

Trade Policy Options for Chile: The Importance of Market Access

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This article uses a multisector, multicountry, computable general equilibrium model to examine Chile's strategy of "additive regionalism"—negotiating bilateral free trade agreements with all of its significant trading partners. Taking Chile's regional arrangements bilaterally, only its agreements with Northern partners provide sufficient market access to overcome trade diversion costs. Due to preferential market access, however, additive regionalism is likely to provide Chile with gains that are many multiples of the static welfare gains from unilateral free trade. At least one partner country loses from each of the regional agreements considered, and excluded countries as a group always lose. Gains to the world from global free trade are estimated to be vastly larger than gains from any of the regional arrangements.

The analysis of regional trade arrangements is typically conducted in the framework of trade creation versus trade diversion, under which preferential tariff reduction is welfare inferior to nonpreferential tariff reduction. However, Wonnacott and Wonnacott (1981) show that regional trade arrangements could produce more gains due to improved market access to trading partners. The logical extension of this argument is that if a country negotiated free trade agreements with all of its trade partners, it would end up with zero effective tariffs on all imports, or free trade, despite the legal existence of positive most-favored-nation (MFN) tariffs. In the process, it would achieve preferential access to its partners' markets. Hence, without transition dynamics, this strategy may produce gains that are considerably larger than unilateral free trade.

We call the process of sequentially negotiating bilateral free trade agreements with all significant trading partners "additive regionalism." There is at least one country, Chile, that is pursuing a clearly articulated strategy of additive regionalism.¹ Does additive regionalism dominate free trade for Chile? If so, by how much?

The government of Chile has successfully concluded a free trade area (FTA) with MERCOSUR and is seeking a free trade agreement with the North American

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1. Mexico, Singapore, and, to a lesser extent, MERCOSUR may be following the same strategy.

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Free Trade Agreement (NAFTA).² Moreover, the government of Chile is attempting to add the European Union, the rest of South America, and several other countries to its network of free trade arrangements.³

It is well known that most results regarding the welfare effects of regional arrangements are typically ambiguous at the theoretical level and that many questions are quantitative rather than qualitative. Thus, we employ an 11-region global computable general equilibrium (CGE) model to examine quantitatively the network of preferential arrangements that Chile is negotiating as well as unilateral trade policy options in Chile. In addition, we estimate the impact of global free trade as a reference point. Our model includes the Chilean economy as well as the economies of Argentina, Brazil, Mexico, the United States, Canada, Central America, the rest of South America, the European Union, Japan, and an aggregate for the rest of the world. Consequently, we are able to estimate the impact on partner and excluded countries from each of the agreements we evaluate.

Critics of Chile's additive regionalism strategy, such as Donoso and Hachette (1996), argue that agreements with Southern countries are unlikely to be beneficial and that it is not worth delaying the benefits of unilateral and multilateral tariff liberalization to pursue these agreements. They argue that only agreements with the European Union, the United States, or Japan offer sufficient access to be worth pursuing. Advocates for the government's strategy, however, believe that there are gains to be achieved from agreements with smaller Southern countries as well. They also argue, as in Butelmann and Meller (1995), that additive regionalism will progressively reduce trade diversion costs, lower the effective average tariff in Chile, and provide considerably improved market access. Furthermore, they note that Chile can unilaterally lower its external tariff while simultaneously pursuing additive regionalism to further reduce trade diversion costs.

We find that the results for NAFTA, MERCOSUR, and especially additive regionalism all point to the crucial importance of improved market access in preferential trading areas. Considered bilaterally, we find that trade diversion costs do indeed dominate the welfare effects of these agreements unless sufficient market access is obtained in partner countries (or third-country tariffs are lowered).

The results support the view that North-South agreements (for example, Chile with the United States or the European Union) are likely to provide sufficient market access to be beneficial, whereas the results for our South-South agreement (Chile-MERCOSUR) suggest the opposite. Agreements that include a Northern

2. MERCOSUR is a customs union between Argentina, Brazil, Paraguay, and Uruguay. Paraguay and Uruguay are too small to be included as separate countries in the dataset we employ, so our MERCOSUR region excludes them. In a FTA, partner countries eliminate tariffs and export taxes or subsidies against each other but retain separate tariffs against third countries. In a customs union, partner regions adopt a common external tariff. Chile has rejected a customs union with MERCOSUR. Although negotiations for Chile's membership in NAFTA have stalled, many commentators believe that Chile will eventually become the next member of NAFTA.

3. As of early 2001, Chile had reached preferential trade agreements with at least 15 countries.

partner increase the welfare of the members of the group in aggregate; only the Chile-MERCOSUR agreement results in net losses for the members as a group. However, Chile can unilaterally lower the external tariff, reducing trade diversion, so that even its agreement with MERCOSUR is beneficial.⁴

We find that Chile's additive regionalism strategy of combining free trade agreements with four regions—NAFTA, MERCOSUR, the European Union, and rest of South America—produces welfare gains for Chile that are many multiples of the value of unilateral free trade if it were to attain tariff-free access to all these markets. This provides support for the theoretical insight of Wonnacott and Wonnacott (1981). However, if the most highly protected sectors in the European Union and rest of South America are excluded from the agreements, the gains are dramatically reduced.⁵

We estimate that at least one of Chile's potential partners in its additive regionalism strategy will lose in all of the options we evaluate. Adding the rest of South America to its network of agreements would substantially improve Chile's preferential access and welfare but would significantly reduce the real income of the rest of South America, which would suffer large trade diversion losses with very little improved market access. Theory, intuition, and experience indicate that preferential arrangements are unlikely to be implemented if the partner countries do not also expect to gain. Nonetheless, the gains for Chile remain substantial relative to unilateral free trade if it could successfully negotiate these agreements with full market access.

Excluded regions are always estimated to lose from any of the preferential arrangements we consider. Thus, where there are gains to partner countries from preferential arrangements, they come at least partly at the expense of excluded regions.

The gains to the world from global free trade are estimated to be between US\$199 billion and \$456 billion per year. These gains to the world vastly exceed the gains from any of the regional arrangements. These results emphasize the continuing importance of multilateral liberalization.

Because Chile starts with a relatively efficient uniform tariff of 11 percent, we estimate that it can obtain only small additional gains from improving the efficiency of its resource allocation by further *unilateral* reduction of its tariffs.⁶ We show that a country like Chile that starts with a uniform tariff will typically have

4. Chile has enacted legislation that will lower its external tariff from 11 to 6 percent in stages, as suggested by our analysis. Thus our estimates could be viewed as an ex post assessment of the policy of lowering the external tariff. In fact, the vice president of the Chilean Central Bank used estimates from an earlier version of our study in his testimony before the Chilean Parliament in favor of lowering the external tariff.

5. In fact, the experiences of some Mediterranean countries (Morocco, Tunisia, and Turkey) in their preferential trade agreements with the European Union suggest that the highly protected agricultural sectors are likely to be excluded from such an agreement.

6. This conclusion ignores the dynamic gains from trade liberalization, which could lead to much larger gains.

the gains from joining a customs union reduced if it must adopt a nonuniform structure. Conversely, if joining a customs union is a movement toward uniformity, the gains are likely to be augmented.⁷ In general, this result indicates that the relative uniformity of the preexisting tariff structure for a country and the proposed common external tariff of any customs union, must be compared on a case-by-case basis to ascertain whether welfare gains will actually be achieved.

We find that the benefits of trade liberalization or regional trade arrangements are considerably reduced if tariff revenue must be replaced by distorting alternative taxes. Similarly, in our optimal tariff calculations, we find that unilateral trade liberalization can proceed to lower tariff levels if efficient replacement taxes are in place.⁸

When there is an optimal tariff, as there is in this model, the amount by which a country can reduce its tariff is limited by the distortions of the replacement tax. Consequently, we have produced an updated estimate of the collected value-added tax (VAT) rates by sector in Chile.⁹ We show that Chile could reduce its legal VAT rates to about 50 percent of present levels and improve its welfare by 0.3 percent of gross domestic product (GDP) if it were able to eliminate evasion and collect the VAT uniformly.¹⁰ These gains are significant when compared to unilateral trade liberalization options. We find that the optimal tariff in Chile is almost double with the VAT rate that is currently collected, compared with a VAT that collects taxes at equal rates across sectors.

Section I describes the model and data. Section II explains the policy results for Chile. Section III examines the impact on partner and excluded countries of Chile's agreements as well as the impact of global free trade.

I. A MULTIREGIONAL TRADE MODEL

General Features

The quantitative model developed to evaluate the trade policy options facing Chile is multi-regional and multi-sectoral. Table 1 lists the 11 regions included explicitly in the model, as well as the 24 sectors included in each region. The general

7. Two other countries with uniform tariffs that may install a nonuniform tariff of a customs union are the Kyrgyz Republic and Estonia. The Kyrgyz Republic has a uniform tariff of 10 percent and has in principle agreed to join in a customs union with Russia, Belarus, and Kazakhstan. The Kyrgyz Republic has not implemented the common external tariff, however, because of fears of the costs of the nonuniformity of the Russian tariff, which is the present common external tariff. See Michalopoulos and Tarr (1997) for details. Estonia also has a uniform tariff of zero and is one of the five transition economies the European Union has designated as candidate countries for accession. Estonian authorities have considerable concerns, however, about the costs of imposing the European Union's common external tariff, especially in the highly protected sectors.

8. However, with low elasticities, there is an adverse terms-of-trade effect that mitigates the welfare gains from reduced costs of trade diversion.

9. See Harrison, Rutherford, and Tarr (1997b).

10. In addition, we eliminate the output tax, which applies primarily to energy, beverages, and tobacco.

TABLE 1. Commodities, Regions, and Factors of Production in the Chile Model

Abbreviation	Meaning
<i>Commodities</i>	
WHT	Wheat
GRO	Other grains
NGC	Nongrain crops
WOL	Wool and other livestock
FRS	Forestry
FSH	Fishing
ENR	Energy products
MIN	Mineral products
MEA	Meat products
MIL	Milk products
FOO	Other food products
B_T	Beverages and tobacco
TEX	Textiles and apparel and leather products
LUM	Lumber and wood
PPP	Pulp and paper
CRP	Chemicals rubber and plastics
I_S	Primary ferrous metals
NFM	Nonferrous metals
FMP	Fabricated metal products
TRN	Transport industries
MAC	Machinery and equipment
T_T	Trade and transport
SER	Services
CGD	Savings good
<i>Regions</i>	
CHL	Chile
ARG	Argentina
BRA	Brazil
RSA	Rest of South America
USA	United States of America
CAN	Canada
MEX	Mexico
CAM	Central America and Caribbean
E_U	European Union 15
JPN	Japan
ROW	Rest of world
<i>Factors</i>	
LND	Land
LAB	Labor
CAP	Capital

specification of this model follows our earlier multiregional model of the effects of the Uruguay Round.¹¹ The most important differences are the inclusion of data for Chile, updated tariff rates for Argentina and Brazil, and more recent data for all other regions. We adopt a multiregion model rather than a small-open-economy model because we need to consider the possible effects on Chile of a reduction in its import tariffs on other MERCOSUR members. Crucially, we also need to account for the “market access” effects on Chilean exports of a reduction of import tariffs by MERCOSUR, NAFTA, or other regions with which Chile agrees to a free trade agreement either separately or collectively.

Although the general theory of the welfare effects of preferential trading arrangements allows for the impact of changes in partner country tariffs on the home country’s terms of trade,¹² some empirical approaches to evaluating preferential trading arrangements ignore them.¹³ Our framework allows us to evaluate explicitly the importance to Chile of improved market access to regions such as MERCOSUR and NAFTA as well as losses Chile may suffer as partner countries raise export prices to Chile.

An important feature of the Chilean economy is that its tariff rate is a uniform 11 percent across all traded sectors. The exception to this is the variable levy system for wheat, sugar, and edible oils. Estimates reveal that the variable levy system has resulted in an average level of protection for these three products in excess of 11 percent.¹⁴ We ignore the variable levy system, which will slightly bias downward our estimated gains from unilateral trade liberalization. Harrison, Rutherford, and Tarr (1997b) describe the key data that are important in the analysis.

Argentine tariffs are virtually identical to Brazilian tariffs. In the case of the United States, the tariff estimates include the tariff equivalents of the nontariff barriers, which are quite important in the sectors with high tariffs. If Chile forms an FTA with MERCOSUR or NAFTA, Chilean exporters will not face these tariffs, but outside exporters to these regions will. Thus, these data are crucial in assessing the value of increased access that Chile will obtain from MERCOSUR and NAFTA, respectively.

11. Harrison, Rutherford, and Tarr (1997c). The Web site http://dmsweb.badm.sc.edu/glenn/ur_pub.htm provides access to the model and related publications.

12. See Wooton (1986) and Harrison, Rutherford, and Wooton (1989, 1993).

13. An example is the approach adopted by Bond (1996). He develops a simple general equilibrium specification of the effects on Chile of these preferential trading arrangements with an impressive level of detail with respect to tariff data. However, his results for Chile joining NAFTA differ significantly from ours because his CGE model does not incorporate the impact on Chile of access to NAFTA markets.

14. The variable levy system is applied by examining monthly prices over the previous 2.5 years for wheat and 50 months for sugar. The distribution is truncated at the top and the bottom by an equal percentage (about 15 percent). The range of the resulting truncated distribution determines the upper and lower bounds. A tariff surcharge or reduction of the tariff below the 11 percent rate is applied if the price in the present month is below or above the bounds. Because the system is not based on a domestic support price, its impact varies enormously from year to year. Valdes (1996, p. 55) estimates that between 1985 and 1995 the nominal protection rate for sugar ranged from 6 to 98 percent, and the nominal protection rate for wheat ranged from 45 to –10 percent (see also Quiroz and Valdes 1993).

We also estimate the rates of collected VAT in each industry and the tax on gross output, respectively. These rates are estimated using the procedures explained in Harrison, Rutherford, and Tarr (1997b, appendix A). The different rates of VAT across sectors arise mainly because of evasion of the VAT. The two largest sectors in Chile, trade and transport services and other services, have a combined 61 percent of value added and are the sectors with the lowest rate of collected VAT (about 3 percent as opposed to about 17 percent for most Chilean manufacturing).

Formal Specification

THE MODEL. The general specification of the model follows our earlier work on the Uruguay Round. We concentrate here on what we call our base model, which is static and assumes constant returns to scale. Except for the fact that imports and exports are distinguished by many regions, the structure of the model within any country is very close to the basic model of de Melo and Tarr (1992).

Production entails the use of intermediate inputs and primary factors (labor, capital, and land). Primary factors are mobile across sectors within a region but are internationally immobile. We assume constant elasticity of substitution (CES) production functions for value added and Leontief production functions for intermediates and the value-added composite. Output is differentiated between domestic output and exports, but exports are not differentiated by country of destination.

Each region has a single representative consumer that maximizes utility, as well as a single government agent. In Harrison, Rutherford, and Tarr (1997b, appendix C), we formally characterize the demand structure and elasticities that are critical to the results. Demand is characterized by nested CES utility functions for each agent, which allows multistage budgeting. Demand at the top level, for the composite “Armington” aggregate of each of the 24 goods in table 1, is Cobb-Douglas. Consumers first choose how much of each Armington aggregate good to consume, such as wheat, subject to aggregate incomes and composite prices of the aggregate goods. The Armington aggregate good is in turn a CES composite of domestic production and aggregate imports. Consumers decide how much to spend on aggregate imports and the domestic good subject to the prior decision of how much income will be spent on this sector, and preferences for aggregate imports and domestic goods are represented by a CES utility function. Finally, consumers decide how to allocate expenditures across imports from the 10 other regions based on their CES utility function for imports from different regions and income allocated to consumption on imports from the previous higher-level decision.

DATA AND ELASTICITIES. Except for tariff data and domestic tax data, the data employed to calibrate the model come primarily from the Global Trade Analysis Project (GTAP) database documented in Gehlhar and others (1996). We use the preliminary release of version 3 of this database, current as of May 1996.

The 11-region version of the model retains all regions of the GTAP database that are directly relevant to our policy simulations. The full GTAP database contains 37 sectors.¹⁵

We generally assume that the lower-level elasticity of substitution between imports from different regions, σ_{MM} , is 30 and that the higher-level elasticity between aggregate imports and domestic production, σ_{DM} , is 15. We refer to these values as our central elasticities. Econometric studies, such as those of Reinert and Roland-Holst (1992) and Shiells and Reinert (1993), suggest lower values. However, Reidel (1988) and Athukorala and Reidel (1994) argue that when the model is properly specified, the demand elasticities are not statistically different from infinity and their point estimates are close to the central elasticity values we have chosen. Moreover, elasticities would be expected to increase over time, and this model presumes an adjustment of about 10 years, a rather long period in the context of these econometric estimates.

To be clear, a value of $\sigma_{MM} = 30$ means that if Chile tried to raise its prices by 1 percent on world markets relative to an average of aggregate imports, Chilean imports would decline relative to aggregate imports by 30 percent. Given that there may be some economists who would prefer lower elasticity estimates, we also perform most of our important policy simulations with $\sigma_{MM} = 8$ and $\sigma_{DM} = 4$. We refer to these as our low elasticities. A high-elasticity scenario for a small open economy such as Chile would be a specification with still less market power for exports, such as would occur in the popular theoretical models of international trade where goods are homogeneous.

The elasticity of transformation between exports and domestic production is assumed to be about four for each sector. Elasticities of substitution between primary factors of production are taken from Harrison and others (1993) and generally reflect econometric estimates for the United States. These estimates are relatively low for primary goods, around unity for manufacturing goods, and elastic for tertiary goods. We assume fixed coefficients between all intermediates and value added.

DISTORTIONS. All distortions are represented as ad valorem price wedges. Border protection estimates combine tariff protection and the tariff equivalents of nontariff barriers. For Brazil and Argentina, these data were estimated by Reincke in Harrison, Rutherford, and Tarr (1997b, appendix B). Otherwise, these data are taken from the GTAP database. They are presented in Harrison, Rutherford, and Tarr (2001, table 9). Other distortions include factor taxes in production, VATs, export subsidies and voluntary export restraints (represented as ad valo-

15. Our aggregation to 24 sectors was undertaken in a manner that ensured that those sectors with significant rates of protection (in the principal trading partners of Chile) are retained as individual sectors. That is, we aggregated sectors that are not important in trade or that have low rates of protection. Aggregation may significantly change the results in applied trade policy analysis, but this type of aggregation results in quite small aggregation bias.

rem export tax equivalents). These are also taken from the GTAP database, except for domestic distortion data in Chile. The latter were estimated for this exercise by Soloaga in Harrison, Rutherford, and Tarr (1997b, appendix A). Lump-sum replacement taxes or subsidies ensure that government revenue in each region stays constant at real benchmark levels. However, for Chile, we capture the marginal efficiency cost of the government having to raise extra revenue through a distortionary domestic tax system. For developing countries, these costs could be quite significant because the revenue losses from trade reform could be sizable.

SOLUTION ALGORITHM. The model is formulated using the GAMS-MPSGE software developed by Rutherford (1999) and solved using the PATH algorithm of Ferris and Munson (2000). Although the model has 11 regions and 24 sectors and is large by historical standards, it is smaller than our Uruguay Round model. Use of demand elasticities as high as those we employ could pose numerical problems in general, but this model solved without difficulty.

II. POLICY RESULTS FOR CHILE

We first discuss how Chile will replace the revenue it will lose from lowering its tariffs and the welfare implications of these options. We then discuss the results regarding the preferential trade area policy options and examine how Chile may use unilateral tariff reduction to optimize its trade policy. Finally, we examine the effects of Chile's strategy of additive regionalism.

The Role of the Replacement Tax

Because Chile is reducing tariffs in most of our scenarios, there is a revenue loss to the government. We impose an equi-revenue requirement in all simulations and stipulate explicitly how the additional tax revenue will be generated. We employ the existing VAT, a uniform VAT, or a lump-sum tax.

WELFARE EFFECTS OF THE REPLACEMENT TAX. Collection of the existing VAT is not uniform in Chile. According to the estimates in Harrison, Rutherford, and Tarr (1997b, table 3), it ranges from 0 percent up to 18 percent across sectors. Hence, raising revenue through the VAT generates distortions: when the VAT is increased, resources move into less highly taxed sectors. This reduces any possible gains from the trade policy change. Results for welfare using the existing VAT are presented in column 1 of table 2.

In fact, we estimate the "marginal cost of public funds" of the existing VAT in Chile to equal 7.6 percent. This implies that consumers and producers will have to be taxed 1,076 pesos for the government to receive 1,000 pesos. The 76 pesos are a welfare loss to the Chilean economy.

We also calculate the marginal cost of public funds of the Chilean tariff, which equals 18.5 percent. Despite the fact that the tariff is uniform across sectors, and

TABLE 2. Welfare and Government Revenue Results for Chile's Trade Policy Options

Policy simulation	With replacement taxes as						Combined effect of uniform VAT and trade policy ^b	
	Existing VAT		Uniform VAT ^a		Lump sum			
	% change in welfare ^c	% change in VAT ^d	% change in welfare ^c	Tariff revenue % of GDP	% change in welfare ^c	% change in welfare ^c	% change in welfare ^c	Tariff revenue % of GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	
1. FTA with MERCOSUR	(central elasticities)	-0.62	45	-0.40	1.7	-0.43	-0.19	1.8
	(low elasticities)	0.04	17	0.07	2.7	0.08	0.19	2.7
2. Customs union with MERCOSUR	(central elasticities)	-0.95	52	-0.74	1.3	-0.73	-0.62	1.2
	(low elasticities)	-0.20	21	-0.22	2.5	-0.17	-0.14	2.5
3. FTA with NAFTA	(central elasticities)	0.82	48	1.03	0.9	1.04	1.23	0.9
	(low elasticities)	0.30	26	0.31	2.1	0.38	0.43	2.1
4. Zero tariffs on NAFTA imports, no improved access	(central elasticities)	-1.11	62	-0.92	0.7	-0.83	-0.64	0.7
	(low elasticities)	-0.47	30	-0.45	2.0	-0.41	-0.33	2.0
5. FTA with MERCOSUR and 6% external tariff	(central elasticities)	0.12	49	0.44	1.7	0.35	0.61	1.7
	(low elasticities)	0.06	38	0.11	1.7	0.13	0.21	1.7
6. FTA with NAFTA and 6% external tariff	(central elasticities)	1.46	45	1.72	1.1	1.70	1.89	1.1
	(low elasticities)	0.41	41	0.45	1.4	0.49	0.55	1.4
7. Reduce external tariff to 8%	(central elasticities)	0.02	16	0.12	2.9	0.10	0.41	2.9
	(low elasticities)	-0.11	17	-0.08	2.7	-0.06	0.03	2.7
8. Reduce external tariff to 6%	(central elasticities)	0.01	28	0.16	2.3	0.11	0.43	2.3
	(low elasticities)	-0.18	30	-0.14	2.1	-0.14	-0.04	2.1
9. Reduce external tariff to zero	(central elasticities)	-0.26	76	0.02	0	0.09	0.21	0
	(low elasticities)	-0.54	72	-0.45	0	-0.42	-0.37	0

^aIn these scenarios we first create an equilibrium with a uniform VAT, no other domestic taxes, then evaluate the “pure” effects of the trade policy.^bThese scenarios combine the impacts of the trade policy simulation with going to a uniform VAT and elimination of the domestic output tax, government revenues held constant.^cPercentage change in Hicksian equivalent variation as a percentage of GDP.^dRequired equiproportional increase in the VAT rate across all sectors to keep government revenues unchanged.

therefore imposes no intersectoral distortion costs, the Chilean tariff imposes a higher distortion cost than the VAT because the tariff favors domestic production over imports.

Column 5 of table 2 shows the results of employing a lump-sum tax as the replacement tax. This tax avoids the distortions of a nonuniform VAT because consumer income is taxed in a fixed amount independently of consumer choices. Hence there are no resource allocation effects from the revenue replacement tax instrument. The results show that there is an added welfare cost of using the VAT, as compared with the lump-sum alternative.

Finally, column 3 of table 2 shows the results of using a uniform VAT. In these scenarios, we first counterfactually create an equilibrium in which all other domestic taxes and subsidies are zero and the VAT is uniform. The impact we evaluate is then solely due to the change in trade policy. Because all sectors are taxed and there is no labor-leisure choice, there is no way to take an action that will lower the tax. In other words, there are no resource allocation effects and the uniform VAT is essentially equivalent to a lump-sum or distortionless tax in our model. In addition, any “second-best” interaction effects of distortions between the tariff and the existing VAT will be removed if we start with a uniform VAT and no other distortions (for this reason, the results for the lump-sum tax and the uniform VAT may differ). In these scenarios, we equalize the VAT across sectors and solve for the level of the VAT that is required to compensate for the lost revenue.

REVENUE EFFECTS. Column 2 of table 2 presents the equi-proportional increase in the VAT required to keep government revenue constant. For example, with central elasticities, an FTA with MERCOSUR will require an increase of 45 percent in the VAT rate across sectors. Thus, if the collected VAT rate is 10 percent in a sector, the collected VAT rate will have to increase to 14.5 percent. With central elasticities, there is a strong substitution away from imports that pay tariffs in favor of imports from partner countries that are tariff free. In this case, the revenue requirements for the VAT are quite high to compensate for the lost tariff revenues. With low trade elasticities, the revenue requirement for the VAT is much smaller, ranging from increases between 17 and 26 percent in the three basic preferential trade arrangement scenarios presented in rows 1–3 of table 2.

In columns 4 and 7 of table 2, we show tariff revenues collected in the new equilibrium as a percentage of GDP. In our initial equilibrium, tariff revenues are equal to about 3.6 percent of GDP, but in the preferential trade area scenarios (rows 1–3), they fall to between 0.9 and 2.7 percent of GDP. Thus, in the preferential trade area scenarios, tariff revenues fall to between 25 and 75 percent of the original levels. The loss of tariff revenue is higher with NAFTA (because NAFTA is a larger share of Chilean imports than MERCOSUR) and higher with central elasticities because of the greater trade diversion. The VAT revenues as a percentage of GDP initially constitute about 9 percent of GDP. Depending on the preferential trade area and elasticities, the tariff loss is between 0.9 and 2.7 percent of

GDP. Hence, if the VAT is employed as the replacement tax, it will be necessary for VAT revenues to increase by about 10 to 30 percent.

Some may question whether the implied increase in the VAT is too high. To provide intuition for the model implications for the VAT, consider a particular scenario in which the lost tariff revenue is about 2.5 percent of GDP, as in row 6 of table 2 with central elasticities. Table 2 estimates that the VAT rate will have to increase by 45 percent to a legal rate of about 26 percent. In 1994, the legal VAT rate of 18 percent generated VAT revenues of about 9 percent of GDP, so the legal rate was twice the collected rate. Assuming no change in the rate of VAT evasion, it would appear necessary to raise the VAT by 5 percent to generate 2.5 percent of GDP (that is, from 18 to 23 percent).

The reason that the model predicts a required increase of the legal VAT rate to 26 percent and not 23 percent is that an increase in the tax will induce a shift away from the highly taxed sectors and an erosion of the tax base. Given our model parameters, increases in the VAT continue to generate additions in revenue within the range under consideration. But it is possible that evasion of the VAT could increase. The required legal VAT rate would then increase and the distortion costs of revenue replacement would be still higher than we have estimated. It is possible that the VAT is not a feasible tax for generating considerably more revenue without further reform in collection procedures.¹⁶ Given the uncertainties over rates of evasion of VAT in Chile, these estimates should be taken as indicative of revenue requirements rather than as precise recommendations for the VAT rate. In fact, the next subsection emphasizes the importance of uniformity of collections.

Options for Preferential Trade Areas

RESULTS IN TABLE 2. Table 2 presents the overall welfare results for the trade policy options. Harrison, Rutherford, and Tarr (1997b) give more detailed results on output, imports, and exports for the main scenarios, with central elasticities. Welfare impacts are presented as a percentage of Chile's GDP. They represent changes on a recurring, annual basis, so a 1 percent welfare gain should be interpreted as a 1 percent increase in real income *each year in the future*.

The first row of table 2 presents the results from the scenario where Chile forms an FTA with MERCOSUR. It assumes that each of the MERCOSUR countries represented in the model, Argentina and Brazil, reduces its tariffs, export subsidies, or taxes on its trade with Chile to zero and that Chile does the same for its

16. To quantify these ideas, we simulated Chile's FTA with MERCOSUR and NAFTA, assuming that the services and trade and transportation sectors cannot have their collected VAT rates increased due to evasion. (These are the sectors with low rates of VAT collection and where evasion of the VAT may prevent additional collections; together they produce about 65 percent of Chilean value added.) With central elasticities, the welfare loss in this case from the FTA with MERCOSUR is increased to -0.60 percent of GDP and the gains from the FTA with NAFTA are reduced to 0.12 percent of GDP. As expected, the required rate of VAT increase jumps to about 75 percent.

trade with MERCOSUR. Chile does not adopt the common external tariff of MERCOSUR in this scenario.

The second scenario, shown in row 2 of table 2, represents Chile joining MERCOSUR as part of the customs union. In addition to the requirements of the scenario in row 1, in this case Chile adopts the common external tariff of MERCOSUR. Although Chile has not joined the MERCOSUR customs union, it is a potential policy option, so we evaluate it in this scenario. For simplicity, we assume that the common external tariff that Chile adopts is the import tariff structure that Brazil currently has with the countries that are not in MERCOSUR.¹⁷

In the third scenario, in row 3 of table 2, Chile forms an FTA with NAFTA. In row 4, primarily to help understand the results, we evaluate the consequences of a free trade agreement between Chile and NAFTA in which Chile does not obtain improved access to the NAFTA market. After discussion of these scenarios, we introduce further simulations to help explain the results and evaluate modified options.

The effects on welfare are dependent on both how Chile chooses to replace the lost tariff revenues and on assumed elasticities. Chile's preferential trade policy options with MERCOSUR lead to a loss of welfare with our preferred central trade elasticities and negligible gains or losses with low trade elasticities. With central trade elasticities, the trade diversion costs of an agreement with MERCOSUR typically dominate the trade creation effects. Moreover, based on the MERCOSUR external tariff, preferential access to the MERCOSUR markets is insufficient to overcome this welfare loss in Chile's markets. Welfare losses are lower with lower assumed elasticities because there is less trade diversion when Chile's consumers are less willing to substitute MERCOSUR's products for those of the rest of the world.¹⁸

The results indicate that the customs union with MERCOSUR is an inferior outcome for Chile compared with a free trade agreement with MERCOSUR. MERCOSUR's tariff structure is diverse compared with Chile's tariff, which is uniform. Because the welfare costs of trade restrictions tend to increase disproportionately with the height of the tariff, Chile is better off with its own uniform

17. This tariff structure is slightly different than the tariff structure shown for Argentina for two reasons. First, there are exceptions to the common external tariff for Argentina and Brazil, as both countries continue to adapt their tariff schedules over time to the agreed common external tariff. In addition, Argentina and Brazil could well have adopted exactly the same common external tariff at a detailed tariff line level, but have different trade shares across these tariff lines. With the different trade weights, the rates that appear in the GTAP database at the 24-sector level reflect differences in these trade patterns and need not reflect differences in the common external tariff at the detailed tariff line level. For ease of comparison, we also assume in our "Chile customs union with MERCOSUR" scenario that Argentina adopts the tariff of Brazil as its common external tariff. This provides a clean representation of the MERCOSUR customs union for our purposes.

18. These results are consistent with those of Donoso and Hachette (1996) and Muchnik, Errazuriz, and Dominguez (1996). Based on the latter's results, which focus on agriculture, Donoso and Hachette estimate that access to the MERCOSUR market would not offer significant gains to Chile. See also Valdes (1995).

tariff than with the common external tariff of the customs union.¹⁹ That is, part of the costs to Chile of joining a customs union with MERCOSUR derive from the loss of tariff uniformity. Thus, one advantage of a free trade agreement for Chile as opposed to a customs union is that only the customs union requires the adoption of a common external tariff.

In comparing our results in rows 1–3 of table 2 regarding Chile's preferential trade area options, the most important result is that the FTA with NAFTA is beneficial to Chile, whereas the other options are likely to present problems.²⁰ To ascertain the source of the gain to Chile from a FTA with NAFTA, we performed the simulation in row 4, in which Chile lowers its tariffs against imports from NAFTA countries but does not obtain improved access in NAFTA markets. Although this is not a policy option that Chile would adopt, the results in row 4 show that Chile loses from preferential reduction of its tariffs against NAFTA countries without reciprocal access to NAFTA markets because the trade diversion dominates the trade creation.

To identify even more precisely the source of the access gains from the FTA with NAFTA, we performed a simulation in which access to only one sector was not obtained: nongrain crops. Our estimates of the tariff distortions suggest that the U.S. tariff is likely to be central in this sector: there is a 20 percent tariff on nongrain crops.²¹ In other words, Chile applies zero tariffs against NAFTA imports, and NAFTA applies zero tariffs against imports from Chile in all sectors except nongrain crops. Although not shown in table 2, if Chile fails to obtain preferential access in nongrain crops, the welfare gains of 0.82 percent we ob-

19. "Ramsey optimal" tariffs will vary inversely with the elasticity of demand. Typically, however, departures from uniformity do not conform with Ramsey optimal rules, but rather with political economy considerations (see Panagariya and Rodrik 1993).

20. Coeymans and Larrain (1994), Reinert and Roland-Holst (1996), and Hinojosa-Ojeda, Lewis, and Robinson (1995) also find that Chile will gain from a FTA with NAFTA.

21. Although the GTAP database indicates that the U.S. tariff on nongrain crops is 47 percent, we have lowered this to 20 percent in our benchmark equilibrium for two reasons. First, we prefer updated estimates where possible. The most important nongrain crops for Chile are fruits and vegetables, and post-Uruguay Round tariff rates for these products in the U.S. market are the relatively modest figures cited in this note; the higher protection estimates for these products in the GTAP database (averaging 56 percent) were derived from an average of protection estimates in the 1989–94 period. Second, the U.S. protection on these products varies with the season. We have assumed that given production in the opposite hemispheres, when Chilean fruits and vegetables are ready for harvest and export to the United States, they would typically face U.S. tariffs that are in the low range of the seasonal tariffs applied by the United States. Products included in the nongrain crops category of the GTAP database (along with the estimated tariff and tariff equivalent of the nontariff barrier in the United States) are: sugar, 67 percent; oilseeds, including peanuts, 25 percent; coffee, cocoa, and tea, 0 percent; cotton, 31 percent; vegetables (fresh, 0–25 percent; frozen, 17.5–25 percent; dried, 25–35 percent, prepared and preserved, 13.6–14.7 percent); fruits (fresh, 0–20 percent; dehydrated, 0.6–2.2 percent; frozen, 0.7–14 percent; juices, 0–31.3 percent; jams and pastes, 7.0–35 percent; canned, 1.9–20 percent); and other nonfood crops (tobacco and jute), 19 percent. The reduced estimates are closer to the estimates of Butelmann and Meller (1995, p. 376). They report that Chilean fresh, frozen, and canned vegetables face MFN tariff rates in the United States ranging from 9.5 to 17.5 percent (with a few percentage point reductions for the former two categories where GSP treatment applies), and that Chilean fruits face U.S. MFN tariffs from 1 to 10 percent.

tained in the full-access case now drop to a welfare loss of 0.58 percent. Thus, access in nongrain crops is crucial to welfare gains from NAFTA.²²

These results demonstrate the importance of improved access emphasized by Wonnacott and Wonnacott (1981). Our results show that Chile can gain more from an FTA with NAFTA than it can from global free trade. But Chile can expect to lose from any of the preferential trade agreements we have considered if there is no improvement in access to partner-country markets.

THE IMPORTANCE OF LOW UNIFORM TARIFFS. These results differ from several earlier numerical evaluations of preferential trading areas (Rutherford, Rutström, and Tarr 1997, Harrison, Rutherford, and Tarr 1997a). We speculate that part of the reason that trade diversion dominates trade creation in these estimates is that Chile has a low and uniform tariff. That is, the implementation of a preferential trade agreement in a country that starts with a dispersed tariff structure may result in a reduction in the dispersion of the tariff structure, although this is not true as a general proposition. Potential benefits from a reduction in the dispersion of the tariff, however, are ignored in more aggregated analyses of preferential trade arrangements.²³ To verify this intuition, we have counterfactually created an initial equilibrium in which Chile applies a 22 percent tariff on one-half of its imports and a zero tariff on all others, and then implemented the policy scenarios in rows 1–4 of table 2 (where we have employed existing VAT replacement and central elasticities). The sectors with high tariffs were selected at random, and the experiment was repeated 206 times. The means of the distributions for welfare as a percentage of GDP are as follows: FTA with MERCOSUR, –0.56 percent; customs union with MERCOSUR, –0.44 percent; FTA with NAFTA, 1.47 percent; and FTA with NAFTA but no improved access, –0.52 percent.

The gains of the FTA with NAFTA are significantly larger when based on the hypothetical nonuniform initial tariff structure. Similarly, the losses from the FTA with MERCOSUR are slightly smaller, reflecting a movement toward uniformity. But losses from a preferential reduction in tariffs toward the NAFTA markets remain unless access to the NAFTA market is obtained. These numerical results are consistent with the theoretical results of Hatta (1977), who found that countries will benefit from moving toward uniformity by simultaneously lowering the highest tariff and raising the lowest tariff.

22. Because U.S. protection in milk products is also high, we examined the impact of denial of improved access in NAFTA markets for Chilean products on both nongrain crops and milk products. Chile exports very little milk products, however, so the welfare result was only slightly more adverse for Chile (–0.60 percent of GDP with central elasticities and existing VAT replacement) relative to denial of Chilean access in nongrain crops alone.

23. There is value in further theoretical work into the generality of the impact of preferential arrangements on uniformity. Note also that in our model, elasticities are equal across sectors, so the Ramsey optimal tariff is uniform. A useful exercise would be to evaluate the impact of a preferential trade arrangement where we start from randomly selected elasticities across sectors and see how often Chile gains from preferential trade agreements as we use a large number of distinct sets of elasticities.

In this hypothetical experiment, we find that the ranking of the customs union with MERCOSUR versus the FTA with MERCOSUR is reversed compared with the actual situation represented in table 1. Although Chile still loses from both preferential trade agreements with MERCOSUR, it is intuitive that the customs union produces smaller losses than the FTA because the common external tariff of MERCOSUR is more uniform than the hypothetical Chilean tariff. In the actual situation of table 2, the customs union with MERCOSUR represents *a movement away from uniformity*.

Optimizing Chile's Trade Policy Options

We know from theory that Chile can reduce the trade diversion costs of preferential trade areas if it lowers its external tariff. Thus, a number of economists have recommended that a reduction in Chile's external tariff be combined with its free trade agreements.²⁴ In rows 5 and 6 of table 2, we evaluate the two FTA options with a simultaneous reduction in the tariff to 6 percent. In rows 7 and 8, we evaluate the impact of lowering the external tariff to 8 and 6 percent, respectively, on a multilateral basis. We evaluate going to global free trade in row 9.

Chile may have a low optimal tariff despite being a small country. If Chilean exports are differentiated from the products of other countries so that Chile in aggregate faces a downward-sloping demand curve for a product, even if individual Chilean producers do not perceive a downward-sloping demand curve, then there will be an optimal export tax to maximize Chilean export profits. The height of the optimal export tax will be inversely related to the elasticity of demand faced by Chile in its export markets, which is in turn determined by how substitutable Chile's products are with those of other countries.²⁵ In the limit, when Chilean products are perfect substitutes in all its export markets for products from all other countries, Chile has no ability to obtain a higher price by restricting its exports. In this case, the optimal export tax is zero.

Although Chile imposes virtually no export taxes, the Lerner symmetry theorem tells us that in general equilibrium import tariffs are equivalent to export taxes. The import tariff will tax all export sectors roughly uniformly. However, with product differentiation and many sectors, market power on exports differs across sectors and destination markets. Hence the import tariff is not as efficient an instrument as export taxes varying by sector and destination. Nonetheless, if export taxes are ruled out, there is a positive optimal import tariff. However, given the existence of a uniform tariff of 11 percent, we investigate both theoretically and numerically whether the optimal tariff is above or below it.

In our central elasticity scenarios, we have assumed that all countries have an elasticity of substitution between imports from different countries (σ_{MM}) equal

24. Such as Schiff and Sapelli (1996), Corbo (1966), and Leipziger and Winters (1996).

25. Individual competitive firms will price at their marginal costs, but because the country as a whole must accept a lower price to sell more, there is an optimal export tax that equates the marginal revenue received from exports equal to the marginal costs. The more elastic the demand, the lower the optimal export tax.

to 30. We show in Harrison, Rutherford, and Tarr (1997b, appendix C) that the optimal tariff t^* is bounded below by $t^* = \{\sigma_{MM}/(\sigma_{MM} - 1)\} - 1$. Thus, even with $\sigma_{MM} = 30$, the optimal tariff is over 3 percent; but in our low elasticity scenarios, with $\sigma_{MM} = 8$, the optimal tariff is over 14 percent.

Considering the preferential trade options in rows 5 and 6 of table 2, there is an expected increase in the estimated welfare gains compared with rows 1 and 3, respectively. With central elasticities, there is a significant improvement in welfare compared with an external tariff of 11 percent. With low elasticities, the adverse terms-of-trade effect of reducing tariffs mitigates the welfare gain from reducing the trade diversion costs. These results show that as long as Chile limits itself to an FTA, it can profit from the increased access it obtains in its partner countries without excessive trade diversion costs, provided it lowers its external tariff sufficiently. In particular, the results in row 5 show that the free trade agreement with MERCOSUR can be expected to yield benefits when the external tariff is lowered to 6 percent. By contrast, comparing rows 5 and 6, we observe that an agreement with NAFTA is worth a lot more than the one with MERCOSUR, largely due to the superior market access of NAFTA.

Rows 7 and 8 of table 2 present estimates of the welfare and replacement tax implications, respectively, to Chile of unilaterally lowering its external tariff. With central elasticities and distortionless domestic taxes (lump sum or uniform VAT), unilateral reduction of the tariff to 6 percent increases welfare, and there are further gains from reducing tariffs from 8 to 6 percent. With the existing VAT as the replacement tax, reducing the tariff to 8 percent increases welfare. However, the distortion costs of the VAT are sufficiently close to the tariff, so that in combination with the small adverse terms-of-trade effects, there are no further gains from tariff reduction below 8 percent. With a distortionless replacement tax, reduction of the external tariff to zero produces positive welfare gains compared with the tariff of 11 percent (row 9). However, because the gains are less than reduction to 6 percent (row 8), the optimal tariff is between 0 and 6 percent.²⁶

With existing VAT replacement, there is some limited scope for beneficial reduction of the tariff with central elasticities. Again, with higher elasticities, the optimal tariff is lower and the gains from tariff reduction would increase.

Sectoral Impacts

Tables 6 and 7 in Harrison, Rutherford, and Tarr (1977b) present the impacts under central elasticities on output, exports and imports at the 24-sector level from three of the principal trade policy options: the FTA with MERCOSUR, the FTA with

26. These were the results employed by the vice president of the Central Bank of Chile in his presentation before the lower house committee of the Chilean Parliament when he argued for a reduction of the tariff to 6 percent. In fact, we have separately calculated the optimum tariff with central elasticities at between 3 and 4 percent, and with low elasticities of about 14 percent, assuming lump-sum replacement of tariff revenues in each case.

NAFTA, and unilateral reduction of the tariff to 8 percent.²⁷ Focusing on the percentage change in output with central elasticities, the sectors that significantly expand under the free trade agreement with MERCOSUR are transportation equipment (dramatically),²⁸ machinery and equipment, iron and steel, and milk. With the free trade agreement with NAFTA, the sectors that expand more than 10 percent are iron and steel, transportation equipment, milk, nongrain crops, and textiles. With unilateral tariff reduction, the expanding sectors are transportation equipment, iron and steel, and, to a lesser extent, nonferrous metals and mining.

Iron and steel and transportation equipment expand under all three trade policy options, but the other expanding sectors differ. Iron and steel and transportation equipment are both small sectors in Chile; each sector produces less than 1 percent of Chilean value added. However, these are the two sectors that export the most intensively: both export over 90 percent of their output. Preferential or multilateral tariff reduction induces a depreciation in the real exchange rate, which makes exporting more profitable and gives a boost to the sectors that export intensively.

With unilateral tariff reduction, the other sectors that expand (nonferrous metals and mining) are also the ones that export a high percentage of their output. So the real exchange rate impact and export intensity explain the pattern of expanding and contracting sectors with unilateral nondiscriminatory tariff reduction.

With a free trade agreement with NAFTA, textiles, milk, and nongrain crops expand—in addition to the two or three most export-intensive sectors—because these three sectors obtain a substantial improvement in their terms of trade in the U.S. market. We considered earlier how improved access to nongrain crops and milk is crucial to an improvement in Chilean welfare from NAFTA, and these sectoral results are consistent with those welfare results.

With the free trade agreement with MERCOSUR, machinery and equipment and milk expand in addition to transportation and iron and steel. Our data indicate that these sectors are two of the most highly protected in MERCOSUR, so they obtain relatively greater improvement in their terms of trade after implementation of a free trade agreement with MERCOSUR, which induces their expansion.

Additive Regionalism

Butelmann and Meller (1995) articulate the strategy of the government of Chile: to negotiate bilateral free trade agreements with MERCOSUR, NAFTA, and all of its significant and willing trading partners, including the European Union and the rest of South America.²⁹ They argue that this strategy will progressively lower

27. We also present the sectoral results with low elasticities.

28. Although the expansion is dramatic in percentage terms, it starts from a very small base. Thus, the absolute increase is plausible.

29. The percentage share of Chile's aggregate exports (imports) for its most significant trading partners are: the United States, 14 (25); Brazil, 5 (7); Argentina, 5 (6); the European Union, 32 (23); the rest of South America, 5 (5); and Japan, 17 (10).

the effective average tariff, successively reduce trade diversion costs, and, crucially, will help ensure stability of access to the markets of partner countries. The free trade agreement in late 1996 between Chile and Canada, in which both countries agreed to eschew antidumping actions against each other, is regarded as a notable example of the advantages that the bilateral approach offers. An opposing view within Chile is offered by Donoso and Hachette (1996). They argue that the limited market access of the bilateral agreements with the Southern countries (for example, MERCOSUR) is not worth delaying the benefits of opening up unilaterally, although agreements with the large markets of the United States, the European Union, or Japan would be worthwhile. Moreover, they fear that the MERCOSUR arrangement may restrict broader liberalization.

Table 3 presents estimates of the gains to Chile of progressively adding free trade agreements, using central elasticities and a lump-sum tax as the replacement tax. Columns 1 and 2 reproduce the estimates in table 2. Column 3 shows that although the MERCOSUR agreement independently results in losses to Chile, when combined with an agreement with NAFTA, the impact of an agreement with MERCOSUR is positive rather than negative. The reason is that competition from NAFTA producers greatly reduces the extent and impact of trade diversion.³⁰ Column 4 of row 1 shows that combining agreements with NAFTA and MERCOSUR with an agreement with the European Union results in a large increase in the gains to more than 5 percent of GDP. Finally, adding a free trade agreement with the rest of South America results in gains of 8.4 percent of GDP. These are enormous estimated gains for a constant-returns-to-scale model. The last column of row 1 excludes the United States from the agreement, but this has only a small negative impact on Chile because it obtains such substantial preferential access in the other markets.

Critics of the government's strategy argue that it is unrealistic to assume that the European Union would grant tariff-free access in its highly protected agricultural products as part of a free trade agreement with Chile. The European Union has steadfastly refused to do so in its Association Agreements with the

30. NAFTA and MERCOSUR combined produce gains of 1.48 percent of GDP, whereas if the results of the NAFTA and MERCOSUR agreements were merely additive (columns 1 and 2) the gains would be only 0.61 percent of GDP. That is, we find that reduced trade diversion from the combined agreements accounts for 0.87 percent of GDP. Because this may appear to be too large a saving due to reduced trade diversion, to verify our explanation we have three additional simulations: (1) Chile unilaterally eliminates tariffs on NAFTA imports without improved access to NAFTA; (2) Chile unilaterally eliminates tariffs on MERCOSUR imports without improved access to MERCOSUR; and (3) Chile unilaterally eliminates tariffs on NAFTA and MERCOSUR without improved access to NAFTA or MERCOSUR markets. If our explanation is correct, simulation 3 should result in reduced trade diversion costs of at least 0.87 percent of GDP, compared with additive losses from the first two simulations. In percentage of GDP, the welfare impacts of these three simulations are: (1) -0.83, (2) -0.82, and (3) -0.77. If the losses of the preferential tariff reduction were additive, the total losses would be -1.65 (= -0.83 - 0.82). Because preferential tariff reduction against the two regions combined results in losses of only -0.77 percent of GDP, trade diversion costs are reduced by 0.88 percent of GDP by combining tariff reductions for the two regions.

TABLE 3. Welfare Results of Additive Free Trade Agreements by Chile
(Chilean gains as a percent of Chilean GDP with central elasticities and lump-sum tax replacement)

Product coverage	Agreements with						
	MERCOSUR	NAFTA	NAFTA & MERCOSUR	NAFTA & MERCOSUR & EU	NAFTA & MERCOSUR & EU & rest of SA ^a	Canada & Mexico MERCOSUR & EU	Canada & Mexico MERCOSUR & EU & rest of SA ^a
1. All products included	(1) -0.43	(2) 1.04	(3) 1.48	(4) 5.24	(5) 8.4		(6) 8.16
2. Excluded products ^b	-0.43	1.04	1.48	2.02	2.48		0.44
3. Excluded products ^b and 6% external tariff	0.35	1.70	2.01	2.29	2.66		0.87
4. Only EU AG products ^c excluded	-0.43	1.04	1.48	2.02	5.48		3.90
5. Only EU AG products excluded and 6% tariff	0.35	1.70	2.01	2.29	5.71		4.44

^aRest of SA is South America except for Chile and the MERCOSUR countries.

^bExcluded products in the agreement with the EU and their tariffs plus nontariff equivalents in the EU are: wheat (57%), grains (74%), nongrain crops (51%), fishing (14%), meat (63%), and milk (129%). Excluded products in the agreement with the rest of South America (and their tariffs) are: nongrain crops (29%), meat (51%), milk (27%), food (34%), beverages and tobacco (55%), textiles and apparel (46%), chemicals, rubber, and plastics (31%), fabricated metal products (43%), and machinery (52%).

^cOnly the agricultural products from the European Union listed in note b are excluded from any of the FTAs.

Source: Authors' calculations.

Central and Eastern European countries and in its Free Trade and Customs Union Agreements with Mediterranean countries, such as Morocco, Tunisia, and Turkey. Hence, it is unlikely to offer concessions to Chile that it has refused to offer to other countries for which it might be viewed as having more to gain geopolitically. Similarly, although more speculatively, it would be doubtful that tariff-free access in the most highly protected products would be provided by the rest of South America because (following Grossman and Helpman 1995) the political-economy interests that obtained such high protection would resist regional competition as well.

Row 2 of table 3 presents results that more realistically reflect possible outcomes due to excluded products. They exclude agricultural products from the agreement with the European Union, and products with tariffs above 25 percent in the rest of South America from that agreement. The results show, as expected, that without preferential access to these highly protected markets, the gains would be dramatically reduced. The last column shows that the United States is crucial to the whole scenario. If the United States is not included in the additive agreements, the gains drop dramatically to 0.44 percent of GDP. The drop in welfare for Chile exceeds the gains from NAFTA alone, showing that competition from (and in) the United States is important to Chile being able to avoid the trade diversion costs of these agreements. Conversely, if Chile can get a free trade agreement with the United States as part of NAFTA, then free trade agreements with MERCOSUR, the European Union, and the rest of South America each add, impressively, about 0.5 percent to Chilean GDP. These gains accrue even when the European Union and the rest of South America exclude their most highly protected items from the agreements.

Proponents of the government's strategy maintain that the trade diversion costs of the free trade agreements will be diminished because Chile will adopt an external tariff of 6 percent. Moreover, though they concede that access to the European Union in agricultural products is unlikely, they maintain that it is possible that Chile will receive full access to the markets of the rest of South America in view of the sustained trend toward open economies in Latin America. In row 3 of table 3, we evaluate the impact of a 6 percent external tariff with the same products excluded from the agreements with the European Union and the rest of South America as in row 2. There are slightly larger gains to Chile from lowering the external tariff, but the United States remains important for substantial gains. In rows 4 and 5, we evaluate additive regionalism where only European Union agricultural products are excluded, so that full access to the rest of South America is obtained. Columns 5 and 6 show that Chile obtains very substantial gains, with a 6 or 11 percent external tariff, if it can obtain tariff-free access to the highly protected markets of the rest of South America.

Thus, if Chile succeeds in including a wide net of countries in its additive regionalism strategy, the estimates of the welfare gains range from 0.44 to 8.4 percent of Chilean GDP. However, table 2 shows that the gains to Chile from unilateral trade liberalization are only about 0.11 percent of GDP. Hence, the

estimated gains to Chile from additive regionalism are 4 to 76 times the gains from unilateral trade liberalization. On balance, it appears that Chile has little to lose by pursuing additive regionalism, especially given that additive regionalism is being combined with lowering the external tariff to about 6 to 8 percent.

III. THE IMPACT OF ADDITIVE REGIONALISM

Experience with regional trade arrangements has shown that if the agreement is not mutually beneficial to all parties, then it is unlikely to be effectively implemented or sustained (World Bank 2000). Agreements may exist *de facto* but are not implemented effectively. Thus, the impact on Chile's partner countries in the trade agreements is relevant to the likely success of the strategy in the long run. Moreover, even if the agreements are beneficial to Chile and its partners, if the benefits are derived from losses to countries that are excluded from the agreements, then clearly the agreements would be unattractive from the perspective of the multilateral trading system. Thus, it is important to estimate the impact on partner and excluded countries from the Chilean strategy of additive regionalism, and to assess the impact on the world in general. As a point of comparison, we also estimate the impact of global free trade on the countries and regions of our model.

Table 4 reports welfare gains as a percentage of own-country GDP, for both our central and low-elasticity cases. For comparisons of gains and losses across countries, table 5 presents the estimated welfare gains in millions of 1995 U.S. dollars. The first five columns in row 1 of table 5 reproduce the results for Chile's additive regionalism strategy, which is presented in the first five columns of table 3. Rows 2–11 present results for the other 10 countries or regions in our model. Column 6 presents results for the global free trade scenario.

Impact on Individual Countries and Regions

From the first five columns of table 4, Chile is too small or its trade pattern is sufficiently different for its regional agreements to have more than a trivial impact on about half of the countries and regions in the model.³¹ This group includes Japan and the rest of the world (which are excluded from all the agreements evaluated in table 3) and the United States and the European Union (which are excluded in some of the arrangements in table 3 and included in others). Canada is also essentially unaffected by Chile's trade policy options.

The rest of South America and Central America lose in all the agreements from which they are excluded, although the welfare loss is only about 0.05 percent of their GDP. These regions compete with Chile for the markets in MERCOSUR and NAFTA and compete with producers from MERCOSUR and NAFTA for the Chilean market. In both cases, they lose access to markets because there is a decline

31. When we round welfare to the nearest 0.01 percent of GDP, the impact is either 0 or 0.01 percent.

TABLE 4. The Welfare Impact of Chile's Additive Free Trade Agreements and Global Free Trade^a
(welfare gains as a percent of each country's GDP)

Country	Elasticity	Agreements with						Global free trade
		MERCOSUR	NAFTA	NAFTA & MERCOSUR	NAFTA & MERCOSUR & EU	NAFTA & MERCOSUR & EU & Rest of sA ^a		
1. Chile	central (low)	(1) -0.40 (0.00)	(2) 1.04 (0.37)	(3) 1.48 (0.60)	(4) 5.24 (2.55)	(5) 8.40 (3.31)	(6) 1.26 (0.68)	
2. United States	central (low)	0.00 (0.00)	0.00 (0.01)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.34 (0.18)	
3. Canada	central (low)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.01 (0.00)	0.42 (-0.36)	
4. Mexico	central (low)	0.00 (0.00)	-0.02 (-0.01)	-0.01 (-0.01)	0.00 (0.00)	0.00 (0.00)	-1.38 (-1.02)	
5. Argentina	central (low)	0.06 (0.00)	0.00 (-0.01)	0.10 (0.02)	0.12 (0.02)	0.07 (0.01)	0.82 (0.60)	
6. Brazil	central (low)	0.02 (0.00)	-0.01 (-0.01)	-0.04 (0.00)	-0.04 (0.00)	-0.02 (-0.01)	0.94 (0.24)	
7. Central America	central (low)	0.00 (0.00)	-0.06 (-0.03)	-0.05 (-0.03)	-0.04 (-0.05)	-0.06 (-0.06)	9.70 (4.42)	
8. Rest of sA	central (low)	0.00 (0.00)	-0.03 (-0.02)	-0.06 (-0.04)	-0.04 (-0.05)	-1.19 (-0.22)	4.40 (1.25)	
9. European Union	central (low)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	2.74 (1.17)	
10. Japan	central (low)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	3.43 (1.98)	
11. Rest of the world	central (low)	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00 (0.01)	0.00 (0.01)	1.97 (0.54)	

^aAll products included in agreements and lump-sum tax replacement.

^bRest of SA is South America except for Chile, Argentina, and Brazil.

Source: Authors' calculations.

TABLE 5. The Welfare Impact of Chile's Additive Free Trade Agreements and Global Free Trade^a
(welfare gains in millions of 1995 US dollars)

Country	Elasticity	Agreements with					
		MERCOSUR	NAFTA	NAFTA & MERCOSUR	NAFTA & MERCOSUR & EU	NAFTA & MERCOSUR & EU & Rest of SA ^b	Global free trade
1. Chile	central (low)	(1) -291 (-67)	(2) 414 (149)	(3) 590 (239)	(4) 2090 (1013)	(5) 3350 (1318)	(6) 504 (270)
2. United States	central (low)	-7 (-24)	51 (306)	-29 (231)	138 (59)	60 (-11)	19,972 (10,833)
3. Canada	central (low)	5 (4)	-20 (-15)	-22 (-13)	23 (14)	49 (19)	243 (-2058)
4. Mexico	central (low)	13 (1)	-58 (-35)	-44 (-35)	-11 (-3)	15 (0)	-4539 (-3315)
5. Argentina	central (low)	63 (44)	-1 (-18)	222 (54)	264 (54)	147 (28)	1832 (1327)
6. Brazil	central (low)	214 (108)	-42 (-36)	-171 (15)	-161 (-11)	-70 (-21)	3912 (1004)
7. Central America	central (low)	4 (3)	-37 (-21)	-32 (-21)	-23 (-29)	-38 (-36)	6112 (2680)
8. Rest of So. America	central (low)	-34 (-28)	-56 (-39)	-95 (-75)	-73 (-90)	-2024 (-376)	7456 (2110)
9. European Union	central (low)	-184 (-28)	-156 (-241)	-336 (-317)	-88 (156)	-200 (86)	207,413 (88,720)

10. Japan	central	-58	-19	-30	81	-2	127,664
	(low)	(-30)	(-48)	(-69)	(-76)	(-91)	(73,711)
11. Rest of the world	central	92	-73	-50	-115	6	85,111
	(low)	(29)	(-89)	(-100)	(-229)	(-232)	(23,348)
12. Sum for included ^c	central	-14	387	546	2255	1327	
	(low)	(85)	(405)	(491)	(1282)	(1043)	
13. Sum for excluded ^d	central	-169	-384	-543	-130	-34	
	(low)	(-73)	(-492)	(-582)	(-424)	(-359)	
14. Sum over all countries	central	-183	3	3	2125	1293	455,680
	(low)	(12)	(-87)	(-91)	(858)	(684)	(198,626)

^aAll products included in agreements and lump-sum tax replacement.

^bRest of SA is South America except for Chile, Argentina, and Brazil.

^cSum of the welfare impact for countries included in the agreement.

^dSum of the welfare impact for countries excluded from the agreement.

Source: Authors' calculations.

in the demand for their exports due to preferential access arrangements between Chile and its partners, which adversely affects their terms of trade and welfare.³²

Perhaps most interesting is that although the rest of South America loses from being excluded by Chile, the biggest loss for this region by far is when the rest of South America *is included* with Chile in a free trade agreement (along with the European Union, NAFTA, and MERCOSUR, as shown in column 5 of table 4). The rest of South America has high protection on the products mentioned in the footnotes for table 3. To the extent that Chilean imports displace imports from other countries in the rest of South America, it loses tariff revenue on imports. Although there is some trade creation from tariff-free access to Chilean imports in the rest of South America, the tariff loss dominates the trade creation due to the high level of the tariffs.³³ Moreover, comparing columns 4 and 5 in table 5, the addition of the rest of South America to the coalition of Chile, MERCOSUR, the European Union, and NAFTA results in an aggregate reduction in welfare for the partner countries (see row 12). The gains to the other partners in this agreement are less than the losses to the rest of South America. So there are insufficient benefits to allow the gainers to compensate the rest of South America for its losses.

For Mexico, competition from Chile for preferred access in the U.S. market results in a very small negative impact of including Chile in NAFTA. However, Chile is too small to make a significant difference to Mexico in the U.S. market. When Chile combines an agreement with NAFTA with an agreement with MERCOSUR, the diversification of Chilean exports results in still less displacement of Mexican exports in the United States, so the negative impact on Mexico of Chile in NAFTA is reduced. When Chile adds the European Union to its group of free trade agreements, the diversification of Chilean exports reduces the small negative impact on Mexico of Chile's preferential access to the United States to virtually zero. By contrast, in the global free trade scenario discussed below, Mexican losses are substantial due to the erosion of preferential access in U.S. markets from the whole world.

Brazil and Argentina both lose from Chile joining NAFTA due to erosion of preference margins in both Chile and NAFTA markets. But Argentina and Brazil both gain small amounts from a MERCOSUR free trade agreement with Chile. The latter fact is partly explained by improved access to the Chilean market for MERCOSUR producers. It is also likely that part of the explanation for this result is that Brazil and Argentina reduce the trade diversion costs of MERCOSUR when they add new partners. That is, Chile will compete with Brazilian producers in Argentine markets. This will reduce the trade diversion costs of Argentina from importing Brazilian products under the MERCOSUR agreement. Of course, Chile could well displace imports from the rest of the world in Argentine markets, which

32. This is consistent with the evidence of Winters and Chang (2000). They find that the price of imports from the United States and Korea in Brazil fell after the formation of MERCOSUR.

33. If the high-tariff products are excluded from the free trade agreement with Chile, the losses are reduced to about one-third of their level (to -0.36 percent).

could increase Argentine trade diversion costs. But as more countries are added to a network of preferential trading arrangements, the trade diversion costs associated with earlier partners are reduced, especially if these are large countries that interject significant competition.³⁴ Comparing columns 4 and 5 in table 5, Brazil and Argentina both lose from Chile negotiating a free trade agreement with the rest of South America. This is likely due to a terms-of-trade loss in the markets of the rest of South America.

Aggregate Impact of Chile's Additive Regionalism Strategy

Even if Chile gains from an agreement or set of agreements, there is the question of whether Chile gains only because other countries lose. In table 5, we convert the percentage gains and losses of table 4 into gains and losses in millions of 1995 U.S. dollars. This allows us to compare gains and losses across countries and arrive at a total for the world. Row 12 sums the welfare effects for countries that are included in the agreement. For example, Chile-MERCOSUR (column 1) includes Chile, Argentina, and Brazil in our model. Row 13 sums the welfare effect for all countries that are not part of the agreement (for example, all countries other than Chile, Argentina, and Brazil in the case of Chile-MERCOSUR). Row 14 sums over all countries.

From row 12 in table 5, trade diversion dominates the Chile-MERCOSUR agreement to the extent that even the members of the agreement lose in the aggregate. But this agreement is the only one we consider that results in losses for the member countries. Other agreements considered in table 5 are "North-South" agreements (in particular, all include the United States), and we estimate that all of these result in aggregate net benefits for the member countries, although at least one member loses in all of them. The inclusion of the United States means that significant competition is injected into the markets of participating members, and this reduces the likelihood of trade diversion dominating.

From row 13 in table 5, all of the preferential arrangements we consider result in losses for the excluded countries or regions. These results are consistent with the results of Winters and Chang (2000). Employing ex post data, they show that there can be a very significant negative welfare effect (through negative terms-of-trade effects) on countries excluded from regional arrangements. In particular, they estimate that MERCOSUR induced losses for the United States, Germany, Japan, the Republic of Korea, and Chile of about \$800 million per year, which was about 9 percent of the value of their exports to MERCOSUR.³⁵

For the world as a whole, with central elasticities, the agreement with MERCOSUR results in losses of \$183 million, primarily due to the trade diversion costs for Chile and the terms-of-trade loss for the European Union. Independent of elas-

34. It is possible, however, that a new partner could divert imports from an excluded country and add to the trade diversion costs on balance.

35. We estimate a very small negative effect for Central America as a result of Chile forming an FTA with NAFTA.

ticities, the agreements in the first three columns result in essentially a zero impact for the world or for the three excluded regions outside of the Western Hemisphere (rounded to the 0.01 percent of their own GDP). With NAFTA involved, Chile has significant gains, but the terms-of-trade loss for the excluded countries is almost as much as the gains to Chile, so the impact on the world is small.

In columns 4 and 5 of table 5, the gains for the world become significant when the European Union is added or when the European Union and the rest of South America are added to Chile's network of agreements. The main reason for the much larger gains to the world is that the gains to Chile become very large when it obtains preferential access to the markets of the European Union and the rest of South America. As explained, given the high protection on selected products in the rest of South America, the trade diversion costs in this region significantly reduce the gains to the world from including this region in Chile's network of free trade agreements.

Impact of Global Free Trade

The results for global free trade are presented in column 6 of tables 4 and 5. As expected, the gains to the world vastly exceed the gains from any regional arrangement. Even the included countries to any agreement gain more from multilateral global free trade than any individual regional arrangement (although the impact on Chile of an agreement with NAFTA is close). These results emphasize the importance of moving toward lower trade barriers in the multilateral context. Mexico is an exception (as is Canada in the low-elasticity case). Mexico sees losses from global free trade due to the erosion of favored access to the U.S. market.

IV. CONCLUSIONS

Our results for Chile point to some general themes regarding regional trading arrangements. One clear theme is that improved market access in preferential trading areas is important. In the case of Chile, trade diversion costs dominate the welfare effects of bilateral agreements unless sufficient market access is obtained in partner countries (or third-country tariffs are lowered). The North-South agreements generally provide sufficient access to make them beneficial, but the South-South agreement we examined did not (although Chile could lower its external tariff to make the South-South arrangement beneficial). We show that efficient replacement taxes are important with changes in either regional or unilateral trade policy and provide greater scope for trade policy action. Finally, our range of estimates for the gains from additive regionalism indicate that Chile has little to lose by pursuing this strategy and may potentially gain many multiples of the gains from unilateral trade liberalization.

We find that the excluded countries lose from all of the regional arrangements that we examine. In addition, partners to these preferential arrangements sometimes lose.

Chile's additive regional arrangements have an almost imperceptible impact on world welfare. However, we estimate that global free trade generates gains to the world that are enormous in comparison, emphasizing the importance of moving toward lower trade barriers in the multilateral context.

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