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Modeling Services Liberalization: The Case of Kenya

by

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Abstract: In this paper we employ a 50 sector small open economy computable general equilibrium model of the Kenyan economy to assess the impact of the liberalization of regulatory barriers against foreign and domestic business service providers in Kenya. The model incorporates productivity effects in both goods and services markets endogenously, through a Dixit-Stiglitz framework. The ad valorem equivalent of barriers to foreign direct investment have been estimated based on detailed questionnaires completed by specialists in Kenya. We estimate that Kenya will gain about 9.3% of the value of Kenyan consumption in the medium run (or 8.8% of GDP) from a full reform package that also includes uniform tariffs. The gains increase to 12.1% of consumption in the long run steady state model. Decomposition exercises reveal that the largest gains to Kenya will derive from liberalization of regulatory barriers against its domestic service providers.

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Both economic theory and empirical literature have shown that wide availability of business services results in productivity gains to the manufacturing sector and contributes to its international competitiveness.[1] In many of the services sectors in Kenya, however, the regulatory regime imposes significant burdens on the cost of providing services, both by Kenyan service providers and by multinationals. Consequently the number of service providers and their quality is lower than it could be. Reform of the regulatory regimes in Kenyan services sectors could therefore result in an increase in the number and quality of business service provision in Kenya.

Moreover, in the context of the negotiations under the Doha Development Agenda, Kenya has received numerous requests for further commitments in the business services area. In addition, Kenya is involved in negotiations of commitments in services in the European Partnership Agreements as well as

[1] Marshall (1988) shows that in three regions in the United Kingdom (Birmingham, Leeds and Manchester) almost 80 percent of the services purchased by manufacturers were bought from suppliers within the same region. He cites studies which show that firm performance is enhanced by the local availability of producer services. In developing countries, McKee (1988) argues that the local availability of producer services is very important for the development of leading industrial sectors.

Both the urban economics literature (Vernon, 1960; Chinitz, 1961) and the more recent economic geography literature (e.g., Krugman, 1991; Porter, 1992; Fujita, Krugman and Venables, 1999) has focused on the fact that related economic activity is economically concentrated due to agglomeration externalities (e.g., computer businesses in Silicon Valley, ceramic tiles in Sassuolo, Italy). Evidence comes from a variety of sources. Ciccone and Hall (1996) show that firms operating in economically dense areas are more productive than firms operating in relative isolation. Caballero and Lyons (1992) show that productivity increases in industries when output of its input supplying industries increases. Hummels (1995) shows that most of the richest countries in the world are clustered in relatively small regions of Europe, North America and East Asia, while the poor countries are spread around the rest of the world. He argues this is partly explained by transportation costs for inputs since it is more expensive to buy specialized inputs in countries that are far away for the countries where a large variety of such inputs are located.

in its regional trading arrangements, COMESA[2] and the East African Customs Union.[3] We shall argue that while there are barriers against foreign investment in business services, *in practice,* the Kenyan regulatory regime does not discriminate heavily against multinationals. However, Kenyan commitments at the WTO or in its regional arrangements are considerably less open than its practice. Binding commitments made at the WTO or in regional agreements provide a signal to investors in the services sectors that they are welcome and that the regulatory regime will not be turned against them arbitrarily.

What would be the consequences for Kenya of responding to the requests of its trading partners by agreeing to further commitments? How much would Kenya gain from reform of its regulatory regime if reform could reduce the costs of providing business services by both its domestic firms as well as multinationals? What would be the impact on industry, agriculture, wages, returns to capital, exports and imports, as well as the services sectors themselves from reforms in the services sectors? .

In this paper we develop a 50 sector small open economy comparative static computable general equilibrium model of Kenya that we believe is appropriate to evaluate the impact of Kenyan liberalization of services barriers. Our key modeling assumptions are that: we assume that a substantial portion of business services require a domestic presence; multinational service providers import some specialized capital or labor as part of their decision to establish a domestic presence; and business services supplied with a domestic presence are supplied by imperfectly competitive firms who produce a unique variety of the service. We adopt the Dixit-Stiglitz-Ethier structure for business services (and for increasing returns to scale goods) that implies endogenous productivity gains from the net introduction of new varieties of service providers. We also allow for endogenous productivity effects from additional varieties of imperfectly competitive goods.[4]

[2] The Common Market for Eastern and Southern Africa (COMESA) is a preferential trade area among Djibouti, Kenya, Madagascar, Malawi, Mauritius, Sudan, Zambia and Zimbabwe.
[3] The East African Customs Union is a customs union among Kenya, Uganda and Tanzania.
[4] Elasticities of substitution for product categories in the Dixit-Stiglitz framework have been estimated by Broda and Weinstein (2004). They estimate that, although there are variances within the groups, for agriculture, services and goods the Dixit-Stiglitz elasticitiy of substitution is close to three. We choose three as our central Dixit-Stiglitz elasticity of substitution.

Crucial to our analysis, we estimate the ad valorem equivalence of the regulatory barriers in business services in Kenya, both discriminatory against foreign investors as well as non-discriminatory barriers that apply to domestic service providers. Among our business services sectors, we find that the regulatory costs are the highest in the transportation sector (especially the maritime sector). Although the regulatory costs are higher for foreign firms, they are very high for domestic firms as well. Regulatory barriers in the communications sector are also quite significant.

We find that the Kenyan tariff structure on average is not very high. On the other hand, there is high dispersion in the tariff structure with some sectors, like beverages and tobacco and grain and milling, with rather high tariffs. Consequently, we also evaluate the potential gains to the Kenyan economy and the impact on different sectors of moving to a uniform tariff.

In our "full reform" package, we estimate that Kenya will gain 9.3 percent of consumption or 8.8 percent of GDP per year. We argue that the gains to Kenya derive from three principal effects: (1) the largest gains derive from a reduction in regulatory barriers against service providers. This will increase the number of service varieties available in Kenya . The variety increase will increase total factor productivity (or lower the quality adjusted costs) in sectors that use business services. Due to their larger share of the market, there are greater gains from liberalization of the regulatory barriers against domestic service providers than from liberalization against foreign service providers; (2) tariff uniformity induces gains of 1.4 percent of GDP per year. The reason is that the distortion costs of a tariff increase with the square on the tariff. Then moving to uniformity can be expected to benefit the country since it is the very high tariffs that cause the most of distortion costs; and (3) positive effects on the investment climate from increases in the rate of return to capital. We use our comparative steady state model to assess that the gains to the economy, when the positive impact on the investment climate is taken into account. The estimated gains increase to 12.1 percent of consumption or 11.4 percent of GDP per year. In the context of the assumptions of this model, this is an upper bound estimate.

This paper is innovative since it is the first paper to numerically assess liberalization of barriers against both domestic and multinational service providers in a multi-sector applied general equilibrium model where the Dixit-Stiglitz variety-productivity effects are important to the results; and it is the first to

assess services liberalization in an sub-Saharan African country.. Earlier related work includes the following. Markusen, Rutherford and Tarr (2005) developed a stylized model where foreign direct investment is required for entry of new multinational competitors in services, but they did not apply this model to the data of an actual economy. Brown and Stern (2001) and Dee et al. (2003) employ multi-country numerical models with many of the same features of Markusen, Rutherford and Tarr. Their models contain three sectors, agriculture, manufacturing and services, and are thus also rather stylized. The Dixit-Stiglitz endogenous productivity effect from the impact of service sector liberalization on product variety is not mentioned in the results of Brown and Stern and are interpreted as of little relevance in Dee et al.[5] The paper by Jensen, Rutherford and Tarr (forthcoming) on Russian WTO accession is the closest to this model; but the impact of liberalization of domestic regulatory barriers is not considered in that paper.

The paper is organized as follows. In section II we provide an overview of the key business services sectors and the estimation of the ad valorem equivalents of the regulatory barriers. In section III we describe the model and the most important data. In section IV we describe and interpret the central policy scenarios. We conclude briefly in section V.

II. Overview of the Kenyan Services Sectors and the Estimation of the Tariff Equivalence of the Regulatory Barriers

Transportation

One bright spot in the Kenyan transportation network is its air transportation services. In recent years, Kenya allowed private sector development (both Kenyan and foreign) to develop the air transportation links. The efficient air transportation services facilitate the important tourism sector and have been instrumental in the development of the Kenyan cut flower industry, which in turn has contributed to growth and poverty reduction.

[5] There have also been numerical estimates of the benefits of services liberalization where services trade is treated analogously to goods trade, i.e. trade in services is assumed to be entirely cross-border and subject to tariffs. For example, see Brown, Deardorff, Fox and Stern (1996).

However, Kenya's port, rail and road transportation facilities are significant problems for transportation of its goods and for the competitiveness of its exports (for details see Helu, 2007; Ochieng, 2007; and World Bank, 2007). Its principal port, Mombassa, is plagued by poor infrastructure and complicated bureaucratic procedures. The port is congested due to mismanagement, rather than lack of capacity (World Bank, 2007). As a result, it takes an average of two weeks to clear a container at the port and more than four weeks for over five percent of the containers. The cost of importing a container into Kenya exceeds $2000, while it is under $1,000 per container in Tanzania and South Africa and under $500 per container in Malaysia and Singapore.[6] Uncertainty over delivery times is a significant cost burden on manufactured exports. The port at Dar es Salaam, Tanzania, is regarded as more efficient and container throughput has been growing much faster there.

Due to a lack of investment, Kenya's railways have significantly declined and are considered rather poor providers of freight transportation services since the 1980s.[7] Road transportation is the primary means of overland transport. But some sections of the key "Northern Corridor" are in very poor condition.

Kenya's problems with its ports, rail and road transportation facilities were highlighted by Kenya's ranking on the international Logistics Perception Index of 2004.[8] Of the 70 countries in the 2004 survey, Kenya was ranked as the least logistically friendly (World Bank, 2007). In Africa, the survey included South Africa, Zambia, Ghana and Nigeria. For 2006, the survey expanded to include 150 countries, and Kenya ranks at number 75--below several African countries, but above average for the region.

Telecommunications

[6] World Bank staff estimates.

[7] In the hope of improved performance, Kenya's railways were turned over to Rift Valley Railways, a South African company, in November 2006. One regulatory reform that has been discussed is whether competition in the provision of freight services should be allowed, with maintenance of the roadbed as a regulated network monopoly by Rift Valley Railways.

[8] The Logistics Perception Index measures the perceptions of managerial level personnel of international freight forwarding companies. It is published by the Global Facilitation Partnership for Transportation and Trade and available at: www.gfptt.org.

Kenya's telecommunications services are expensive compared with other sub-Saharan African countries and even more when compared with those of East and South Asia. Relative to countries with comparable income, Kenya has fewer fixed lines per capita, less than half the level of international calls per subscriber and higher Internet charges. Perhaps more important, is the low efficiency of service provision (see World Bank, 2007, pp.45-47). Kenya currently requires that telephone companies must be at least 30 percent owned by Kenyan nationals. Problems related to the licensing off the third mobile telephone provider[9] and the "Second National Operator" are primarily due to this restraint. In fact, the Government has acknowledged that the 30 percent ownership requirement is delaying licensing of additional telecom operators.[10] Data transmissions are especially expensive by international standards. In early 2007, these are being done by satellite. The government is attempting to connect to a fiber optic cable on the seabed. When successful, it is estimated that the costs per month for data transmissions will drop several fold. On international surveys of doing business, long distance telecommunication charges are considered burdensome on average less than ten percent of the time; but in Kenya the figure is 44 percent. The World Bank (2007, p. 46) assesses that delays in implementing the reform agenda are the reason for the high cost and low quality of telecommunication services in Kenya.

While there are obviously serious economic problems in the sector, the government has implemented significant reforms in the sector in the last ten years. The government's strategy for the sector is outlined in the Postal and Telecommunications Policy Statement of 1997.[11] The strategy outlines a more liberal and private sector led strategy designed to optimize the sector's contribution to economic growth of Kenya (Ndaro, 2007) The Kenya Communications Act of 1998. created the Communication

[9] Regarding the third mobile telephone operator, a consortium of a local investor (Kenya National Federation of Cooperatives, KNFC) and foreign investors (Econet Wireless) won the tender in February 2004. But the consortium was put together to meet the 30 percent local ownership requirement, not because of business reasons. Citing deals made by a previous CEO of KNFC, KNFC at one point wrote to the Communications Commission of Kenya (CCK) withdrawing from the consortium. KNFC later withdrew its letter of objection, but lost its controlling share of the consortium. CCK, nonetheless, awarded the license to Econet Wireless and court battles ensued. The Government eventually suspended the entire CCK board and its Director General, and suspended the license of Econet. In April 2007, Econet has agreed to withdraw its court case and settle the matter out of court.

[10] "SNO to get a year to meet local ownership rule," *The Saturday Standard*, Business section, April 14, 2007.

[11] This statement is consistent with the government's Economic Recovery Strategy for Wealth Creation (ERS)

Commission of Kenya as an independent regulator of the sector. The monopoly rights of Telekom Kenya Ltd expired on June 30, 2004. Since then four internet backbone suppliers have been licensed; seven public data operators were licensed; and five commercial VSAT operators and local loop operators were licensed. Mobile operators were awarded international gateway licenses and the licensing process for a "Second National Operator" is underway. Moreover, a draft law for the sector was undergoing review in the spring of 2007. Once passed, many new reforms would be implemented designed to attract new private investment into the sector by licensing new players in various sub-sectors of telecommunications. In early 2007, the main regulatory challenges are the licensing of the second national operator, passage of the draft law for the sector, planned establishment of a national backbone infrastructure and development of a universal access strategy. The estimates of this paper can be taken as an assessment of the effective implementation of this reform program. (See Ndaro (2007) for further details on the regulatory challenges of the sector.)

Banking and Insurance

Banking. Relative to other countries in Africa, Kenya has a well developed financial sector. The cost of credit does not appear to be a major constraint for large enterprises. Nonetheless, medium, small and micro enterprises have severe problems accessing credit.[12] Only about 1.5 percent of the credit these enterprises receive is from banks, and about 90 percent of them have no access to credit. Their problems accessing credit is because of: the high costs to banks of evaluating and monitoring credit to small enterprises; the absence of credit rating agencies, deficiencies in the legal system that make enforcement of debt contracts difficult and push collateral requirements too high for small firms; many small firms lack the capacity to process bank paperwork; and many small firms do not have access to insurance that would significantly reduce the risk to banks and the collateral required.

Foreign banks can operate in Kenya, either by acquiring a Kenyan bank or by obtaining a license to operate as an Kenyan affiliate bank of a multinational bank. In practice, affiliates of multinational

[12] Despite the credit problems, it is the medium and small enterprises that are the fastest growing part of the Kenyan economy. They increased their share of GDP from 13.8 in 1993 to 18.4 in 1999.

banks are provided full market access and national treatment, but Kenya has not "bound" this practice at the WTO. The European Union has requested that Kenya commit to national treatment of foreign investment in the sector by binding this commitment at the WTO (Kiptui, 2007). Branch banking by foreign banks, however, is not permitted.

Insurance. The insurance market in Kenya is small, but is considered one of the more developed in Africa**.** Similar to banking issues, however, medium, small and micro enterprises have little access to insurance (World Bank, 2007). Regarding the regulatory environment, **c**ross border provision of insurance is limited to cargo insurance and reinsurance services. In addition, the ownership of an insurance company must be at least partially Kenyan.

Distribution Services

Distribution services is the wholesale and retail trade sector of the economy. In Kenya in 2004 this sector accounted for about ten percent of GDP, there were 217 thousand retail outlets and about 66 percent of these retail outlets were either small retail stores or kiosks. Only one-half a percent of the outlets are super markets or very large stores. It is necessary to distinguish agricultural marketing from the marketing of manufactured goods.

Prior to 1993, many agricultural products, including maize, coffee and tea had to be sold to State Marketing Boards. The State Marketing Boards had an exclusive right to purchase, distribute and import these products. Since the reforms of 1993, farmers are now free to see to private traders or to mills or the final consumer directly, but they still have the option to sell to the State Marketing Board if they choose. On the other hand, distribution of manufacturing goods has traditionally been handled by the private sector.

Presently numerous business licenses are required and many are considering damaging forms of government regulation (Onyango, 2007). The Government established a committee to review 1335 licenses. Draft laws and regulations have been prepared to implement the recommendations of the committee but have not yet been implemented. In addition, restrictions on large scale outlets, shop opening hours and zoning restraints on business have been criticized as unnecessary burdens on business.

With respect to discriminatory restraints on foreign investors, Kenya requires that foreigners conduct business only in areas designated as general business areas. Local partners are encouraged, but not required. Expatriates employees are limited and the company must demonstrate that the skills are not available locally.

Ad Valorem Equivalence of Barriers to Foreign Direct Investment in Services Sectors.

Estimates of the ad valorem equivalents of the regulatory barriers in services are key to the results. In order to perform these estimate the ad valorem equivalents, we first need to assess the regulatory environment in the services sectors in our model. Fortunately, there is a good set of studies on the services sectors that were presented at the conference on "Trade in Services" in Nairobi, Kenya on March 26, 27, 2007. In particular, we examined the papers by: Kiptui (2007) on financial services; Ndaro (2007) or communication services; Helu (2007) on maritime services; Ochieng (007) on transport services; and Oresi (2007) on railway services. In addition, we commissioned a 54 page survey of the regulatory regimes in key Kenyan business services sectors, namely, insurance, banking, fixed line and mobile telecommunications services and maritime transportation services.[13]. Finally, the study by the World Bank (2007) provided additional detail on the key issues in the sectors. These questionnaires and papers provided us with data and descriptions and assessments of the regulatory environment in these sectors.

Mircheva (2007) then estimated the ad valorem equivalents of barriers to foreign direct investment in fixed line and mobile telecommunications, banking, insurance and maritime transportation services. The process involved converting the answers and data of the questionnaires into an index of restrictiveness in each industry. Mircheva followed the methodology of Kimura, Ando and Fujii (2004a, 2004b, 2004c) to generate these estimateS. This methodology involves building on the estimates and methodology explained in the volume by C. Findlay and T. Warren (2000), notably papers by Warren

[13] We thank Ms. Sonal Sejpal of the law firm of Anjarwalla & Khanna Advocates for leading this research effort. The same sources provided the data on share of expatriate labor discussed below.

(2000), McGuire and Schulele (2000) and Kang (2000). For each of these service sectors, authors in the Findlay and Warren volume evaluated the regulatory environment across many countries. The price of services is then regressed against the regulatory barriers to determine the impact of any of the regulatory barriers on the price of services. Mircheva then assumed that the international regression applies to Kenya. Applying that regression and their assessments of the regulatory environment in Kenya from the questionnaires and other information sources, she estimated the ad valorem impact of a reduction in barriers to foreign direct investment in these services sectors.[14] Mircheva then weighted her fixed line and mobile telecommunications estimates by their market shares to obtain her estimate for communications, and similarly for banking and insurance to get the estimate for financial services. In the case of transportation, we take maritime transportation as a proxy for all transportation sectors. The results of the estimates are listed in table 4.

III. Overview of the Model and Key Data

Overview of the Model Formulation

This paper follows the algebraic structure of the model of Jensen, Rutherford and Tarr (2004). Here we provide a general description. Primary factors include skilled, semi-skilled and unskilled labor; mobile capital; sector-specific capital in imperfectly competitive sectors; and primary inputs imported by multinational service providers, reflecting specialized management expertise or technology of the firm. The existence of sector specific capital in several sectors implies that there are decreasing returns to scale in the use of the mobile factors and supply curves in these sectors slope up.

There are 50 sectors in the model shown in table 1. The input-output table is taken from Kiringai. Thurlow and Wanjala (2006) and is based on 2003 data. The table is very rich in agricultural detail, with

[14] Warren estimated quantity impacts and then using elasticity estimates was able to obtain price impacts. The estimates by Mircheva that we employ are for "discriminatory" barriers against foreign direct investment.

20 agricultural sectors. We have four business services sectors: communication, finance, transport and other services.

Regardless of sector, all firms minimize the cost of production. One category of sectors is *competitive goods and services sectors* produced under constant returns to scale and where price equals marginal costs with zero profits. This includes all twenty of the agriculture sectors, apparel, footwear, baked goods, and services such as administration, hotels, health and real estate.[15] In these sectors, products are differentiated by country of origin, i.e., we employ the Armington assumption. All goods producing firms (including imperfectly competitive firms) can sell on the domestic market or export. Firms optimize their output decision between exports and domestic sales based on relative prices and their constant elasticity of transformation production function.

Goods produced subject to increasing returns to scale are differentiated at the firm level. We assume that manufactured goods may be produced domestically or imported. Firms in these industries set prices such that marginal cost (which is constant) equals marginal revenue; and there is free entry, which drives profits to zero. For domestic firms, costs are defined by observed primary factor and intermediate inputs to that sector in the base year data. Foreigners produce the goods abroad at constant marginal cost but incur a fixed cost of operating in Kenya. The cif import price of foreign goods is simply defined by the import price, and, by the zero profits assumption, in equilibrium the import price must cover fixed and marginal costs of foreign firms. We employ the standard Chamberlinian large group monopolistic competition assumption within a Dixit-Stiglitz framework, which results in constant markups over marginal cost.

For simplicity we assume that the composition of fixed and marginal cost is identical in all firms producing under increasing returns to scale (in both goods and services). This assumption in a our Dixit-

[15] Although electricity is monopolistically supplied, it is prices are controlled by the government. Thus, pricing to exploit market power is excluded by the government, and we maintain the assumption of price equal to marginal costs.

Stiglitz based Chamberlinian large-group model assures that output per firm for all firm types remains constant, i.e., the model does not produce rationalization gains or losses.

The number of varieties affects the productivity of the use of imperfectly competitive goods based on the standard Dixit-Stiglitz formulation. The effective cost function for users of goods produced subject to increasing returns to scale declines in the total number of firms in the industry.

The third category of sectors is *services sectors that are produced under increasing returns to scale and imperfect competition,* namely telecommunications, financial services, transportation services and other business services. In services sectors, we observe that some services are provided by foreign service providers on a cross border basis analogous to goods providers from abroad. But a large share of business services are provided by service providers with a domestic presence, both multinational and Kenyan.[16] Our model allows for both types of foreign service provision in these sectors. There are cross border services allowed in this sector and they are provided from abroad at constant costs—this is analogous to competitive provision of goods from abroad. Cross border services, however, are not good substitutes for service providers who have a domestic presence.[17]

There are also multinational service firm providers that choose to establish a presence in Kenya in order to compete with Kenyan firms directly. When multinationals service providers decide to establish a domestic presence in Kenya, they will import some of their technology or management expertise. That is, foreign direct investment generally entails importing specialized foreign inputs. Thus, the cost structure of multinationals differs from national only service providers. Multinationals incur costs related to both imported primary inputs and Kenyan primary factors, in addition to intermediate factor inputs. Foreign provision of services differs from foreign provision of goods, since the service providers use Kenyan primary inputs. Domestic service providers do not import the specialized primary factors available to the

[16] One estimate puts the world-wide cross-border share of trade in services at 41% and the share of trade in services provided by multinational affiliates at 38%. Travel expenditures 20% and compensation to employees working abroad 1% make up the difference. See Brown and Stern (2001, table 1).
[17] Daniels (1985) found that service providers charge higher prices when the service is provided at a distance.

multinationals. Hence, domestic service firms incur primary factor costs related to Kenyan labor and capital only. These services are characterized by firm-level product differentiation. For multinational firms, the barriers to foreign direct investment affect their profitability and entry. Reduction in the constraints on foreign direct investment will induce foreign entry that will typically lead to productivity gains because when more varieties of service providers are available, buyers can obtain varieties that more closely fit their demands and needs (the Dixit-Stiglitz variety effect).

Comparative Steady State Formulation. In this version of our model, we allow the capital stock to adjust to its steady state equilibrium along with all of the model features we employ in our WTO reference case, i.e., we allow for tariff and FDI liberalization with endogenous productivity effects as above. We call this our comparative steady state model. In the comparative static model, we assume that the capital stock is fixed and the rental rate on capital is endogenously determined. In the comparative steady state model, the logic is reversed. We assume that the capital stock is in its initial steady state equilibrium in the benchmark dataset, but that the capital stock will adjust to a new steady state equilibrium based on a fixed rate of return demanded by investors. That is, if the trade policy shock happens to induce and increase in the rate of return on capital so that it exceeds the initial rate of return, investors will invest and expand the capital stock. Expansion of the capital stock drives down the marginal product of capital, i.e., it drives down the rental rate on capital, until the rate of return on capital falls back to the initial level.[18] To analyze trade policy, this comparative steady state approach has been employed by many authors, including Harrison, Rutherford and Tarr (1996, 1997) and Baldwin et al. (1999) and Francois et al. (1996). The approach, however, dates back to the 1970s, when both Hansen and Koopmans (1972) and Dantzig and Manne (1974) used it. The approach ignores the foregone consumption necessary to achieve the higher level of investment and thus, is an upper bound estimate on the long run gains within the framework of the model assumptions.

[18] The rate of return on investment in our model is the rental rate on capital divided by the cost of a unit of the capital good.

Data

Input-output table. The key data source for our study is the social accounting matrix taken from Kiringai. Thurlow and Wanjala (2006). This is a social accounting matrix for the year 2003. The table is very rich in agricultural detail, with 20 agricultural sectors. A full listing of the sectors and factors of production is provided in table 1. Kiringai et al. (2007) also provide a set of twenty household accounts integrated into the social accounting matrix. These are twenty households are ten rural and ten urban, ranked according to income.

Share of Expatriate Labor Employed by Multinational Service providers. The impact of liberalization of barriers to foreign direct investment in business services sectors on the demand for labor in these sectors will depend importantly on the share of expatriate labor used by multinational firms. We explain in the results section that despite the fact that multinationals use Kenyan labor less intensively than their Kenyan competitors, if multinationals use mostly Kenyan labor, their expansion is likely to increase the demand for Kenyan labor in these sectors.[19] We obtained estimates of the share of expatriate labor or specialized technology not available to Kenyan firms that is used by multinational service providers in Kenya from the survey mentioned above. We found that multinational service providers use mostly local primary factor inputs and only small amounts of expatriate labor or specialized technology. In particular, the estimated share of foreign inputs used by multinationals in Kenya is: telecommunications, 10% plus or minus 2%; financial services, 3%, plus or minus 2%; maritime transportation, 3%, plus or minus 2%; and air transportation, 12.5%, plus or minus 2.5%.

Tariff and Sales Tax data.

Our estimates for tariff and sales tax data are taken from Kiringai. Thurlow and Wanjala (2006). Based on these data, tariff revenue constitutes about 2.3 percent of GDP in 2003.

[19] See Markusen, Rutherford and Tarr (2005) for a detailed explanation on why FDI may be a partial equilibrium substitute for domestic labor but a general equilibrium complement.

IV. Results

In our "full reform" scenario, we assume that regulatory barriers in business services sectors against both foreign direct investment and domestic investors are cut in half. (The ad valorem equivalent of the barriers against new domestic or multinational entrants in specified in table 4.) We also assume that tariffs, as specified in table 4, are set at a uniform tariff level that leaves tariff revenue unchanged.

We first discuss (and present in table 5) our estimates of the full reform scenario. We assess the impact on aggregate variables such as welfare and the real exchange rate, aggregate exports, the return to capital, skilled labor, semi-skilled labor, unskilled labor and land, and the percentage change in tariff revenue. In order to obtain as assessment of the adjustment costs, we estimate the percentage of each of our five factors of production that would have to change industries. The gains come from a combination of effects, so we also estimate the comparative static impacts of the various components of the full reform scenario in order to assess their relative importance.

In order to assess the importance of the various components of the full reform scenario, we conduct several additional scenarios, in which we only permit one of the components of the full reform package to change, and hold the other components at the status quo level.

Aggregate Effects

We estimate that the welfare gains to Kenya of full reform are equal to 9.3 percent of Kenyan consumption (or 8.8 percent of GDP) in the medium term. These gains derive from three key effects: (1) removal of regulatory barriers against Kenyan potential service providers; (2) removal of regulatory barriers against multinational service providers in Kenya; and (3) gains from moving to a uniform tariff. We execute several scenarios that allow us to understand the relative impact of these various elements and the mechanisms through which they operate. We discuss three of these below.

The improvement of aggregate welfare is accompanied by a significant increase in wages. We estimate that the wages of skilled labor, semi-skilled labor and unskilled labor will increase by 16.4 percent, 8.3 percent and 11.3 percent, respectively. The return on capital also increases by 6.5 percent.

Only the rents on land decline. The decline in rents on land is explained by the fact that land is used only in agriculture, and, as we explain below, agriculture declines relative to the services and manufacturing sectors of the economy.

Impact of Removing regulatory Barriers Against Kenyan Service Providers. In this scenario, labeled reform only domestic regulatory barriers, we reduce by 50 percent the ad valorem equivalent of the barriers on domestic service providers in Kenya, but there is no reduction in the discriminatory tax on multinationals in the services sectors; nor is there any movement toward tariff uniformity.. At 7.8 percent of the value of Kenyan consumption, the largest share of the gains derives from the liberalization of regulatory barriers against Kenyan service providers. The results are explained by the fact that the estimated barriers are rather high in the services sectors, especially in the transportation sectors, by the fact that services are a substantial part of the market economy of Kenya, and by the relatively large share of the market captured by domestic service providers.

The reduction in the tax on domestic service providers increases profitability for domestic provision of services in Kenya, thereby inducing new entry by domestic service providers until zero profits are restored. Although there is a loss of multinational service varieties due to increased competition from domestic service providers, there is a net increase in varieties. Kenyan businesses will then have improved access to Kenyan services in areas like telecommunication, banking, insurance, transportation and other business services. The additional service varieties in the business services sectors should lower the cost of doing business and result in a productivity improvement for users of these goods through the Dixit-Stiglitz-Ethier effect.

Impact of Foreign Direct Investment Liberalization in Business Services.. In this scenario, labeled only FDI, , we reduce by 50 percent the ad valorem equivalent of the barriers against multinational service providers who may wish to serve the Kenya market, but there is no reduction in the tax equivalent of the regulatory burden on domestic firms in the services sectors; nor is there any movement toward tariff uniformity. Reducing barriers against multinational service providers yields a gain of 1.8 percent of Kenyan consumption. The reasons for the gains are similar to the reasoning above for the source of gains from liberalization against domestic service providers. Gains from reducing

barriers to multinational investors are substantial, but significantly less than the gains from reducing regulatory barriers to domestic service providers. This result largely derives from the fact that the domestic share of the market is larger so the same percentage change in domestic service providers (compared to multinationals) results in larger gains.

Impact of Tariff Uniformity. In this scenario, labeled only tariffs, we impose tariff uniformity, but we do not change the ad valorem tax equivalent on regulatory by domestic or multinational service providers. In moving to tariff uniformity, the average level of the Kenyan tariff is unchanged. The level of the tariff is imposed that results in the same average collected tariff rate in Kenya—the difference in the highs and lows are eliminated and replaced with a unique tariff for all sectors. Moving to uniform tariffs yields and estimated welfare gain of 1.5 percent of consumption. Our result of gains from tariff uniformity is consistent with the results of Martinez de Pereira (2000) in 13 countries and Harrison, Rutherford and Tarr (1993) for Turkey. These authors have found that moving to tariff uniformity results in welfare benefits. The reason is that the distortion costs of a tariff increase with the square on the tariff. Then moving to uniformity can be expected to benefit the country since it is the very high tariffs that cause the most of distortion costs.[20] Moreover, the typical lobbying for protection environment in a country is one-sided as industry groups receive concentrated benefits and lobby but diverse consumer interests face a free-rider problem and typically do not lobby. Panagariya and Rodrik (1993) have shown, uniformity dramatically reduces the incentive to lobby the government for protection. And the experience of Chile shows that industry groups may lobby in favor of lower protection in such a case. Thus, in his evaluation of the arguments for and against tariff uniformity, Tarr (2002) has argued that the overwhelming advantage of a uniform tariff is that it is likely to lead to a lower level of protection due to the change in the political economy for protection.

[20] These results show that, in practice, tariffs do not differ from uniformity due to Ramsey optimal tax considerations.

Sector Results

Expanding Sectors. In the full reform scenario, liberalization of barriers against potential service providers in transportation leads to a significant expansion of output in the transportation services sector. Since the barriers in transportation are the highest, the expansion if the greatest in the transportation sector. We estimate an increase in the output of the transportation sector by 59 percent (including the output of multinational firms operating in Kenya). We also estimate that the "other services" and the electricity sectors increase by about 8 percent.

Three agriculture sectors realize substantial expansion: cut flowers (151 percent) and sugar cane (40 percent) and rice (10 percent). All these sectors benefit significantly from the lower costs of business services. Cut flowers are almost exclusively exported and depend heavily on transportation services. The cut flower sector benefits from full liberalization in two ways: it benefits directly from the reduced quality adjusted costs of transportation services and also from the depreciation of the real exchange rate.

Given that we assume that total employment is fixed, if labor expands in some sectors, it must contract in other sectors. Given the large expansion in several sectors, we must have declines in others, at least in the medium term. (In the long run, it is possible for capital expansion to lead to more widespread expansion.) We estimate declines in output in many sectors, especially those that use business services less intensively. Moreover, since we assume uniform tariffs in our full reform scenario, import competing sectors with relatively high protection compared to the average for Kenya have their tariffs decline relative to the average. Then grain milling, wheat and beverages and tobacco, all of which have relatively high protection, are estimated to experience significant output declines. We also estimate that chemicals, mining, coffee and tea will decline significantly.

Sectors we estimate will expand are those that either: export a relatively large share of their output; are relatively unprotected initially compared to other sectors of the economy; or experience a significant reduction in the cost of their intermediate inputs, typically because they have a large share of intermediate inputs that come from sectors that experience productivity advances due to trade or FDI liberalization.

Business Services Sectors. Kenyan business and labor interests in these sectors are not the same, and we discuss the impact on labor in these sectors first. We find that skilled and unskilled employment will expand in the transportation, telecoms and other business services sectors, but not the financial sector. This is an application to a full economy model of the result found by Markusen, Rutherford and Tarr (2005). They have shown in a more stylized model that even when foreign direct investment is a partial equilibrium substitute for domestic skilled labor, it may be a general equilibrium complement. The reason is as follows. As a result of a reduction in the barriers to foreign direct investment in these sectors, we estimate that there will be an expansion in the number of multinational firms who locate in Kenya to provide business services from within Kenya , and a contraction in the number of purely Kenyan firms. Although multinationals also demand Kenyan labor, though they use Kenyan labor slightly less intensively than Kenyan firms, i.e., since multinationals import primary inputs, foreign direct investment is a partial equilibrium substitute for Kenyan labor. But as more service firms enter the market, the quality adjusted price of services falls, and industries that use services expand their demand for business services. On balance, the increase in labor demand from the increase in the demand for business services typically exceeds the decline in labor demand from the substitution of multinational supply for Kenyan supply in the Kenyan market. That is, FDI is a partial equilibrium substitute but a general equilibrium complement to Kenyan labor. Thus, we estimate that labor in the business services sectors will typically gain from an expansion in foreign direct investment and multinational provision of services in Kenya .

Regarding capital, as a result of the removal of restrictions, we estimate there would be significant increase in foreign direct investment and an increase in multinational firms operating in Kenya . We estimate that specific capital owners in imperfectively competitive sectors will lose from this increase in competition. We expect, however, that the increase in foreign direct investment to have diverse impacts on Kenyan firms. We define a firm as a multinational even if a foreign firm and a Kenyan firm have formed a joint venture. Multinationals will often look for Kenyan joint venture partners when they want to invest in Kenya . Kenyan companies that become part of the joint ventures in the expanding multinational share of the business services market will likely preserve or increase the value of their investments. Kenyan capital owners in business services who remain wholly independent of multinational

firms, either because they avoid joint ventures or are not desired as joint venture partners, will likely see the value of their investments decline, and the least efficient will exit the industry.[21]

This suggests that domestic lobbying interests within a service sector could be diverse regarding FDI liberalization. We estimate that labor should find it in their interest to support FDI liberalization even if capital owners in the sector oppose it. But capital owners themselves may have diverse interests depending on their prospects for acquisition by multinationals.

Comparative Steady State Formulation

When we allow the capital stock to adjust to its long run equilibrium value, the gains to the Kenyan economy increase to 12.1 percent of consumption of 11.4 percent of GDP per year. In this formulation the costs of foregone consumption to achieve the higher capitals stock are not taken into account, so in the context of this model, the estimates should be considered upper bound estimates. On the other hand, Rutherford and Tarr (2002) have shown that in a fully dynamic model with endogenous productivity effects, the gains can be considerably larger than those estimated here.

Constant Returns to Scale Formulation

In order to assess the importance of the modeling assumption of endogenous productivity effects from additional varieties, we also consider a "constant returns to scale" (CRTS) version of the model. In this version, there are no endogenous productivity effects from additional varieties of imperfectly supplied goods or services. We estimate that the gains fall to 4.1 percent of consumption or 3.8 percent of GDP. While this is considerably smaller than our estimates with endogenous productivity effects, the gains are large by the standards of CRTS trade models. The reasons is that we are considering reforms of regulatory barriers against both foreign and domestic service providers and we assume that the regulatory barriers impose real resource costs in the initial equilibrium, i.e., there are large "rectangles of rent losses in the CRTS model.

[21] We assume that firms in the business services sectors must use a specific factor in order to produce output. This specific factor results in an upward sloping supply curve in each business services sector.

VI. Conclusions

In this paper we have developed an innovative small open economy computable general equilibrium model of the Kenyan economy that is capable of assessing the impact of the liberalization of regulatory barriers against both domestic and multinational service providers. Surveys and estimates of the ad valorem equivalence of the barriers against foreign direct investment were prepared for this model. We find that the reform package we consider in this paper (in many cases reforms under consideration by the Kenyan government) could provide very substantial gains to the Kenyan economy. Reduction of the barriers against potential service providers, both foreign and domestic, is the largest source of the gains. Moving to tariff uniformity, could provide additional significant gains and provide an improved environment for the political economy of protection.

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Table 1. Sectoral and Factor Structure of the Kenya Model

Business Services	
comm	Communication
fsrv	Finance
osrv	Other services
tran	Transport
Increasing Returns to Scale (IRTS) Goods	
bevt	Beverages & tobacco
omfd	Other manufactured food
prnt	Printing and publishing
petr	Petroleum
chem	Chemicals
mach	Metals and machines
nmet	Non metallic products
oman	Other manufactures
Factors of Production	
skl	Skilled labor
ssk	Semi-skilled labor
usk	Unskilled labor
cap	Capital
lnd	Land

Constant Returns to Scale (CRTS) Goods and Services			
maiz	Maize	goat	Other livestock
whea	Wheat	fish	Fishing
rice	Rice	fore	Forestry
barl	Barley	mine	Mining
cott	Cotton	meat	Meat & dairy
ogrn	Other cereals	mill	Grain milling
sugr	Sugarcane	bake	Sugar & bakery & confectionary
coff	Coffee	text	Textile & clothing
tea	Tea	foot	Leather & footwear
root	Roots & tubers	wood	Wood & paper
oils	Pulses & oil seeds	watr	Water
frui	Fruits	elec	Electricity
vege	Vegetables	cons	Construction
cutf	Cut flowers	trad	Trade
ocrp	Others crops	hotl	Hotels
beef	Beef	rest	Real estate
dair	Dairy	admn	Adminsitration
poul	Poultry	heal	Health
oliv	Sheep goat and lamb for slaughter	educ	Education

Table 2. Sectoral Value Added

	Labor %			Capital %	Land %	GDP billions of Kenyan shillings	GDP (%)
	Skilled	Semi-skilled	Unskilled				
IRTS Goods and Services (total)	9.4	18.8	11.8	60.0		351.2	36.0
CRTS Goods and Services (total)	9.7	22.2	14.4	46.1	7.5	625.4	64.0
Business Services (excluding transport)	12.4	7.2	15.9	64.5		191.9	19.6
Communication	3.7	19.7	13.7	62.9		30.6	3.1
Finance	1.2	5.4	19.3	74.0		66.7	6.8
Other services	23.1	4.4	14.3	58.3		94.5	9.7
Transport	9.9	34.6	5.5	50.0		66.9	6.9
IRTS Goods	2.8	31.6	7.8	57.8		92.4	9.5
Beverages & tobacco		0.7	34.0	65.2		13.7	1.4
Other manufactured food	8.3	36.1	0.5	55.1		0.9	0.1
Printing and publishing		44.8		55.2		5.7	0.6
Petroleum		0.4	1.3	98.4		3.9	0.4
Chemicals	16.4	5.4	29.7	48.5		7.1	0.7
Metals and machines	2.8	55.0	2.9	39.2		8.2	0.8
Non metallic products	0.5	9.8		89.7		23.1	2.4
Other manufactures	3.3	63.9	0.6	32.3		29.8	3.0
Agriculture	16.8	38.8	0.3	22.5	21.5	219.0	22.4
Maize	10.7	48.0	0.2	10.7	30.4	28.9	3.0
Wheat	0.7	25.0		20.6	53.7	0.4	0.0
Rice	24.8	21.2		22.6	31.3	1.1	0.1
Barley	1.1	24.9		20.6	53.4	0.7	0.1
Cotton	17.4	26.3	0.1	12.7	43.5	0.3	0.0
Other cereals	8.6	24.6	0.2	23.5	43.2	0.1	0.0
Sugarcane	7.6	37.6	0.3	11.5	43.1	1.8	0.2
Coffee	14.6	30.1	0.2	12.2	42.8	5.6	0.6
Tea	13.9	45.3	0.2	10.6	30.0	35.0	3.6
Roots & tubers	11.6	38.3	0.3	31.9	18.0	10.0	1.0
Pulses & oil seeds	12.0	38.0	0.5	11.9	37.7	19.0	1.9
Fruits	15.3	34.0	0.2	10.6	39.9	13.5	1.4
Vegetables	14.7	38.7	0.3	29.8	16.5	22.0	2.2
Cut flowers	35.2	19.7	0.1	10.3	34.7	11.7	1.2
Others crops	15.3	36.5	0.6	27.3	20.3	7.3	0.7

Table 2. continued

	Labor %			Capital %	Land %	GDP billions of Kenyan shillings	GDP (%)
	Skilled	Semi-skilled	Unskilled				
Beef	24.8	36.2	0.5	38.5		13.9	1.4
Dairy	26.1	35.7	0.2	38.1		23.6	2.4
Poultry	15.3	43.4	0.8	40.5		15.2	1.6
Sheep goat and lamb for slaughter	28.2	36.9	0.2	34.6		5.1	0.5
Other livestock	6.5	35.4	0.2	58.0		3.8	0.4
Other CRTS	5.8	13.2	22.1	58.9		406.4	41.6
Fishing	3.7	7.4		88.8		3.9	0.4
Forestry	3.1	23.2		73.7		7.0	0.7
Mining	16.4	30.9		52.7		3.2	0.3
Meat & dairy	3.2	27.6	0.0	69.2		11.9	1.2
Grain milling	2.1	9.5	2.9	85.5		9.6	1.0
Sugar & bakery & confectionary	7.9	36.8	11.7	43.6		4.4	0.5
Textile & clothing	57.0	9.3	0.6	33.1		5.4	0.6
Leather & footwear	13.9	2.3		83.9		5.2	0.5
Wood & paper	4.4	7.1	27.1	61.4		2.9	0.3
Water		28.8	10.9	60.3		13.1	1.3
Electricity	0.7	25.4	1.5	72.3		12.9	1.3
Construction	1.5	14.9	2.5	81.1		51.8	5.3
Trade	16.6	5.6	7.0	70.8		63.6	6.5
Hotels	51.1	5.0	0.9	43.1		9.8	1.0
Real estate	0.3	29.8	13.0	57.0		56.2	5.8
Adminsitration	1.1	12.1	8.0	78.8		49.3	5.1
Health	1.6	2.6	92.5	3.2		21.2	2.2
Education	0.8	2.9	66.4	30.0		74.9	7.7

Table 3. Trade Flows (in percentage or billions of Kenyan shillings, BKS)

		Imports			Exports		
		Value (BKS)	% Total a/	% of total use b/	Value (BKS)	% Total	% Output
IRTS Goods and Services	irts	369.9	88.7	38.4	122.4	46.0	17.6
CRTS Goods and Services	crts	47.0	11.3	5.6	143.9	54.0	14.4
Business Services (excluding transport)	bsrv	7.6	1.8	2.6	3.4	1.3	1.2
Communication	comm				1.9	0.7	3.9
Finance	fsrv	7.6	1.8	7.4	1.4	0.5	1.5
Other services	osrv						
Transport	tran	53.5	12.8	29.7	38.1	14.3	23.1
IRTS Goods	ds	308.9	74.1	60.7	80.8	30.4	32.7
Beverages & tobacco	bevt	1.9	0.5	6.5	12.3	4.6	29.1
Other manufactured food	omfd	25.8	6.2	76.4	2.8	1.1	69.6
Printing and publishing	prnt	10.9	2.6	34.9			
Petroleum	petr	82.2	19.7	73.3	16.0	6.0	49.0
Chemicals	chem	72.2	17.3	86.8	15.6	5.8	71.2
Metals and machines	mach	74.0	17.8	83.3	15.8	5.9	55.8
Non metallic products	nmet	4.0	0.9	11.1	3.8	1.4	11.1
Other manufactures	oman	37.8	9.1	43.9	14.7	5.5	22.2
Agriculture							
	agri	20.1	4.8	11.1	104.7	39.3	38.5
Maize	maiz	0.8	0.2	2.0	0.3	0.1	0.6
Wheat	whea	10.1	2.4	96.1	0.1	0.0	14.6
Rice	rice	4.9	1.2	53.7			
Barley	barl				0.1	0.0	11.0
Cotton	cott				0.0	0.0	7.4
Other cereals	ogrn				0.0	0.0	41.2
Sugarcane	sugr	2.2	0.5	42.5	1.5	0.6	33.7
Coffee	coff				11.7	4.4	86.6
Tea	tea	0.4	0.1	9.0	47.1	17.7	91.5
Roots & tubers	root						
Pulses & oil seeds	oils	0.5	0.1	3.4	8.1	3.1	38.3
Fruits	frui				2.0	0.8	18.2
Vegetables	vege	0.5	0.1	2.7	7.9	3.0	31.0
Cut flowers	cutf				21.3	8.0	98.4
Others crops	ocrp	0.7	0.2	6.0	4.5	1.7	29.9
Beef	beef						
Dairy	dair						
Poultry	poul						
Sheep goat and lamb for slaughter	oliv						
Other livestock	goat						

Table 3. continued

		Imports			Exports		
		Value (BKS)	% Total a/	% of total use b/	Value (BKS)	% Total	% Output
Other CRTS	other	26.9	6.4	4.1	39.2	14.7	5.4
Fishing	fish						
Forestry	fore						
Mining	mine	0.4	0.1	31.5	6.1	2.3	95.2
Meat & dairy	meat	1.2	0.3	2.9	12.8	4.8	25.7
Grain milling	mill	0.5	0.1	2.7			
Sugar & bakery & confectionary	bake	4.0	1.0	17.4	2.5	0.9	10.8
Textile & clothing	text	9.3	2.2	43.6	4.4	1.6	31.2
Leather & footwear	foot	1.5	0.4	9.9	3.5	1.3	20.4
Wood & paper	wood	2.7	0.6	43.4	8.4	3.2	88.9
Water	watr						
Electricity	elec						
Construction	cons						
Trade	trad						
Hotels	hotl						
Real estate	rest	7.4	1.8	10.1	1.5	0.6	2.3
Adminsitration	admn						
Health	heal						
Education	educ						

a/ Percentage of total is the percentage of economy-wide imports.
b/ Total use includes final consumption, intermediate use, investment and government demand.

Table 4. Benchmark Distortions (ad valorem rates in percentage)

	Tariff	Sales Tax	Tax on the output of domestic firms	Tax on multinational output
IRTS Goods and Services	4.0	7.3		
CRTS Goods and Services	12.8	3.3		
Business Services		0.2		
Communication			12.0	25.0
Finance			8.0	17.0
Other services			0.0	0.0
Transportation			42.0	57.0
IRTS Goods	4.8	12.8		
Beverages & tobacco	27.8	42.3		
Other manufactured food	1.4	5.5		
Printing and publishing	2.1	12.1		
Petroleum	5.2	22.0		
Chemicals	1.9	4.6		
Metals and machines	6.1	4.2		
Non metallic products	9.5	0.7		
Other manufactures	8.1	3.0		
Agriculture	11.3	1.0		
Maize	10.0			
Wheat	19.2			
Rice	0.0			
Barley				
Cotton		12.5		
Other cereals				
Sugarcane	4.0	19.4		
Coffee				
Tea	8.6	5.1		
Roots & tubers				
Pulses & oil seeds	13.9	0.0		
Fruits				
Vegetables	8.6	0.1		
Cut flowers				
Others crops	3.4	3.4		
Beef				
Dairy				
Poultry				
Sheep goat and lamb for slaughter				
Other livestock				

Table 4. continued

	Tariff	Sales Tax	Tax on the output of domestic firms	Tax on multinational output
Other CRTS	13.9	3.8		
Fishing				
Forestry				
Mining	12.0	4.1		
Meat & dairy	10.5	15.5		
Grain milling	137.3	9.4		
Sugar & bakery & confectionary	21.0	17.1		
Textile & clothing	14.9	8.5		
Leather & footwear	16.7	14.5		
Wood & paper	16.8	5.9		
Water				
Electricity				
Construction				
Trade		1.9		
Hotels		13.9		
Real estate				
Adminsitration				
Health				
Education				

Table 5: Summary of Policy Measures
(results are percentage change from initial equilibrium)

Scenario definition	Benchmark	Full Reform	Only Regulator Barriers in Services	Only Domestic Barriers in Services	Only FDI Barriers in Services	Only Uniform Tariffs
Liberalization of barriers for domestic firms	No	Yes	Yes	Yes	No	No
Liberalization of barriers for foreign firms	No	Yes	Yes	No	Yes	No
Uniform import tariffs?	No	Yes	No	No	No	Yes
Aggregate welfare						
Welfare (EV as % of consumption)		9.3	8.8	7.8	1.8	1.5
Welfare (EV as % of GDP)		8.8	8.3	7.4	1.7	1.4
Government budget						
Tariff revenue (% of GDP)	2.3	2.4	2.5	2.5	2.4	2.3
Tariff revenue (% change)		0.0	5.1	4.7	1.0	0.0
Aggregate trade						
Real exchange rate (% change)		2.5	1.8	1.3	0.8	0.4
Aggregate exports (% change)		-7.4	-8.1	-9.0	-0.2	2.4
Factor Earnings						
Skilled labor		16.4	14.7	12.7	4.5	2.6
Semi-skilled labor		8.3	7.4	5.7	1.4	1.5
Unskilled labor		11.3	10.7	9.3	3.0	1.3
Capital		6.5	6.9	5.4	2.0	-0.2
Land		-3.9	-3.9	-4.2	-1.2	-3.8
Factor adjustments						
Skilled labor		10.8	9.2	8.9	3.1	4.4
Semi-skilled labor		9.8	8.6	8.3	2.9	4.7
Unskilled labor		2.8	2.4	2.2	0.7	1.1
Capital		2.8	2.2	2.1	0.7	1.4
Land		22.3	20.7	20.2	7.3	9.5

Source: Authors' estimates.

Table 6: Welfare Impacts and Decomposition

	Decile	Income ($/day)	Welfare Impact (%EV)	Decomposition of Welfare Impacts (% EV)							
				Taxes	Skilled Labor	Semi-Skilled Labor	Unskilled Labor	Land	Capital	Transfers	Savings
Full Reform											
Rural	0	0.2	0.2	0.0	1.1	0.9	0.1	-2.8	1.1	-0.2	0.0
	1	0.3	3.4	-0.2	1.3	1.9	0.1	-1.7	1.9	0.0	0.0
	2	0.4	4.7	-0.6	1.5	1.9	0.4	-1.2	2.7	0.0	0.0
	3	0.5	5.2	-0.5	1.8	1.6	0.3	-1.0	2.9	0.1	0.0
	4	0.5	6.5	-0.6	2.3	1.6	0.3	-0.9	3.7	0.0	0.0
	5	0.6	7.3	-0.9	2.0	2.2	0.9	-0.7	3.8	0.1	0.0
	6	0.7	6.4	-1.1	1.8	1.7	1.1	-0.8	3.6	0.0	0.0
	7	0.8	7.4	-1.1	1.9	1.9	1.1	-0.4	3.9	0.1	0.0
	8	1.0	7.5	-1.2	1.8	2.0	1.2	-0.5	4.1	0.1	0.0
	9	1.3	8.9	-1.5	2.0	1.5	1.5	-0.3	5.5	0.1	0.0
Urban	0	0.0	16.0						15.6	0.4	0.0
	1	0.0	6.0	-0.3	1.7	0.5	0.1	-0.1	4.4	-0.4	0.0
	2	0.0	3.9	-0.5	2.1	0.7		-1.1	2.9	-0.3	0.0
	3	0.0	8.9	-1.2	7.4	1.0	1.1	0.0	0.1	0.4	0.0
	4	0.1	5.2	-1.2	3.8	2.7		-0.3	0.2	0.0	0.0
	5	0.4	18.4	-2.0	2.2	2.5	0.2	0.0	13.6	1.8	0.0
	6	1.2	13.0	-2.0	1.0	1.3	0.1	0.0	11.3	1.2	0.0
	7	1.8	10.0	-2.4	1.9	2.1	0.5	0.0	6.8	1.1	0.0
	8	2.9	15.1	-5.7	2.0	2.6	0.9	0.0	14.6	0.7	0.0
	9	11.6	9.9	-3.7	1.6	1.9	3.2	0.0	6.7	0.2	0.0
Tariff Reform Only											
Rural	0	0.2	-0.5	0.0	0.2	0.3	0.0	-1.5	0.3	0.1	0.0
	1	0.3	0.4	0.0	0.3	0.6	0.0	-1.0	0.5	0.1	0.0
	2	0.4	0.8	-0.1	0.3	0.5	0.1	-0.7	0.7	0.1	0.0
	3	0.5	1.0	-0.1	0.3	0.5	0.0	-0.6	0.7	0.1	0.0
	4	0.5	1.3	-0.1	0.5	0.5	0.1	-0.5	0.9	0.1	0.0
	5	0.6	1.2	-0.2	0.4	0.5	0.1	-0.5	0.9	0.1	0.0
	6	0.7	1.3	-0.2	0.4	0.5	0.2	-0.5	0.9	0.1	0.0
	7	0.8	1.4	-0.2	0.3	0.5	0.1	-0.3	0.9	0.1	0.0
	8	1.0	1.3	-0.3	0.3	0.5	0.2	-0.4	0.9	0.1	0.0
	9	1.3	1.7	-0.3	0.4	0.4	0.2	-0.2	1.3	0.0	0.0
Urban	0	0.0	6.9						6.3	0.6	0.0
	1	0.0	2.0	-0.1	0.4	0.2	0.0	0.0	1.2	0.3	0.0
	2	0.0	1.3	-0.1	0.5	0.3		-0.6	0.8	0.3	0.0
	3	0.0	1.7	-0.3	1.4	0.2	0.2	0.0	0.0	0.2	0.0
	4	0.1	1.3	-0.3	0.8	0.8		-0.2	0.0	0.1	0.0
	5	0.4	2.2	-0.3	0.2	0.2	0.0	0.0	2.0	0.1	0.0
	6	1.2	2.6	-0.4	0.2	0.3	0.0	0.0	2.3	0.2	0.0
	7	1.8	2.1	-0.5	0.3	0.5	0.1	0.0	1.5	0.3	0.0
	8	2.9	1.8	-1.0	0.2	0.3	0.1	0.0	2.3	0.0	0.0
	9	11.6	1.5	-0.7	0.2	0.3	0.3	0.0	1.3	0.0	0.0

Source: Authors' estimates.

Table 7: Impacts on Industry and Employment of Full Reform

	% change from benchmark							
	output	exports	imports	skl	ssk	usk	cap	lnd
IRTS Goods and Services	11.5	11.9	-11.3	11.3	19.2	3.7		
CRTS Goods and Services	-3.4	-23.3	26.9	-6.2	-9.1	-1.7	0.0	0.0
Business Services								
Communication	-0.1	-6.2		-5.4	1.6	-1.1		
Finance	-2.9	-9.0	-28.9	-7.5	-0.6	-3.3		
Other services	8.6			6.1	14.0	11.0		
Transport	59.0	97.9	-61.6	50.6	61.7	57.4		
Dixit-Stiglitz Goods								
Beverages & tobacco	-8.1	-16.1	140.2		-5.6	-8.1		
Other manufactured food	-0.1	-1.3	-10.7	-5.7	1.2	-1.4		
Printing and publishing	-5.5		-13.5		-5.5			
Petroleum	-15.4	-22.3	2.5		-13.6	-15.9		
Chemicals	-54.5	-60.6	-6.6	-55.9	-52.7	-53.9		
Metals and machines	-19.5	-22.5	-2.8	-24.7	-19.1	-21.2		
Non metallic products	-15.7	-26.3	26.5	-21.2	-15.4			
Other manufactures	-4.0	-9.5	21.4	-10.3	-3.6	-6.2		
Agriculture	-7.3	-19.0	-6.4	-3.8	-14.1	-11.0	-2.4	0.0
Other CRTS	-2.0	-34.2	51.7	-9.9	-1.3	-1.6	0.5	
Key:								
skl Skilled labor								
ssk Semi-skilled labor								
usk Unskilled labor								
cap Capital								
lnd Land								

Source: Authors' estimates.

Table 8: Impacts on CRTS Industry and Employment of Full Reform

	% change from benchmark							
	output	exports	imports	skl	ssk	usk	cap	lnd
Agriculture	-7.3	-19.0	-6.4	-3.8	-14.1	-11.0	-2.4	0.0
Maize	-0.9	-10.6	22.6	-10.4	-3.8	-6.4	-2.2	8.4
Wheat	-37.6	-35.3	-8.3	-45.6	-41.6		-40.6	-34.2
Rice	10.6		-3.9	0.6	8.0		9.8	21.7
Barley	-5.9	-3.6		-18.0	-11.9		-10.4	-0.7
Cotton	-9.8	-13.3		-19.4	-13.5	-15.8	-12.0	-2.5
Other cereals	-3.6	-8.6		-14.5	-8.2	-10.7	-6.7	3.4
Sugarcane	40.0	83.9	-31.5	24.3	33.4	29.9	35.7	50.4
Coffee	-63.1	-67.6		-67.1	-64.7	-65.6	-64.1	-60.2
Tea	-85.6	-87.7	-8.9	-87.0	-86.0	-86.4	-85.8	-84.2
Roots & tubers	4.6			-4.4	2.7	0.0	4.4	15.7
Pulses & oil seeds	0.5	-6.7	45.8	-10.0	-3.3	-5.9	-1.7	9.0
Fruits	4.7	0.8		-6.2	0.8	-1.9	2.5	13.5
Vegetables	-1.1	-11.5	26.2	-9.2	-2.5	-5.1	-0.8	9.9
Cut flowers	151.2	153.4		129.7	146.7	140.2	150.9	178.0
Others crops	-17.4	-28.1	-6.4	-24.4	-18.9	-21.0	-17.5	-8.6
Beef	1.1			-4.8	2.2	-0.5	4.0	
Dairy	0.5			-5.2	1.8	-0.9	3.5	
Poultry	1.7			-4.9	2.2	-0.5	3.9	
Sheep goat and lamb for slaughter	0.9			-4.7	2.4	-0.3	4.1	
Other livestock	1.6			-5.9	1.1	-1.6	2.8	
Other CRTS	-2.0	-34.2	51.7	-9.9	-1.3	-1.6	0.5	
Fishing	3.2			-5.0	2.0		3.7	
Forestry	2.6			-5.4	1.5		3.3	
Mining	-74.9	-76.9	8.3	-76.6	-74.9		-74.4	
Meat & dairy	0.9	-7.1	30.3	-6.9	0.0	-2.7	1.7	
Grain milling	-10.2		1197.4	-17.4	-11.3	-13.7	-9.8	
Sugar & bakery & confectionary	-8.1	-16.9	67.2	-14.3	-8.0	-10.4	-6.4	
Textile & clothing	-20.4	-33.6	36.2	-23.2	-17.5	-19.7	-16.1	
Leather & footwear	-8.0	-17.1	48.7	-14.7	-8.4		-6.8	
Wood & paper	-58.4	-64.6	56.7	-61.3	-58.4	-59.5	-57.7	
Water	-2.8				-3.5	-6.0	-1.9	
Electricity	7.8			-0.7	6.6	3.8	8.4	
Construction	0.0			-8.0	-1.2	-3.8	0.5	
Trade	0.2			-6.5	0.4	-2.2	2.1	
Hotels	2.8			-1.4	5.9	3.1	7.7	
Real estate	3.3	-11.3	-5.9	-4.4	2.7	0.0	4.4	
Adminsitration	0.1			-7.8	-1.0	-3.6	0.7	
Health	0.4			-4.1	2.9	0.2	4.7	
Education	0.2			-5.4	1.6	-1.1	3.3	

Source: Authors' estimates.

Table 9: Impacts on Market Prices

	% change from benchmark				
	Full Reform	Only Entry Barriers	Only Domestic	Only FDI	Only Tariffs
IRTS Goods and Services	-1.4	-2.1	-1.7	-0.6	0.3
CRTS Goods and Services	4.6	4.9	4.1	1.2	-0.4
Business Services	0.4	-0.4	0.9	-1.0	1.0
Communication	-2.1	-2.6	-0.2	-2.5	0.6
Finance	-4.4	-5.4	-2.5	-3.1	1.2
Other services	4.9	4.1	3.7	1.1	1.0
Transport	-21.5	-21.9	-19.7	-4.2	0.8
Dixit-Stiglitz Goods	3.6	2.8	2.5	0.6	-0.1
Beverages & tobacco	1.8	3.7	3.6	0.3	-2.5
Other manufactured food	7.6	2.5	2.4	0.4	4.3
Printing and publishing	6.4	4.7	4.0	1.2	1.6
Petroleum	2.6	1.7	1.5	0.4	0.3
Chemicals	8.5	3.1	2.8	0.8	5.0
Metals and machines	2.4	3.7	3.1	0.9	-4.5
Non metallic products	5.0	4.0	3.6	0.7	1.1
Other manufactures	0.2	1.9	1.3	0.3	-2.2
Agriculture	5.3	4.8	3.9	1.2	0.3
Other CRTS	4.5	4.9	4.1	1.3	-0.5

Source: Authors' estimates.

Table 10: Impacts on Prices in CRTS Industry

	% change from benchmark				
	Full Reform	Only Entry Barriers	Only Domestic	Only FDI	Only Tariffs
Agriculture	5.3	4.8	3.9	1.2	0.3
Maize	4.8	3.7	2.8	0.9	0.7
Wheat	-8.1	1.8	1.3	0.8	-10.4
Rice	7.1	2.7	2.1	0.8	3.8
Barley	1.8	1.3	0.5	0.2	-1.2
Cotton	3.6	2.5	1.8	0.7	0.2
Other cereals	4.7	3.7	2.6	0.6	-0.6
Sugarcane	-3.3	-4.9	-4.6	-0.7	1.2
Coffee	20.0	14.2	12.9	0.5	6.1
Tea	24.3	22.0	19.1	3.9	3.0
Roots & tubers	4.3	3.9	3.1	1.0	0.4
Pulses & oil seeds	4.4	3.7	2.8	0.8	0.0
Fruits	3.5	2.8	2.0	0.7	-0.1
Vegetables	5.8	4.6	3.6	1.2	1.1
Cut flowers	-18.8	-16.9	-17.6	-9.2	-13.5
Others crops	7.4	6.0	5.0	1.5	1.2
Beef	7.7	6.8	5.6	1.8	1.0
Dairy	7.9	7.4	6.0	2.0	0.9
Poultry	6.7	6.8	5.4	1.8	0.4
Sheep goat and lamb for slaughter	7.9	7.3	6.0	1.9	1.0
Other livestock	7.1	6.8	5.4	1.8	0.6
Other CRTS	4.5	4.9	4.1	1.3	-0.5
Fishing	5.5	5.6	4.5	1.6	0.0
Forestry	5.7	5.6	4.5	1.5	0.3
Mining	5.9	7.7	7.1	1.6	-1.2
Meat & dairy	4.7	4.4	3.8	0.9	0.2
Grain milling	-5.2	2.5	1.9	0.8	-7.7
Sugar & bakery & confectionary	1.8	3.6	3.1	0.9	-1.9
Textile & clothing	1.1	4.2	3.5	1.2	-3.0
Leather & footwear	3.9	5.0	4.1	1.3	-1.0
Wood & paper	1.0	4.8	4.3	1.3	-3.1
Water	7.1	6.9	5.5	1.8	0.4
Electricity	5.1	5.0	4.0	1.2	0.1
Construction	4.0	3.8	3.2	0.9	-0.4
Trade	1.9	1.6	1.6	0.2	0.5
Hotels	5.2	4.8	4.3	1.1	0.6
Real estate	6.8	5.8	4.7	1.5	1.1
Adminsitration	5.0	5.1	4.1	1.3	-0.3
Health	9.0	8.4	7.3	2.3	1.0
Education	8.2	7.9	6.7	2.2	0.6

Source: Authors' estimates.

Table 11: Impacts on Sectoral Activity

	% change from benchmark				
	Full Reform	Only Entry Barriers	Only Domestic	Only FDI	Only Tariffs
IRTS Goods and Services	11.5	10.6	9.2	3.9	6.1
CRTS Goods and Services	-3.4	-2.5	-2.3	-0.6	-1.7
Business Services	3.6	2.9	3.9	0.3	1.1
Communication	-0.1	-0.4	1.8	-1.4	0.9
Finance	-2.9	-4.1	-0.8	-2.4	2.0
Other services	8.6	8.1	7.3	2.5	0.7
Transport	59.0	51.1	45.8	12.0	10.7
Dixit-Stiglitz Goods	-14.0	-10.5	-11.2	1.3	7.2
Beverages & tobacco	-8.1	-2.1	-3.3	2.0	-3.0
Other manufactured food	-0.1	-27.8	-30.7	6.8	74.1
Printing and publishing	-5.5	-8.7	-8.2	-1.6	0.7
Petroleum	-15.4	-1.7	-6.0	5.6	-14.1
Chemicals	-54.5	-45.7	-48.0	-2.9	-31.5
Metals and machines	-19.5	-29.6	-27.4	-2.5	101.7
Non metallic products	-15.7	-7.5	-7.9	0.1	-10.4
Other manufactures	-4.0	0.0	0.4	2.5	-3.7
Agriculture	-7.3	-6.9	-6.3	-1.7	-3.0
Other CRTS	-2.0	-0.8	-0.8	-0.2	-1.2

Source: Authors' estimates.

Table 12: Impacts on Sectoral Activity in CRTS Industry

	% change from benchmark				
	Full Reform	Only Entry Barriers	Only Domestic	Only FDI	Only Tariffs
Agriculture	-7.3	-6.9	-6.3	-1.7	-3.0
Maize	-0.9	3.3	3.1	0.8	-3.2
Wheat	-37.6	6.6	7.5	3.7	-38.0
Rice	10.6	1.0	0.9	0.6	9.5
Barley	-5.9	-0.6	-1.3	1.7	-2.5
Cotton	-9.8	4.0	3.7	1.0	-12.0
Other cereals	-3.6	-3.1	-2.2	0.3	1.9
Sugarcane	40.0	59.1	50.7	10.3	-9.3
Coffee	-63.1	-52.2	-51.1	4.4	-33.4
Tea	-85.6	-83.0	-80.6	-34.5	-35.8
Roots & tubers	4.6	4.4	4.2	0.9	1.0
Pulses & oil seeds	0.5	1.6	2.0	1.2	1.4
Fruits	4.7	4.9	4.8	1.2	1.6
Vegetables	-1.1	0.3	0.9	0.2	-0.8
Cut flowers	151.2	123.3	126.7	51.0	80.4
Others crops	-17.4	-12.3	-13.0	0.2	-8.9
Beef	1.1	1.3	1.3	0.2	0.4
Dairy	0.5	0.4	0.6	-0.1	0.3
Poultry	1.7	1.1	1.3	0.1	0.8
Sheep goat and lamb for slaughter	0.9	1.0	1.1	0.1	0.5
Other livestock	1.6	1.2	1.5	0.1	0.6
Other CRTS	-2.0	-0.8	-0.8	-0.2	-1.2
Fishing	3.2	2.6	2.6	0.3	1.3
Forestry	2.6	2.2	2.2	0.4	0.7
Mining	-74.9	-72.7	-71.1	-19.6	-18.6
Meat & dairy	0.9	1.0	0.8	0.9	1.2
Grain milling	-10.2	4.5	4.1	1.0	-12.9
Sugar & bakery & confectionary	-8.1	1.9	1.6	0.7	-9.0
Textile & clothing	-20.4	-9.7	-8.5	-1.7	-10.8
Leather & footwear	-8.0	-6.7	-6.1	-1.2	-1.8
Wood & paper	-58.4	-50.1	-47.7	-13.2	-25.9
Water	-2.8	-1.6	-1.2	-0.2	-0.8
Electricity	7.8	7.5	7.0	1.8	2.2
Construction	0.0	0.0	0.0	0.0	0.0
Trade	0.2	0.5	-0.3	1.1	-0.1
Hotels	2.8	2.8	2.5	0.6	0.7
Real estate	3.3	0.6	1.2	0.0	2.9
Adminsitration	0.1	0.0	0.1	0.0	0.1
Health	0.4	0.4	0.4	-0.1	0.3
Education	0.2	0.2	0.2	0.0	0.2

Source: Authors' estimates.

Figure 1: Production and Allocation of Output