

**THE FISCAL IMPACT OF LIBERALIZATION OF THE  
TELECOMMUNICATIONS SECTOR IN MOROCCO**

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# THE FISCAL IMPACT OF LIBERALIZATION OF THE TELECOMMUNICATIONS SECTOR

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## I. INTRODUCTION

The Government of Morocco (GOM) has enacted a telecommunications law (Law 24/96). The Law provided for liberalization in the telecommunications sector and also conferred substantial regulatory functions upon the newly-created regulatory agency, *Agence National de Reglementation des Telecommunications* (ANRT). The GOM has issued a second GSM license and is now moving towards further liberalization of the telecom sector. Prior to the privatization of the incumbent operator, Itissalat-Al-Maghrib (IAM), the GOM will need to evaluate how to structure the competitive business environment that the privatized corporation will face and likely impacts of this structure on the telecom sector as a whole. The particular liberalization approach (including timetable for introduction of competition into various market segments, degree of liberalization, presence of entry barriers, etc.) is certain to have an impact on fiscal flows to the government implementing the liberalization. Fiscal flows, such as proceeds from the privatization transaction and fiscal contribution of the operator, are influenced by several factors. Factors include the particular characteristics of the country and the economic environment, but also the particular privatization/liberalization path selected.

This study was undertaken for the purpose of providing the GOM with an analysis of the fiscal impacts of various liberalization and privatization approaches, using observations derived from a cross-country panel of data and information. The results of the international analysis are then used, in combination with information on the Moroccan economic and telecom market environment, to provide rough estimates of potential fiscal effects of different policy choices for Morocco. Risk is assessed by examining two scenarios of liberalization as

well as variations on assumed secular growth in international traffic growth and on the assumed impact of liberalization on growth of international traffic.

## **II. METHODOLOGY**

### **A. Data Sources**

Data were collected on the privatization and liberalization experiences in countries covering a range of geographic areas and income levels. More extensive, time-series data were collected on the countries which had some history of both privatization and liberalization. These included: Australia, Chile, Denmark, Finland, Mexico, New Zealand, and the United Kingdom.

### **B. Estimating Fiscal Impacts**

#### **1. Multiplier Effect**

##### **a. Multiplier Concept**

An increase in demand results in two impact on the economy: direct and indirect. The direct effect of the additional calls on GDP is measured as the dollar value of the increase in demand. It is calculated by multiplying the increase in output by the value-added per unit of additional output. In addition, macro-economic models typically embody “multiplier effects” which translate effects of a direct change in production in a particular sector into total effects on the economy. The impact of increased demand in telecommunications are certain to produce additional, indirect effects on the general economy.

##### **b. SPR Estimate**

SPR estimates the general economy effects of increased production in telecom to be 1.4. That is, for every unit increase in international telecommunications, there will be an additional 0.4-unit increase in output in the economy outside telecommunications.

The 1.4 multiplier estimate was derived in a 1993 SPR study that estimated the economic impact of high settlement rates for international telecommunications services<sup>1</sup>. The study estimated the effect of lowering settlement rates to cost-based levels, and the resulting decrease in prices for international telecommunications. The price declines would vastly stimulate demand for calls in both directions. A price demand elasticity of  $-1.0$  was used to estimate the effect of price decreases on demand.<sup>2</sup>

The 1.4 multiplier effect, estimated above, reflects the impact in one year only. In reality, gains from increased telecom production would persist indefinitely and grow over time, as the telecom market expands. Therefore, it is interesting to also examine the effect of stimulated demand compounded over several years. To estimate future impact, an assumption of secular growth in international telecom minutes of 12 percent per year (conservative, given the observed data range of 12-17 percent per year) is projected. Since price changes have historically been modest, almost all demand growth is exogenous – i.e., not the result of stimulation from price reductions. A 12 percent secular growth rate compounds the multiplier effect by almost three-fold by year ten following the increase in telecom usage.

### c. Supporting Studies

Sources other than the SPR study corroborate the estimate of 1.4 as a reasonable indicator of the multiplier effect. For example, an economic study conducted by T.J. Kehoe and J. Serra-Puche, “*A General Equilibrium Appraisal of Energy Policy in Mexico*” estimated a multiplier of between 1.2 and 1.3 for the energy sector of the Mexican economy. The multiplier for the telecom sector is likely to be higher than for the energy sector because telecom is a factor of production to more high-growth sectors of the economy than is energy.

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<sup>1</sup> Strategic Policy Research, Inc., *The U.S. Stake in Competitive Global Telecommunications Services: The Economic Case for Tough Bargaining*, December 16, 1993.

<sup>2</sup> This demand elasticity is discussed in more detail below in Section V – A.

Other studies have provided qualitative evidence that indirect multiplier effects are sizable for telecommunications. For example, 1991 study by DRI/McGraw-Hill<sup>3</sup> presented an estimate of the impacts of improvements in telecom usage on productive efficiencies in other industries and the U.S. economy as a whole. The study found increased investment in the telecom infrastructure during the period 1963 through 1982 significantly contributed to increased productive efficiency and overall economic growth. Part of this is because, as industries consumer more telecom in their production processes, they are able to reduce the need for more costly, less efficient inputs. It calculated the economy-wide rate at which telecom can be substituted for other inputs in the production processes as 1 to 1.64. In effect, \$1.64 of expenditures on alternative inputs (*e.g.*, labor, courier service, business travel) are saved by spending an additional \$1 on telecom services.

A 1998 study by Gae-Iyong Choi and Nakgyoon Choi<sup>4</sup> on the Asia-Pacific Information Infrastructure (“APII study”) examined the role of the information infrastructure in narrowing the gap between developed and developing countries in the Asia-Pacific region. The study then estimated impacts of changes in production of telecommunications sector on other sectors of the economy, using input-output table analysis. The study analyzes the growth of the telecom sector, together with the linkage effects derived from the input-output relationships and expected growth of the economies, estimate the impact of telecom on economic gain in the APEC region. The results supported the theory of a multiplier effect from the telecom sector on the general economy. It found that a modest projection of growth in the telecom sector (3% in the developed economies and 7% in developing countries) yielded an economic gain of \$2.303 trillion. High projected growth in the telecom sector (10% in developed economies and 15% in developing countries) yielded a huge economic gain of \$40.243 trillion.<sup>5</sup>

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<sup>3</sup> DRI/McGraw-Hill, “The Contribution of Telecommunications Infrastructure to Aggregate and Sectoral Efficiency”, February 1991.

<sup>4</sup> G. Choi (Korea Information Society Development Institute) and N. Choi (Korea Institute for Industrial Economics and Trade), *The Impact of APII – Korea Submission to APEC Telecommunications Working Group*, September 1998.

<sup>5</sup> The APII study also found important socio-cultural impacts of the information infrastructure – particularly, how it affects work, both nationally and internationally. Development of the infrastructure would promote (continued...)

Similarly, a recent study of the effect of infrastructure on output<sup>6</sup> used a cross-section of countries to estimate an aggregate production function including infrastructure capital. The results indicated that telephone networks have a higher marginal productivity than other types of capital. The study found the elasticity of output with respect to telephone stock to be around 0.14, holding constant the overall stock of capital. In other words, there is observed a large impact from increasing telephone stock and removing an equal amount of investment in other physical capital; *i.e.*, transferring investment from other types of capital to telecom infrastructure would raise output. The results apply to both developed countries and to developing countries.

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(...continued)

delocalization of employment, affording workers flexibility in location as well as potential to work for multiple employers from a single location. The infrastructure would also assist workers in keeping skills upgraded so as to remain more productive and competitive in the workforce.

<sup>6</sup> David Canning (Department of Economics, The Queen's University at Belfast), "The Contribution of Infrastructure to Aggregate Output", Belfast: Northern Ireland.

### **III. TIME-SERIES ANALYSIS**

#### **A. Methodology**

##### **1. Fiscal Impact**

The objective of our times-series analysis is to estimate the *total* fiscal impact of the liberalization process by examining major sources of fiscal revenues before and after the year of liberalization. Any liberalization is supposed to lower prices and increase quantities. Price changes are appropriately considered as *transfers* between consumer and producers of the telecom and the other sectors of the economy. They have little or no impact on aggregate economic welfare. In sharp contrast, *quantity* changes constitute real economic effects and directly affect aggregate economic welfare.

Liberalization effects are usually concentrated in long distance basic telephone services and wireless services, at least during the first years of liberalization. The most important impact of liberalization is usually that the price of the international service goes down, while the amount of international traffic goes up. For that reason, our analysis of fiscal impacts of liberalization among countries focuses on the international market. Liberalization similarly affects domestic long distance, but sufficient data to support quantitative analysis of that market are not available.

Our empirical approach to measure fiscal impacts is as follows. First, we chose the countries to be analyzed. Time-series analysis was performed for seven countries. A summary of the countries is displayed below.

<b>Countries studied on a time-series basis</b>			
Country	ITU's classification	Privatization Year	Liberalization Year
1. United Kingdom	"High income"	1984, 1992/93	1996
2. Australia	"High income"	1992,1997	1992,1997
3. Denmark	"High income"	1994, 1998	1994
4. Finland	"High income"	1998,1999	1994
5. New Zealand	"High income"	1990	1991
6. Chile	"Middle income"	1988-89	1994
7. Mexico	"Middle income"	1990-94	1997

Source: ITU (1999); Guislan (1997); others.

For each country we divided the time-series data in two sub-periods: before and after the year of liberalization. Data were collected for outgoing and incoming international traffic for each country both before and after liberalization. Volumes of traffic were obtained from the ITU's *Direction of Traffic* publication and Telegeography's reports. The fiscal impact in any given year was modeled to depend on the multiplier ( $\mu$ ), assumed to be 1.4<sup>7</sup>; the effective revenue tax of the country ( $\tau$ ), measured as the total tax revenues divided by the total GDP of the country; and the value of the change in total international traffic which is explained below. The multiplier captures the total effects on the overall economy as a consequence of a change in the output of telecom sector. Output in this case is measured as the international traffic.

The change in the value of international traffic both outgoing and incoming were estimated as follows. The net price for outgoing traffic ( $p_n^o$ ) was derived by calculating the international tariff for outgoing traffic minus the settlement rate ( $s$ ).<sup>8</sup> Since only 1994 data on revenues of international services (retail, settlements outgoing revenues and settlement for incoming revenues) were available, we calculated two prices for each country: the overall average effective price for outgoing traffic as well the overall average settlement rate.

<sup>7</sup> The multiplier effect measures the additional income generated by the increase of US\$ 1 in the telecom sector on the rest of the economy. The assumed value is 0.4, i.e. US\$ 1 of increased output in the telecom sector generates US\$ 0.4 of additional income in the rest of the economy.

<sup>8</sup> All prices in foreign currency were converted to US\$. The exchange rate used was the average official exchange rate as recorded by ITU database. The settlement rate is subtracted because it is not part of the value-added generated within the country.

$$P_n^o = P^o - s$$

The changes in quantities of outgoing and incoming international traffic quantities were calculated for each year. Denoting change as  $\Delta$ , the change in outgoing traffic ( $\Delta q^o$ ) is equal to the current year traffic minus the one in the previous year,

$$\Delta q^o = q_t^o - q_{t-1}^o$$

and similarly for the change in incoming traffic ( $\Delta q^i$ )

$$\Delta q^i = q_t^i - q_{t-1}^i$$

Since we have divided the traffic data into the before and after periods we calculate for each After (A) and Before (B) period the following relationships

$$A \equiv \{\mu * \tau * (\bar{p}_n^o \Delta q^o + \bar{s} \Delta q^i)\}_A$$

$$B \equiv \{\mu * \tau * (\bar{p}_n^o \Delta q^o + \bar{s} \Delta q^i)\}_B$$

where the bars over the variables indicate indices that are constant for all the years.  $A$  and  $B$  each measure the average total fiscal revenues that the Government gets from the change in international traffic in period after and before liberalization, respectively. Since  $A$  and  $B$  represent absolute monetary values, we normalize their difference by dividing them by the international revenue of a given year. Then, our index of fiscal impact ( $Z$ ) is expressed as

$$Z = \frac{A - B}{C}$$

where

$$C \equiv (\bar{p}_n^o \bar{q}^o + \bar{s} \bar{q}^i)$$

and therefore Z becomes

$$Z = \frac{\mu^* \tau^* [\{\bar{p}_n^o \Delta q^o + \bar{s} \Delta q^i\}_A - \{\bar{p}_n^o \Delta q^o + \bar{s} \Delta q^i\}_B]}{(\bar{p}_n^o \bar{q}^o + \bar{s} \bar{q}^i)}$$

This measurement approach includes International Message Toll Service (IMTS) traffic, but excludes private line traffic. The data measuring IMTS and private circuits between other countries and the U.S. indicate migration in recent years from IMTS to private line use. This phenomenon is occurring both in countries that have liberalized and in countries that have not. To the extent this phenomenon is separate from liberalization, our estimates of fiscal positive impact of liberalization on international traffic are conservative. The effect of the migration on measured IMTS minutes is compounded by the fact that heavier users more likely are migrating to the private line circuits.

## B. Aggregate Results

The change in the fiscal impact from international traffic following liberalization (relative to the base of international traffic revenues) was positive in the case of each of the countries examined except for Mexico, where it was approximately zero. Mexico was unique in that it had a particularly high migration to private line usage due, in part, to a settlement rate structure which deterred use of IMTS circuits. The average of fiscal impact from liberalization for all of the seven countries in the data panel was 3.7% per year. The average for the countries liberalizing from monopoly to full competition in international long-distance was 3.8, while the average of the two countries moving from duopoly to competition (U.K. and Australia) was 3.5.

The change in the value of international traffic (relative to the base of international traffic revenues) was also positive for each country studied.<sup>9</sup> The average for all the countries was 6.2% per year. The average for the countries liberalizing from monopoly to full competition in international long-distance was 5.5%, while the average of the two countries moving from duopoly to competition (U.K. and Australia) was 8.0%.

## **C. Australia**

### **1. Wireline**

Prior to full liberalization, the wireline sector had a facilities duopoly consisting of the merged Telecom/OTC (Telstra) and the privatized AUSSAT (Optus), established in 1991. The duopoly covered local, long-distance and international, with six-year exclusivity to 1997.

AUSSAT privatization was finalized in 1992, with the sale of 24.5% to BellSouth, 24.5% to Cable and Wireless; 51% to Optus Pty Ltd.

Before full liberalization, in early 1997, four companies dominated the resale market: AAPT, Worldxchange, Global One and BT Australasia. With full liberalization, 30 firms have become facilities based carriers.

### **2. Wireless**

Three public licenses were issued by yearend 1992, to: Telstra, Optus, and Arena GSM Pty. Ltd. There were about 2 million mobile subscribers in mid-1995, 3.5 million mobile subscribers in mid-1996, and close to 4.5 million by mid-1997. Full liberalization of the telecom market in 1997 was expected to further stimulate the market.

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<sup>9</sup> This is estimated using a modified  $Z_1 = Z / \mu\tau$ .

The Australian mobile phone market, 1994-97

Year/Subscribers/Revenues (US\$billions)

1994	5,200,000	\$0.98
1995	2,350,000	\$1.7
1996	4,000,000	\$2.4
1997	5,200,000	\$2.3

In 1997, there were three primary carriers: Telstra, Optus, and Vodafone. In mid-1997, Telstra had 60% of the market share, Optus had 33%, and Vodafone had 7%.

The Australian Communications Authority (ACA) held a spectrum auction in early 1998 for bandwidths being set aside for PCS. There was another invitation for bids in an auction of spectrum in the 1.8 GHz PCS bands in metropolitan areas of Australia in 1999. The ACA was instructed to apply bidding limits so that no bidder may use more than 2X20 MHz in the 1.8 GHz bands, including spectrum acquired in the 1998 auction. Applications were due December 3, 1999.

The September 1999 Government decision to make available spectrum in the 3.4 GHz band was expected to enhance competition in the local telephone market. The band may be used for wireless local loop applications, which can be used to compete with the existing local networks.

### **3. Privatization**

The initial public offer of one-third of the shares of Telstra (leaving the government with two-thirds stake) raised \$14.3 billion. As of late 1999, the company issued a second share offering of 16.6% of its shares to put 49.9% of Telstra in public hands (with the remainder held by the Australian government). Full privatization was anticipated to occur because government control of the company was viewed as a handicap.

### **4. Liberalization**

In 1983, the independent, government-owned national satellite system, AUSSAT was established. Telecom was faced with limited competition on its trunk telephone and data

services from AUSSAT private network services. AUSSAT also had the scope to operate internationally.

Competition in CPE and value-added services began in 1989. Competition began in national long distance and international telephone service markets in 1991. Competitors were allowed to resell Telstra services in 1991. In 1992, there was established a transitional facilities duopoly based on the merged Telecom/OTC (AOTC and later Telstra) and a privatized AUSSAT (later Cable & Wireless Optus). Cable & Wireless Optus began resale of Telstra analog mobile service and began offering national long distance and international telephone service.

Legislation to implement the new regulatory framework and merge Telecom and OTC occurred July, 1991. The sale of AUSSAT and licensing of the second carrier, Optus Communications, was finalized in February, 1992. The government implemented pro-competitive safeguards, including equal access and interconnection between the carriers.

Competition began in the mobile telephone service market in 1992. Plans were made to issue three mobile licenses — one each to Telecom/OTC and the second carrier, with a third by yearend 1992. Telstra began offering digital mobile service in 1993, the same year that Cable & Wireless Optus and Vodafone began offering that service.

In July, 1997, the Government opened the telecom market to full competition by removing the limit on the number of carriers allowed in the market an amending regulation that apply to providers of telecom services. As of June, 1999 there were about 30 licensed carriers, 50 carriage service providers (resellers) and 700 internet service providers. As of early 1997, Telstra held 80% of the telecom revenues.

#### (1) Access and local

Telstra currently faces limited competition in basic access and local call services. The main facilities-based competitors are Cable & Wireless Optus (fixed and mobile), Vodafone (mobile) and AAPT Limited (fixed). New competitors include Powertel, One.Tel, Hutchison and MCI Worldcom.

(2) National long distance and international telephone service

Competition has significantly eroded Telstra's market share in these areas. The larger competitors have their own switches, lease access and transmission capacity and resell services primarily from Telstra and Cable & Wireless Optus.

(3) Mobile

Telstra competes with Cable & Wireless Optus and Vodafone, which each operate digital networks, and with other competitors which resell either Cable & Wireless Optus or Vodafone service.

**5. Regulatory Agency**

The Australian Telecommunications Authority (AUSTEL) began operations in July, 1989. AUSTEL operated under the general policy direction of the minister for transport and communications, but was otherwise independent. It had overall responsibility for the economic and technical regulation of Australia's telecom industry. AUSTEL had a specific mandate to promote competition within the regulatory framework established by the government.

The Australian Competition and Consumer Commission (ACCC) were to have responsibility for specific aspects of telecom relating to competition and consumers after the liberalization. Pricing and interconnection arrangements before liberalization were negotiated by AUSTEL. After June 1997, AUSTEL and the Spectrum Management Agency (SMA) merged as the Australian Communications Authority (ACA).

## 6. Quantitative Analysis

<b>Australia</b>			
	Before liberalization (1993-1997) (\$M/year)	After liberalization (1997-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	90.8	168.3	6.7%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	26.6	49.2	2.0%

### D. Chile

#### 1. Wireline

##### a. Local

Compañía de Telecomunicaciones (CTC) is by far the largest local service provider. Entelphone, VTR and Telex's Telesat have started to offer local service. Other players include Telcoi, CMET, Telefónica Manquehue, and Telefónica del Sur.

CTC had 2,056,353 lines as of yearend 1996 and 91% of the market share for lines. CTC's local service revenues are generated through fixed charges, per call charges (local measured service is standard) and line connection charges. In 1997, CTC generated \$1.05 billion dollars in revenues and \$280.6 million in net profits from basic telephone services. It is estimated that 61.3% of CTC's revenues come from basic telephone service.

VTR had approximately 76,000 lines installed by yearend 1995, which increased 27.6 percent by yearend 1997. Telesat had over 28,000 lines by yearend 1997.

Entelphone (a local telephone subsidiary of ENTEL) had over 30,000 lines in Santiago at yearend 1997. Telefonica Manquehue started operations in 1982, but had not become a real competitor to CTC by yearend 1997 it had approximately 30,000 lines and planned an additional 20,000 lines by yearend 1998. Including lines for corporate clients will bring the total to 70,000.

b. Long-distance

The multi-carrier system has operated since end of 1994 for domestic and international long-distance. In mid-1998, 10 companies provided long-distance. ENTEL is the largest, but CTC has pursued an aggressive market approach.

Primary long-distance providers are ENTEL and CTC Mundo. Others include: Chilesat, BellSouth, VTR, CNT Telefónica del Sur, Telefónica Manquehue, Transam, and Iusatel.

Domestic Long-Distance Market shares for Chile (September 1997)<sup>10</sup>

Entel:	40.9%
CTC Mundo:	34.4%
Chilesat:	14.6%
BellSouth:	1.4%
VTR:	3.7%
Others	5.0%

International Long-Distance Market shares for Chile (August 1997)<sup>11</sup>

Entel:	33.1%
CTC Mundo:	21.6%
Chilsat:	17.8%
BellSouth:	10.7%
VTR:	10.3%
Others	6.5%

**2. Wireless**

Cellular service was authorized in 1988, with two 800-MHz band licenses awarded in each of Chile's 13 geopolitical regions. Subscriberhip grew to 36,000 in 1991, 85,000 in 1993, and to 200,000 by yearend 1995. CTC and VTR, which were two of the four active firms as of 1996, merged to form Startel and controlled 54% of the market. BellSouth had 33% of the market in 1996, and Telecom had 13% in 1996.

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<sup>10</sup> Source: U.S. Department of Commerce data.

<sup>11</sup> Source: U.S. Department of Commerce data.

Calling Party Pays was to be implemented in January 1999. The introduction of PCS doubled the existing wireless market, reaching a penetration rate of 6% at yearend 1998 compared to 2.7% in 1997. Wireless subscribers totaled 802,744 in November 1998, of which 466,648 are CTC, 185,000 are BellSouth and 151,096 from ENTEL. The yearend 1998 count was approx. 964,212. Cellular phone charges in Chile were reputedly the cheapest in Latin America in 1998, but still higher than the U.S. prices.

### **3. Privatization**

In 1982, the government sold CNT and CTY, the two small telcos in southern Chile. In 1989, the Government of Chile sold all state-owned telecom companies, including the two dominant carriers – Compañía de Teléfonos de Chile (CTC, domestic service) and Empresa Nacional de Telecomunicaciones (ENTEL, long-distance service). The Australian investor Alan Bond paid US \$140 million for 35% of CTC and took control of the company in 1988. Two years later, after investing the required \$100 million in CTC and collecting about \$90 million in dividends, Bond sold his share of CTC stock (then about 50%) through direct negotiation to Telefónica de España for \$390 million. In mid-1990, \$100 million of new CTC stock was sold in the U.S.

In 1989, Telefónica de España bought 10 percent of ENTEL's shares from CORFO, and another 10 percent in 1990. By mid-1991, the state had sold most of its shares in telecom. Telefónica had a strong minority interest in ENTEL and majority ownership of CTC. However, in 1993, the Supreme Court decided that Telefónica had to sell either stock in CTC or ENTEL.

### **4. Liberalization**

The Chilean telecom sector was the first to be privatized in Latin America and is the most liberal. In 1982, a law was passed that allowed any person or entity, national or alien, to apply to provide telecom services.

In April 1993, the antitrust tribunal decided that Chile's telecom market should not be segmented and that CTC and ENTEL should be permitted into each other's markets, which are also open to other providers. The terms of entry were debated. An April 1993 Supreme Court

decision required Telefónica de España to divest itself of holdings in either CTC or ENTEL. Today, Chile has a fully liberalized telecom market; it freely grants licenses and concessions in most services. Following liberalization, CTC and Telex-Chile were very aggressive in getting into the ENTEL (long-distance) market.

Competition in long-distance is affected by the fact the customers in Chile do not presubscribe to a particular long-distance carrier for direct-dialed calls. As of 1994, consumers could select a provider prior to each long-distance call by using the relevant three-digit access code. Therefore, long-distance carriers compete for every call placed.

The telecom sector has grown significantly since liberalization, and is considered to be one of the most booming sectors in Chile's economy. According to the U.S. Department of Commerce, Chile's telecom market has grown at an average 14% per year since privatization in 1989. Estimates<sup>12</sup> of telecom market size growth are: 1996: \$606.8 million; 1997: \$702.5 million; 1998: \$842.0 million.

## 5. Regulatory Agency

SUBTEL was established in 1977 as a government agency responsible for telecommunications regulation. A 1992 Telecom law reinforced Secretaría de Telecomunicaciones (SUBTEL's) regulatory powers.

## 6. Quantitative Analysis

<b>Chile</b>			
	Before liberalization (1993-1994) (\$M/year)	After liberalization (1994-1997) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	17.23	64.33	11.4%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	6.22	23.24	4.1%

<sup>12</sup> U.S. Department of Commerce.

## **E. Denmark**

### **1. Wireline**

In 1991, the three regional and one state-owned telephone companies merged into a single nationwide company – Tele Danmark A/S. Today, Tele Danmark remains the leading provider of telecom services in Denmark. It provides both local and long-distance service. As of 1998, Tele Danmark still had over 90% of the long-distance call market and over 60% of the international call market.

Following legislation adopted in mid-1996, Denmark liberalized the telecom sector and foreign telephone companies began competing with the national telephone company on all fronts, including fixed and cellular. The major foreign player in fixed-line services is Swedish Telia.

### **2. Wireless**

In 1992, following a public international tender, Denmark issued a license for a private company (Sonofon) to compete with Tele Danmark on GSM cellular service. Following international bidding procedures, four companies were awarded DCS 1800 licenses in March 1997. The companies were Tele Danmark Mobil, Sonofon (Danish/American), Telia (Swedish), and France Telecom (French).

### **3. Privatization**

Tele Danmark was partially privatized in 1994. A public sale of a 47% percent yielded \$2.96 billion. An additional 42% was sold to Ameritech (now SBC) in November 1997 for \$3.2 billion. In January 1998, Tele Danmark decided to repurchase the State's remaining shares to reduce the capital share, with effect in April 1998.

### **4. Liberalization**

In June, 1996, Denmark adopted legislation which almost fully liberalized the telecom sector and made Denmark compliant with the EU Resolution on Liberalization of the Telecommunication Sector.

## 5. Regulatory Agency

The telecommunications policymaker in Denmark is the Ministry of Research and Information Technology. The regulatory entity is the National Telecom Agency.

## 6. Quantitative Analysis

<b>Denmark</b>			
	Before liberalization (1993-1997) (\$M/year)	After liberalization (1997-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	30.6	58.5	5.2%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	25.7	49.1	9.1%

## F. Finland

### 1. Wireline

The state-owned company Telecom Finland changed its name to Sonera corporation in April 1998. It is Finland's leading telecom operator and provides a full range of telecom services. Despite growing competition, Sonera remains the largest telecom provider. Sonera serves about half of the mobile phone market using their GSM network and also operates more than 780,000 fixed-access lines providing local, long-distance, and international service.<sup>13</sup> Sonera remains about 60% state-owned.

The two main players in telecom services are the state-owned Sonera Corporation, which provides local, long-distance and international service, and the 46 privately owned local telephone companies operating under the Finnet Group, which also offer long-distance service since the market was opened in 1994. Finnet had covered about 25% of the geographical area of the country, while Telecom Finland had covered 75% of the area. Both Sonera and the

<sup>13</sup> Hoover's Online, "Sonera Group plc", 1/27/2000.

private companies have subsidiaries and sister companies which are involved in provision of data, mobile and advanced technology services. Secondary companies include Telia Finland Oy, the Swedish telecom operator and Global One Communications (which provides network and other services for their contracting customers).

## **2. Wireless**

There were recently five cellular operators in the market. Telecom Finland began its mobile NMT-900 service in 1981, began operating a GSM network in mid-1992 and later began GSM-1800 service. Radiolinja Oy also began a GSM network in 1992 and later began GSM-1800 service. Finnet began its GSM-1800 network in mid-1997. Helsinki Telephone Company began GSM-1800 service in February 1998 and Telivo (Telia) also now offers GSM-1800 service.

## **3. Privatization**

Sonera began privatization in October 1998. In September 1999, Sonera released 113 million shares for companies and international investors as well as 14 million shares to private Finnish investors. The second share sale dropped state ownership of Sonera from 77.8% to about 60%.

## **4. Liberalization**

The Telecommunications Law of 1987 provided for public telecom service to be provided either by Telecom-Finland or a Finnish entity holding a concession. It provided for Telcom Finland's monopoly in national and international public long-distance, telex and paging.

The long-distance market was opened to competition in 1994. In 1994, Kankoverkko Oy (partly owned by what is now Finnet) began providing competing public switched domestic long distance services and Finnet International began providing international services. Results were dramatic – in the first year, the Finnet Group captured 56 percent of the national long-distance market, Telivo gained 4 percent of the market, while the former monopoly's market

share declined to 40 percent. Local competition has been permitted and exists, but the government developed legislation to promote local competition beginning only in 1997.

Access and interconnection charges are determined by commercial agreement. If parties are unable to agree, the Ministry may be asked to intervene. Recent regulations require that interconnection charges between carriers be equal and cost-oriented.

Finland's competitive telecom market has yielded significant advances in development of innovative telecom services. For example, the first global system for mobile communications was deployed in Finland. There are many competing Internet access providers. Telecom Finland became the first carrier to deliver voice-over-the-Internet service in late 1996.

Finland enjoys a very high penetration rate for wireless phones and Internet usage. The telecom network is 100 percent digital, and new services such as wireless Internet access to electronic cash systems were introduced first in Finland. Telecom investment and revenue per inhabitant have grown considerably since liberalization.

## 5. Regulatory Agency

The regulatory agency is the Telecommunications Administration center under the Ministry of Transport and Communications.

## 6. Quantitative Analysis

<b>Finland</b>			
	Before liberalization (1992-1993) (\$M/year)	After liberalization (1993-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	2.87	7.30	4.3%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	1.86	4.72	2.8%

## **G. Mexico**

### **1. Wireline**

The dominant fixed service provider is Teléfonos de México (TELMEX). Competition in long-distance began in 1997. Competition in local service is more recent.

### **2. Wireless**

Cellular networks have been operational in Mexico since 1990. The SCT (regulatory agency) followed the U.S. licensing model, allowing non-wireline providers to compete for services with a wireline system. As the wireline provider, TelCel (a TELMEX subsidiary) controlled approximately 50% of the cellular market.

### **3. Privatization**

Some shares in TELMEX were already held privately when the government sped up its privatization in 1990.

A total of 55.1% was privatized over 1990-1994. In 1990, 4.4% went to the employees for \$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 \$1,757 million. In 1991, 15.7% was offered to the public yielding \$2,170 million. In 1991, SBC bought 5.1% for \$467 million. In 1992, 4.7% was sold for \$1.5 billion through a domestic and international offering. In 1993, 3.3% was sold for \$1 billion. In 1994, the remaining 1.5% was sold for \$550 million.

The privatization of TELMEX included a six-year monopoly for basic telecom services. The terms of the sale called for TELMEX to expand access by 12% per year through 1994, reduce the waiting period for repairs, improve the quality of service, and improve services in rural areas (at least one telephone to each town with 500 inhabitants or more by 1994).

### **4. Liberalization**

Pursuant to the concession agreement, TELMEX's exclusivity period for long-distance and international services officially ended in August 1996, but competition in long-distance and international services did not begin until January 1997. Before the exclusivity period ended,

TELMEX was required to take measures to ensure that competition would be viable. This included bringing rates toward a cost-basis, by lowering long-distance charges and increasing local rates, and establishing an interconnection plan that provided competitors with equal access to end users.

There were 10 new long-distance operators (Alestra, Amaritel, Avantel, Iusatel, Midtel, Nextel, Protel, Telinor, TELMEX and Telnor) by 1997.

The 1994 Interconnection Resolution required TELMEX to provide interconnection to new operators at 60 points on the network by 1997, rising to 200 by the start of the year 2000. Equal access was to begin in April 1998.

Local competition has been slower to start, as the competition rules were not published until October 1997.

## 5. Regulatory Agency

The telecommunications policy-maker in Mexico is the Secretaría de Comunicaciones y Transportes. The regulator is the Comisión Federal de Telecomunicaciones.

## 6. Quantitative Analysis

Mexico			
	Before liberalization (1993-1997) (\$M/year)	After liberalization (1997-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	260.4	264.9	0.2%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	76.2	77.5	0.0%

In Mexico, which has the great majority of its international traffic with the U.S., private line circuits were 7% of the total active circuits in 1995, 32% of total active circuits in 1996, 39% of total active circuits in 1997, and 42% of total active circuits in 1998.

Mexico's fiscal impact of approximately zero was unique and reflects a particularly high migration to private line usage. That increase was due, in part, to an interconnection regime for international traffic, which deterred the use of IMTS.

For April 1996 to November 1998, the Mexico's regulatory body established a fairly high interconnection rate for long distance carriers, in order to recover local service costs while domestic rates were adjusted. The interconnection rate had two components: (i) a basic rate of 19 cents of a peso per minute, indexed to inflation, applicable to all long distance points, and (ii) a 58% surcharge on the settlement rate for incoming international long distance calls. This regime made incoming IMTS costly for competing long distance carriers to supply; so they partially circumvented the high interconnection rates through more intensive use of private lines.

In November 1998, COFETEL eliminated the surcharge on the settlement rate for the incoming international traffic, and established a flat interconnection rate for termination and origination in the fixed network.

## **H. New Zealand**

### **1. Wireline**

Telecom New Zealand had a monopoly until mid-1991. Competition was introduced in that year, and the competitor Clear had obtained almost one-fifth of the international and national toll service market by late 1998.

### **2. Wireless**

TCNZ remained the sole wireless provider through mid-1998. Bell South New Zealand's GSM network began operation in June of 1998.

### **3. Privatization**

In 1986, the government of New Zealand announced its plans to make several government departments into state-owned enterprises (SOEs). The SOEs were required to operate on a fully commercial basis, and to pay dividends and taxes to the government. The Telecom Corporation of New Zealand Limited (TCNZ) was created in 1987. Regulatory

responsibility was placed in the Communications Division of the Department of Trade and Industry, now the Ministry of Commerce. In December 1987, the government announced progressive, full liberalization of the telecom sector. The process began with liberalization of progressed to abolition of the statutory monopoly in Spring of 1989. Privatization of TCNZ was considered in 1989 and occurred in 1990.

TCNZ was privatized in September 1990, when it was sold to a consortium of New Zealand and American (Bell Atlantic and Ameritech) buyers for NZ\$4.25 billion. Bell Atlantic and Ameritech each purchased 50%, but were required to reduce, and actually did reduce, their stakes to 24.9% within 3 years. The sale also required that at least NZ\$500 million worth of shares be made available in public offering on the New Zealand market. A July 1991 stock issue brought strong interest, and share prices rose quickly.

The New Zealand Government is no longer an official shareholder, but does retain a “Kiwi”, or golden, share, which holds special voting rights that allow the government to control the maximum shareholding of any single foreign entity and to ensure that TCNZ’s obligations regarding residential service remain. The obligations call for free local calls to remain a tariff option for residents, that residential line rental rate increases do not exceed the price index, that line rentals to rural residents not exceed that to urban residents, and that residential service not become less available.

#### **4. Liberalization**

Prior to 1987, the Post Office had a statutory monopoly for telecom services. However, a 1988 telecommunications law abolished the monopoly of Telecom New Zealand, effective April 1, 1991. The Telecommunications Amendment Act of 1988 removed TCNZ’s statutory monopoly for public switched network services effective April 1, 1991. It also allows for competition in all telecom services, and allows companies to become network operators through a statutory process, once they have met the specified criteria.

Competition was effectively introduced in 1991 when Clear Communications (a consortium of MCI, Bell Canada, the railway company, and a local broadcasting company) entered the market, offering national and international toll calling in 1991. As of late 1998,

Clear was reported to have captured 18% of the national toll market and 20% of the international toll market.<sup>14</sup> More recent market entrants include Australia's Telstra, Worldxchange and Global One.

New Zealand does not currently have an industry-specific telecommunications regulatory body. Instead, the sector is regulated by relying on general competition law, as embodied in the Commerce Act 1986. The Commerce Act 1986, in part, prohibits (a) contracts, arrangements, and understandings that substantially lessen competition; (b) exclusionary provisions and price fixing, and (c) use of a dominant position for the purpose of restricting, preventing, or deterring or eliminating a person from a market. Other relevant laws are the consumer protection provisions of the Fair Trading Act 1986, and two industry-specific measures established in the Telecommunications Act 1987 to promote competition. One of the two industry-specific measures requires TCNZ to disclose information on prices, terms and conditions of providing certain services so as to afford competitors information normally available in a competitive market and to assist in the monitoring of TCNZ.

Liberalization yielded significant new services and benefits to consumers. Following liberalization (between yearend 1997 and March 1991) greater flexibility in charging was introduced by replacing the three-minute charge with one-second rounding for subsequent time periods; offering greater discounts for off-peak toll calls; basic tariffs on traffic volumes rather than on distances; and introducing off-peak rates for a number of international destinations. Following liberalization, TCNZ also began a concessional service for the elderly. Following liberalization, TCNZ improved maintenance and repair of the network, and fault rate, directory assistance answering times, and handling times all fell significantly. The waiting time for installation virtually disappeared from its 1985 level of 15,000 customers at a time waiting for new connections. TCNZ underwent heavy investment in upgrading its network, spending NZ\$3,500 million between 1987 and 1993. As a result, the network was significantly

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<sup>14</sup> U.S. Department of Commerce, International Trade Administration.

modernized, and became largely digital. Also, new services were introduced, including an 800 toll-free direct dialing service, cellular services and electronic paging.<sup>15</sup>

## 5. Regulatory Agency

New Zealand telecommunications is not regulated by an industry-specific regulatory organization.

## 6. Quantitative Analysis

New Zealand			
	Before liberalization (1989-1991) (\$M/year)	After liberalization (1991-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	2.89	8.60	6.2%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	1.40	4.17	3.0%

### I. United Kingdom

#### 1. Wireline

With the end of the duopoly for long-distance in 1996, numerous competing fixed service providers arrived on the scene. However, British Telecom still carries a majority of traffic.

#### 2. Wireless

The cellular market has been competitive. Cellnet and Vodafone both began operations in 1985. One-2-One began its DCS-1800 service in 1993 and Orange began its DCS-1800 service in 1994.

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<sup>15</sup> Hunter Donaldson, "The New Zealand Experience" in *Implementing Reforms in the Telecommunications Sector* (B. Wellenius and P. Stern, eds.), 1994, p. 257.

### **3. Privatization**

British Telecom was privatized over 1984-93. The total privatization yielded an estimated \$22.8 billion.

The divestiture plan was announced in 1992. Profitability increased before divestiture, when 51% of the company was privatized in 1994 for £3.7 billion. Another 27% was sold in 1991 in a public offering and the remaining 21% was sold in 1993 in a public offering.

The 1984 privatization was accompanied by a new regulatory approach based on price-caps (in this case, retail price index minus an efficiency factor (RPI minus x)). The RPI minus x approach holds the price level below the consumer price index and also allows the firm to rebalance prices.

### **4. Liberalization**

The Telecommunications Act (1981) allowed government to establish network competition. The Telecommunications Act of 1984 led to privatization of BT and set up of the independent regulator, OFTEL. Liberalization of CPE, mobile, cellular, VAS, data and resale markets occurred between 1985 and 1990.

Concurrent with BT's privatization, Cable & Wireless (under the name Mercury) was allowed to construct competing facilities. This led to a duopoly which lasted until the open entry policy of 1991. Mercury entered the switched voice market in 1986, providing international and domestic voice services.

Basic voice was fully liberalized in 1996, so the international communications market became open to competition, as well. Prior to that, the international market had been a duopoly, with only resale permitted by other competitors.

### **5. Regulatory Agency**

The telecommunications regulatory agency in the United Kingdom is the Office of Telecommunications (OFTEL).

## 6. Quantitative Analysis

<b>United Kingdom</b>			
	Before liberalization (1994-1996) (\$M/year)	After liberalization (1996-1998) (\$M/year)	Change following liberalization (percent, relative to international revenues)
Annual growth of international traffic value	315.14	732.61	9.3%
Annual growth of fiscal impact of international traffic (estimated using tax rate and multiplier effect of 1.4)	170.3	395.9	5.0%

## IV. PRIVATIZATION PRICE REGRESSION ANALYSIS

### A. Methodology

SPR implemented an econometric model to assess the empirical relevance of certain explanatory variables for the privatization price using data from 18 countries.

The following variables were used in the regression equation:

#### Dependent Variable:

- *Privatization price per pop.* Data reflect the observed prices paid in the privatization of the telecom entity in each country. Privatization data for the following countries were included in the model: Belgium, Denmark, Germany, Netherlands, Argentina, Cuba, Czech Republic, Hungary, Indonesia, Mexico, Peru, Venezuela, Panama, Guinea, Ghana, Chile, Finland and New Zealand.<sup>16</sup> It was necessary to normalize the privatization price to comparable-year dollars and estimate a “price per pop” comparable among countries by dividing the sale price by each country’s population. In cases where data reflected only a partial sale, the partial sale price was divided by the percentage sold to derive an estimated sale price for the entire telecom entity.

#### Independent Variables:

- *Telephone Penetration.* One would expect higher telephone penetration levels, measured as telephone lines per each 100 inhabitants, to be correlated with higher *privatization price per pop.* Higher penetration usually corresponds to higher assets per pop for the privatized company.<sup>17</sup>

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<sup>16</sup> Privatization prices for first 13 of the countries were taken from Guislan (1997), the others from various sources. Australia and the U.K. were excluded from the sample because they had extended periods of duopoly and so were not comparable to the other liberalization scenarios.

<sup>17</sup> We also tried GDP per capita as an explanatory variable, but it was highly collinear with telephone penetration and was statistically insignificant.

- *Exclusivity period.* Privatization is often accompanied by a period of years of exclusivity during which the privatized entity holds monopoly rights for some basic telephone services. One may expect that longer exclusivity periods yield a higher privatization price. The exclusivity period is measured as the years between privatization and liberalization. When privatization occurred over more than one year, the average of the privatization years is used in calculating the differential.
- *Privatization year.* The privatization year is the calendar year in which privatization occurred. When early privatization activity captured in the data occurred over more than one year, the value reflects an average of those years.

*Econometric specification*

Specification of the econometric equation is as follows. Denoting  $\ln(.)$  as the logarithm of a variable and the subscript  $i$  for a country, the regression model is:

$$\ln p_i = \beta_0 + \beta_1 \ln pene_i + \beta_2 priv\_year_i + \beta_3 excl_i^2 + \varepsilon_i$$

where:

$p_i$	denotes the privatization price per pop of country $i$
$pene_i$	is the mainline telephone penetration expressed as number of telephones per each 100 inhabitants in country $i$
$priv\_year_i$	is the year of privatization of the incumbent operator in country $i$
$excl_i^2$	is the squared of years of exclusivity or monopoly period in country $I$
$\varepsilon_i$	is the disturbance or error term in country $i$

## B. Results

Results are shown in Table 2. All the explanatory variables are statistically significant.

- Penetration is used in the regression as a control variable. Its coefficient implies an elasticity of 1.05, which means that a 10 percent increase in penetration rate will increase 10.5 percent the privatization price.
- Year of privatization is another control variable. The results show that the more recent the privatization year, the higher is the price per pop.

The results also show that additional years of exclusivity yield a higher price per pop. The coefficient for years of exclusivity indicates that one additional year of exclusivity increases price per pop by 1.4% ( $=\exp(0.011629*1)-1$ ), two years increases price per pop by 4.7% ( $=\exp(0.011629*4)-1$ ), and five years increases price per pop by 33.7% ( $=\exp(0.011629*25)-1$ ).

Since telecom is a rapidly growing sector, one would expect the effect of exclusivity on the privatization price to increase more than proportionately with the number of years. In reality, the square of the exclusivity period fit the data better than the exclusivity period itself or the exclusivity period raised to the 1.5 power.

**Table 2**  
**ECONOMETRIC MODEL RESULTS**  
 (Dependent variable: Log price per pop (ln p))

Explanatory Variables	
Ln Telephone Penetration /1 <i>t-Statistic</i>	1.050664 12.01
Years of exclusivity squared <i>t-Statistic</i>	0.011629 3.51
Privatization Year <i>t-Statistic</i>	0.139128 2.52
Constant <i>t-Statistic</i>	-10.57769 -1.99
R <sup>2</sup> Adjusted	93%
Number of countries	18

1. For a variable to be statistically significant at the 5-percent level with 14 degrees of freedom, the absolute value of the *t-Statistic* must be higher than 2.15; a higher absolute value of the *t-Statistic* indicates greater statistical significance.

Sources: Guislan (1997), World Bank, International Telecommunication Union.

## V. MODEL: IMPACT ON MOROCCO

### A. Approach and Assumptions

We have prepared estimates of the fiscal impact of liberalization of the telecommunications sector in the Year 2000 (concurrent with privatization) and the fiscal impact of liberalization of the telecommunications sector in the Year 2002. By comparing the calculated fiscal impacts in each of these two scenarios, it is possible to estimate the differential – i.e., the impact of the delay in liberalization.

To develop an estimated privatization price, we use the regression analysis developed in Section III, using values for Morocco telephone penetration rate projected to the year 2000 (for the sale to the strategic investor) and 2001 (for the anticipated public offering). We assume that a 30% stake will be sold to private investors in 2000 and another 25% will be sold in a public offering in 2001.<sup>18</sup>

Measurement of the impacts requires estimation of the revenue stream attributable to international traffic. We have estimated the revenue stream by using the trend of the increase in international traffic indicated by observed data in recent years. We estimate the total increase in international traffic in Morocco to be approximately 22% per year.<sup>19</sup>

We also estimate the incremental international traffic generated by demand resulting primarily from lowered prices that would occur with liberalization. We use the average of the quantity effect measured in the panel of countries; *viz.*, 6.2%<sup>20</sup> per year after liberalization.

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<sup>18</sup> Our regression results indicate a value of Maroc Telecom in line with the estimates generated by private investment firms. Two groups of investment banks -- JP Morgan & Company working with Banque Centrale Populaire and Merrill Lynch working with Banque Paribas and Banque Commerciale du Maroc recently valued Maroc Telecom at \$5 billion, almost doubling an earlier estimate “Morocco: Maroc Telecom valued at \$5 billion”, Middle East Economic Digest, December 10, 1999.

<sup>19</sup> Based on the observed increase in total international traffic minutes between 1996 and 1998 as reported by Telegeography.

<sup>20</sup> This the average value of  $Z_1 = Z / \mu\tau$  for the seven countries analysed.

Our model assumes that the (absolute) price-elasticity of international traffic is one. The assumption of a  $-1$  elasticity in a developing country is justified by empirical research. There have been only a few studies of the elasticity of demand for telecom services in developing countries. GRADE's study for Perú estimated price elasticities for international services for the period following the privatization year. The average price elasticity estimated was  $-1.430$ . Recently, Karikari and Gyimah-Brempong<sup>21</sup> estimated price and income elasticities for a sample of African countries. The price elasticity from Africa to USA traffic flows was between  $-0.443$  to  $-1.4241$ , for short and long-run elasticities, respectively.

On the basis of this evidence, we can reasonably assume that the demand elasticity of Morocco's international service is approximately  $-1.0$ . This means that the revenue does not change appreciably as a consequence of a price change since there is an equal proportionate change in quantity. Thus, the total revenue of international traffic is assumed to remain unchanged.

However, the additional consumption of international traffic does have a multiplier effect on the general economy, as discussed earlier in the report. Therefore, the value of the additional traffic generated can be assumed to generate 1.4 times as much additional revenue base for the government. The tax rate of 24 percent<sup>22</sup> of general economy revenues is applied to that revenue base to estimate the additional taxes generated for the government from increased international traffic usage.

We also need to account for the telecom-sector specific taxes that would be generated under the different scenarios. We assume the phase-out of the monopoly tax from 4% (2000) to 2% (2001) to 0% in 2002.<sup>23</sup> We have projected estimated market shares of the new entrant

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<sup>21</sup> Karikari, J. and K. Gyimah-Brempong. (1999). "Demand for International Telephone Services Between U.S. and Africa." *Information Economics and Policy* 11 (1999) 407-435.

<sup>22</sup> Tax rate estimated using the 1997 tax revenue as percentage of GDP in Morocco, as reported World Bank, "1999 World Development Indicators".

<sup>23</sup> Since the (absolute) demand elasticity of international services is approximately one, price changes have little or no effect on taxes that apply to revenues of competitors, as well as to those of the incumbent. We therefore do not include such taxes in our analysis.

in each year after liberalization, based on reported new entrants' market shares in international traffic in order to attribute the overall revenue that should be the basis for each type of tax under the different scenarios.<sup>24</sup> The monopoly tax is applied to the Maroc Telecom portion of the international traffic revenue stream.

We apply a discount rate of 5% per year to the out-years of revenue to estimate a net present value.

## **B. Base Case: International Long-Distance Only**

In the following analysis, we apply base case assumptions to estimate the fiscal impact resulting from liberalization generated from the international long-distance segment alone.

The base case scenario assumes the parameters discussed above. A summary of the base case assumed parameters is provided below.

Percent IAM privatized in 2000	30%
Percent IAM privatized in 2001	25%
Quantity stimulus from liberalization (per year)	6.2%
1998 incoming mins (million)	460
1998 outgoing mins (million)	158
1998 incoming base revenue/min.	\$0.33
1998 outgoing base revenue/min.	\$0.53
1998 int'l traffic base (\$M)	236
Trend in increase int'l traffic 1996-1998 mins (million)	22%
Tax Pressure (tax/GDP)	24%
NPV Discount	5%
Privatization price, 2000 2 yr. Exclusivity (\$M)	5771
Privatization price 2000 0 yr. Exclusivity (\$M)	5509
Privatization price 2001 1 yr. Exclusivity (\$M)	6938
Privatization price 2001 0 yr. Exclusivity (\$M)	6858

An analysis of the cumulative fiscal impacts from liberalization in 2000 versus in 2002, analyzing the impacts of international long-distance (ILD) traffic stimulation *only* shows that

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<sup>24</sup> New entrant market share data from Table 2.2 "International market share of new market entrants – share of minutes of international traffic (percent)", OECD 1999, p.29. Years 1-6 after liberalization based on average of available market share data. Years 7-8 are estimated based on trend, assuming 50% market share in year 8.

there is an initial loss in government revenue, due to the lower privatization price garnered absent any years of exclusivity. However, the increased government revenue obtained through taxes on the additional activity in the general economy stimulated by the increased telecommunications eventually over-compensates for that loss. Using the base case parameters, the cumulative fiscal gains from liberalizing in 2000 begin to exceed those of liberalizing in 2002 (the “cross-over” point) in the year 2005. The fiscal gain from delayed liberalization is all captured in the first years, through increased privatization price and some minimal effect on monopoly taxes on a higher market share. However, once the “cross-over” point occurs, gains from earlier liberalization (and stimulation of international traffic growth) are compounded, while no more gains from delayed liberalization are reaped.

Base Case: ILD Only, Liberalization in Year 2000

<b>Base Case: ILD only</b>		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<u>A. Liberalization of IAM in 2000</u>									
[a]	New entrants' market share	9%	16%	21%	26%	28%	38%	45%	50%
[b]	In'tl traffic rev - current trend (\$M)	351	428	523	637	778	949	1158	1412
[c]	Int'l traffic rev assoc. w/incr. Qty.(\$M)	22	53	97	158	241	353	502	700
[d]=[c]*tax*1.4	Tax from multiplier effect (\$M)	7	18	33	53	81	119	169	235
[e]	IAM int'l revenue (\$M)	318	362	412	471	557	593	637	706
[f]	Entrants' int'l revenue (\$M)	33	67	110	167	221	356	521	706
[g]	Monopoly tax rate (%)	4%	2%	0%	0%	0%	0%	0%	0%
[h]=[g]*[e]	Monopoly tax (\$M)	13	7	0	0	0	0	0	0
[i]	Privatization Price (\$M)	1653	1715						
[j]=[d]+[h]+[i]	Total Fiscal Impact \$98	1673	1740	33	53	81	119	169	235
[k]	NPV Fiscal Impact \$98	1673	1657	30	46	67	93	126	167
[l]	Cumulative NPV Fiscal Impact	1673	3329	3359	3405	3472	<u>3565</u>	3691	3858
of which:									
	NPV Privatization Price (\$M)								3286
	NPV Tax from multiplier effect (\$M)								553
	NPV Monopoly tax (\$M)								20

Base Case: ILD Only, Liberalization in Year 2002

<b>Base Case: ILD only</b>		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<u>A. Liberalization of IAM in 2002</u>									
[a]	New entrants' market share	0%	0%	9%	16%	21%	26%	28%	38%
[b]	In'tl traffic rev - current trend (\$M)	351	428	523	637	778	949	1158	1412
[c]	Int'l traffic rev assoc. w/incr. Qty.(\$M)	0	0	32	79	145	235	359	525
[d]=[c]*tax*1.4	Tax from multiplier effect (\$M)	0	0	11	27	49	79	121	177
[e]	IAM int'l revenue (\$M)	351	428	474	538	614	700	828	882
[f]	Entrants' int'l revenue (\$M)	0	0	49	99	164	248	329	530
[g]	Monopoly tax rate (%)	4%	2%	0%	0%	0%	0%	0%	0%
[h]=[g]*[e]	Monopoly tax (\$M)	14	9	0	0	0	0	0	0
[i]	Privatization Price (\$M)	1731	1735						
[j]=[d]+[h]+[i]	Total Fiscal Impact \$98	1745	1743	11	27	49	79	121	177
[k]	NPV Fiscal Impact \$98	1745	1660	10	23	40	62	90	125
[l]	Cumulative NPV Fiscal Impact	1745	3405	3415	3438	3478	<u>3540</u>	3630	3756
of which:									
	NPV Privatization								3383
	NPV Tax from Multiplier Effect								350
	NPV Monopoly Tax								22

A cost-benefit of the fiscal impact of liberalizing in Year 2000 instead of Year 2002 can be made based on the Net Present Value of the impacts through Year 2007. (Because the multiplier effect benefits will extend beyond that year, this is a conservative estimate even of the impacts from international long-distance traffic.) Considering the effects of the

international long-distance traffic alone, by the year 2007, the earlier liberalization scenario will have yielded \$102 million additional benefits as compared to those generated from liberalization in year 2002.

### **C. Sources of taxation**

In both the Year 2000 and Years 2002 liberalization scenarios, the source of the tax revenue shifts over time, under the assumptions of gain in market share (reflected above).

The calculation of the change in sources of incremental tax revenue resulting from liberalization can be calculated as follows:

$$\text{Tax}_{\text{Incumbent}} = -\text{Rev}_t * (\text{MTR}_t + \text{GTR}) * \text{MS}_t$$

$$\text{Tax}_{\text{Entrant}} = \text{Rev}_t * \text{GTR}_t * \text{MS}_t$$

$$\text{Tax}_{\text{General Economy}} = [(1.4)*\text{ME}_t]/1.4$$

Where:

$$\text{Rev}_t = \text{Industry Revenues}$$

$$\text{MTR}_t = \text{Monopoly Tax}$$

$$\text{GTR}_t = \text{General Economy Tax Rate}$$

$$\text{MS}_t = \text{Market Share (est.)}$$

$$\text{ME}_t = \text{Multiplier Effect}$$

Applying these calculations to our assumptions detailed, above, yields the following shifts in sources of tax revenue over time:

Sources of Incremental Tax Revenue (\$M): Base Case, ILD Only, Liberalization in Year 2000:

2000 Liberalization Tax NPV (\$M)	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Incumbent:	-9	-17	-24	-35	-44	-67	-93	-120
Entrant:	8	15	24	35	44	67	93	120
General Economy:	7	17	30	46	67	93	126	167
<b>Total</b>	<b>6</b>	<b>16</b>	<b>30</b>	<b>46</b>	<b>67</b>	<b>93</b>	<b>126</b>	<b>167</b>

Sources of Incremental Tax Revenue (\$M): Base Case, ILD Only, Liberalization in Year 2002:

2002 Liberalization Tax NPV (\$M):	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
Incumbent:	0	0	-11	-21	-32	-47	-59	-90
Entrant:	0	0	11	21	32	47	59	90
General Economy:	0	0	10	23	40	62	90	125
<b>Total</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>23</b>	<b>40</b>	<b>62</b>	<b>90</b>	<b>125</b>

As these results indicate, the incumbent operating is paying lower taxes by year 2007 in the earlier liberalization scenario. However, under our assumption that total industry revenue stays the same in each scenario, this shortfall is completely compensated for by the taxes paid by the new entrant. The taxes from the general economy, however, are higher in the earlier liberalization scenario. This differential has no counterpart shortfall, and so represents a net gain in fiscal revenues.

#### **D. Extrapolation to Total Long Distance**

The analysis presented in the previous section focused on the impact of liberalization on international long-distance (ILD) traffic revenues. This focus yields a conservatively late assessment of when the “cross-over” would occur. If we consider other facets of the telecom market, the benefits of earlier liberalization are even greater.

There are some sectors of the telecom market where liberalization is not likely to have a sizeable fiscal revenue impact in the short-term. Data services would be unlikely to make a large contribution. Local service competition generally does not occur on a significant level for some time after liberalization, unless an elaborate interconnection regime is designed expressly for local-service competition. Furthermore, local service competition is generally slower to develop than that in long-distance services because of the extensive and costly infrastructure required and the elaborate interconnection arrangements that must be negotiated with the incumbent provider.

There may be significant additional tax revenue resulting from domestic long-distance (DLD) service competition. A general estimate of the additional tax contribution of domestic long distance liberalization was generated by examining the relative revenue of international long-distance and national long-distance in three of the countries researched in the study. The ratio of domestic to international long distance revenue in Mexico in 1997 was approximately 1.1.<sup>25</sup> The ratio of domestic to international long distance revenue in Australia in 1997 was approximately 1.2.<sup>26</sup> The ratio of domestic to international long distance revenue in Chile in 1997 was significantly lower – at about 0.5<sup>27</sup> – but this may be due to Chile’s unique policies, which led to unusually keen competition in international service. On the basis of these comparisons, we can make a rough estimate that domestic long-distance service contributes the same amount as international long-distance in revenues.

We can use this assumption to recalculate the “cross-over” point for when the cumulative benefits of earlier liberalization exceed those of later liberalization. To reflect the impact of domestic long-distance, we double the 1998 international traffic base in our assumed

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<sup>25</sup> Estimated by comparing Telmex’s reported domestic and international long-distance revenues, extrapolated to total market revenues using Telmex’s share of each of the two markets.

<sup>26</sup> Estimated by comparing Telstra’s reported domestic and international long-distance revenues, extrapolated to total market revenues using Telstra’s share of each of the two markets.

<sup>27</sup> Estimated by comparing CTC’s reported domestic and international long-distance revenues, extrapolated to total market revenues using CTC’s share of each of the two markets.

parameters. The observed growth rate of domestic long-distance traffic is lower<sup>28</sup> than that for international long-distance traffic, so we also apply the lower projected growth rate to the domestic long-distance traffic. The revised parameters are reflected below:

Percent IAM privatized in 2000	30%
Percent IAM privatized in 2001	25%
Quantity stimulus from liberalization (per year)	6.2%
1998 Total LD traffic base (\$M)	472
Trend in traffic growth – int'l, domestic LD	ILD 22%, DLD: 6%
Tax Pressure (tax/GDP)	24%
NPV Discount	5%
Privatization price, 2000 2 yr. Exclusivity (\$M)	5771
Privatization price 2000 0 yr. Exclusivity (\$M)	5509
Privatization price 2001 1 yr. Exclusivity (\$M)	6938
Privatization price 2001 0 yr. Exclusivity (\$M)	6858

Under this broader scenarios, an analysis of the cumulative fiscal impacts from liberalization in 2000 versus in 2002 shows the same initial loss in government revenue, due to the lower privatization price garnered absent any years of exclusivity. However, increased government revenue obtained through taxes on the additional economy stimulated by the increased telecommunications over-compensates for that loss even sooner. Using the base case parameters, the cumulative fiscal gains from liberalizing in 2000 exceed that of liberalizing in 2002 (the “cross-over” point) occur by the year 2003 -- two years earlier than in the international-only analysis. It should be noted that this estimate is still likely to be conservative – i.e., the cross-over point could be even earlier – because it does not consider whatever other stimulation of the telecom market (e.g., data, local service) that might occur.

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<sup>28</sup> Increase in traffic 1996-1997 was 6% (Source: ITU, “World Telecommunications Indicators Database”).

Base Case: Both ILD and DLD, Liberalization in Year 2000

<b>Base Case: Both ILD and DLD</b>		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<u>A. Liberalization of IAM in 2000</u>									
[a]	New entrants' market share	9%	16%	21%	26%	28%	38%	45%	50%
[b]	LD traffic rev using recent growth trends (\$M)	616	709	820	953	1112	1303	1533	1811
[c]	LD traffic rev assoc. w/incr. Qty.(\$M)	38	88	153	236	345	485	666	898
[d]=[c]*tax*1.4	Tax from multiplier effect (\$M)	13	30	51	79	116	163	224	302
[e]	IAM LD revenue (\$M)	559	599	647	704	796	814	843	905
[f]	Entrants' LD revenue (\$M)	57	110	173	249	316	489	690	905
[g]	Monopoly tax rate (%)	4%	2%	0%	0%	0%	0%	0%	0%
[h]=[g]*[e]	Monopoly tax (\$M)	22	12	0	0	0	0	0	0
[i]	Privatization Price (\$M)	1653	1715						
[j]=[d]+[h]+[i]	Total Fiscal Impact \$98	1688	1756	51	79	116	163	224	302
[k]	NPV Fiscal Impact \$98	1688	1672	46	69	95	128	167	214
[l]	Cumulative NPV Fiscal Impact	1688	3360	3407	<u>3475</u>	3571	3698	3865	4080
Of which:									
	NPV Privatization Price (\$M)								3286
	NPV Tax from Multiplier Effect (\$M)								760
	NPV Monopoly Tax (\$M)								34

Base Case: Both ILD and DSD, Liberalization in Year 2002

<b>Base Case: Both ILD and DLD</b>		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<u>A. Liberalization of IAM in 2002</u>									
[a]	New entrants' market share	0%	0%	9%	16%	21%	26%	28%	38%
[b]	LD traffic rev using recent growth trends (\$M)	616	709	820	953	1112	1303	1533	1811
[c]	LD traffic rev assoc. w/incr. Qty.(\$M)	0	0	51	118	207	323	475	674
[d]=[c]*tax*1.4	Tax from multiplier effect (\$M)	0	0	17	40	70	109	160	226
[e]	IAM LD revenue (\$M)	616	709	744	805	878	962	1097	1131
[f]	Entrants' LD revenue (\$M)	0	0	76	148	235	341	436	679
[g]	Monopoly tax rate (%)	4%	2%	0%	0%	0%	0%	0%	0%
[h]=[g]*[e]	Monopoly tax (\$M)	25	14	0	0	0	0	0	0
[i]	Privatization Price (\$M)	1731	1735						
[j]=[d]+[h]+[i]	Total Fiscal Impact \$98	1756	1749	17	40	70	109	160	226
[k]	NPV Fiscal Impact \$98	1756	1665	15	34	57	85	119	161
[l]	Cumulative NPV Fiscal Impact	1756	3421	3437	<u>3471</u>	3528	3613	3733	3893
Of Which:									
	NPV Privatization Price (\$M)								3383
	NPV Tax from multiplier effect (\$M)								472
	NPV Monopoly Tax								38

A cost-benefit of the fiscal impact of liberalizing in Year 2000 instead of Year 2002 can be made based on the Net Present Value of the impacts through Year 2007. (Because the multiplier effect benefits will extend beyond that year, this is a conservative estimate even of the impacts from total long-distance traffic.) Considering the effects of both international and domestic long-distance traffic alone, by the year 2007, the earlier liberalization scenario will

have yielded \$187 million additional benefits as compared to those generated from liberalization in year 2002.

It should be emphasized that the analysis presented, above, does not account for the dramatic benefits from telecommunications sector liberalization that have already accrued in Morocco due to the liberalization of the wireless sector. Liberalization of the wireless segment yielded several sources of fiscal benefits – in addition to the large price for the sale of the concession, there were also significant gains from competition. Because of the elasticity of demand for wireless service is likely much higher than for wireline service and there was significant unmet demand, the impact of competition probably yielded a much larger stimulation of demand and more aggressive expansion of networks. This rapid growth translates into a high yield in tax revenues from the multiplier effect. Incorporation of these large benefits of liberalization from the wireless would significantly inflate the benefits of telecom liberalization that we have estimated, here.

Other scenarios are possible that would serve to increase the fiscal impact of liberalization even further. For example, it is likely that a third GSM license could be supported in Morocco. A survey of GSM operations around the world illustrates several cases where three or even more GSM operators are being supported within a country. Examples include Australia, Austria, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Netherlands, Portugal, Romania, Spain, Sweden, Switzerland, and the United Kingdom.<sup>29</sup>

In the event such a third license is issued, the fiscal impact will benefit both from the price obtained from sale of the license as well as the multiplier effect resulting from economic activity associated with cellular traffic stimulated by increased competition.

## **E. Risk Analysis**

We performed a sensitivity analysis varying several parameters in order to assess the risk to government revenue of parameters other than those assumed above.

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<sup>29</sup> U.S. Department of Commerce data on world cellular markets, updated 3/2000.

In the conservative base case scenario, considering only the effects on international long-distance traffic leads, to a “cross-over” in cumulative fiscal impact benefits from liberalization being greater with liberalization in 2000 as of the year 2005. This is the point at which the multiplier effects from the stimulated telecom sector generate enough economic activity and resultant tax revenue to compensate for the lower privatization price of a non-exclusive license.

If we assume the privatization prices are only 80% of that assumed in the base case, the “cross-over” point will occur earlier, as would be expected. The cumulative fiscal impact from liberalization from liberalizing in 2000 exceeds that from liberalizing in 2002 as soon as the year 2004.<sup>30</sup> If we assume the alternative scenario, that the privatization prices are 20% higher than the estimates included in the base case, then the “cross-over” point occurs later, in the year 2006.

The base case scenario assumes an extension of the recent trend of growth in international traffic of approximately 22% per year. If we vary that assumption to project a lower growth rate of 15%, the “cross-over” point occurs later, in the year 2006. If we instead project a higher growth rate of 30%, the “cross-over” point occurs earlier, in the year 2004.

The base case scenario assumes that liberalization has a 6.2% stimulus on international traffic growth beyond the pre-existing growth trend. This is the average impact observed from the panel of countries examined. The stimulus is largely, if not completely, due to price decreases brought about by competition. If we instead assume that there is only half that stimulation effect – 3.1% – then the “cross-over” point occurs later, in the year 2008. If we assume a higher effect – 10% – then the “cross-over” point occurs earlier, in the year 2004.

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<sup>30</sup> This scenario is not improbable, as our estimates of the privatization price for IAM are significantly higher than the latest estimate provided by JP Morgan, and almost three times that of earlier estimates of IAM value generated by investment firms.

## F. Impact on Businesses and Consumers

### 1. Lower prices

Inherent in the assumption of a price elasticity of  $-1$  in the market for international traffic is that most of the incremental quantity growth in international traffic following liberalization is due to a decrease in prices. This decrease in prices is a substantial benefit to consumers and businesses.

### 2. Telephone Penetration

Progress toward universal service is often used as an argument against liberalization, under the logic that profit-maximizing firms will not find it profitable to extend service to the marginal subscribers. However, rather than hinder penetration, liberalization appears to increase availability of the telephone network. Available data collected for the panel of countries indicate that liberalization helps to stimulate the growth of access lines. In particular, growth was stimulated in both the developing countries in our sample.

<b>Impact of Liberalization on Rate of Growth of Access Lines</b>			
Country	Rate before Liberalization	Rate after Liberalization	Change
Australia	2.3%	7.8%	5.5%
Chile	13.0%	17.0%	5.0%
Denmark	2.2%	2.7%	0.5%
Finland	0.8%	1.0%	0.2%
Mexico	6.5%	7.0%	0.5%
New Zealand	1.7%	0.3%	-1.4%
United Kingdom	4.0%	2.1%	-1.9%

### 3. Quality of Service

Quality of service data indicate no evidence of a decline following liberalization. Quality of service data were not available for all the countries in the panel for prior to and after liberalization. However, all data that were available indicated there was no deterioration in the quality of service following liberalization. The available data on waiting list for telephone service showed a significant decrease in Chile and New Zealand after liberalization. The

percentage of faults cleared by the next working day increased in Chile, in Finland, and in the United Kingdom. The percentage of unsuccessful local calls decreased in Chile. Telephone faults per 100 calls decreased in Chile, in Finland, New Zealand and the United Kingdom.

#### **4. New Services**

While it is difficult to conduct a formal comparison on introduction of new services between non-liberalized and liberalized scenarios, there is anecdotal evidence that liberalization promotes network development. In the U.K., British Telecom recently announced the launch of the “U.K.’s largest and advanced data network” and the launch with its mainland Europe partners of a pan-European fiber network connecting 200 cities.<sup>31</sup> Tele Danmark digitized its network following liberalization, and in December 1998 transferred the last of its analog customers to the new digital exchange. Tele Danmark has also launched a pilot ADSL transmission providing rapid Internet service.<sup>32</sup> In Australia, Telstra has established a strategic business unit responsible for expanding their range of products and developing content-based businesses, such as Internet and e-commerce, pay television services and directories. It is the largest Internet service provider in Australia and helps business customers to build “extranets” which extend their intranets to other authorized users. Internet services include an Internet protocol dial access to corporate systems, web-hosting and streamlining services.

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<sup>31</sup> BT Annual Report, 1999.

<sup>32</sup> Tele Danmark Annual Report 1998.