one can measure the funds overspent on the equipment side instead of contributing to the network expansion.

With these improvements implemented, the pace of the development of the telecommunication started to accelerate as early as 1987. Privatisation and elaboration of a new telecommunication regulatory framework found their way on the political agenda as early as 1990 (Heller, 1994).

The now stand alone Hungarian Telecommunications Company (HTC), was once more able to obtain a US\$ 40 million loan from the World Bank and other international financing institutions. HTC was keen to strengthen its position in the likelihood of a privatisation. Issuing bonds on the domestic financial market and furthering its partnerships with local partners, HTC managed to reduce the self-financing ratio of its investment to 50 per cent (Heller, 1994) while embarking in ambitious expansion plans. This led to the high level of growth prior to the privatisation as mentioned above.

On the revenue front, comparing the pre- and post- separation periods is not an easy task (see Figure 7, notes). Figures from the two periods should not be compared (pre-separation employee data includes postal and broadcasting employees), nevertheless, revenue trends can be compared. While revenue per employee is levelling-off in the 1980s (see Figure 7), the same indicator is skyrocketing, nearly doubling in five years time, once telecommunication operations are run independently from the two other businesses. This growth trend is maintained once the privatisation takes place.



Notes: * See note in Figure 6.
Local currency revenues have been adjusted using the Consumer Price Index provided by IMF.

Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 7 - Revenue per Employee and per Main Line in Hungary (1980-95)

The privatisation in the Hungarian telecommunications is therefore another case in point in our contextual approach. The set of incentives responsible for the improvement of the telecommunications performance indicators has changed throughout time. Here again the ownership structure does not explain it all. Political determination after 1989 to transform the country in a post-communist era, combined with a top-management convinced with the likelihood of privatisation, brought significant change in the telecommunications sector before the privatisation actually took place. Looking at the performance indicators, the impact of privatisation alone is far from being obvious.

4.3 Mexico

As highlighted below, the contextual findings in the case of Mexico are pretty much the same as the ones observed in the case of Argentina. Whereas many barriers to investment inhibited TELMEX's ability to develop its telecommunications network prior to privatisation, those barriers were removed or considerably eased when preparing the operator for the private takeover.

Taxes on telecommunication services used to seriously erode TELMEX's revenue basis as taxes were set up as a percentage of end-user tariffs (just like a value-added tax). In 1989, one year before the privatisation took place, tax accounted for 90.48 per cent of the tariff for local calls, 57.82 per cent for domestic long distance calls and 40.30 per cent for international calls (Petrazzini, 1995). In 1990, a new tax framework was adopted, accounting for 29 per cent of

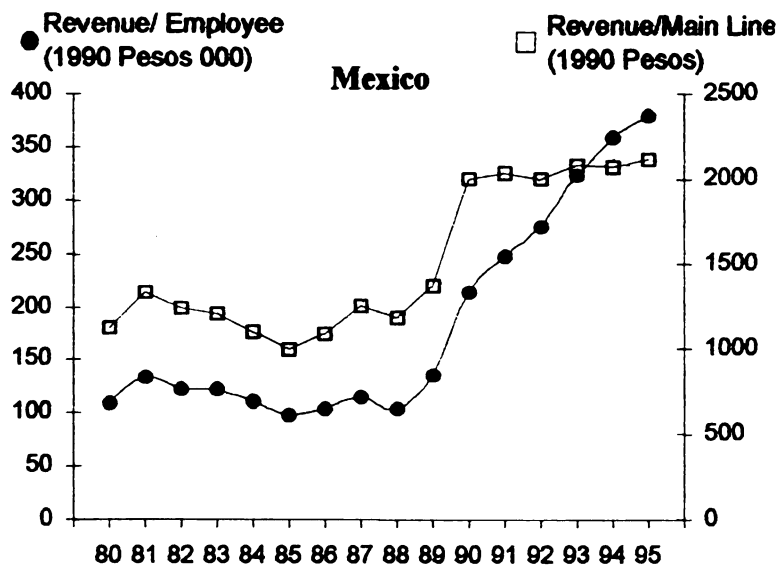
revenues from rental charges, local and long-distance calls but TELMEX would be able to use up to 65 per cent of the tax in investments (Petrazzini, 1995). Prior to 1990, as TELMEX was still profitable, the arrangement seemed to please both parties (the government and the company) but it prevented TELMEX from embarking in more ambitious expansion plans.

As in the case of Argentina (and despite a heavy tax structure) tariffs for local services had been kept low for social and political reasons. Prior to the privatisation, drastic increases were designed to balance the cross-subsidisation by long-distance and international services (Petrazzini reports a 620 per cent increase in early 1990). These measures along with the tax reform resulted in boosted revenues for TELMEX (Casasús, 1994). Indeed, TELMEX's revenues per line jumped from US\$ 440 per line in 1989 to US\$ 710 in 1990 and US\$ 828 in 1991 (ITU, 1997). Calculations using constant 1990 pesos show the same jump (See Figure 8).

Similarly to what the government did in Argentina, the Mexican government absorbed TELMEX's former debt prior to the privatisation in 1990. The private consortium took over a company with a low debt ratio (Petrazzini reports that short-term debt consequently amounted to a low 5 per cent of total operating assets).

Although the government seems to have undertaken every effort to increase both the attractiveness of the company to private investors and its future ability to fund its network development more heavily than it previously had, TELMEX was not transferred to private investors without strong incentives for

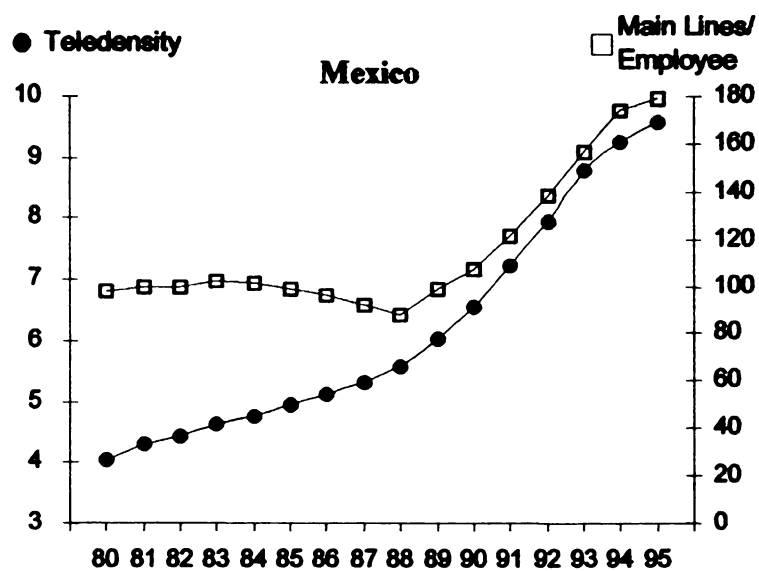
them to embark in real expansion plans. The deal included obligations to expand the network by 12 per cent a year, to provide service to every town with more than 500 inhabitants by 1996 (Casasús, 1994). Quality-of-service goals were designed along with penalties if goals could not be met. Furthermore, TELMEX's monopoly over long-distance and international services would fall, after a period of six years (Casasús, 1994). Competition could be allowed in all basic services before 1996, if the expansion and efficiency goals were not met, the ultimate penalty being the cancellation of the concession granted by the Mexican government (Petrazzini, 1995).



Note: Local currency revenues have been adjusted using the Consumer Price Index provided by IMF.

Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 8 - Revenue per Employee and per Main Line in Mexico (1980-95)



Notes: Teledensity: main lines in operation per 100 inhabitants.
Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 9 - Teledensity and Main Lines per Employee in Mexico (1980-95)

With those incentives along with the fact that TELMEX's investment ability was restored, one has a clearer reading of the growth of teledensity in Mexico as shown in Figure 9. Network compound average annual growth rate was 5.9 per cent over the period 1981-1988 while it reached 11.9 per cent over the period 1989-1994 (ITU, 1997).

In the case of Mexico, the privatisation of telecommunications ranked high on the political agenda. Political commitment to privatisation along with political commitment to improve the company's ability to invest in its network were great incentives to raise the company's profile. In the years following the privatisation the three main set of incentives can be described as:

- *Ownership-specific incentives*: the company should be a profitable business.
- *Licence-based incentives*: potential loss of the licence if goals set in the licence are not met. Prior to the privatisation, if any such goal had been imposed on to the company, they were not complemented by threats of penalties.
- *Competition-specific incentives*: in any case competition is to be introduced as of January 1996. The company has to comfort its position before it takes place.

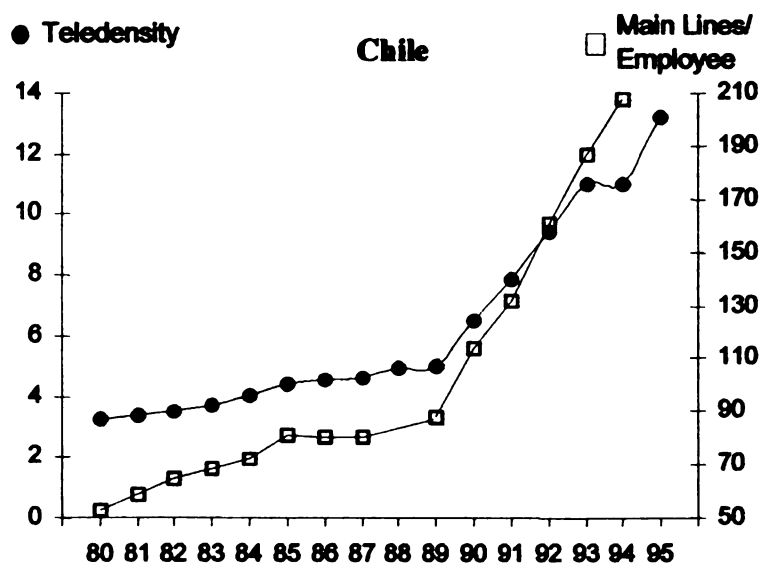
Hence, as concluded previously in the two other cases presented before, one cannot conclude that the change in the ownership structure alone explains the improvement observed when looking at our performance indicators series in

Mexico. A combination of the three sets of incentives described above provides a better explanation.

4.4 Chile

In the early 1980s, Chile's telecommunication sector was dominated by two companies in which the State held majority stakes: CTC on the local telecommunication market and ENTEL on the domestic long-distance and international market, both acting as a *de facto* monopoly.

Back in the early 1980s, Chile's teledensity (with 3.2 main lines per inhabitants in 1979 and 3.5 in 1982, see Figure 10) was lower than in other neighbouring countries in Latin America such as Argentina, Brazil, Colombia, Uruguay and Venezuela and was growing relatively slowly, taking 0.1 point of teledensity each year (ITU, 1997). Unused connection capacity was however fairly low (under 4 per cent in the early 1980s) and demand for telephone services was high with, for instance, the official waiting list accounting for 41 per cent of the number of existing subscribers in 1980 (ITU World Telecommunications Indicators Database, 1997).



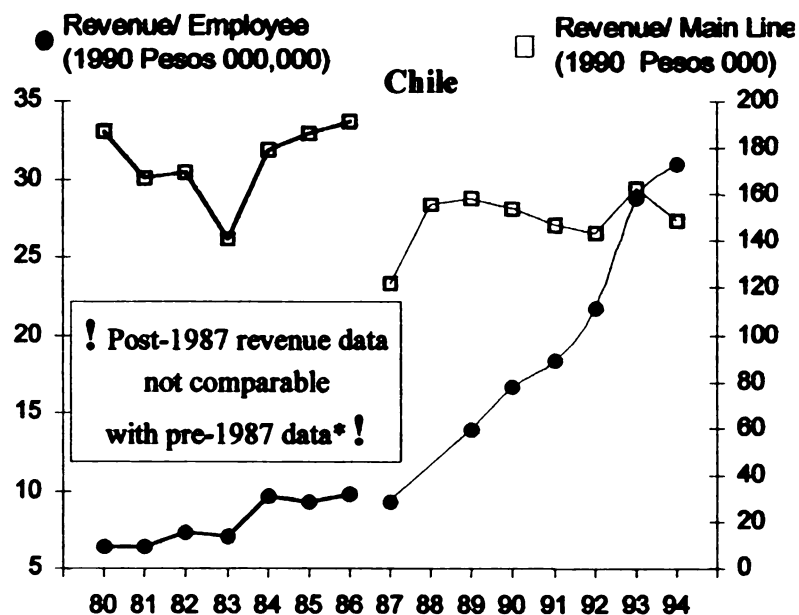
Notes: Teledensity: main lines in operation per 100 inhabitants in Chile;
Main lines per employee indicator calculated for CTC only.

Source: Data adapted from ITU World Telecommunication Indicators Database and ITU PTO Database.

Figure 10 - Teledensity and Main Lines per Employee in Chile (1980-95)

The key problem identified at that time was the lack of financial resources made available to the telecommunications sector. The revenues of the local service provider, CTC, would not enable the company to embark in a fast expansion programme due to its small customer base while the heavy foreign debt burden prevented the government from funding adequately the development of the network (Stehmann, 1995). Drawing funds from the private sector seemed to be an appropriate answer.

Whereas competition had always been possible in theory, the government would not grant concessions in areas already covered by existing concessions (Melo, 1995). In 1982, a telecommunication law was passed to encourage private investment, paving the way for new entrants to apply for licenses to provide telecommunication services but Melo argues that the lack of a clear statement on tariff issues actually provided little or no incentives for entrepreneurs to set up a business in the telecommunication sector. Therefore, the results were not the one expected apart from putting some pressure on the existing incumbent. Growth in teledensity jumped from 2.9 per cent in 1982 to 8.3 per cent in 1984 and 9.9 per cent in 1985 but the following two years, the growth dropped under 3 per cent (ITU World Telecommunications Indicators Database, 1997).



Notes: Local currency revenues have been adjusted using the Consumer Price Index provided by IMF;
 * Revenue data was not available at the company level prior to 1987: Pre-1987 revenue data refers to the telecommunication sector as a whole. Post-1987 revenue data refers to CTC. Employee data has been adjusted accordingly. Figures from the two periods are not comparable but trends are.

Source: Data adapted from ITU World Telecommunication Indicators Database and ITU Database.

Figure 11 - Revenue per Employee and per Main Line in Chile (1980-95)

In 1987, the government decided to have the private sector participate more actively in the funding of telecommunication and the sale of a significant stake of CTC to a strategic equity partner (SEP) was decided. The SEP would be required to invest US\$ 100 million in the company to begin with. In early 1988, Alan Bond, an Australian tycoon was selected. Paying US\$ 140 million for 35 per cent of CTC, Bond did invest US\$ 100 million within two years as required but he also collected US\$ 90 million in dividends over the same period and ended up selling his stake to Telefónica (Spain) in 1990 for US\$ 390 million (Melo, 1995).

Bond definitely boosted the value of the company. As a consequence of the government's decision to allow rate rebalancing (between local and long-distance) in 1987, revenues per line jumped in 1988 (See Figure 11). The unused connection capacity of local exchanges did increase under Bond's leadership from 7.7 per cent in 1988 to 20 per cent in 1989 and 1990 but teledensity did not follow the same path in 1988 and 1989 (see Figure 10): the SEP is committed to invest in developing the network but the actual signing up (or connection) of new subscribers does not occur at the same pace. Priority may have been given to deriving as much revenue as possible from existing subscribers rather than actually connecting new subscribers.

The arrival of Telefonica of Spain at the commands of the company in 1990 led to a real jump in teledensity. Revenues are boosted using the growth potential of the network rather than the revenue per line potential (see the teledensity indicator in Figure 10 and the revenue per line indicator in Figure 11). However, still another factor has to be taken into account when looking at the

evolution of revenue per line: in 1989 the principle of a multicarrier system for the long-distance market appears on the regulator's agenda (Stehmann, 1995). After a long legal battle led by ENTEL which tried to bar CTC from entering its market, CTC was finally allowed to expand its business in the long distance market in 1992 which translated in higher revenue per line in 1993. Nevertheless, now that the principle of a multicarrier system had been enforced in the long-distance market, CTC could do little but accept its extension to the local market in 1994 and prepare for competition by adjusting rates (see Figure 11).

Chile's telecommunications sector stands as an interesting example as privatisation of CTC which owned the fixed lines network and provides local telephone services, occurred as early as 1987. Clearly Alan Bond's objective was to get a quick return on investment. Despite an obligation to invest US\$ 100 millions, no clear goals (number of lines to be installed, quality of service to be reached) seems to have been set at the time. Hence without appropriate incentives in place, private ownership improved the financial ratios (and therefore the company's profitability) but did not do much in terms of new customers being connected.

Once Telefonica of Spain was running CTC, the main sets of incentives at work can be described as:

- *Ownership-specific incentives*: the business should be profitable in the long run (not only in the short run as put in practice by Bond). The growth potential of the network should be exploited (not only the growth potential of revenues derived from existing customers).

- *Competition-specific incentives*: the threat of forthcoming competition from ENTEL and other new entrants on CTC's main market (local telecommunications services) was always present because it had been made possible by the law (and later enforced by the courts). For the top-management had now a longer-term view, CTC's dominant position had to be comforted before competition actually took place.
- *Legacy incentives*: the past behaviour of Alan Bond at the commands of CTC may also have provided some strong incentives for Telefonica to prove better as a shareholder. Indeed, in front of the government as well as in the courts during the legal battles, trust in CTC behaviour was certainly not running high.

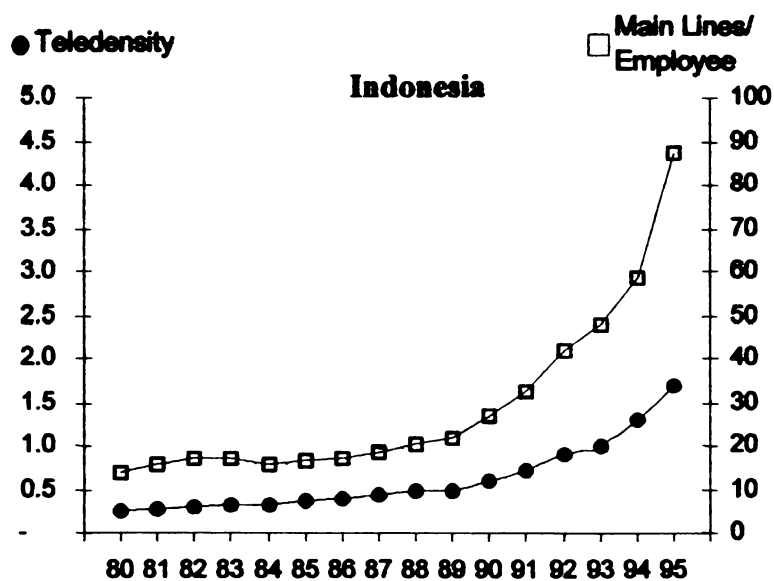
4.5 Indonesia

With a population approaching 200 million people, Indonesia's 3.3 million main lines in operation amounted to a low teledensity (1.7 main lines per 100 inhabitants). Though efforts have been made over the last decade to foster the development of the network, this figure is poor when compared with other countries in the region (China, Thailand, the Philippines and Malaysia among others have a higher teledensity).

While the issue had been acknowledged by the government, the solutions tailored to address it, did not really prove effective. Since 1973, five-year plans, known as Repelita plans, reflected the government's commitment towards the

telecommunications sector. However, in order to meet their targets the plans were usually overlapping (Ure, 1996).

As early as 1989, it was decided that the private sector could be used to improve the rate of growth of the network. As the law required all telecommunications services to be provided by government-owned entities due to national security concerns (Bruce and Cunard, 1995), the private sectors was invited to participate in financing and building limited portions of the local network infrastructure but not in managing or operating these networks (Intven, 1996). This led to the design of Build-Transfer schemes known as PBH (Pola Basi Hasil) whereby nine private local companies entered into revenue-sharing agreement to build 775 000 lines and transfer ownership to PT Telkom, the national domestic operator (Harrington, 1996 and Ure, 1996). Under these schemes, the nine contractors were guaranteed a high return on their investment which made this funding solution an expensive one in the end while the impact on teledensity remained limited (Intven, 1997, and see Figure 12).

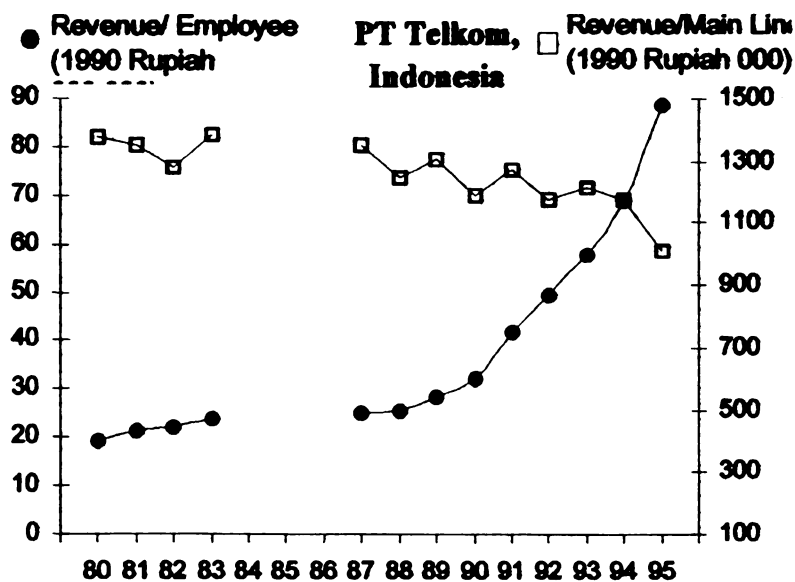


Notes: Teledensity: main lines in operation per 100 inhabitants in Indonesia;
Main Lines per Employee: data refers to PT Telkom exclusively.

Source: Data adapted from ITU World Telecommunication Indicators Database and ITU PTO database.

Figure 12 - Teledensity and Main Lines per Employee in Indonesia (1980-95)

The way the schemes worked did not provide real incentives for managerial reforms at PT Telkom (Bruce & Cunnard, 1995). The nine private companies were used as subcontractors delivering turnkey portions of the local networks. As a consequence, indicators such as "Revenue per employee" or "Main lines in operation per employee" have been significantly boosted (see Figure 12 and Figure 13). Indeed, more lines were taken care of by a steady number of employees in PT Telkom and higher revenues were cashed by the company as the number of lines in operation increased. PT Telkom was profitable but the government would take around 60 per cent of the company's pre-tax profits. Once the number of lines to be delivered by the subcontractors was agreed, PT Telkom had no incentives to build more lines by itself. Hence the limited increase in teledensity.



Notes: Local currency revenues have been adjusted using the Consumer Price Index provided by IMF;
Revenue data missing for 1984, 1985, and 1986.

Source: Data adapted from ITU PTO Database.

Figure 13 - PT Telkom's Revenue per Employee and per Main Line (1980-95)

Ever since 1995 (the end of the period we are looking at), there have been major changes in the Indonesian telecommunications sector. PT Telkom was partly privatised in 1995. As mentioned in Chapter 1, the timing of the privatisation did not allow selling as big a stake of the company as it had been expected. More significantly, as of 1996, the schemes used to build up the network were greatly improved.

The schemes now resemble a temporary privatisation of the telecommunications network. Indeed, the country has been divided into six regions, five of which have been granted to five consortia (one region per consortium). Each consortium inherits the local network in its region for 15 years, commits to rehabilitate and operate the network as well as to build a number of lines decided in advance (300 000 to 500 000 new lines depending on the region). In the meantime, each consortium pays royalties to PT Telkom (on top of the agreed upfront payment) and commit funds and human resources to train PT Telkom staff. The cash paid to PT Telkom (some US\$ 6 billions) is to be used by the Indonesian operator to upgrade and expand the local network in the sixth region including the greater Jakarta area (Intven, 1996). At the end of the 15 years licence, the network in each of the five regions is transferred back to PT Telkom. As it falls out of our time period, the results of such a reform does not show yet in our indicators.

The case of Indonesia is interesting to look at as the participation of the private sector until 1996 was limited to delivering installed telephone lines. In a country where the building of the network had turned private while the operation

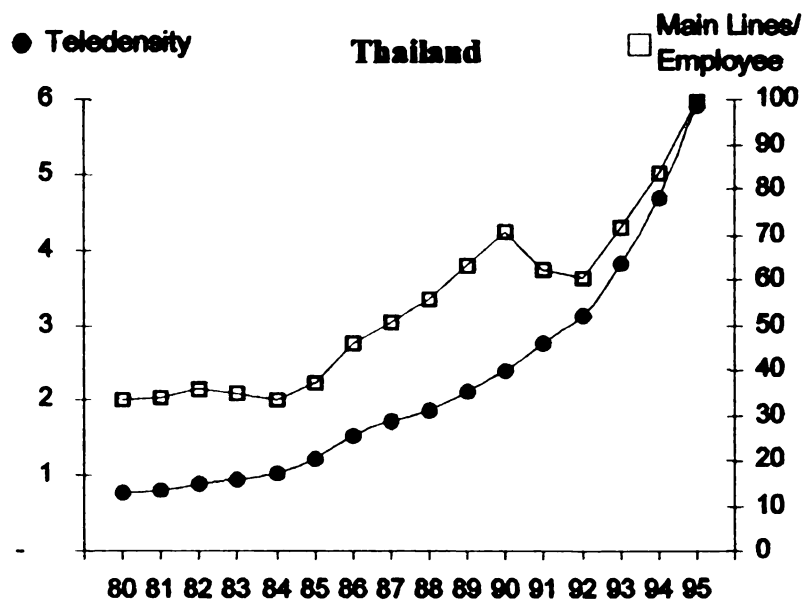
and the management of the network remained in the state-owned telecommunications operator, the set of incentives at work is different from what has been observed in the other cases above. The incentives to build up the network are passed on to the subcontractors. For them, the main driver is a guaranteed high return on investment. As for PT Telkom, the connections and management of the new lines seemed to provide enough new revenue not to bother about any other incentives.

4.6 Thailand

The case of Thailand has already been developed in much detail in section 1.2.1. However, it is worth coming back to this example with the specific approach chosen in this chapter. As in many countries, the telecommunication sectors was used as a “ready to use” cash resource with 60 per cent of the profit taken by the government. Looking at the performance indicators series pictured in Figure 14, it is clear that teledensity was growing regularly from the mid-1980s on, TOT, the domestic operator, adding an average of 140 000 lines to the network per year. Nevertheless, maintaining a certain level of profit was not compatible with overinvesting.

The arrival of the Build-Transfer schemes changed the picture. Contrary to the PBH schemes adopted in Indonesia in the early 1990s, Thai BT schemes required the participating private companies not only to build but also to operate new lines (which means finding subscribers to start with). TOT was also to buy

back the lines once completed but not to operate them until the end of the concession period. The private companies in charge of building portions of the local networks had been given detailed targets with a threat of financial penalties if these targets were not met.



Notes: Teledensity: main lines in operation per 100 inhabitants.
Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 14 - Teledensity and Main Lines per Employee in Thailand (1980-95)

The following could be observed:

- The threat of financial penalties put great incentives on the private companies to complete the building of their network on time or even ahead of time.

However, the domestic operator had no incentive to buy back the lines earlier than expected when the lines were delivered ahead of time.

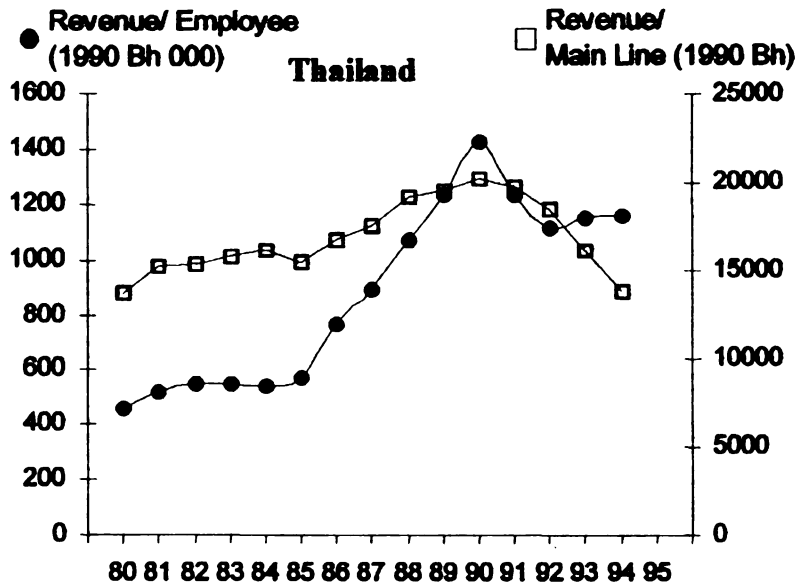
- In their hurry to build new lines as required, the private companies concentrated their efforts on building lines rather than signing on new customers. For instance, Deutsche Morgan Grenfell reported in September 1996 that while the private companies TelecomAsia and Thai Telephone had transferred to TOT 1.02 million lines and 450 000 lines respectively by the end of March 1995, they had connected only 432 000 and 250 000 subscribers respectively. The demand for lines had been slower than expected. However, even the expressed demand was not met. For example, 25 percent of TelecomAsia's subscribers (people asking for a line) were not yet connected in mid 1996. Available capacity represented 10.8 per cent of the population at the end of 1996 while only 6.7 percent of the population was actually connected (that is to say around 38 percent of the available capacity was not used). As recently as April 1997, the Bangkok Post reported that TelecomAsia had still half of the 2.6 millions lines delivered to TOT unsold. Deutsche Morgan Grenfell suggested that part of the blame was on TOT. Indeed, the state-owned operator would not agree on reducing the high one-off installation charge and deposit (the charges are set up by TOT and the private companies and have to be approved by the government).

- Whereas investment had been made by the fixed-network contractors, the price of mobile telephony dropped considerably to attract mobile customers to the point where mobile calls were cheaper than fixed calls, luring customers to mobile networks rather than to fixed networks. TelecomAsia and Thai Telephone tried to convince the government to lower the price of calls on the fixed-network along with the royalties paid to TOT. In so doing, they wanted to become more competitive as against the main mobile operators (Total Access Communications and Advanced Info Services) while not reducing their own revenues.

The combined impacts of these factors can be seen in Figure 15, which pictures revenue indicators. While the main line indicators (Figure 14) tell the success story of the Build-Transfer schemes, the revenue indicators do not inspire the same feeling. In the end, the set of incentives at work in Thailand can be summarised as:

- *Regulatory-specific incentives*: the conditions built in the BT schemes provided an impetus for the private companies to roll out their networks quickly while the state-owned company TOT had no real incentives to accelerate its buy back programme.
- *Ownership-specific incentives*: a significant part of state-owned TOT's profit being taken by the government, one can conclude that there is conscious or unconscious incentives from the government sphere to maintain a steady level of profit.

- *Other communications means as an incentive:* Thailand is probably one of the best examples for this type of incentives. Indeed, while fixed-line subscriber teledensity reached 6.7 percent at the end of 1996, mobile teledensity was at 3 percent. With mobile communications cheaper than fixed-line communications, this provide great incentives for the fixed network to react, whether by negotiating lower price with the government (still setting the fixed-line prices) or by embarking in original offering programmes. For instance TelecomAsia, was betting in 1997 on combining its new PCT network offer (adapted from the Japanese PHS systems) with its fixed-network offer.



Note: Local currency revenues have been adjusted using the Consumer Price Index provided by IMF.

Source: Data adapted from ITU World Telecommunication Indicators Database.

Figure 15 - Revenue per Employee and per Main Line in Thailand (1980-95)

4.7 Conclusions

This chapter has focused, in more detail than allowed by statistical analysis, on the incentives at work prior and posterior to the privatisation or Build/Transfer event. For each country or operator looked at, a particular attention has been put to analyse events according to the framework of incentives developed and proposed in Chapter 2.

In Argentina and Mexico, given the concessions and efforts made by the government to prepare for the privatisation, the main performance indicators ought to boom. Before the privatisation made its way through to the political agenda, the conditions to run the telecommunication operator in a business-like manner were simply not there. One could think that the very same results could have been achieved without the privatisation taking place but with the government acting independently as a sound shareholder in a business-like manner.

In Hungary, the separation of Posts, as suggested earlier on by the T-Test and regression analysis, appears to be the main factor for improved performance indicators along with the granting of World Bank loans with business-oriented obligations attached to them as well as the determination of both the politicians and the decision-makers in the telecommunications company.

Chile is an even better example. Indeed the “first” privatisation did not bring the expected results as the investors in place did not pursue the same game of incentives, looking indeed for short-term profits. The arrival of a strategic

partner two years later with a longer-term vision along with a real short-term threat of competition provides a more plausible explanation for the improvement of the operator efficiency than the privatisation itself.

Thailand is another case in point when looking at the framework of incentives that set the background in which the telecommunication sector operates. Much of the obligations imposed upon the private sector companies were aimed at building lines and were fruitful in this respect. However, the overall framework of incentives did not provide the necessary conditions for a corresponding customer take up rate to take place. In Indonesia, the same phenomenon could be observed (before 1996) in that incentives were provided for private subcontractors to build lines (without the ability to operate them) while no or few corresponding incentives were provided for state-owned telecommunications operators.

Interestingly, similarly to the T-Test and regression analysis, the contextual analysis suggests in each case that the privatisation or the Build/Transfer event is not to be considered as a stand-alone factor that will impact the efficiency (as defined in Chapter 2) of a given telecommunication operator and therefore of the telecommunication sector in a given country. The event *per se* takes place within a framework of changing dynamics. These dynamics are actually the observable part of the game of incentives at work.

This chapter has also allowed us to highlight practical examples in each case analysed of the different types of the incentives at work presented in

Chapter 2. The analysis developed in Chapter 2, 3 and 4 now allows us to answer the two research questions raised in the introductory chapter :

(R1): Is a shift in the ownership structure likely to have an impact on the efficiency of the telecommunications service sector in a given country and to what extent can such a shift explain variations of the main telecommunication performance indicators?

(R2): What are the other issues to be taken into account when looking at the evolution of the telecommunication sector?

The tentative answer to these two questions is spelled out in the concluding chapter, based on our analysis.

Conclusion

The shift towards private ownership is no longer a challenged issue and it is now taken for granted by most economists and policy makers in both so-called developed and developing countries. The involvement of the private sector has therefore been growing fast in the telecommunications field. Governments have been eager to explore new ways of financing the telecommunications development in order to substitute for the public funding, much needed in other sectors of the economy. With many countries having partially or totally introduced private sector management in their telecommunication service industry, there is in-depth material to allow researchers to look back and attempt to answer the following questions:

(R1): Is a shift in the ownership structure likely to have an impact on the efficiency of the telecommunications service sector in a given country and to what extent can such a shift explain variations of the main telecommunication performance indicators?

(R2): What are the other issues to be taken into account when looking at the evolution of the telecommunication sector?

This thesis has been articulated with three main purposes in mind :

- Provide a descriptive background (Chapter 1) on the involvement of the private sector (materialised in the award of stakes in national telcos, or in the award of network building and operating contracts) so that the reader be familiarised with the two main types of private sector participation in the

telecommunication service industry (privatisation and Build/Transfer schemes),

- Design an analytical framework (Chapter 2) based on the available literature to address the above two questions
- Put to test (Chapter 3 and 4) the suggestions raised in this analytical framework using three different tools that are T-Test, regression analysis and contextual analysis.

The key suggestion raised in the analytical framework (Chapter 2) in relation to research questions (R1) and (R2) is the following:

The ownership structure does not explain it all and other factors (or set of incentives) should be looked at. The performance indicators of fixed-line operators are indeed likely to be impacted by a number of factors including not only the nature of the ownership but also the structure of the market competition, the effectiveness of the regulatory framework, the availability of other communications means, etc.

As highlighted in Chapter 3, the impact of a change in an operator's ownership structure is not easily assessed neither using the T-Test tool nor running the regression analysis tool. Where these tools provided sound results, the same conclusions could be derived as seen in the cases of Mexico and Hungary. Interestingly, in these very cases, the results suggested that it was not the privatisation event itself that actually explained the growth variation of the

chosen indicators. In the other cases looked at, we found that either no valid results could be obtained or that the privatisation event did not explain much of the growth variation observed for the chosen performance indicators. The data available to us prevented us from running regression analysis with more than one regressor.

At this stage, it seemed therefore all the more important to engage in a contextual analysis in order to grasp a wider understanding of the operators' incentives at work. Interestingly, as highlighted in Chapter 4 and similarly to the T-Test and regression analysis, the contextual analysis suggests in each case that the privatisation or the Build/Transfer event is not to be considered as a stand-alone factor that will impact the efficiency (as defined in Chapter 2) of a given telecommunication operator and therefore of the telecommunication sector in a given country. The event *per se* takes place within a framework of changing dynamics. These dynamics are actually the observable part of the game of incentives at work.

It should be noted however that, due the availability of data (or non-availability of data), our research was carried out on a limited number of countries or operators. The conclusions drawn from this research may not be generalised as such to other countries or operators. Specific research for each country or operator should therefore be carried out and is strongly encouraged as appropriate data and material become available.

This being said and based on the analysis presented in Chapter 2 to 4, a proposed answer to the two research questions raised in the introductory chapter is the following:

(R1):

One cannot conclude that a shift in the ownership structure will have by itself an impact on the efficiency of the telecommunications service sector in a given country. In the cases looked at using T-Test, regression and contextual analysis, it appears that one should look at the impact of a broader framework defined as a framework of incentives. Operators are influenced by this broader framework and their reaction to the different sets of incentives materialises one way or the other in the growth variation of the indicators used to assess their performance. Therefore the extent to which a shift *per se* in the ownership structure of an operator explains the variations of the main telecommunication performance indicators cannot be quantified.

(R2):

The other issues or variables to be taken into account when looking at the evolution of the telecommunication sector are the issues or variables that are potentially capable of generating incentives for the operators. As described in Chapter 2 and illustrated in Chapter 4, they include:

- The structure of market competition,
- The effectiveness of the regulatory framework,
- The availability of other communication means,

- The organisational changes affecting the operator.

Based on the contextual analysis presented in Chapter 4, one can also argue that a sound analysis of the situation coupled with a clear determination at the political level (in both cases) constitutes another key variable to be taken into account.

Based on this conclusion, it is suggested that to foster the efficiency of the telecommunication service sector (as measured by performance indicators defined in Chapter 2) policy-makers have to make sure the proper sets of enforceable incentives are in place whether they choose to have the private sector to participate in the telecommunications service industry or not.

APPENDICES

APPENDIX A

APPENDIX A

WHO MADE THE LEAP?

Table 21 - Privatisations to date (1984-1996).

<i>Country</i>	<i>Privatised company</i>	<i>Amount raised in US\$ million</i>	<i>Year</i>	<i>%*</i>	<i>Note</i>
Argentina	Telecom Argentina	1'779	1990, 1992	100	Private sale in 1990 of 60% to a consortium including STET (Italy, 30%), France Télécom (30%), JP Morgan (USA, 10%), Compañía Naviera Perez Companc (30%); the sale raised US\$ 539 million. 30% sold to the public in February 1992, raising US\$ 1'240 million. 10% per cent went to the company's employees.
Argentina	Telefónica Argentina	1'499	1990, 1991	100	Private sale in 1990 of 60% to COINTEL, consortium consisting of Telefónica de España (30%), Citicorp (USA, 57%), and Techint (Italy, 10%). The sale raised US\$ 631 million. 30% sold to the public in 1991, raising some US\$ 868 million. 10 per cent went to the company's employees.
Australia	Optus (formerly AUSSAT)	1'200	1991	100	AUSSAT, domestic satellite operator was sold to Optus Communications (24.5% BellSouth , 24.5% Cable & Wireless , 51% Optus Proprietary, an Australian consortium). The price included a general carrier license.
Barbados	Barbados External Telecommunications	22	1991	25	Cable & Wireless increased its stake to 85%. The government has a repurchase option to be exercised after five years.

Table 21 (cont'd).

Country	Privatised company	Amount raised in US\$ million	Year	%*	Note
Barbados	Barbados Tele-phone Company	3	1991	11	Cable & Wireless increased its stake to 75%. The government has a repurchase option to be exercised after five years.
Belgium	Belgacom	2'400	1996	49	A consortium that includes Ameritech (USA) (40%), TeleDanmark (33%) and Singapore Telecom (27%), bought 49% of Belgacom.
Belize	Belize Telecom-munica-tions Ltd	52	1988, 1990, 1992	97.5	49% sold in 1988, including 25% to BT . In 1990, 13.1% sold to local investors and a further 35.4% in 1991. In 1995, most BT's shares passed to MCI .
Bolivia	ENTEL	610	1995	50	Private sale of 50% to STET (Italy).
Canada	Teleglobe	467	1987	100	Since the company was originally sold to Memotec but subsequent ownership changes have left, BCE as the main shareholder (24.3%).
Cape Verde	Cabo Verde Telecom	20	1995	40	Portugal Telecom paid US\$ 20 million for a 40% stake in the company in December 1995.
Chile	ENTEL	121	1988, 1989	69	The state-owned Corporación de Fomento de la Producción (CORFO) gradually sold most of its shares in ENTEL. Telefónica de España which had bought up to 20% of ENTEL was asked to withdraw because of its stake in CTC. Its shares went to COINTEL of Argentina. STET acquired an 18% stake in ENTEL for US\$ 278 million in December 1995.

Table 21 (cont'd).

Country	Priva- tised company	Amount raised in US\$ million	Year	%*	Note
Chile	CTC	375	1987, 1990		Bond Corporation acquired 53% of CTC with investments of US\$ 115 million and US\$ 155 million in 1987 and 1988 respectively. In 1990, those interests were bought by Telefónica de España .
Czech Republic	SPT Telecom	1'450	1994, 1995	49	In 1994, 30% of the company was "sold" to the general public, through vouchers, given away for free. Private sale of 27% to Swiss Telecom and Netherlands PTT in 1995 through a capital increase. Investors paid US\$ 1.32 billion in cash and committed to provide know-how services worth US\$ 130 million. After the capital increase, the government still owns 51%.
Denmark	Tele-Danmark	3'035	1994	48.3	TeleDanmark first repurchased shares from the government for some US\$ 172 million and then issued shares: US\$ 1'178 million were raised through ADS (American Depositary Shares), some US\$ 1'830 million were raised through a classical public offering and some US\$ 11 million from shares sold to the company's employees. In the process, the government only got 5.7% of the raised amount.
Germany	Deutsche Telekom	13'360	1996	26	713 million shares were sold in November 1996. 23.7 million went to the employees for US\$ 0.34 billion, the domestic tranche (454.2 million shares) raised US\$ 8.68 billion and the international tranche (235.3 million shares) raised US\$ 4.34 billion.

Table 21 (cont'd).

Country	Privatised company	Amount raised in US\$ million	Year	%*	Note
Gibraltar	Gibraltar Nynex Communications	10	1989	50	A joint venture was formed between the Government of Gibraltar and Nynex to take charge of Gibraltar's telecommunications and its modernisation.
Greece	OTE	530	1996	8	In April 1996, 5% was offered to domestic investors raising US\$ 332 million, 1% was offered to employees, raising US\$ 67 million, and 2% was offered to international investors , raising US\$ 132 million..
Guinea	SOTEL-GUI	45	1996	60	Private sale of 60% to Telekom Malaysia (no capital calls to date).
Guyana	Guyana Telecommunication Corporation	17	1991	80	Atlantic Tele-Network of the US acquired 80%. The government kept the remaining 20%.
Hungary	MATÁV	1'727	1993, 1996	67.2	30.2% sold in 1993 for US\$ 875 million and 37% in February 1996 for US\$ 852 million to the Magyarcom Consortium (Ameritech/Deutsche Telekom).
Indonesia	PT Indosat	1119	1994	35	10% of the capital was offered on Jakarta and Surabaya Stock Exchanges raising US\$ 316 million, 25% on the New York Stock Exchange in the form of American Depositary Shares (ADS), raising US\$ 873 million; the government maintains 65%.
Indonesia	PT Telkom	1'590	1995	19	12.5% sold on the domestic market, raising some US\$ 1'040 million. 6.5% constituted the international tranche , raising some US\$ 540 million.

Table 21 (cont'd).

Country	Priva- tised company	Amount raised in US\$ million	Year	%*	Note
Ireland	Telecom Eireann	290	1996	20	Private sale of 20% to KPN (Netherlands) and Telia (Sweden). An option for another 15% over three years is reserved for the consortium.
Israel	Bezeq	178	1990, 1991	24	Domestic Public Offerings in September 1990 and May 1991 raised respectively US\$ 74 million accounting for 6.4% of total capital and US\$ 104 million accounting for 17%. The government still owns 76%. As of January 1996, Cable & Wireless had bought up to 10.02% on Tel-Aviv stock exchange.
Jamaica	Telecom- munica- tions of Jamaica (TOJ)	84	1989, 1990	40	The incorporation of TOJ took place in May 1987, grouping Jamintel in which Cable & Wireless had 49% and Jamaican Telecommunication Corporation in which the state had 90%. By this arrangement C&W received 39% of TOJ. The government of Jamaica sold 20% in 1989 and again in 1990 to C&W which thus increased its stake up to 79%.
Japan	NTT	70'469	1986, 1987, 1988	34.6	NTT was privatised in three steps: US\$ 13.85 billion (12.5%) were raised in 1986, US\$ 34.4 billion (12.5%) in 1987 and US\$ 22.2 billion (9.6%) in 1988 through domestic public offerings. The government still retains some 65%.

Table 21 (cont'd).

Country	Priva- tised company	Amount raised in US\$ million	Year	%*	Note
Korea (Republic of)	Korea Telecom	3'514	1993, 1994, 1996	28.8	10% sold in a public offering in April 1993 raised US\$ 898 million. 10% sold in two open domestic competitive bidding in 1994 (5% each raising respectively US\$ 622 million and US\$ 844 million). 8.8% raised US\$ 1.15 billion in 1996 (last quarter).
Latvia	Lattelkom	160	1994	49	Private sale to TILTS Communications A/S: Cable & Wireless (63%), Telekom Finland (27%) and IFC (World Bank) (10%). TILTS will eventually obtain an equity stake of 49% over a three year period.
Malaysia	Telekom Malaysia	1287	1990, 1993	22.6 5	14.9% was sold on September 1990 raising US\$ 870 million. The second public offering took place in 1993.
México	Telefónos de México (Telmex)	7'769	1990, 1991, 1992, 1993, 1994	55.1	In 1990 4.4% went to the employees for US\$ 325 million (financed through loans) and 20.4% was sold to a consortium including Grupo Carso of Mexico, France Télécom and SBC of the US for US\$ 1'757 million. In 1991, 15.7% were offered to the public (domestic and international public offerings), raising some US\$ 2'170 million. In 1991, SBC exercised its option to buy 5.1% for some US\$ 467 million. 4.7% was sold in 1992, for some US\$ 1.5 billion through a domestic and international offering . US\$ 1 billion were raised in 1993 for 3.3% of the company. US\$ 550 million were raised in January 1994 for the remaining 1.5%.

Table 21 (cont'd).

Country	Privatised company	Amount raised in US\$ million	Year	%*	Note
Mongolia	Mongolian Telecommunications Company (MTC)	11	1995	100	Korea Telecom invested US\$ 4.5 million for a 40% stake in August 1995. 60% were offered to the public, raising US\$ 6.5 million.
Netherlands	KPN	3'791	1994	30	30% of KPN sold by the government on the Amsterdam Stock Exchange.
New Zealand	Telecom Corporation of New Zealand	2'500	1990	100	Private sale to Ameritech and Bell Atlantic of the USA (50% each) with the obligation for them to reduce their stake to 24.9% within 3 years which they did.
Pakistan	Pakistan Telecommunication Co.		1994	12	In September 1994, 12% of the company was issued in the form of convertible vouchers. Those vouchers were converted between August and November 1996 on the Karachi Stock Exchange.
Perú	Telefónica del Perú	3'202	1994, 1996	61.6	Telefónica de España paid US\$ 1'392 million to the Peruvian government for a 35% stake in ENTEL-Peru, Compañía Peruana de Telefonos (CPT) and their subsidiaries. As part of the agreement, Telefónica also invested US\$ 610 million in CPT. The Peruvian companies were merged to become Telefónica del Perú. In 1996, 26.6% was sold (domestic and international public offering) for US\$ 1.2 billion.

Table 21 (cont'd).

Country	Priva- tised company	Amount raised in US\$ million	Year	%*	Note
Portugal	Portugal Telecom	1'925	1995, 1996	49	In 1995 the sale of 28% raised some US\$ 977 million. In June 1996, 21% raised some US\$ 948 million through a domestic and international offering . 12.7 million shares out of 37.35 million shares were reserved for employees and small investors. The government still owns 51% of the company.
Puerto Rico	Telefóni- ca Larga Distancia	142	1992	79	Private sale of 79% to Telefónica de España .
Singapore	Singapore Telecom	4'336	1993, 1996	16.6 7	11% sold on Singapore Stock Exchange in October 1993, raising US\$ 2'654 million (1.18% were purchased by foreign investors, corresponding to US\$ 285 million). 0.67% were sold in July 1996, raising US\$ 261 million. 5% were sold in November 1996, raising US\$ 1'421 million.
Spain	Telefóni- ca de España	1579	1992, 1993, 1995	13.5	The state reduced its stake insignificantly from 33.69% to 33.63% in 1992, then to 31.86% in 1993 and then to 20.16% in 1995. The transactions raised respectively US\$ 7 million, US\$ 146 million and US\$ 1'426 million.
United Kingdom	BT	22'931	1984, 1991, 1993	100	BT's privatisation was led in three tranches: US\$ 5200 million (51%) were raised in 1984, US\$ 9821 million (27%) in 1991 and US\$ 7910 million (22%) in 1993. The government retains a "golden share".

Table 21 (cont'd).

Country	Priva- tised company	Amount raised in US\$ million	Year	%*	Note
Venezu- ela	CANTV	2'792	1991, 1996	89	Private sale in 1991 of 40% (but with majority voting control), raising US\$ 1'900 million, to Venworld consortium which includes GTE (USA) , AT&T (USA) , Telefónica de España , and two Venezuelan partners. In November 1996, domestic and international public offering raising US\$ 892 million for 49% of the company.

Notes: * Percentages displayed represent the stake sold over the period;
 Characters in bold indicate foreign investment;
 Average annual exchange rates have been used.

Source: Adapted from ITU World Telecommunication Development Report 96/97.

APPENDIX B

APPENDIX B

A CLOSER LOOK AT AMBROSE AND AL'S STATISTICS

Ambrose and al claims state-owned telecommunications operators are overstaffed in developing countries with 50 to 100 employees per 1,000 main telephone lines as compared to 0.2 employees at most in Europe, Japan and the United States (Ambrose and al, 1990). The 0.2 figure seemed suspicious. This would mean a ratio of 5,000 main lines per employee back in 1988 while even the most efficient telecommunication operators do not reach the 500 lines per employee ratio in 1995. Therefore, the 'employees per 1,000 main lines' indicator has been recalculated for the countries displayed in the table provided by Ambrose and al (Table 22), this time using the ITU World Telecommunication Indicators Database and the ITU PTO Indicators Database. Results of this new calculation are shown in Table 23. The bad thing about Ambrose and al's data is that it benefited from the label 'World Bank' and was trusted as such. The same statement was for example reused in *Telecommunication Policy* (McKormick, 1993).

Ambrose provides data for Tanzania, Ecuador, Hungary, Indonesia, Malaysia and India on the one hand and the US (New York Telephone and New England Telephone), Spain (Telefonica de España) and Japan (NTT) on the other hand. This naturally leads readers acknowledge the huge difference between public and private ownership.

It would have helped to also provide data for other countries where telecommunication operators have been partly private for several decades (see Table 9, Chapter 2). Comparing the efficiency of the Tanzanian network (around 66,000 main lines in operation in 1988) or the Ecuador network (around 384,000 lines in 1988) with the Spanish one or the Japanese one (respectively around 11 million and 49.9 million lines in 1988) is somewhat not fair. Not to mention that companies picked up in both the US and Japan only provide domestic telecommunications. Indeed, if a company handles both domestic and international calls, the employee base will be larger but with the very same number of telephone lines. This will bias the comparison of the efficiency of such a company with the one of a company which only provide domestic services. As suggested in Table 9 (Chapter 2) the problem may not lie only on the consideration of ownership. Efficiency, measured in Employees per 1,000 main lines in operation, in the Philippines or Jamaica does not plead in favour of private ownership.

Table 22 - Efficiency measured in terms of employees per 1,000 lines in selected countries (1)

Data as provided by Ambrose and al.	Lines in Service	Employees/ 1,000 DELs*
Tanzania	54,000	69.00
Ecuador	343,000	18.00
Hungary	858,000	23.00
Indonesia	894,000	50.00
Malaysia	350,000	50.00
India	2,898,000	96.00
New England Telephone (USA)	5,500,000	0.21
Telefonica de Espana	9,337,000	0.14
New York Telephone (USA)	9,800,000	0.20
NTT (Japan)	46,772,000	0.16

Note: * DEL (Direct Exchange Line): telephone line which connects subscriber to local telephone exchange.

Source: Ambrose and al, 1990 p 10; derived from PTT reports, Pyramid Research, Inc.

Table 23 - Efficiency measured in terms of employees per 1,000 lines in selected countries (2)

Recalculation using ITU data.	Main lines in operation	Employees/ 1,000 main lines in operation
Tanzania	66,058	74.3
Ecuador	383,589	15.5
Hungary*	915,900	22.9
Indonesia	828,812	50.2
Malaysia	1,247,687	22.6
India	4,174,278	86.7
Telefonica de Espana	10,971,600	6.0
Nynex (USA)	14,807,000	6.6
NTT (Japan)	49,900,000	5.7

Notes: No data being mentioned in Ambrose's original table but other tables in his book using mostly 1988 data, recalculations have been made for that year.

* 1989 data.

Source: ITU World Telecommunication Indicators Database, ITU PTO Indicators Database.

Similarly, Ambrose and al claims that the switching capacity in use is typically 75 per cent or less due to poor maintenance and delays in linking new subscribers to the exchange. The table provided to back this hypothesis (Ambrose and al, 1990, p 10) shows 8 out of 11 developing countries with utilised exchange capacity ranging from 82 to 93 per cent in 1987 or 1988 (Hungary, Indonesia, Morocco, Argentina, India, Turkey, Chile, and Brazil) and only 3 countries with a utilised exchange capacity of or below 75 per cent (Egypt, Tunisia and Malaysia). One would expect more evidence before stating such an hypothesis.

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