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Assessing the Benefits of Telecommunications Liberalization to Tunisia

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Abstract

In this paper we provide a quantitative analysis of the welfare impact of improved domestic market access for foreign telecom providers in Tunisia. In this context, we set up a CGE model for Tunisia in which the domestic telecommunications industry is initially monopolized. In that case, one of the major potential benefits of providing a license to a foreign telecom provider is that it can erode domestic market power. Potentially offsetting these benefits, however, limited entry by foreign firms into the domestic telecom market may shift profits abroad and may induce an international cartel formation if the regulation of the domestic telecom sector is weak. We find that limited foreign market access in Tunisia is welfare improving if regulation can prevent the domestic incumbent and the foreign service provider to form a cartel. If they form a cartel, however, foreign market access is welfare reducing. Our results emphasize the importance of market structure and the regulatory environment on the success of telecom liberalization. It strengthens the argument that pro-competitive regulatory reforms need to accompany telecommunications liberalization in developing countries such as Tunisia.

JEL classification: F12, F13, F23

Keywords: service trade liberalization, imperfect competition, market structure, pro-competitive regulatory reforms

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1 Introduction

In this paper we provide a quantitative analysis of the welfare impact of improved domestic market access for foreign telecom providers in Tunisia. In this context, we set up a CGE model for Tunisia in which the domestic telecommunications industry is initially monopolized. In that case, one of the major potential benefits of providing a license to a foreign telecom provider is that it can erode domestic market power. Potentially offsetting these benefits, however, limited entry by foreign firms into the domestic telecom market may shift profits abroad and may induce an international cartel formation if the regulation of the domestic telecom sector is weak. The paper is organized as follows. Section 2 investigates the importance of regulation on the efficiency of the telecom market. Section 3 provides an overview of Tunisia's telecommunications sector. Section 4 explains the setup of the CGE model and the specific nature of the telecommunications sector in the model. Section 5 summarizes the benchmark data. Section 6 provides the results and section 7 concludes.

2 Telecom Liberalization, Regulation and Growth

Telecommunications is generally recognized as one of the crucial infrastructural backbones of any modern-day economy. Since it is a vital intermediate input for most final goods, an improvement in telecom services can have a significant impact on efficiency and growth across a wide range of user industries (Deardorff, 2001). It also impacts trade by affecting the capacity of firms to compete in foreign and domestic markets. Good quality and low cost of leased lines and backbone networks finally facilitates internet penetration and the spread of IT applications in businesses that spur productive efficiency. Several empirical studies have measured the importance of telecommunications sector performance on economic growth. Roller and Waverman (2001), for example, find a strong positive relation between a country's fixed-line penetration rate and its economic performance. Madden and Savage (1998) identify that investment in telecommunications infrastructure is a good predictor of growth in transition economies.

Reflecting this increased awareness of the importance of the telecom sector, scholars and policymakers in developed and developing countries alike have started to cast aside the view that the telecommunications sector is a natural monopoly and have started to consider telecom liberalization. This has led 69 countries (among which Tunisia) to sign onto the 1997 WTO agreement on

Basic Telecommunications Services. The agreement, which is an annex to the Fourth Protocol of the General Agreement on Trade and Services (GATS), commits participating countries to open their telecommunications services markets.

Empirical studies have revealed that successfully introducing effective competition in telecommunications usually requires more than simply eliminating barriers to entry in the various segments of the market. Proper regulation that allows foreign market access and curbs market power also plays an important part in procuring effective competition to achieve ultimate liberalization. In most developing countries, impediments limiting commercial presence continue to be the more common barrier to international transactions in telecommunication services (Warren, 1995). The involvement of foreign capital in the construction and operation of telecommunications infrastructure is often limited by legislation, administrative decree or terms of concession. Limitations range from total exclusion from the entire market to equity caps in 'sensitive' market segments such as basic telephony. Foreign providers can also encounter impediments to trade in the form of anti-competitive behavior by the incumbent carrier, in those countries where the incumbent is unconstrained by effective competition policies or regulatory pressures (Hoekman, Low and Mavroidis, 1996). Wallsten (2001) indeed finds that establishing a regulatory authority before privatization is significantly and positively correlated with the performance of the telecommunications sector. Consistent with that result, Fink, Mattoo and Rathindran (2001) find that introducing competition after privatizing incumbent operators leads to fewer mainlines per population compared to a simultaneous introduction of the two policies.

A major achievement of the negotiation was the creation of the "Reference Paper" on pro-competitive regulatory principles in the telecommunications sector that was accepted by 61 of the 69 countries making binding offers on market access (Tunisia was not one of them). The reference paper represents the regulatory component of the basic telecommunications agreement. It provides a set of common guidelines for a regulatory framework that countries should follow to support the transition of the telecommunications sector to a competitive marketplace and to guarantee effective market access and foreign investment commitments. The reference paper deals with six regulatory principles including competitive safeguards, interconnection, universal service, licensing, allocation and use of scarce resource and creation of independent regulator (A summary of these six principles can be found in appendix A). Once the reference paper is adopted, the principles of the reference

paper become binding commitments and enforceable through dispute settlement under WTO.

This study uses a CGE model for Tunisia to provide a quantitative analysis of the importance of regulation and market structure for telecom liberalization. As such our paper is markedly different from other studies. We not only focus on the welfare impact of complete liberalization, but also investigate the impact of partial liberalization and regulation. This stems from the observation that many WTO members' commitments to liberalizing telecom trade have only been partial. And in the cases where commitments have been made, the telecom sector has at best moved from a monopoly to a duopoly market structure. By quantifying the effects of partial liberalization in telecommunications, this study is aimed at illuminating for WTO members the potential gains and losses that might be achieved through partial liberalization.

3 Overview of Tunisia's Telecom Industry

The Tunisian telecommunications market has long been characterized by the monopoly of Tunisia Telecom and the extensive role of the State as policy-maker, regulator and operator in the sector. Tunisie Telecom, also known as The Office National des Telecommunications, is a 100% state owned company created in 1995 and it is the national monopoly on the fixed telephony services. Tunisie Telecom has a monopoly on the mobile telephony through its subsidiary Tunicell which was created in 1998.

[Table 1: Summary statistics of Tunisia's telecom sector]

Like most developing countries, the Tunisian government initially was reluctant to open the telecommunication sector to private and foreign investment. Since the mid-1990s, however, the government has followed other developing countries by initiating a program of regulatory reform and by introducing limited competition. In 1997, it was a signee of the World Trade Organization Agreement of Basic Telecommunications Services in 1997 (it did not sign on to the reference paper). This agreement combined binding commitments on market access from its participants along with a statement of "pro-competitive" regulatory principles. In accordance to the WTO Negotiations on Basic Telecommunications, Tunisia committed to permitting telex and data transmission competition from 1999, mobile telephone and paging, frame relay, and teleconferencing from 2000, and

local telephone competition in 2003. For all services, however, foreign ownership is capped at 49%, and foreign ownership of the state PTO is only permitted to 10% beginning in 2002.

In compliance with the agreement, Tunisia enacted a new Communications Code in January 2001 (Law n. 2001-1), which abolished the monopoly of the State in the sector, stated basic regulatory principles, and created two regulatory agencies - the INT (Instance Nationale des Telecommunications), in charge of the regulation of the telecommunications sector and the ANF (Agence Nationale des Frequences), in charge of spectrum management. Nevertheless, the 2001 Telecommunications Act leaves significant lawful capacities to the Ministry of Communications Technologies (MCT) with regard to licence awarding, dispute settlements and application of sanctions.

In terms of introduction of effective competition, Tunisia has awarded a second GSM license to an international consortium, led by Orascom Telecom (Orascom Tunisie Telecom, OTT). OTT paid US$454 million for the license, awarded on March 20, 2002. Orascom Telecom subsequently entered into a joint venture agreement with the Kuwaiti operator Watanya Telecom to jointly develop and operate OTT. OTT launched its services in December 2002 under the brand name of Tunisiana. The entry of a second GSM operator on the market is expected to increase mobile penetration dramatically. For example, the consulting firm Arab Advisors projected the GSM market to increase almost nine fold by 2006, reaching a penetration rate of 43 percent, or 4.4 million subscribers. The Tunisian government has also launched a license award process to install and operate a very small aperture terminal (VSAT) telecommunications network in Tunisia. This network will help meet the increasing demand for data services and provide additional telecommunications infrastructure.

While managing the award of the second GSM license and of a VSAT license, Tunisia has also put forward changes in its regulatory regime (implementing decrees in key areas, such as interconnection), and has started discussions to privatize 10 percent of the incumbent operator, Tunisie Telecom. The implementation of a program to introduce effective competition seems to be the main bottleneck to sector development in the current telecommunications market.

[Table 2: Summary statistics of Tunisia's telecom market structure]

The initial reforms have led to good progress in telecommunications development since 1997. Waiting time for a fixed telephone connection has declined from several months in 1997 to 15 days in 1999 in urban areas. The disruption rate has been reduced from 0.7 to 0.4 during the same

period. Digitization of the telephone network has increased from 10% in 1987 to 100% in 1999. And following international trends in tariffs, the Tunisian authorities have implemented a series of telephone tariff reductions since 1997.

Notwithstanding the recent liberalization efforts, the liberalization of Tunisia's telecommunications sector lags behind most other developing countries. Tunisia remains the least advanced in terms of market liberalization in the MENA region, despite the fact that it has a higher GDP per capita (see table 1). This is particularly troublesome since telecommunications liberalization in the MENA region as a whole has been slower and less pronounced than other regions in the world (Rossotto et al., 2003). Its telecommunications network remains underdeveloped. The government-controlled Tunisie Telecom is currently the sole fixed line operator and one of two mobile service operator. In 2002, penetration ratio was 11% for fixed lines and 10.34% for mobile phones (mobile penetration was only 0.69% in 2000).

4 The Model

We employ what is, in most respects, a standard CGE model of a small open economy. Our contribution lies in the way how we incorporate the telecommunications sector in the CGE framework. In the baseline and counterfactuals, the telecom sector takes on various imperfectly competitive market structures. In addition, we introduce telecommunications as an intermediate producer service that can affect value added productivity in other industries (Markusen, Rutherford and Tarr, 2002).

In our model, the telecommunications sector is assumed to be an imperfectly competitive industry. In the baseline scenario, it consists of a domestic monopoly. In the counterfactual scenarios, the telecommunications sector is liberalized and one or more foreign and/or domestic firms are allowed to enter the market. Since domestic and foreign firms provide differentiated products, we choose total telecom output Z to be a CES function of composite telecom services provided by domestic providers Z_D and multinational telecom providers Z_M, each of which is in turn a CES function of the individual z_d and z_m varieties.

$$Z = (Z_D^{\epsilon} + Z_M^{\epsilon})^{\frac{1}{\epsilon}} \tag{1}$$

$$Z_D = \left[\sum_i^{n_d} z_{di}^{\zeta} \right]^{\frac{1}{\zeta}} \tag{2}$$

$$Z_M = \left[\sum_i^{n_m} z_{mi}^{\eta} \right]^{\frac{1}{\eta}} \tag{3}$$

The elasticity of substitution between product groups is $\sigma = \frac{1}{1-\epsilon}$, while the elasticity of substitution within product groups is $\sigma_d = \frac{1}{1-\zeta}$ and $\sigma_m = \frac{1}{1-\eta}$. We require that σ, σ_m and σ_d all exceed unity. n_d and n_m are the number of domestic and foreign telecom providers, respectively.

In our model, telecommunications liberalization involves presenting the domestic monopoly with one or more competing foreign firms that then can form various market structures. In particular, we assume that in the counterfactual scenarios, three separate market structures can occur. Under international cournot duopoly, the telecom regulator provides a foreign firm with a license and the incumbent and the foreign firm strategically compete in quantities. Under international cartel, the telecom regulator provides a foreign firm with a license and the incumbent and the foreign firm collude. Under monopolistic competition, domestic and foreign firms can freely enter the market. The major difference between the various market structures is the Lerner markup conditions that telecom providers use. It is not trivial to derive these Lerner markup conditions in a general equilibrium setting. Hoffman (2003) illustrates that deriving the optimal Lerner markup condition in CGE is problematic since each firm faces more than one buyer and the buyers often have different elasticities of demand. This problem is often avoided by focusing on large group monopolistic competition where the scale of individual firms and the elasticity of demand are identical and fixed. Hoffmann (2003) shows that the general equilibrium Lerner markup condition is a weighted average of the elasticities of demand for the different buyers:

$$p_i \left[1 - \frac{1}{\phi_u \theta_u + \sum_j \phi_{yj} \theta_{yj}} \right] = c_i \tag{4}$$

where ϕ_j is the elasticity of demand for buyer j and θ_{yj} is the share of the total quantity sold to buyer j. The elasticity of demand for the N producers good is, therefore, a weighted average of the elasticities of demand for the different buyers. In the appendix, we derive the general equilibrium Lerner markup conditions for the four market structures. They all can be summarized in one

generalized Lerner markup condition:

$$\frac{p_{zj} - c_j(w,r)}{p_{zj}} = \frac{1}{\sigma}\left[\frac{\theta_u}{1+(\sigma-1)s_i} + \sum_i \frac{\theta_{yi}\rho}{(1-s_j)\rho + \sigma(s_{vai})s_j}\right]^{-1} \tag{5}$$

where p_{zj} is the price of telecom services from provider j, c_j is the marginal cost of provider j, s_j is the market share of telecom provider j in the telecom market. s_{VA_i} is the share of value added in combined value added and producer services. σ is the elasticity of substitution between domestic telecom services and foreign telecom services. ρ is the elasticity of substitution between value added and producer serivces. As is explained in the appendix, the generalized Lerner markup condition is the Lerner markup condition for each firm under international cournot duopoly. If $s_d = 1$, it reduces to the Lerner markup condition for a domestic monopoly. If both the domestic and the foreign firm treat $s_j = 1$, then we are in the international cartel market structure. Finally, under monopolistic competition, the markup reduces to $\frac{1}{\sigma_j}$ for each firm.

An important question that can have significant impact on the welfare of a country is what happens to the rents generated by the domestic and foreign firms. We assume that the rents generated by domestic firms in all scenarios accrue to the domestic representative agent. Rents generated by foreign firms will be shifted to the representative agent in some scenarios and will be transferred abroad in others.

It is important to note that liberalization does not, in our model, generate endogenous changes in FDI flows. Rather, the scenarios involve changes in ownership and market structure in ways that improve efficiency and alters the distribution of rents. This assumption reflects the fact that in several service sectors there is no foreign participation (that is, FDI) in the benchmark equilibrium. In that context it is impossible to determine what the impact of liberalization would be on "marginal" FDI flows, which would not be meaningful. It also permits us to retain a fixed aggregate capital stock in the model, rather than engaging in dynamic simulations of endogenous investment and capital allocation. In this context, the estimates of welfare changes from liberalization of establishment rules are likely to be understated relative to full long-run gains.[1]

Telecom services Z are demanded by two different types of buyers in the CGE model. On the

[1]Kehoe (2002) discusses the importance of incorporating changes in trade and investment flows in sectors where they have been absent in the computation of new equilibrium outcomes. This observation stems from the chronic tendency of CGE models of NAFTA to underpredict the ultimate impacts of that trade agreement on Mexico's international trade and investment.

one hand, consumers treat it as a final consumer good. On the other hand, telecom services form a part of a select group of intermediate producer services that can have a significant impact on the productivity of other industries (Jensen, Rutherford and Tarr, 2003).[2] We introduce this idea by formulating producer services PS as a composite of all the individual producer services including telecom. Composite producer services are further modelled as imperfect substitutes to value added.

$$PS_i = min\left[\frac{x_{1i}}{b_{1i}}, ..., \frac{x_{m-1,i}}{b_{m-1,i}}, \frac{x_{zi}}{b_{zi}}\right] \tag{6}$$

$$V_i = \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + PS_i^{\gamma}\right]^{\frac{1}{\gamma}} \tag{7}$$

The elasticity of substitution between value added and producer services is $\rho = \frac{1}{1-\gamma}$.

We assume that production of all sectors except for telecom is characterized by constant returns to scale and perfect competition, implying that prices equal marginal costs of output in these sectors. In all sectors, production functions are approximated with Leontief technologies using composite intermediate inputs x_{ji} for all sectors except for producer services $j = 1, ..., n$, and the CES combination of real value added and composite producer services V_i mentioned above.

$$Y_i = min\left[\frac{x_{1i}}{a_{1i}}, ..., \frac{x_{ni}}{a_{ni}}, \frac{V_i}{a_{VAi}}\right] \tag{8}$$

Intermediate inputs and final goods are differentiated by country of origin according to the Armington assumption, so that export and import prices differ across regions. The three trading regions are the European Union (EU), the Arab League countries, and the rest of the world (ROW). In each sector, demand for domestically produced and imported goods is represented by a CES function, and intermediate imports are also differentiated across regional sources of supply in a CES structure. Similarly, Tunisian industries supply regionally differentiated goods to both domestic and foreign markets (exports). Production follows a nested two-stage constant elasticity of transformation (CET) function. Total output is first calculated as the sum of domestic supply and total exports, with the latter then being allocated across the same destination regions according to

[2] In our model, producer services are: Telecommunication services, commercial services, construction services, transportation services, financial services, insurance, business services, property rent and leasing, repair services and education and health services.

a sub-CET function. Capital and labor are assumed to be freely mobile across sectors, implying that our simulations pertain to long-run outcomes of liberalization.

A representative consumer maximizes a nested CES utility function with a corresponding multi-staged budget constraint. In the first stage, the consumer decides how much to spend on goods from each sector, given the budget constraint. Income elasticities across sectors are set at unity as given by a Cobb-Douglas (CD) utility nest. In the second nest, the consumer determines domestic and aggregate import expenditures in each sector according to a CES function. Then given a budget for imports, the consumer selects purchases of imports from each region. These latter functions also characterize the split between government consumption and investment spending on domestic and imported goods and services. The representative consumer receives income from primary factors (labor and capital), net transfers from the government, the current-account deficit, and any net economic rents from the operation of restrictions on services trade.

Two standard closure rules are imposed: the savings-investment balance and a fixed current account balance. The savings-investment balance is based on the assumption that the capital stock is exogenously fixed at the benchmark level. This stock is financed through forced consumer savings that acts as a direct (lump-sum) tax. The interest rate (an index price of the composite capital stock) is endogenous and determined by factor demand conditions. The current-account is defined as the sum of the merchandise trade balance, the services balance, net foreign worker remittances, and (negative) net payments on foreign capital. We assume that foreign reserves will be held constant so that the current account will be just offset by (the negative of) the capital account. The current-account balance itself is held constant in real terms throughout the simulations. Income from foreign remittances less foreign capital payments enters as an exogenous addition to the representative agent's income. To hold the current account balance fixed while international prices are constant requires a balancing item. This is accomplished by means of a change in the home "real exchange rate," which refers implicitly to a change in the home price index (generated by changes in price of home-produced goods) sufficient to sustain a constant current-account balance as import and export volumes change.

The government budget deficit is a deduction in available income for the representative agent, constituting a transfer to government consumption. The deficit is held fixed during our simulations. Thus, if a policy reform causes prices to fall, thereby reducing the tax revenues required to finance

government expenditures, this tax saving is transferred to the representative agent. At the same time, if trade liberalization results in lost tariff revenues, the revenues are recouped by means of allowing household lump-sum tax rates to vary endogenously.

5 Benchmark Data

The data for the model consist of a Social Accounting Matrix (SAM) and other parameters, such as import and export trade flows by region, sectoral tax and tariff rates, and elasticities of substitution and transformation. Because there is little empirical evidence on relevant elasticities for the Tunisian market, we make standard assumptions about their values. In particular, labor-capital substitution is set at unity in a Cobb Douglas value added production function. Benchmark trade elasticities are drawn from Rutherford, Rutstrom and Tarr (1995) and Konan and Maskus (2000). The various trade elasticities are 2.0 for substitution between domestic and imported goods, 5.0 for substitution among regional imports and for transformation between domestic output and exports, and 8.0 for transformation among regional export destinations. These data are assembled into a consistent set of relationships between intermediate demand, final demand, and value-added transactions using the 1995 input-output table for Tunisia on a diskette provided by the Institut National De La Statistique (INS) along with the 1998 INS *Les Comptes de la Nation* report.

[Table 3: Sectoral output and factor shares]

In terms of the Lerner markup in the telecommunications sector, we would ideally like to estimate the impact that telecom barriers have on price markups for Tunisia. Warren and Findlay (2000) suggest computing the pro-competitive impacts using price-cost margins (or "net interest margins"). Unfortunately, these estimates are not available for Tunisia. By relying on industry studies in Tunisia and extensive discussions with Tunisian industry experts, country economists and government officials and on Zarrouk (2000), we have been able to estimate a price wedge of 30% between telecom prices in Tunisia and world's best practice prices. A problem with this estimate is that the wedge not only includes the monopoly power markup but also a proportionate waste factor (Maskus and Konan, 2002). Throughout the baseline counterfactual scenarios, it is assumed that barriers to FDI generate wedges consisting of half rents and half waste. In other words, the monopoly markup equals 15%. We subject this share to sensitivity analysis.

6 Results

The telecommunications sector is assumed to be monopolized in the benchmark and can take on three distinct market structures in the counterfactual scenarios. Under international duopoly, one foreign firm is allowed to access the market and that firm strategically competes in quantities with the domestic incumbent. We distinguish between two types of international cournot duopoly competition. Under DUO, the foreign firm transfer its profits to the representative agent. Under DUOR, the foreign firm transfers all of its profits abroad. Under international cartel (CAR), the foreign firm colludes with the domestic incumbent and we assume that it shifts all its profits abroad. Under monopolistic competition (MC), there is free entry and all firms compete. Since in this case, profits for each firm are zero, there is no profit shifting by foreign firms.

Table 4 clearly demonstrates that allowing a foreign telecom provider market access does not necessarily lead to welfare improvements. Only if the regulator can induce competition between the domestic incumbent and the foreign telecom provider will telecom liberalization induce welfare gains. This illustrates that the realization of gains from trade liberalization in the telecom industry is tied closely to issues of market regulation and market structure.

Sensitivity analysis demonstrates the importance of the decomposition of the price wedge into resource-using versus rent-generating barriers. We can see this from table 4. In table 4a, there are no resource-using barriers and the entire price wedge is rent-generating. In table 4b, half of the price wedge is resource-using and half is rent-generating. As is illustrated in table 4, the welfare impact of telecom liberalization is greater (but not necessarily positive) when the entire price wedge is rent-generating barriers. Under the competitive cases DUO and DUOR, the welfare gain is larger when the wedge is entirely rent-generating. Under the cartel case CAR, however, the welfare loss is greater when the price wedge is entirely due to rent-generating barriers.

7 Conclusion

We show that the realization of gains from trade liberalization is tied closely to issues of market regulation and market structure. In particular, we show that the allowance of one foreign firm to enter the market might lead to a welfare deterioration if the foreign firm enters a cartel and shifts profits abroad. Nonetheless, if regulation prevents cartel formation and induces competition,

allowing a foreign firm will be welfare improving for Tunisia. Our paper reiterates that in basic telecommunications pro-competitive regulation is needed to deliver effective competition and gains from services liberalization.

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A Appendix: The WTO Reference Paper (Cowhey and Klimenko, 1999)

The following is a summary of the major features of the WTO Reference Paper.

1. It creates obligations for governments concerning their regulation of "major suppliers" of telecommunications services. A major supplier controls "essential facilities" for the public network that "cannot feasibly be economically or technically substituted in order to provide a service." Thus, the paper focuses on regulatory treatment of the dominant incumbent carrier.

2. Governments must take measures to assure that major suppliers do not engage in anti-competitive practices, such as anti-competitive cross-subsidies, use of information obtained from competitors, or withholding timely technical information needed by competitors.

3. Governments will assure interconnection with a major supplier for competitors at any technically feasible point in the networks. The terms, conditions, and quality must be non-discriminatory (no less favorable to the competitor than the operating company of the major supplier). Interconnection must be timely and done at "cost-oriented rates that are transparent, reasonable, having regard to economic feasibility, and sufficiently unbundled so that the supplier need not pay for network components or facilities that it does not require for the service to be provided." The terms for interconnection must be publicly available and enforceable on a timely basis.

4. Governments may maintain policy measures designed to achieve universal service. However, they must be administered in ways that are transparent, nondiscriminatory and competitively neutral. They should not be more burdensome than necessary to achieve the specific goal for universal service.

5. The regulatory body is separate from the operators and must employ procedures that assure impartiality in regard to all market participants.

6. Governments will use procedures for the allocation and use of scare resources, including frequencies, that are timely, objective, transparent and nondiscriminatory.

B Deriving the Lerner Markup Conditions

The Lerner markup condition for telecom services depends on the market structure and the overall elasticity of demand for each service provider. As illustrated above, the overall elasticity of demand in a CGE model is a weighted average of the elasticities of demand for the different buyers of the service. Telecom services are used as intermediate goods by all sectors and is also consumed as a final good, and so we need to derive the demand elasticity for all these users. In this appendix we derive the Lerner markup condition for each firm under each market structure. We first derive the elasticity of demand for intermediate good users under each market structure. Then we derive the elasticity of demand for final demand. Finally, we combine the individual demand elasticities to derive the Lerner markup condition for each service provider under each market structure.

B.1 Demand elasticity for intermediate inputs

To determine the Lerner markup rule under each market structure, we need to first derive the price for telecom service in each market structure. Let p_{yi} denote the domestic price of Y_i and p_{zj} denote the price received by telecom provider j. Since final Y_i production is assumed perfectly competitive in our model, p_{zj} is the value of the marginal product of z_j in producing Y_i. The price of an individual foreign service p_{zj} can thus be derived from the chain rule:

$$p_{zj} = p_{yi}\frac{\partial Y_i}{\partial z_j} = p_{yi}\frac{\partial Y_i}{\partial Z_i}\frac{\partial Z_i}{\partial Z_{ij}}\frac{\partial Z_{ij}}{\partial z_{ij}} \tag{A-1}$$

Since Y_i and PS_i are Leontief, the cost share of V_i in the production of Y_i is a_{VAi} and the cost share of Z in the production of PS_i is b_{zi}. As a result,

$$V_i = a_{VAi}Y_i \tag{A-2}$$

$$Z_i = b_{zi}PS_i \tag{A-3}$$

Therefore,

(A-4) $$Y_i = \frac{\left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}}\right)^{\gamma}\right]^{\frac{1}{\gamma}}}{a_{VAi}}$$

From (A-4), we can derive $\frac{\partial Y_i}{\partial Z_i}$:

(A-5) $$\frac{\partial Y_i}{\partial Z_i} = \frac{1}{a_{VA_i} b_{zi}} \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}}\right)^{\gamma}\right]^{\frac{1-\gamma}{\gamma}} \left(\frac{Z_i}{b_{zi}}\right)^{\gamma-1}$$

B.1.1 Domestic Monopoly

Under a domestic monopoly, the government solely gives a license to a domestic telecom provider. As a result, equation (1) simplifies to:

(A-6) $$Z_i = Z_{id} = z_{id}$$

As a result:

(A-7) $$\frac{\partial Z_i}{\partial Z_{id}} = \frac{\partial Z_{id}}{\partial z_{id}} = 1$$

The price for telecom provider thus is:

(A-8) $$p_{zd} = \frac{p_{yi}}{a_{VA_i} b_{zi}} \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}}\right)^{\gamma}\right]^{\frac{1-\gamma}{\gamma}} \left(\frac{Z_i}{b_{zi}}\right)^{\gamma-1}$$

The perceived elasticity of demand from each firm that uses telecom as an input is:

(A-9) $$\frac{1}{\phi_i} = \frac{-\partial p_{zj}}{\partial z_{ij}} \frac{z_{ij}}{p_{zj}} = \frac{s_{VAi}}{\rho}$$

where $s_{va_i} = \frac{VA_i^{\gamma}}{VA_i^{\gamma} + BS_i{}^{\gamma}}$

For modelling purposes, it is important to derive the market share of value added s_{VA_i}. For this, we rely on the cost minimization problem for V:

(A-10) $$\Lambda = p_{va} VA + p_{bs} PS + \lambda\left(V - (VA^{\gamma} + PS^{\gamma})^{\frac{1}{\gamma}}\right)$$

If we solve for this:

(A-11) $$s_{VA} = \frac{p_{va}^{1-\rho}}{p_{va}^{1-\rho} + p_{ps}^{1-\rho}}$$

B.1.2 International Cournot Duopoly

Under international cournot duopoly, the regulator gives a license to one domestic and one foreign providers and the two providers compete strategically in quantities. This implies that equation (1) simplifies to:

(A-12) $$Z = (z_{id}^{\epsilon} + z_{im}^{\epsilon})^{\frac{1}{\epsilon}}$$

As a result,

(A-13) $$\frac{\partial Z_i}{\partial Z_{ij}} = (z_{id}^{\epsilon} + z_{im}^{\epsilon})^{\frac{1-\epsilon}{\epsilon}} z_{ij}^{\epsilon-1}$$

(A-14) $$\frac{\partial Z_{ij}}{\partial z_{ij}} = 1$$

(A-15) $$p_{zj} = \frac{p_{yi}}{a_{VA_i} b_{zi}} \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}} \right)^{\gamma} \right]^{\frac{1-\gamma}{\gamma}} \left(\frac{Z_i}{b_{zi}} \right)^{\gamma-1} (z_{id}^{\epsilon} + z_{im}^{\epsilon})^{\frac{1-\epsilon}{\epsilon}} z_{ij}^{\epsilon-1}$$

Under Cournot competition, each firm assumes that a change in its output will leave the other firm's output unchanged. As a result, each firm j's perceived inverse price elasticity for each intermediate use i is:

(A-16) $$\frac{1}{\phi_{yi}} = \frac{1}{\sigma}(1 - s_j) + \frac{1}{\rho} s_{vai} s_j$$

where market share for firm j equals $s_j = \frac{z_j^{\epsilon}}{z_d^{\epsilon} + z_m^{\epsilon}}$.

For modelling purposes, it is important to derive the market share of the domestic firm s_d. For this, we rely on the cost minimization problem for Z:

(A-17) $$\Lambda = p_{zd} z_d + p_{zm} z_m + \lambda \left(Z - (z_d^{\epsilon} + z_m^{\epsilon})^{\frac{1}{\epsilon}} \right)$$

The first order conditions lead to the following demand functions for the inputs z_d and z_f:

(A-18) $$z_j = Z p_j^{-\sigma} \left(\sum_i p_i^{1-\sigma} \right)^{\frac{-\sigma}{\sigma-1}}$$

We can now plug the input demand functions in the cost minimization problem and set $Z = 1$ to derive P_z:

(A-19) $$P_z = \frac{I_Z}{Z} = \frac{1}{\left(\sum_i p_i^{1-\sigma} \right)^{\frac{1}{\sigma-1}}}$$

This implies that the input demand functions are:

(A-20) $$z_j = \frac{I_Z p_j^{-\sigma}}{\sum_i p_i^{1-\sigma}}$$

This implies that:

(A-21) $$s_j = \frac{p_{zj}^{1-\sigma}}{p_{zd}^{1-\sigma} + p_{zm}^{1-\sigma}}$$

B.1.3 International Cartel

Under an international cartel, the regulator provides a license to a domestic and a foreign telecom provider, but both providers collude. To determine the Lerner markup conditions when the domestic and the foreign telecommunications providers form a cartel, we assume that both firms set the same price $p_{zd} = p_{zm}$. Since there is a constant elasticity of substitution between both telecom services, this implies that both firms also provide the same amount of telecommunication services, i.e. $z_d = z_m$. From (1), the production function for Z thus becomes:

(A-22) $$Z_i = 2^{\frac{1}{\gamma}} z_i$$

where $z_i = z_{id} = z_{im}$

(A-23) $$\frac{\partial Z_i}{\partial z_i} = 2^{\frac{1}{\gamma}}$$

As a result, the price for the domestic and foreign firm equals:

(A-24) $$p_z = \frac{p_{yi}}{a_{VA_i} b_{zi}} \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}} \right)^{\gamma} \right]^{\frac{1-\gamma}{\gamma}} \left(\frac{Z_i}{b_{zi}} \right)^{\gamma-1} (z_{id}^{\epsilon} + z_{im}^{\epsilon})^{\frac{1-\epsilon}{\epsilon}} z_{ij}^{\epsilon-1} 2^{\frac{1}{\gamma}}$$

The perceived inverse elasticity of demand from each firm that uses telecom as an input is:

(A-25) $$\frac{1}{\phi_i} = \frac{-\partial p_z}{\partial z_i} \frac{z_i}{p_z} = \frac{s_{VAi}}{\rho}$$

B.1.4 Monopolistic Competition

Under monopolistic competition, domestic and foreign telecom providers can freely enter.

(A-26) $$\frac{\partial Z_i}{\partial Z_{ij}} = (Z_{iD}^{\epsilon} + Z_{iM}^{\epsilon})^{\frac{1-\epsilon}{\epsilon}} Z_{iM}^{\epsilon-1}$$

(A-27) $$\frac{\partial Z_{im}}{\partial z_{im}} = \left[\sum_i^{n_m} z_{mi}^{\eta} \right]^{\frac{1-\eta}{\eta}} z_{mi}^{\eta-1}$$

Therefore,

(A-28) $$p_{zm} = \frac{p_{yi}}{a_{VA_i} b_{zi}} \left[(L_i^{\alpha_i} K_i^{\beta_i})^{\gamma} + \left(\frac{Z_i}{b_{zi}} \right)^{\gamma} \right]^{\frac{1-\gamma}{\gamma}} \left(\frac{Z_i}{b_{zi}} \right)^{\gamma-1} (Z_{iD}^{\epsilon} + Z_{iM}^{\epsilon})^{\frac{1-\epsilon}{\epsilon}} Z_{im}^{\epsilon-\eta} z_{mi}^{\eta-1}$$

Large-group monopolistic competition implies that an individual firm views Z as fixed or parametric, and here by extension views Z_M and Z_D as fixed. Thus the individual firm views all variables on the right-hand side of the price equation as fixed except for its own output zm_i. This implies that the inverse elasticity of demand for each intermediate good sector equals:

(A-29) $$\frac{1}{\phi_i} = \frac{1}{\sigma_m}$$

For the domestic firm, the demand elasticity is:

(A-30) $$\frac{1}{\phi_i} = \frac{1}{\sigma_d}$$

B.2 Demand elasticity for final demand

Preferences of the representative consumer are represented by a Cobb-Douglas utility function.

(A-31) $$U(C) = \sum_h \kappa_h \log(Y_h^c) + \kappa_z \log(Z^c)$$

It is a well-established result that the demand elasticity for each final (composite) good is equal to 1.

B.2.1 Domestic monopoly

In a domestic monopoly,

(A-32) $$Z_c = Z_{cd} = z_{cd}$$

As such, the final demand elasticity for the domestic monopolist is 1.

B.2.2 International Cournot Duopoly

In a Cournot duopoly,

(A-33) $$Z = (z_{id}^{\epsilon} + z_{im}^{\epsilon})^{\frac{1}{\epsilon}}$$

As is derived in Head and Mayer (1999), this leads to the following final demand elasticity:

(A-34) $$\frac{1}{\phi_{ui}} = \frac{1}{\sigma}\Big(1 + (\sigma - 1)s_i\Big)$$

B.2.3 International Cartel

In an international Cartel, both firms treat final demand elasticity as 1.

B.2.4 Monopolistic Competition

Under monopolistic competition, the final demand elasticity equals the intermediate demand elasticity:

(A-35) $$\frac{1}{\phi_u} = \frac{1}{\sigma_d}$$

B.3 Lerner markup conditions

We can combine the individual demand elasticities to derive the general equilibrium Lerner markup condition according to (15). The general Lerner markup condition that holds for all market structures equals:

$$\frac{p_{zj} - c_j(w,r)}{p_{zj}} = \frac{1}{\sigma}\left[\frac{\theta_u}{1+(\sigma-1)s_i} + \sum_i \frac{\theta_{yi}\rho}{(1-s_j)\rho + \sigma(s_{vai})s_j}\right]^{-1} \tag{A-36}$$

That is also the equation under international duopoly. Under domestic monopoly, $s_d = 1$ and the equation simplifies to:

$$s_j = \frac{p_{zj}^{1-\sigma}}{p_{zd}^{1-\sigma} + p_{zm}^{1-\sigma}} \tag{A-37}$$

Under international cartel, both firms treat $s_j = 1$. Under monopolistic competition, the Lerner markup condition simplifies to:

$$\frac{p_{zj} - c_j(w,r)}{p_{zj}} = \frac{1}{\sigma_j} \tag{A-38}$$

C Appendix: Model Equations and Notation

C.1 Production

1. Value added function: $V_i = \left[a_{Li} L_i^{\frac{\sigma_i - 1}{\sigma_i}} + a_{Ki} K_i^{\frac{\sigma_i - 1}{\sigma_i}}\right]^{\frac{\sigma_i}{\sigma_i - 1}}$
2. Imported Intermediates: $M_{iN} = \left[\sum_r \delta_{ri} m_{riN}^{\frac{\eta_i - 1}{\eta_i}}\right]^{\frac{\eta_i}{\eta_i - 1}}$
3. Composite Intermediate: $z_{ji} = \left[\gamma_{di} d_{ji}^{\frac{\eta_j - 1}{\eta_j}} + \gamma_{mi} m_{ji}^{\frac{\eta_j - 1}{\eta_j}}\right]^{\frac{\eta_j}{\eta_j - 1}}$
4. Final Good Technology: $Y_i = min\left[\frac{z_{1i}}{a_{1i}}, ..., \frac{z_{ni}}{a_{ni}}, \frac{V_i}{a_{VA}}\right]$
5. Domestic & Foreign Sales: $Y_i = \left[\alpha_{Di} D_i^{\frac{\epsilon_i - 1}{\epsilon_i}} + \alpha_{xi} X_i^{\frac{\epsilon_i - 1}{\epsilon_i}}\right]^{\frac{\epsilon_i}{\epsilon_i - 1}}$
6. Export Allocation: $X_i = \left[\sum_r \beta_{ri} X_{ri}^{\frac{e_i - 1}{e_i}}\right]^{\frac{e_i}{e_i - 1}}$
7. Marginal Cost Condition: $(1+\lambda_i)c_i Y_i = \sum_j (1+v_j) p_j d_{ji} + \sum_j \sum_r (1 + u_j + t_{rj}) p_{rj}^m m_{rji} + (w_K K_i + w_L L_{1i})$

C.2 Utility

8. Utility Function: $U = \Pi_i C_i^{bi}; \sum_i b_i = 1$
9. Domestic & Import Consumption: $C_i = \left[\phi_{Di} D_{iC}^{\frac{\psi_i - 1}{\psi_i}} + \phi_{MiC} M_{iC}^{\frac{\psi_i - 1}{\psi_i}}\right]^{\frac{\psi_i}{\psi_i - 1}}$
10. Import Allocation: $M_{iC} = \left[\sum_r \delta_{ri} M_{ric}^{\frac{\eta_i - 1}{\eta_i}}\right]^{\frac{\eta_i}{\eta_i - 1}}$

C.3 Constraints and Balancing Items

11. Agent's Budget Constraint: $\sum_i \tilde{p}_i^C C_i = w_K \bar{E}_K + w_L \sum_i L_i - \sum_i \tilde{p}_i^{IF} I_i^F - \sum_i p_i I_i^I - r^F K^F - D + \sum_i v_i Y_i$
12. Government Budget Constraint: $\sum_i \tilde{p}_i^G G_i = D + \sum_i \tau_{Vi} \tilde{p}_i^C V_i + \sum_i \sum_r t_{ri} p_{ri}^m (M_{riC} + M_{riI}^F)$
13. Current Account Balance: $0 = \sum_r \sum_i \frac{1}{e}(p_{ri}^m M_{ri} - p_{ri}^x X_{ri} - w_L^F L^F - r^F K^F)$
14. Product Market Clearance: $S_i = \sum_j a_{ji} Y_j + G_i + I_i^F + I_i^I + C_i$
15. Factor Market Clearance: $\sum_i K_i = \bar{E}_K; \sum_i L_i = \bar{E}_1 L$
16. Zero Profits: $p_i D_i + \sum_r p_{ri}^x X_{ri} = c_i Y_i$
17. Supply Value Balance: $\tilde{p}_i S_i = \tilde{p}_i^Z \sum_j a_{ji}(1 + v_i) Y_j + \tilde{p}_i^C D_{iC} + \tilde{p}_i^{IF} D_{iI}^F + \tilde{p}_i^G D_{iG} + \tilde{p}_i^{IF} I_i^I + \sum_r (1 + u_i + t_{ri}) p_{ri}^m (M_{riC} + M_{riG} + M_{riI}^F)$

C.4 Price Relationships and Identities

18. Components of Domestic Sales:
19. Components of Import Sales:
20. Domestic Price of Intermediate Imports:
21. Domestic Price of Imports from C:
22. Consumer Price of Domestic Goods:
23. Capital Market Equilibrium:

C.5 List of Variables

L_i	Domestic labor inputs, sector i (i=1, ..., 34)
K_i	Capital (other value added) inputs, both mobile and immobile
V_i	Value added
M_i	Imports
M_{ri}	Imports from region r (r=EU, MENA, ROW)
M_{iN}	Imports of commodity i for intermediate use
m_{riN}	Imports for intermediate use from region r (r=EU, MENA, ROW)
z_{ji}	Composite intermediate input of j into i (j=1, ..., 34)
d_{ji}, m_{ji}	Intermediate usages of domestic and imported goods
Y_i	Output of good i
D_i, X_i	Output for domestic sales and exports
D_{iC}, D_{iG}, D_{iI}^F	Domestic sales: private and public consumption, capital formation
X_{ri}	Exports of good i to region r
c_i	Index of marginal cost of production
p_i	Domestic producer price index

C.6 List of Parameters

σ_i	Substitution elasticity between capital and labor
η_a	Substitution elasticity between intermediates and value added
η_i	Armington elasticity on imports between regions
η_j	Substitution elasticity between domestic and imported intermediates
ϵ_i	Transformation elasticity between domestic and imported intermediates
e_i	Transformation elasticity on exports between regions
ψ_i	Substitution elasticity between domestic and imported consumption
t_{ri}	Tariff rate on imports from region r ($t_{ri} = 0$ for services sectors)
u_i	Resource-using services border barriers ($u_i = 0$ for non-service sectors)
v_i	Service rents on output($v_i = 0$ for non-service sectors)
λ_i	Service resource-using barriers on output ($\lambda_i = 0$ for non-service sectors)

Table 1: Tunisia's telecom sector compared to other countries

	Per 100 inhabitants			1000	% of GDP per capita	US$
	Main lines	Mobile subscribers	Internet users	Phone waiting list	Fixed Line subscr. fee	GDP per capita
	2001	2001	2001	2000	1999	2000
Algeria	6.04	0.32	0.19	401.4	2.5	1,613
Bahrain	24.66	42.49	19.89	0	0.4	11,518
Egypt	10.3	4.33	0.93	1300	0.9	1,424
Iran	15.5	2.3	0.62	1107	-	5,182
Israel	47.63	80.82	23.05	?	0.6	17,586
Jordan	12.74	14.39	4.09	14.6	2.4	1,653
Kuwait	23.97	24.82	10.15	0	0.6	19,529
Lebanon	19.49	21.25	8.58	0	3.2	4,980
Libya	10.93	0.9	0.36	80	?	5,944
Morocco	3.92	15.68	1.31	5	6.3	1,160
Oman	8.97	12.37	4.58	3.9	1.5	6,418
Qatar	27.45	29.31	6.56	0	0.5	24,138
Saudi Arabia	14.48	11.33	1.34	206	1.4	8,009
Syria	10.88	1.2	0.36	?	0.8	1,185
Tunisia	**10.89**	**4.01**	**1.02**	**83.7**	**1.2**	**2,050**
UAE	39.69	71.97	33.92	0.3	0.2	19,750
Yemen	2.21	0.8	0.09	159.5	2	384
Africa	2.62	2.93	0.85		12.7	766
Americas	35.14	26.09	21.64		3.1	15,372
Asia	10.68	9.07	4.34		5.5	2,330
Europe	40.54	43.75	18.05		1.1	11,467
Oceania	40.04	44.95	27.72		3.7	14,798
World	17.19	15.48	8.21		5.7	5,274

Source: ITU 2002

Reference period: 1998

	Market structure						Regulator				Total rating
	Fixed network				Mobile network						
	Local	Domestic long distance	International	Leased lines	Analog	Digital	Separate	Interconnection	FDI fixed	FDI mobile	
Algeria	1	1	1	1	1	1	0	0	0	0	2
Bahrain	1	1	1	1	1	1	1	0	1	1	5
Egypt	1	1	1	1	2	2	1	0	0	1	5
Iran	1	1	1	1	1	1	0	0	0	0	2
Israel	1	1	2	2	3	3	0	0	1	1	6.5
Jordan	1	1	1	1	1	1	1	0	1	1	5
Kuwait	1	1	1	1	1	1	0	0	1	0	3
Lebanon	1	1	1	2	2	2	0	0	1	1	5.25
Libya	1	1	1	1	1	1	0	0	0	0	2
Morocco	1	1	1	1	1	1	1	1	1	1	6
Oman	1	1	1	1	1	1	0	0	0	0	2
Qatar	1	1	1	1	1	1	0	0	0	0	2
S. Arabia	1	1	1	1	1	1	0	0	0	0	2
Syria	1	1	1	1	1	1	0	0	0	0	2
Tunisia	1	1	1	1	1	1	0	0	0	1	3
Yemen	1	1	1	1	1	1	0	0	0	1	3

Reference period: 2001

	Market structure						Regulator				Total rating
	Fixed network				Mobile network						
	Local	Domestic long distance	International	Leased lines	Analog	Digital	Separate	Interconnection	FDI fixed	FDI mobile	
Algeria	1	1	1	1	2	2	1	1	0	1	6
Bahrain	1	1	1	1	2	2	1	0	1	1	6
Egypt	1	1	1	2	2	2	1	0	0	1	5.25
Iran	1	1	1	1	1	1	0	0	0	0	2
Israel	1	1	2	2	3	3	0	0	1	1	6.5
Jordan	1	1	1	2	2	2	1	0	1	1	6.25
Kuwait	1	1	1	1	1	1	0	0	1	0	3
Lebanon	1	1	1	2	1	1	0	0	1	1	4.25
Libya	1	1	1	1	1	1	0	0	0	0	2
Morocco	1	1	1	2	2	2	1	1	1	1	7.25
Oman	1	1	1	1	1	1	0	0	0	0	2
Qatar	1	1	1	1	1	1	0	0	0	0	2
S. Arabia	1	1	1	1	1	1	0	0	0	0	2
Syria	1	1	1	1	1	1	0	0	0	0	2
Tunisia	1	1	1	1	1	1	1	0	0	1	4
Yemen	1	1	1	1	2	2	0	0	0	1	4

Figure 1: Rossotto, Sekkat and Varoudakis, 2003

TABLE 3: SECTORAL OUTPUT AND FACTOR SHARES (%)

	Production	Imports	Household Consumption	Intermediate Consumption	Exports
AGGREGATE SECTORS (% of total)					
Agriculture and Fishing	17.5	10.2	32.4	20.1	6.6
Manufacturing	30.0	63.2	29.7	51.3	55.3
Utilities, Mining, Petroleum	5.8	5.8	4.0	10.9	6.8
Services	46.7	20.8	33.8	17.7	31.2
SERVICE SECTORS (% of total)					
Construction	8.2	0.0	0.3	0.4	0.0
Distribution/Commerce	6.9	0.0	0.0	0.0	0.0
Transportation	5.6	2.7	5.7	4.3	8.7
Communication	1.0	0.1	0.3	1.7	0.4
Hotel	1.5	0.0	3.9	0.1	0.0
Restaurant	4.1	0.0	10.9	0.0	0.0
Finance	2.5	0.2	0.1	4.8	0.3
Insurance	0.3	0.2	0.3	0.6	0.0
Business	1.4	2.1	0.1	2.5	2.5
Real Estate	2.6	0.0	5.0	1.3	0.0
Repair	1.3	0.0	1.1	1.8	0.0
Health and Education	2.0	0.0	4.9	0.2	0.0
Public	9.0	0.0	0.6	0.0	0.0
Other Services	0.2	0.0	0.6	0.0	0.0
Tourism	--	15.4	--	--	19.3

Institute National de la Statistique, 1998, *Les Comptes de la Nation Base 1983, agregats et tableaux d'ensemble 1993-1997.*

TABLE 4: % CHANGE IN MACRO-VARIABLES

RENT WEDGE = 100%, WASTE WEDGE=0%

	BMK	DUO	DUOR	CARTEL
WELFARE		2.07	0.97	-0.44
GDP		1.65	1.58	0.09
CPI		-0.82	-0.50	1.24
WAGE		1.47	1.47	0.08
KPRICE		0.97	0.97	0.09
AG	0.19	0.18	0.18	0.19
MAN	0.32	0.32	0.32	0.32
MU	0.07	0.07	0.07	0.07
SERV (EXL. TEL)	0.41	0.40	0.40	0.41

RENT WEDGE = 50%, WASTE WEDGE=50%

	BMK	DUO	DUOR	CARTEL
WELFARE		0.51	0.51	-0.10
GDP		0.32	0.54	0.13
CPI		-0.51	-0.46	0.14
WAGE		0.39	0.37	0.05
KPRICE		0.56	0.57	0.10
AG	0.19	0.18	0.18	0.19
MAN	0.32	0.32	0.32	0.32
MU	0.07	0.07	0.07	0.07
SERV (EXL. TEL)	0.41	0.40	0.40	0.41