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Integration, Interdependence, and Regional Goods: An Application to Mercosur

By the early 1990s, the world economy was becoming increasingly regionalized as a result of the formation of the North American Free Trade Agreement (NAFTA) in 1993 and the European Economic Area in 1992. This trend coincided with the growing globalization of the world economy and the push toward liberalized trade across the Americas. Despite previous unsuccessful integration attempts, the countries of Argentina, Brazil, Paraguay, and Uruguay signed the Treaty of Asunción in 1991, formally launching the Southern Cone Common Market (Mercosur). The foremost objective of the treaty was to guarantee access to each other's markets and improve bargaining power vis-à-vis NAFTA and the European Union in order to facilitate integration into the world economy.

The formation of Mercosur resulted in an important decrease in tariff and nontariff barriers in the region. From 1990 to 1996, average tariff rates fell from 22 to 13 percent in Argentina, from 32 to 9 percent in Brazil, from 16 to 9 percent in Paraguay, and from 28 to 10 percent in Uruguay.[1] This tariff reduction resulted in an unprecedented expansion of trade in the Mercosur region. Total trade by Mercosur countries grew from U.S.$75 billion in 1990 to almost U.S.$187 billion in 1997, or an average rate of

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1. See Terra (1999).

increase of about 14 percent a year. During the same period, intra-Mercosur trade increased even more dramatically, from U.S.$8 billion in 1990 to U.S.$82 billion in 1997, resulting in an increase in the share of intra-Mercosur trade in total trade from 11 to 22 percent during the period. In this regard, the Mercosur strategy appears to have been successful.

The mere increase in trade flows, however, does not guarantee improvements in welfare. It is well known at least since Viner that the formation of a customs union can lead to a decrease in welfare if the trade diversion outweighs the trade creation effect.[2] Work in this area suggests that the creation of Mercosur has not led to a decrease in welfare.[3] Even so, this does not mean that Mercosur is the best possible outcome. Nin and Terra employ a computable general equilibrium model to analyze the effects of alternative trade liberalization experiments: unilateral uniform trade reduction, preferential trade reduction (while keeping the common external tariff constant), and a combination of both (which is what actually happened in Mercosur).[4] They find that while all policies lead to an increase in intraregional trade and welfare, unilateral trade reduction is the best policy for Argentina.

In this paper we argue that to evaluate the benefits of commercial integration, one needs to go beyond the static framework implicit in the trade creation versus trade diversion analysis. Two key facts must be taken into account. First, Brazil represents 70 percent of the region's gross domestic product (GDP), making it the dominant partner in the agreement. Second, trade in the remaining three Mercosur economies is largely concentrated with Brazil: 31 percent of Argentina's exports of goods, 34 percent of Uruguay's, and 38 percent of Paraguay's go to Brazil. Consequently, policymakers have expressed concern regarding the vulnerability of Argentina, Paraguay, and Uruguay (henceforth, referred to as the smaller economies) to devaluations in Brazil. These concerns have become so widespread that

2. Viner (1950).

3. FIEL (1992) employs the Baldwin and Murray (1977) methodology and finds that in both Argentina and Brazil, trade creation marginally outweighs trade diversion. Michelín (1993) applies the same methodology to Uruguay and also finds net trade creation. De Brun and Michelín (1994), however, employ the SMART program; they find that trade destruction outweighs trade creation in the case of Uruguay. Chang and Winters (1999) find that Mercosur countries improved their terms of trade against the rest of the world after the formation of the bloc.

4. Nin and Terra (1998).

the Argentine media regularly refer to the dangers of what they call Brazil-dependence. In Uruguay the same phenomenon is called Merco-dependence, highlighting the fact that it is not only the direct effects of Brazil that matter for Uruguay, but also the indirect effects through the Argentine economy.

Does the fact that a substantial share of Argentina's, Paraguay's, and Uruguay's trade is concentrated with Brazil necessarily mean that these countries are severely exposed to sharp and discontinuous changes in Brazil's real exchange rate? The short answer is not necessarily. Suppose Argentina exports oil to Brazil (which it does in substantial amounts, since 42 percent of Argentina's oil exports go to Brazil). What would happen if Brazilian demand for Argentine oil were suddenly to shrink? Oil is a relatively homogeneous commodity whose price is quoted in international spot and futures markets. Therefore, oil exports to Brazil should be relatively easy to relocate in other markets—probably after an adjustment period and at lower prices and higher transportation costs. Nothing very substantial should happen to oil production in Argentina. Suppose now that Argentina exports cars to Brazil (which it does in substantial amounts, since 90 percent of Argentina's car exports go to Brazil as a result of a special regime which governs automobile trade between Argentina and Brazil). What would happen in this case if Brazilian demand for Argentine cars were suddenly to shrink? Since cars are exported to Brazil—and only to Brazil—based on a special regime, the Argentine auto industry is not competitive in other markets. Hence, the decline in Brazilian demand should translate into large inventories, production cuts, and worker layoffs, since it would be very difficult to relocate to other markets.

This is, in fact, what happened after the Brazilian devaluation of January 1999. Figure 1 shows the behavior of the bilateral real exchange rate between Argentina and Brazil, which suffered a 19 percent drop in January 1999 and stayed 10 percent below its predevaluation level through December 1999. Figure 2 illustrates the behavior of the Argentine automobile industry during 1998–99. The figure shows that an index of automobile unit quarterly exports fell from a peak of 140 in the third quarter of 1998 to a minimum of 40 the same quarter of 1999. At the same time, an index of oil unit exports barely decreased, from 270 to 258 in the same period. Figure 3 shows that the contraction of car exports had a substantial impact on production. Seasonally adjusted automobile production fell 44 percent

FIGURE 1. Argentina and Brazil: Bilateral Real Exchange Rate, 1995–2000

Source: Authors' calculations, based on data from the Instituto Nacional de Estadistica y Censos (INDEC) for Argentina and the Instituto de Pesquisa Economica Aplicada (IPEA) for Brazil.

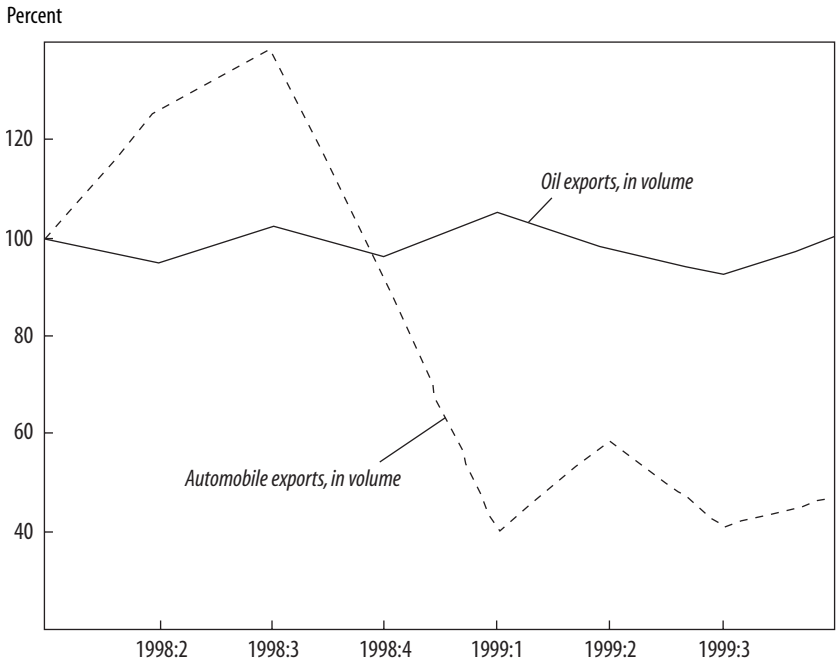
from June 1998 to June 1999. Figure 3 also shows that oil refining was virtually unchanged during the same period.[5]

These paradigmatic examples serve to establish an important concept that is emphasized throughout this paper: for any Mercosur country, the economy's macroeconomic vulnerability to shocks in Brazil increases in step with its trade in regional goods, that is, goods that are tradable within the region but largely nontradable with the rest of the world.[6] The important dimension for evaluating the macroeconomic vulnerability of the

5. The figures might give the impression that automobile production or exports had recovered by 2000. This is not the case. Automobile production and exports, which reached a peak of 435,000 and 225,000 units, respectively, in 1998, fell to 290,000 and 92,000 units, respectively, in 1999. In 2000, automobile production and exports were 325,000 and 130,000 units, respectively, well below their 1998 peaks.

6. To the best of our knowledge, the term *regional good* was coined by Bergara, Dominioni, and Licandro (1994).

FIGURE 2. Argentina: Regional versus Nonregional Goods Exports, 1998–99

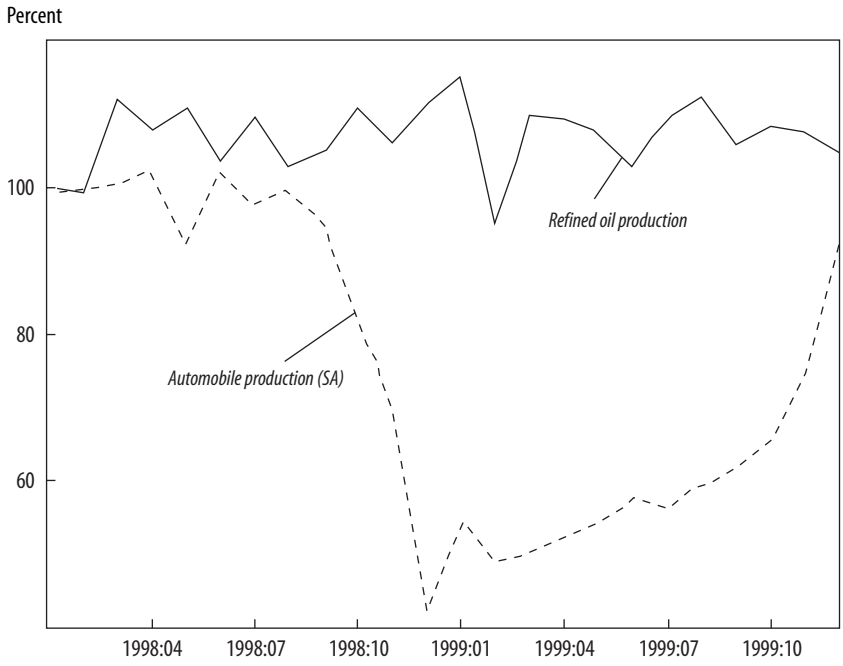


Source: Authors' calculations, based on data from the Fundación de Investigaciones Latinoamericanas (FIEL) and the Instituto Nacional de Estadistica y Censos (INDEC).

smaller Mercosur countries to shocks in Brazil through the trade channel is not the volume of trade, but the nature of trade. In other words, macroeconomic exposure to Brazil is not determined by how much a country trades with Brazil, but by the type of trade it has with Brazil.

The potential effects of shocks stemming from the large trade partner are not limited to trade linkages, however. Financial shocks that affect Brazil can have potentially large and direct effects on Argentina, Paraguay, and Uruguay through financial channels as well. Assume that for some reason Brazil's risk assessment changes and there is a decline in the availability of international financing, as reflected, for example, in an increase in the spread of Brazilian international bonds over U.S. Treasury bonds. That increase in the perception of risk with respect to Brazil will immediately translate into an increase in the risk of its smaller trade partners in Mercosur. Furthermore, the increase in the risk of the smaller trade part-

FIGURE 3. Argentina: Regional versus Nonregional Goods Production, 1998–99



Source: Authors' calculations, based on data from the Fundación de Investigaciones Latinoamericanas (FIEL) and the Instituto Nacional de Estadistica y Censos (INDEC).

ners will be larger the larger their exposure (in the trade sense) to Brazil.[7] Although shocks to risk premiums can have potentially important quantitative effects on aggregate demand, this paper concentrates exclusively on the effects of shocks to bilateral exchange rates.[8]

The present paper assesses the macroeconomic vulnerability of Argentina, Paraguay, and Uruguay to real devaluations in Brazil by formalizing the concept of regional goods at both the empirical and theoretical levels. We define the vulnerability of the smaller regional partners in

7. It is quite possible that the financial channel works both ways, in the sense that an increase in Argentina's risk premium can lead to adverse macroeconomic developments in Brazil. In fact, the nominal devaluation of the real observed in 2001 could be blamed on the increase in Argentina's country risk linked to the possibility of default. This suggests very complicated interactions between the trade and financial channel of transmission.

8. Bevilaqua and Talvi (1999) present some numerical simulations that suggest that the financial channel can be quite strong.

Mercosur vis-à-vis larger partners, that is, Argentina vis-à-vis Brazil, on the one hand, and Paraguay and Uruguay vis-à-vis Argentina and Brazil, on the other. A country is said to be more vulnerable to shocks in the larger regional trade partners when a change in the price of regional goods produces a larger macroeconomic impact, requiring a larger adjustment in output, employment, and the rate of return on capital in the regional goods sector; a larger adjustment in real wages; a larger adjustment in demand for regional goods; and a larger adjustment in the composition of the trade balance (regional balance vis-à-vis the balance with the rest of the world). The greater the required adjustment, the greater the vulnerability. We find that vulnerability, thus defined, depends on the share of regional goods in total output and the share of regional goods in total consumption, and not on the net trade position in regional goods.

The paper suggests that there is an important link between commercial policy and macroeconomic policy coordination. In the first place, the presence of regional goods implies that shocks to bilateral exchange rates can have a large macroeconomic impact on the small Mercosur economies. Moreover, the integration strategy pursued by Mercosur countries has created a policy-induced distortion in the form of artificial trade in regional goods, as a result of special regimes (such as the one prevailing in the automobile sector) and a large dispersion in tariff rates and regional preference margins across sectors. Consequently, if Mercosur countries desire to move toward deeper integration, they should either seek monetary arrangements that eliminate fluctuations in real exchange rates or redesign the protection structure to make it less discriminatory against the rest of the world.

The paper is organized as follows. The next section presents some stylized facts on Mercosur, documenting the evolution of trade in goods within member countries and then highlighting the characteristics of the trade agreement that make smaller Mercosur economies vulnerable to macroeconomic developments in Brazil. The subsequent section presents the main empirical contribution of the paper. Specifically, we develop empirical definitions of regional goods and then measure the extent of trade in regional goods by estimating intraregional trade in services, identifying the commodity items that can relatively easily find alternative markets, and calculating three alternative indicators of export exposure. The following section formally incorporates the concept of regional goods into a model of an intertemporal open economy. This model is used to assess

the main channels of the transmission of shocks to the price of regional goods, to perform sensitivity analysis to ascertain the main factors behind vulnerability, and to set the stage for meaningful policy discussions. In the final section, we discuss the policy implications.

Mercosur: Stylized Facts[9]

This section assesses the evolution of intraregional trade flows since the inception of Mercosur. We start by documenting the very rapid growth of intraregional trade flows in recent years, as well as the increasing importance of Brazil as a trade partner for Argentina, Paraguay, and Uruguay. We then show that what sets Mercosur apart from other trade arrangements such as NAFTA and the European Union is not the mere presence of a dominant trade partner, with which there is a large concentration of trade for the smaller economies (and not vice versa), but the fact that this partner exhibits volatile macroeconomic fundamentals.

The Evolution of Merchandise Trade

In recent years, trade flows have increased substantially for the Mercosur region. Total exports from Mercosur countries grew from U.S.$46 billion in 1990 to U.S.$82 billion in 1997, or about 9 percent a year, on average. An even more impressive change occurred with Mercosur's total imports, which increased from U.S.$29 billion in 1990 to almost U.S.$105 billion in 1997, or about 20 percent a year, on average. Most of this increase in trade flows occurred within the Mercosur region. The average growth rates of intraregional exports and intraregional imports for the four Mercosur countries were substantially higher than the growth rates of total exports and total imports during the period.

The increase in the relative importance of intraregional trade varied among the four countries. In 1990, about 15 percent of Argentina's exports were sent to Mercosur countries; this share rose to 35 percent in 1997. For Brazil, although the initial value was much lower (about 4 percent), by 1997 the intra-Mercosur share of total exports was more than four times the 1990 value (17 percent). Paraguay and Uruguay also saw significant increases, though not on the scale of Argentina and Brazil. In both cases,

9. The material in this section is based on Bevilaqua, Blanco, and Talvi (2000b).

the intra-Mercosur share of total exports grew by about 50 percent during the period, from 40 percent to 60 percent in Paraguay and from 34 percent to 50 percent in Uruguay. Increases in the intra-Mercosur share of total imports have been less dramatic. For Argentina, the share rose from 21 to 25 percent between 1990 and 1997. In the case of Brazil, the 1997 intra-Mercosur share of total imports was almost 50 percent higher than the 1990 value. For Paraguay, intra-Mercosur imports increased from about a third to almost half of total imports during the period, while in Uruguay they rose from 40 percent to almost 60 percent of the country's total imports.

Mercosur removed barriers that had long restrained trade among countries in the region. Its impressive performance, however, also stems from economic reforms in Argentina and Brazil during the first half of the 1990s. It is thus possible that a significant part of the increase in intraregional trade flows can be attributed to macroeconomic conditions in the member countries and not to a Mercosur effect. This issue is analyzed by Bevilaqua, Blanco, and Talvi, who formally test the empirical importance of Mercosur by examining the response of merchandise trade flows in the four economies to real exchange rate and output fluctuations within the region.[10] They incorporate a dummy variable to capture the impact of the Mercosur initiative on trade flows, which takes a value of 0 from 1985 to 1990, and a value of 1 from 1991, when the Treaty of Asunción was signed, to 1997. The estimation results confirm that after 1991, the countries in the region traded more with one another as a result of Mercosur. This result is consistent with that obtained by Frankel, Stein, and Wei, who indicate that Mercosur trade is far greater than what can be explained by a standard gravity model.[11] They find a strong intraregional trade bias that increased in the late 1980s: in 1985, trade was twice what could be explained by gravity; in 1990 the ratio had risen to eight.[12]

What Is Special about Mercosur?

Other trade arrangements share some of the characteristics described above, in that they triggered a rapid growth in intraregional trade flows in their first years of existence and the larger economies became increasingly

10. Bevilaqua, Blanco, and Talvi (2000b).
11. Frankel, Stein, and Wei (1995).
12. Similar evidence is presented by Abreu and Bevilaqua (1995).

important trade partners for the smaller economies as integration moved forward. This raises the question of what characteristics make Mercosur special and help to explain the concern about the excessive dependence of the smaller economies on the largest economy in the region. A key feature of Mercosur is that the dominant trade partner is both very large and potentially very volatile, and it is the focus of a large concentration of trade for the smaller countries. This section highlights these essential characteristics of Mercosur, using the European Union and the North American Free Trade Agreement (NAFTA) as benchmarks.

The first essential characteristic of Mercosur is the relative size of the economies belonging to the trade arrangement. The larger the relative size of a country in a given integration initiative, the greater will be the impact of shocks originating in this particular country on the other countries in the region. Brazil, the largest economy in the region, generated about 70 percent of Mercosur's GDP in 1996. The concentration of regional GDP in Mercosur is not as high as in the case of NAFTA, where the United States economy corresponds to 80 percent of regional GDP. It is substantially higher, however, than in the European Union, where Germany represented about 29 percent of the regional GDP in the same year. In fact, Brazil's share in Mercosur's GDP is larger than the combined share of the three largest economies in the European Union.

Concentration of trade with a specific country, of course, increases the potential impact of shocks coming from this country. In this regard, NAFTA appears to be the extreme case: the United States is by far the most important intraregional market for both Canada and Mexico. Only 0.5 percent of Canada's total exports are sent to Mexico and only 2 percent of Mexico's total exports go to Canada. Although the relevant magnitudes are quite different, the same concentration pattern is found in Mercosur, where Brazil is the most important export market for the other three countries. At least 31 percent of the smaller countries' exports were sent to Brazil in 1997. The situation is substantially different in the European Union. Germany, the largest economy in the region, is not the major export market for all the other European countries. For both Belgium-Luxembourg and Spain, the most important intraregional export market is France, the second largest economy in the region. The highest concentration of intraregional exports in a single market for a European Union country in 1997 was found in Ireland, which sent about 24 percent of its exports to the United Kingdom and not Germany. Import sources are also much more

diversified in the European Union than in Mercosur. Except for Ireland, which buys one third of its total imports from the United Kingdom, countries in the European Union buy a smaller share of their total imports from their main intraregional supplier than Argentina, Paraguay, and Uruguay buy from Brazil.

So far, the analysis indicates that Mercosur, unlike the European Union, is a trade arrangement characterized by a large and dominant trade partner, with which the smaller economies have a large trade concentration. Since these characteristics are also present in NAFTA, they are not enough to differentiate Mercosur from other trade arrangements or to explain the concerns about the smaller economies' excessive dependence on the largest economy in the region. To establish why Mercosur is different, we need to combine this information with another essential characteristic of Mercosur: the uncertainty regarding macroeconomic developments in the largest economy.

All else equal, the more uncertain the macroeconomic environment in the largest economy, the higher is the risk of macroeconomic shocks for the smaller economies. Table 1 presents information on the mean and standard deviation of real exchange rate and industrial production volatility for Brazil, Germany, and the United States for the period 1985–97.[13] Both the mean and the standard deviation of the volatility of real exchange rates are, on average, much higher for Brazil than for the other two countries. Brazil's mean real exchange rate volatility in 1985–97 corresponds to almost two and a half times Germany's volatility and about five times the United States' volatility. When the period is split into two subperiods, the mean of the real exchange rate volatility in Brazil is seen to have decreased during the 1990s, but it is still much higher than in Germany or in the United States. The results for industrial production are even more extreme. Industrial production volatility in Brazil is six times that of the United States and five times that of Germany for the whole period.

The analysis so far has emphasized the reasons why Brazil is a potentially volatile trading partner. This does not necessarily imply that the increase in intraregional trade has led to more volatile overall trade (intraregional plus interregional). Maybe without Mercosur, for instance,

13. The real exchange rate is constructed as the ratio of the wholesale price index to the consumer price index in each country. For each observation, the standard deviation is computed with quarterly values for the preceding two-year period. We define the volatility of a series as the standard deviation of the first difference of the logarithm of the variable.

TABLE 1. Brazil, Germany, and United States: Macroeconomic Volatility, 1985–97
Mean and standard deviation (in parentheses)

Indicator and country	*1985–90*	*1991–97*	*1985–97*
Real exchange rate volatility			
Brazil	1.45	1.09	1.22
	(0.14)	(0.19)	(0.25)
Germany	0.52	0.50	0.50
	(0.14)	(0.16)	(0.15)
United States	0.53	0.49	0.51
	(0.17)	(0.20)	(0.19)
Industrial production volatility			
Brazil	5.23	5.04	5.11
	(1.83)	(2.46)	(2.24)
Germany	. . .	1.12	1.12
	. . .	(0.40)	(0.40)
United States	0.63	0.86	0.78
	(0.21)	(0.31)	(0.30)

Source: Authors' calculations, based on data from the Federal Reserve Board, U.S. Bureau of Labor Statistics, Banco Central do Brasil, Brazilian Institute for Geography and Statistics (IBGE), and Bundesbank.

Argentina would not produce cars at all, making the country more dependent on higher volatility goods.[14] To ascertain whether trade with Brazil might have reduced overall volatility, we studied the times series behavior of Argentina's goods exports to Brazil, the United States, the European Union, and Japan. For each trading partner country, we measured the volatility of the export series and the volatility of the rest of the world using monthly data from January 1990 to September 2000. The results are shown in table 2. Argentine exports to Brazil are at least three times as volatile as exports to any other export market for the whole period, which confirms our claim that Brazil is a volatile trading partner. It is possible, however, that if exports to Brazil are negatively correlated with exports to other trading partners, then overall volatility can be reduced by increasing trade with Brazil. This is not the case. Argentine exports excluding Brazil are half as volatile as exports excluding any other major partner for the whole period. On the other hand, since intraregional trade increased considerably during the second half of the decade, the higher volatility of Brazilian imports from Argentina might be attributable to the upward trend of Argentine exports to Brazil. To account for this trend, we split the sample period into two subperiods. Even during the second sub-

14. We thank Laura Alfaro for suggesting this line of inquiry.

TABLE 2. Volatility of Argentine Exports to Major Trading Partners[a]
Millions of dollars

Period and trading partner	*Own volatility*	*Volatility of the rest of the world*	*Decrease in volatility from eliminating trade*
1990–2000			
Brazil	217	221	324
European Union	71	504	41
Japan	19	536	9
United States	51	507	38
World	545	. . .	. . .
1990–95			
Brazil	135	221	108
European Union	70	288	41
Japan	16	322	7
United States	30	311	18
World	329	. . .	. . .
1996–2000			
Brazil	108	213	65
European Union	63	248	30
Japan	21	265	14
United States	42	268	11
World	279	. . .	. . .

Source: Authors' calculations, based on the United Nations Economic Commission for Latin America and the Caribbean (ECLAC), *Base Regional de Datos de Coyuntura.*

a. Volatility is measured as the standard deviation of monthly exports.

period (1996–2000), when the trend in Argentine exports to Brazil had subsided, it is still the case that trade volatility falls the most when trade with Brazil is eliminated (twice as much as when the European Union is eliminated).

Measuring the Extent of Trade in Regional Goods

Given the basic features of Mercosur discussed above, should the vulnerability of the smaller trade partners with respect to macroeconomic developments in Brazil be a concern? Does the fact that a substantial share of Argentina's, Paraguay's, and Uruguay's trade is concentrated on Brazil mean that these countries are severely exposed to sharp and discontinuous changes in Brazil's real exchange rate? The answer depends on the type of trade involved.

Recall the example of oil exports presented in the introduction. If Brazil unilaterally devalues its currency and its demand for oil declines, a small country that exports oil to the Brazilian market can probably relocate those exports to other markets, selling them at the going world price (probably at higher transport costs and possibly after an adjustment period). Hence, the fact that this country increases its trade with Brazil over time simply implies that in the event of a major macroeconomic upheaval in Brazil, this country will have to redirect to other world markets a larger portion of its trade than before. Except for the resource loss resulting from higher transport costs, nothing very substantial should happen from a macroeconomic viewpoint.

This is not the case for all goods, however. Some goods and services are tradable with regional partners but nontradable with other world markets, because of transport cost differentials, trade barriers, or special trade regimes. Prominent examples of such regional goods include Argentina's automobile exports to Brazil, which are regulated by a special trade regime, Uruguay's export of tourist services to Argentina, and Paraguay's sale to Brazil of energy produced at the Itaipú power plant. Suppose now that a small Mercosur economy only exports regional goods to the Brazilian market. As in the previous example, exports to the Brazilian market will fall if Brazil unilaterally devalues its currency. In this case, the exports cannot be relocated elsewhere because they are regional goods. A reduction in the external demand, prompted by the shock originating in the Brazilian economy, will therefore have a very substantial impact on the domestic economy. These concerns regarding the dependence on regional goods are not merely theoretical, as demonstrated by the pattern of Argentine automobile exports and production car exports in 1998–99.

Since the relative importance of trade in regional goods is a key factor in determining the real effects on the smaller economies of shocks originating in Brazil, the paper measures the extent of trade in regional goods for Argentina with Brazil and for Paraguay and Uruguay with both Argentina and Brazil. We use both Argentina and Brazil in the case of Paraguay and Uruguay because shocks originating in Brazil potentially affect these two economies both directly and indirectly, through the impact generated by Argentina's response to a shock in Brazil.

To measure trade in regional goods for a given country with a certain degree of accuracy, we start by estimating the extent of intraregional trade

in services. This is a necessary first step because the relative importance of services in total trade might be different for the four countries and because trade in services may have a larger regional component than trade in goods, especially for the smallest economies (Paraguay and Uruguay). We then assess the relative exposure of each economy on the basis of four indicators of the share of regional goods in total exports.

Trade in Services

Total exports of services from Mercosur countries increased from about U.S.$7 billion in 1990 to almost U.S.$11 billion in 1995, or about 9 percent a year, on average. The fastest growth rate is associated with Uruguay, where exports of services in 1995 reached almost three times their 1990 value. Between 1995 and 1997, Uruguay's services exports increased even more, reaching about U.S.$1.5 billion at the end of the period, or about 35 percent of total exports of goods and services.

Table 3 presents the share of intraregional services in total services exports.[15] As in the case of goods, most of the increase in the export of services occurred within the Mercosur region. The table shows that the shares of intraregional exports of services in total exports of services increased in the 1990s. In 1990 an estimated 28 percent of the exports of services of Mercosur countries were intraregional; this value increased to 33 percent in 1995. As with trade in goods, the increase in the relative importance of intraregional exports of services differed for the four Mercosur countries. Proportionally, the largest increase is associated with Argentina, where the share of intraregional services exports increased from 34 percent in 1990 to 42 percent in 1997. Paraguay and Uruguay already had very large shares of intraregional exports of services in 1990, but in both cases this share increased even further during the following years.

15. The share of intraregional service exports in total export of services was estimated with the use of the methodology described in Bevilaqua, Blanco, and Talvi (2000a). The estimation involved the bilateral assignation of total services exports for the different Mercosur countries following some basic criteria established for each of the services accounts. In some cases, such as transportation services and other services, for example, the criterion was simply the use of the same structure of total merchandise exports to distribute services exports among different trade partners.

TABLE 3. Mercosur: Share of Intraregional Services Exports in Total Services Exports, 1990–97

Percent

Country and trading partner	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*	*1996*	*1997*
Argentina	34	33	35	38	39	40	41	42
Brazil	13	14	15	18	19	20	20	21
Paraguay	7	6	5	6	6	5	6	6
Uruguay	14	14	15	14	14	15	15	16
Brazil	15	16	27	31	24	22	n.a.	n.a.
Argentina	8	9	20	23	18	16	n.a.	n.a.
Paraguay	2	2	3	3	3	3	n.a.	n.a.
Uruguay	4	4	5	5	3	3	n.a.	n.a.
Paraguay	74	74	73	68	67	71	70	87
Argentina	22	21	17	19	16	21	23	28
Brazil	50	51	53	46	48	48	46	57
Uruguay	2	3	2	3	2	2	2	2
Uruguay	54	53	49	54	54	54	61	65
Argentina	45	44	42	45	43	39	43	47
Brazil	9	8	7	9	10	14	16	16
Paraguay	1	1	1	1	1	1	1	1

Source: Bevilaqua, Blanco, and Talvi (2000a).
n.a. Not available.

Most of the results obtained for the evolution of trade in services thus confirm the previous evidence obtained for the evolution of merchandise trade among the Mercosur countries in the 1990s. However, some important results are specific to the analysis of trade in services. First, trade in services cannot be simply considered a given fraction of total trade for the entire region. The share of services in total exports of goods and services is substantially higher in both Paraguay and Uruguay than in Argentina and Brazil. Second, the shares of intraregional trade in services for Argentina, Paraguay, and Uruguay are higher than the respective shares of intraregional trade in goods. For Argentina the increase in this share reflects the importance of Uruguay as a destination for its services exports. For Paraguay, the increase in the share with respect to its counterpart for goods is explained entirely by Brazil, which was already a major export market in the case of goods. The most interesting case, however, is Uruguay. When services are considered, the most important market for this country's exports is Argentina, and not Brazil as in the case of goods. Finally, for Brazil the relative importance of intraregional trade flows is the same for both goods and services.

The Extent of Trade in Regional Goods

Having estimated the extent of intraregional trade in services, we now proceed to measure the share of trade in regional goods as a percentage of total trade in goods and services for Argentina, Paraguay, and Uruguay, the three Mercosur economies potentially exposed to macroeconomic developments in Brazil. The first step in the analysis is the construction of four alternative indicators of the share of regional goods in total exports of goods and services. We then use these indicators to assess the relative exposure of the smaller economies.[16] As a starting point we define

$$I_0 = \frac{X^{M,R}}{X^M},$$

where X^M is total exports of goods and $X^{M,R}$ is total exports of goods to Brazil. In other words, I_0 is the share of intraregional trade in goods, which is the traditional measure of exposure to Brazil.

To obtain a more representative figure of exposure we define

$$I_1 = \frac{X^G + X^S}{X},$$

where X^G and X^S are the country's regional exports of goods and services, respectively, and X is the country's total exports of goods and services.

To narrow down the list of goods and services included in the definition of regional goods we define

$$I_2 = \frac{(X^G - X^{G,C}) + X^T + s_2(X^S - X^T)}{X},$$

where $X^{G,C}$ is the country's regional exports of commodity goods, X^T is exports of travel services, and $s_2 = (X^G - X^{G,C})/X$. Thus I_2 excludes commodities from intraregional exports of goods, together with the services associated with commodity exports.[17] In other words, I_2 measures the share of intraregional exports of noncommodity goods and services as a proportion of total exports of goods and services.

Finally, we define

16. These indicators are developed in Bevilaqua, Blanco, and Talvi (2000a).

17. The list of commodities excluded from intraregional trade is listed in Bevilaqua, Blanco, and Talvi (2000a).

$$I_3 = \frac{(X^G - X^{G,C} - X^{G,O}) + X^T + s_3(X^S - X^T)}{X},$$

where $X^{G,O}$ includes any export items for which more than 50 percent had destinations outside the region and $s_3 = (X^G - X^{G,C} - X^{G,O})/X$. Indicator I_3 makes our definition of regional goods even more narrow in that it excludes not only commodities, but also any other export item for which less than 50 percent of exports were intraregional. The 50 percent cutoff point is necessarily arbitrary, but changing it to 40 or 60 percent does not significantly alter the results. Exports of services associated with these items were also excluded.

Table 4 presents the values of the three alternative exposure indicators, along with the most widely used indicator (namely, the share of intraregional trade in goods in total trade in goods), before and after the formal creation Mercosur.[18] Because of data availability, for Argentina we show these indicators in 1990 and 1996, for Paraguay in 1991 and 1996, and for Uruguay in 1990 and 1997.

The first stylized fact suggested by the data in table 4 is that exposure has increased for all countries, independently of how we measure it. In the case of Argentina, for example, I_2 doubled from 7.2 in 1991 to 15 percent in 1997, while I_3 increased sixfold from 1.3 to 9.5 during the same period. Similar, although weaker, results are found for Paraguay and Uruguay; this can be attributed to the fact that the exposure levels were quite high to start with. In Uruguay, I_3 increased from 22 in 1990 to 38 percent in 1997.

If we focus on the latter part of the sample, the inclusion of trade in services does not significantly increase Argentina's exposure to Brazil. In 1996 there is almost no difference between the exposure measured as the simple share of intraregional merchandise exports in total merchandise exports (I_0) and the equivalent share including services (I_1). Argentina's exposure to Brazil declines significantly when commodities are excluded from total intraregional exports in I_2.[19] The share of regional goods in Argentina's total exports to Brazil declines from 27 to 15 percent. The

18. The indicators presented in this section are calculated in Bevilaqua, Blanco, and Talvi (2000a).

19. This is not surprising since the second largest (mineral fuels and oils) and third largest (cereals) Argentine exports to Brazil are commodities that account for 8.2 percent of total exports to Brazil.

TABLE 4. Mercosur: Exposure Indicators
Percent

Country, year, and trading partner	Indicator			
	Goods (I_0)	Goods and services (I_1)	Noncommodity goods and services (I_2)	Regional goods and services (I_3)
Argentina				
1990				
Brazil	6.1	11.8	9.5	9.6
Total	11.5	11.8	7.2	1.3
1996				
Brazil	27.8	26.9	15.4	9.5
Total	27.8	26.9	15.4	9.5
Paraguay				
1991				
Argentina	6.1	11.8	9.5	9.6
Brazil	27.6	36.4	21.7	18.2
Total	33.7	48.2	31.2	27.8
1996				
Argentina	9.2	14.0	11.9	11.3
Brazil	49.9	48.6	24.3	21.8
Total	59.1	62.5	36.2	33.1
Uruguay				
1991				
Argentina	4.8	13.3	12.8	11.9
Brazil	29.5	25.1	14.6	9.7
Total	34.3	38.4	27.4	21.6
1997				
Argentina	13.0	24.9	22.8	21.7
Brazil	34.0	28.0	17.1	16.1
Total	47.0	52.9	39.9	37.8

Source: Bevilaqua, Blanco, and Talvi (2000a).

exposure is reduced even further, to only 9.5 percent, when we eliminate all items for which less than 50 percent of total exports are intraregional (I_3). In other words, when commodities and goods for which Brazil is not a dramatically important export market are excluded from the computations, Argentina's exposure to Brazil declines substantially.

We reach different conclusions for Paraguay and Uruguay. Paraguay's relative exposure to Argentina and Brazil in regional goods is very different from the country's simple share of intraregional exports in total exports, using 1996 data. This is due to the fact that trade in services is concentrated with Argentina, while trade with Brazil is intensive in

commodities. When both goods and services are considered, the total exposure of Paraguay increases from 59 to 62 percent. The exposure drops dramatically, however, when commodities and goods for which intraregional exports are less than 50 percent of total exports are excluded (I_2 and I_3). This drop in total exposure is explained by the decline in exposure to Brazil. While Paraguay continues to be more exposed to Brazil in absolute terms, the relative exposure to Argentina increases substantially.

The results for Uruguay are similar to the results for Paraguay in one respect: the relative exposure to Argentina and Brazil in regional goods is different from what is suggested by simple intraregional export shares in 1997. With regard to regional goods, however, Uruguay is still highly exposed to the region even when commodities are excluded. This is due to the large importance of travel services trade in total services exports to Argentina. While Argentina only represents 28 percent of intraregional merchandise trade for Uruguay, it represents almost 60 percent of trade in regional goods when both I_2 and I_3 are considered.[20]

The increase in exposure that took place in the region from 1990 to 1997 is not accidental. It is the result of the integration strategy pursued by Mercosur members. Mercosur has generated a consistent increase in the margin of preference afforded to regional members. While the preference margins were insignificant for most products before the signing of the Treaty of Asunción, this was no longer the case in later years. For example, Uruguay applied an average tariff of 2.3 percent to Mercosur members in 1995, in contrast to 9.6 percent for nonmembers (the average common external tariff was 11 percent).[21] By 1999 the average nonmember tariff was 12.4 percent, while the member tariff was close to 0 (the average common external tariff was 14 percent).[22] Furthermore, the common external tariffs underwent a large dispersion. The standard deviation of the common external tariffs was close to 6 percent in both years. Common external tariffs, however, do not tell the whole story. Protection for some sectors

20. In fact, the largest export item for Uruguay is travel services, which represented about 18 percent of total exports in 1997. Of this amount, 71 percent were exports to Argentina and 9 percent were exports to Brazil.

21. These are simple averages over 10,555 tariff lines. We thank María Inés Terra for supplying the necessary information.

22. According to Laird (1997), approximately 95 percent of all intraregional trade was duty free by 1995. Similarly, Chang and Winters (1999) find that the average preference margin accorded by Brazil to Argentine exporters vis-à-vis U.S. exporters was at least 8 percent.

is much larger than these averages suggest.[23] In addition, there are the special regimes. The special automotive regime between Argentina and Brazil, for example, establishes a whopping 35 percent nonmember tariff for Argentina, a zero tariff for intra-Mercosur trade, and a compensated trade regime designed to prevent the Argentine market from becoming flooded by Brazilian imports, given the relative cost advantages of Brazilian automotive producers.[24]

Tariff preferences have generated a reorientation of exports toward the region that has regionalized the smaller members in Mercosur. Yeats finds that the fastest growing products in Mercosur intraregional trade are generally capital intensive goods in which members have not displayed a strong export performance in outside markets.[25] More importantly, he finds that Mercosur's own trade barriers are responsible for this result, since those sectors that have experienced the largest reorientation of exports toward the region face larger than average (regional) tariff preferences. Porta compares the behavior of regional exports in 1989 and 1996.[26] He finds that in aggregate terms, close to 50 percent of intra-Mercosur trade corresponds to products in which the member countries present comparative advantages that are either not sharp or unstable. Moreover, the share of this group of products increases over time in relation to exports in which member countries have strong comparative advantages.[27] The bulk of these products corresponds to the automobile and petrochemical sectors, which do not entail strong comparative advantages and are thus sensitive to regional trade preferences. Since goods with a weak comparative advantage or a comparative disadvantage are highly sensitive to factors that can influence efficiency or prices, such as bilateral exchange rates and

23. The Mercosur agreement allows for exceptions to the common external tariffs. In 1995, these lists included 3,000 items. The average common external tariff for these items equals 13 percent, which was 2 percent larger than the average common external tariff for all goods.

24. The automotive regime was originally put in place by the Seventeenth Integration Protocol signed by Argentina and Brazil in December 1988. It was formally incorporated into Mercosur when the Treaty of Asunción was signed.

25. Yeats (1997).

26. Porta (2000).

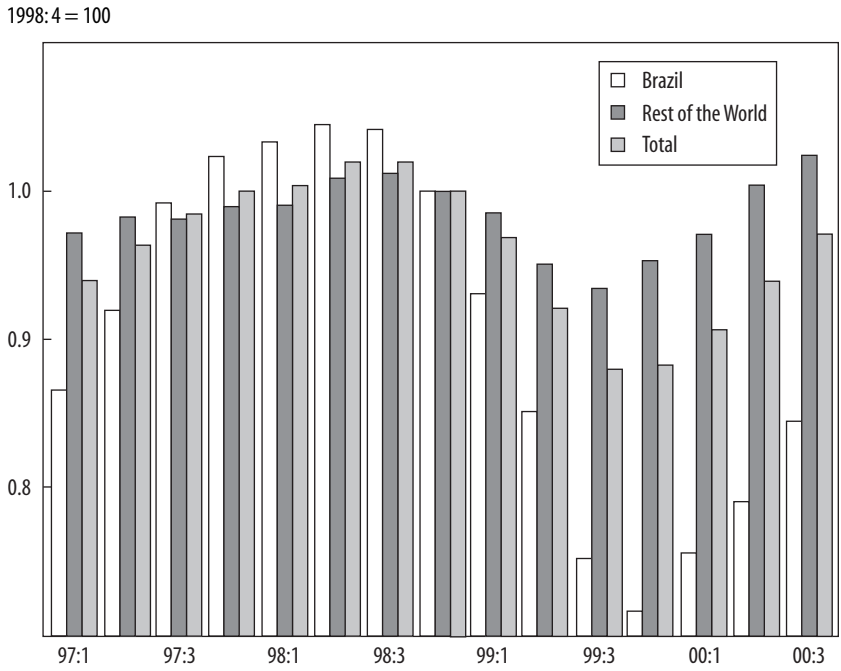
27. For Argentina, the growth in exports for which the country has a strong comparative advantage contributes 30 percent to total growth in exports to Brazil during the period, compared to a contribution of 65 percent for those goods in which the country does not enjoy a comparative advantage or has a comparative disadvantage. The corresponding figures for exports from Brazil to Argentina are 29 percent and 70 percent.

regional trade preferences, tariff policy has regionalized the economies of the small Mercosur countries.

We close this section with some comments on the evolution of Argentine exports in the wake of the Brazilian devaluation of 1999. Figure 4 compares annually accumulated quarterly exports from Argentina to Brazil and to the rest of the world from the first quarter of 1997 to the third quarter of 2000. The figure shows that Argentine exports to Brazil, which grew in 1997 at a rate higher than exports to the rest of the world, experienced a large decline in 1999 that was much larger than the decline in exports to the rest of the world. Argentine exports both to Brazil and to the rest of the world resumed growth in 2000. However, while annual exports of the latter had recovered fully by the third quarter of 2000, annual Brazilian exports remained 15 percent below the level prevailing in the fourth quarter of 1998.

Of course, the drop in Argentine exports to Brazil could be completely unrelated to our regional goods concept. Table 5 shows that this is not the case. Suppose we adopt a broad definition of regional goods and identify regional exports with noncommodity exports and nonregional exports with exports of commodities, in the spirit of indicator I_2. The table illustrates the behavior of the two types of goods under this definition. While total Argentine commodities exports to Brazil declined by 14 percent from 1998 to 1999, noncommodity exports declined by 33 percent. Similarly, the median percentage fall for noncommodity exports during the same period was 20 percent, compared with a median percentage decline in commodity exports of 36 percent. This pattern is robust to the definition of regional goods employed. If we narrow our definition and identify regional goods with noncommodity exports for which more than 50 percent are exported to Brazil (in the spirit of indicator I_3), total Argentine nonregional exports to Brazil declined by 19 percent from 1998 to 1999, whereas regional exports declined by 38 percent. The median percentage falls were 34 and 41 percent, respectively. In addition, the drop in regional exports was quite persistent. When we adopt the broad definition of regional goods, the share of regional goods exports in total Argentine exports to Brazil fell from 70 percent in 1998 to 65 percent and 58 percent in 1999 and 2000, respectively. If we adopt the narrow definition, the share of regional goods exports fell from 44 percent in 1998 to 38 percent and 34 percent in 1999 and 2000, respectively. The evidence thus shows that

FIGURE 4. Argentine Exports, Last Four Quarters



Source: Authors' calculations, based on data from the Secretaria de Comercio Exterior (SECEX) of Brazil.

regional goods were responsible for the drop in Argentine exports to Brazil.

The Quantitative Impact and Transmission Channels of Shocks within Mercosur: A Model of Trade Linkages

Following an earlier paper by Talvi, this section constructs a model that captures the essential characteristics of Mercosur described above, namely, a very large and volatile trade partner (Brazil) with which the smaller partners of the trade agreement (Argentina, Paraguay, and Uruguay) have a large concentration of trade.[28] The model also formally

28. Talvi (1995).

TABLE 5. Argentina: Regional versus Nonregional Exports, 1998 and 1999

	Exports (billions of U.S. dollars)		*Percent change*	
Type of export	*1998*	*1999*	*Weighted average*	*Median*
Broad definition of regional goods[a]				
Regional goods	5.66	3.77	−33	−36
Nonregional goods	2.38	2.04	−14	−20
Narrow definition of regional goods[b]				
Regional goods	3.56	2.21	−38	−41
Nonregional goods	4.47	3.60	−19	−35

Source: Secretaria de Comercio Exterior (SECEX), *Estadísticas de Comercio Exterior.*

a. Regional goods exclude noncommodity exports.

b. Regional goods exclude noncommodity exports and any other export item for which less than 50 percent of exports are intraregional.

incorporates the concept of regional goods, that is, goods that are tradable with the regional partner but largely nontradable with the rest of the world.

The model is used to evaluate the vulnerability of the small economy to shocks originating in the large regional partner, as represented by permanent and temporary shocks to regional prices, p. A country is said to be more vulnerable to shocks in the larger regional trade partners when a change in the price of regional goods produces a larger macroeconomic impact, requiring a larger adjustment in output, employment, and the rate of return on capital in the regional goods sector; a larger adjustment in real wages; a larger adjustment in demand for regional goods; and a larger adjustment in the composition of the trade balance (regional balance vis-à-vis the balance with the rest of the world). The greater the required adjustment, the greater the vulnerability.

This model assumes, for simplicity, a world with only two goods: a regional good and a tradable good. It further assumes that the shares of regional goods in consumption and production are exogenous and independent of preferences and commercial policy. The discussion in the previous subsection suggests that this is not the case. Fortunately, our highly simplified model can be given precise microeconomic foundations, which we sketch briefly here and discuss in detail in the appendix.

Suppose that there exists a continuum of goods distributed in the unit interval. The consumer regards any good s produced locally as a perfect substitute to good s produced in the region (Brazil) and as a perfect sub-

stitute to good *s* produced in the rest of the world. Then, if the small regional partner is a price taker, the domestic price will be the minimum of the Brazilian price gross of the intrablock tariff rate and the world price gross of the extra-block tariff. The tariff structure, along with the prevailing nominal exchange rate, induces a partitioning of the set of all goods into three subsets. The first subset is composed of commodities. Good *s* is classified as a commodity when the large regional partner is a price taker in the world market for good *s* and is not able to influence the price perceived by agents in the small regional economy through a nominal devaluation. The second subset includes noncommodities for which the rest of the world is the cheapest international source, while the third subset includes noncommodities for which Brazil is the cheapest international source. In line with our discussion in previous sections, only goods in the latter category can be classified as regional goods.

This setup implies a division of the whole space of goods into regional and tradable goods; this division is policy induced and does not rely on arbitrary restrictions on the utility function. Specifically, a nominal appreciation of the Brazilian real leads to a distribution of goods from second to the last set and a fall in the price of goods in the latter set. An increase in regional preference margins leads to a redistribution of goods from the third to the second group, thus regionalizing the economy. Intuitively, if category *s* enjoys a high preference margin, it is more likely that it is shielded from competition from the rest of the world and that its price is determined by conditions in the regional partner.

Finally, our microeconomic foundations yield the same conclusions as the simplified model discussed below when the fraction of goods belonging to the last two subsets is constant and does not depend on the level of the nominal exchange rate. In this case, the share of expenditures in regional and tradable goods is constant and independent of the exchange rate, as the simplified model described below assumes. Since this effect is second order (especially in the short run, when it is costly to adjust), it does not invalidate the results below.

The rest of the section proceeds as follows. First, we consider an endowment economy with regional goods and determine the main factors behind demand-side vulnerability. We then introduce production and evaluate the impact of shocks to the price of regional goods on supply-side macroeconomic variables. The final subsection summarizes the main findings of the section.

An Endowment Economy with Regional Goods

Consider a small open economy with a representative consumer that derives utility from the consumption of a traded good and a regional good, that is, a good that is traded only with the region and is not traded with the rest of the world.[29] We assume that the small open economy takes the price of regional goods as given.[30]

The consumer's lifetime utility (that is, present discounted utility) is given by

$$\int_0^\infty \frac{z_t^{1-\frac{1}{\eta}} - 1}{1 - 1/\eta} \exp(-\beta t) dt, \tag{1}$$

where z is an index of real consumption, β is the subjective discount factor and η is the intertemporal elasticity of substitution. The real consumption index z is a Cobb-Douglas function of tradable consumption (c^*) and regional consumption (c):

$$z = (c^*)^q (c)^{1-q}. \tag{2}$$

The consumer can hold only one asset, namely, an internationally traded bond, k_t. We can thus write the flow constraint of the consumer as

$$\dot{k}_t = rk_t + y_t^* + p_t y_t - c_t^* - p_t c_t, \tag{3}$$

where y_t^* and y_t are the endowments of the tradable and regional good, respectively, and where we have normalized the price of the traded good to 1.

Maximization of equation 1 subject to equations 2 and 3 while imposing the standard non-Ponzi game and transversality conditions implies the following first-order conditions:

$$c^* = qP_z z, \tag{4}$$

29. The model developed in this paper is deterministic. A stochastic version of our model yields very similar results yet provides no additional insights.

30. This stems not only from the fact that the Argentine economy is roughly one-third the size of Brazil's, but also from the fact that Argentina uses a currency board, which removes any possibility of the country's influencing the terms of trade between the two. Moreover, Argentina's GDP is more than ten times that of Uruguay and Paraguay.

$$c = (1-q)\frac{P_z z}{p}, \tag{5}$$

$$P_z \equiv q^{-q}(1-q)^{q-1}p^{1-q}, \tag{6}$$

$$Z = P_z z, \tag{7}$$

$$z_t^{-\frac{1}{\eta}} = \lambda P_{zt}, \text{ and} \tag{8}$$

$$\int_0^\infty z_t P_{zt} \exp(-rt)dt = k_0 + \int_0^\infty (y_t^* + p_t y_t)\exp(-rt)dt, \tag{9}$$

where Z represents aggregate consumption expenditures, P_z is a price index, and λ is the marginal utility of wealth.[31] These first-order conditions are fairly standard. Their intuition will become clear when we analyze the properties of the model.

Before we continue, a few definitions are in order. We define the overall trade balance (TB), the trade balance with the rest of the world (tb^*), and the trade balance with the region (tb) as

$$TB \equiv y^* + py - c^* - pc = g - P_z z,$$

$$tb^* \equiv y^* - c^*, \text{ and}$$

$$tb \equiv p(y-c).$$

QUALITATIVE ANALYSIS. This section presents two simple exercises, with the twofold aim of understanding the model and studying the dynamic adjustment of our model economy to different temporal paths of regional prices. Since the model is fairly standard, we keep the discussion intuitive to avoid burdening the reader with unnecessary algebra.[32] The two experiments we perform consist of a permanent change in the price of regional goods, p, which implies a change in wealth (the present discounted value of income) and a temporary change, which does not change wealth. We assume an initial situation in which the economy is

31. See Bevilaqua and Talvi (1999) for a formal derivation of these results.

32. For a more formal discussion that includes proofs of all the results discussed here, see Bevilaqua and Talvi (1999).

traveling along a perfect foresight equilibrium path in which p is expected to be constant and equal to p_0 forever.

The first experiment entails a permanent increase in regional prices. Assume that at time 0 there is an unanticipated permanent increase in p from p_0 to p_h. Formally, the path of p is given by

$$p_t = \begin{cases} p_0 & \text{for } t < 0, \\ p_h > p_0 & \text{for } 0 \le t. \end{cases} \tag{10}$$

It can be shown that for permanent shocks, all variables converge immediately to their long-run values, and thus the model displays no dynamics. Consequently, the current account balance should be balanced for all $t \ge 0$.[33] In other words,

$$P_{zt} z_t = rk_0 + y^* + p_h y, \tag{11}$$

for all $t \ge 0$.

Since the increase in the price of the regional good leads to an increase in income in terms of the tradable good, gross national product (the right-hand side in equation 11) increases, such that aggregate consumption expenditures ($Z = P_z z$) increase. Tradable consumption (c^*) increases not only because wealth increases, but also because its relative price falls. In the case of regional goods (c), on the other hand, these two effects offset each other, since its relative price increases. As long as net external debt is not too large, the second effect dominates.

Inspection of equation 11 shows that the overall trade balance surplus (TB) must equal net income payments ($-rk_0$). Since rk_0 has not changed, TB does not change either. The production of tradable goods is fixed, so the increase in tradable consumption leads to a fall in the tradable goods balance (tb^*). The only way that the economy can accommodate the increase in tradable goods imports, given that the overall trade balance has not changed, is through an increase in the regional trade balance (tb).

Consider now a temporary unanticipated increase in the price of the regional good, such that wealth remains unchanged (the second experiment). Formally, the path of p satisfies

33. If the current account shows a surplus for $t \ge 0$ (that is, if the sum of the trade balance surplus and net income receipts is positive), it will grow without bound ever after at the rate of r, violating the transversality condition. If it shows a deficit for $t \ge 0$, it will decline without bound, hence violating the non-Ponzi game condition.

$$p_t = \begin{cases} p_0 & \text{for } t < 0, \\ p_h > p_0 & \text{for } 0 \le t < T, \text{ and} \\ p_l & \text{for } t \ge T \end{cases} \tag{12}$$

$$\int_0^\infty [y^* + p_t y] \exp(-rt) dt = (y^* + \bar{p}y) / r. \tag{13}$$

Furthermore, we assume that for all t, the intertemporal elasticity of substitution exceeds the intratemporal elasticity and that real consumption is price inelastic (that is, $\eta < 1$).[34] In what follows, we denote the interval $(0, T)$ as period 1 (or the transition) and (T, ∞) as period 2.

To understand the path of the endogenous variables, first note that the fact that p_h is larger than p_0 implies that p_l is smaller than p_0. If this were not the case, wealth after the shock would exceed wealth prior to the shock, thereby contradicting our definition of a temporary shock. Second, since real consumption (z) is price inelastic with respect to the price level, an increase in the latter raises aggregate consumption expenditures ($P_z z$). Furthermore, given that the price of aggregate consumption (P_z) is a weighted average of the prices of the components of the basket, its path mimics that of p and the price level must fall at time T. Since the fall in p at time T is perfectly anticipated, equation 8 implies that aggregate consumption expenditures must fall at T: $z_1 P_{z1} > z_2 P_{z2}$, where the subscripts 1 and 2 denote the respective periods. Moreover, by assumption wealth has not changed, such that $z_1 P_{z1} > z_0 P_{z0} = \text{rk}_0 + y^* + py > z_2 P_{z2}$. This implies that we observe a boom in aggregate consumption expenditures at time 0 and a bust at time T.

The path of tradable goods, in turn, mimics that of aggregate consumption expenditures, because tradable goods are the numeraire and expenditure shares in regional and tradable goods are constant. Given that the share of regional goods in aggregate consumption expenditures is a constant fraction of aggregate consumption expenditures (that is, regional goods' consumption is proportional to Z), when $\eta = 1$ (perfect aggregate consumption smoothing) all fluctuation in regional goods' prices must be absorbed by fluctuations in regional goods' consumption, so the latter must fall on impact and increase at time T. When $\eta = 0$ (perfect real consumption smoothing), aggregate consumption expenditures are unit elastic with

34. This assumption is consistent with the parameters we employ in the numerical simulations below.

respect to the price level. However, since the price level is a weighted average of individual prices, aggregate consumption expenditures fluctuate less than regional goods prices. Thus the path of regional goods consumption also falls on impact and increases at time T.

We now study the effect on the external accounts. Given that the increase in p is temporary, the country enjoys a temporary positive terms-of-trade shock, and the trade balance improves on impact and falls below its original level at the end of the transition. Since tradable consumption jumps on impact, the trade balance with the rest of the world worsens on impact and improves at time T. The regional balance must therefore improve on impact and worsen at time T. Finally, the current account improves (shows a surplus) at time 0 because the trade balance improves on impact and net foreign assets are predetermined. Furthermore, the fact that the trade balance is unchanged for $t \in (0, T)$ implies that the current account continues to improve during this interval. When the trade balance worsens at time T, however, the current account must balance. Otherwise, net external assets will grow or decline at rate r forever, violating either the transversality or non-Ponzi game condition. This implies that the initial improvement in the current account is smaller than the final deterioration.

NUMERICAL EXAMPLES. The objective of this section is to evaluate the demand-side vulnerability of the small economy to shocks originating in the large regional partner, as represented by permanent and temporary shocks to regional prices, p. Demand-side vulnerability is defined as follows: a country is said to be more vulnerable to shocks originating in the large trade partner if a shock of any given size requires a relatively large adjustment in aggregate consumption expenditures and in the composition of the trade balance. The greater the required adjustment, the greater the vulnerability.

The section proceeds as follows. We start by characterizing a benchmark (steady-state) situation and presenting the benchmark parameter configuration. The rest of the section then quantifies the effects of regional price fluctuations, ascertains which factors determine demand-side vulnerability, and identifies the channels by which these fluctuations are transmitted throughout the economy.

In the benchmark situation, we assume that the economy is traveling along a perfect-foresight equilibrium path in which regional prices are

anticipated to be constant forever and equal to $\bar{p}$. In this case, benchmark aggregate consumption is given by the equation,

$$\bar{z} = \frac{rk_0 + y^* + \bar{p}y}{\bar{P}}. \tag{14}$$

The benchmark parameter values are given in table 6. The values for q (the share of tradable goods in aggregate consumption expenditures) and ψ (the share of tradable goods in output) were chosen to mimic the exposure to trade in regional goods as measured by the three indicators of the previous section. The implied assumption is that the structure of production, as measured by ψ, is similar to the structure of trade. In other words, if trade in regional goods represents 30 percent of total trade, the production of regional goods represents 30 percent of total output. Given ψ, the value of q follows directly from the assumption of the regional trade balance. For example, if $\psi = q$, regional trade is balanced in the initial situation.

The interest rate was set equal to the prevailing world real interest rate. The intertemporal elasticity parameter is consistent with the estimates of Ostry and Reinhart and Reinhart and Végh.[35] The estimates reported in Ostry and Reinhart for the intratemporal elasticity parameter are consistent with our assumption that this elasticity equals 1. Finally, we normalize the benchmark value of regional prices (p) to be equal to 1.

Given the specific functional forms assumed in this paper, it is possible to obtain closed-form solutions for all the endogenous variables in the model.[36] We now proceed to simulate the behavior of the model under the two types of shocks we consider.

The first experiment we perform is an unanticipated (sudden) permanent decline in the price of regional goods of 20 percent from its original benchmark leve1 (the type of experiment described qualitatively in the previous subsection). This shock can be thought of as a real devaluation in Brazil or, alternatively, as a contraction in the demand of Brazilian imports, that is, of the small country's exports, owing to a recession. Table 7 measures the impact of this shock on the endogenous variables of the model for alternative parameter configurations.

35. Ostry and Reinhart (1992); Reinhart and Végh (1995).

36. The paths of the endogenous variables are derived explicitly in Bevilaqua and Talvi (1999).

TABLE 6. Benchmark Parameters

Description	*Symbol*	*Value*
Share of tradable goods in aggregate consumption expenditures	q	0.85
Share of tradable goods in output	ψ	0.85
Real interest rate	r	0.03
Intertemporal elasticity of substitution	η	0.5
Intratemporal elasticity of substitution	ε	1.0
Net external assets as percent of output	w_0	0.0
Relative price of regional good	$\bar{p}$	1.0
Duration of temporary shocks (in years)	T	3.0

A first glance at the results in table 7 suggests that permanent shocks to the price of regional goods have potentially large quantitative effects on aggregate consumption expenditures and on the composition of the trade balance. In the case in which $\psi = q = 0.85$, aggregate consumption expenditures fall by 3 percent, regional goods consumption increases by 21 percent, and although the overall trade balance remains in equilibrium, the required adjustment in the regional trade balance is 2.6 percent of GDP.

TABLE 7. Sudden Permanent Decline in the Price of Regional Goods
Steady-state values

Endogenous variable	*Parameter configuration*			
	Regional trade balance			
	$\psi = 0.95$	$\psi = 0.95$	$\psi = 0.95$	$\psi = 0.95$
	$q = 0.95$	$q = 0.85$	$q = 0.70$	$q = 0.50$
Aggregate consumption expenditures (Z)[a]	−1.0	−3.0	−6.0	−10.0
Regional good consumption (c)[a]	23.8	21.3	17.5	12.5
Overall trade balance (TB)[b]	0	0	0	0
Regional trade balance (tb)[b]	−0.45	−2.6	−4.2	−5.0
Current account ($\dot{k}$)[c]	0	0	0	0
	Regional trade imbalance			
	$\psi = 0.82$[d]	$\psi = 0.67$[d]	$\psi = 0.88$[e]	$\psi = 0.73$[e]
	$q = 0.85$	$Q = 0.70$	$q = 0.85$	$q = 0.70$
Aggregate consumption expenditures (Z)[a]	−3.6	−6.6	−2.4	−5.4
Regional good consumption (c)[a]	20.5	16.8	22.0	18.3
Overall trade balance (TB)[b]	0	0	0	0
Regional trade balance (tb)[b]	−3.1	−4.6	−2.0	−3.8
Current account ($\dot{k}$)[c]	0	0	0	0

a. Percent change with respect to the initial level.
b. Change in percent of GDP.
c. Change in percent of GDP (end of transition).
d. Surplus of 3 percent of GDP.
e. Deficit of 3 percent of GDP.

Put differently, a 20 percent decline in the price of regional goods implies that the smaller country would run a huge trade deficit vis-à-vis the larger trade partner. In a more realistic setting, this kind of quantitative adjustment in the regional balance in response to shocks in the large regional partner would certainly produce strains within the trade agreement, inviting retaliatory trade measures.

More careful examination reveals that demand-side vulnerability is an increasing function of and is very sensitive to the shares of regional goods in production and consumption. Comparing the first and second columns of the top panel of the table demonstrates that the larger the share of regional goods in both production and consumption, the larger the required adjustment in aggregate consumption expenditures and in the composition of the trade balance for any given size of shock. For example, when $\psi = q = 0.7$, aggregate consumption expenditures fall by 6 percent, and the required adjustment in the regional trade balance is 4.2 percent in response to a permanent 20 percent reduction in the price of regional goods.

The bottom panel of table 7 shows the sensitivity of the results to the assumption of trade balance maintained in the top panel. Exposure is more sensitive to the share of regional goods in both production and consumption than to the net trade position in regional goods (as a percentage of GDP). A comparison of columns 1 and 2 of the second panel shows that given a trade balance deficit of 3 percent ($= q - \psi$), increasing the share of regional goods consumption from 15 percent to 30 percent almost doubles the fall in aggregate consumption expenditures from 3.6 percent to 6.6 percent. At the same time, if the regional consumption share is held constant at 30 percent while the 3 percent surplus moves to a 3 percent deficit (columns 2 and 4), the fall in aggregate consumption expenditures declines only to 5.4 percent. These results imply that what matters the most is not whether a country is a net exporter of regional goods, but how important regional goods are on the demand and supply side.

Finally, it is extremely important to note that all responses are fairly proportional to the percentage decline in regional goods' prices. For example, when $\psi = q = 0.85$, regional goods prices decline by only 10 percent, aggregate consumption expenditures fall by 1.5 percent, and the regional trade balance deteriorates by 1.3 percent of GDP. The linearity of the results on the percentage changes in regional goods prices is also common to all the experiments we perform below, although we do not present the full results because of space limitations.

Our second experiment encompasses a temporary decline in regional prices, as described in the previous subsection. Specifically, assume that the economy faces a temporary unanticipated (20 percent) decrease in the price of the regional good that lasts for three years, such that intertemporal wealth is unchanged.[37] Table 8 measures the impact of this shock on selected endogenous variables for alternative parameter configurations. The results suggest that temporary shocks to the price of regional goods have potentially large quantitative effects on aggregate consumption expenditures, on the current account, on the trade balance, and on the composition of the trade balance. In the case in which $\eta = 0.5$ and $\psi = q = 0.85$, aggregate consumption expenditures fall by 1.7 percent, and the current account deteriorates by 1.5 percent of GDP. The required change in the composition of the trade balance is temporary but large: the trade balance of the small country vis-à-vis its regional trade partner deteriorates by 2.8 percent of GDP. The intuition behind these results is the following: as a result of the decline in p, which can be thought of as a temporary deterioration of the terms of trade, the consumer aims to smooth consumption (z) by running a current account deficit and accumulating debt that will be repaid once the price of regional goods is higher. In addition, the temporary decline in the price of regional goods leads the consumer to substitute consumption away from regional goods and in favor of world goods, which changes the composition of the trade balance.

Nonetheless, the size of the required macroeconomic adjustment is fairly sensitive to the choice of parameters. For any given value of η and for an economy with balanced regional goods trade, the larger the share of regional goods in both production and consumption, the larger the required adjustment in aggregate consumption expenditures, the current account, the trade account, and the regional trade balance, for any given size of shock. For example, when $\psi = q = 0.7$, aggregate consumption expenditures fall by 3.3 percent, the current account deteriorates by 3 percent of GDP, and the trade account declines by 2.7 percent of GDP in response to a temporary 20 percent reduction in the price of regional goods.

As in the case of a permanent shock, vulnerability is much more sensitive to assumptions regarding the share of regional goods in production

37. This implies that after three years, the price of regional goods would have to be 2 percent permanently higher than the benchmark level to ensure that wealth does not change.

TABLE 8. Sudden Temporary Decline in the Price of Regional Goods
Steady-state values

Endogenous variable	*Parameter configuration*			
Impact effects for regional trade balance, $\eta = 0.5$				
	$\psi = 0.95$	$\psi = 0.85$	$\psi = 0.70$	$\psi = 0.50$
	$q = 0.95$	$q = 0.85$	$q = 0.70$	$q = 0.50$
Aggregate consumption expenditures (Z)[a]	−0.6	−1.7	−3.3	−5.8
Regional good consumption (c)[a]	24.3	23	20.9	18.3
Overall trade balance (TB)[b]	−0.45	−1.4	−2.7	−4.6
Regional trade balance (tb)[b]	−1.0	−2.8	−5.0	−7.3
Current account ($\dot{k}$)[c]	−0.5	−1.5	−3.0	−5.0
Impact effects for regional trade imbalance, $\eta = 0.5$				
	$\psi = 0.85$[d]	$\psi = 0.70$[d]	$\psi = 0.85$[e]	$\psi = 0.70$[e]
	$q = 0.88$	$q = 0.73$	$q = 0.82$	$q = 0.67$
Aggregate consumption expenditures (Z)[a]	−1.3	−2.9	−2	−3.6
Regional good consumption (c)[a]	23.4	21.3	22.5	20.5
Overall trade balance (TB)[b]	−1.7	−3.1	−1.0	−2.4
Regional trade balance (tb)[b]	−2.8	−5.2	−2.7	−4.8
Current account ($\dot{k}$)[c]	−1.8	−3.3	−1.1	−2.6
Impact effects for regional trade balance, $\eta = 0.9$				
	$\psi = 0.95$	$\psi = 0.85$	$\psi = 0.70$	$\psi = 0.50$
	$q = 0.95$	$q = 0.85$	$q = 0.70$	$q = 0.50$
Aggregate consumption expenditures (Z)[a]	−0.1	−0.3	−0.7	−1.1
Regional good consumption (c)[a]	24.9	24.6	24.2	23.6
Overall trade balance (TB)[b]	−0.9	−2.7	−5.3	−8.9
Regional trade balance (tb)[b]	−1.0	−3.0	−5.8	−9.5
Current account ($\dot{k}$)[c]	−1.0	−2.9	−5.8	−9.7

a. Percent change with respect to the initial level.
b. Change in percent of GDP.
c. Change in percent of GDP (end of transition).
d. Surplus of 3 percent of GDP.
e. Deficit of 3 percent of GDP.

and consumption than to the net trade position in regional goods. For a 3 percent regional goods balance surplus (columns 1 and 2 of the second panel), a rise in the share of regional goods production from 15 percent to 30 percent implies that the fall in aggregate consumption expenditures more than doubles, from 1.3 to 2.9 percent, while the required adjustment in the regional goods trade surplus almost doubles, from 1.8 to 3.3 percent. However, if the production share of regional goods is held constant at 30 percent while the regional trade balance surplus of 3 percent drops to a 3 percent deficit (columns 2 and 4), the fall in aggregate consumption expenditures increases more modestly, from 2.9 to 3.6 percent, while the

required adjustment in the regional trade balance falls slightly, from 5.2 to 4.8 percent.

The bottom panel shows sensitivity to our assumption regarding the intertemporal elasticity of substitution, η. When $\eta = 0.9$, aggregate consumption expenditures still fall, but by less than in the case of $\eta = 0.5$, while the current account and the trade account deteriorate by more, for any value of $\psi = q$. The reason is that a higher η produces a larger change in real consumption (z) for any given change in the price of the consumption basket, Pz. Since aggregate consumption expenditures decline by a smaller amount in response to an adverse terms-of-trade shock, the current account and the trade balance deficit must deteriorate by a larger amount.

Finally, the model developed in this section does not differentiate between nondurable consumption and durable consumption and investment as components of aggregate expenditures. However, one can address this issue in connection with the intertemporal elasticity of substitution. The intertemporal elasticity of substitution can be interpreted not only as a characteristic of the utility function, but also as a characteristic of aggregate demand. One would expect that the intertemporal elasticity of substitution would be larger for investment or durable goods than for nondurable goods. A simple way to include investment, therefore, would be to assume that the intertemporal elasticity of substitution of the aggregate good that includes nondurable consumption, durable consumption, and investment is a weighted average (by the shares in aggregate consumption expenditures) of the intertemporal elasticity of these aggregate demand subaccounts. For example, if the elasticity in nondurable consumption is assumed to be 50 percent and its share in aggregate consumption expenditures to be 50 percent, while the elasticity in durables and investment is assumed to be 90 percent, then the intertemporal elasticity of substitution would be 60 percent. The effects on the endogenous variable could be interpolated from the tables. For example, for $\psi = q = 85$ percent, the change in aggregate consumption expenditures would be 1 percent.

Supply-Side Effects

We now extend the model to allow for production in order to study the supply-side effects of fluctuations in the price of regional goods. We assume that the firms own the factors of production and produce both the tradable and nontradable goods (y^* and y, respectively). We further assume

that there are two sector-specific factors, namely, capital in the tradables sector (K^*) and capital in the regional sector (K), and one mobile factor, labor. The representative firm in our economy allocates the labor endowment ($\bar{L}$) to the tradables sector in the amount L^* and to the regional sector in the amount L, in order to maximize the present value of dividends that it rebates to the consumer. This implies that the marginal product of labor is equalized across sectors.

With respect to the consumer, there are almost no changes. The only difference is that instead of owning the rights to the endowment of the goods, the consumer now owns the rights to the firms. As we argue in Bevilaqua and Talvi (1999), the first-order conditions of the consumer's problem derived in the previous section continue to hold in the present context.

Finally, the equilibrium conditions of the basic model continue to hold. Specifically, the present discounted value of aggregate consumption expenditures equals wealth:

$$\int_0^\infty P_{zt} z_t \exp(-rt)dt = k_0 + \int_0^\infty (y_t^* + y_t p_t) \exp(-rt)dt.$$

QUALITATIVE ANALYSIS. A convenient feature of this model is that the supply-side variables are only functions of the relative price of regional goods. Consequently, we can derive the supply-side effects of a change in relative prices even without knowing how the consumer's problem is modified. Intuitively, an increase in p increases the demand for labor in the regional sector, which drives up wages and draws labor toward the regional sector. Production of the regional good thus increases at the expense of production in the tradables sector. At the same time, the increase in p increases the marginal product of capital in the regional sector, driving up its rental rate. The decrease in the supply of labor to the tradables sector diminishes the marginal product of capital in that sector, and the corresponding real rate of return falls.

With respect to the demand side, the introduction of a nontrivial production structure does not substantially modify the results derived for the endowment economy.[38] We therefore disregard demand-side results in the remainder of this section.

38. Bevilaqua and Talvi (1999) show that the demand side of the endowment model and the demand side of the production model are equivalent up to a linear approximation, and that the linear approximation is quite accurate.

NUMERICAL EXAMPLES. This subsection evaluates the supply-side vulnerability of the small economy to shocks originating in the large regional partner, as represented by permanent and temporary shocks to regional prices, p. We define supply-side vulnerability as follows: a country is said to be more vulnerable to shocks originating in the large trade partner if a shock of any given size requires a relatively large adjustment of output, employment, and rates of return on capital in the regional goods sector, as well as a relatively large adjustment of real wages. The greater the required adjustment, the greater the vulnerability.

The subsection proceeds as follows. First, we posit explicit functional forms for the production function and establish the benchmark parameters. Second, we discuss the supply-side effects of changes in p.

For our numerical simulations we assume the following Cobb-Douglas technology:

$$F^*(K^*, L^*) = A^*(L^*)^{\alpha}(K^*)^{1-\alpha} \text{ and}$$

$$F(K^*, L^*) = A(L)^{\beta}(K)^{1-\beta},$$

where A^* and α are total factor productivity and the labor share in the tradables sector and A and β are total factor productivity and the labor share in the regional sector. Given the assumed production technology, it is relatively easy to solve for the rest of the supply-side variables.[39]

The parameters that we employ for our simulations are presented in table 9. Labor shares in the two sectors were both set equal to 40 percent. To be consistent with the endowment model, we assume that GDP is still equal to 1, while the share of tradables production in GDP varies from 0.95 to 0.50. To keep the initial situation consistent with long-run equilibrium, we assume that the returns to capital are equal to the real interest rate, which, in turn, is assumed to be 3 percent. The rest of the parameters ($\bar{L}$, K^*, K, A^*, and A) were chosen to be consistent with the above assumptions.[40]

We now quantify the supply-side effects of changes in relative prices, using as an example the case in which p falls by 20 percent. Table 10

39. The exact functional forms for the supply-side variables are presented in Bevilaqua and Talvi (1999).

40. The exact procedure by which these parameters were calculated is described in Bevilaqua and Talvi (1999).

TABLE 9. Benchmark Productivity Parameters

Description	*Symbol*	*Value*
Share of labor in tradable good production	α	0.40
Share of labor in regional good production	β	0.40
Gross domestic product (GDP)	g	1.00
Contribution of tradable production to GDP	ψ	0.85
Rate of return in tradable sector	ρ^*	0.03
Rate of return in regional sector	ρ	0.03

measures the impact of this shock on the endogenous variables of the model for alternative parameter configurations. The table shows that permanent shocks to the price of regional goods have potentially large quantitative effects on employment, the real return on capital in the regional goods sector, and real wages, even when the share of regional goods production in GDP is as small as 5 percent. Specifically, when $\psi = 0.95$, output in the regional goods sector declines by 13.2 percent and employment in the regional goods sector declines by 30.0 percent. In equilibrium, real wages must fall by 1 percent in order for the tradable goods sector to absorb the workers laid off from the regional goods sector. In a more realistic setting characterized by frictions such as nominal wage rigidities or adjustment costs associated with shifting workers from one sector to the other, unemployment could increase on impact by as much as 1.5 percentage points if laid off workers cannot be immediately absorbed by the

TABLE 10. Supply-Side Effects of a Decline in the Relative Price of Regional Goods

	ψ			
Endogenous variable	*0.95*	*0.85*	*0.7*	*0.5*
Output of regional goods (y)[a]	–13.2	–12.1	–10.4	–7.8
Employment in regional goods sector (L)[a]	–30.0	–27.7	–24.0	–18.4
Potential change in unemployment ($L + L^*$)[b]	1.5	4.2	7.2	9.2
Wages (w)[a]	–0.9	–2.8	–5.7	–9.6
Return to capital in regional goods sector (r)[b]	–0.9	–0.9	–0.8	–0.8
Real exchange rate with respect to rest of the world ($1/w$)[c]	1.0	2.9	6.0	10.7
Regional trade partners (p/w)[d]	–19.2	–17.7	–15.2	–11.5

a. Percent change with respect to the initial level.
b. Absolute change in percentage points with respect to initial level.
c. The real exchange rate with respect to the rest of the world is defined as the price of world goods in terms of wages.
d. The real exchange rate with respect to the regional partner is defined as the price of regional goods in terms of wages.

other sector in the economy.[41] Finally, the adverse impact on the return on capital is close to 1 percent per year. For an initial return on capital of 3 percent, this change implies a 30 percent decline in the value of the assets of firms involved in the production of regional goods.

Supply-side vulnerability is an increasing function of the share of regional goods production in GDP. The larger the share of regional goods in the productive structure of the small country, the larger the required reduction in real wages and the larger the potential impact on unemployment. For example, when $\psi = 0.7$, real wages must fall in equilibrium by 5.7 percent, and unemployment could potentially rise up to 7 percentage points. However, the impact on the return on capital invested in the regional goods sector appears to be insensitive to the share of regional goods in total output, depending only on the size of the reduction in *p*.

Finally, it is interesting to highlight the direction and size of the realignment in the equilibrium real exchange rate vis-à-vis the rest of the world and vis-à-vis the large regional partner in response to a 20 percent decline in the price of regional goods. The bilateral real exchange rate with respect to the regional partner appreciates, that is, the price of regional goods declines in terms of wages, but the change is less than the full amount of the reduction in *p*, since labor costs also decline as a result of the shock. The real exchange rate vis-à-vis the rest of the world depreciates, that is, the price of world goods increases in terms of wages, owing to the decline in labor costs. As a result, the competitiveness of the tradable goods sector improves while that of the regional goods sector deteriorates when regional prices decline. The equilibrium change in the real exchange rate with respect to the rest of the world is larger the greater the share of regional goods in total production and, naturally, the greater the size of the shock to the price of regional goods.

Conclusion

The integration strategy pursued by Mercosur members following the signing of the Treaty of Asunción in 1991 resulted in an unprecedented

41. These effects are captured by the row labeled *potential change in unemployment* in table 10. They assume that none of the workers laid off by the regional sector are absorbed by the tradables sector.

growth in trade flows within the Mercosur region in the 1990s. This process has made the smaller Mercosur countries extremely dependent on Brazil as an export market and import source. Since Brazil is a very volatile and dominant trade partner, the increase in intraregional trade flows has raised concerns regarding the vulnerability of the smaller Mercosur countries to macroeconomic developments in Brazil. These concerns are valid, however, only to the extent that trade in regional goods is an important component of total trade for the smaller Mercosur countries. With the aid of three alternative indicators of exposure to regional goods trade, we have shown that this is indeed the case, especially for Paraguay and Uruguay. The concerns about vulnerability are thus justified. Furthermore, the evidence suggests that the increase in regional goods trade can be explained by the presence of special regimes and increases in the preference margins afforded to members of the regional bloc.

The paper developed a model that incorporated the concept of regional goods, with the aim of understanding the main channels by which a drop in regional goods prices would be transmitted and determining which parameters determined vulnerability. The analysis indicates that for reasonable parameter configurations, the small Mercosur countries are indeed vulnerable to real exchange rate developments, in the sense that the required adjustment of key macroeconomic variables is potentially large. More importantly, the larger the share of regional goods in both consumption and production, the greater is demand- and supply-side vulnerability, independently of the extent of net trade in regional goods.

Since the size of the required adjustments to a real devaluation in Brazil depends on both the size of the devaluation and the importance of regional goods in consumption and production, smaller Mercosur partners can reduce their vulnerability to Brazil in essentially two ways: by reducing the likelihood of large and discontinuous changes in Brazil's real exchange rate and by reducing the share of regional goods in consumption and production.[42] Consequently, our analysis generates two main policy implications. First, to the extent that sharp and discontinuous changes in the nominal exchange rate in Brazil translate—even if temporarily—into sharp and discontinuous changes in the real exchange rate, smaller countries should seek monetary arrangements for Mercosur that reduce the likelihood of such events. Second, smaller countries should

42. As mentioned above, all numerical results are linear in the rate of devaluation.

avoid trade arrangements for Mercosur that artificially increase their consumption and production exposure to regional goods, that is, goods that are tradable with Brazil but largely nontradable with respect to the rest of the world.

One way to reduce the likelihood of sharp and discontinuous changes in Brazil's nominal bilateral exchange rate with respect to its Mercosur partners is to set up monetary arrangements that limit Brazil's ability to alter, in a discretionary manner, the nominal (and real) exchange rate. An extreme form of such arrangement would be the establishment of a single currency for Mercosur, perhaps even convertible to the U.S. dollar.[43] The Argentine government pursued this policy initiative in the wake of the Brazilian devaluation of 1999. Given Brazil's position as the large partner of Mercosur—it represents 70 percent of Mercosur's GDP, comparable only to the size of the United States in NAFTA—and its correspondingly very low exposure to macroeconomic shocks originating in the smaller partners, it is not surprising that the Brazilian government was lukewarm to the idea of a single currency, especially one linked to the U.S. dollar or the U.S. dollar itself. Recent modifications in Argentina's Convertibility Law, however, allow for a dual-currency (dollar-euro) currency board. This might be a step in the right direction because a common currency convertible to both the euro and the dollar could weaken Brazil's reluctance to adopt a common currency.

Exposure to trade in regional goods can be reduced by eliminating special regimes and the selective imposition of high external tariffs for certain categories of goods. Special regimes, such as those prevailing for automobiles between Argentina and Brazil, tend to create artificial trade flows within the region. Selective imposition of higher external tariffs, as in the case of dairy products, creates an umbrella of protection and price differentials vis-à-vis the rest of the world for certain categories of goods. The smaller trade partners, who sell at higher prices in Brazil, have very low incentives to adopt production technologies that would make them competitive at world prices, that is, vis-à-vis the rest of the world rather than the region. This behavior tends to regionalize certain categories of goods and services and thus to increase the macroeconomic vulnerability of the economy as a whole to shocks originating in Brazil.

43. Given the high degree of financial liability dollarization in both Argentina and Uruguay, the need for some sort of dollar-based convertible currency is hard to avoid.

Political economy factors conspire against the dismantling of the prevailing high external tariffs and special regimes once they have been put in place. Although across-the-board tariff reductions might not have significant enough effects on productive sectors to merit large opposition to such measures, measures designed to eliminate special regimes could face great opposition. A decrease of the average common external tariff from 14 percent (the level prevailing in 1999) to 11 percent (the level prevailing in 1995), for example, is equivalent to a 3 percent permanent decline in the price of regional goods, which would not result in large aggregate effects according to our model. Consider the automobile industry, however. A reduction of the current 35 percent Argentine nonmember tariff to 20 percent (Mercosur's average common external tariff for the sector in 1999) would yield effects that are in the same order of magnitude as the actual devaluation of 1999.[44] In fact, the special automotive regime that was set to expire at the end of 1999 was still in place in June 2001, as the Argentine automotive industry has lobbied the Argentine government to maintain the status quo. Although this problem seems insurmountable at the present stage, the problem would have been irrelevant had it been tackled on time.[45]

This paper adds an important dimension to the theory of preferential trade agreements. The existence of regional goods adds an additional factor to consider, one that complements the well-known trade creation and destruction issues. Moreover, regional goods can impede the move toward deeper integration. Macroeconomic instability, by itself, can prove a stumbling block to regional integration even in the absence of regional goods.[46] Trade arrangements that lead to special regimes and a distorted tariff structure (in the sense that intraregional tariff preference margins are large and exhibit great dispersion) induce the artificial creation of regional goods,

44. According to the Argentine Association of Automobile Manufacturers (ADEFA), employment in the sector fell from 22,400 in 1998 to 18,500 in 1999.

45. Argentine automobile exports to Brazil totaled only U.S.$54 million in 1990 but had climbed to U.S.$2,400 million in 1997 (30 percent of all Argentine exports of goods to Brazil and 8 percent of all Argentine exports of goods).

46. This could explain, in part, why Mercosur succeeded while previous attempts failed. In fact, Mercosur's impressive performance until the 1998 devaluation owes a lot to the economic reforms implemented in Argentina and Brazil in the first half of the 1990s, together with the favorable global environment during that period. In a more hostile environment, intraregional trade would not have grown at the high rates we have documented in this paper.

thereby exacerbating the problem.[47] Arbitrary measures designed to protect inefficient sectors, while facilitating integration in the short run, can increase trade tensions and intensify the need for coordination and discretion in the long run, insofar as they regionalize the economy.

Appendix: Some Microeconomic Foundations for Regional Goods

This appendix elaborates on the microeconomic foundations for the concept of regional goods. Using a rather simple framework, we show two important results. First, the set of regional goods is a function of policy parameters such as the nominal exchange rate and the regional tariff structure (that is, the dispersion between intrabloc tariffs and common external tariffs). Second, the economy presented in the main text is a special but representative case of the one presented here.

Setup

Assume that there exists a continuum of goods distributed on the unit interval, that any good $s \in I \equiv [0, 1]$ can potentially be imported from the regional partner or from the rest of the world, and that the consumer regards imports from the region and the rest of the world as perfect substitutes. Then, if the domestic country is a price taker in world markets, the domestic prices of good s is given by

$$p(s) = \begin{cases} p(s, E)[1 + \tau(s)] / E & \text{if} \quad s \in B \\ p^*(s)[1 + \tau^*(s)] & \text{if} \quad s \in W, \end{cases}$$

where

$$\begin{aligned} B &\equiv \{s \in I \mid p(s, E)[1 + \tau(s)] / E \leq p^*(s)[1 + \tau^*(s)]\} \\ W &\equiv \{s \in I \mid p(s, E)[1 + \tau(s)] / E > p^*(s)[1 + \tau^*(s)]\}, \end{aligned}$$

$p(s, E) = E$ is the cost, insurance, and freight (c.i.f.) price (in reais) of good s when imported from Brazil, E is the real-dollar real exchange rate, $p^*(s)$

47. Furthermore, fluctuations in nominal exchange rates provide ammunition to those sectors that are inefficient and that therefore need special regimes and high tariffs in order to survive. CEI (1999), for example, concludes that some Argentine sectors with structural

is the c.i.f. price (in dollars) of good s when imported from the rest of the world, $\tau(s)$ and $\tau^*(s)$ are the ad valorem tariff rates levied on good s depending on whether good s is imported from Brazil or the rest of the world, respectively, B is the set of goods imported from Brazil, and W is the set of goods imported from the rest of the world.

To simplify the exposition, assume that $\tau^*(s)$ is piece-wise differentiable and right-hand continuous, that it is an increasing function (that is, the higher s, the higher the preference margin for good s), that $p^*(s) = 1$ and $\tau(s) = \tau$, and that the set of world goods is nonempty for the set of parameters considered.[48] Then, there exists some function, $\bar{s}(\tau^*(\cdot), \tau, E)$, such that

$$s \in W \Leftrightarrow s \leq \bar{s}.$$

For any tariff structure, given by $\tau^*(s)$ and τ, and nominal exchange rate, only a subset of all goods will be imported from the rest of the world.

It can be shown that $\bar{s}$ has the following two properties. First, it is nonincreasing in E and nonincreasing in τ. Intuitively, a depreciation of the real increases the set of goods whose price is determined by conditions in the Brazilian market. A fall in the tariff applied to regional goods leads to the same outcome, since more goods are cheaper when imported from Brazil. Second, it is nondecreasing in $\tau^*(s)$ (that is, an upward shift in $\tau^*(s)$ does not lead to a fall in $\bar{s}$).

We make the further simplifying assumption that the set of all goods, I, can be partitioned into two sets, commodities (C) and noncommodities (N), such that

$$p(s, E) = E \Leftrightarrow s \in C \text{ and}$$

$$p(s, E) = 1 \Leftrightarrow s \in N.$$

We can then define

$$T(\bar{s}) \equiv C \cup W(\bar{s}) \text{ and}$$

$$R \equiv I \setminus T(\bar{s}).$$

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competitive disadvantages (footwear, paper products, and textiles) were the most vocal in advocating protective measures for their sector throughout the decade.

48. These assumptions imply no loss in generality.

Intuitively, the set of traded goods consists of commodities and any other items that can be imported more cheaply from the rest of the world. The set of regional goods consists of all noncommodities that can be imported more cheaply from Brazil. By definition, nominal devaluations cannot change the set of commodities, but they will change the set of regional goods and traded goods. In other words, $R(\cdot)$ is nondecreasing in E. Changes in the tariff structure will also change the sets $R(\cdot)$ and $T(\cdot)$ in an intuitive way.

We now proceed to analyze the consumer's intratemporal problem. Specifically, assume the consumer solves

$$Z = \min_{c(s)} \int_0^1 p(s)c(s)ds \quad s.t. \quad z = \exp\left(\int_0^1 h(s)\log(c(s))ds\right),$$

where $h(s)$ is a differentiable probability density function that can be interpreted as the share of good s in aggregate consumption expenditures. The solution to this problem yields

$$c^* = q\frac{P_z z}{p^*},$$

$$c = (1-q)\frac{P_z z}{p},$$

$$Z = P_z z, \text{ and}$$

$$q = \int_T h(s)ds,$$

where c^* and c are aggregator functions that represent tradable and regional goods consumption, respectively, p^* and p are indexes that represent the price of tradable goods and the price of regional goods, respectively, q is the share of regional goods in aggregate consumption expenditures, and P_z is the price level. We can now corroborate the claims that the integration process can lead to a regionalization of the economy and that the model presented here is a general case of the model in the main text.

Tariff Structure and Regional Goods

The integration process has led simultaneously to a fall in average tariffs and an increase in preference margins. Consequently, we can analyze this

process in two stages. The first stage consists of across-the-board tariff reductions. We can model this as a simultaneous decline in $\tau^*(s)$ and τ, which leaves the set of regional goods unchanged. Specifically, suppose that

$$\frac{d\tau^*(s)}{1+\tau^*(s)} = \frac{d\tau}{1+\tau} < 0 \quad \text{for all } s.$$

This implies that neither $\bar{s}$ nor the set of regional goods R changes. In the second stage, the common external tariff is raised for all goods. Hence, $\bar{s}$ falls, and the set of regional goods and the share of regional goods in consumption increase. This leads precisely to a regionalization of the economy.

The presence of E as an argument in the functions above implies that the setup presented here is more general than the one used in the main text. In particular, a nominal devaluation not only changes the price of regional goods (that is, $s \in R$), but it also increases the amount of goods that are regional, since $\bar{s}$ is nonincreasing in E. However, the model presented in the text is a special case of the model presented here when the set of regional goods is fixed. In our setup, for example, this can easily be motivated by assuming that $\tau^*(s)$ is a step function. In that case, almost everywhere, a small change in E will not change the set R.[49] The elasticities of the price of tradable goods and the price of regional goods and the price index equals 0, 1, and $q - 1$, respectively. These elasticities are the same as in the original model, so the intratemporal problem of the consumer does not change. The key difference is that now q is not exogenous, but rather depends on the tariff structure. Hence, the dispersion in tariffs brought about by the integration process does indeed lead to a regionalization of the domestic economy. Since these results are the same as those that hold in the model presented in the main text, the latter model is a special case of the one derived here.

49. The assumption that the set of regional goods is fixed is similar to the assumption in the main text that the intratemporal utility function is Cobb-Douglas, which also implies that the share of consumption in regional goods is independent of the price of regional goods.