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The Impact of Liberalizing the Telecommunication Sector in Morocco

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Introduction

Over the last decade, the telecommunication sector has embarked in a period of deep change initiated by technological innovation, liberalization of national markets, and by partial or full liberalization of incumbent operators. Historically, telecom operators were state-owned and vertically integrated monopolists. Due to large fixed costs of building a network, the activity of providing telecommunication services was considered as natural monopoly. However, technological progress and innovation generated new transmission systems and decreased the cost of building infrastructure. Therefore, the idea of a natural monopoly is no longer seen as valid. In addition, evidence indicates that the absence of competition does not provide incentives to decrease costs, leads to inefficiencies and welfare loss. As a consequence, most historical operators, all over the world, have been subjected to privatization plans.

Since the early nineties, Morocco, like most other countries, has put substantial emphasis on telecommunication and information technologies because of their role in the digital age. The significant development recorded over the last decade can be traced back to three major causes: legal and institutional telecommunications reforms; political openness and democratisation; and, technological changes.

The purpose of this paper is to present the major developments recorded in telecommunication sector in Morocco and assess the impact of regulating the telecommunication sector in Morocco along the European Union lines. The basic assumption underlying this work is the following. Further liberalization of various market segments of the telecommunication sector would benefit communications intensive industries that provide key “backbone services” to the economy, such as transport, distribution and finance. It would also improve competitiveness of exporting industries by reducing their costs and facilitating their integration to transnational production networks. The quality and price of telecommunication services directly affect business costs, but also affects the capacity of firms to network and compete in foreign and domestic markets. Finally, development of telecommunication services sector would create more investment opportunities for the domestic private sector, and help attract more FDI and portfolio investment. Regulatory reforms that inject more competition in markets for services and network industries are, in turn, instrumental in forcing operators to improve efficiency and pass on the lower production costs to users. But because in many developing countries domestic providers of services often operate

¹ Valuable research assistance has been provided by A. IRALI and A. HASSANI.

below international efficiency standards, opening up markets to competition has to go in tandem with lowering trade barriers in services and making room for increased foreign entry in domestic markets. Cross-border supply of almost all services relies on telecommunication services. From the Moroccan perspective, it is an area where trained and cheap labor force can represent a significant comparative advantage.

However, better performance in Telecom may result from liberalization, but is also partly driven by economic development. Income growth bolsters demand for telecommunications and networking services, both from businesses and households, and at the same time provides the financial resources for investment necessary to expand the telecommunications infrastructure. Moreover, in higher-income countries services markets are generally more competitive, so that further empirical analysis is needed to disentangle the impact of market liberalization from that of economic development and other factors².

The association agreement between the European Union and Morocco, which entered into force in March 2000, represents the legal basis of EU-Morocco relations. This agreement provides for the gradual establishment of an industrial free-trade zone by 2012 and progressive liberalization of trade in agriculture. The agreement between Morocco and the EU foresees, in addition to that, to start negotiations for a free trade area in services. Although the signed agreement contains no binding commitments in the area of services, it has provisions on freedom of establishment, free movement of capital and competition rules. In addition, Morocco is expected to deepen further its relationships with Europe within the framework of the "*Neighboring Policy*". In addition, As WTO member, Morocco has committed itself to gradually liberalize its telecommunication services, and signed a FTA with the US that covers telecommunication services.

So far, the potential impact of liberalizing trade in goods on the Moroccan economy has received a relatively significant academic attention (Rutherford and Tarr (1997), Chater and Hamdouch (2001), Achy and Milgram (2003) and Chater (2004)). In contrast, the potential impact of liberalizing trade in services in general, and telecommunications services more specifically, have not received comparable interest. The main objective of this research is to filling this gap in the literature. The potential impact of liberalizing telecommunications services goes beyond the telecommunication sector itself since these services enter as intermediate inputs in other activities. Further liberalization is expected to lead to increase competition, decrease prices for users, and improve quality and access to various telecommunications services.

The rest of this paper is organized as follows. The first section presents the major developments in the Telecommunication sector in Morocco. Section two examines the Moroccan regulations as well as institutions in charge of supervising Telecommunication sector activity. Section three computes the degree of trade restrictiveness in this sector in Morocco with respect to that of the European Union. Section four provides a first approximation of the potential welfare effects of

² Rosotto , Sekkat and Varoudakis, "Opening up Telecommunications to competition and MENA integration in the World economy".

harmonizing the Moroccan regulations in the Telecommunication sector with those of the EU. Finally, section five concludes.

1. Major developments in the telecommunication sector

a. Major regulatory and institutional developments

Telecommunication sector in Morocco recorded remarkable changes over the last decade in its regulatory framework as well as in its market structure. Before the issuance of the law 24-96 in 1997, telecommunication sector in Morocco was controlled and run by a state monopoly company. This legal framework replaced a very old legislation that goes back to 1924, which reserved an exclusive right for the state monopoly of wire line and wireless telegraphs and telephones. The law of 1984 simply transferred the same monopoly to a state-owned company: the *Post Office and Telecommunications Board*³.

The Moroccan government has recognized, relatively earlier than other countries in the region, the potential of telecommunication sector to become an essential pillar for economic development. The need for reform, including privatization and competition within the telecom sector, started in the late eighties and led to the adoption by the Moroccan parliament of the law 24-96 in 1997 following almost seven years of deliberation.

As a result of the telecommunication law of 1997, the *Post Office and Telecommunications Board* (ONPT⁴) was restructured and two entities have been created in 1998: *Itissalat Al Maghrib* (IAM) or *Maroc Telecom* S.A. for telecommunications, and *Barid Al Maghrib* for postal services. The Law also set up the National Telecommunications Regulation Agency (ANRT⁵), an independent entity in charge of regulating the telecommunications services.

A second Global Satellite Messaging (GSM) license was granted in August 1999 and inaugurated in April 2000 for fifteen years. The license guarantees that no third cellular license will be awarded before August 2003. The winning bidder, *Medi telecom*, a consortium led by Spain's Telefonica paid an amount of DH 10.6 billion, which is the equivalent of US \$ 1.1 billion. *Medi telecom* is owned by a consortium of international telecom operators – Telefonica S.A. (30.5%), and Portugal Telecom S.A. – (30.5%) in addition to Moroccan institutional and financial investors led by the BMCE Bank (20%) and CDG⁶ (8%). Relative to Morocco's population size, this is the highest fee ever paid for a mobile license

³ Office National de Postes et des Télécommunications (ONPT).

⁴ ONPT: Office National des Postes et Télécommunication

⁵ ANRT: Agence National de Réglementation des Télécommunications

⁶ CDG: Caisse de dépôt et de Gestion, which is a public financial institution.

In conformity with the law 24-96, value added services⁷ were also liberalized and full competition has been introduced in their supply. Companies such as *European Datacom Maghreb*, *Globalstar North Africa*, *Orbcomm Maghreb*, *Soremar* and *Thuraya Maghreb*, are competing on the GMPCS⁸ market. Companies such as *Cimcom*, *Gulfsat Maghreb*, and *Space Com* are providing VSAT⁹'s services. Competition also exists for data transmission, internet services, and cybercafés. The market for value added services is still underdeveloped or even declining in some of its segments (National leased lines and X-25 for instance). It continues also to be excessively dominated by the historical operator, *Maroc Telecom*. As internet service provider, *Maroc Telecom* operates under the commercial brand "*Menara*", it controls over 90 percent the market and keeps all other "competitors" in a very marginal position.

In January 2001, the incumbent operator "*Maroc Telecom*" was partially privatized by transferring 35 per cent of its capital to *Vivendi Universal* for DH 23.3 billion or the equivalent of US \$ 2.3 billion.

On 24 April 2002, the ANRT issued a "call for tender" for the granting of a second fixed telephony license, which should have ended the monopoly of *Maroc Telecom*. However, due to the global situation in the telecommunications sector and the need for the ANRT to prove its credibility and effective independence from the executive, the tender received no bids before the deadline.

The telecommunications law (24-96) has been amended and completed by the promulgation of the new law (55-01), which came into effect in November 2004. The new legal framework aims at promoting investment in various segments of telecommunications services, ensure a rational use existing infrastructure, promote research and innovation in telecom related activities, and provide the legal and financial means for universal service, which accounts internet as one of its components according to the law. The regulatory agency (ANRT) has also been given wider prerogatives to monitor competition, arbitrate disputes, and impose penalties on anticompetitive practices.

Vivendi Universal agreed with the Moroccan government in November 2004 to increase its stake in *Maroc Telecom* from 35 to 51 percent. The agreement took effect in January 2005. The deal amounts to DH 12.4 billion, or approximately \$ 1.4 billion. This sum

⁷ According to WTO, value-added telecommunication services are telecommunications for which suppliers "add value" to the customer's information by enhancing its form or content or by providing for its storage and retrieval.

⁸ GMPCS is a personal communication system providing transnational, regional or global coverage from a constellation of satellites accessible with small and easily transportable terminals. GMPCS services include two-way voice, fax, messaging, data and even broadband multimedia.

⁹ VSAT stands for Very Small Aperture Terminals and refers to receive/transmit terminals installed at dispersed sites connecting to a central hub via satellite using small diameter antenna dishes. VSAT technology represents a cost effective solution for users seeking an independent communications network connecting a large number of geographically dispersed sites. VSAT networks offer value-added satellite-based services capable of supporting the Internet, data, LAN, voice/fax communications, and can provide powerful, dependable private and public network communications solutions.

includes the value of the additional 16% stake in the capital and a premium for continuing control by *Vivendi Universal*.

A further step in the privatization of *Maroc Telecom* has been made when the government decided to sell another 14.9 percent of the capital through an international public offering. The offering, which ran from 22 November to 7 December 2004, was oversubscribed 21 times. This IPO is the first international equity offering and offshore listing of a Moroccan company. It led to an allocation of 30 percent of the offering to overseas institutional investors, and the rest, 70 percent, to national investors (44 percent for corporate entities, 23 percent for individual investors and 3 percent for *Maroc Telecom* personnel). The *Maroc Telecom* IPO allowed the government to collect nearly US \$ 1 billion.

The process of liberalization has been reinforced by launching the second "call for tender" for the second fixed-telephony license that was finally granted to *Medi telecom* in July 2005 for DH 75 million. The license covers a local loop network, an inter-urban network, and an international network. *Medi Telecom* is expected to be operational on the fixed telephony market at the beginning of 2006.

{Insert Figure 1}

More recently, in September 2005, *Maroc Connect*, the second Internet service provider in Morocco, was awarded the third fixed-telephony license by the National Telecommunications Regulatory Agency. The license provides for offering fixed line phone services within a 35km area. The capital of *Maroc Connect* is equally shared between "Attijari-Capital Risque" and "Fipar Holding" respectively subsidiaries of ONA¹⁰ and CDG. The company paid DH 306 million or about US \$34 million to the government and is committed to invest some US \$ 110 million before the end of the first year of the contract.

The unilateral reform process was supported by multilateral commitments made by Morocco under the WTO's General Agreement on Trade in Services (GATS). Morocco participated in telecommunications negotiations (Telecommunications Agreement) under GATS which started in 1996 and made commitments that were annexed to the Fourth Protocol of GATS in February 1997 and went into effect in January 1998. Morocco committed not to impose any restrictions on market access for cross-border supply (mode 1), and consumption abroad (mode 2) for value added services (excluding telephone and telex). It has also committed not to impose any limitations on national treatment for the same services. A schedule of specific commitments that completes the 1997 commitments has been offered by the Moroccan authorities and came into force in October 2000. It indicates in a more comprehensive way the various commitments made by Morocco under each of the four modes of supply of telecommunications services. Morocco committed to keep some activities such fixed telephony, telex services and ISDN¹¹ under monopoly of *Maroc Telecom* until the end of 2001. However, for the

¹⁰ ONA is the largest private financial holding in Morocco.

¹¹ ISDN: Integrated Service Data Network

extent of foreign participation in Maroc Telecom capital, no bidding commitment has been scheduled. So far, Morocco has fulfilled its commitments and has even gone beyond as presented earlier.

<Insert table 1>

b. Major developments in basic telecommunication indicators

The telecommunication sector in Morocco expanded steadily following the process of its liberalization. The expansion has been particularly remarkable for the mobile telephony.

The number of telephone fixed lines increased from 400 000 lines in 1990 to almost 1 500 000 lines in 2000. However, due to the cream-skimming effect from the mobile, this number decreased by some 22 percent in 2001 and stagnated in 2002. The demand for the mainline network has been rising since 2003 driven essentially by an increasing demand for Internet connection. In 2004, Morocco has a telephone density of less than fifty lines per one thousand inhabitants, which is very low in comparison with other countries with the same level of economic development. In 2002, the average telephone density for middle income countries is 167 mainlines per 1000 people, 107 for MENA region and 585 for high income countries¹². The demand for fixed lines continues to be dominated by residential subscriptions that represent 68 percent of the market, compared to 22 percent for professional use, and the rest, 10 percent, for public phones.

Regarding mobile telephone services, Morocco is referred to a success story in the region. Since March 2000, the mobile telephone market has been shared between two operators: *Maroc Télécom* and *Méditel*. Their market shares at the end of 2004 are respectively 67.5 and 32.5 percent. The number of subscribers rose from less than 400 000 subscribers in 1999 to 2.852 million in 2000, 6.2 million in 2002, and 9.3 million subscribers by the end of 2004. The last figures released by the ANRT for the end of September 2005 indicate that the total number of mobile subscribers in Morocco is approaching 12 million. Many remote areas with no previous telephone services are currently covered by the mobile phone network.

{Insert Table 2}

The spectacular boom of the mobile network has enabled Morocco to compensate for its lag in fixed line services and even to catch up with other middle income countries in terms of overall telephone penetration. This indicator stood at 35.4 percent at the end of 2004 and more than 40 percent on the basis of the last available figures of September 2005. However, a significant proportion of mobile phones in Morocco are run through prepaid cards (95 percent) rather than through regular subscriptions (only 5 percent), which might be detrimental for growth potential in the medium and long-run. In

¹² World Development Indicators (2004)

addition, as indicated earlier, the upsurge in the mobile demand has been achieved at the expense of the mainline network. This cannibalisation of the market the mobile demand seems to be hampering internet development.

However, other factors contribute to the weakness of internet demand in Morocco. The illiteracy rate among adults in Morocco is one of the highest in the region and stands at 48 percent in 2004. The number of personal computers per 100 people is also very low. It did not exceed 2.36 in 2002 compared to 4.54 for middle income countries, 3.82 in MENA region¹³. The estimates provided by the National Regulatory Agency (ANRT) for 2004 indicate that 12 percent of households are equipped with personal computers¹⁴. So far, the cost of access and the lack of competition in fixed telephony also lie behind the low internet penetration rate in Morocco.

Due to the attractive commercial offers by *Maroc Telecom*, the *number of subscribers* has almost doubled over the first nine months of 2005 increasing from 113 170 to 206 452. Although the *number of internet users* is much higher as the number of cybercafés is growing, Morocco still compares unfavourably to both middle income countries, and the MENA region. The expected entry of new operators on the fixed telephony market is expected to foster competition and boost household as well as corporate demand for internet services.

2. The regulatory framework analysis

Telecommunication sector reform in Morocco is a relatively recent process that effectively started with the adoption of the new telecommunication law in 1997 (*Law 24-96 on Postal and Telecommunications Services*). The Law 24-96 admits the principle of competition in all branches of the telecommunications market. The Law governs interconnection of various operators' networks and lays down the criteria and prerequisites for telecommunication services' supply. The law 24-96 has been recently (November 2004) amended and completed by the adoption of the Law 55-01. The new law offers the legal means to effectively address new issues in telecommunication industry in a liberalized market.

The rest of this section analyzes the provisions of the regulatory framework governing telecommunication sector in Morocco. It focuses on the prerogatives granted to the national regulatory agency (ANRT), the legal regime under which each telecommunication activity can be undertaken. The section deals with other issues, very critical and highly sensitive in a newly liberalized market, such as interconnection, price regulation, frequency allocation and universal service¹⁵.

¹³ World Development Indicators (2004)

¹⁴ With an average of 5 people per household, this figure is equivalent to 2.4 computers per 100 people. There is almost no change in comparison with the figure provided by the World Bank for 2002.

¹⁵ On the basis of the law 24-96 as amended and complemented by the law 55-01

2.1. Telecommunication Regulatory Agency

The National Telecommunication Regulatory Agency (ANRT) is a publicly-owned entity endowed with legal independence and financial autonomy. It holds broad legal, technical and economic regulation powers adapted to the new requirements of a rapidly evolving sector which is highly strategic both nationally and internationally. The ANRT has been invested with wide authority for regulation, oversight and supervision, enforcement, and monitoring development of telecommunication sector. It is involved in all technical, economic and legal aspects of telecommunication operations and provided with legal means ranging from information request to ordering of injunctions and penalties.

In the *legal sphere*, ANRT is entrusted with the drafting laws, decrees and other legal texts regulating the telecommunication sector, preparing draft legislation with respect to the legal regimes governing operators' activities, preparing and keeping up to date the terms of reference setting out the rights and obligations of network operators, establishing the procedure for submitting interconnection disputes, designing rules governing the management and oversight of the radio frequency spectrum, issuing its opinion with respect to applications for the awarding of licenses, receiving declarations that are filed, expressing the intent to offer value-added services on a commercial basis, setting the conditions for undertaking investigations, Issuing authorizations to establish and operate independent networks. ANRT is also in charge of establishing the interconnection terms and conditions on a case-by-case basis.

Regarding its *technical regulatory* powers, ANRT is in charge of establishing the technical and administrative specifications for the acceptance of terminal equipment; granting certifications for manufacturing, importing, offering for sale and distribution of terminal equipment, and for its connection to a public telecommunication network; certifying telecommunication equipment testing and measurement laboratories which may be authorized to issue permits; establishing categories and technical conditions with respect to the use of radio networks and installations consisting of low-power and low-range equipment.

Regarding its *economic regulatory* powers, ANRT is in charge of proposing the tariff ceiling that can be charged for universal service; establishing licensing fees and other fees relating to attribution and renewal of licenses with respect to radio frequency assignments. ANRT is also in charge of developing a legal framework with a view to ensuring that free competition and the principle of equal treatment prevail, and to protect providers and as well as users from anti-competitive or discriminatory practices. ANRT ensures that all users receive equal treatment.

The law on telecommunication also specifies the responsibilities of ANRT and its powers regarding the security of communications, the confidentiality of information, and ensures that the needs of national defense and public security are met, that operators support regional and national development, and environmental protection, and they contribute in funding universal service objectives.

The national regulatory agency has been provided with effective powers for investigating operators' compliance with laws and regulations in force and terms of licenses, authorizations and approvals granted in the telecommunication sector. It is also responsible for assuring compliance with provisions governing interconnection and those relating to dispute settlement.

<Insert table 3>

The ANRT power of investigation is exercised through inquiries, including on-site inspections and the requesting of any necessary information or documents that will enable the Agency to examine operators' compliance with their obligations and terms of reference.

The enforcement and penalty power is the strongest weapon with which ANRT is endowed to prevent anti-competitive practices by network operators. The law (55-01) has set various financial penalties depending on the type of violation committed.

- Operators not respecting to supply ANRT with the information required by the regulation in force regarding analytical accounting and the accounts audit, information regarding universal services, information on research and training, information on the general directory of subscribers, or on tariff offers are liable to a penalty of a maximum of one hundred thousand Moroccan dirham (DH 100 000).
- Operators and telecom services suppliers not respecting to supply ANRT with the information regarding the use of radio frequencies and the equipment of telecommunications, or deadlines to supply ANRT with the information required by the regulation in force or by the latter are liable to a penalty of a maximum of fifty thousand Moroccan dirham (DH 50 000).
- Operators and telecom services suppliers not respecting to supply ANRT with the information regarding other issues (not list above) are liable to penalties of a maximum of twenty thousand Moroccan dirham (DH 20 000).

If the holder of public telecom networks license fails to respect legal and regulatory texts provisions or his specifications document, and fails to conform to the formal notice addressed to him by the director of ANRT, he becomes liable to a warning that can be published in the official bulletin, to a total or partial suspension of the license for a maximum of 30 days, and/ or a fine of a maximum of 1% of the previous year's turnover exclusive of tax and net of the interconnection expenses.

The management and administrative bodies of the ANRT are structured into three entities: the board of directors (BD), the management board (MB) and general director (GD).

The BD consists, in addition to its president, of the representatives of the State and individuals from public and private sector appointed by decree for one five year period

for their technical, legal and economic skills in the field of information and communication technologies (ICT). The BD deliberates on the general focus of the ANRT and decides on its annual activity program, it examines the ANRT's management reports and meets as often as circumstances require but at least twice a year (before 31 May, to approve the financial statements for fiscal year-end, and before 31 October, to adopt the budget for the following fiscal year).

The MB assists the BD which deliberates on issues delegated by the BD. The MB is in particular in charge of settling disputes regarding interconnection. The members of the MB are appointed by the BD for a single five year renewable term.

The GD, appointed by the King by royal decree, holds all the powers necessary to manage the ANRT. The DG participates, in an advisory role, in the meetings of the BD and MB during which it assumes the role of reporter.

In order to enhance its transparency and accountability, ANRT establishes at the end of each fiscal year an annual report on its activities. This report is sent to the Prime Minister, and published in the Official bulletin. It allows making activities of the ANRT public and ensures that regulatory functions are performed transparently.

The power and credibility of ANRT have been put to test over the last few years over settling disputes on interconnection fees, and through license allocation. The decisions made by ANRT show both its independence and effectiveness in regulating the market and handling telecommunication related affairs.

2.2. Legal regimes in telecommunication sector

Different legal regimes are in place in the telecommunication sector (under the law 24-96 promulgated in 1997 and the law 55-01 officially issued in November 2004) depending on the nature of services provided.

The *licensing regime* applies to public telecommunication networks that make use of the public domain or the radio frequency spectrum. The License is granted by government decree to any legal entity selected in a call for tender. The legal entity selected in a bid has to comply with the general principles of operating public telecom networks as well as with specific provisions stipulated in the call for tender. These provisions relate to the establishment of the network, provision of the service, coverage area for the service, radio frequencies and blocks of numbers assigned, as well as conditions with respect to access to high points that are in the public domain. There are also minimum requirements as to professional and technical qualifications, and financial guarantees imposed to applicants. The call for proposals specifies access conditions to and interconnection with public telecommunication networks, and can also, specify the terms and conditions for leasing any components of those networks.

The *authorization regime* applies to independent networks that may be established and operated by any individual or legal entity. The authorization is granted by the ANRT. It

can be issued only if such networks don't interfere with the technical operation of existing networks.

The *approval regime* applies to terminal equipment that are intended to be connected to a public telecommunication network to radio facilities whether or not connected to public network, and to laboratories for the testing and measurement of telecom equipment. The approval is issued by the ANRT or by a test and measurement laboratory.

The *declaration regime* applies to value-added services, fixed by regulation. These services may be freely provided by any individual or legal entity after having submitted a declaration to the ANRT. The latter notifies within two months, eventually, its opposition if it appears that service offered undermines safety, public order or is contrary to morality and common values.

Any supply of telecommunications services is *subjected to commercial presence*. Thus any foreign company wishing to provide telecommunication services or infrastructure must establish its subsidiary in Morocco.

License-holders are bound by various obligations among which: fair competition, obligation to keep independent financial accounts for each network and service operated, confidentiality and neutrality of service with respect to the messages transmitted, requirements in connection with national defense and public security, conditions with respect to providing the information required for an annual directory of subscribers, and obligation to comply with international agreements ratified by Morocco.

Internet access providers are not qualified as telecom operators. They are not subject to the licensing regime, but simply must file a declaration with ANRT. However, this does not rule out that they are subject to the general obligations set in Law 24-96 and 55-01 in addition to the terms of their declaration. The declaration sets out the terms and conditions under which services are to be provided.

The Internet access service must, under a leasing agreement, use the linkage facilities of one or more of the existing public telecommunication networks unless the Internet access provider holds a license itself and wishes to use the linkage facilities of the network covered by that license.

2.3.Mechanism of licenses allocation

The awarding of the second GSM license represented a significant success for the ANRT. It is worthwhile to examine the procedure in detail.

ANRT initiated the process for awarding a second license for the establishment and operation of a mobile public telephone network according to the GSM standard. In 1998, a *GSM-2* Project Team was set up within ANRT, and an invitation for expressions of interest was issued. The procedure was completed in 1999 when the license was awarded. The steps whereby the process was carried through to its

conclusion were as follows: establishment of a specific organizational unit to administer the project, issuing of an invitation for expressions of interest¹⁶, selection of a bank to advise on the procedure, pre-qualification process, finalization of the terms of reference, issuing of the call for bids, and the publication of the notice ranking the bids.

The key provisions set forth in the terms of reference cover the following areas: the duration of the license, which was fixed at 15 years, terms and conditions for the establishment and operation of the network, the possibility of the successful bidder constructing its own transmission network, authorization to provide subscribers with direct international access from 1 January 2002, a period of exclusive operation of four years, mechanisms for contributing towards the general objectives of the State, mechanisms for paying financial counterpart funds and various fees, itemization of the various responsibilities of the successful bidder.

2.4. Frequency allocation

The frequency spectrum in Morocco forms part of the State's public domain and ANRT is responsible for allocating frequencies to the various users (ITU (2001)). It is also in charge of enforcing restrictions with regard to any encoding of information exchanged, spectrum planning, and coordination at the international level. ANRT has already allocated frequencies for independent radio networks, public entities, government ministries, diplomatic missions, security agencies, and operators of public telecommunication networks, (Médi Telecom, Maroc Telecom).

2.5. Price regulation

In the initial phases of the reform process, competition is not fully developed and an asymmetry exists between the incumbent operator and new entrants (ITU (2001)). ANRT has been particularly concerned about abuse of a dominant position in the marketplace and predatory pricing for mobile and Internet services. The Agency regularly reviews changes in the tariffs charged and particularly when they relate to access to universal service.

2.6. Universal service¹⁷

The concept of universal service was first introduced in the Law 24-96, which defines it as “*making available to everyone of a minimum service consisting of a telephone service of specified quality at an affordable price, the connection of emergency calls, the provision of an information service and a directory of subscribers, either in printed or in electronic form, and the provision throughout the country of telephone booths installed in public places, all in keeping with the principles of equality, continuity, universality and flexibility*”.

¹⁶ 15 international operators had made submissions: Deutsche Telecom, France Télécom, GTE, CGSAT, Telecel, SBC, Stet, Telecom Portugal, Telefónica, Telia, MTN, Rumeli, Investcom Holding, TIM and Vodafone.

¹⁷ On the basis of ITU (2001), “Effective Regulation, Case study: Morocco”

Under Article 40, the incumbent (Maroc Telecom) is charged with providing universal service together with other operators. The cost of universal service, however, is shared amongst all telecommunication operators. All operators of public networks are required to make a contribution towards universal service equivalent to 2 percent of their turnover net of taxes and interconnection fees. A special fund devoted to Universal Service was created by the financial law of 2005 and managed by the regulatory agency.

2.7. Interconnection

The concept of interconnection refers mainly to two types of services. First, reciprocal services offered by operators of networks that are open to the public, which allow all users to communicate freely with one another, regardless of the network to which they are attached or the services they use. Second, services offered by the operator of a network that is open to the public to a provider of telephone service that is open to the public.

ANRT has broad responsibilities regarding technical regulation of interconnection. In particular, it is in charge of approving technical and tariff quotations offered by operators, revising interconnection agreements whenever necessary, settling disputes in regard to interconnection. Dominant operators are compelled to maintain separate accounts for their interconnection activities as to ensure transparency and avoid discriminatory treatment among various operators.

3. Assessment of barriers to trade in the telecommunication sector in Morocco

It has been emphasized (Achy & Hassani 2005) that measurement of barriers to trade in services is very challenging and much more complex than the case of trade in goods. Yet, measurement of trade in services is very crucial to policy makers in their bilateral, regional and multilateral negotiations. The main objective of this section is to provide a first assessment on the potential impact of regulating the telecommunication sector in Morocco along the European Union lines. The basic assumption that lies behind this exercise is that by removing barriers to trade, liberalization will increase competition in the domestic market, and reduce the price of telecommunications services. This first order effect of liberalization is expected to make consumers better off by improving their surplus. In addition, since telecommunications services are inputs for other activities, any reduction of their cost will improve competitiveness and generate wider economic effects. Hence to study welfare effects of adopting the EU regulation in the area of telecommunications; we shall consider not only the effect on consumer surplus due to the change in price of telecommunications but also those effects owed to changes in the price of other commodities.

3.1 Literature review

Various methodologies have been used to quantify barriers to trade in services: frequency indexes based either on actual restrictions or commitments scheduled by countries under GATS, quantity-based measures and price-based measures.

GATS schedules provide information on measures affecting services trade as related to market access and national treatment both by service sector and by mode of service supply. It is then possible to identify barriers to commercial presence or foreign direct investment (mode 3) as well as those restraining cross-border supply of telecom services (mode 1). However, the information contained in the GATS schedules suffers from various limitations. First, commitments contained in the national schedules do not include any information on services which have been left unbound or which have not been included in the schedules¹⁸. Information in the national schedules reports only commitments and does not reliably reflect the actual restrictions. Third, it is very difficult to assess and compare the relative restrictiveness of measures contained in GATS schedules among sectors or countries.

The quantity-based methodology makes use of penetration models to estimate the quantity wedge existing between actual and consumption volumes in fully liberalized environment. The price-impact approach follows a similar approach in order to estimate the price wedge existing between the actual price of a service and the hypothetical price of the service once all restrictions have been removed (Deardorff and Stern (2004)).

For the specific case of telecommunications, Warren (2000a) used a 1997 survey by the International Telecommunications Union (ITU) to construct a set of policy indexes for 136 countries taking into account actual market structure and performance indicators. The indexes have been constructed to incorporate the limitations on market access (MA) and national treatment (NT) for two modes of supply, cross-border trade and foreign direct investment.

Entry barriers impede either cross-border trade or limit FDI in telecommunications. Technological changes are rendering the first category of barriers less and less effective and it becomes virtually impossible to limit access of residents to foreign telecommunication services directly through international calls. However, foreign firms aiming at supplying cross-border services may not be allowed to operate from their home country and be required to have a physical presence in the market. Regarding impediments to FDI, foreign capital may be limited by legislation, administrative decree or terms of concession. Entry of foreign telecom providers may also be prevented by asking them to construct and operate their own networks instead of leasing existing networks.

An important constraint on operations arises from the lack of effective regulation that guarantees fair network interconnection. Usually, the national network is controlled by a dominant carrier, which also competes with new entrants (domestic and foreign) in the final product market. Another constraint is the existence of non-transparent and

¹⁸ Unbound services are assumed to be fully restricted, but this may not actually be the case.

discriminatory standards. Incompatibility of telecommunication systems can represent a substantial extra-cost for foreign suppliers and may force them to adopt incumbent standards in order to connect to the local network (Warren (2000a)).

In order to assess the economic impact of these restrictions, Warren (2000b) uses penetration models to quantify the impact of limits on competition upon fixed network services and mobile telephony consumption using a sample of 20 countries. Restrictions on competition are accounted for through a simple count of the number of operators (fixed and mobile) and by the inclusion of the indexes described earlier (Warren (2000a)). The policy variables used are based on data for 1997. Warren shows that liberal policies increase both fixed and mobile network penetration. The results are used to estimate the quantity impact of barriers to trade in each country of the sample. Tariff- equivalent can be then deduced from these quantity-impact measures. Warren concludes that the major beneficiaries are primarily developing countries, where significant increases in penetration are expected if more liberal policies were adopted.

Trewin (2000) applies a price-based methodology to estimate the price-wedge arising from restrictions to trade in telecommunications services. Tariff equivalents are deduced from a decomposition of the price wedge. Prices of telecommunications services are estimated using output and input measures, as well as others related to policies and quality of services. Using a time series of ITU-based data over the period 1982-1992 on 37 countries, Trewin shows that telecom services in high income countries appear to be more capital-intensive and dynamic than low-income countries, in which these services are costly, labor-intensive and static. Trewin suggests that these last aspects could be reflecting policies in terms of pricing, labor arrangements and competition.

3.2. Computation of restrictiveness index for Morocco

Our objective in this research is to measure the degree of restrictiveness to trade and FDI in the telecommunication sector in Morocco.

Restrictiveness indexes computed by Warren (2000a) are based on a 1997 survey by the International Telecommunications Union (ITU). Table 3 reports these indexes for a subset of countries. It reveals that the degree of restrictions to trade in telecommunications services for Morocco is extremely high. The index takes the value 0.9 compared to 0.9333 for Tunisia, 0.7987 for Turkey and 0.6333 for Egypt.

<Insert table 4>

Considering 1997 as the base case, the expected price reduction in telecommunications services in case Morocco fully liberalizes its market is remarkably high as it amounts to 1000 percent according to Warren's computations.

<Insert table 5>

However, given the dramatic changes recorded in telecommunication landscape in Morocco over the last few years, it would not be relevant to consider 1997 as the base case for assessing the welfare effects. The telecommunication law was passed in 1997 and then completed in 2004; the independent regulatory agency was created in 1998; the second GSM license was attributed in 1999 and value added services were fully liberalized; the incumbent was partially privatized in 2001 and effectively controlled by a foreign shareholder (Vivendi Universal) since 2004; a second license of fixed telephone services was attributed in July 2005 covering a local loop network, an inter-urban network, and an international network; and finally a third license for offering fixed line phone services within a 35km area was granted in November 2005. Operations under both licenses are expected to start in 2006.

To account for these changes, we computed updated restrictiveness indexes for telecommunications services in Morocco based on a methodology similar to that of the Australian Productivity Commission developed by McGuire and Schuele (2000) for banking services and Warren (2000a) for telecommunications services. Following Boylaud and Nicoletti (2000), who pointed out that telecommunications services are heterogeneous, we consider that it may not be appropriate to compute a single index to account for regulatory and policy environments in the whole telecommunication sector. Therefore, three restrictiveness indexes have been computed covering the three main activities (fixed lines, mobile and value added services). The same exercise has been done by Boughzala (2005) for the telecommunication sector in Tunisia.

The three steps methodology more comprehensively described in (Achy & Hassani 2005) has been applied. In the first step, all potential restrictions are listed and classified into categories. Weights are assigned to them respectively depending on their importance. These weights indicate how significantly each category of restrictions would limit service suppliers from competing in the market. In the second step, a score is assigned to each category based on available data, surveys and interviews. The assigned scores range from 0 (absence of restrictions) to 1 (high degree of restrictiveness). For each category, the restrictiveness index component is obtained by multiplying the assigned score by its corresponding weight. Finally, the restrictiveness index is calculated by summing up the various components.

It should be noticed that the scores reflect not only the state of regulations but also the perception of their effective implementation. For instance, the market for fixed telephony is still under monopole in 2005, but the attribution of the second and the third license is already felt on the market (market contestability). This anticipated entry of new competitors pushed *Maroc Telecom*, the incumbent operator, to start behaving as if it were already in 2004 and 2005 under some degree of competition.

On the basis of our computation, restrictiveness indexes for fixed telephony, mobile telephony and internet services in Morocco in 2005 are respectively 0.34, 0.21 and 0.26. These figures lead to an overall restrictiveness index, obtained as simple arithmetic average, of 0.267. As the three activities are not of the same importance, an adjusted

index has been computed by weighting each activity by its corresponding share of the total turnover in telecommunication sector in 2004. The overall restrictiveness index on the basis of this alternative computation is 0.278, which is not significantly different compared to the unadjusted index.

The Restrictiveness index computed by Warren on the basis of 1997 data was much higher than ours because all liberalization reforms in telecommunication sector in Morocco have been implemented after 1997, as has been extensively presented earlier.

However, the degree of restrictiveness in telecommunications services in Morocco is still higher when compared to the European countries. According to Warren (2000a), restrictiveness indexes in 1997 for Finland and UK were (0.00), Netherlands and Denmark (0.03), Germany (0.05), Austria (0.13), Italy (0.14), Luxembourg (0.17), Belgium (0.20), and France (0.21). Since 1997, the European Commission has adopted several directives to ensure that telecommunications markets are open and fully competitive (Akdemir et al. (2005) for a review of the regulatory framework in the European Union). Therefore, adopting the “*acquis communautaire*” would mean removing all the remaining restrictions.

3.2. Tariff equivalent of impediments to trade in telecommunication sector

The tariff equivalent is the additional price paid by consumers due to the existence of various restrictions. Theoretically, the presence of restrictions affects access, quality and price. Under liberalization and full competition, telecommunications services would be accessible to a wider range of customers; of a better quality, and cheaper than under restrictions. The focus of this paper is on *price-based measure of the* impact of liberalizing telecommunications services. The two other components are also highly important, particularly when access to fixed telephony and internet services are extremely limited. However, these dynamic components require more data and specific approaches to assess their potential effects.

The tariff-equivalent approach derives estimates of barriers to trade from the difference between current prices and prices that would prevail once all restrictions were abolished.

By extending the findings of Warren (2000a) in converting the overall restrictiveness index for telecommunications services in Morocco, estimated to (0.278), we obtain a tariff-equivalent of (32 percent). In other words, the extent of existing restrictions increases the price of telecommunications services by 32 percent compared to what would prevail under full liberalization. Our calculation also indicates that the magnitude of the tariff equivalent amounts to 40.5 percent for the fixed telephony, 29.7 percent for internet services, and only 23.4 percent in the mobile telephony. These results provide evidence that full liberalization of telecommunications services would benefit users particularly in fixed telephony and internet services. The expected price reduction for mobile services is relatively lower but still significant in absolute terms.

4. Welfare effects of fully liberalizing telecommunications services

The objective of this research is not only to quantify the magnitude of barriers to trade in the telecommunication sector, but also to provide an assessment of the impact of these barriers on the rest of the economy. The same exercise has already been done in the area of removing barriers on goods using econometric, as well as partial and general equilibrium methodologies. The relevance of this assessment arises from the need to understand how the removal of barriers to trade in such services will affect conditions of competition, productivity, allocation of resources, and economic welfare within and between sectors and countries (Deardorff and Stern 2004).

On the basis of our previous calculations, the adoption of the “*acquis communautaire*” in the telecommunication sector would result in a 32 percent decrease in the price of telecommunications services, which would make consumers better-off by increasing their surplus. But since telecommunications services are inputs used by almost all activities in their processes of production and distribution of other goods and services, it is expected that prices in these activities would also decrease, which would further increase consumers’ surplus.

In order to assess the total effect a 32 percent decrease in the price of telecommunications services on the economy, the 1998 *Input-Output table* of the Moroccan economy has been used¹⁹. By using this table, we assume that there are no significant changes in the structure of the Moroccan economy over the period 1998-2005. We suppose in particular that the telecommunication sector plays more or less the same role in 2005 compared to 1998. In our view, this assumption is a serious limitation as it tends to underestimate the remarkable progress in telecommunication sector over the last few years. The second limitation of the 1998 *Input-Output table* of the Moroccan economy is the absence of any distinction between transport and telecommunications, only one line stands for both²⁰. On the basis on value added data, the share of telecommunications in “Transport and telecommunications” amounted to 23 percent in 1998 and more than 34 percent in 2002²¹. The third limitation is that Input-Output methodology only accounts for static effects. Evidence indicates that dynamic effects are much more important in telecommunications activities.

First, Let A be the 36x36 matrix of input coefficients. On the basis of A ; the matrix B is created from the 35x35 input-output matrix by deleting the 29th column and 29th row referring to transport and telecommunications. Denote the 29th row where the 29th column element has been deleted by e . Let p be the 1x35 price vector of the 35 commodities excluding transport and telecommunications and $v.a$ the corresponding 1x35 unit gross value added vector. The price equation can be written as:

$$p = p B + p_b e + v.a$$

¹⁹ This is the most recent input-output table available in Morocco.

²⁰ As we overlooked this issue at this stage, our results should be interpreted cautiously.

²¹ Comptes et Agrégats de la nation (1980-2002)

p_b denotes the price of the banking services. By rearranging the above equation, we obtain:

$$p = p_b e (I-B)^{-1} + v.a (I-B)^{-1}$$

Once the price of transport and telecommunications that will prevail in Morocco when it adopts and implements the EU rules and regulations, p_b is fixed, we determine the *equilibrium prices* of the other 35 remaining commodities from the above equation assuming that there is no change in the unit gross value added vector $v.a$.

We denote by π the 1x36 price vector composed by the price vector p and the scalar p_b . $\pi = (p \ p_b)$, and CON the 36x1 consumption expenditure vector obtained from the 1998 input-output matrix by deleting the value of transport and telecommunications and con_b the value of consumption of transport and telecommunications. Then we form the 36x1 consumption vector as

$$CONS = \begin{bmatrix} CON \\ con_b \end{bmatrix}.$$

By construction, all base year prices are equal to unity. Hence, total consumption expenditure evaluated at base-year prices can be written as:

$$C = u \text{ } CONS$$

where u denotes the 1x36 unit vector. The value of total consumption expenditure evaluated at the prices that will prevail once Morocco has adopted and implemented the EU rules and regulations in the telecommunication sector is then given by:

$$C^* = \pi \text{ } CONS$$

The effect on consumer welfare can be calculated as:

$$(C - C^*) \times 100 / C^{*22}$$

As indicated earlier, this measure of welfare effect change focuses exclusively on the price effect of liberalization. It does not account for any potential increase in consumer demands for the different commodities following their price reduction. Hence, this approach provides a downward biased estimate of the welfare effect. Accounting for the other effects would require the use of *price elasticities of demand* for the 36 commodities included in the input-output table, which are nor readily available. Thus, the welfare gain is very likely to be higher that estimates provided in this paper.

On the basis of previous computations, the adoption of the EU rules and regulations in the telecommunication sector is expected to lead to a reduction of banking services' price 32 percent. Accordingly, the welfare of the society captured through total consumption, will improve by 0.1627 percent. Since in 1998 consumption represented

²² Note that this approach determines the equivalent variation in consumer' income.

86.12 percent of GDP²³, this welfare gain will translate into an increase of 1.4 percent in GDP.

Since in 2004, GDP amounted to DH 444 billion or the equivalent of US\$ 50 billion, our first and rough approximation of the welfare gain from adopting the EU rules and regulations in the telecommunication sector is estimated to US\$ 700 million. It very likely that this figure underestimate the total effect of liberalizing telecommunications services in Morocco.

5. Conclusion

Since 1997, the telecommunication sector in Morocco has embarked in a period of deep change initiated by technological innovation, liberalization of national markets, and by partial or full liberalization of incumbent operators.

The purpose of this paper was to present the major developments recorded in telecommunication sector in Morocco, quantify the extent of the existing restrictions, and assess the impact of regulating the telecommunication sector in Morocco along the European Union lines.

So far, the potential impact of liberalizing trade in goods on the Moroccan economy has received a relatively significant academic attention. In contrast, the potential impact of liberalizing trade in services in general, and telecommunications services more specifically, have not received comparable interest. Yet, measurement of trade in services is very crucial to policy makers in their bilateral, regional and multilateral negotiations. The potential impact of liberalizing telecommunications services goes beyond the telecommunication sector itself since these services enter as intermediate inputs in other activities.

On the basis of our computation, restrictiveness indexes for fixed telephony, mobile telephony and internet services in Morocco in 2005 are respectively 0.34, 0.21 and 0.26. These figures lead to an overall restrictiveness index, obtained as simple arithmetic average, of 0.267. As the three activities are not of the same importance, an adjusted index has been computed by weighting each activity by its corresponding share of the total turnover in telecommunication sector in 2004. The overall restrictiveness index on the basis of this alternative computation is 0.278, which is not significantly different compared to the unadjusted index. The Restrictiveness index computed by Warren on the basis of 1997 data was much higher than ours because all liberalization reforms in telecommunication sector in Morocco have been implemented after 1997.

On the basis of our previous calculations, the adoption of the “*acquis communautaire*” in the telecommunication sector would result in a 32 percent decrease in the price of telecommunications, which would make consumers better-off by increasing their welfare. Our first and rough approximation of this welfare gain is estimated to US\$ 700 million but needs to be taken cautiously due to data paucity. It very likely that this

²³ Haut Commissariat au Plan (2003), « Comptes et Agrégats de la nation 1980-2002 »

figure underestimate the total effect of liberalizing telecommunications services in Morocco.

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Figure 1

Gradual deregulation agenda of telecommunication sector in Morocco

Stage 1	Stage 2	Stage 3	Stage 4
Separation of regulatory and operation functions	Restructuring	Opening up the sector to competition (not fixed lines) and partial privatization	Further privatization of Maroc Telecom and introduction of competition in fixed line services

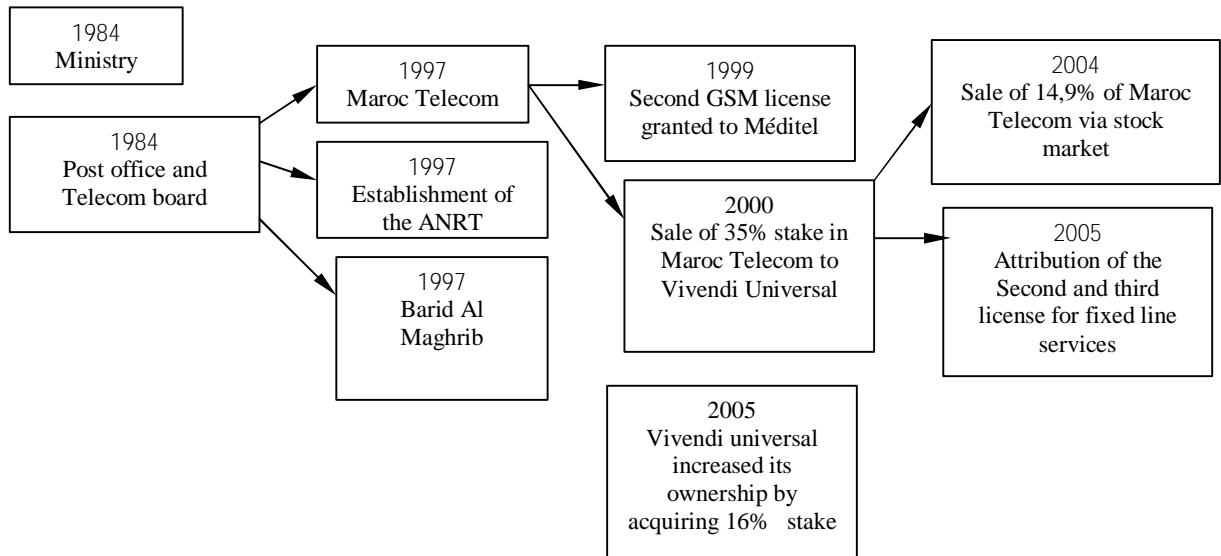


Table 1
Summary of Morocco's telecommunication sector commitments under the GATS

Items	Mode of supply			
	Cross-border supply	Consumption abroad	Commercial presence	Presence of natural persons
	Market access/National treatment			
<i>Telecommunication services</i>				
Value-added services (excluding telephone and telex)	N/N	N/N	OP/N	NBex/NB
Electronic mail services	N/N	N/N	OP/N	NBex/NB
Telephone answering services	N/N	N/N	OP/N	NBex/NB
Direct permanent information search services and database servers	N/N	N/N	OP/N	NBex/NB
Electronic data exchange services	N/N	N/N	OP/N	NBex/NB
Improved value added fax services, including registration, retransmission and registration and search	N/N	N/N	OP/N	NBex/NB
Point-to-point telephone services	OP/N	N/N	OP/NBex	NB/NBex
Telex services	OP/N	N/N	OP/NBex	NB/NBex
Integrated service data network (ISDN)	OP/N	N/N	OP/NBex	NB/NBex
Packet-switched data transmission services (TDCP)	OP/N	N/N	OP/NB	NBex/NBe x
Frame relaying services	OP/N	N/N	OP/NB	NBex/NBe x
Mobile telephone services	OP/N	N/N	OP/N	NBex/NBe x
Paging services	OP/N	N/N	OP/N	NBex/NBe x
PCS systems	OP/N	N/N	OP/N	NBex/NBe x
Mobile data transmission services	OP/N	N/N	OP/N	NBex/NBe x
Private leased circuit services	OP/N	OP/N	N/NB	NBex/NBe x

Source: WTO (2003): "Trade Policy Review, Kingdom of Morocco", Report by the Secretariat.

- N None: Morocco has agreed not to impose any restrictions on this item.
Nex None, except for contrary provisions under horizontal commitments made by Morocco.
NB Not bound: Morocco has not undertaken any commitment on this item.
NBex Not bound, except for contrary provisions under horizontal commitments made by Morocco.
OP Other provisions apply.

Table 2
Telephone Penetration (fixed and Mobile) in Morocco over the period 1997-2005

	1997	1998	1999	2000	2001	2002	2003	2004	Sept 2005
Number of subscribers (1000)	1368	1504	1835	4323	5915	7324	8551	10645	13322
Fixed telephony (000)	1300	1393	1471	1472	1140	1127	1219	1308	1345
GSM (000)	68	111	364	2851	4775	6197	7332	9337	11977
Number of lines (per 100 inhabitants)	5,10	5,40	6,50	15,45	19,62	24,77	28,59	35,61	45,1
Fixed	4,80	5,00	5,20	5,05	3,92	3,86	4,11	4,38	4,5
Mobile	0,30	0,40	1,30	10,40	15,70	20,91	24,48	31,23	40,06

Table 3

Responsibilities of ANRT regarding interconnection

Approval of fixed-to-fixed interconnection tariffs	Approval of fixed-to-mobile interconnection tariffs	Disputes settlement	Remarks
Set by ANRT in advance	<ul style="list-style-type: none"> – Negotiated – Referred to ANRT in case of disagreement 	ANRT has sole responsibility in the settlement of disputes. This function is performed by the management committee	Only ANRT has the power to set interconnection charges and serve as an arbitrator

Source: Effective regulation, Case Study: Morocco (2001)

Appendix 1

Key information on telecommunication sector in Morocco

Item	Situation in Morocco
Ownership of the incumbent	<i>Maroc Telecom</i> The government of Morocco (34%), Vivendi Universal (51%), Shareholders through the stock market (14,5%), Employees (0,5%)
Ownership of other telecom operators	<i>Médi Telecom</i> (awarded the second GSM license in 1999 and won the second fixed phone license in July 2005) Portugal Telecom (30,5%), Telefonica (from Spain) (30,5%), BMCE Bank (20%), Group Afriquia (11%) and CDG (8%)
Degree of ownership allowed	No limit on foreign ownership. Under GATS, Morocco reserved the right to limit the proportion of foreign ownership but the level has not yet been specified.
Degree of market liberalization	Opening up of telecommunication services to competition: mobile telephony since 1999 and other licenses may awarded through public tender, GMPCS open to competition in 1999, VSAT in 2000. Full liberalization of value-added services (radio messaging, internet access and service providers (ISPs). Access to market is also open for packet-switched data transmission and frame relay. Fixed telephony (local, long distance and international) has been a monopoly of Maroc Telecom until recently (July 2005).
Leased line and resale	More than 6200 leased lines in 2003
Callback	Callback services are allowed

Appendix 2
Methodology for constructing restrictiveness indexes in telecommunication sector

Policy Index	Content
Market access/Trade <i>(MA/trade)</i>	Captures policies that discriminate against all potential entrants (domestic and foreign) seeking to supply cross-border telecom services. It is based on data on leased lines and resale.
MA/Investment (fixed) <i>MA/INV (fixed)</i>	Captures policies that discriminate against all potential entrants (domestic and foreign) seeking to supply fixed network services via investment in the country at issue. The index is a weighted average of three questions: <ul style="list-style-type: none"> – Does competition operate in the market for fixed services? (the number of competitors) – Does policy allow for competition in the market for fixed services? (local, long distance domestic, international, data and leased lines). Full competition (0), Partial competition (0,5), monopoly situation (1). – Is the incumbent privatized? The inverse of the fraction of the incumbent that is privatized (0.0-1.0).
MA/Investment (mobile) <i>MA/INV (mobile)</i>	Captures policies that discriminate against all potential entrants (domestic and foreign) seeking to supply cellular mobile services via investment in the country at issue. The index is constructed in much the same way as MA/INV (fixed).
National Treatment/Trade <i>NT/Trade</i>	Captures policies that discriminate against potential foreign entrants seeking to supply cross-border telecommunications services. It is constructed from the ITU data on individual country policy relating to callback services.
National Treatment /Investment <i>NT/INV</i>	Captures policies that discriminate against potential foreign entrants seeking to supply fixed or mobile telecommunications services via investment in the country at issue. It is constructed on the basis of ITU data on individual country policies. The index is based on the percentage of foreign investment allowed in competitive carriers.

Source: Warren (2000)

Table 3
Restrictiveness Index score for Telecommunications Services

Country	Restrictions on ongoing operations			Restrictions on establishment			Restrictions on ongoing operations	Foreign index total
	Restrictions on cross-border trade	Restrictions on ongoing operations total	Domestic index total	Restrictions on direct investment in fixed and mobile network services	Restrictions on establishment total	Restrictions on cross-border trade	Restrictions on ongoing operations total	
<i>MA/INV</i>	MA/Trade			NT/FDI		NT/Trade		
<i>0,3333</i>	0,1667	<i>0,1667</i>	<i>0,5000</i>	0,5333	<i>0,5333</i>	0,3667	<i>0,3667</i>	<i>0,9000</i>
<i>0,2333</i>	0,2000	<i>0,2000</i>	<i>0,4333</i>	0,2333	<i>0,2333</i>	0,4000	<i>0,4000</i>	<i>0,6333</i>
<i>0,0000</i>	0,0000	<i>0,0000</i>	<i>0,0000</i>	0,0000	<i>0,0000</i>	0,0000	<i>0,0000</i>	<i>0,0000</i>
<i>0,0500</i>	0,0000	<i>0,0000</i>	<i>0,0500</i>	0,2100	<i>0,2100</i>	0,0000	<i>0,0000</i>	<i>0,2100</i>
<i>0,0493</i>	0,0000	<i>0,0000</i>	<i>0,0493</i>	0,0493	<i>0,0493</i>	0,0000	<i>0,0000</i>	<i>0,0493</i>
<i>0,1867</i>	0,2000	<i>0,2000</i>	<i>0,3867</i>	0,2887	<i>0,2887</i>	0,4000	<i>0,4000</i>	<i>0,6887</i>
<i>0,1567</i>	0,1333	<i>0,1333</i>	<i>0,2900</i>	0,1967	<i>0,1967</i>	0,3333	<i>0,3333</i>	<i>0,5300</i>
<i>0,0436</i>	0,0000	<i>0,0000</i>	<i>0,0436</i>	0,0436	<i>0,0436</i>	0,0000	<i>0,0000</i>	<i>0,0436</i>
<i>0,3333</i>	0,2000	<i>0,2000</i>	<i>0,5333</i>	0,5333	<i>0,5333</i>	0,4000	<i>0,4000</i>	<i>0,9333</i>
<i>0,2667</i>	0,2000	<i>0,2000</i>	<i>0,4667</i>	0,3987	<i>0,3987</i>	0,4000	<i>0,4000</i>	<i>0,7987</i>

0 to 1. The higher the score, the greater are the restrictions for an economy.