RWANDA AS A FREE TRADE ZONE

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October 15, 2003

Abstract

This paper investigates the potential economic impacts of establishing Rwanda as a free trade zone (FTZ), based on review of economic theory and developing country experiences with export processing zones, and on simulations of a simple economic model applied to recent data on Rwanda's trade, protection, and production requirements. The applied analysis indicates the superiority of adopting an economywide FTZ for economic welfare, exports, and employment, especially in agriculture. It also indicates that political support for an economywide FTZ might be increased by simultaneously reducing foreign aid inflows, to maintain if not improve price incentives in import-competing sectors. Finally, the paper draws attention to the obstacle posed to the FTZ proposal by Rwanda's membership in the Common Market for Eastern and Southern Africa.

Adapted from the authors' report prepared for the U.S. Mission to Rwanda of the U.S. Agency for International Development under Contract No. PCE-I-00-99-00033-00 with Abt Associates Inc., Bethesda, Maryland U.S.A (www.abtassoc.com). Dean DeRosa, the corresponding author, is principal economist of ADR International, Ltd., an economic research and policy consulting firm located in Falls Church, Virginia U.S.A. (www.adr-intl.com). Vernon Roningen is an economic consultant and the developer of VORSIM, computer software for economic modeling in the Microsoft Excel spreadsheet, headquartered in Arlington, Virginia U.S.A. (www.vorsim.com). Both authors are principals of Potomac Associates (www.PotomacAssocs.com). Assistance and helpful comments received from Andy Cook, John Mellor, and the participants in a seminar held to discuss the report in Kigali, Rwanda, June 10, 2002, are gratefully acknowledged.

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1. Introduction

Since the 1994 genocide, Rwanda has made substantial strides towards recapturing lost economic ground, achieving growth of nearly 6 percent in 2000 and average growth of nearly 10 percent since 1995 (Table 1). In support of this effort, Rwanda -- a small, low-income country of 8 million inhabitants residing on just 26 thousand square kilometers of land -- has been the beneficiary of substantial international donor assistance, amounting to over $2 billion since 1995. This international aid has been predominantly devoted to reconstruction of the country's infrastructure, and restoration and improvement of government institutions and services, especially those serving rural areas where most Rwandans reside as small-scale farmers.[1] Economic policy reforms have also been important, led in part by adoption of one of the most liberal trade regimes in Africa. In 1994, import tariff rates in Rwanda were nearly 40 percent on average, with tariff peaks as high as 100 percent or more. Today, they stand at only 11.3 percent on average, with tariff peaks no higher than 25 percent.

This paper investigates the economic implications of a bold proposal that Rwanda establish itself as an economywide free trade zone (FTZ), following in the footsteps of some better known small, populous countries that have established themselves as free trade zones such as Hong Kong and Singapore in the Far East, and Dubai and Mauritius in the Near East and Africa.[2]

At the heart of the FTZ proposal is the objective of expanding production and trade to increase employment opportunities in Rwanda. The country is currently facing underemployment in the rural economy where land tenure is becoming too fragmented for efficient agricultural production and innovation. It is also facing limited opportunities for employment in urban areas where there has been mainly slow development of labor-intensive manufacturing activities. With sufficient foreign direct investment and greater education of the labor force,[3] a free trade regime in Rwanda might also add to the country's potential for higher economic welfare and growth by taking advantage of the country's strategic position at the geographic (and linguistic) crossroads between Anglophone East Africa and Francophone

[1] World Bank (2002a). See also Republic of Rwanda (2000a, 2001b).

[2] The term "free trade zone" has been widely used interchangeably with "duty free zone," "export processing zone," and "manufacturing zone." It has also been used to cover situations in which tariffs and other customs duties are suspended for consumption only, production only, or both production and consumption. The present analysis does not consider consumption-only free trade zones, such as Dubai. It focuses mainly on the implications of economywide free trade zones versus export processing zones, the latter covering production by firms in narrowly defined export-oriented sectors.

Central Africa, to serve as a regional entrepot center for not only merchandise trade but also trade in services, including tourism and information and communications technology (ICT)-related services.

To a considerable degree, the economic situation of Rwanda is revealed in its current structure of merchandise trade (Table 2). The country's exports are highly concentrated in traditional agricultural commodities, chiefly coffee, tea, pyrethrum (vegetable gums and resins), and hides and skins.[4] Also contributing significantly to recorded exports are metal and other mineral ores, including columbite-tantalite -- an exotic metal ore mined principally in the Congo (transported to Rwanda for international export) and used in production of mobile phones and other modern electronic products. In contrast, Rwanda's imports span a wide variety of products, especially manufactures, reflecting the paucity of manufacturing activity in Rwanda outside of the coffee, tea, and beverages and tobacco industries (Figure 1). Also notably, the country's total import bill exceeds its aggregate export earnings by a wide margin, sustained by generous foreign aid inflows. In the future, if Rwanda's imports are to stay at their current level (and expand with growth of the economy), Rwanda must look increasingly to financing its import bill through either greater export earnings or greater inflows of foreign direct investment.

Many emerging market countries faced a similar predicament during the last two decades. Moreover, reduced foreign aid flows and official development lending have, arguably, been among the most important motivations for unilateral trade liberalization in the new global economy. By liberalizing their trade regimes, emerging market countries have sought to reduce the anti-export bias of their former import-substitution policies, in order to promote employment in (mainly) labor-intensive export sectors. In the new global economy, emerging market countries have also turned increasingly to welcoming investment by multinational corporations (MNCs) in order to intensify the process of domestic structural adjustment to world relative prices and greater international competition, and to make the process more dynamic through, for instance, FDI-related transfers of technology and other spillover effects on the domestic economy.[5]

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[3] See Borensztein, DeGregorio, and Lee (1998).
[4] Given the extreme concentration of Rwanda's exports in these three primary commodities, it is unsurprising that quantitative studies of the Rwanda's comparative advantage identify these three commodities as among the most important to the country's export potential. See AIPA (2001).
[5] On the prominent role of foreign direct investment in the new global economy and its increasing importance to economic development, see for instance WTO (1996) and Moran (1998).

Free trade policies are not a panacea for mediocre economic performance, nor is there universal support for adoption of such policies. Moreover, economic institutions and the efficiency with which they are administered are important too (Rodrik 1996). Also, on empirical grounds, "contrarians" have questioned whether free trade policies are principally responsible for the so-called East Asian Miracle.[6] The analysis here, however, predominantly subscribes to the view that free trade policies matter and contribute significantly to the economic prospects of both large and small countries. Accordingly, the analytical foci of the present paper are mainly the economywide free trade zone and more narrowly defined export processing zones, their bases in economic theory and developing country experience, and their potential quantitative impacts on the Rwandan economy and trade.

The quantitative analysis utilizes a simple model of Rwanda's international trade and related employment that is founded in part upon the review of free trade zones in economic theory and practice in developing countries presented in Section 2. Section 3 then discusses the specifications of the simple trade and employment model underlying the quantitative analysis. The quantitative analysis itself, presented in Section 4, subsequently considers the trade, employment, and welfare impacts of different forms of free trade zones for Rwanda, ranging from small, enclave or industry-specific export processing zones to a full, economywide free trade zone. The quantitative analysis also considers the economic impacts of reduced foreign aid flows to Rwanda. Finally, the concluding section of the paper, Section 5, briefly considers the way forward for Rwandan trade policy in light of Rwanda's membership in the Common Market for Eastern and Southern Africa (COMESA) and the bloc's near-term plan to form a customs union.[7]

2. Free Trade Zones in Economic Theory and Practice

Background and Political Economy Setting

The Rwanda FTZ proposal envisions establishing Rwanda as an ***economywide*** free trade zone, following the example of Hong Kong or Singapore (hence the well-meaning appellation, "Singapore in the Mist"). More frequently, however, free trade zones are constituted as narrowly defined enclaves. That is,

[6] On the East Asian Miracle, see World Bank (1993). For contrarians views on the empirical validity of the East Asian Miracle and, more recently, on the growth impacts of trade liberalization, see Young (1994, 1995), Krugman (1994), Rodriguez and Rodrik (1999), and Rodrik (1999). Also, for a rejoinder to the recent studies of Rodriguez and Rodrik, see Srinivasan and Bhagwati (1999).

[7] COMESA (1994).

they are defined by the boundaries of a firm, an industry (or collection of related firms), or limited geographic area -- and popularly termed export processing zones (EPZs).

Export processing zones in developing countries became popular during the 1970s, when many developing countries gradually began to turn away from import substitution policies in favor of more open economies and export promotion policies. These countries sought to reduce the anti-export bias of their trade regimes, as a means of promoting their exports to the more rapidly growing major industrial countries and, in so doing, as a means of promoting their economic growth. But more fundamentally in the judgment of many economists, the adoption of more outward-oriented economic policies succeeded in better integrating the productive resources (if not always also the consumption possibilities) of these developing countries in the global economy. This occurred through the adjustment of domestic relative prices and the real exchange rate to levels more consistent with world relative prices and with more realistic valuation of the countries' productive resources (expressed in the real exchange rate).[8] In economic theory, adjustment of domestic relative prices and the exchange rate to conform to world relative prices promotes more efficient allocation of domestic resources and allows a country to take greater advantage of its comparative advantage. As a result, the country tends to enjoy greater gains from international trade and (potentially) higher economic growth.[9]

In highly protected developing countries, export processing zones are appealing to exporters because, once located in the zones, exporting firms are able to purchase their imported inputs at international prices and sometimes are able to sell their output abroad at a more realistic exchange rate. Export processing zones are also appealing to multinational corporations. As widely acknowledged agents of the new global economy, MNCs are strongly outward-oriented and typically seek, through foreign direct investment, to locate their manufacturing facilities in low-wage developing countries in order to reduce their labor input costs, particularly for lower value-added products (Warr 1989).

In addition to exporters and multinational corporations, economic policy makers in protected developing countries also have an interest in supporting export processing zones. For political economy

[8] The real exchange rate is usually defined as the relative price of nontraded domestic goods in terms of traded goods. As seen in the next section, the real exchange rate plays a prominent role in the applied economic model developed for the present study.

[9] On the indeterminacy of the effects of openness on economic growth, see Srinivasan and Bhagwati (1999).

reasons, these policy makers are often reluctant to move quickly or boldly in the direction of adopting significant trade liberalization on an economywide basis. However, in response to globalization and wide recognition of the need to promote exports and attract outward-oriented foreign direct investment, they often regard export processing zones, along with adoption of fiscal incentives to promote foreign direct investment, as appropriate intermediate measures to liberalize trade and foreign investment regimes sufficiently to realize some, albeit smaller expected gains in economic welfare and growth without incurring the displeasure of domestic vested interests in maintaining protection.

In promoting export processing zones, economic policy makers may also succeed in reducing external pressures for trade policy reform, especially those emanating from multilateral and bilateral donors. The World Bank, for instance, has endorsed establishment of export processing zones as a means of promoting exports in developing countries where duty-drawback schemes (which permit export producers to obtain reimbursement for tariffs paid on imported inputs) are not feasible and the costs of constructing or administering the export processing zones are not overly burdensome (Nash and Takacs 1998). Indeed, the Bank has supported development lending programs that include funding for export processing zones in a number of developing countries, including in Africa.[10]

Free Trade Zones in Economic Theory

Notwithstanding widespread support for EPZs as an instrument for promoting exports and attracting foreign direct investment, neoclassical trade theory -- the central paradigm of current international trade theory -- contents that in the presence of protection, export processing zones are of limited benefit to less developed countries at best and, at worse, are welfare-reducing.[11]

Consider a small, fully employed developing country that produces two goods (X and Y) using only capital and labor, and protects local producers from imports of the capital-intensively produced good Y. As seen in Figure 2, this country will produce at a point on its production possibilities frontier such as Z_o and consume at a point such as C_o, at domestic relative price $P_d=(P_x/P_y)_d$. Though C_o lies outside the country's production possibilities frontier, the consumption point is attainable through international trade at the international terms of trade $P_f=(P_x/P_y)_f$, by exporting the relatively labor-intensive good X in exchange

[10] See for instance Yung *et al.* (1990) and World Bank (1992).

for imports of the relatively capital-intensive good Y. That P_d is lower than P_f (implying that the domestic relative price of the exported good X is "repressed") reflects the fact that the country imposes an ***ad valorem*** tariff t_y on imports of Y, such that $P_d = P_f / (1 + t_y)$. If instead the country were constituted as an economywide free trade zone or equivalently simply practiced free trade, then it would produce at a point such as Z_1 and consume at a welfare-superior point such as C_1. Thus, it is apparent from Figure 2 that an economywide free trade zone would result in greater consumption of both X and Y, greater production (and greater exports) of the labor-intensive good X, but lower production (and greater imports) of the tariff-protected, capital-intensive good Y.

Export Processing Zone with No FDI

Protection expands production in the import-competing sector but represses production in the exporting sector. In neoclassical theory, it also raises the return to physical capital and reduces real wages in the economy. Suppose, in an attempt to ameliorate this situation and, in particular, to expand the country's exports of labor-intensive goods, economic policy makers establish a free trade zone for production of both X and Y. Because there is no tax on exports, producers of the good X are indifferent between producing in the regular domestic economy or in the export processing zone. On the other hand, producers of the import-competing good Y prefer the higher price for their output in the tariff-protected domestic economy and, accordingly, maintain their production in the sheltered economy. As a consequence, production in the country's domestic economy remains at Z_0 and total consumption at C_0. That is, establishing the export processing zone results in no change to the overall structure of production and consumption in the country, or to the country's economic welfare.

Export Processing Zone with FDI

Now assume more realistically that foreign direct investment accompanies establishment of the export processing zone. Specifically, assume that foreign capital is combined with domestic labor to produce and export good X from the duty free zone. In this case, labor is drawn from the domestic economy to the free trade zone, causing output in the tariff-protected domestic economy to adjust to a point such as Z_2 in Figure 3.[12] The wages earned by domestic labor in the export processing zone are remitted to

[11] See Hamada (1974), Brecher and Diaz-Alejandro (1977), and Hamilton and Svensson (1982).
[12] With the withdrawal of a portion of the labor force from the domestic economy to the export processing zone, the production possibilities schedule of the country's domestic economy shifts inward from TT to

the domestic economy where consumption by EPZ workers takes place. This gives rise to a point such as Z_2' from which the country may exchange its bundle of domestically produced goods plus in-kind remitted wages through international trade to reach welfare-maximizing consumption at C_2.

Consumption at C_2 is inferior to initial consumption at C_0, however. Thus, more realistic representation of export processing zones in neoclassical trade theory, to include capital contributed from abroad through foreign direct investment, results in an unambiguous decrease in economic welfare in the host country. Moreover, the diagrammatic analysis in Figure 3 may be extended mathematically to demonstrate that the return to foreign direct investment in the export processing zone is higher than if the foreign direct investment had been made in an open economy or equivalently an economywide free trade zone, at the world (free market) rate of return to capital.[13] This situation leads to the corollary that in the presence of tariff protection, foreign investment in an export processing zone not only decreases the economic welfare of the host country but also involves an implicit subsidy to foreign direct investment in the zone.

In contrast, an economywide free trade zone with foreign direct investment would not lead to a decrease in economic welfare in Figure 3. Moreover, outward-oriented foreign direct investment would tend to be attracted by fundamental comparative advantage factors in the host country, not unintended subsidy elements inherent to export processing zones and other export promotion policies adopted as "stop-gap" measures to promote exports in protected economies.

Free Trade Zones in Practice

The assessment of free trade zones in basic neoclassical trade theory is rather clear-cut: free trade zones, either accompanied or unaccompanied by foreign direct investment, are unlikely to result in positive economic benefits for the host country so long a tariff protects the capital-intensive import-competing sector and the free trade zone is constituted as an enclave for labor-intensive export production rather than an economywide free trade zone. This finding has been criticized on grounds that basic neoclassical trade theory is not sufficiently realistic to represent the circumstances under which export processing zones are

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TT', as illustrated in Figure 3. Moreover, at given domestic relative prices P_d, production in the domestic economy moves to point Z_2 by the so-called Rybczynski theorem.

[13] See Hamilton and Svensson (1982).

typically established in developing countries. For instance, early critics pointed out that basic neoclassical trade theory does not consider intermediate inputs to production, underemployment of labor or other factors of production, of possible spillover effects of foreign direct investment in EPZs on the domestic economy.[14] Thus, case studies of the experiences of export processing zones in developing countries are necessary to provide a clearer picture of the benefits of free trade zones to less developed countries.

EPZs in East Asia

In a seminal study, Warr (1989) analyzed export processing zones established during the 1970s in four prominent developing East Asian countries: Indonesia, Korea, Malaysia, and Philippines. Using a cost-benefit methodology and detailed data on foreign exchange transactions, employment of labor and other domestic resources, and administration and infrastructure costs, he examined the net benefit stream of export processing zones in the four East Asian countries and computed the internal rate of return to economic investment in the zones for an eleven year period (six years for the EPZ in Indonesia), 1972-82.

Warr's cost-benefit calculations indicate that the East Asian export processing zones succeeded in achieving substantial rates of return in both Indonesia (26 percent) and Malaysia (28 percent) if not also Korea (15 percent). In the Philippines, however, infrastructure costs and subsidies proved exceedingly high, so much so that the net present value and computed internal rate of return of the Philippine EPZ were both negative. In all cases, the EPZs succeeded in supporting appreciable employment and foreign exchange earnings, the latter impact owing not to the export earnings of the EPZs but rather to the requirement that firms located in the export processing zones convert their foreign exchange holdings to cover domestic costs at official exchange rates rather than at typically lower market (or shadow) exchange rates. Indonesia and Korea were also found to be relatively successful in collecting substantial taxes from multinational corporations operating in the export processing zones. With the exception of Malaysia, however, administrative and infrastructure costs were everywhere very high as a portion of gross benefits from establishment of the export processing zones (50 percent or more).

[14] As reported by Devereux and Chen (1995), recent, highly complex extensions to basic neoclassical trade theory have in fact considered imported intermediate goods and unemployment conditions (but not spillover effects of FDI). However, these extensions have largely upheld the findings of the basic theory. Notably, Devereux and Chen find that when the basic theory is extended to include quantitative restrictions on imports, EPZs can improve economic welfare. For more in depth review of export processing zones in economic theory, including application of the so-called new growth theory to export processing zones and potential spillover effects, see Johansson (1994).

Warr's results do not indicate whether consumption possibilities were increased by the export processing zones (the prime consideration of the previous theoretical analysis), though the logic of his cost-benefit analysis suggests that consumption possibilities might have been increased in those cases where public investment in the zones yielded relatively high rates of return. Nor do they provide evidence on possibly beneficial spillover effects of the EPZs. However, they do indicate that in most cases the export processing zones were economically viable if not also economically profitable.[15] Notwithstanding this important finding, Warr himself is skeptical about accepting his findings at face value. In particular, he notes that advances in export promotion policies in the four countries subsequent to 1982 were aimed largely at achieving the same results as export processing zones but at significantly lower administrative costs and without public expenditures to support the special infrastructure requirements of EPZs.[16] Thus, Warr concludes overall that export processing zones are far from effective "engines of development." Also, presaging the experiences of emerging market countries during the rise of globalization in the 1990s, he concludes that, based on the experience of Taiwan and Korea which both largely turned their backs on further development of EPZs during the 1980s, interest in EPZs tends to wane as industrial development (and trade liberalization) proceeds.

EPZs Worldwide

Since publication of Warr's study on EPZs in East Asia, the World Bank has periodically undertaken its own studies of the efficacy of export processing zones in developing countries. These studies encompass a number of regions world wide (including Sub-Saharan Africa) but only a relatively narrow set of exporting sectors because EPZ firms in developing countries are devoted predominantly to production of apparel and assembly of electronic goods.[17]

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[15] Warr provides no estimates of what the social rate of return to capital is in the four countries considered. Thus, for instance, it is not clear whether an internal rate of return of 28 percent for the export processing zone established in Indonesia is a better investment than had the resources been invested in another project in the country.

[16] Warr reports that most of the countries developed "in-bond" policies whereby duty-free intermediate inputs for export production could be held on factory sites anywhere within the country, not solely within "fenced" EPZs. Also, he reports that many of the East Asian countries found that fiscal and other incentives to attract foreign direct investment to the EPZs could also be applied outside of zones, without having to establish special enclaves to support export producers and with potentially greater spillover effects on the domestic economy.

[17] See principally Yung, Kutterbach, and White (1990); World Bank (1992); Madani (1999); and Watson (2001).

World Bank studies have not improved much, if at all, upon Warr's analytical methodology for assessing export processing zones, reportedly because of insufficient data to carry out formal economic cost-benefit calculations (Madani 1999). Thus, World Bank studies tend to focus on the "apparent impact" of export process zones measured in terms of number of firms supported, gross and net export earnings,[18] and employment generation. The summary of World Bank study findings reported in Table 3 indicates few successes in this regard, including if one looks mainly to the statistic most frequently reported, namely, employment supported by EPZs. Indeed, export processing zones appear to support less than 3 percent of the labor force in most developing countries, except the Dominican Republic (5 percent) and, most notably, Mauritius (17 percent). The Bank studies also reveal the considerable extent to which tax holidays and other fiscal incentives (beyond elimination of import duties on imported inputs) are extended to multinational corporations to encourage foreign direct investment in export processing zones, albeit frequently offset in part by domestic content requirements and restrictive labor regulations that can be costly to MNCs. For instance in Africa, both Kenya and Mauritius have extended corporate tax holidays to MNCs for periods up to ten years. Such investment incentives are frequently offered in competition with other developing countries. But such competition to attract foreign direct investment is very costly to low-income countries and essentially leads to (non-recoverable) subsidies to MNCs, the economic cost of which is compounded if the foreign direct investment in export processing zones ultimately proves inappropriate to the comparative advantage of host countries or fails to achieve substantial employment gains.

Overall, the World Bank studies take a rather guarded view of the efficacy of export processing zones. While recognizing their potential for not only expanding exports but also as possible catalysts for the introduction of new technologies, and advanced labor and management skills in less developed countries, the World Bank studies find that export processing zones have widely proven to be more costly to organize and administer than anticipated, and also have not achieved remarkable employment gains in most cases.[19] Thus, the studies emphasize that export processing zones are not a first-best policy choice. More important, they contend that inward-oriented countries should principally pursue thoroughgoing trade liberalization,

[18] Net exports refer to exports by EPZ firms less their demands for imported intermediate goods.

[19] Also, the World Bank studies do not marshal much in the way of systematic evidence on the importance of the spillover effects on the domestic economy emanating from foreign direct investment in export processing zones. This contrasts with economic research on spillover effects emanating from foreign direct

that is, trade liberalization extended to all sectors of the economy, including rural and urban households (i.e., consumers). Among other economic policy recommendations, the World Bank studies of export processing zones emphasize maintenance of a stable macroeconomic environment and liberal foreign investment regime, protection of private property rights, and policies to support general and higher education. In such an environment, it is contended, a less developed country should be able to expand its trade and foreign direct investment in the new global economy, without reliance on export processing zones or other halfway measures (of limited efficacy) intended to promote exports, employment, and economic growth.

Mauritian EPZs -- An African Success Story?

The apparent success of export processing zones in Mauritius is worth considering more closely. Mauritius has a strong agrarian past, and today sugar continues to be one of the country's major exports. However, since the establishment of export processing zones in the country during the early 1970s, concentrated mainly in clothing and apparel manufacturing, Mauritius has succeeded in diversifying exports, expanding manufacturing employment, and achieving relatively high economic growth (Table 1). Subramanian and Roy (2001) examined the so-called Mauritian miracle, investigating in particular the contribution of several possible factors to the robust economic performance of Mauritius -- general trade liberalization, institutional arrangements surrounding the export sector (including export processing zones), and education and human resource development.[20]

Subramanian and Roy find partial support for each of these factors. However, they emphasize that trade liberalization undertaken by Mauritius has been very limited in nature. Indeed, import tariffs and the frequency of nontariff barriers remain higher in Mauritius than most countries in Eastern and Southern Africa. They place greater emphasis on "heterodox opening" of the Mauritian economy, principally through adoption of export processing zones and other arrangements that enabled export producers to enjoy duty-free imports of essential inputs.[21] In this way, Mauritian exporters were not placed at a competitive disadvantage in world markets by the otherwise protective stance of the Mauritian trade regime. Also, EPZ

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investment in developing countries in general. See for instance Blomstrom (1989), Kokko (1992), and Aitken *et al.* (1997).

[20] Earlier studies of export processing zones in Mauritius include Hein (1988), Alter (1991), Romer (1992), Frisen and Johansson (1993), and Lall and Wignaraja (1998).

firms were granted more liberal employment laws than domestic firms, ensuring that EPZ wages were more flexible and internationally competitive. Finally, with regard to other institutional factors surrounding the export sector, Subramanian and Roy point out that Mauritius is the beneficiary of significant trade preferences extended to its exports of sugar by the European Union (at prices substantially above world market prices) and its exports of apparel by both the United States and the European Union under the Multi-Fiber Arrangement (again at prices substantially higher than world market prices).

Beyond economic policies and institutional arrangements directly supporting Mauritian exports, Subramanian and Roy emphasize the relatively high education level of the Mauritian workforce.[22] Such human resource development is a prime incentive to MNCs anxious for access to not only low-wage labor but also a workforce that can be readily trained to operate (and maintain) advanced machinery and equipment, and, more generally, can readily adapt to advanced production and management technologies that often accompany outward-oriented direct foreign investment. Also, relatively high education in Mauritius might have contributed to better oversight and administration of export processing zones in the country, by both public officials and private sector managers of the zones.

Interestingly, when the contribution of the foregoing factors -- trade policy, export institutions and trade arrangements, and general education -- are added up quantitatively, Subramanian and Roy find that they still cannot account fully for the strong growth and export performance of the Mauritian economy. This leads them to postulate the importance of a fourth factor, namely, the diversity of the Mauritian population and its considerable familiarity with economic opportunities in the world at large. Thus, while Subramanian and Roy ascribe a great deal of importance to the role of export processing zones in the remarkable economic performance of Mauritius, they contend that other positive factors have also contributed significantly to the Mauritian miracle, independently and possibly interactively with the establishment of export processing zones.

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[21] On the notion of heterodox opening and the importance of economic institutions and export arrangements to the success of trade liberalization, see Rodrik (1996, 1999).

[22] For 1997, the Harbison-Myers index of human resource development (Harbison and Myers 1964), calculated as the secondary enrollment rate plus five times the university enrollment rate (both calculated in their respective age cohorts), stood at 97 percent in Mauritius, compared to only 37 percent in Sub-Saharan Africa as a whole. Unfortunately, current education statistics are not available for Rwanda. However, for

3. Rwanda Trade Simulation Model

The Rwanda trade simulation model is a quantitative model developed for the present study to investigate the potential impacts of the Rwanda FTZ proposal on major sectors of the Rwandan economy, and on the country's economic welfare and employment. Given the limited national accounts data for Rwanda, the model is necessarily simple in design and focuses principally on export and import trade by 131 categories of traded goods, and on the proximate relationship of trade in these categories to domestic production and employment in the underlying economy.[23]

The Model

The Rwanda trade simulation model is a computable partial equilibrium model, based on familiar (log-linear) import demand and export supply functions for traded goods. Because Rwanda is a small trading economy, the country is assumed unable to affect its external terms of trade through changes in the volume of either its exports or imports. Thus, international prices of traded goods are exogenous in the model. At the same time, however, economic equilibrium similar to that found in more sophisticated general equilibrium models is maintained in the present model by a balance of payments constraint that determines the (real) exchange rate.[24]

Import Demand

Import demand M^d_k for traded good k is given by the relationship:

$$(1) \qquad M^d_k = C^m_k \, [P^m_k - \lambda_k \Sigma_j (a_{jk} \, P^m_j)]^{\eta k}$$

1993 the Harbison-Myers index of human resource development stood at less than 15 percent in Rwanda. See World Bank (1997, 2000).

[23] Trade in services and nontraded goods are not explicitly considered in the Rwanda trade simulation model. The 131 categories of traded goods in the model are based on the major chapters of the Harmonized System (HS) of the International Customs Cooperation Council (Antweiler 2001), combined with over 30 major agricultural and manufacturing sectors of the Rwandan economy identified in *Rwanda Development Indicators 2001* (Republic of Rwanda 2001a).

[24] The real exchange rate is defined as the aggregate price of nontraded goods in terms of traded goods in the model. In effect, the aggregate price of nontraded goods is the numeraire in the model. Corden (1971) and Dornbusch (1974) provide theoretical underpinnings for the model. On applied economic models for trade and development policy analysis that incorporate both traded and nontraded goods, and on the determination of nominal and real exchange rates in such models, see Robinson (1989), Francois and Reinert (1997), and Ginsburgh and Keyzer (1997).

where

$$P^{m}_{k} = P^{*}_{k} (1 + t_{k}) / e$$

and where λ_k is a dichotomous (0,1) variable that equals unity only if sector k is a major domestic producing sector (identified in *Rwanda Development Indicators 2001*),[25] a_{jk} is the amount of good j necessary to produce one unit of output of good k, η_k is the own-price elasticity of import demand for good k, P^{*}_{k} is the world price of good k denominated in an international currency such as U.S. dollar, t_k is the *ad valorem* tariff rate for good k, and e is the real exchange rate. Equation (1) states that import demand is a positive function of the real exchange rate for the Rwandan franc, the (absolute value of the) price elasticity of import demand, and the price of intermediate inputs to produce good k, and a negative function of the world price of good k and the tariff rate.[26, 27]

Export Supply

Export supply (X^{s}_{k}) of good k is given by the relationship:

(2) $$X^{s}_{k} = C^{x}_{k} [P^{x}_{k} - \Sigma_j (a_{jk} P^{m}_{j})]^{\alpha k}$$

where

$$P^{x}_{k} = P^{*}_{k} / e ,$$

[25] See Republic of Rwanda (2001a). The import demand specification in equation (1) is not rigorously derived. Nevertheless, it assumes that import demand is derived from total domestic demand for each traded good less total domestic production of the same good. Wherever domestic production of good k is not significant, the dichotomous variable λ_k is assumed equal to zero.

[26] That import demand and (further below) export supply are independent of world prices of other traded goods belies the partial equilibrium character of the proposed model. That is, the model does not explicitly incorporate the hallmark of general equilibrium models: long-run possibilities for substitution of goods (and resources) in demand and production.

[27] If good k satisfies intermediate demands for inputs to production as well as demands for final consumption in the model, then import demand in equation (1) is expanded to account for intermediate demands in the model. For instance, if M_k is a major input to domestic production of, say, good n, then equation (1) for good k in the model takes a form similar to:

(1') $$M^{d}_{k} = C^{m}_{k} \{ [P^{m}_{k} - \Sigma_j (a_{jk} P^{m}_{j})]^{\eta k} + a_{kn} [X^{s}_{n} - \lambda_k M^{d}_{n}] \}$$

where λ_k is (again) a dichotomous (0,1) variable that equals unity only if sector k is a major domestic producing sector.

and where α_k is the own-price elasticity of export supply of good k. Equation (2) states that export supply is a positive function of the world price of good k and the elasticity of export supply, and a negative function of the price of intermediate inputs to produce good k and the real exchange rate.

That Rwanda might both import and export goods in the same category reflects possible domestic production of similar (but not identical) import-competing goods and export goods in the same category. Indeed, some traded goods categories defined in the model are sufficiently broad that they might encompass goods produced by significantly different factor intensities within the same category. Beyond such classification problems, the occurrence of exports and imports in the same category may also reflect the influence of transportation costs for like goods imported and exported from widely separated customs ports in the country, rather than a departure from the model's underlying assumption of trade in homogeneous (i.e., undifferentiated) goods.[28]

International Payments Equilibrium

Net earnings from trade in services and net international resource flows, including net funding from international donors, to finance trade imbalances are exogenous in the model. Thus, the condition for equilibrium in the balance of payments is

$$\Sigma_k (P^*_k X^s_k - P^*_k M^d_k) + K^* = 0 \qquad (3)$$

where K* is the sum of net service export receipts and net financial inflows from abroad, denominated in an international currency. This balance-of-payments condition is essential for "closure" of the model and determines the real exchange rate.

Trade Liberalization

Trade liberalization in the Rwanda trade simulation model is represented by reductions in tariff rates for one or more categories of traded goods in the model. Trade liberalization will initially induce increases in import demands and reductions in tariff revenues. The initial impacts of trade liberalization,

[28] The case of U.S. petroleum exported from Alaska to Japan, while Eastern U.S. ports import petroleum from the Middle East, is a prime example. A popular alternative approach to accounting for "two-way

however, must be tempered by considerations for maintenance of the balance of payments and adjustment of the exchange rate. Initial increases in import demands will tend to worsen the balance of payments, and hence cause the exchange rate to depreciate, giving rise to domestic relative price effects. The main relative price effect will be increased profitability of exports. This will promote export shipments[29] and raise export receipts until balance of payments equilibrium is restored. Thus, trade liberalization will not only increase imports but also increase exports. In the case of Rwanda, this means that the agriculture sector, which is the principal source of the country's traditional exports (tea and coffee) -- followed by the mining sector and the textiles and apparel sector -- should particularly benefit from trade liberalization.[30]

The impacts of trade liberalization are assessed with respect to some specific indicators within the framework of Rwanda trade simulation model. First, to assess which sectors of the Rwandan economy gain or lose from establishing Rwanda as a free trade zone, changes in exports and imports are interpreted as indicators of gains or losses to production in major sectors.[31] In sectors where exports expand, production in the underlying Rwandan export industry is assumed to rise. And analogously, in sectors where imports expand, production in the underlying Rwandan import-competing industry is assumed to fall. To assess proximate changes in employment, the model applies current (2000), sector employment-to-output ratios to changes in net trade by sector.[32] Finally, to assess the overall impact of FTZs and other trade policy

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trade" in world trade models is to incorporate the assumption of differentiated demands for similar products produced in different countries, following Armington (1969).

[29] Although trade restrictions may exist abroad, Rwanda is assumed to be such small country in the trade simulation model that the only constraints on its ability to export to the world are the limitations of its own domestic production capabilities, as governed by (assumed) magnitudes of export price elasticities in the model.

[30] Non-traditional exports should also be expected to expand under a more open trade regime. Though the Rwanda trade simulation model is not sufficiently robust to project expansion of exports where no trade initially exists, the applied analysis of the next section includes special consideration of the potential for expansion of non-traditional exports of potatoes and certain other vegetable crops under trade liberalization combined with wider use of imported fertilizer in Rwandan horticulture.

[31] Strictly speaking, the changes in exports and imports do not necessarily correspond precisely to changes in domestic output of export goods and import-competing goods respectively, because domestic demands for both export goods and import-competing goods should also be expected to share in the adjustment to new trade levels.

[32] Operationally, the simulation model calculates the proximate change in employment ΔE_k in each sector k as

$$\Delta E_k = a_{Lk} (\Delta X_k - \lambda_k \Delta M_k)$$

where a_{Lk} is the number of workers required per unit of output in sector k, and λ_k is a near-dichotomous variable that equals one if sector k is a major domestic producing sector identified in *Rwanda Development*

initiatives on the Rwandan economy, the model computes changes in national economic welfare. Using so-called Harberger triangles (Harberger 1954, 1971), changes in national economic welfare are computed as the sum of changes in consumer surplus and producer surplus, net of the reduction in tariff revenues.[33]

Database and Parameter Values

The database underlying the Rwanda trade simulation model consists of three main elements. First, 2001 statistics for Rwanda's exports and imports with the world, and import tariff rates were collected from the Rwanda Revenue Authority. Second, 2000 technical requirements for labor and major produced inputs to industry were compiled from the Rwanda *Census of Industrial Production 2000* (UNIDO 2001). And third, technical requirements for labor and major produced inputs to agriculture were compiled for the most recent year possible from a variety of published and unpublished reports collected mainly from the Ministry of Agriculture.[34]

The parameters of the trade simulation model consist principally of own-price elasticities of import demand and export supply (Table 4). Values of the import price elasticities of demand are values suggested for East African countries by the World Bank (Republic of Uganda 1997), based on econometric estimates of price elasticities in international trade compiled by Stern *et al*. (1976). Similarly, "central" values of price elasticities of export supply in the model are based on econometric estimates of price elasticities in international trade compiled by Stern *et al*. (1976), Goldstein and Khan (1985), and DeRosa (1992).

4. Quantitative Analysis and Results

Free Trade Zone Scenarios

Adoption of an ***economywide free trade zone*** is represented in the Rwanda trade simulation model by simply a reduction of all import tariffs in the model to zero. As noted previously, this representation of a

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Indicators 2001 (Republic of Rwanda 2001a) and equals zero if no appreciable domestic production occurs in the sector.

[33] See Roningen (2002b).

[34] The specifications of the import demand equations and export supply equations in the Rwanda trade simulation model are sufficiently general to include technical requirements for all produced inputs. Unfortunately, a recent input-output table is not available for Rwanda's economy, and time and resources

free trade zone is equivalent to thoroughgoing unilateral trade liberalization by the country. The impacts of the economywide free trade zone are then determined by the extent of changes in model variables vis-à-vis their baseline values.

The Rwanda trade simulation model and underlying database are not sufficiently developed to differentiate the domestic economy from one or more export processing zones. Nor is the model sufficiently developed to incorporate explicit consideration of foreign direct investment. Thus, in the present model ***export processing zones*** are represented solely as enclaves of export producers granted duty free access to intermediate inputs (whether actually imported or not). In this way, the model specifies that export producers in EPZs make their output decisions and intermediate demand decisions on the basis of duty-free world prices. At the same time, all import-competing producers in the model continue to face tariff-ridden domestic prices for both their output and intermediate inputs. Also, all non-EPZ export producers in the model continue to face tariff-ridden domestic prices for their intermediate inputs but duty-free world market prices for their output. Beyond such details, the impacts of an export processing zone are determined in the same way as under the economywide free trade zone scenario, that is, by comparing changes in model variables vis-à-vis their baseline values.

Two different export processing zone scenarios are considered. The first is an export processing zone formed by all manufacturing sectors, while the second is an export processing zone formed by only the textiles and apparel sector. These two EPZ scenarios are suggested by the experience of developing countries with export processing zones, whereby developing countries attempt to diversify their production and exports of mainly manufactures but, owing to global ramifications of the Multi-Fiber Arrangement, frequently succeed mainly in increasing their production and exports of textiles and apparel.

Related Scenario: Reduced Foreign Aid

Finally, in a fourth scenario, the Rwanda trade simulation model is also applied to investigate the implications of significantly reducing official aid flows to Rwanda. Representation of reduced Rwandan aid dependence in the model is accomplished by simply reducing the exogenous level of net international capital inflows in the model. In 2000, foreign aid to Rwanda relative to the country's total trade was 56

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available for the present study were not adequate to compile information about more than two-to-three

percent, compared to 37 percent in Uganda and 30 percent in Tanzania.[35] In the foreign aid reduction scenario considered here, exogenous net capital inflows to Rwanda are reduced by 25 percent, bringing the level of foreign aid relative to total trade in Rwanda substantially nearer to the level found in Uganda.[36]

Simulation Results

Table 5 provides a summary of the simulation results for the three principal sectors of the Rwandan economy, agriculture, mining, and manufacturing, for the four scenarios discussed previously, the first three covering variants of the FTZ proposal and the last two covering the so-called related scenarios. The results and interpretation of changes in the variables highlighted in Table 5 are mostly straightforward. However, the uniform adjustment of export prices in the simulation results for each scenario requires some explanation, as does the identical change in imports and exports under each scenario except the scenario for reduced foreign aid flows to Rwanda.

Close inspection of the specification of export prices in the model [equation (2) above] reveals that the proportional change of the domestic price of exports will always be equal to the proportional change of the Rwandan price of foreign exchange, so long as world prices of traded goods are constant. Thus, because world prices remain unchanged under each scenario, domestic prices facing all Rwandan exporters change by the same proportion and, in fact, precisely indicate the adjustment of the real exchange rate. For example, under the economywide FTZ scenario the domestic price of all Rwandan exports rises by 8.5 percent, which is precisely equal to the increased cost of foreign exchange in Rwanda induced by adoption of the free trade regime.[37]

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major inputs to production in each major sector of the Rwandan economy.

[35] World Bank (2002b).

[36] Net capital inflows to Rwanda are nearly entirely foreign aid flows. It should also be noted that in reducing foreign aid flows by 25 percent without simultaneously reducing import demand autonomously by a corresponding (nominal) amount, the reduced foreign aid scenario implicitly assumes that international aid flows to Rwanda are essentially lump-sum resource transfers, and are not necessarily tied to purchases of traded goods.

[37] The Rwandan franc price of foreign exchange is equal to the inverse of the exchange rate variable e specified in the equations of the trade simulation model. Thus, an increase of 8.5 percent in the Rwandan franc price of foreign exchange is equal to a depreciation of the foreign currency price of the Rwandan franc, by 7.9 percent.

Finally, it should also be noted that under all scenarios except the scenario depicting reduced foreign aid, the simulated increases in export and import quantities are identical.[38] This reflects the balance of payments constraint enforced by the model.[39]

Free Trade Zone Scenarios

As mentioned previously, the Rwanda FTZ proposal refers mainly to the establishment of an economywide free trade zone, akin to the ***de facto*** free trade regimes observed in Hong Kong and Singapore. The simulation results in Table 5 indicate clearly that the economywide FTZ is the only representation of the Rwanda FTZ proposal that has substantial impacts on the Rwandan economy, notably giving rise to a substantial depreciation of the exchange rate (indicated by the increase in export prices) and appreciable-to-significant increases in overall trade and trade-related employment. The expansion of trade is led by a nearly 20 percent increase in the volume of exports. At the same time, the economywide FTZ increases real imports by just over 3 percent. Though overall employment is stimulated by 4.2 thousand man-years, this trade-related gain in employment amounts to just 0.1 percent of the Rwandan labor force (estimated at 3 million).[40]

The simulation results in Table 5 also make clear that the economywide FTZ has very important indirect effects on the Rwandan economy, indirect effects not apparent in the simulation results for the EPZ variants of the Rwanda FTZ proposal. Specifically, the simulation results summarized in Table 5 reveal that in eliminating import tariffs across the board and thereby reducing import prices facing not only producers (for their produced inputs and equipment) but also consumers of a wide range of products, an economywide FTZ expands exports and employment in agriculture -- the largest and most highly labor-using sector of the economy -- by Frw 3.5 billion (evaluated at base period prices) and 4.1 thousand man-years, respectively. Moreover, the economywide FTZ scenario results in the largest welfare gains to the economy (Frw 3.0

[38] Quantities of exports and imports in Table 5 and in the subsequent tables of simulation results accompanying this section are valued at base period prices that were set equal to unity in the model through appropriate calibration of the quantity units for each traded good.

[39] Under the reduced foreign aid scenario, the overall increase in net exports is precisely equal to the assumed reduction in foreign aid flows (measured in foreign currency terms), again enforced by the balance of payments constraint in the model.

[40] This outcome is substantially lower than the 2-to-3 percent employment gain achieved by EPZs in many developing countries, as reported in Section 2. However, it should be understood that the present simulation results do not include employment impacts of foreign direct investment that would be stimulated by adoption of an economywide FTZ. Also, as seen in Table 5 and discussed further below in the text, the

billion or 0.4 percent of GDP, garnered chiefly by producers of agricultural products), albeit at a high cost to government revenues from import duties (Frw 12.5 billion or 1.7 percent of GDP).[41] These results are broadly consistent with the economic literature on import-substitution policies favoring capital-intensive industry in low-income countries that have a strong comparative advantage in agriculture and labor-intensive sub-sectors of manufacturing, such as apparel manufacturing and assembly of electronic components and products. They are also consistent with the related economic literature on the repression of agriculture (and, more generally, rural development) in such countries.[42]

The scenarios depicting establishment of manufacturing export processing zones result in comparatively miniscule gains in exports, employment, and economic welfare, concentrated chiefly in manufacturing. That these economic impacts are so small and limited in scope may be traced to the fact that trade liberalization under the EPZ scenarios is very modest, so much so that the accommodating changes in trade prices and the exchange rate are imperceptible in Table 5 and have few appreciable indirect effects on other sectors of the economy.

Detailed simulation results for the economywide FTZ scenario confirm that thoroughgoing trade liberalization should be expected to promote production, exports, and employment in the sectors corresponding to the sectors of Rwanda's currently strongest comparative advantage: horticulture (chiefly coffee, tea, and gums and resins), mining (chiefly columbite-tantalite), hides and leather manufacturing, and textiles.[43] However, the impacts on import demands simulated by the trade model indicate some interesting patterns of possible structural adjustment in other sectors of the Rwandan economy under an economywide FTZ. Clearly, in animal products and particularly manufacturing sectors such as processed

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present simulation results indicate that the pure trade-related gains to employment are significantly smaller from establishing EPZs than an economywide FTZ in Rwanda.

[41] Because tariff revenues represent simply a transfer from the government to consumers, the change in tariff revenues is not necessarily equivalent to a change in economic welfare. Nonetheless, for a small, low-income country such as Rwanda, elimination of import duties, resulting in reduced government revenues amounting to 1.7 percent of GDP, is a serious matter. In a companion study by the authors (DeRosa and Roningen 2003), the Rwanda trade simulation model is modified to include domestic indirect taxes, including particularly non-distortionary value-added taxes on traded and nontraded goods and services, and applied to investigate the fiscal impacts of the Rwanda free trade zone proposal. Among the principal findings of the companion study is that raising the value-added tax rate in Rwanda to 20 percent, from the present rate of 15 percent, while eliminating the import tariff regime would reduce the estimated loss in government revenues by more than half, from Frw 12.6 billion to Frw 5.8 billion.

[42] For among the most recent and influential contributions to this literature, see Krueger, Schiff, and Valdes (1988, 1992).

[43] Detailed simulation results are reported in a technical appendix available from the authors.

foods, rubber and plastic products, textiles and apparel, and paper products where thoroughgoing trade liberalization results in lower import prices and substantial expansion of imports, domestic production and employment by import-competing firms should be expected to contract in the face of expanded imports.[44] But the model also identifies other sectors such as chemicals, metal products, footwear, and miscellaneous manufactures in which domestic production and employment by import-competing firms should be expected to expand. These are generally sectors in which protection in Rwanda is already relatively low. As a consequence, indirect effects of reducing relatively high protection in other sectors (operating through depreciation of the exchange rate) cause import prices to rise and import demands to decline in largely unprotected sectors, promoting expansion of domestic production and employment by import-competing firms in these sectors. Thus, an economywide FTZ holds important potential for promoting domestic production and employment in not only traditional agricultural exporting sectors such as tea and coffee, but also both traditional and nontraditional import-competing sectors in which domestic producers are not currently sheltered from international competition by relatively high tariff protection.

The detailed simulation results for the economywide FTZ scenario also confirm that while producers of import-competing goods in highly protected sectors may be injured, thoroughgoing trade liberalization benefits consumers across a comparatively wide spectrum of primary products and manufactures, including vegetable products and processed foods, paper products, textiles and apparel, and machinery and equipment. That the total increase in economic welfare enjoyed by consumers (Frw 145 million) is substantially less than that enjoyed by producers (Frw 2,887 million) reflects the fact that the reported changes in consumer surplus are net of a substantial portion of the initial tariff revenues.[45]

Finally, the detailed simulation results for the manufacturing EPZ scenarios reveal that given the current structure of the Rwandan economy (and no foreign direct investment), little gain would result from establishing export processing zones for manufactures outside the textile and apparel sector. According to the simulation results, the manufacturing-wide EPZ would significantly increase gross exports of textiles and apparel by about Frw 95 million (Frw 75 million on a net basis), but would lead to no appreciable

[44] Note that in some sectors such as wood products, transport equipment, and professional equipment increased imports do not have substantial impacts on domestic employment (or output). This is because there is little if any import-competing production in these sectors in Rwanda.

increase in exports of other products. This result is, in fact, an artifact of the simplicity of the Rwanda trade simulation model, whereby, like most other applied trade models, the present model tends to simulate changes in trade only in product categories for which trade is recorded in the base period. Nonetheless, the simulation results for the manufacturing-wide EPZ scenario serve to illustrate the greater efficacy of general trade liberalization (the situation under the economywide FTZ scenario) for promoting export diversification. Because general trade liberalization must be accommodated by a significant depreciation of the real exchange rate, it results in a substantially greater increase in domestic price incentives for all export producers. Thus, as illustrated by the present simulation results, an economywide free trade zone provides a much surer prescription for diversifying a country's exports than narrowly constituted, fenced or unfenced export processing zones.[46]

Reduced Foreign Aid Scenario

The present, relatively high levels of foreign aid to Rwanda are intended to provide temporary financing for restoration of Rwanda's infrastructure, institutions, and public services. Yet this foreign aid provides a major source of financing for Rwanda's balance of payments which contributes to overvaluation of the country's exchange rate. This tends to repress exports, by lowering their profitability. However, it also tends to repress production of import-competing goods for the same reason (domestic prices of import-competing goods are lower than they would otherwise be).[47] In this light, protection might be viewed as a second-best economic policy. Although it injures competitive export producers and producers of import-competing goods that receive little or no protection, it does maintain a more "level playing field" for protected producers of import-competing goods who have the least international comparative advantage but otherwise may be efficient producers of commodities and manufactures.

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[45] If Rwandan tariff revenues are currently inefficiently redistributed to consumers, through for instance corrupt or ineffective public works and services, then actual gains to consumers from thoroughgoing trade liberalization would be much greater than reported.

[46] It should also be noted that the Rwanda trade simulation model does not incorporate consideration for administrative costs associated with export processing zones. That such costs usually impose a substantial burden on less developed countries provides an added reason for pursuing an economywide FTZ, which conceptually involves only small administrative costs.

[47] This phenomenon is popularly called Dutch Disease, after the experience of the Netherlands during the late 1950 and early 1960s when massive revenues from the discovery of North Sea natural gas deposits, within the jurisdiction of the Netherlands, unsettled the exchange rate of the country's currency and left Dutch producers of traded goods less internationally competitive. Notably, it has recently been alleged that excessive dependence on foreign aid is damaging the economy of Rwanda's neighbor, Uganda (Phillips 2002).

Thus, reducing foreign aid to Rwanda might be regarded as a natural complement to adoption of an economywide FTZ. Not only would it be expected to mitigate losses to protected producers of import-competing goods from adoption of the economywide FTZ but it would also be expected to enhance Rwanda's export performance further by reducing the overvaluation of the exchange rate attributable to the country's relatively high foreign aid. This is confirmed in the simulation results for reduced foreign aid (unaccompanied by the economywide FTZ) summarized in Table 5, and in the detailed simulation results. A 25 percent reduction in the foreign aid flows to Rwanda causes the price of foreign exchange and export prices to rise by nearly 14 percent across the board, causing aggregate exports to rise by nearly 10 percent and trade-related employment to climb by 6,544 man years. Notably, prices of imports also rise by about 14 percent across the board. This reduces the volume of imports by nearly 20 percent to the expected benefit of import-competing producers. It also reduces import tariff revenues but by only Frw 2,467 million.

Under the reduced foreign aid scenario, increased exports and employment are again concentrated mainly in agriculture. Interestingly, exports expand by less than under the economywide FTZ scenario because domestic prices of imported inputs rise under the reduced foreign aid scenario. Also, the reduction in imports by nearly 20 percent implies a steep decline in consumer surplus (Frw 1,811 million), which is mainly offset by an increase in producer surplus (Frw 2,353 million). Finally, it is also interesting to note that the employment gain chiefly in agriculture (5,198 man years) is accompanied by a sizable increase of employment in manufacturing (1,022 man years). This last outcome is not attributable to the modest increase in manufactured exports. Rather, it is attributable to the power of reduced foreign aid to increase the profitability of production by efficient producers of import-competing manufactures. Thus, the steep decline in manufactured imports gives rise to expansion of employment in manufacturing, virtually across the board as seen in the detailed simulation results. Accordingly, while adoption of the Rwanda FTZ proposal might impose considerable adjustment costs on producers of some import-competing manufactures, if the proposal were adopted simultaneously with a policy or reduced foreign aid flows, producers of nearly all import-competing manufactures would benefit. This is seen in the last panel of Table 5 which summarizes simulation results for a second reduced foreign aid scenario in which the economywide FTZ is simultaneously adopted. Importantly, such a two-pronged economic strategy might

be expected to significantly reduce political opposition to the Rwanda FTZ proposal by vested interests in the country's current structure of protection.

5. The Way Ahead

The proposal to establish Rwanda as a free trade zone on a par with the trade policy regimes of Hong Kong and Singapore is a bold policy proposal, intended to improve export performance, diversify production and exports, and promote higher self-sustaining growth in Rwanda. To be sure, Rwanda does not enjoy the natural advantage of a deep-water port such as the seaports enjoyed by the two East Asian countries and many other emerging market countries. Moreover, the country faces other disadvantages, most prominently, its recent political upheaval and present extensive reliance on foreign aid.

Yet nominally, the present trade policy regime of Rwanda is among the most liberal in Sub-Saharan Africa and, in fact, is not far removed from those of either Hong Kong or Singapore (Table 1). Thus, the Rwanda FTZ proposal and many of the sectoral and macroeconomic benefits of adopting an economywide free trade zone quantified by the present study should not be viewed as beyond the practical grasp of the country and its economic policy makers. Indeed, the Rwanda FTZ proposal should be viewed as not only attainable but also appropriate to overcoming the country's present international stigma and attracting the private sector capital and technical know how from abroad necessary to promote Rwanda and integrate its human, agricultural, and other resources more productively into the new global economy and the regional economy of Eastern and Central Africa.

Notwithstanding this pragmatic policy prescription for Rwanda's economic future, the country and its policy makers find themselves bound by a less outward-oriented regional economic agenda calling for the countries of Eastern and Southern Africa to form a customs union under the Common Market for Eastern and Southern Africa in 2004. Rwanda presently extends tariff preferences of 80 percent to its COMESA trading partners, and is scheduled to become a full-fledged member of the COMESA free trade area by January 1, 2004 (COMESA 2003). Given that intra-COMESA trade is relatively limited and member countries maintain independent external tariff policies, the present COMESA free trade area poses little threat to Rwanda's present, comparatively liberal trade policy. However, under the customs union

mandated by the COMESA Treaty, the country's external tariff regime would no longer be independent; it would be bound by the COMESA common external tariff.

Thus, the COMESA customs union complicates the way ahead for Rwandan trade policy regime. Beyond precluding establishment of an economywide free trade zone in Rwanda, the new customs union would likely raise the country's average tariff and thereby would reduce its economic welfare (and integration with the global economy), not unlike the situation currently facing Uganda in joining the new East African Community customs union (DeRosa, Obwona, and Roningen 2002). If regionalism is a force for trade liberalization in Africa, then it is mainly so for the more highly protected countries in the region, at least in its currently spreading form of planned customs unions throughout Africa. For the more liberal African countries such as Rwanda and Uganda, it threatens to undo the significant trade liberalization these countries have accomplished during the last decade and near-term prospects for further trade liberalization, in the context of the present study, under the free trade zone proposal for Rwanda.

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Table 1. Economic Indicators for Rwanda and Selected Other African Countries, 2000

Country	Population	Gross Domestic Product: Total (Per Capita)	Gross Domestic Product: Annual Growth (1995-2000)	Structure of Output 1/: Agriculture	Industry	Services	Trade and Protection: Merchandise Trade: Exports (% Agr.)	Imports (% Mfg.)	Protection: Average Import Tariff	Non-Tariff Barriers
	(Mill.)	($ Bill.; $)	(%)	-------- (% GDP) --------			----- ($ Mill.) -----		(%)	(% Freq.)
Rwanda	8	1.8 (236)	5.6 (9.7)	47	21	31	53 (75)	213 (62)	11.3	0.0
Other East Africa										
Kenya	31	10.4 (338)	-0.2 (1.7)	26	16	58	1,734 (68)	3,106 (60)	18.0	2.1
Tanzania	35	9.0 (257)	5.1 (3.9)	46	15	39	663 (88)	1,524 (66)	34.4	4.0
Uganda	23	6.2 (265)	3.5 (6.0)	45	18	38	461 (73)	1,516 (65)	10.6	0.9
Selected Other Africa										
Ghana	19	5.2 (269)	3.7 (4.4)	10	7	83	1,598 (37)	2,973 (60)	37.5	9.9
Mauritius	1	4.4 (3,773)	8.0 (5.6)	9	33	58	1,557 (18)	2,093 (70)	32.6	16.5
Senegal	9	4.4 (464)	5.6 (5.4)	17	24	59	920 (54)	1,521 (51)	n.a.	n.a.
Togo	5	1.2 (269)	-0.7 (2.1)	42	21	37	363 (43)	565 (60)	n.a.	n.a.
Memorandum Items:										
Sub-Saharan Africa 2/	576	193 (334)	2.5 (3.5)	17	29	54	63,212	48,722	22.0	7.2
East Asia and Pacific	1,881	2,598 (1,374)	6.4 (4.1)	15	45	41	1,212,295	1,102,393	9.7	12.4
Hong Kong	7	163 (23,709)	10.5 (2.5)	0	15	85	201,860 (2)	212,805(90)	0.0	24.5
Singapore	4	92 (22,959)	9.9 (5.8)	0	35	65	137,804 (3)	134,545(82)	0.4	18.2
Developing Countries	4,839	6,494 (1,342)	5.6 (3.9)	13	35	52	2,026,930	1,892,317	14.5	11.2
World	6,057	31,363 (5,178)	3.9 (3.0)	4	32	62	6,338,198	6,510,806	12.6	12.2

Sources: COMESA Secretariat, "Revenue Implications of Elimination of Intra-COMESA Tariffs on Intra-COMESA Trade," 2000; UNCTAD, *Handbook of Statistics On-Line*, 2003; UNCTAD, *Trade Information and Analysis System*, 2001; and World Bank, *World Development Indicators*, 2000.

1/ Structure of output refers to 1998.

2/ Excludes South Africa.

Table 2. Rwandan Merchandise Trade by HS Section and Major Categories, 2001
(Millions of Rwandan Francs)

HS Section, Major Categories	Exports	Share (%)		Imports	Share (%)	
Live Animals and Animal Products	0.0	0.0		1,626.6	1.3	
Vegetable Products	14,355.0	74.9		12,772.9	10.4	
Tea	7,292.7	38.1	**	0.5	0.0	
Coffee	6,603.9	34.5	**	302.8	0.2	
Gums and Resins	413.5	2.2	**	119.7	0.1	
Vegetables	0.4	0.0		2,160.2	1.8	
Rice	0.0	0.0		2,921.5	2.4	**
Other Cereals	0.0	0.0		2,149.0	1.8	
Grain Mill Products	0.2	0.0		3,898.7	3.2	**
Fats and Oils	0.0	0.0		3,976.0	3.3	**
Manufactured Foodstuffs	18.5	0.1		7,342.9	6.0	
Sugar	0.0	0.0		3,792.2	3.1	**
Mineral Products	3,771.4	19.7		20,367.7	16.7	
Columbite-Tantalite	3,698.6	19.3	**	0.0	0.0	
Cassiterite	28.9	0.2		0.0	0.0	
Mineral Fuels	1.8	0.0		17,578.1	14.4	**
Chemicals	94.7	0.5		9,419.6	7.7	**
Pharmaceuticals	0.0	0.0		3,716.1	3.0	**
Rubber and Plastics	44.5	0.2		4,394.6	3.6	**
Hides and Leather Products	343.9	1.8		159.1	0.1	
Cork and Wood Articles	5.0	0.0		435.0	0.4	
Pulp and Paper Products	2.0	0.0		16,375.3	13.4	
Books and Manuscripts	2.0	0.0		13,771.3	11.3	**
Textiles and Apparel	407.8	2.1		5,475.0	4.5	
Textiles	398.4	2.1	**	1,447.8	1.2	
Apparel	9.5	0.0		4,027.1	3.3	**
Footwear, Other Made-Up Articles	3.0	0.0		721.3	0.6	
Stone and Mineral Products	3.7	0.0		1,389.4	1.1	
Precious Stones and Jewelry	0.0	0.0		4.4	0.0	
Base Metals and Metal Products	33.0	0.2		8,266.7	6.8	
Iron and Steel	32.2	0.2		4,321.5	3.5	**
Machinery	31.9	0.2		17,778.2	14.5	
Industrial Machinery	20.0	0.1		5,106.8	4.2	**
Electric Machinery	10.8	0.1		10,763.8	8.8	**
Transport Equipment	0.0	0.0		8,247.0	6.7	
Road Vehicles	0.0	0.0		8,173.5	6.7	**
Professional Equipment	5.5	0.0		2,072.3	1.7	
Arms and Ammunition	0.0	0.0		2.0	0.0	
Miscellaneous Manufactures	3.9	0.0		1,323.0	1.1	
Works of Art	32.3	0.2		120.7	0.1	
All Goods	19,156.1	100.0		122,269.7	100.0	

Source: Rwanda Revenue Authority.
Notes: Asterisks denote major categories of Rwandan trade.

Table 3. Impact of Export Processing Zones in Selected Developing Countries

Country	First EPZ Year	Observa-tion Year	Number of Firms	Gross Exports ($ Mill.)	Employ-ment	% Work-force
Africa						
Cameroon	n.a.	1995	16	n.a.	3,594	n.a.
Kenya	n.a.	1996	n.a.	n.a.	n.a.	n.a.
Namibia	n.a.	1996	6	n.a.	2,000	n.a.
Mauritius	1971	1995	481	1,030	80,466	17.1
Senegal	n.a.	1990	10	15	600	n.a.
Togo	1995	1996	29	n.a.	4,000	n.a.
East Asia						
Indonesia	n.a.	1996	168	12	98,000	n.a.
Rep. of Korea	1970	1991	n.a.	n.a.	21,910	0.2
Malaysia	1971	1996	n.a.	n.a.	196,774	2.3
Philippines	1972	1997	n.a.	1,994	183,709	0.6
Taiwan	1966	1997	n.a.	n.a.	57,016	0.6
Vietnam	n.a.	1996	40	n.a.	7,142	n.a.
Latin America						
Costa Rica	1972	1996	109	125	47,972	3.6
Dominican Rep.	1968	1996	n.a.	n.a.	164,639	4.9
El Salvador	1976	1996	208	n.a.	50,000	2.1
Honduras	1976	1996	n.a.	n.a.	61,162	2.9
Jamaica	1976	1994	56	235	14,148	1.1
Mexico	1965	1997	2,033	n.a.	898,786	2.4
South Asia						
Bangladesh	1983	1996	96	311	37,533	0.1
Sri Lanka	n.a.	1990	144	437	60,000	0.9

Source: Madani (1999).

Table 4. Own-Price Elasticities of Import Demand and Export Supply

HS Section	Import Demand	Export Supply
I. Live animals and animal products	-0.77	0.75
II. Vegetable products	-0.61	0.75
III. Fats and oils	-1.10	0.75
IV. Manufactured foodstuffs	-1.10	0.75
V. Mineral products	-0.92	0.50
VI. Chemicals	-1.58	1.00
VIII. Rubber and plastics	-1.60	1.00
IX. Hides and leather products	-1.32	1.00
X. Cork and wood articles	-1.18	1.00
XI. Pulp and paper products	-1.37	1.00
XII. Textiles and apparel	-1.78	1.00
XIII. Footwear and other made-up articles	-1.88	1.00
XIV. Stone and mineral products	-2.03	1.00
XV. Precious stones and jewelry	-2.25	1.00
XVI. Base metals and metal products	-2.12	1.00
XVII. Machinery	-3.00	1.00
XVIII. Transport equipment	-2.50	1.00
XIX. Professional equipment	-2.10	1.00
XX. Arms and ammunition	-0.80	1.00
XXI. Miscellaneous manufactures	-1.39	1.00
XXII. Works of art	-1.00	1.00

Sources: Based on empirical estimates compiled by Stern et al. (1976), Goldstein and Khan (1985), DeRosa (1992), and Republic of Uganda (1997).

Note: Price elasticities of import demand and export supply determined the responsiveness of trade flows to price changes in the Rwanda trade simulation model. Values are averages by HS section across the 131 categories of trade goods in the simulation model.

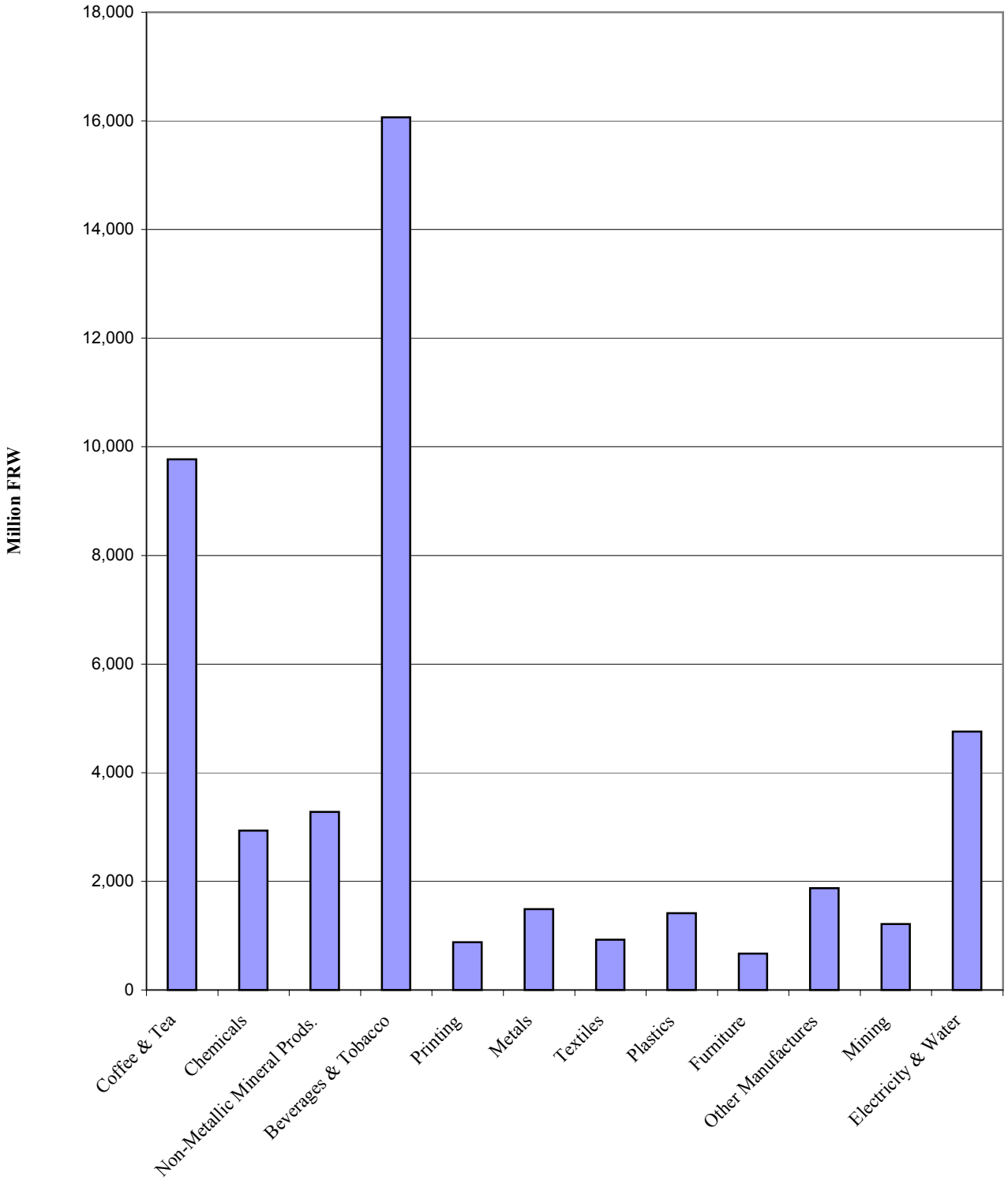
Table 5. Summary of Simulation Results
(Changes in Variables)

Scenario, Sector	Import Price	Export Price	Import Qty.	Export Qty.	Import Qty.	Export Qty.	Employ-ment	Producer Surplus	Consumer Surplus	Economic Welfare	Tariff Revenues
	(Percent)		(Base Frw Million)		(Percent)		(Man Yrs)		(Frw Million)		
					Free Trade Zone Scenarios						
Economywide FTZ											
Agriculture	-1.7	8.5	541	3,463	2.9	24.1	4,132	2,492	22	2,512	-1,923
Minerals	2.5	8.5	-833	158	-4.1	4.2	113	247	-13	234	-1,207
Manufacturing	-2.4	8.5	4,010	192	4.9	18.7	-43	148	138	286	-9,397
All Products	-1.6	8.5	3,813	3,813	3.1	19.9	4,203	2,887	145	3,032	-12,527
Relative to base (%) 1/	...	...	...	...	...	...	0.1	0.4	0.0	0.4	-1.7
Manufacturing EPZ											
Agriculture	0	0	5	-3	0	0	-13	-4	0	-4	1
Minerals	0	0	11	-1	0.1	0	-1	-1	0	-1	1
Manufacturing	0	0	77	96	0.1	9.4	13	48	0	48	9
All Products	0	0	92	92	0.1	0.5	-2	43	0	43	10
Relative to base (%) 1/	...	...	...	...	...	...	0.0	0.0	0.0	0.0	0.0
Textiles and Apparel EPZ											
Agriculture	0	0	5	-3	0	0	-13	-4	0	-4	1
Minerals	0	0	11	-1	0.1	0	-1	-1	0	-1	1
Manufacturing	0	0	76	95	0.1	9.3	13	47	0	47	9
All Products	0	0	91	91	0.1	0.5	-2	42	0	42	10
Relative to base (%) 1/	...	...	...	...	...	...	0.0	0.0	0.0	0.0	0.0
					Reduced Foreign Aid Scenario						
Reduced Foreign Aid											
Agriculture	13.6	13.7	-1,764	1,438	-9.6	10	5,207	1,802	-136	1,667	-209
Minerals	13.8	13.7	-3,760	250	-18.5	6.6	324	401	-273	128	-215
Manufacturing	13.8	13.7	-18,426	141	-22.1	13.6	1,022	150	-1,403	-1,253	-2,042
All Products	13.7	13.7	-23,950	1,829	-19.6	9.5	6,552	2,353	-1,811	542	-2,467
Relative to base (%) 1/	...	...	...	...	...	...	0.2	0.3	-0.2	0.1	-0.3
Reduced Foreign Aid with Economywide FTZ											
Agriculture	11.0	22.6	-1,215	5,155	-6.6	35.9	9,622	4,783	-78	4,705	-1,923
Minerals	15.7	22.6	-4,262	405	-20.9	10.7	412	674	-368	306	-1,207
Manufacturing	10.2	22.6	-14,391	350	-17.2	34.0	951	331	-939	-608	-9,397
All Products	11.2	22.6	-19,869	5,909	-16.3	30.8	10,984	5,788	-1,386	4,403	-12,527
Relative to base (%) 1/	...	...	...	...	...	...	0.4	0.8	-0.2	0.6	-1.7

Source: Rwanda trade simulation model.

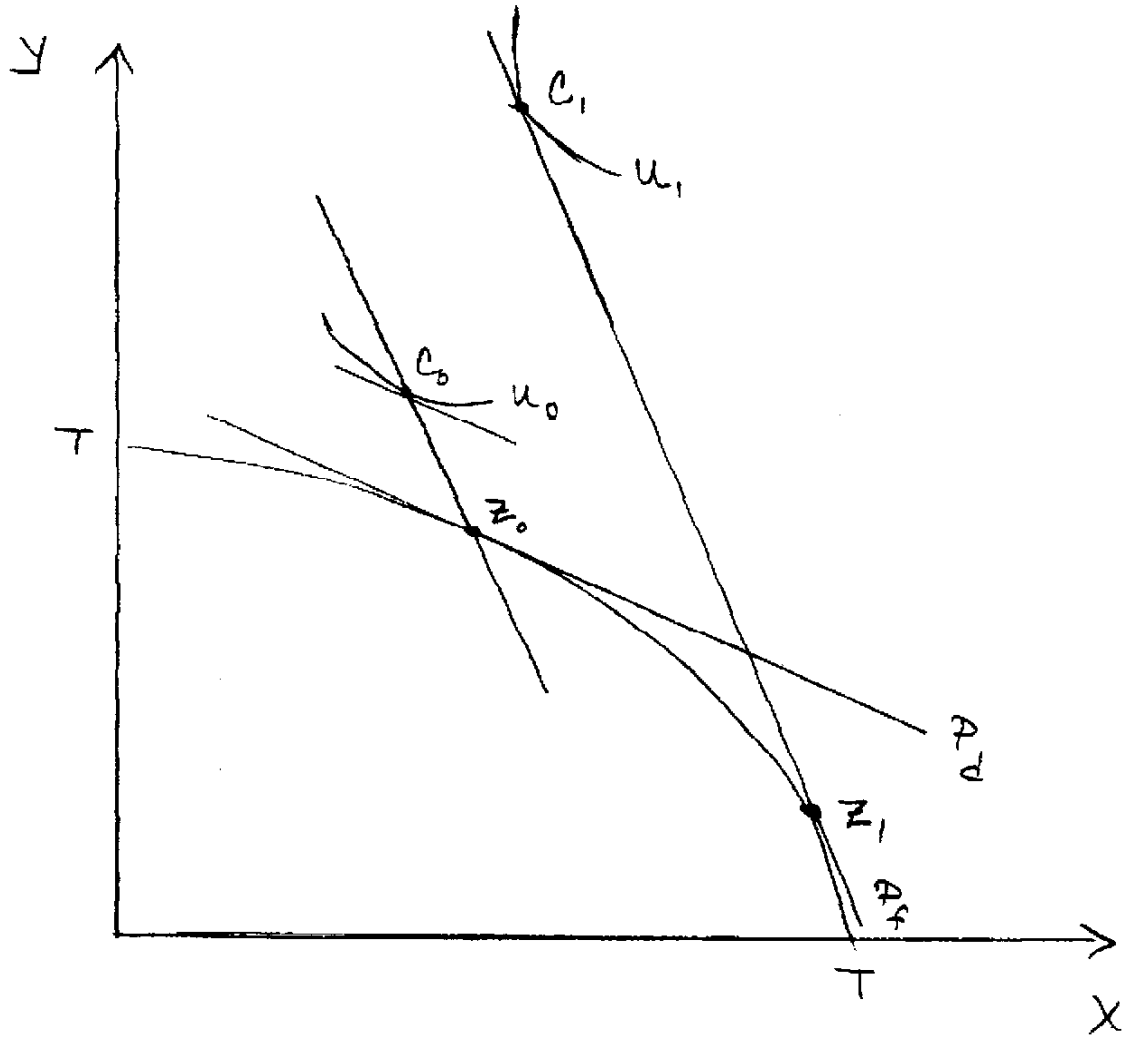
1/ Relative to 2001 labor force (3 million persons) for employment, 2001 GDP (Frw 750 billion) for welfare variables and tariff revenues.

Figure 1. Rwanda: Value Added by Industry Group, 2000



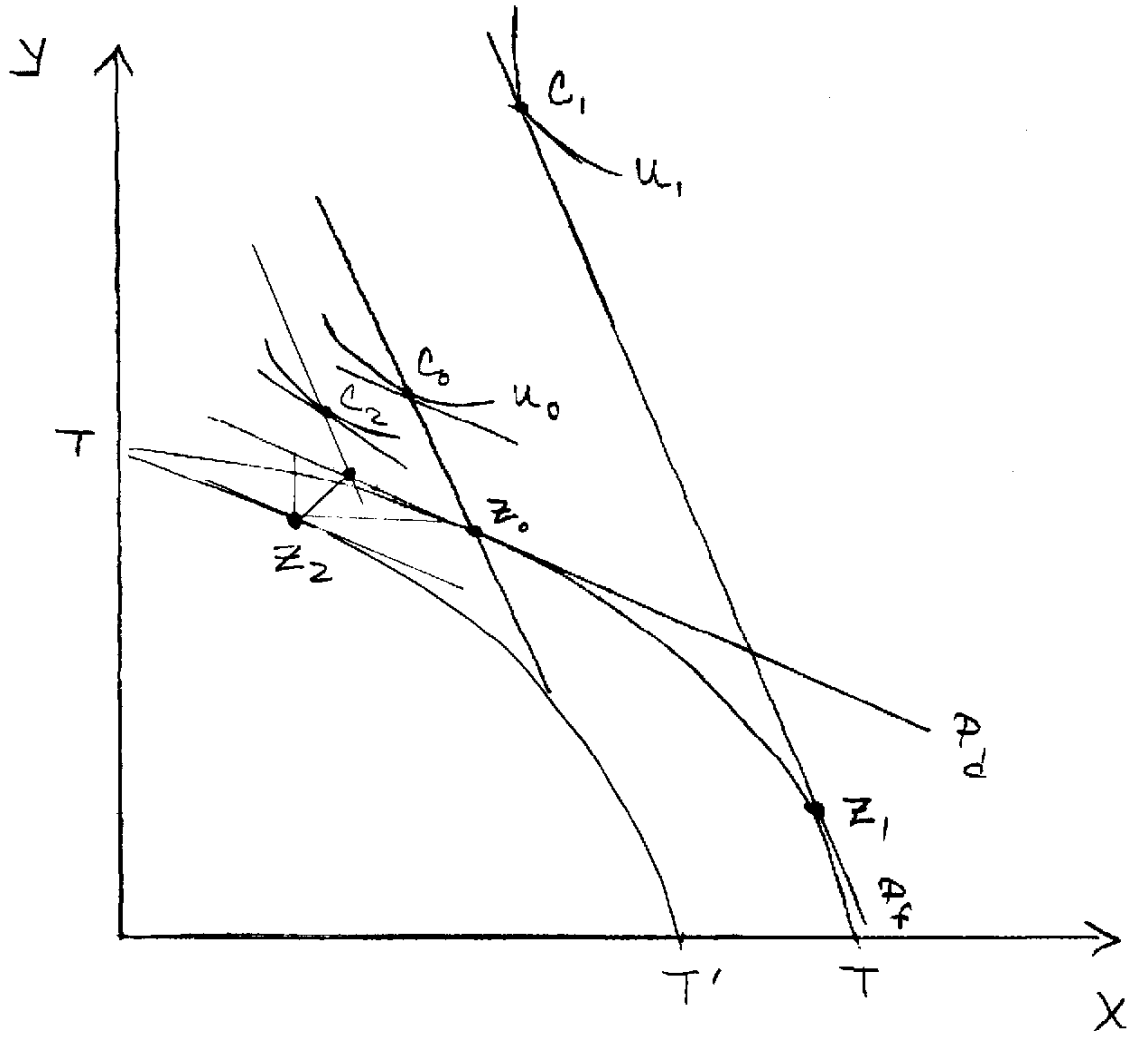
Source: Census of Industrial Production, 2000

Figure 2. EPZ Impact with No Foreign Direct Investment



Source: Adapted from Hamilton and Svensson (1982).

Figure 3. EPZ Impact with Foreign Direct Investment



Source: Adapted from Hamilton and Svensson (1982).

APPENDIX: Table 6. Detailed Solution Results: Economywide Free Trade Zone Scenario 1/

		Change in										
		Import Price (%)	Export Price (%)	Imports (Million Frw)	Exports	Imports (%)	Exports (%)	Employ-ment (Man Yrs.)	Producer Surplus	Consumer Surplus (Million Frw)	Total Welfare	Tariff Revenue
I	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	-2.8	8.5	176	0	10.8	0.0	-14	0	6	6	-244
II	B - VEGETABLE PRODUCTS - II	-1.4	8.5	306	3,463	2.4	24.1	4,146	2,492	14	2,506	-1,282
	IRISH POTATOES	3.4	8.5	0	0	N/A	N/A	0	0	0	0	0
	BEANS	3.4	8.5	0	0	N/A	N/A	0	0	0	0	0
	SWEET POTATOES	3.4	8.5	0	0	N/A	N/A	0	0	0	0	0
	OTHER VEGETABLES, TUBERS	-5.6	8.5	68	0	3.5	N/A	0	0	2	2	-288
	COFFEE	-13.2	8.5	62	1,636	20.6	24.8	2,124	1,170	5	1,175	-76
	TEA	-13.2	8.5	0	1,807	N/A	24.8	2,416	1,292	0	1,292	0
	MAIZE	3.4	8.5	-5	0	-0.7	N/A	115	0	0	0	-37
	RICE	3.4	8.5	-38	0	-1.3	N/A	66	0	-1	-1	-146
	SORGHUM	3.4	8.5	-1	0	-0.5	N/A	9	0	0	0	-5
	MILLING PRODUCTS	-5.6	8.5	256	0	6.6	N/A	-769	0	8	8	-585
	SOYBEANS	3.4	8.5	0	0	N/A	N/A	0	0	0	0	0
	LAC; GUMS AND RESINS	3.4	8.5	-3	17	-2.3	4.2	140	27	0	27	-6
III	C - FATS AND OILS - III	-1.3	8.5	59	0	1.5	0.0	0	0	0	0	-398
IV	D - MANUFACTURED FOODSTUFFS- IV	-7.1	8.5	688	1	9.4	6.3	-37	1	36	38	-1,232
V	E - MINERAL PRODUCTS - V	2.5	8.5	-833	158	-4.1	4.2	113	247	-13	234	-1,207
	CEMENT	3.4	8.5	-35	0	-3.9	N/A	2	0	-1	-1	-45
	CASSITERITE	8.5	8.5	0	1	N/A	4.2	0	2	0	2	0
	WOLFRAMITE	8.5	8.5	0	2	N/A	4.2	0	3	0	3	0
	COLUMBITE-TANTALITE	8.5	8.5	0	155	N/A	4.2	41	242	0	242	0
VI	F - CHEMICALS - VI	3.0	8.5	-296	9	-3.1	9.1	68	9	-7	2	-503
	PHARMACEUTICAL PRODUCTS	5.9	8.5	-335	0	-9.0	N/A	70	0	-10	-10	-93
	FERTILIZERS	8.5	8.5	-113	0	-12.6	N/A	23	0	-5	-5	0
	OTHER ESSENTIAL OILS	-5.6	8.5	47	4	10.0	8.5	-10	4	2	5	-70
	SOAP ETC., WAXES, POLISHES	-5.6	8.5	227	1	30.4	N/A	-41	0	7	8	-112
VII	G - RUBBER AND PLASTICS - VII	-3.3	8.5	244	4	5.6	8.5	-34	4	7	11	-538
VIII	H - HIDES AND LEATHER PRODUCTS - VIII	-5.5	8.5	19	29	12.1	8.5	5	31	1	31	-24
	RAW HIDES AND SKINS	3.4	8.5	0	29	N/A	8.5	7	31	0	31	0
IX	I - CORK AND WOOD ARTICLES - IX	-5.6	8.5	37	0	8.4	8.5	0	0	1	2	-65
X	J - PULP AND PAPER PRODUCTS - X	-2.2	8.5	509	0	3.1	21.1	-25	0	17	17	-1,803
XI	K - TEXTILES AND APPAREL - XI	-5.6	8.5	705	139	12.9	34.0	-19	93	23	115	-821
	TEXTILES	-5.6	8.5	146	135	10.1	33.8	17	90	5	95	-217
	APPAREL	-5.6	8.5	560	4	13.9	40.0	-37	2	18	21	-604
XII	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	2.1	8.5	-40	0	-5.5	8.5	4	0	0	0	-46
XIII	M - STONE AND MINERAL PRODUCTS - XIII	-5.6	8.5	188	1	13.5	18.2	-6	1	6	7	-208
XIV	N - PRECIOUS STONES AND JEWELLERY- XIV	-1.3	8.5	0	0	3.1	8.4	0	0	0	0	0
XV	O - BASE METALS AND METAL PRODUCTS - XV	0.5	8.5	-88	3	-1.1	8.5	2	3	2	5	-660
XVI	P - MACHINERY- XVI	-1.8	8.5	934	3	5.3	8.5	-5	3	12	15	-1,876
XVII	Q - TRANSPORT EQUIPMENT - XVII	-5.5	8.5	1,125	0	13.6	8.5	0	0	36	36	-1,227
XVIII	R - PROFESSIONAL EQUIPMENT - XVIII	-1.4	8.5	73	0	3.5	8.5	0	0	1	1	-209
XIX	S - ARMS AND AMMUNITION - XIX	-3.5	8.5	0	0	2.9	0.0	0	0	0	0	0
XX	T - MISCELLANEOUS MANUFACTURES - XX	-2.8	8.5	-13	0	-1.0	8.5	4	0	1	1	-155
	FURNITURE, BEDDING, ETC.	-1.3	8.5	-52	0	-7.4	N/A	9	0	0	0	-69
XXI	U - WORKS OF ART - XXI	-13.2	8.5	18	3	15.2	8.5	1	3	2	4	-30
AGR	**AGRICULTURE = I + II + III**	**-1.7**	**8.5**	**541**	**3,463**	**2.9**	**24.1**	**4,132**	**2,492**	**20**	**2,512**	**-1,923**
MIN	**MINERALS = IV**	**2.5**	**8.5**	**-833**	**158**	**-4.1**	**4.2**	**113**	**247**	**-13**	**234**	**-1,207**
MAN	**MANUFACTURING = IV + sum(VI:XXI)**	**-2.4**	**8.5**	**4,104**	**192**	**4.9**	**18.7**	**-43**	**148**	**138**	**286**	**-9,397**
ALL	**ALL PRODUCTS**	**-1.6**	**8.5**	**3,813**	**3,813**	**3.1**	**19.9**	**4,203**	**2,887**	**145**	**3,032**	**-12,527**

1/ Solution equilibrium US$/Frw exchange rate is 0.921.

APPENDIX: Table 7. Detailed Solution Results: Manufacturing Export Processing Zone Scenario 1/

		Change in										
		Import Price (%)	Export Price (%)	Imports (Million Frw)	Exports	Imports (%)	Exports (%)	Employ-ment (Man Yrs.)	Producer Surplus	Consumer Surplus (Million Frw)	Total Welfare	Tariff Revenue
I	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
II	B - VEGETABLE PRODUCTS - II	0.0	0.0	3	-3	0.0	0.0	-13	-4	0	-4	0
	IRISH POTATOES	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	BEANS	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	SWEET POTATOES	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	OTHER VEGETABLES, TUBERS	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	COFFEE	0.0	0.0	0	-2	0.0	0.0	-2	-2	0	-2	0
	TEA	0.0	0.0	0	-2	N/A	0.0	-2	-2	0	-2	0
	MAIZE	0.0	0.0	0	0	0.0	N/A	-2	0	0	0	0
	RICE	0.0	0.0	0	0	0.0	N/A	-1	0	0	0	0
	SORGHUM	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	MILLING PRODUCTS	0.0	0.0	1	0	0.0	N/A	-4	0	0	0	0
	SOYBEANS	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	LAC; GUMS AND RESINS	0.0	0.0	0	0	0.0	0.0	-1	0	0	0	0
III	C - FATS AND OILS - III	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
IV	D - MANUFACTURED FOODSTUFFS- IV	0.0	0.0	3	0	0.0	0.0	0	0	0	0	0
V	E - MINERAL PRODUCTS - V	0.0	0.0	11	-1	0.1	0.0	-1	-1	0	-1	1
	CEMENT	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	CASSITERITE	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
	WOLFRAMITE	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
	COLUMBITE-TANTALITE	0.0	0.0	0	-1	N/A	0.0	0	-1	0	-1	0
VI	F - CHEMICALS - VI	0.0	0.0	6	0	0.1	0.5	-1	0	0	0	0
	PHARMACEUTICAL PRODUCTS	0.0	0.0	2	0	0.1	N/A	0	0	0	0	0
	FERTILIZERS	0.0	0.0	0	0	0.1	N/A	0	0	0	0	0
	OTHER ESSENTIAL OILS	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
	SOAP ETC., WAXES, POLISHES	0.0	0.0	0	0	0.1	N/A	0	0	0	0	0
VII	G - RUBBER AND PLASTICS - VII	0.0	0.0	2	0	0.1	0.0	0	0	0	0	0
VIII	H - HIDES AND LEATHER PRODUCTS - VIII	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
	RAW HIDES AND SKINS	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
IX	I - CORK AND WOOD ARTICLES - IX	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
X	J - PULP AND PAPER PRODUCTS - X	0.0	0.0	7	0	0.0	11.5	0	0	0	0	1
XI	K - TEXTILES AND APPAREL - XI	0.0	0.0	25	95	0.5	23.4	15	48	0	48	4
	TEXTILES	0.0	0.0	22	93	1.6	23.3	15	46	0	46	3
	APPAREL	0.0	0.0	3	3	0.1	29.0	0	1	0	1	0
XII	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	0.0	0.0	1	0	0.1	0.0	0	0	0	0	0
XIII	M - STONE AND MINERAL PRODUCTS - XIII	0.0	0.0	1	0	0.1	8.9	0	0	0	0	0
XIV	N - PRECIOUS STONES AND JEWELLERY- XIV	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
XV	O - BASE METALS AND METAL PRODUCTS - XV	0.0	0.0	6	0	0.1	0.0	-1	0	0	0	0
XVI	P - MACHINERY- XVI	0.0	0.0	17	0	0.1	0.0	0	0	0	0	2
XVII	Q - TRANSPORT EQUIPMENT - XVII	0.0	0.0	6	0	0.1	0.0	0	0	0	0	1
XVIII	R - PROFESSIONAL EQUIPMENT - XVIII	0.0	0.0	2	0	0.1	0.0	0	0	0	0	0
XIX	S - ARMS AND AMMUNITION - XIX	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
XX	T - MISCELLANEOUS MANUFACTURES - XX	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
	FURNITURE, BEDDING, ETC.	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
XXI	U - WORKS OF ART - XXI	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
AGR	**AGRICULTURE = I + II + III**	**0.0**	**0.0**	**5**	**-3**	**0.0**	**0.0**	**-13**	**-4**	**0**	**-4**	**1**
MIN	**MINERALS = IV**	**0.0**	**0.0**	**11**	**-1**	**0.1**	**0.0**	**-1**	**-1**	**0**	**-1**	**1**
MAN	**MANUFACTURING = IV + sum(VI:XXI)**	**0.0**	**0.0**	**77**	**96**	**0.1**	**9.4**	**13**	**48**	**0**	**48**	**9**
ALL	**ALL PRODUCTS**	**0.0**	**0.0**	**92**	**92**	**0.1**	**0.5**	**-2**	**43**	**0**	**43**	**10**

1/ Solution equilibrium US$/Frw exchange rate is 1.000.

APPENDIX: Table 8. Detailed Solution Results : Textiles and Apparel Export Processing Zone Scenario 1/

		Change in										
		Import Price (%)	Export Price (%)	Imports (Million Frw)	Exports	Imports (%)	Exports (%)	Employ-ment (Man Yrs.)	Producer Surplus	Consumer Surplus (Million Frw)	Total Welfare	Tariff Revenue
I	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
II	B - VEGETABLE PRODUCTS - II	0.0	0.0	3	-3	0.0	0.0	-13	-4	0	-4	0
	IRISH POTATOES	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	BEANS	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	SWEET POTATOES	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	OTHER VEGETABLES, TUBERS	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	COFFEE	0.0	0.0	0	-2	0.0	0.0	-2	-2	0	-2	0
	TEA	0.0	0.0	0	-2	N/A	0.0	-2	-2	0	-2	0
	MAIZE	0.0	0.0	0	0	0.0	N/A	-2	0	0	0	0
	RICE	0.0	0.0	0	0	0.0	N/A	-1	0	0	0	0
	SORGHUM	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	MILLING PRODUCTS	0.0	0.0	1	0	0.0	N/A	-4	0	0	0	0
	SOYBEANS	0.0	0.0	0	0	N/A	N/A	0	0	0	0	0
	LAC; GUMS AND RESINS	0.0	0.0	0	0	0.0	0.0	-1	0	0	0	0
III	C - FATS AND OILS - III	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
IV	D - MANUFACTURED FOODSTUFFS- IV	0.0	0.0	3	0	0.0	0.0	0	0	0	0	0
V	E - MINERAL PRODUCTS - V	0.0	0.0	11	-1	0.1	0.0	-1	-1	0	-1	1
	CEMENT	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
	CASSITERITE	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
	WOLFRAMITE	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
	COLUMBITE-TANTALITE	0.0	0.0	0	-1	N/A	0.0	0	-1	0	-1	0
VI	F - CHEMICALS - VI	0.0	0.0	5	0	0.1	0.0	-1	0	0	0	0
	PHARMACEUTICAL PRODUCTS	0.0	0.0	2	0	0.1	N/A	0	0	0	0	0
	FERTILIZERS	0.0	0.0	0	0	0.1	N/A	0	0	0	0	0
	OTHER ESSENTIAL OILS	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
	SOAP ETC., WAXES, POLISHES	0.0	0.0	0	0	0.1	N/A	0	0	0	0	0
VII	G - RUBBER AND PLASTICS - VII	0.0	0.0	2	0	0.1	0.0	0	0	0	0	0
VIII	H - HIDES AND LEATHER PRODUCTS - VIII	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
	RAW HIDES AND SKINS	0.0	0.0	0	0	N/A	0.0	0	0	0	0	0
IX	I - CORK AND WOOD ARTICLES - IX	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
X	J - PULP AND PAPER PRODUCTS - X	0.0	0.0	8	0	0.0	0.0	0	0	0	0	1
XI	K - TEXTILES AND APPAREL - XI	0.0	0.0	25	95	0.5	23.4	15	48	0	48	4
	TEXTILES	0.0	0.0	22	93	1.6	23.3	15	46	0	46	3
	APPAREL	0.0	0.0	3	3	0.1	29.0	0	1	0	1	0
XII	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	0.0	0.0	1	0	0.1	0.0	0	0	0	0	0
XIII	M - STONE AND MINERAL PRODUCTS - XIII	0.0	0.0	1	0	0.1	0.0	0	0	0	0	0
XIV	N - PRECIOUS STONES AND JEWELLERY- XIV	0.0	0.0	0	0	0.1	0.0	0	0	0	0	0
XV	O - BASE METALS AND METAL PRODUCTS - XV	0.0	0.0	6	0	0.1	0.0	-1	0	0	0	0
XVI	P - MACHINERY- XVI	0.0	0.0	17	0	0.1	0.0	0	0	0	0	2
XVII	Q - TRANSPORT EQUIPMENT - XVII	0.0	0.0	6	0	0.1	0.0	0	0	0	0	1
XVIII	R - PROFESSIONAL EQUIPMENT - XVIII	0.0	0.0	2	0	0.1	0.0	0	0	0	0	0
XIX	S - ARMS AND AMMUNITION - XIX	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
XX	T - MISCELLANEOUS MANUFACTURES - XX	0.0	0.0	1	0	0.0	0.0	0	0	0	0	0
	FURNITURE, BEDDING, ETC.	0.0	0.0	0	0	0.0	N/A	0	0	0	0	0
XXI	U - WORKS OF ART - XXI	0.0	0.0	0	0	0.0	0.0	0	0	0	0	0
AGR	**AGRICULTURE = I + II + III**	**0.0**	**0.0**	**5**	**-3**	**0.0**	**0.0**	**-13**	**-4**	**0**	**-4**	**1**
MIN	**MINERALS = IV**	**0.0**	**0.0**	**11**	**-1**	**0.1**	**0.0**	**-1**	**-1**	**0**	**-1**	**1**
MAN	**MANUFACTURING = IV + sum(VI:XXI)**	**0.0**	**0.0**	**76**	**95**	**0.1**	**9.3**	**13**	**47**	**0**	**47**	**9**
ALL	**ALL PRODUCTS**	**0.0**	**0.0**	**91**	**91**	**0.1**	**0.5**	**-2**	**42**	**0**	**42**	**10**

1/ Solution equilibrium US$/Frw exchange rate is 1.000.

APPENDIX: Table 9. Detailed Solution Results: Reduced Foreign Aid Scenario 1/

		Change in										
		Import Price (%)	Export Price (%)	Imports (Million Frw)	Exports	Imports (%)	Exports (%)	Employ-ment (Man Yrs.)	Producer Surplus	Consumer Surplus (Million Frw)	Total Welfare	Tariff Revenue
I	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	13.7	13.7	-214	0	-13.1	0.0	19	0	-17	-17	-32
II	B - VEGETABLE PRODUCTS - II	13.5	13.7	-1,035	1,438	-8.1	10.0	5,188	1,802	-79	1,722	-124
	IRISH POTATOES	13.7	13.7	0	0	N/A	N/A	0	0	0	0	0
	BEANS	13.7	13.7	0	0	N/A	N/A	0	0	0	0	0
	SWEET POTATOES	13.7	13.7	0	0	N/A	N/A	0	0	0	0	0
	OTHER VEGETABLES, TUBERS	13.7	13.7	-142	0	-7.4	N/A	0	0	-11	-11	-21
	COFFEE	13.7	13.7	-35	668	-11.5	10.1	929	833	-3	830	-9
	TEA	13.7	13.7	0	738	N/A	10.1	987	919	0	919	0
	MAIZE	13.7	13.7	-37	0	-5.0	N/A	863	0	-3	-3	-2
	RICE	13.7	13.7	-146	0	-5.0	N/A	253	0	-11	-11	-7
	SORGHUM	13.7	13.7	-5	0	-5.0	N/A	83	0	0	0	0
	MILLING PRODUCTS	13.7	13.7	-514	0	-13.2	N/A	1,542	0	-41	-40	-77
	SOYBEANS	13.7	13.7	0	0	N/A	N/A	0	0	0	0	0
	LAC; GUMS AND RESINS	13.7	13.7	-10	27	-8.6	6.6	223	44	-1	43	-1
III	C - FATS AND OILS - III	13.7	13.7	-524	0	-13.2	0.0	0	0	-40	-40	-52
IV	D - MANUFACTURED FOODSTUFFS- IV	13.7	13.7	-995	2	-13.5	10.1	31	2	-80	-77	-167
V	E - MINERAL PRODUCTS - V	13.8	13.7	-3,760	250	-18.5	6.6	324	401	-273	128	-215
	CEMENT	13.7	13.7	-130	0	-14.4	N/A	7	0	-9	-9	-6
	CASSITERITE	13.7	13.7	0	2	N/A	6.6	1	3	0	3	0
	WOLFRAMITE	13.7	13.7	0	3	N/A	6.6	1	4	0	4	0
	COLUMBITE-TANTALITE	13.7	13.7	0	245	N/A	6.6	65	393	0	393	0
VI	F - CHEMICALS - VI	13.7	13.7	-1,767	13	-18.8	13.7	374	14	-128	-114	-94
	PHARMACEUTICAL PRODUCTS	13.7	13.7	-710	0	-19.1	N/A	149	0	-50	-50	-18
	FERTILIZERS	13.7	13.7	-170	0	-19.1	N/A	35	0	-12	-12	0
	OTHER ESSENTIAL OILS	13.7	13.7	-89	6	-19.1	13.7	22	6	-7	-1	-13
	SOAP ETC., WAXES, POLISHES	13.7	13.7	-143	0	-19.1	N/A	26	0	-11	-11	-21
VII	G - RUBBER AND PLASTICS - VII	13.7	13.7	-817	6	-18.6	13.7	107	7	-63	-56	-100
VIII	H - HIDES AND LEATHER PRODUCTS - VIII	13.7	13.7	-36	47	-22.5	13.7	14	50	-3	48	-5
	RAW HIDES AND SKINS	13.7	13.7	0	47	N/A	13.7	11	50	0	50	0
IX	I - CORK AND WOOD ARTICLES - IX	13.7	13.7	-72	1	-16.5	13.7	0	1	-6	-5	-11
X	J - PULP AND PAPER PRODUCTS - X	13.7	13.7	-2,696	0	-16.5	13.7	129	0	-205	-205	-297
XI	K - TEXTILES AND APPAREL - XI	13.7	13.7	-1,203	56	-22.0	13.7	84	60	-95	-35	-180
	TEXTILES	13.7	13.7	-192	55	-13.3	13.7	17	58	-15	43	-29
	APPAREL	13.7	13.7	-1,011	1	-25.1	13.7	68	1	-80	-78	-152
XII	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	13.9	13.7	-191	0	-26.5	13.7	15	0	-14	-13	-11
XIII	M - STONE AND MINERAL PRODUCTS - XIII	13.7	13.7	-329	1	-23.6	13.7	11	1	-26	-25	-49
XIV	N - PRECIOUS STONES AND JEWELLERY- XIV	13.7	13.7	-1	0	-25.1	13.6	0	0	0	0	0
XV	O - BASE METALS AND METAL PRODUCTS - XV	13.7	13.7	-1,962	5	-23.7	13.7	190	5	-145	-141	-159
XVI	P - MACHINERY- XVI	13.7	13.7	-5,483	4	-30.8	13.7	33	5	-415	-411	-575
XVII	Q - TRANSPORT EQUIPMENT - XVII	13.7	13.7	-2,071	0	-25.1	13.5	0	0	-163	-163	-308
XVIII	R - PROFESSIONAL EQUIPMENT - XVIII	13.7	13.7	-566	1	-27.3	13.7	0	1	-43	-42	-57
XIX	S - ARMS AND AMMUNITION - XIX	13.7	13.7	0	0	-9.8	0.0	0	0	0	0	0
XX	T - MISCELLANEOUS MANUFACTURES - XX	13.7	13.7	-213	1	-16.1	13.7	33	1	-16	-16	-25
	FURNITURE, BEDDING, ETC.	13.7	13.7	-114	0	-16.5	N/A	21	0	-9	-9	-11
XXI	U - WORKS OF ART - XXI	13.7	13.7	-15	4	-12.1	13.7	1	5	-1	3	-4
AGR	**AGRICULTURE = I + II + III**	**13.6**	**13.7**	**-1,773**	**1,438**	**-9.6**	**10.0**	**5,207**	**1,802**	**-136**	**1,666**	**-209**
MIN	**MINERALS = IV**	**13.8**	**13.7**	**-3,760**	**250**	**-18.5**	**6.6**	**324**	**401**	**-273**	**128**	**-215**
MAN	**MANUFACTURING = IV + sum(VI:XXI)**	**13.8**	**13.7**	**-18,417**	**141**	**-22.0**	**13.6**	**1,022**	**150**	**-1,403**	**-1,252**	**-2,042**
ALL	**ALL PRODUCTS**	**13.7**	**13.7**	**-23,950**	**1,829**	**-19.6**	**9.5**	**6,552**	**2,353**	**-1,811**	**542**	**-2,467**

1/ Solution equilibrium US$/Frw exchange rate is 0.879.

APPENDIX: Table 10. Detailed Solution Results: Reduced Foreign Aid Scenario with Economywide Free Trade Zone 1/

		Change in										
		Import Price (%)	Export Price (%)	Imports (Million Frw)	Exports	Imports (%)	Exports (%)	Employ-ment (Man Yrs.)	Producer Surplus	Consumer Surplus (Million Frw)	Total Welfare	Tariff Revenue
I	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	9.8	22.6	-49	0	-3.0	0.0	6	0	-2	-2	-244
II	B - VEGETABLE PRODUCTS - II	11.4	22.6	-718	5,155	-5.6	35.9	9,615	4,783	-48	4,735	-1,282
	IRISH POTATOES	16.8	22.6	0	0	N/A	N/A	0	0	0	0	0
	BEANS	16.8	22.6	0	0	N/A	N/A	0	0	0	0	0
	SWEET POTATOES	16.8	22.6	0	0	N/A	N/A	0	0	0	0	0
	OTHER VEGETABLES, TUBERS	6.6	22.6	-72	0	-3.8	N/A	1	0	-3	-3	-288
	COFFEE	-1.9	22.6	23	2,425	7.4	36.7	3,220	2,233	0	2,233	-76
	TEA	-1.9	22.6	0	2,678	N/A	36.7	3,582	2,466	0	2,466	0
	MAIZE	16.8	22.6	-40	0	-5.4	N/A	929	0	-3	-3	-37
	RICE	16.8	22.6	-176	0	-6.0	N/A	304	0	-15	-15	-146
	SORGHUM	16.8	22.6	-5	0	-5.3	N/A	87	0	0	0	-5
	MILLING PRODUCTS	6.6	22.6	-265	0	-6.8	N/A	796	0	-10	-10	-585
	SOYBEANS	16.8	22.6	0	0	N/A	N/A	0	0	0	0	0
	LAC; GUMS AND RESINS	16.8	22.6	-12	44	-10.3	10.7	360	74	-1	73	-6
III	C - FATS AND OILS - III	11.5	22.6	-447	0	-11.3	0.0	0	0	-28	-28	-398
IV	D - MANUFACTURED FOODSTUFFS- IV	5.0	22.6	-348	3	-4.7	16.5	-3	4	-15	-11	-1,232
V	E - MINERAL PRODUCTS - V	15.7	22.6	-4,262	405	-20.9	10.7	412	674	-368	306	-1,207
	CEMENT	16.8	22.6	-154	0	-17.1	N/A	8	0	-14	-13	-45
	CASSITERITE	22.6	22.6	0	3	N/A	10.7	1	5	0	5	0
	WOLFRAMITE	22.6	22.6	0	4	N/A	10.7	1	7	0	7	0
	COLUMBITE-TANTALITE	22.6	22.6	0	397	N/A	10.7	104	661	0	661	0
VI	F - CHEMICALS - VI	16.4	22.6	-1,929	22	-20.5	23.2	413	24	-186	-162	-503
	PHARMACEUTICAL PRODUCTS	19.6	22.6	-951	0	-25.6	N/A	200	0	-96	-96	-93
	FERTILIZERS	22.6	22.6	-254	0	-28.6	N/A	52	0	-29	-29	0
	OTHER ESSENTIAL OILS	6.6	22.6	-47	10	-10.0	22.6	13	11	-2	9	-70
	SOAP ETC., WAXES, POLISHES	6.6	22.6	49	1	6.6	N/A	-9	1	2	3	-112
VII	G - RUBBER AND PLASTICS - VII	9.2	22.6	-578	10	-13.2	22.6	74	11	-33	-22	-538
VIII	H - HIDES AND LEATHER PRODUCTS - VIII	6.7	22.6	-19	78	-12.0	22.6	19	87	-1	86	-24
	RAW HIDES AND SKINS	16.8	22.6	0	78	N/A	22.6	18	87	0	87	0
IX	I - CORK AND WOOD ARTICLES - IX	6.6	22.6	-37	1	-8.6	22.6	0	1	-1	0	-65
X	J - PULP AND PAPER PRODUCTS - X	10.5	22.6	-2,141	1	-13.1	36.8	102	1	-133	-132	-1,803
XI	K - TEXTILES AND APPAREL - XI	6.6	22.6	-596	209	-10.9	51.4	74	175	-23	152	-821
	TEXTILES	6.6	22.6	-56	204	-3.9	51.2	37	170	-2	168	-217
	APPAREL	6.6	22.6	-541	6	-13.4	58.2	37	4	-21	-16	-604
XII	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	15.3	22.6	-211	1	-29.3	22.6	17	1	-18	-18	-46
XIII	M - STONE AND MINERAL PRODUCTS - XIII	6.6	22.6	-169	1	-12.2	33.5	5	1	-6	-5	-208
XIV	N - PRECIOUS STONES AND JEWELLERY- XIV	11.5	22.6	-1	0	-21.7	22.8	0	0	0	0	0
XV	O - BASE METALS AND METAL PRODUCTS - XV	13.6	22.6	-1,946	7	-23.5	22.6	184	8	-154	-145	-660
XVI	P - MACHINERY- XVI	10.9	22.6	-4,593	7	-25.8	22.6	29	8	-281	-273	-1,876
XVII	Q - TRANSPORT EQUIPMENT - XVII	6.7	22.6	-1,124	0	-13.6	22.5	0	0	-45	-45	-1,227
XVIII	R - PROFESSIONAL EQUIPMENT - XVIII	11.4	22.6	-487	1	-23.5	22.6	0	1	-31	-29	-209
XIX	S - ARMS AND AMMUNITION - XIX	9.0	22.6	0	0	-6.7	0.0	0	0	0	0	0
XX	T - MISCELLANEOUS MANUFACTURES - XX	9.8	22.6	-214	1	-16.2	22.6	34	1	-13	-12	-155
	FURNITURE, BEDDING, ETC.	11.5	22.6	-152	0	-22.0	N/A	28	0	-10	-10	-69
XXI	U - WORKS OF ART - XXI	-1.9	22.6	2	7	2.0	22.6	2	8	0	8	-30
AGR	**AGRICULTURE = I + II + III**	**11.0**	**22.6**	**-1,215**	**5,155**	**-6.6**	**35.9**	**9,622**	**4,783**	**-78**	**4,705**	**-1,923**
MIN	**MINERALS = IV**	**15.7**	**22.6**	**-4,262**	**405**	**-20.9**	**10.7**	**412**	**674**	**-368**	**306**	**-1,207**
MAN	**MANUFACTURING = IV + sum(VI:XXI)**	**10.2**	**22.6**	**-14,391**	**350**	**-17.2**	**34.0**	**951**	**331**	**-939**	**-608**	**-9,397**
ALL	**ALL PRODUCTS**	**11.2**	**22.6**	**-19,869**	**5,909**	**-16.3**	**30.8**	**10,984**	**5,788**	**-1,386**	**4,403**	**-12,527**

1/ Solution equilibrium US$/Frw exchange rate is 0.816.

APPENDIX: Table 11. Rwanda Model Sectors, Baseline Protection and Trade, and Input Requirements

					Protection and Trade 2001			Production Input Requirements 2000							
									Input 1		Input 2		Input 3		
No.	HS Section	Model Sector	HS Detail	Model Code	MFN Tariff (%)	Imports (000 Rwf)	Exports (000 Rwf)	Labor Input (Pers./000Rfr)	Model Code	Cost Share	Model Code	Cost Share	Model Code	Cost Share
1	A - LIVE ANIMALS AND ANIMAL PRODUCTS - I	BOVINE CATTLE	102	ACATL	5.0	139	0	0.00000000						
2		GOATS AND SHEEP	104	AGOAT	5.0	0	0	0.00000000						
3		POULTRY	105	APTRY	5.0	5,194	0	0.00000000						
4		LIVE ANIMALS	1 - (102 + 104 + 105)	ALNES	5.0	0	0	0.00000000						
5		MEAT AND EDIBLE MEAT OFFAL	2	AMEAT	15.0	5,598	0	0.00000000						
6		FISH, CRUSTACEANS & AQUATIC INVERTEBRATES	3	AFISH	15.0	15,420	0	0.00000000						
7		MILK AND MILK PRODUCTS	401 TO 406	AMILK	15.0	1,587,444	0	0.00000011	~AMILK	0.304	~FGNES	0.227	~BRNES	0.072
8		OTHER DAIRY PRODS; BIRDS EGGS; HONEY; ED ANIMAL PR NES	4 - (401 TO 406)	AEGGS	25.0	2,255	0	0.00000000						
9		PRODUCTS OF ANIMAL ORIGIN, NES	5	AONES	15.0	10,584	0	0.00000000						
10	B - VEGETABLE PRODUCTS - II	LIVE TREES, PLANTS, BULBS ETC.; CUT FLOWERS ETC.	6	BPLNT	15.0	44	21,717	0.00000000						
11		IRISH POTATOES	70100	BIPOT	5.0	0	0	0.00000490	~BIPOT	0.324	~ESALT	0.086	~FFERT	0.061
12		PEAS	70810	BPEAS	5.0	242,017	0	0.00001495	~BPEAS	0.073	~OTOOL	0.021	~FFERT	0.307
13		BEANS	70820	BBEAN	5.0	0	0	0.00001882	~BBEAN	0.057	~OTOOL	0.017	~FFERT	0.241
14		CASSAVA	71410	BCASS	5.0	0	0	0.00000259	~BCASS	0.020	~ESALT	0.032	~FFERT	0.023
15		SWEET POTATOES	71420	BSPOT	5.0	0	0	0.00000582	~BSPOT	0.086	~OTOOL	0.018	~FFERT	0.098
16		TARO	71490	BTARO	5.0	0	0	0.00000318						
17		OTHER EDIBLE VEGETABLES & CERTAIN ROOTS & TUBERS	7 - (70100 + 70810 + 70820 + 71410 + 71420 + 71490)	BVNES	15.0	1,918,198	359	0.00000862						
18		GROUNDNUTS	80290	BGNUT	5.0	76	0	0.00000685	~BGNUT	0.035	~FPEST	0.073	~FFERT	0.033
19		BANANAS	80300	BBANA	5.0	0	0	0.00000367						
20		OTHER EDIBLE FRUIT & NUTS; CITRUS FRUIT OR MELON PEEL	8 - (80290 + 80300)	BRNES	5.0	3,075	22,502	0.00000852						
21		COFFEE	901	BCOFE	25.0	302,777	6,603,871	0.00000134	~BCOFE	0.341	~FFERT	0.215		
22		TEA	902	BTEAC	25.0	528	7,292,690	0.00000134	~BTEAC	0.341	~FFERT	0.215		
23		MATE & SPICES	9 - (901+ 902)	BSPIC	25.0	5,229	0	0.00000000						
24		WHEAT	1001	BWHET	5.0	0	0	0.00001192	~BWHET	0.081	~OTOOL	0.036	~FFERT	0.212
25		MAIZE	1005	BMAZE	5.0	732,140	0	0.00002352	~BMAZE	0.025	~OTOOL	0.014	~FFERT	0.247
26		PADDY (IN HUSK)	100610	BPADD	5.0	333,555	0	0.00000270						
27		RICE (MILLED)	100630	BRICE	5.0	2,921,525	0	0.00000270	~BPADD	0.533				
28		SORGHUM	1007	BSGHM	5.0	100,495	0	0.00001646	~BSGHM	0.016	~OTOOL	0.016	~FFERT	0.285
29		OTHER CEREALS	10 - (1001 + 1005 + 100610 + 100630 + 1007)	BCNES	5.0	2,148,954	0	0.00000000						
30		MILLING PRODUCTS; MALT; STARCH; INULIN; WHT GLUTEN	11	BMILL	15.0	3,898,720	169	0.00000000						
31		SOYBEANS	1201	BSOYB	5.0	0	0	0.00001608	~BSOYB	0.041	~OTOOL	0.021	~FFERT	0.307
32		OTHER OIL SEEDS ETC.; MISC GRAIN, SEED, FRUIT, PLANT ETC	12 - 1201	BOILS	5.0	45,734	203	0.00000000						
33		LAC; GUMS, RESINS & OTHER VEGETABLE SAP & EXTRACT	13	BGUMS	5.0	119,693	413,512	0.00000000						
34		VEGETABLE PLAITING MATERIALS & PRODUCTS NES	14	BMNES	5.0	124	0	0.00000000						
35	C - FATS AND OILS - III	ANIMAL OR VEGETABLE FATS, OILS ETC. & WAXES	15	CFATS	10.0	3,976,045	0	0.00000000						

APPENDIX: Table 11 (Cont.). Rwanda Model Sectors, Baseline Protection and Trade, and Input Requirements

					Protection and Trade 2001			Production Input Requirements 2000							
									Input 1		Input 2		Input 3	
No.	HS Section	Model Sector	HS Detail	Model Code	MFN Tariff (%)	Imports (000 Rwf)	Exports (000 Rwf)	Labor Input (Pers./000Rfr)	Model Code	Cost Share	Model Code	Cost Share	Model Code	Cost Share
36	D - MANUFACTURED FOODSTUFFS- IV	EDIBLE PREPARATIONS OF MEAT, FISH, CRUSTACEANS ETC	16	DMEAT	25.0	44,122	0	0.00000062						
37		SUGARS AND SUGAR CONFECTIONARY	17	DSUGR	15.0	3,792,223	0	0.00000034	~DSUGR	0.164	~DSUGR	0.070	~FPEST	0.032
38		COCOA AND COCOA PREPARATIONS	18	DCOCO	15.0	29,271	0	0.00000023						
39		FARINACEOUS PRODUCTS	1902	DFARI	25.0	109,227	0	0.00000034	~DFARI	0.370	~DSUGR	0.035		
40		BAKERY PRODUCTS	1905	DBAKE	25.0	32,930	0	0.00000034	~DFARI	0.370	~DSUGR	0.035		
41		OTHER PREP CEREAL, FLOUR, STARCH OR MILK; BAKERS WARES	19 - (1902 + 1905)	DFNES	15.0	368,345	0	0.00000023						
42		PREP VEGETABLES, FRUIT, NUTS OR OTHER PLANT PARTS	20	DNUTS	25.0	453,006	5	0.00000036	~BRNES	0.292	~DSUGR	0.052	~MGLAS	0.035
43		MISCELLANEOUS EDIBLE PREPARATIONS	21	DMISC	15.0	1,416,020	781	0.00000023						
44		SOFT DRINKS	2201 + 2202	DSDRK	25.0	15,353	5,505	0.00000003						
45		MALT BEER	2203	DBEER	25.0	102,856	12,254	0.00000003						
46		WINES	2204 + 2205	DWINE	25.0	151,493	0	0.00000003						
47		OTHER BEVERAGES, SPIRITS AND VINEGAR	22 - (2201 TO 2205)	DBNES	25.0	229,602	0	0.00000003	~MGLAS	0.238	~JPNES	0.095	~BBANA	0.100
48		FOOD INDUSTRY RESIDUES & WASTE; PREP ANIMAL FEED	23	DFEED	15.0	15,127	0	0.00000023						
49		CIGARETTES	240220	DCIGT	25.0	169,382	0	0.00000003	~DTNES	0.362	~PENES	0.015		
50		OTHER TOBACCO AND TOBACCO PRODUCTS	24 - 240220	DTNES	15.0	413,913	0	0.00000023						
51	E - MINERAL PRODUCTS - V	CEMENT	2523	ECEMN	5.0	899,344	420	0.00000017						
52		OTHER SALT; SULFUR; EARTH & STONE; LIME & CEMENT PLASTER	25 - 2523	ESALT	15.0	1,890,275	0	0.00000023						
53		CASSITERITE (TIN ORE)	2609	ECASS	0.0	0	28,920	0.00000026						
54		WOLFRAMITE (TUNGSTEN ORE)	2611	EWOLF	0.0	0	41,664	0.00000026						
55		COLUMBITE-TANTALITE (COLTAN - NIOBIUM & TANTALUM ORE)	261590	ECOLM	0.0	0	3,698,646	0.00000026						
56		OTHER ORES, SLAG AND ASH	26 - (2609 + 2611 + 261590)	EONES	0.0	0	0	0.00000023						
57		ELECTRICITY	2716	EELEC	5.0	0	0	0.00000018						
58		OTHER MINERAL FUEL, OIL ETC.; BITUMIN SUBST; MINERAL WAX	27 - 2716	EFNES	5.0	17,578,114	1,750	0.00000023						
59	F - CHEMICALS - VI	INORG CHEM; PREC & RARE-EARTH MET & RADIOACT COMPD	28	FCHEM	5.0	996,304	49,785	0.00000023						
60		QUININE	293921	FQUIN	5.0	2,246	0	0.00000023						
61		OTHER ORGANIC CHEMICALS	29 - 293921	FGNES	5.0	503,389	414	0.00000023						
62		PHARMACEUTICAL PRODUCTS	30	FPHRM	2.5	3,716,098	0	0.00000023						
63		FERTILIZERS	31	FFERT	0.0	891,020	0	0.00000023						
64		PAINTS	3208 TO 3210	FPAIN	5.0	115,240	0	0.00000018	~ESALT	0.470	~OINES	0.064		
65		OTHER TANNING & DYE EXT ETC; DYE, PAINT, PUTTY ETC; INKS	32 - (3208 TO 3210)	FTANN	5.0	276,889	0	0.00000023						

APPENDIX: Table 11 (Cont.). Rwanda Model Sectors, Baseline Protection and Trade, and Input Requirements

					Protection and Trade 2001			Production Input Requirements 2000							
									Input 1		Input 2		Input 3		
No.	HS Section	Model Sector	HS Detail	Model Code	MFN Tariff (%)	Imports (000 Rwf)	Exports (000 Rwf)	Labor Input (Pers./000Rfr)	Model Code	Cost Share	Model Code	Cost Share	Model Code	Cost Share
66		TOOTHPASTE, DENTAL FLOSS	3306	FTPST	10.0	139,080	0	0.00000023						
67		OTHER ESSENTIAL OILS ETC; PERFUMERY, COSMETIC ETC PREPS	33 - 3306	FCNES	15.0	468,236	42,256	0.00000023						
68		SOAP ETC; WAXES, POLISH ETC; CANDLES; DENTAL PREPS	34	FSOAP	15.0	746,615	2,201	0.00000018	~CFATS	0.508	~FCHEM	0.096	~FCHEM	0.064
69		ALBUMINOIDAL SUBST; MODIFIED STARCH; GLUE; ENZYMES	35	FGLUE	5.0	79,555	0	0.00000023						
70		EXPLOSIVES; PYROTECHNICS; MATCHES; PYRO ALLOYS ETC	36	FEXPL	20.0	175,184	0	0.00000023						
71		PHOTOGRAPHIC OR CINEMATOGRAPHIC GOODS	37	FPHTO	15.0	148,362	0	0.00000023						
72		PESTICIDES (INCLUDING PYRETHRUM EXTRACT)	3808	FPEST	5.0	797,784	0	0.00000023						
73		OTHER MISCELLANEOUS CHEMICAL PRODUCTS	38 - 3808	FONES	5.0	363,559	0	0.00000023						
74	G - RUBBER AND PLASTICS - VII	PLASTIC PIPE	3917	GRUBR	5.0	353,481	18,713	0.00000012						
75		OTHER PLASTICS AND ARTICLES THEREOF	39 - 3917	GPLST	15.0	2,318,564	0	0.00000023						
76		RETREAD RUBBER TIRES	4012	GTIRE	10.0	15,907	0	0.00000012	~GRNES	0.336	~FGLUE	0.027		
77		OTHER RUBBER AND ARTICLES THEREOF	40 - 4012	GRNES	10.0	1,706,665	25,759	0.00000023						
78	H - HIDES AND LEATHER PRODUCTS - VIII	RAW HIDES AND SKINS (NO FURSKINS) AND LEATHER	41	HHIDE	5.0	1,493	343,924	0.00000023						
79		LEATHER ART; SADDLERY ETC; HANDBAGS ETC; GUT ART	42	HLART	15.0	157,527	0	0.00000023						
80		FURSKINS AND ARTIFICIAL FUR; MANUFACTURES THEREOF	43	HFURS	25.0	34	0	0.00000023						
81	I - CORK AND WOOD ARTICLES - IX	WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL	44	IWOOD	15.0	434,896	2,396	0.00000023						
82		CORK AND ARTICLES OF CORK	45	ICORK	5.0	31	0	0.00000023						
83		MFR OF STRAW, ESPARTO ETC.; BASKETWARE & WICKERWRK	46	ISTRW	25.0	56	2,589	0.00000023						
84	J - PULP AND PAPER PRODUCTS - X	WOOD PULP ETC; RECOVD (WASTE & SCRAP) PPR & PPRBD	47	JPULP	5.0	0	0	0.00000023						
85		STATIONERY, BUSINESS FORMS	4820	JFORM	25.0	515,805	0	0.00000037	~JPNES	0.392	~FTANN	0.120		
86		OTHER PAPER & PAPERBOARD & ARTICLES (INC PAPR PULP ARTL)	48 - 4820	JPNES	15.0	1,920,609	0	0.00000037	~JPNES	0.361	~FTANN	0.110		
87		NEWSPAPER PUBLISHING	4902	JNEWS	5.0	167,552	0	0.00000037	~JPNES	0.329	~FTANN	0.101		
88		OTHER PRINTED BOOKS, MANUSCRIPTS ETC	49 - 4902	JBOOK	10.0	13,771,346	1,989	0.00000037	~JPNES	0.345	~FTANN	0.105		
89	K - TEXTILES AND APPAREL - XI	TEXTILES	50 TO 59	KTEXT	15.0	1,447,828	398,375	0.00000017	~KTEXT	0.363	~FTANN	0.276		
90		APPAREL	60 TO 63	KAPPR	15.0	4,027,140	9,458	0.00000017	~KTEXT	0.600				
91	L - FOOTWEAR AND OTHER MADE-UP ARTICLES - XII	FOOTWEAR, GAITERS ETC. AND PARTS THEREOF	64	LFOOT	5.0	643,651	2,951	0.00000023						

APPENDIX: Table 11 (Cont.). Rwanda Model Sectors, Baseline Protection and Trade, and Input Requirements

					Protection and Trade 2001			Production Input Requirements 2000							
									Input 1		Input 2		Input 3		
No.	HS Section	Model Sector	HS Detail	Model Code	MFN Tariff (%)	Imports (000 Rwf)	Exports (000 Rwf)	Labor Input (Pers./000Rfr)	Model Code	Cost Share	Model Code	Cost Share	Model Code	Cost Share
92		HEADGEAR AND PARTS THEREOF	65	LHEAD	25.0	17,231	0	0.00000023						
93		UMBRELLAS, WALKING-STICKS, RIDING-CROPS ETC, PARTS	66	LSTIK	15.0	57,592	0	0.00000023						
94		PREP FEATHERS, DOWN ETC; ARTIF FLOWERS; H HAIR ART	67	LFETH	25.0	2,844	0	0.00000023						
95	M - STONE AND MINERAL PRODUCTS - XIII	ART OF STONE, PLASTER, CEMENT, ASBESTOS, MICA ETC.	68	MSTON	15.0	312,085	2,644	0.00000017	~ECEMN	0.364	~ESALT	0.095		
96		CERAMIC PRODUCTS	69	MCERM	15.0	464,674	1,084	0.00000017	~ESALT	0.465				
97		GLASS AND GLASSWARE	70	MGLAS	15.0	612,689	0	0.00000023						
98	N - PRECIOUS STONES AND JEWELLERY- XIV	NAT ETC PEARLS, PREC ETC STONES, PR MET ETC; COIN	71	NPSTN	10.0	4,405	25	0.00000023						
99	O - BASE METALS AND METAL PRODUCTS - XV	IRON AND STEEL	72	OIRON	5.0	4,321,480	32,199	0.00000023						
100		IRON OR STEEL STRUCTURE NES (METAL ROOFING?)	7308	OSTRC	5.0	664,713	0	0.00000010	~OINES	0.519				
101		NAILS	7317	ONAIL	15.0	99,064	0	0.00000010						
102		OTHER ARTICLES OF IRON OR STEEL	73 - (7308 + 7317)	OINES	15.0	1,097,985	80	0.00000023						
103		COPPER AND ARTICLES THEREOF	74	OCOPR	15.0	15,214	0	0.00000023						
104		NICKEL AND ARTICLES THEREOF	75	ONICK	15.0	0	0	0.00000023						
105		ALUMINUM AND ARTICLES THEREOF	76	OALUM	10.0	702,521	210	0.00000023						
106		LEAD AND ARTICLES THEREOF	78	OLEAD	10.0	915	0	0.00000023						
107		ZINC AND ARTICLES THEREOF	79	OZINC	10.0	32,817	0	0.00000023						
108		TIN AND ARTICLES THEREOF	80	OTINA	15.0	454	0	0.00000023						
109		BASE METALS NES; CERMETS; ARTICLES THEREOF	81	OBNES	5.0	1,598	0	0.00000023						
110		TOOLS, CUTLERY ETC. OF BASE METAL & PARTS THEREOF	82	OTOOL	5.0	448,924	477	0.00000023						
111		MISCELLANEOUS ARTICLES OF BASE METAL	83	OMNES	15.0	881,042	0	0.00000023						
112	P - MACHINERY- XVI	NUCLEAR REACTORS, BOILERS, MACHINERY ETC.; PARTS	84	PBOIL	11.3	5,106,770	19,957	0.00000023						
113		ELECTRICAL STORAGE BATTERIES	8507	PBATT	15.0	455,572	0	0.00000037						
114		TELEVISION AND RADIO RECEIVERS	8527 + 8528	PRADO	10.0	1,219,863	1,147	0.00000037						
115		INSULATED WIRE AND CABLES	8544	PWIRE	15.0	232,192	0	0.00000037	~OCOPR	0.381	~GPLST	0.188		
116		OTHER ELECTRIC MACHINERY ETC	85 - (8507 + 8527 + 8528 + 8544)	PENES	10.0	10,763,762	10,758	0.00000023						
117	Q - TRANSPORT EQUIPMENT - XVII	RAILWAY OR TRAMWAY STOCK ETC; TRAFFIC SIGNAL EQUIP	86	QRAIL	0.0	58,667	0	0.00000023						
118		VEHICLES, EXCEPT RAILWAY OR TRAMWAY, AND PARTS ETC	87	QVEHC	15.0	8,173,452	20	0.00000023						
119		AIRCRAFT, SPACECRAFT, AND PARTS THEREOF	88	QAIRC	2.5	803	0	0.00000023						

APPENDIX: Table 11 (Cont.). Rwanda Model Sectors, Baseline Protection and Trade, and Input Requirements

					Protection and Trade 2001			Production Input Requirements 2000							
									Input 1		Input 2		Input 3		
No.	HS Section	Model Sector	HS Detail	Model Code	MFN Tariff (%)	Imports (000 Rwf)	Exports (000 Rwf)	Labor Input (Pers./000Rfr)	Model Code	Cost Share	Model Code	Cost Share	Model Code	Cost Share
120		SHIPS, BOATS AND FLOATING STRUCTURES	89	QBOAT	5.0	14,059	0	0.00000023						
121	R - PROFESSIONAL EQUIPMENT - XVIII	OPTIC, PHOTO ETC, MEDIC OR SURGICAL INSTRMENTS ETC	90	ROPTC	10.0	2,010,145	5,444	0.00000023						
122		CLOCKS AND WATCHES AND PARTS THEREOF	91	RCLOK	15.0	34,080	0	0.00000023						
123		MUSICAL INSTRUMENTS; PARTS AND ACCESSORIES THEREOF	92	RMUSC	10.0	28,037	20	0.00000023						
124	S - ARMS AND AMMUNITION - XIX	ARMS AND AMMUNITION; PARTS AND ACCESSORIES THEREOF	93	SAMMO	12.5	2,046	0	0.00000023						
125	T - MISCELLANEOUS MANUFACTURES - XX	FURNITURE; BEDDING ETC	9401 TO 9404	TFURN	10.0	694,188	0	0.00000018	~IWOOD	0.282	~GPLST	0.292	~KTEXT	0.019
126		LAMPS AND LIGHTING FITTINGS	94 - (9401 TO 9404)	TLAMP	10.0	183,986	0	0.00000023						
127		TOYS, GAMES & SPORT EQUIPMENT; PARTS & ACCESSORIES	95	TTOYS	15.0	105,004	0	0.00000023						
128		MISCELLANEOUS MANUFACTURED ARTICLES	96	TMNES	15.0	339,797	3,884	0.00000023						
129	U - WORKS OF ART - XXI	WORKS OF ART, COLLECTORS' PIECES AND ANTIQUES	97	UARTW	25.0	120,704	32,317	0.00000023						
130		SPECIAL CLASSIFICATION PROVISIONS, NES	98	USNES	0.0	0	0	0.00000023						
131		SPECIAL IMPORT PROVISIONS, NES	99	UINES	0.0	0	0	0.00000023						

Sources: Rwanda Revenue Authority (protection and trade statistics); UNIDO *Rwanda Census of Industrial Production 2000* , Rwanda Ministry of Commerce,Industry, and Tourism, October 2001; diverse Rwanda agricultural stud and authors' estimates.