ECONOMIC
RESEARCH
FORUM

منــــتـــدى
البـــحـــوث
الاقتصادية

2008

working paper
series

LIBERALIZING TRADE IN SERVICES IN TUNISIA:
GENERAL EQUILIBRIUM EFFECTS

Saoussen Ben Romdhane

Working Paper No. 404

Liberalizing Trade in Services in Tunisia: General Equilibrium Effects

Saoussen Ben Romdhane

Working Paper 404

May 2008

Saoussen Ben Romdhane, Teaching Assistant in Economics, Institut Supérieur d'Informatique et de Gestion de Kairouan.
Email: saoussen-benromdhane@hotmail.fr, saous2000@yahoo.fr

Abstract

The main objective of the paper is to simulate removal of barriers to trade in services in Tunisia by focusing on two modes; cross-border delivery (Mode 1) and commercial presence (Mode 3). For the first mode, we model restrictions as tariff equivalent-price wedges. Thus, the simulation of services liberalization consists of removing totally, or partially, these estimated tariff equivalents. We assume for the second mode (Mode 3), that restrictions are a combination of monopoly-rent distortions and inefficiency costs. Our approach consists of introducing excess cost directly into the production function through the total factor productivity coefficient. Meanwhile, the rent component is handled in the same way as domestic taxes on sales of domestically-produced services. Under this mode, we consider three scenarios varying according to alternative assumptions on the relative importance of excess cost as opposed to rents. The first one assumes that prior to liberalization; firms did not have any market power but were inefficient by comparison to best- practice. The second scenario makes the opposite assumption – that local production followed best-practice but that market power generated rents in the initial situation. The final scenario is a mixed one assuming that inefficiency cost and rents weigh equally. Results show that the potential welfare implications of services liberalization are clearly positive and substantial. The liberalization of cross border trade leads to a small gain in welfare while the combination of rent generating and cost inefficiencies distortions has a more significant effect. Welfare increases by more than 4 percent when we consider the two modes of service delivery and most of this gain is attributed to FDI liberalization. The service share in production is relatively important, in particular when we combine the effects of Mode 1 and the mixed scenario of Mode 3. This result confirms the idea that liberalizing services has a large impact on welfare.

ملخص

الهدف الرئيسي من هذه الورقة هو محاكاة إزالة العقبات التي تواجه تجارة الخدمات في تونس من خلال التركيز علي أسلوبين هما التوصيل عبر الحدود (الأسلوب الأول) و التواجد التجاري (الأسلوب الثالث). أما بالنسبة للأسلوب الأول فإننا نصور تلك الحواجز علي أنها تعريفة جمركية مكافئة للسعر وبالتالي فان محاكاة تحرير الخدمات هي عبارة عن التخلص الجزئي أو الكلي من معادلات التعريفة الجمركية المقدرة. أما بالنسبة للأسلوب الثاني فإننا نفترض أن العوائق تضم كلاً من تشوهات الإيجار الاحتكاري وتكاليف نقص الكفاءة. ويتألف منهجنا من إدخال التكلفة الزائدة مباشرة في دالة الإنتاج من خلال مجمل إنتاجية عوامل الإنتاج بينما تم معالجة مكون الإيجار بنفس طريقة الضرائب المحلية علي مبيعات الخدمات المحلية. وبناء علي هذا الأسلوب فإننا نأخذ بعين الاعتبار ثلاثة سيناريوهات تتفاوت حسب الافتراضات البديلة للأهمية النسبية للتكلفة الزائدة بالإيجار. يفترض السيناريو الأول أن الشركات لم يكن لها أية قوة سوقية قبل تحرير الخدمات ولكنها افتقرت إلى الكفاءة إذا قيست بالممارسات الأفضل, وعلي العكس يفترض السيناريو الثاني أن الإنتاج المحلي يتبع ممارسة افضل وان القوة السوقية قد حققت ريعا بداية الأمر. أما الافتراض الأخير فهو مزيج بين الافتراضيين الأول والثاني ويفترض أن عدم الفعالية في تقدير التكاليف أو الإيجار لهما نفس الأهمية. وتظهر النتائج أن ردود الفعل الطيبة المحتملة لتحرير الخدمات ستكون إيجابية وجوهرية. ويؤدي تحرير التجارة الخارجية ا لي زيادة طفيفة في الرفاهية بينما الجمع بين تحقيق الريع و تشوهات عدم كفاءة التكلفة يؤدي إلى تأثيرات اكبر. كما نجد أن الرفاهية تزداد بأكثر من 4% إذا أخذنا في الاعتبار نموذجي توصيل الخدمات وان معظم هذه الزيادة يعزي إلى تحرير الاستثمار الأجنبي المباشر. ونصيب الخدمة في الإنتاج له أهمية نسبية ولاسيما عند الجمع بين تأثيرات الأسلوب الأول و السيناريو المختلط للأسلوب الثالث. وتؤكد هذه النتيجة أن تحرير الخدمات له تأثير كبير علي الرفاهية.

1. Introduction

For the past two decades trade in services has grown faster than merchandise trade. The share of services in both GDP and employment has risen with income and it's become very important even in the poorest countries. In 2001, service sectors accounted for 45 percent of GDP in low-income economies, 57 percent in middle-income economies and almost 71 percent in high-income ones. Services activities in low and middle-income countries have been expanding faster than GDP and represent on average 5 to 10 percent points more of GDP than in the early 1980s. The service sector increasingly determines overall growth of productivity in the economy (IMF, 1997). Developing countries have a keen interest in many service areas including tourism, health and construction. According to the World Travel and Tourism Council, tourism is the world's largest employer accounting for one in ten workers worldwide.

Service liberalization generates many benefits that can be summarized in six points: **Economic performance**: Efficient services infrastructure is a precondition for economic success. Services such as telecommunications, banking, insurance and transport represent strategic inputs for all sectors, goods and services alike. (Lipsey, 2001) , (Markusen,1989). **Development and improvement of human welfare**: **I**n developing countries**,** access to water, sanitation, power, transportation, education and health is associated with higher productivity and earnings. It also helps exporters and producers to capitalize on their competitive strength, whatever the goods and services they are selling. Building on foreign investment and expertise, a number of developing countries have also been able to advance in international services markets – from tourism and construction to software development and health care. Services liberalization has thus become the key element of many development strategies. **Consumer savings:** It is evident that liberalization leads to lower prices, better quality and a wider choice for consumers in many services. Such benefits, in turn, work their way through the economic system to help improve supply conditions for many other products. Thus, even if some prices increase during liberalization (for example the cost of local calls) they tend to be outweighed by price reductions and quality gains. **Faster innovation:** Countries with liberalized services markets have seen greater product and process innovation. The explosive growth of the Internet in some countries is in marked contrast to its slower take-off in others that have been more hesitant to embrace telecom reform. Similar contrasts can be drawn for financial services and information technology. **Greater transparency and predictability**: A country's commitments to its WTO services schedule amounts to a legally binding guarantee that provides a solid ground for foreign firms to supply their services. This gives everyone with a stake in the sector—producers, investors, workers and users—a clear idea of the rules of the game. They are able to plan for the future with greater certainty, which encourages long-term investment. **Technology transfer**: Many foreign services are best transferred through commercial presence (mode 3), in particular through foreign direct investment (FDI) and the continuous contact between the service provider and clients (Markusen, Rutherford and Tarr (1995)). Movement of people could also provide know-how transfer and temporary employment for developing countries. Restrictions on FDI or on the movement of professional personnel may reduce services trade by far more than other barriers –like tariffs – may limit trade in goods. Indeed, in Tunisia, laws and regulatory agencies pose entry barriers that essentially rule out FDI in the key service sectors. Foreign direct investment involves inflows of capital, but more importantly it embodies the transfer of technology that can upgrade productivity in the domestic economy. Because financial, communications and professional services are key intermediate inputs in the production of nearly all sectors, technological improvements in these sectors could essentially upgrade overall productivity. Thus, whereas liberalizing the trade of goods moves an economy toward specialization, liberalizing the trade in services through permitting foreign establishments could lead to more balanced output expansion.

Since 1995, many countries joined the GATS (General Agreement on Trade in Services).The outcome of the GATS would be greater competition, no discrimination against foreign services suppliers and better structures for economically rational markets. The competition improves services performance, increase in infrastructure investment and service coverage, improve service quality, and consequently prices are more closely aligned to underlying costs.

Services play a significant and increasing role in the Tunisian economy. They account for more than half of GDP and their total value has been growing in recent years faster than the production of goods. They also make up one-third of household consumption and eighteen percent of intermediate demand according to the 2001 input-output table. Of the tradable services, tourism plays the most significant role, representing over fifteen percent of imports and more than nineteen percent of all exports.

Tunisia has gone a long way towards liberalizing merchandise imports, particularly with respect to the European Union. It signed an FTA with the EU in 1995 and embarked on a schedule of removing tariffs on manufactured goods imported from its European partner over a twelve-year period. The FTA is near completion so that by January 2008 all import duties on manufacturing imports will be removed. In contrast, services have been so far kept out of the FTA and although negotiations have been launched, they are still at a very early stage.

Tunisia made multilateral liberalization commitments under GATS, particularly in telecommunications, financial services and tourism, but they are very limited compared to the commitments made by several developing countries with a similar level of development. It is fair to say that foreign participation in services is still very small, with the exception of recent substantial participation in telecommunications. A wide range of restrictions still prevails, reducing opportunities to improve efficiency and quality. Communication, financial, insurance, distribution, and professional services are still expensive and less diversified than in other countries with a similar level of development. The potential for reaping significant gains from liberalizing trade in services is therefore high.

According to Hoekman (1995), gains in welfare of the tariff reduction on the industrial products would be three times more elevated if only a quarter of barriers that are currently in place on the exchange of services are eliminated. Konan and Maskus (2006), note the potentially large gains in welfare for Tunisian citizens of liberalization in services. Reducing service barriers generate relatively large welfare gains with low adjustment costs. Services liberalization promotes economic activity in all sectors and raises the capital and labor real returns. In terms of production and welfare, the gains from liberalizing trade in services may be much larger than those resulting from liberalization of merchandise trade. Konan and Maskus (2006) reported a combined welfare effect equal to more than 7 percent of GDP against approximately a 3 percent gain in the Tunisian case if only trade in goods is liberalized.

The objective of our work is to assess the expected gains of services liberalization by focusing on two modes of service delivery: cross-border (Mode 1) and commercial presence (Mode 3). Mode 1 restrictions are modeled as tariff-equivalent price wedges while Mode 3 restrictions cover both monopoly-rent distortions arising from imperfect competition among domestic producers, and inefficiency costs arising from a failure of domestic service providers to adopt least-cost practices. While the other two modes of service delivery (Modes 2 and 4) may be important, most of the literature has focused on the other two modes because restrictions are more quantifiable for the former than for the latter. In addition, commercial presence through FDI (Mode 3) has been at the center of debates on liberalization of trade in services. Compared to previous analysis, particularly that of Konan and Maskus, our

contribution is two-fold: using more recent data and introducing a new approach in modelling the excess cost and rent effects of restrictions on Mode 3 of service delivery.

2. Measuring Service Barriers: Methodological Issues

Because of the intangible nature of many services, direct transactions between the consumer and producer are required. This fact complicates measuring both the service flows and their corresponding impediments.

In the case of trade in merchandises, tariff and non-tariff barrier (NTB) typically drive a wedge between the price of the good on world markets and its domestic price. This wedge, or "tariff equivalent" provides a convenient and often observable measurement of the size of the barriers. However, in the case of services, this simple measurement is not often observable. It remains true, though, that the concept of a tariff equivalent is a useful way of quantifying a barrier to trade even though it may be much harder to observe. Both the role of barriers to trade in services and the possible meaning of a tariff equivalent can be better understood in the context of each of the standard four "Modes of Supply" that arise for traded services following GATS classification. Mode 1 trade involves the cross-border supply of services from suppliers remaining abroad. It is the case of services traded internationally across borders in a manner similar to cross-border trade in goods. An example would be the ability to purchase insurance services from a firm domiciled abroad. Mode 2 refers to services that require the consumer to be in the location of the producer, as in the cases of tourism and education. Mode 3 activities include services for which it is critical to establish a local presence in order to provide them. This mode of international services provision is arguably the most general and the most important: provision through a commercial presence that is the result of foreign direct investment (FDI). Almost any service can be provided by firms from one country to consumers in another if the firms are allowed to establish a physical presence there. Examples of such transactions include certain types of banking services and the provision of telecommunications facilities. Finally, Mode 4 refers to the temporary cross-border movement of workers. Such as construction workers permitted to migrate temporarily as guest workers.

Despite this legal definition, the border measures such as tariffs are generally difficult to apply to services because customs agents cannot readily observe services as they cross the border (Hoekman and Primo Braga (1997)). It is also the case that many services are provided in the country of consumption rather than cross-border. Therefore, services restrictions are typically designed in the form of government regulations applied to the different modes of services transactions. Thus, for example, regulations may affect the entry and operations of both domestic and foreign suppliers of services and in turn increase the price or the cost of the services involved. Services barriers are therefore closer to NTBs than to tariffs, and their impact will depend on how the government regulation is designed and administered. These regulations can take many forms, and are usually specific to the type of service being regulated. Therefore, since services themselves are so diverse, services barriers are also diverse, making them somewhat difficult to classify in general terms[1]. Hoekman and Braga (1997) classify and provide examples of services barriers as follows: (1) quotas, local content and prohibitions; (2) price-based instruments; (3) standards, licensing and procurement; and (4) discriminatory access to distribution networks. These distinctions are also suggested by the Australian Productivity Commission[2]. Some studies have carried out

---

1 An excellent survey of these measurement issues is provided by Warren and Findlay (2000) and Hoekman (2000) provide. See also Deardorff and Stern (2004) for discussion of measurement and modelling in services.
2 For further information see the Australian Productivity Commission website (www.pc.gov.au/research/memoranda/servicesrestriction/index.html).

many service barriers measurement. In what follows, we summarize a number of these approaches:

Frequency Measures and Indexes of Restrictiveness

A widely used approach is to construct frequency measures showing the extent of usage of service trade restrictions, from which the severity of the impacts of such measures on trade flows are loosely inferred. The studies of frequency-based measures identify the kinds of restriction that apply to services. The idea consists of assembling a complete list of barriers, and identifying the restrictiveness of these barriers in terms such as the numbers of firms or countries to which they apply and other characteristics. This latter information leads to construct an Index of Restrictiveness. Hoekman (1995) constructed frequency ratios to quantify the presence of barriers based on the GATS schedule of commitments – completed in 1993-94 by country– designating sectors or sub-sectors as unrestricted or partially restricted. The ratios that are calculated equal the number of actual commitments in relation to the maximum possible number of commitments[3]. While this index provides some indication of the extent of commitments, it is not designed to measure the level of service barriers.

As part of the Australian Productivity Commission project, various studies have been conducted to develop more elaborate weighing system frequency measures than those used by Hoekman, labeled as trade restrictiveness scores (McGuire (1998), McGuire and Schuele (2000) and Kalirajan et al. (2000) for banking services. Warren (2000a, 2000b) for telecommunication services, Kang (2000), McGuire, Schuele and Smith (2000) for maritime, Kalirajan (2000) for distribution services, Kemp (2000) for education, Nguyen-Hong (2000) for professional services and Hardin and Holmes (1997) for foreign investment in services)). The main idea is to construct a score of services restriction ranging between zero and one. The various categories are weighted judgmentally in terms of the importance of the costs involved. This method is preferred because barriers may differ in their importance for different aspects of economic performance.

McGuire (1998), constructed a restriction score for financial services. The results showed that Australia's financial services market is relatively open compared with the eight Asian economies. Australia ranks second in banking and securities services markets behind Hong Kong, and third behind Singapore and Hong Kong in insurance services markets. Kalirajan (2000), constructed restrictiveness indexes for distribution services for 38 economies. The indexes covered the services of commission agents, wholesalers, retailers, and franchisers. The result was that the cost-raising impact of restrictions on establishment for foreign firms in the distribution sector ranges from around 0 to 8 per cent; Belgium, India, Indonesia, France, Korea, Malaysia, the Philippines, Switzerland, and Thailand were the most restrictive economies and Singapore and Hong Kong the most open.

McGuire and Schuele (2000) constructed an openness index based on a variety of data sources for the banking sector in 38 economies for the period 1995-98, including the GATS schedules of commitments and other reports and documentation pertaining to actual restrictions. The authors give separate scores for the restrictions applicable only to foreign banks and the "domestic" restrictions applicable to all banks. The differences between the foreign and domestic scores can be interpreted as a measurement of the discrimination

---

3 Hoekman focused on market access and national treatment commitments. As he notes (1996, p. 101), there were 155 sectors and sub-sectors and four modes of supply specified in the GATS. This yields $620 \times 2 = 1440$ total commitments on market access and national treatment for each of 97 countries. The frequency ratio for a country or a sector is then defined as the fraction of these possible commitments that were in fact made, implying an index of trade restrictiveness equal to one minus this fraction.

applied to foreign banks. The results show that countries with less restricted banking sectors tended to have higher GNP per capita.

Holmes and Hardin (2000) have attempted to focuses only on restrictions on FDI in services (Mode 3). Information used is not collected from the GATS commitments but from the actual FDI restrictions of Asia Pacific Economic Cooperation (APEC). To reflect the efficiency costs of the different barriers, they treated all restrictions equally and they devise a judgmental system of weighting. Their results for 15 APEC countries for the period 1996-98 show that communications and financial services are more subject to FDI restrictions than business, distribution and environmental services.

The construction of frequency and openness indexes represents a preliminary step that can provide the basis for the next step, which involves using available methodologies to evaluate the economic impacts of eliminating the barriers.

Price-Impact Measurement

As an alternative to the frequency index approach to measuring barriers, price-based measures of barriers to service trade have been proposed, but thus far little calculated[4]. Hoekman (1995, 1996) constructs in a first step a frequency ratio of services restrictiveness in the GATS. In a second step, he assumes that failure to liberalize in a sector would be equivalent to some particular tariff level selected using knowledge of the sector. These maximum tariff equivalents ranged from 200 percent for sectors in which market access was essentially highly constrained in most countries such as maritime, air transport, postal services, voice telecommunications, and life insurance, to 20-50 percent for sectors in which market access was less constrained. In the second step, he applies his frequency-ratio measurement of liberalization to these maximum tariffs to construct tariff equivalents that differ by country based on their offers in the GATS[5]. It is then possible to construct weighted average measurements by country and sector, using the value of output by sector for a representative industrialized country. However, Hoekman's measurements are not considered to indicate the absolute ad valorem tariff equivalents because the tariff equivalent benchmarks are just judgmental and are not distinguished according to their economic impact. Moreover, the benchmarks include only market access restrictions.

In more recent studies, an improved approach was used; it consists of combining other data with a restrictiveness index or another proxy measure in order to estimate the effects of services barriers econometrically. The study of Doove et al. (2001) is based on an index of restrictiveness for the industry of international air passenger transport built by Gonenc and Nicoletti (2001), who had also used an econometric model to estimate the effects of restrictiveness for a group of 13 OECD countries. Doove et al. applied this estimated coefficient to calculate price effects for 35 OECD and non-OECD countries. The results indicate substantial variations across countries as a consequence of the agreement-specific bilateral restrictions. In the same way, Doove et al. adopt the telecommunication regulatory measures constructed by Boylaud and Nicoletti (2000). In order to estimate the price impacts for 24 OECD countries and 23 other countries, these measurements were incorporated into an econometric framework for the individual sectors. The authors also developed a measure of restriction and price impact for industrial electricity supply for 50 economies.

---

4 See Bosworth, Findlay, Trewin, and Warren (2000) for a useful methodological discussion of the construction and interpretation of price-impact measurements of impediments to services trade.

5 For example, assuming a benchmark tariff equivalent of, say, 200percent for postal services, and a frequency ratio of 40 percent to reflect a country's scheduled market access commitments, the tariff equivalent for that sector and country is set at $200 - 0.4(200) = 120$ percent.

Other studies of price impacts of services restrictions have been undertaken, including individual modes of supply and covering telecommunications (Trewin (2000)), banking services (Kalirajan, McGuire, Nguyen-Hong, and Schuele (2000)), international air services (Johnson, Gregan, Gentle, and Belin (2000)), maritime services (Fink, Mattoo, and Neagu (2002)), engineering services (Nguyen-Hong (2000)), in both developed and developing countries. The construction of price-impact measurements is a hard task because it requires specialized knowledge of the sectors in order to calculate the price impacts of the regulatory measures involved.

Quantity-Impact Measurements

For some service sectors, it is more appropriate to model the determination of quantity rather than price, and then to include the trade restrictiveness index in a quantity equation. These quantity measures of the importance of service trade restrictions are typically based on results of econometric models. Warren (2001a,b) uses an econometric procedure to develop quantity-based measures for telecommunications services for 136 countries. To construct a set of policy indices, Warren (2000a) uses a 1997 survey by the International Telecommunications Union (ITU) rather than commitments made in trade negotiations. Five separate indices were constructed, corresponding to the more important distinctions drawn in the GATS context – namely the differences between market access and national treatment and between trade and investment. In the construction of these indices, Warren sought to incorporate economic as well as legal inputs by including a count of the number of firms actually competing in a market, as well as measures of the formal policies. Warren (2000b), quantified the comparative impact on telecommunications consumption of limits on competition, controlling for other explanatory variables. Consumption is measured in terms of the number fixed and mobile connections per hundred persons. Restrictions on competition are modeled using the ITU-derived indices of telecommunication policies. The result show that estimates for the advanced industrialized countries are relatively low compared to the much higher estimates for the newly industrializing countries.

Warren and Findlay (2000) measured the wedge between price and marginal cost in service sectors in order to get an indication of the impact that impediments might have on prices. They also sought to develop quantity impact measures by comparing domestic output to international standards. They constructed a Trade Restrictiveness Index and Price and/or Cost Effect Measures databases, which provided tax equivalents of the price and/or cost effects of restrictions in selected service sectors. For each economy, the nature and the extent of restrictions on services trade are summarized in trade restrictiveness indexes. The more important restrictions are, the more the economy is judged to be below the index. The restriction categories are then weighed together according to a judgment about their relative economic cost. The weights are generally chosen so that the total restrictiveness index score for an economy ranges from 0 to 1. Two index scores are calculated, one for domestic and another for foreign service suppliers. A foreign index is calculated to measure all the restrictions that inhibit foreign firms from entering and operating in a country. It covers both discriminatory and non-discriminatory restrictions. A domestic index represents restrictions faced by domestic firms and it generally only covers non-discriminatory restrictions. The difference between the foreign and domestic index scores may be considered as a measure of discrimination against foreigners.

Concerning Price and/or Cost Effect Measures, econometric models are used to estimate the effects of restrictions on the price and/or cost of services. These models include many relevant determinants of economic performance (price, profit margin, cost or quantity) plus a measure of trade restrictions, as measured by the trade restrictiveness index. The subcomponents of the restrictiveness index are entered separately so that the econometrics

can replace judgment in determining the relative weights attached. The econometric model is useful to estimate the determinants of economic performance in that service sector. Price and cost measures are calculated from the results of the econometrics and where necessary, a profit or quantity effect is converted to a price or cost effect. The results indicate the extent to which restrictions affect price-cost margins, and therefore create economic rents, or raise costs above what they otherwise would be in the case of best practice. The same classification of trade restrictiveness index is given for the price and/or cost effect measures according to whether they are on establishment or cross-border, and according to whether they are discriminatory or non-discriminatory.

Gravity-Model Estimates

Francois and Hoekman (1999) fit a gravity model to bilateral services trade for the United States and its major trading partners, taking Hong Kong and Singapore to be free trade benchmarks. The independent variables are distance between trading partners, per capita income, gross domestic product (GDP) and a Western Hemisphere dummy variable. The differences between actual and predicted imports were taken to imply the effects of trade barriers and were then normalized relative to the free trade benchmarks for Hong Kong and Singapore.

CGE Models as a Useful Tool for the Analysis of Liberalization of Trade in Services

While the data required to conduct econometric estimations for services trade is rare, CGE modelling, with relatively low information, provides a framework for both multi-sectoral and multi-country analysis of the impact of removing barriers to trade in services. Few studies have examined the effects of services liberalization. Some of these have failed to take account of barriers to commercial presence as an important category of barrier to trade in services (Brown, Deardorff and Stern (1996) and Hertel (2000)). For this purpose, Petri (1997) introduced a treatment of barriers to foreign direct investment in the services sector, but he didn't take into account barriers on the other modes of service supply.

More recently, many studies are based on a version of GTAP (Hertel (1997)) with foreign direct investment, known as FTAP. They treat FDI as a capital flow and barriers to the right of establishment. Liberalization (removal of the tax) results in a global reallocation of capital as sector-level rates of return adjust to a new equilibrium. This approach improves significantly the contribution compared to other work, which focused only on cross-border trade (Mode 1). A paper of Dee and Hanslow (2001), sought to analyze the impact of removing barriers to services. The barriers included non-discriminatory barriers to market access, as well as discriminatory restrictions on national treatment. Both barriers to commercial presence and barriers to the other modes of service delivery are included. The authors compared the gains from liberalizing services trade with the gains from removing all post-Uruguay barriers to trade in agriculture and manufacturing. They also compared the gains from the total removal of barriers to services trade with the gains from several alternative approaches to partial liberalization. They conclude that trade by commercial presence is significant in all sectors, even though it is not captured in conventional balance of payments statistics.

Brown and Stern (2001) analyzed the effects of removal of services barriers by taking into account many conditions of international capital mobility and variations of capital stock due to increased investment. They regarded the cost-price margins estimated by Hoekman (2000), as indicative of barriers to FDI. Barriers to FDI are assumed to take the form of an increased cost of locating investment in a host country. Since the cost-price gap is smallest in most sectors in Hong Kong, a country thought to be freely open to foreign firms, the excess in any other country above the Hong Kong figure is taken to be due to barriers to the establishment of foreign firms. Their results, suggest the fact that when barriers are lowered, international

capital in the form of FDI will then be attracted to countries with the relatively highest rates of return and away from other countries. The welfare effects of removing services barriers are higher and vary across countries depending on how international capital mobility and changes in domestic investment respond to changes in rates of return.

A more recent paper by Markusen (2007) adopted a general model of fragmentation of production activities in order to capture the specific features of business services. He considered a situation in which both trade and foreign investment in services were initially banned or technically infeasible. Then, he computed three scenarios: one, trade but not investment in services is assumed to be feasible or allowed; two, only investment is allowed, and three, both trade and investment in services are allowed. The author concluded that liberalization or technical/institutional changes that allow trade and investment in services tend to favor a skilled labor-abundant economy over an unskilled labor-abundant one.

For the Tunisian case, Rutherford et al.(1995), show that for different scenarios of suppression of non-tariffs barriers applied to UE importations, of improvement of the Tunisian agricultural export access to the market of the UE and of harmonization of norms and efficiency gains of exchange activities, an FTA between Tunisia and the UE would increase the short term well-being of Tunisia of 3.11 percent due to the sectorial capital and 4.65 percent long-term well being due to mobile capital. In the same way, Brown et al. (1997), analyzed the potential effects of the Tunisia–EU Association Agreement in a model with monopolistic competition in non-agricultural sectors. They take into account the influence of the sectorial capital, the mobile capital impact and the evolution possible of FDI entry indicate with the first element, a receding of 0.2 percent of welfare , what let's suppose a diversion of exchange flux. However, with the second element, they note a progression of 3.3 percent. In short, with the third element, the authors found that welfare gain ranged from -0.1 percent to -1 percent. Such results reflected a deterioration of the terms of the exchange as Tunisian exports expanded to permit the remuneration of IDE. These findings show the probability of a diversion of short-term exchange flows, but in the long-term, welfare could increase meaningfully due to the reduction of the administrative costs of exchanges, the harmonization of norms, the simplification of exchanges and the dynamic export productivity gains. Only the study of Konan and Maskus (2006) assessed the effects of services liberalization in Tunisia. The authors compared goods versus services liberalization in terms of welfare, outputs and factor prices. They did simulations for different scenarios of abolition of restrictions, according to two modes of services delivery (Mode one and Mode three). Restrictions on services trade involved both cross-border supply (tariff-equivalent price wedges) and foreign ownership (monopoly-rent distortions and inefficiency costs). Their results showed on the one hand that the reform permits a gain as a supplement of more elevated welfare of 30 to 40 percent that predicted in the case of suppression of tariffs on imported merchandise. The combination of liberalization and reform of services lead to higher gains than if one of the policies had been driven alone, and were linked to a growth of 13 percent of the GDP. Unfortunately, this work is based on the 1995 Tunisian input-output table which is relatively outdated.

In our analysis, we try to quantify the impact of liberalization in individual service sectors. The construction of the model is based on the 2001 Social Accounting Matrix that we have already built and other parameters, such as import and export trade flows by region and tax and tariff rates. Mode 1 restrictions are modeled as tariff-equivalent price wedges while Mode 3 restrictions comprise both monopolistic rent distortions, arising from imperfect competition among domestic producers, and inefficiency costs, arising from a failure of domestic service providers to adopt least-cost practices. Our model is designed to capture only the several static effects of services liberalization. We do not compute gains from dynamic CGE models (Rutherford and Tarr (2002)). The tariff-equivalent price wedges are

based on the Australian Productivity Commission project for telecommunication and on information-based assumptions for the other service sectors.

3. Services in Tunisia: Importance in the Tunisian Economy and Current Policy

Services account for 57 percent of GDP. Compared to other Mena countries this is a relatively high share although it is still lower than share of services in the GDP of developed countries which exceeds 70 percent. In terms of production, the main services – other than public services – are domestic trade, transportation and communication, hotels and restaurants and financial services (Table 1). In the context of international trade, the contribution of services is far more important in exports than in imports, accounting for over 30 percent and 18 percent of total exports and imports of goods and services respectively. This sector has generated the largest surplus among all sectors, with exports reaching over US$3.6 billion and imports standing at about US$2 billion. The largest source of exports is tourism while the main importing activities are transportation and tourism. In dollar terms, exports and imports have grown respectively at the average rates 6.3 percent and 12.4 percent per annum from 2000 to 2005, against 13.1 and 8.5 percent for agriculture and 12. and 8.2 percent for manufacturing.

It is important to note that the service classification shown in Table1 does not match the distinction by mode of service delivery (Modes one to four). Imports and exports correspond at best to cross border trade (Mode one) and consumption abroad (Mode two). Repatriated FDI earnings and labor income are instead included under the heading of international income transfers. Thus, if the latter classification is used, trade in services will weigh more heavily in total trade. As an indication, total repatriated capital income and labor reached US$118.5 million and US$1546 million respectively in 2006. FDI flows averaged US$ 3.279 billion in 2006[6]. They represented 48.6 percent of gross fixed capital formation in that year with FDI in services accounting for over 70 percent of total FDI flows. The largest destination of FDI inflows was telecommunications, tourism and real estate.

There has been a radical change in the telecommunication sector in Tunisia since 2003. Prior to that year, Tunisie Telecom, the state owned operator was the only provider of fixed and cellular telephone services. A new operator entered the cellular market in 2003 resulting in a sharp expansion of mobile telephony and ending the rationing of the service. Since then, there has been a total transformation of the mobile landscape, both in terms of service availability, quality and prices. The Tunisian authorities also intend to liberalize the fixed line services by introducing a second private provider. Already, a third of its capital was sold to a foreign investor. In contrast, internet services are still limited to national firms although some competition exists between domestic providers. Exports of call center services have boomed in recent years. There are currently seven call centers – six of them off-shore.

In the banking sector, foreign participation is still subject to the central bank's authorization. However, two banks have been privatized with foreign banks holding the majority shares (UIB and Banque du Sud) while development banks with large foreign ownership have been converted into universal banks. The three largest banks, which together account for about half of bank assets, have remained in state hands. A major weakness of the banking system is the high ratio of non-performing loans. In spite of the sharp reduction that took place in the last five years, this ratio still remains above 20 percent – which is much higher than the level recorded for other MENA countries like Morocco at 12 percent[7]. Unlike the banking sector, the insurance sector is still very much closed to foreign providers who are only allowed to sell their services to non-residents (Article 44 of the Insurance Code).

6 World Investment Report, 2006. CNUCED.
7 IMF article – reports for Morocco and Tunisia (2006)

Air transportation is still restricted by agreements between companies which allow them to share the market. Tunisia is lagging behind countries like Morocco which has made large steps towards implementing an open sky policy. Business related activities such as accounting, auditing and legal services are highly regulated, and so is the establishment of foreign firms in these activities. These examples highlight the pervasive nature of restrictions on trade in services in Tunisia, and the extent of further reforms needed for liberalization.

Regarding Mode 2 of service delivery, there are restrictions on the amount that nationals can transfer abroad in order to spend on services such as tourism, health care or education. As for Mode 4, restrictions go in both directions. Tunisian service firms are faced with barriers to entry for workers in developed countries while foreign firms are not allowed to employ more than a few staff in Tunisia (Generally limited to 4).

4. The Model and Benchmark Data

To explore the magnitude of the potential gains from service liberalization , we use a competitive, constant returns to scale computable general equilibrium (CGE) model of a small open economy with 15 sectors, of which 12 are service sectors and 2 are trading partners(EU and Rest of the World). Tunisia is modeled as a price taker. So, policy changes are assumed not to significantly alter prices in other regions of the world.

The specification of the model follows other standard assumptions:

- The representative consumer maximizes a Cobb-Douglas (CD) utility function which depends on goods originating in each sector. Thus, the income elasticities of demand of this good are all equal to one.
- The consumer's decision is a multi- staged decision. First the consumer decides on the amount to be spent on each good and then on the domestic and foreign substitutes for each good. The substitution follows a CES utility function.
- Income is received from capital and labor. In addition, the consumer receives transfers from the government and pays taxes. The current account deficit, which represents foreign savings, is also added to his income.
- Constant returns to scale and perfect competition imply that prices equal marginal costs.
- Outputs are produced according to a Leontief function using intermediate inputs and real value added. An LES function describes the substitutability between labor and capital inputs in producing real value-added. In each sector, demand for domestically produced and imported goods is represented by a CES function. Production follows a constant elasticity of transformation (CET) function. Total output is calculated as the sum of domestic supply and total exports.
- Only labor is assumed to be freely mobile across sectors.
- The closure rule used in the model is that of a fixed current account deficit.
- The GDP deflator (world price index) is set to a value of one.
- For Tunisia – being a small country – world prices remain constant.

The construction of the model is based on the 2001 Social Accounting Matrix that we have already built and other parameters, such as import and export trade flows by region and tax and tariff rates. Trade-weighted import tariffs were determined by data collections for 2001 and vary across regions due to duty drawback provisions and the preferential treatment of the EU. There are no data on tariff collections on services, and we take their tariff rates to be zero.

For the Tunisian market, there is no evidence on relevant elasticities. So, we make standard assumptions about their values. In particular, labor–capital substitution is set at unity in a Cobb–Douglas value-added production function. We draw benchmark trade elasticities from

Rutherford et al. (1995) and Konan and Maskus (2006). The various trade elasticities are 2.0 for substitution between domestic and imported goods, 5.0 for transformation between domestic output and exports.

Warren and Findlay (2000), under the Australian Productivity Commission project, suggest computing the pro-competitive impacts using price-cost margins (or "net interest margins"). Ideally, we would also like to capture the cost-reduction effects by comparing actual costs to a constructed estimate of costs if services were provided according to a 'world's best-practice' cost function. The author's methodology produces estimates of the effects of trade barriers that are explicitly linked to characteristics of the restrictions themselves, rather than being generated as an "unexplained residual". It proceeds as follows: First, qualitative information on barriers to services trade is converted into a quantitative "restrictiveness index". This involves identifying all relevant categories of restrictions. Then scoring for each country, their actual restrictions in each category according to their restrictiveness, and weighting together the different category scores according to an assessment of their relative economic significance. The second step is to enter the restrictiveness index into an econometric model of economic performance in the sector in question (where Y is some measure of performance), along with whatever other factors (X) economic theory suggests might be important determinants of performance (these can be industry-specific or economy-wide).

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

Finally, with an estimate of β in hand, the model can be used to predict the "first round" effects of liberalization. If total liberalization yields a restrictiveness index score of zero, then βR itself gives an estimate of the effects of current restrictions on economic performance, relative to a free-trade benchmark. This benchmark can be converted into a percentage "tax equivalent" by a mathematical manipulation which depends on the particular measure of performance and the particular functional form for the estimating equation. However, a free trade benchmark need not always coincide with zero regulation. The method is flexible enough to allow that in a free trade situation, it would still be appropriate to have prudential regulation of financial services, safety regulation of air passenger transport services, and so on.

Unfortunately, for Tunisia, as for other developing countries, only the measurement for telecommunications is available according to Warren and Findlay's approach. Restrictiveness Index Scores and Price Effect Measures for Tunisian telecommunications are given in Table 2 and Table 3.

The authors distinguish between the domestic and foreign restrictions, that is to say between barriers to entry faced by domestic firms and additional barriers faced by foreign firms. The overall restrictiveness index for Tunisia is estimated at about 93 percent, broken down into 53 percent domestic and 40 percent foreign (Table 2). The degree of domestic restrictiveness is very high, putting Tunisia among the group of least liberalized countries[8]. In fact, Tunisia ranks almost last among 136 countries for which Warren and Findlay estimated restrictiveness. Consequently, the price equivalent of restrictions in Tunisia is very high, totaling about 157 percent (90 percent domestic and 67 percent foreign, Table 3).

Konan and Maskus (2006) modeled restriction wedges between price and true marginal costs. The authors supposed that services liberalization allowed the entry of new firms, leading to a more competitive (eliminating rents) and a more efficient (introducing lower cost firms) market structure. Regulations distort prices and quantities through two channels: the cartel

---

8 It should be recalled that this measure is related to the year 2000 when the sector was still very highly protected.

effect and the cost inefficiency effect. According to the first effect, barriers to FDI and strict regulations limit both domestic and foreign participants in certain service sectors, thus hampering competition and supporting market power on behalf of local firms. This market power creates the opportunity in sector i to charge price markups v_i over marginal cost c_i.

$$c_i (1 + v_i) = p_i \quad (1)$$

The markup depends on the number of firms, price elasticity of demand and assumptions about reactions of rival firms.

The second effect implies that marginal costs in a regulated environment may be excessively high as low-cost foreign suppliers are excluded from the market. Moreover, domestic suppliers may be forced to absorb various regulations on provision and other bureaucratic procedures into their costs. These activities do not contribute to output and generate pure economic waste (Hoekman and Konan 2001).Thus, resource-using service barriers λ_i raise marginal costs above 'best practice' marginal costs c_i^* that would prevail in a liberalized environment.

$$c_i^*(1 + \lambda_i) = c_i \quad (2)$$

The wedge between price and true marginal costs is shown by combining equation (1) and (2). This wedge depends on the product of an ad valorem markup and a proportionate waste factor. It would be highly useful to estimate these two wedges in each sector in order to simulate the effects of their separate and joint removal. Unfortunately, it is not possible to perform this decomposition except on assumed shares. Thus, throughout the baseline counterfactual scenarios, it is assumed that barriers to FDI generate wedges consisting of half rents and half waste.

We have quantified the restrictions on trade in services in Tunisia on the basis of available studies and educated guesses taking into account the severity of the restrictions in each sector. We use Warren (2000) estimates of the price wedge for telecommunications. For the insurance sector, there are legal restrictions which severely restrain international cross border trade (MODE 1)[9], or more significantly, foreign subsidiary suppliers (MODE 3) in the Tunisian market. As is the case throughout this analysis, thorough industry studies of Tunisia's competitiveness in insurance relative to international markets are not available. A moderate baseline assumption is that inefficiencies in Tunisian insurance result in consumer policies that are on the order of 20 percent higher than would be the case in a fully liberalized market. We assume that similar barriers apply to business services. They are assumed to be equal to 10 percent. Regarding financial services, Joseph Francois (1999) using a gravity model, estimated tariff equivalents in business, financial, and construction services and found them to be relatively low in the MENA region. Business and financial services impose an estimated four percent and construction services an estimated 9.5 percent tariff equivalent on trade. While this would indicate that the MENA region is relatively efficient in traded financial services, these estimates tend to be biased downward for low-volume trading nations. A conservative estimate of the tax-distorted wedge in the financial sector should be around ten percent. There is a good reason to believe that these estimates are overly cautious. Tunisia has in place a comprehensive system of controls on external capital flows that interfere with attaining trade credit, resources for travel and also limits access of Tunisian citizens to modern financial instruments. The price wedge in transportation reflects the high level of benchmark regulation in this sector in comparison with markets in similar countries. It is averaged at 50 percent. The hotels and tourism and restaurant sectors are viewed here as already substantially liberalized and subject to a small price-cost wedge. However, foreign participation remains subject to the investment code and projects are granted approval upon a

---

9 Tunisian residents are not allowed to contract insurance in foreign countries.

"*Cahier de Charges*" or detailed conditions to be met by the investor. We consider that there is no potential liberalization for the remaining sectors (Public services and other services).

5. CGE Simulations and Results

Our simulations involve liberalization of trade in services according to Mode 1 and Mode 3 which correspond respectively to cross-border service flows and commercial presence, better known as FDI.

Concerning Mode 1, it is obvious that there are no explicit tariffs on imports of services. Tariff equivalents should therefore be estimated, as previously discussed, on the basis of the extent of restrictions characterizing the various service sectors of the Tunisian economy. These equivalents are treated in the model similarly to the explicit import duties levied on merchandise imports. Thus, in the simulation of Mode 1 liberalization consists of removing totally or partially these estimated tariff equivalents.

However, Mode 3 should be handled differently. As explained in the theoretical section and following Konan and Maskus (2006), we distinguish between two effects of restrictions falling under this mode of delivery: the excess cost or inefficiency effect and the monopoly power or rent effect. There are at least two approaches to model this distinction. The first one, which is applied by Konan and Maskus, is to assume that local firms produce services at a higher cost than the best-practice level (the inefficiency component). To this excess cost a rent is added due to monopoly power. The second approach, which we apply in our simulations, consists of introducing excess cost directly in the production function through the total factor productivity coefficient. Thus, if a sector has an excess cost with respect to best practice equal to 20 percent for example and if liberalization of Mode 3 of trade in the relevant service removes this excess cost, the effect can be simulated by assuming that the TFP (A_{tr}) rises by 20 percent above its level in the initial state of the economy. The second component – the rent component (f_{tr}) – is handled in the same way as domestic taxes on sales of domestically-produced services. It is important to note that unlike taxes, which go into the government's budget, these rents go to producers and are part of the income of the representative household.

Liberalization under Mode 3 is supposed to attract FDI flows for a developing country such as Tunisia which implies that the stock of capital would increase following liberalization. However, it is difficult to model FDI endogenously because it should depend on differences in rates of return to capital in Tunisia as opposed to the source countries. Given this constraint, we have two options. The first is to assume that the foreign-owned capital will increase by some proportion which is an arbitrary assumption. The second option, which we follow, is simply to assume that the total stock of capital in the economy remains constant and that foreign competition pressure materializes through the reduction or even total removal of excess cost and rents in the various tradable service sectors.

Table 6 summarizes the results of our simulations. We have considered first, the total liberalization of services under Mode 1 through the removal of the tariff equivalent on imports on services (Scenario 1). For trade under Mode 3, we consider three cases varying according to alternative assumptions on the relative importance of excess cost as opposed to rents. Case one (Scenario 2) assumes that prior to liberalization; firms did not have any market power but were inefficient by comparison to best-practice. Case 2 makes the opposite assumption that local production followed best-practice and that market power generated rents in the initial situation (Scenario 3). The third and final case assumes that excess cost (inefficiency) and rents weigh equally prior to liberalization (Scenario 4). The last column of Table 6 combines the effects of Mode 1 liberalization with the effects of the mixed scenario of Mode 3.

As shown in Table 6, the effects of particular interest are on welfare, measured by the equivalent variation of the representative agent, as well as on wages and the return to capital. Other relevant effects involve the composition of production and prices. The liberalization of cross-border trade in services improves welfare by only 0.85 percent and raises labor and capital rewards respectively by 0.67 percent and approximately 1 percent. Thus, both factors profit from liberalization, although the gains are relatively small. This result, which is similar to that found by Konan and Maskus, contrasts with the effects found in studies of liberalization of trade in goods which generally show that labor gains while capital loses in developing countries. As expected, the production share of services slightly declines to the benefit of manufacturing. The effects are substantially larger when Mode 3 is liberalized. In column (2) TFP increases (the cost falls) in each service sector, resulting in a welfare improvement of 4.64 percent which is very high compared to the effects of liberalization of trade in goods recorded for Tunisia or most other countries. In column (3), the elimination of domestic rents leads to a small gain in welfare of 0.26 percent. The effects of the mixed scenario are shown in column (4). Welfare increases by 3.46 percent, the price of capital increases by 4.5 percent and wages increase by 2.12 percent. It is important to note that while in the three cases of FDI liberalization scenarios both labor and capital returns increase, capital gains relatively more than labor does.

In column 5 we consider the impact of border barriers and investment barriers liberalization. The result is an increase in welfare equal to 4.34 percent, most of which attributed to FDI liberalization. The service share in production shifts from 38.87 percent to 40.5 percent, which may be considered as relatively large.

6. Conclusion
The main objective of the paper has been to simulate the removal of barriers to trade in services in Tunisia by focusing on Mode 1 and Mode 3 of service delivery. The potential welfare implications of services liberalization are clearly positive and substantial. Even given modest assumptions about the current environment for trade in services, welfare was found to increase by more than 4 percent. This result confirms the idea that the liberalization of services has a more important impact on welfare than that of goods, and that gains would be rather modest if liberalization is limited to the latter. Our work has shed some light on the effects expected from the so called deep integration – the integration that encompasses services.

References

Boylaud, O. and G. Nicoletti. 2000. «Regulation, Market Structure and Performance in Telecommunications». Working Paper No. 237ECO/WKP (2000), 10, Economics Department, OECD, Paris, 12 April.

Brown, Drusilla and Robert M. Stern. 2001. « Measurement and Modeling of the Economic Effects of Trade and Investment Barriers in Services». *Review of International Economics* 9:262-86.

Brown, Drusilla K., Deardorff, Alan V., Stern, Robert M. 1997. «Some Economic Effects of the Free Trade Agreement between Tunisia and the European Union». In: Galal, Ahmed, Hoekman, Bernard (Eds.), Regional Partners in Global Markets: Limits and Possibilities of the Euro–Med Agreements. Centre for Economic Policy Research, London.

Brown, Drusilla K., Deardorff, Alan V., Stern, Robert M. 1996. « The Liberalization of Services Trade: Potential Impacts in the Aftermath of the Uruguay round». In: Martin, Will, Winters, Alan (Eds.), The Uruguay Round and the Developing Countries. Cambridge University Press, Cambridge.

Dee, Philippa, Hanslow, Kevin. 2000. «Multilateral Liberalization of Services Trade ». In: Stern, Robert M. (Ed.), Services in the International Economy. University of Michigan Press, Ann Arbor.

Doove, Samantha, Owen Gaabbitas, Duc Nguyen-Hong, and Joe Owen. 2001. « Price Effects of Regulation: Telecommunications, Air Passenger Transport and Electricity Supply». Productivity Commission Staff Research Paper. Canberra (October).

Fink, Carsten, Aaditya Mattoo, and Ileana Cristina Neagu. 2002. «Trade in International Maritime Services: How Much Does Policy Matter? ». *World Bank Economic Review* 16:81-108.

Gonenc, R. and G. Nicoletti. 2001. « Regulation, Market Structure and Performance in Air Passenger Transportation ».OECD Economic Studies, No. 32, OECD, Paris.

Hertel, Thomas W.2000. « Potential Gains from Reducing Trade Barriers in Manufacturing, Services and Agriculture». In: "Multilateral Trade Negotiations: Issues for the Millennium Round," St. Louis: Federal Reserve Bank of St. Louis.

Hertel, Thomas W. 1997. « Global Trade Analysis: Modelling and Applications» .Cambridge University Press, Cambridge.

Hoekman, Bernard.1995. « Tentative First Steps: An Assessment of the Uruguay Round Agreement on Services». Policy Research Working Paper, vol.1455. World Bank, Washington DC.

Hoekman, Bernard and Carlos A. Primo Braga. 1997. «Protection and Trade in Services: A Survey». *Open Economies Review* 8:285-308.

Holmes, Leanne and Alexis Hardin. 2000. «Assessing Barriers to Services Sector Investment in Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications». London and New York: Routledge.

Institut National de la Statistique. 2003. «Comptes de la Nation, Base 1983, Agrégat et Tableaux d'Ensemble 1998-2002». Volume 1. Décembre. Tunis.

Johnson, Martin, Tendar Gregan, Geraldine Gentle, and Paul Belin. 2000. «Modeling the Benefits of Increasing Competition in International Air Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge

Kalirajan, Kaleeswaran. 2000. « Restrictions on Trade in Distribution Services». Productivity Commission Staff Research Paper, Canberra (August).

Kalirajan, Kaleeswaran, Greg McGuire, Duc Nguyen-Hong, and Michael Schuele. 2000. «The Price Impact of Restrictions on Banking Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Kang, Jong-Soon. 2000. « Price Impact of Restrictions on Maritime Transport Services» .In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Kemp, Steven. 2000. « Trade in Education Services and the Impacts of Barriers on Trade». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Konan, Denise and Maskus, Keith.2006.« Quantifying the Impact of Services Liberalization in a Developing Country ». *Journal of Development Economics* 81: 142– 162

Lipsey, Robert, 2001. «The New Economy: Theory and Measurement». Paper for 27th Annual PAFTAD Conference: The New Economy: Challenges for East Asia and the Pacific, Canberra, Australia.

Markusen, James R .2007. «Trade in Business Services in General Equilibrium». *NBER Working Paper* 12816, Cambridge, January.

Markusen, James R. 1989. «Trade in Producer Services and in Other Specialized Intermediate Inputs ». *American Economic Review,* 79, 85– 95.

McGuire, Greg. 1998. «Australia's Restrictions on Trade in Financial Services». Staff Research Paper, Productivity Commission, Canberra (November).

McGuire, Greg, Michael Schuele, and Tina Smith. 2000. «Restrictiveness of International Trade in Maritime Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implication. London and New York: Routledge.

McGuire, Greg and Michael Schuele. 2000. «Restrictiveness of International Trade in Banking Services». Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London.

Nguyen-Hong, Duc. 2000. «Restrictions on Trade in Professional Services». Productivity Commission, Staff Research Paper, Ausinfo, Canberra, August.

Petri, P.A. 1997. «Foreign Direct Investment in a Computable General Equilibrium Framework. ». Paper prepared for the conference, Making APEC Work: Economic Challenges and Policy Alternatives, 13-14 March, Keio University, Tokyo.

Rutherford, Thomas, Tarr, David. 2002. «Trade Liberalization, Product Variety and Growth in a Small Open Economy: A Quantitative Assessment ». *Journal of International Economics* 56, 247– 272.

Rutherford, Thomas, Rustrom, Elisabeth, and Tarr, David.1995. « The Free Trade Agreement between Tunisia and European Union ». In Galal and Hoekman.

Rutherford, Thomas, Rustrom, E.E., Tarr, David. 1995. « The Free Trade Agreement between Tunisia and the European Union». (manuscript). World Bank.

Trewin, Ray. 2000. «A Price-Impact Measure of Impediments to Trade in Telecommunications Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Warren, Tony. 2000a. «The Identification of Impediments to Trade and Investment in Telecommunications Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Warren, Tony. 2000b. «The Impact on Output of Impediments to Trade and Investment in Telecommunications Services». In Christopher Findlay and Tony Warren (eds.), Impediments to Trade in Services: Measurement and Policy Implications. London and New York: Routledge.

Appendix: Model equations

A. Production

$$XS_j = \min\left[\frac{CI_j}{io_j}, \frac{VA_j}{v_j}\right]$$

$$VA_{tr} = A_{tr}\left[a_{tr}LD_{tr}^{-\alpha_{tr}} + (1 - a_{tr})KD_{tr}^{-\alpha_{tr}}\right]^{\frac{-1}{\alpha_{tr}}}$$

$$VA_{ntr} = LD_{ntr}^{\alpha_{ntr}}$$

$$CI_j = io_j XS_j$$

$$DI_{tr,j} = aij_{tr,j}CI_j$$

$$LD_{tr} = \left[\left(\frac{r_{tr}}{s}\right)\left(\frac{a_{tr}}{1 - a_{tr}}\right)\right]^{\theta_{tr}} KD_{tr}$$

$$LD_{ntr} = \frac{P_{ntr}XS_{ntr} - \sum_{tr} PC_{tr}DI_{tr,ntr}}{s}$$

B. Income and Consumption

$$YM = s\sum_j LD_j + \lambda\sum_{tr} r_{tr}KD_{tr} + TG + DIV$$

$$YDM = YM - TD$$

$$SM = \psi YDM + TWM$$

$$YE = (1 - \lambda - \lambda_w)\sum_{tr} r_{tr}KD_{tr}$$

$$SE = YE - DIV - TDE + TWE$$

$$YG = \sum_{tr} TIM_{tr} + \sum_{tr} TIE_{tr} + \sum_{tr} TI_{tr} + TD + TDE$$

$$SG = YG - G - TG + TWG$$

$$TI_{tr} = tx_{tr}(P_{tr}XS_{tr} - PE_{tr}EX_{tr}) + \frac{tx_{tr}}{(1 + tx_{tr})}PM_{tr}M_{tr}$$

$$TIM_{tr} = tm_{tr}ePWM_{tr}M_{tr}$$

$$TIE_{tr} = te_{tr}PE_{tr}EX_{tr}$$

$$TD = tyYM$$

$$TDE = tyeYE$$

$$C_{tr} = \frac{\gamma_{tr}YDM}{PC_{tr}}$$

$$INV_{tr} = \frac{\mu_{tr}IT}{PC_{tr}}$$

$$DIT_{tr} = \sum_{j} aij_{tr,j}CI_{j}$$

C. Prices Relationships

$$PV_{j} = \frac{P_{j}XS_{j} - \sum_{tr} PC_{tr}DI_{tr,j}}{VA_{j}}$$

$$r_{tr} = \frac{PV_{tr}VA_{tr-}sLD_{tr}}{KD_{tr}}$$

$$PD_{tr} = (1 + tx_{tr} + f_{tr})PL_{tr}$$

$$PM^{r}_{tr} = (1 + tx_{tr})(1 + tm_{tr})ePWM_{tr}$$

$$PE_{tr} = \frac{ePWE_{tr}}{(1 + te_{tr})}$$

$$PC_{tr} = \frac{(PD_{tr}D_{tr} + PM_{tr}M_{tr})}{Q_{tr}}$$

$$P_{tr} = \frac{(PL_{tr}D_{tr} + PE_{tr}E_{tr})}{XS_{tr}}$$

$$PINDEX = \sum_{j} \delta_{j}PV_{j}$$

D. International Trade

$$XS_{tr} = B_{tr}^E \left[\beta_{tr}^E EX_{tr}^{k_{tr}^E} + (1 + \beta_{tr}^E) D_{tr}^{k_{tr}^E} \right]^{\frac{1}{k_{tr}^E}}$$

$$EX_{tr} = \left[\left(\frac{PE_{tr}}{PL_{tr}} \right) \left(\frac{1 - \beta_{tr}^E}{\beta_{tr}^E} \right) \right]^{\tau_{tr}^E} D_{tr}$$

$$Q_{tr} = A_{tr}^M \left[\alpha_{tr}^M M_{tr}^{-\rho_{tr}^M} + (1 - \alpha_{tr}^M) D_{tr}^{-\rho_{tr}^M} \right]^{\frac{-1}{\rho_{tr}^M}}$$

$$M_{tr} = \left[\left(\frac{PD_{tr}}{PM_{tr}^r} \right) \left(\frac{\alpha_{tr}^M}{(1 - \alpha_{tr}^M)} \right) \right]^{\sigma_{tr}^M} D_{tr}$$

$$SR = e \sum_{tr} PWM_{tr} M_{tr} + \lambda_w \sum_{tr} r_{tr} KD_{tr} + \sum_r TWE - e \sum_{tr} PWE_{tr} EX_{tr}$$

E. Equilibrium

$$Q_{tr} = DIT_{tr} + C_{tr} + INV_{tr}$$

$$XS_{ntr} P_{ntr} = G$$

$$LS = \sum_j LD_j$$

$$IT = SM + SE + SG + SR$$

List of Variables

LD_j: Domestic labor inputs in sector j (J=15),

LD_{tr}, LD_{ntr} : Domestic labor inputs in tradable sectors (j=1..14) and non tradable sector (j=1)

KD_{tr} : Domestic capital input in tr sectors

VA_j, VA_{tr}, VA_{ntr} : Value added in j, tr and ntr sectors

XS_j, XS_{tr}, XS_{ntr} : Production of sector j, tr and ntr sectors

CI_j : Total intermediate consumption of sector j

C_{tr} : Private consumption of good or service tr

$DI_{tr,j}$: Intermediate consumption of good or service tr in sector j

DIT_{tr} : Intermediate demand for good or service tr

YM, YE, YG: Household, Firms and government income

YDM: Household disposable income

e: Exchange rate

EX_{tr} : Export of good or service tr

INV_{tr}: Investment in good or service tr

IT: Total investment

D_{tr} : Demand for domestic good or service

M_{tr} : Import of good or service tr

P_i : Producer price

P_{tr}, P_{ntr} : Price of tr and ntr good or service

PC_{tr} : Composite price of domestic and imported good or service

PD_{tr} : Domestic price for good or service tr including tax

PL_{tr} : Domestic price of good or service tr excluding tax

PE_{tr} : Domestic price of exported good or service tr

PWE_{tr} : International price of exported good or service tr

PM_{tr} : Domestic price of imported good or service tr

PWM_{tr} : International price of imported good or service tr

PINDEX: Producer price index

PV_j: Value added price

Q_{tr}: Demand for composite good or service tr

r_{tr}, s : Capital and labor prices

SE, SG, SM: Firm, government and household saving

TD: Receipts from direct taxation on household income

TDE: Receipts from direct taxation on firms incomes

TI_{tr} : Receipts from indirect tax

TIE_{tr}, TIM_{tr}: Receipts from indirect tax on exports and imports

DIV: Dividends paid to household

G: Public consumption

SR: Government budget deficit

TWE, TWM, TWG: International transfers to firms, household and government

TG: Transfers from government to household

List of Parameters

A_{tr} : Scale parameter (CES function)

a_{tr}: Share parameter (CES function)

α_j : Substitution parameter between labor and capital

θ_{tr} : Substitution coefficient between labor and capital

$aij_{tr,j}$: Input- output coefficient

io_j : Technical coefficient (Leontief function)

v_j : Technical coefficient (Leontief function)

A_{tr}^M : Scale parameter (CES function)

α_{tr}^M : Share parameter (CES)

ρ_{tr}^M : Substitution parameter (CES)

σ_{tr}^M : Substitution elasticity between imported and domestic good or service(CES)

B_{tr}^E : Scale coefficient (CET function)

β_{tr}^E : Distribution parameter (CET)

k_{tr}^E : Transformation parameter between export and domestic output (CET)

τ_{tr}^E : Transformation elasticity (CET)

f_{tr}: Firms rents

tm_{tr} : Imports duties

te_{tr} : Tax on export

tx_{tr} : Tax rate

tye: Direct income tax rate for firms

ty : Direct income tax for household

δ_j : Share of sector j in total value added

γ_{tr} : Share of the value of good tr in total consumption

λ : Share of capital income received by households λ_w : Share of capital income received by foreigners

ψ Propensity to save for household

μ_{tr} : Share of the value of good tr in total investment

Table 1: Sectoral Output and Factor Shares (percent of total)

	Production	Imports	Intermediate consumption	Households consumption	Exports
Aggregate sectors (percent of total)					
Agricultural and fishing	7.78	4.91	11.33	9.85	1.41
Manufacturing	38.73	68.23	57.91	44.96	61.01
Utilities, mining, energy and construction	14.62	8.87	12.57	3.91	7.14
Services	**38.87**	**18.00**	**18.20**	**41.37**	**30.44**
Of which					
Domestic trade	7.07	-	-	-	-
Transportation	5.56	2.58	4.03	5.07	8.58
Communication	1.93	0.14	3.56	0.46	0.16
Hotel and tourism	1.66	12.40	0.12	6.16	18.71
Restaurant	3.97	-	0.03	9.49	-
Finance	2.33	0.39	4.7	0.12	0.4
Insurance	0.2	0.07	0.29	0.18	0.02
Business related services	1.57	2.40	3.00	0.07	2.58
Real estate	2.39	0.01	0.98	4.66	0.01
Repair	1.23	-	1.21	1.40	-
Other services	2.12	-	0.28	2.76	-
Public services	8.84	-	-	9.00	-

Institut National de la Statistique. (2003) ; Comptes de la Nation, Base 1983, agrégats et tableaux d'ensemble 1998-2002, Volume 1. Décembre. Tunis

Table 2: Restrictiveness Index Scores for Telecommunication Services in Tunisia

Domestic Price Effect			Foreign Index		
Restrictions on establishment	*Restrictions on cross- border trade*	*Domestic price total*	*Restrictions on establishment*	*Restrictions on cross-border trade*	*Foreign Price total*
0.33	0.20	0.53	0.53	0.40	0.93

Note: Restrictiveness on FDI and mobile network services.
Source: Warren (2000).

Table 3: Price Effect Measures for Telecommunication Services in Tunisia

Domestic price effect			Foreign index		
Restrictions on establishment	*Restrictions on cross- border trade*	*Domestic price total*	*Restrictions on establishment*	*Restrictions on cross-border trade*	*Foreign Price total*
56.1percent	33.7percent	89.8percent	89.8percent	67.3percent	157.1percent

Source: Warren (2000).

Table 4: NTB Ad Valorem Price Equivalents (percent)

	Mode 1 (Cross-border trade)	Mode3 (Foreign presence)
Domestic trade(Distribution)	NT	3
Transportation	50	3
Communication	157	30
Hotel and tourism	NT	3
Restaurant	NT	3
Finance	10	10
Insurance	20	20
Business related services	10	10
Real estate	10	10
Repair	NT	3
Other services	NT	NT
Public services	NT	NT

NT-Non traded activities

Table 5: Effects of Liberalization of Trade in Services in Tunisia: Alternative Scenarios

	Cross-border Mode 1	FDI Mode 3			Cross- border and FDI Mode 1 and Mode 3 (mixed)
		Cost scenario	Rent scenario	Mixed scenario	
Macroeconomic variable(percent change)					
Welfare (Equivalent Variation)	0.85	4.64	0.26	3.46	4.34
Consumer price index	-0.11	1.27	-4.12	-3.22	-2.19
Real return to labor	0.67	1.23	2.97	2.12	1.13
Real return to capital	1.02	4.97	4.00	4.55	5.55
Production (Share of total)					
Agricultural (Benchmark=7.78)	.7	8.33	8.02	8.61	8.36
Manufacturing (Benchmark=38.73)	49.15	39.12	39.33	39.89	39.01
Utilities, mining, energy and construction (Benchmark=14.62)	7.46	13.40	12.11	12.27	12.69
Services (Benchmark=38.87)	37.69	39.25	40.54	39.23	40.94