Impact of Trade and Macroeconomic Policies on Agricultural Growth: The South American Experience

Alberto Valdés

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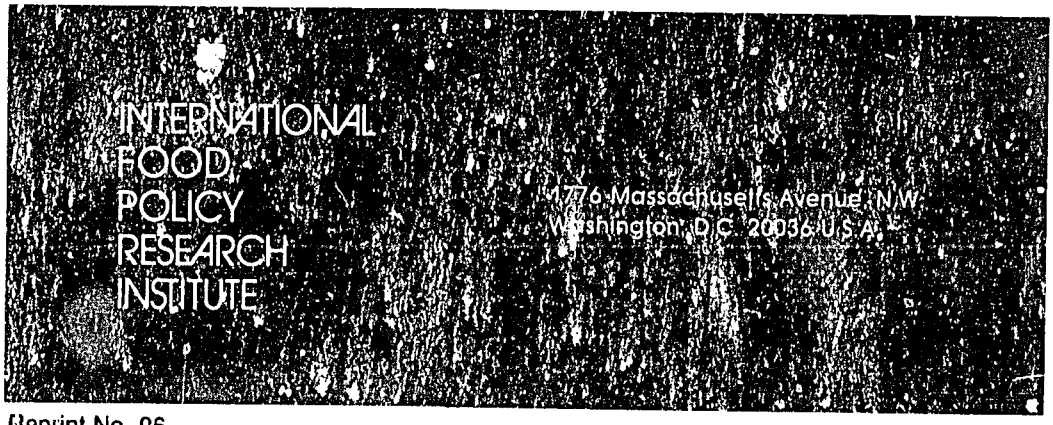

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CHAPTER X

Impact of Trade and Macroeconomic Policies on Agricultural Growth: The South American Experience

*by Alberto Valdés**

Introduction

The underlying thesis of this chapter is that agricultural growth is strongly affected by developments in other sectors of the economy, particularly through the trade and macroeconomic policies of the government concerned. This interaction is of special significance in many developing countries where agriculture is the backbone of the economy and a highly tradeable sector.

Intervention in agricultural markets is a worldwide phenomenon. To guide such intervention, governments use expenditure and incentive policies designed to stimulate agricultural growth and promote domestic food security. New roads are built. Irrigation and storage schemes are devised. Agricultural trade restrictions are imposed in the form of import tariffs and import/export licensing. Exports are sometimes subsidized, sometimes taxed. Prices in input and output markets are supported or fixed. These measures represent the sector-specific interventions.

However, other policies directed at trade and macroeconomic management of the economy are of the utmost importance to agriculture. Changes

*Director, International Food Trade and Food Security Program, International Food Policy Research Institute, Washington, D.C. Dr. Valdés contributed this paper at the invitation of the Inter-American Development Bank.

in industrial protection, government spending, international capital flows, wages, and nominal exchange rates can reinforce or neutralize such sector-specific policies as government expenditure and investment programs. Sustained sectoral growth requires resource flows between sectors that adjust to their relative opportunities over time. For an understanding of the dynamics of growth, an economy-wide view of returns is therefore necessary.

Perhaps the best way of studying how a government's macroeconomic decisions and policies towards other sectors affect agriculture is to evaluate the effects of such policies on the real exchange rate (RER), since correct RER alignment is required if a country is to take advantage of the growth opportunities offered by international trade. The RER can be defined as the ratio of the price of tradeables to the price of nontradeables. The prices of tradeables are determined by world market prices, nominal exchange rates, and trade policies. The prices of nontradeables i.e., home goods and services, are determined domestically, by changes in domestic supply and demand. The RER plays a central role in the profitability of tradeables—both import-competing (such as cereals) and exportables—in agriculture. It is indeed through the RER that the trade and macroeconomic management of the economy affects agriculture. And, it will be argued in the text, the RER provides a long-term signal for the allocation of resources among various sectors. Hence the importance of the RER in the process of growth.

In most countries, agriculture has a larger tradeable component than the rest of the economy. For example, in Argentina, Colombia, and Chile, tradeables account for over two-thirds of that sector's economy. On the other hand, the nonagricultural sectors in these countries are characterized by a larger portion of nontradeables. In Colombia nontradeables such as banking, commerce, transportation, public services, and construction and housing account for more than 50 percent of nonagricultural activity (Garcia/Montes, 1986).

In the late 1970's and early 1980's, Latin American countries faced complex issues of adjustment and growth. Their difficulties have been attributed to both the international economic environment and domestic economic policies. Although international economic conditions are crucial to an understanding of an economic environment, this study targets domestic policies.

In attempting to elucidate in a long-run context the impact of trade and macroeconomic policies on agricultural growth, the approach used in this chapter is broader than that of most studies on agricultural policies; it postulates that agricultural incentives are derived as much from foreign trade and macroeconomic policies as from sector-specific interventions. Apart from a few studies, this approach has remained outside the scope of the debate on development strategies.

How foreign trade and macroeconomic policies affect the structure of incentives to a predominantly tradeable sector such as agriculture in Latin America is the subject of the first section. As will be seen, an understanding of the process of determining the equilibrium RER and of movements of this rate is crucial. The second section reviews quantitative evidence on the RER

and its effects on relative prices relevant to agriculture, in the light of the experience of Argentina, Chile, and Colombia during the 1960-83 period. The final section examines the particularly puzzling problem of the relationship between the aggregate supply response of agriculture and the structure of incentives, assuming that such incentives represent the combined effect of sector-specific interventions and trade and macroeconomic policies.

The Impact of Trade and Macroeconomic Policies on Incentives for Agriculture: A Real Exchange Rate Approach

The real exchange rate is perhaps the most influential price affecting incentives for agriculture. Although short-run fluctuations in the RER have some significance, resource flows between the agricultural and the nonagricultural sectors can best be assessed by focusing on the long-run equilibrium value.

There are two major categories of exchange rates: the real exchange rate, which can be measured in several different ways according to the deflator used, and the nominal exchange rate.

The *nominal* exchange rate is an undeflated factor used for converting one currency into another; it is the exchange rate a government can announce or attempt to fix. The *equilibrium nominal* exchange rate is that rate at which the demand and supply of foreign exchange (for financing both current and autonomous capital account transactions) are equal for a given set of trade taxes and subsidies. The *purchasing power parity rate* (PPP) is the nominal exchange rate corrected by the ratio of foreign to domestic prices in an equilibrium base period. The equilibrium nominal rate and the PPP rate do not necessarily represent an optimum exchange rate, nor do they correspond to the *shadow price* of foreign exchange used in social project evaluation.

An important factor in analyzing single activities is the *nominal effective* exchange rate—the price of foreign exchange inclusive of taxes imposed on its purchase. For a given country, differences in the effective exchange rate reflect differences in the export taxes or protection levels imposed on the activity concerned. This measure is clearly commodity specific, and thus more suitable for analyzing the differential impact of trade policy on traded goods.

Previously, the equilibrium RER was defined in terms of the PPP. The traditional PPP approach has major shortcomings. One is that, unlike what is implied by the PPP, over time the RER is not constantly in equilibrium. In fact, changes in RER levels do not necessarily imply RER misalignment. On the contrary, to accommodate external shocks changes in the RER are required. However, recognition of the relationship between supply and demand for tradeables, and of the fact that changes in the current account depend on their prices relative to those of nontradeables, has led to a new perception of the RER. As a measure of the degree of competitiveness of the tradeables sector, the RER is now defined as the ratio of prices of tradeables

to prices of nontradeables.[1] The terms RER appreciation and depreciation refer to a fall and rise in the RER, respectively.

As a relative price, the RER reflects the impact of trade and macroeconomic policies on the prices of tradeable and nontradeable goods in the aggregate. As explained in Dervis *et al.*, a given nominal devaluation is consistent with smaller, greater, or equivalent real devaluations, depending on the adjustment in the prices of nontradeable or home goods that results from the nominal devaluation. Labor is the single most important market determining this relationship between nominal and real devaluation, since wages are the principal determinant of changes in the prices of home goods.

Thus, the RER is to be understood as a long-term signal for the allocation of resources among various sectors. As such, its significance as a policy tool is somewhat removed from the day-to-day concerns of the central bank, whose task is to manage the nominal exchange rate in the face, inter alia, of fluctuations in the prices of a country's principal imports and exports, and in international interest rates.

Only three types of policies are available to a government in its efforts to affect the RER: trade policy; policy towards capital movements (including reserve changes and foreign borrowing and assistance); and fiscal policy. A government alters the nominal rate in an effort to modify the real rate. Changes in these rates move simultaneously across all traded activities. But movements in the real rate result not only from adjustments in the nominal rate but also from the behavior of wages, variations in the capital account, and fiscal and monetary variables. They are all factors in the final outcome. The RER can move for autonomous reasons, for example an oil discovery associated with the Dutch disease phenomenon,[2] or a drastic short-run shift in terms of trade such as a coffee boom.

Since most agricultural products are tradeables, the main result of RER changes will be changes in resource flows, essentially of savings and labor, to and from agriculture and the other sectors, i.e., the nontraded, nonagricultural sector and the protected tradeable goods sectors in industry.

Trade and RER issues are best analyzed with a disaggregated version of RER, which allows the relative prices of import-competing, nontraded goods, and exportables to be brought into focus. Furthermore, to analyze

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[1]Home (or nontraded) goods are goods whose prices are not directly deduced from world prices plus tariffs. The prices of home goods become the reference point, since the home goods sector is to some extent sheltered from trade. This domestic sector is a residual sector absorbing resources from and spilling them to the traded sectors as relative prices change. In most developing countries it is a large sector, and includes subsistence agriculture and services.

[2]The Dutch disease "problem" was originally raised in relation to gas exports in the Netherlands, North Sea oil in Britain and minerals in Australia. To the extent that an export boom is expected to be temporary, the real appreciation of the exchange rate which is likely to occur will have adverse effects on other tradeable goods sectors. A real appreciation will result, for example, from a rise in nominal wages and in prices of non-tradeables while the nominal exchange rate is fixed.

the impact of macroeconomic policies on agriculture, it is useful to divide an economy into six subsectors, as illustrated in the following table.

	Nonagricultural	Agricultural
Importables	Most industrial products, final machinery, and intermediate products	Cereals, dairy products, beef
Exportables	Minerals, oil, textiles, other industrial products	Sugar, cotton, coffee, bananas, beef, cereals, fruits
Home Goods	Communications, transportation, banking, housing and other construction, commerce, and public services	Cassava, yams, some varieties of beans

Despite the difficulties inherent in the analytical and empirical applications of the concept of an equilibrium RER, a sketch of the interrelations between the determinants of the RER is attempted below.

Trade Policy and the Exchange Rate: Compensating Agriculture for Protection to Other Industries

Industrial protection helps industry at the expense of agriculture. This fact is usually ignored by the partial equilibrium view so common in justifying assistance to industry. However, a policy that protects industry raises the cost of importable inputs such as fertilizers, machinery, and other materials used by farmers. The resulting changes in the RER can indirectly, and possibly more severely, penalize producers in other import-competing industries and in the exportables sector. As domestic import prices increase in response to import restrictions, import demand declines and the "surplus" generated in the trade account requires a lower RER if external equilibrium is to be restored. Thus, the exchange rate that maintains a balance in the external account at the prevailing, "higher" rate of protection to industry is below the RER at lower levels of protection. Why?

Import restrictions are taxes. Whether direct such as tariffs, or indirect such as quota rations, these taxes have the same effect: they increase the prices of imported protected goods compared with the prices of exportables, home goods, and other importables. Who pays these taxes?

Initially, the import tax is paid by the direct consumers—farmers and households alike. But eventually wages, and the prices of home goods, are also driven up. The sector that is especially hard hit is exportables. Since exportables must be priced to compete on world markets, exporters cannot raise prices to recoup the high costs of industrial protection. In Latin America, the losers are usually the exporters of agricultural products.

In addition to these cost pressures on the unprotected sectors, import restrictions cause prices of different goods and services to change in different ways. Protectionism increases the prices of industrial imports against those of exports, home goods, and other unprotected sectors. Theoretical and methodological advances in recent years have elucidated the nature of some

of these relationships (Dornbusch, 1974; Sjaastad, 1980; and others). The different price changes can be measured, as can the resulting changes in output and demand.

A striking consequence of import price hikes in many Latin American countries is that the prices of home goods—which are closely related to wage levels—rise nearly as much as import prices, which thus reduces "true" protection. And export industries and unprotected sectors are even worse off. Empirical studies of the economies of Colombia, Uruguay, Argentina, Chile, Brazil, and Peru confirm that exporters in all these countries, and producers of import-competing foodstuffs in some of them, have paid at least half the cost of industrialization programs (Clements and Sjaastad, 1984). Government policy controls nominal protection through commercial policy. But the incidence of trade policy on resource allocation and income distribution will depend on "true", not on nominal, protection. "True" protection measures the changes in the prices of the protected activity relative to the prices of home goods and other tradeables. The discouragement to agricultural tradeables is usually across the board and affects exportables as well as import-competing commodities. Moreover, this penalty cannot be removed by nominal devaluation. Indeed, as long as industry is highly protected, agriculture will suffer the consequence of a lower RER.

In the case of export promotion policies, such as tax rebates, drawbacks, export credit subsidies, and direct subsidies on inputs, the equilibrium RER is reduced by permitting a higher level of exports. However, in most Latin American countries, agricultural exports have not received such export subsidies. In fact, in some of them, for example Argentina, agricultural exports were subject to export taxes. Furthermore, input subsidies on exportables were usually small compared with import protection on industrial products.

However, although large-scale trade liberalization efforts in the form of reductions in import tariffs and export taxes, will help reduce the anti-export bias of previous policy, trade liberalization *per se* does not guarantee an increase in the RER. The reason is that accompanying macroeconomic policies can offset the increase in the RER resulting from lower import restrictions, and a reduction of export taxes tends to appreciate the RER.

Government Spending

Let us consider an economy with continuous budget deficits and consequently a chronic balance-of-payments problem. If the foreign trade deficit is met mainly by foreign borrowing or assistance, the RER will drift down to a level lower than it would otherwise have had. This downward drift will work against the entire tradeable component of agriculture, both exportable and import-competing. On the other hand, if the balance of payments problem is tackled by means of quantitative import restrictions or by explicit tariffs (rather than by devaluation), the consequence for the exportable sector of agriculture will be clearly adverse, and the favorable impact on agri-

cultural import-competing components will depend on how much these policies restrict farm imports.

The link between the RER and government spending goes beyond budget deficit problems. The distinction between real private and real government expenditure is that (from the demand side), in most cases, the government's propensity to spend on home goods will be higher than that of private agents, and that private agents react more to changes in relative prices and disposable income.

As argued by Rodriguez (1980), expansionary government spending could raise the relative prices of home goods, which would reduce the RER and vice versa. This effect would occur regardless of whether the additional expenditure by the government is financed by domestic borrowing (which possibly will increase interest rates and thus crowd out the private sector), by an "inflation tax" (which decreases the real balances of private agents), or by higher taxation. Thus, government expenditures can affect the level of private spending (and thereby the RER) through changes in interest rates, tax revenues, and/or through a transfer of income from private agents through the "inflation tax".

Whether or not financing increased expenditures through foreign borrowing eliminates the crowding out of the private sector is unclear; but some appreciation of the RER will occur as a result of the expansion in total expenditure, since some of this additional spending will go to home goods, and a reduction in private spending is unlikely. In most cases, a principal link between the RER and an expansionary fiscal policy is the effect of such policy in raising the level of wages in the economy. The end result could be a fall in the profitability of producing tradeables (which at constant nominal exchange rates have exogenously determined prices) rather than nontradeables (whose prices would rise).

Thus, increases in government expenditure lower the RER, which in turn causes the relative profitability of producing tradeables to fall, and affects consumption by promoting a switch to tradeables, which expands imports and reduces the export surplus. The result in both cases is the imbalance in the current account often associated with increased government spending.[3]

Changes in Terms of Trade

Another determinant of the RER is the ratio of export to import prices and is known as the terms of trade (TOT). How the TOT affect the RER varies according to the nature of the change in TOT and is the result of two oppos-

[3]Dornbusch argued that two fiscal budget-related factors often induce a lag in a real depreciation of the exchange rate. One is a devaluation, which raises the budgetary cost of servicing the public foreign debt; the other is the foreign exchange rate guarantee. Thus, in a situation of public foreign debt and Central Bank exchange rate guarantees, there is a tendency to overvalue as a means of avoiding an increase in the fiscal deficit.

ing forces, usually described as the income and substitution effects. For example, the resulting higher export prices augment disposable income, and the country becomes richer. Upward pressure on the domestic demand for tradeables and home goods boosts the prices of home goods, which leads to a lower RER. The opposite occurs with a fall in TOT. At the same time, there is a substitution effect, which raises the domestic prices of exportables relative to those of importables and home goods.

An improvement in TOT via a reduction in the foreign prices of importables reduces the domestic prices of importables relative to those of home goods and exportables, and induces an expansion in demand and a fall in the supply of importables, with a concomitant increase in imports, deterioration in the trade balance, and a depreciation of the RER. The income effect works in the opposite direction; it raises the prices of home goods and thus appreciates the RER.

The effect on the RER of changes in the TOT must be analyzed within a country context. We cannot determine *a priori* what the effect of changes in TOT on the RER will be. We must know whether the export price variable or the import price variable changes, the extent of the substitution between home goods and imports and exports, the shares of imports and exports in tradeables, and the degree of resistance to downward adjustments in the prices of home goods. In countries such as Argentina and Chile, the TOT are more affected by export price changes. A negative correlation between changes in the TOT and the RER would be expected. But in countries where changes in import prices are more important, the net result is difficult to predict.

Foreign Capital Movements

Capital movements can substantially influence the RER. A policy of heavy overseas borrowing can lower the RER, as happened in Argentina and Chile in the late 1970's and early 1980's. Conversely, a policy of large overseas investment can raise the RER. The adverse effects of a booming export sector on the nonbooming tradeable sectors can then be reduced by a conscious policy of foreign exchange sterilization. This policy might include the retirement of previously contracted foreign debts, a conscious policy of overseas investment, and accumulation of foreign exchange receipts by the central bank. These related issues are discussed in this and the following section.

For the foreseeable future, many Latin American countries will be forced to devalue their currencies if they are to achieve or maintain a RER high enough to generate an export surplus proportionate to their foreign debt repayment. Their debt could thus become a strong stimulus for expanding agricultural production in the region, given the high tradeability of its agricultural sector.

Have countries given agriculture signals consistent with the increased scarcity of foreign exchange? What fraction of the required export surplus will come from export or import substitution in agriculture? These are important questions for most of Latin America today. The current situation is

the reverse of that in the late 1970's, when large foreign borrowing by several Latin American economies contributed to a net appreciation of their RER.[4] Thus, indirectly, the large net capital inflows during the late 1970's severely constrained the growth of agricultural production by reducing the competitiveness of agricultural tradeable goods.

The connection between capital flows and the RER may be summarized as follows: for a given level of international reserves, equilibrium in the balance of payments requires a higher balance in the capital account, which lowers the balance in the current account. In other words, a larger net inflow of capital will induce a lower RER and reduce the surplus in the current account. This relationship can be expressed by the identity $(C/y) + (K/y) - (GR/y) = O$, where C, K, GR, and y represent current account, capital account, a change in reserves, and total product, respectively.

Moreover, to take the dynamic adjustments in capital flows into account, several adjustments must be made in the identity, as shown by Edwards (1985). In the long run, the balance in the capital account is a function of a "desired" level of foreign indebtedness. If one is prepared to express numerically the "desired" levels of international reserves and foreign debt, for an expected growth rate, the RER level becomes determinable as a function of these parameters.[5]

These long-run "desired" levels link the volume of capital flows controlled by private agents with capital controls, government foreign borrowing, domestic trade policy, and the level of international interest rates. Although these links are crucial in the determination of the RER, since they affect RER movements from one equilibrium to another, they are, unfortunately, most difficult to quantify.

Export Booms and the Dutch Disease Phenomenon

Macroeconomic developments, and specifically the wide and unpredictable fluctuations in the TOT that influence those developments, make it difficult to determine and maintain a RER consistent with long-term growth objectives and export diversification. Large and exogenous changes in export prices associated with a booming sector and the Dutch disease phenomenon fall into this general category. The large influx of foreign exchange resulting from high oil export prices in the 1970's into Mexico and Venezuela and from high world prices of coffee into Colombia (where coffee represented 55 percent of merchandise exports in 1970–82) has been linked to a real appreciation of the exchange rate, which in turn affected the exchange rate applied to importables and to nonoil and noncoffee exports.

This appreciation occurs because the "spending" effect of this addi-

[4]Capital outflows, of course, have the opposite effect.

[5]It is a difficult task, since a country's desired ratios of both international reserves and debt to income are not necessarily constant through time, and are themselves a function of the evaluation by foreign lenders of the country risk.

tional income can raise the demand for both tradeables and nontradeables, and increase the prices of the latter. In addition, the "resource movement" effects of new revenues can induce higher employment in the booming sector and/or higher government expenditure and move labor from agriculture to the services and government sectors.[6] Thus, the export boom can result in a loss in competitiveness of nonoil or noncoffee tradeables, the extent of which will depend on the success of sterilization policies.[7] The paradox is that even a promising development such as the discovery of petroleum resources or a sharp rise in the world prices of certain exportables can have an adverse impact for a period of several years on the rest of the tradeables, particularly in agriculture.

Recapitulation

So far, we have described the determinants of the equilibrium RER. For RER management, we need a measure of the difference between actual and "equilibrium" prices of tradeables relative to nontradeables in the absence of interventions for every year of the time period in question. While calculation of the RER adjustment should be attempted, it should be borne in mind that the conceptualization and quantification of such normative issues as the desired size of government expenditures, foreign capital flows, and trade interventions is an extremely complex matter.

An equilibrium RER represents that relative price of tradeables to nontradeables which is consistent with a sustainable long-run equilibrium in a country's external account.[8] Black market exchange rates and short-run values are not necessarily good indicators of the long-run disequilibrium in the RER. Success in equilibrating the current account over time is affected by the desired rate of capital inflows to the private and public sectors, the desired rate of accumulation of foreign assets by domestic residents, a long-run desired level of protection and size of the government sector, and the compatibility of the policies with full employment. Changes in the TOT are certain to affect the management of the RER. Attempts to estimate possible RER misalignment therefore involve judgements as to the desired level of protection, government expenditures, and openness of the trade and foreign

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[6]A Dutch disease type of model is discussed in W.M. Corden and J.P. Neary, "Booming Sector and De-Industrialization in a Small Open Economy," *Economic Journal*, 1982. An application of the model to the noncoffee sector in Colombia is to be found in S. Edwards, Appendices A and B in V. Thomas, *Linking Macroeconomic and Agricultural Policies for Adjustment and Growth in Colombia*, World Bank (Johns Hopkins University Press, Baltimore, 1985).

[7]A sixth determinant, not discussed here, is the secular effect of differential changes in preferences and/or productivity. In the long run, productivity could increase faster in tradeables than in the home goods sector. Other things being equal, this faster increase stimulates competitiveness and tends to reduce the RER, which makes home goods and services more expensive.

[8]That is, when income equals expenditure and both traded and home goods markets are in equilibrium. A good presentation of the concept of the equilibrium RER is to be found in Edwards (1985). Assuming equilibrium in the monetary sector, long-run equilibrium in the external accounts implies compatibility with long-run equilibrium in the home goods market.

capital account. In the next section we examine some of these empirical estimates for Latin America.

Review of Quantitative Evidence on the RER and Its Effects on Incentives for Agricultural Growth

On the Determinants of RER

There is no single method for estimating the degree of misalignment of the RER in a particular country and the order of magnitude of any such estimates should be considered approximate. Since empirical attempts to construct a model of the determinants of the RER are plagued with measurement problems, proxies must be used for several latent variables.[9]

Table X-1 presents a synthesis of the findings of various studies of South American countries. As may be seen, in the Cavallo and Cottani study, the import restrictions variable was significant for all the countries except Chile. However, strong evidence of how a lower overall rate of protection would

Table X-1. Empirical Relations between the Real Exchange Rate (RER) and Its Determinants[1]

		Import Restrictions	Terms of Trade	Govt. Expenditure	Capital Inflows
Argentina	(a)	(+)	(−)	(−)	(−)
	(b)	(−)			
Brazil	(a)	(−)	(ns)	(ns)	(+)
Chile	(a)	(ns)	(ns)	(ns)	(−)
	(c)	(−)	(+)	(−)	
Colombia	(a)	(−)	(ns)	(ns)	(−)
	(d)	(−)	(−)	(−)[2]	
Peru	(a)	(−)	(ns)	(−)	(−)
	(e)	(−)	(−)		

Symbols: (+) indicates positive correlation
(−) indicates negative correlation
(ns) results are statistically insignificant.

[1]RER as dependent variable, estimation using multiple regression technique.
[2]For noncoffee exportables.
[a]Cavallo and Cottani (1985) for the World Bank, unpublished. Their measure of the RER is not the same as that used in (b), (c), and (d) below.
[b]Sturzenegger (1986), unpublished.
[c]Hurtado, Muchnik, and Valdés (1986), unpublished, covers 1960-82. Real wages refers to salaries in the government sector.
[d]Garcia and Montes (1986), unpublished.
[e]Valdés, 1985.

[9]The fact that most official price statistics do not discriminate between tradeables and nontradeables has stimulated considerable debate on the most appropriate proxy for measuring the actual RER. While price series have been constructed for some countries, a readily obtainable proxy is $RER = Eo_t * (WPI^f/CPI^d)$, where Eo represents the nominal exchange rate and WPI^f and CPI^d represent the wholesale price index of the major trading partners and the domestic cost-of-living index, respectively.

have raised the RER is suggested in the studies on Chile, as well as on Peru, Brazil, and Colombia. A freer trade policy during the 1960's and 1970's would have raised the RER substantially in these countries.

In the case of Argentina, Sturzenegger concludes that the overvaluation of the RER was approximately 27 percent. Changing commercial policy by removing current export taxes equivalent on average to 14 percent on all exportables during the same period, would have substantially decreased the overvaluation, and increased the prices of exportables relative to those of home goods. The equilibrium reduction in the nominal exchange rate induced by an increase in exports would, however, offset part of the increase in the RER.

In Peru and Colombia, import protection has lowered the RER and adversely affected the competitiveness of the unprotected tradeables sectors, since the RER declined and the domestic prices of importables rose. If both export taxes and import restrictions are removed, the RER would rise considerably above its former level, in view of the predominance of the effects of import over export restrictions and the relevant elasticities.

In an analysis of the Peruvian trade regime during 1966-83, Valdés (1985) concludes that an increase of 10 percent in the tariff on nonagricultural imports results in an implicit tax of 10 percent on agricultural goods. With respect to home goods, the implicit tax on agriculture varies. On import-competing agricultural activities such as rice, the implicit tax is 5.6 percent. In the case of exportable agricultural goods such as cotton and sugar, the implicit tax is calculated at 6.6 percent. Similar calculations based on increased protection of agricultural importables or on increases in the prices of agricultural exportables showed a smaller impact on the prices of home goods.

In Peru the RER fell steadily from the mid-1960's to 1977, recovered slightly in 1978 and 1979, and then fell again until 1983. This decline in the RER seems to have been induced in part by the industrialization strategy in Peru. In fact, the evolution of the uniform tariff equivalent suggests that during the 1960's and 1970's the Peruvian economy became more closed, with increased restrictions on trade. The profitability of producing agricultural tradeables (cereals, export products, oilseeds), vis-à-vis nontradeables and protected industrial products in the nonagricultural sector, was significantly reduced. Declines in the long-run RER have harmed the production of agricultural tradeables in Peru and increased domestic consumption of tradeables (imported cereals and exportables), reduced the contribution of agriculture to growth and to the balance of payments, and made the country more dependent on imported food.

Although the TOT effect on the RER is statistically insignificant for most countries in Table X-1, increases in the TOT are positively correlated with the RER in Chile, while Cavallo reports a negative coefficient in his study of Argentina.

According to Cavallo's estimates, fiscal expenditure had a significant impact on the RER only in Argentina and Peru. Capital flows and monetary

and exchange rate policy influenced the RER significantly in all five countries. The Chilean study by Hurtado *et al.* concludes that, when wages in the public sector increase beyond productivity growth, the prices of home goods rise. Thus, the related increases in total absorption (domestic expenditure) relative to GDP are associated with a depressive effect on the RER.

A well-documented assessment of the links between capital flows, exchange rates, and macroeconomic policies is presented by Corbo and de Melo (1985) for the Southern Cone countries. For example, in his analysis of Chile's reforms and macroeconomic adjustments during the period 1974-84, Corbo (1985) argues that the large foreign debt accumulated was partly the result of a major policy error. This error was the use of the exchange rate to stabilize prices without due regard to the incentives to large capital inflows during a time of exceptionally high liquidity in international capital markets. Corbo and de Melo (1985) found that, if capital inflows had been 50 percent lower in 1980 and 1981, the equilibrium exchange rate would have been 13 percent higher. The peso appreciation and ensuing loss in competitiveness of the tradeable sector between 1979 and late 1981 was about 29 percent (Corbo, 1985). This lower RER was a major force behind the sharp slowdown in the production of cereals, oilseeds, and livestock products observed in Chilean agriculture during those years. In contrast, from 1982 to 1984, domestic production of cereals in Chile increased by approximately 48 percent; this increase coincided with reforms in the exchange rate system and macroeconomic policies, including wage deindexation, which led to a significant rise in RER.

Other relevant studies are those on the Colombian coffee boom by Thomas (1985) and Garcia/Montes (1986). In the late 1970's, a coffee boom set in motion a rapid growth in the money supply and inflation, despite the stabilization efforts of the Colombian authorities. The deceleration in the depreciation in the crawling peg exchange rate led to an appreciation of the RER, which reduced incentives to produce noncoffee agricultural tradeables. This deceleration occurred at a time of growing fiscal imbalance, which contributed to inflation. Although some attempt was made to increase agricultural incentives through sectoral policies such as higher import protection, domestic price supports, and credit subsidies, these policies were directed only at import-competing cereals and ignored a vast agricultural sector. In such a case sectoral assistance can be justified as temporary compensation until the necessary macroeconomic adjustments become effective.

Although preliminary, some of the findings are the outcome of imaginative efforts to determine the impact of the forces behind the RER. Links between the RER, commercial and fiscal policies, and the capital account can now be calculated for specific countries, as in studies by Sturzenegger, Hurtado *et al.*, Thomas, and Garcia/Montes; this country-specific approach lends itself to a richer specification of the interactions between the variables.

For a sectoral-level analysis, the following section compares the effect of "direct price" intervention, which results from explicit agricultural price pol-

icies (including trade policies specific to agricultural products) with the effects of "indirect" or economy-wide policies, which affect the relative prices of the sector.

On Measuring Agricultural Terms of Trade

To measure incentives to agriculture in a long-term perspective, one can compare the actual structure of relative prices with what the structure of prices would have been in the absence of price interventions in the relevant sectors. Price interventions for agriculture can then be defined as the difference between the prevailing prices, both in agriculture (Pa) and in the nonagricultural sector (Pna), and those prices that would have prevailed in the absence of price interventions (Pa* and Pna*). The expressions for measuring the terms-of-trade effect are presented in the Appendix.

The total level of price intervention equals the sum of the effects of economy-wide policies and of the agricultural-commodity-specific price interventions. The sector-specific interventions consist of agricultural price controls and trade barriers to agricultural products. The economy-wide interventions capture the overvaluation of the RER that may result from commercial as well as monetary, fiscal, and exchange rate policies designed to cope with unemployment, government expenditures, protection to the nonagricultural sector, and capital flows. In small open economies (i.e. price takers in world markets), which include most Latin American economies, trade and macroeconomic policies might very well have a stronger and even opposite effect on agricultural prices than policies designed specifically to benefit agriculture. Measures of direct and total price interventions (from which indirect price interventions can be derived) in Argentina, Chile, and Colombia are presented in Table X-2.

In Argentina, between 1960 and 1984, agricultural and economy-wide policies taxed wheat, beef, and corn production, as indicated by the negative signs in Table X-2. This finding could have been anticipated in view of the explicit export taxes on some agricultural exports (the highest of which were applied during years of high world prices such as 1974–75). Direct price interventions reduced the domestic price between 12 and 42 percent for wheat, and between 11 and 35 percent for beef. Economy-wide interventions added a substantial amount to the total taxation on the production of these goods, as shown in column (b) of Table X-2. For example, during the period 1981–84, the effect of economy-wide price interventions added 29.2 and 39.5 percent to the total tax on wheat and beef, respectively, over and above the direct taxation of 17.3 and 13.8 percent. Of course, domestic consumers were better off. As a result of direct taxation of exports, prices to domestic consumers during 1960–84 were subsidized between 12 and 42 percent for wheat and 11 and 35 percent for beef. Fiscal revenue objectives and a policy of cheap food for urban consumers were undoubtedly very strong economic and political motives behind the taxation of agricultural exports in Argentina

Table X-2. Average Annual Direct and Indirect Price Interventions to Agricultural Producers

ARGENTINA	(a) Direct Price Interventions			(b) Total (Direct and Indirect) Interventions		
Years	Wheat	Beef	Corn	Wheat	Beef	Corn
		(percent)			(percent)	
1960-65	-19.7	-35.3	-5.4	-41.6	-53.0	-31.1
1966-70	-12.3	-26.9	-13.7	-37.8	-47.7	-38.7
1971-75	-42.3	-28.8	-38.9	-55.8	-46.1	-53.7
1976-80	-22.6	-11.1	-22.4	-48.1	-39.7	-47.8
1981-84	-17.3	-13.8	-18.7	-46.5	-53.3	-47.7

CHILE	(a) Direct Price Interventions			(b) Total (Direct and Indirect) Interventions		
Years	Wheat	Beef	Milk	Wheat	Beef	Milk
		(percent)			(percent)	
1960-65	7.6	-12.0	214.8	-42.5	-53.4	67.4
1966-70	9.2	-25.3	166.2	-29.3	-51.4	73.6
1971-75	-17.3	-33.4	86.1	-49.9	-59.3	25.3
1976-80	16.5	-16.0	113.4	20.8	-12.9	93.0

COLOMBIA	(a) Direct Price Interventions			(b) Total (Direct and Indirect) Interventions		
Years	Wheat	Cotton	Coffee	Wheat	Cotton	Coffee
		(percent)			(percent)	
1960-65	24.2	10.7	-18.0	11.6	-0.6	-10.1
1966-70	24.3	15.6	-34.6	9.7	1.9	-11.7
1971-75	-8.3	-0.1	-35.0	-16.1	-8.5	-8.5
1976-80	4.9	2.6	-49.1	-7.2	-9.1	-11.4
1981-83	20.2	11.6	-34.4	1.3	-5.9	-15.6

Source: Sturzenegger for Argentina; Hurtado, Muchnik, and Valdés for Chile; and Garcia and Montes for Colombia.

The situation in Chile illustrates the strong effect of economy-wide policies on incentives to farmers. While beef producers were subject to both direct and indirect taxation throughout the period, wheat growers received slightly positive nominal protection (except during 1971-75, when world prices were high), and dairy farmers received a very substantial level of nominal protection during the entire period. As shown in Column (b) of Table X-2 for Chile, economy-wide intervention substantially reduced the net level of protection to milk production, but nonetheless left that sector with levels of overall protection of between 25 and 93 percent through the rest of the period 1960-1980. In contrast, for wheat the slightly positive direct protection was more than offset by substantial indirect taxation, which resulted in overall taxation during the period 1960-1975. For beef production, economy-wide interventions added from 26 to 42 percent between 1960 and 1975, yet had practically no effect during the period 1976-80.

In Colombia, coffee producers were taxed throughout the period 1960-

83 (Table X-2). However, part of this export tax was used to improve world coffee prices under an international commodity agreement between large coffee exporters. How much of it was an "optimum" export tax and how much was determined by fiscal revenue motives is unclear. Wheat and cotton in Colombia present the opposite case—that of an import-competing activity, and an exportable, respectively—with substantial nominal protection for wheat production (except in 1971-75) and lower protection (positive) for cotton. Adjustment for economy-wide interventions substantially reduces real protection for wheat and cotton production (Table X-2). In fact, it results in negative (total) protection for wheat and cotton between 1971-80, and negative protection for cotton during most of the period except in 1966-1970.

As may be observed for Argentina, Chile, and Colombia the effect attributable to economy-wide policies on relative prices in agriculture has in most cases been larger than the effect of sectoral (direct) price policies. This economy-wide effect represents in essence the impact on the RER of the trade, fiscal, and monetary policies followed during this time.

So far, the focus has been on the effects of economic policies on incentives to agriculture. These incentives are the signals to which economic agents can react. But do they react? Is the supply of total agricultural output "responsive" to incentives in the long run? These issues are discussed below.

On the Output Response of Agriculture

Implicit in much of the literature on infant industry is the assumption that agriculture is destined for a static role technologically while industry is dynamic: that is, that, while individual crop output responds to price movements, the aggregate supply of agricultural products from the sector as a whole is quite unresponsive to incentives—the so-called (aggregate) supply inelasticity of agriculture in Latin America. If that assumption is correct, the "social cost" of using agriculture as a "tax" base for economic development is low. In this chapter, agricultural taxation is used to mean not land or income taxes, but trade taxes and quantitative restrictions, or more generally the terms of trade of agriculture vis-à-vis those of the rest of the economy.

This author challenges that assumption. Moreover, an examination of the conventional arguments for the subsidization of infant industries shows that they are as relevant to agriculture as to industry. Technological change can occur in agriculture as much as in industry.[10] One expects the aggregate supply response to price movements to be lower than that of individual crop

[10]There are two arguments; first, infant industries are unable to obtain risk-capital on account of the greater uncertainties, and therefore have to be artificially provided with an assured market by governmental measures such as protection and subsidies; second, externalities, which were deemed to be more acute in industry than in agriculture. Both, it is argued here, apply equally well to agriculture (Valdés and Siamwalla, 1984).

output, since it costs more to switch the resources required for aggregate supply response between sectors than to switch resources between crops. But favoring industry on the grounds that the price responsiveness of aggregate agricultural output is low is a mistake.[11]

The relationship between the aggregate supply response of agriculture and incentives is quite complex and not yet fully understood. Empirical work on the long-run responsiveness of agriculture has recently begun to challenge the narrow approach taken in the past in so much of the literature on supply response.

The long-run supply response is the sum of the short-run response (in which land, labor, and capital are fixed) and the effect of the price change on output via its impact on the intersectoral reallocation of "fixed" factors. Thus, the key distinction between short-term and long-term output response to prices is explained by intersectoral flows of labor and capital, and the relationship between incentives and new technology. The well-known "distributed-lag" approach that dominated the literature in the 1960's and 1970's failed to capture the response of labor migration, investment in agriculture, and productivity changes to changes in the sectoral terms of trade.

In the long run, the rate of labor migration depends on intersectoral differences in income. Influenced by real wage differentials between these sectors, labor will move from agriculture into nonagriculture. Unemployment in the urban sector will also affect these migrations.[12] A similar pattern holds for capital. For a total level of investment for the whole economy, the sectoral allocation will be influenced by prospective returns to capital in each sector. Thus, the flows of both labor and capital from agriculture to nonagricultural sectors should accelerate when perspective returns to these factors in the nonagricultural sectors increase relative to those in agriculture.

The analysis of the relationship between prices and the generation and adoption of new technology in agriculture indicates that technical changes in agriculture (tubewells, fertilizer, electricity, equipment) usually require an increase in capital stock, which is subject to capital constraints. The adoption of such techniques therefore depends on the rate of capital accumulation and incentives (Mundlak, 1985).

Recent work on aggregate agricultural supply response—which measures supply response through a fuller specification of rural-urban linkages in the labor and capital markets—is beginning to challenge the pessimistic view of the supply response of the agricultural sector. Some of the best technical work in this field has been done on South American countries, specifically the studies by Cavallo and Mundlak on Argentina (1982), and of Coeymans and Mundlak on Chile (forthcoming).

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[11]There are, of course, other arguments for taxing (inefficiently) agriculture: to help finance government, and to reduce the price of food.

[12]That is, adjusted for differences in cost of living, and for determinants of productive capacity such as age and education.

In their study on Argentina covering the period in 1950-71, Cavallo and Mundlak (1982) considered two policies. One policy, trade liberalization, modeled the elimination of the tax on agricultural exports and the tariff on nonagricultural imports. Although the elimination of the export tax would have increased agricultural output, the resulting decline in the RER diluted the effect of the tax reduction and, combined with the elimination of import tariffs, decreased the per capita output of nonagriculture more than it increased agricultural output, with the result that overall growth was lower.

The other policy involved keeping the RER from falling in response to liberalized trade. Through fiscal and monetary policies in the simulation, the combination of liberalized trade and a managed RER produced impressive increases in both agricultural and nonagricultural per capita output. But trade liberalization caused the price of food to increase more than nonagricultural wages. Thus, food subsidies should perhaps be considered a means of compensating wage earners for the improved economic environment for agriculture.

A follow-up study by Cavallo (1985) on Argentina, which used Cavallo and Mundlak's dynamic general equilibrium approach with explicit modeling of agriculture (1982), shows that agricultural output response to permanent changes in relative prices gradually approaches an elasticity close to 1.0. That is, a 10 percent increase in agricultural relative prices generates a 10 percent increase in aggregate output. Cavallo observes a very high elasticity of capital with respect to price (which reaches 2.3 after 20 years). Trade liberalization scenarios for Argentina show an impressive increase in capital utilization in agriculture. Despite a low labor response to prices, and with an elasticity of cultivated land to prices of 0.4, this high response of capital, and significant response of land, result in a strong overall agricultural output response to relative prices in Argentina.

In the Chilean study covering the period 1962-1982, the economy is divided into five sectors linked by an input-output matrix. Coeymans and Mundlak show that a permanent increase of 10 percent in agricultural relative to nonagricultural prices generates an increase in output of 20 percent, which implies a long-run elasticity of about 2.0.[13]

The impact of changes in economic incentives should not be viewed as a "once and for all" impact. Consideration of the dynamics of the sectoral growth process indicates that it is a cumulative process in which the output effect could be significantly greater than what might have been predicted by the agricultural price response analysis used during the 1960's and 1970's.

These values are not consistent with the unresponsiveness of agricultural output to prices assumed by the structuralist view of inflation and growth in the 1950's and 1960's in South America. These findings suggest

[13]These values are consistent with the estimates of the aggregate long-run supply elasticity for agriculture for the United States made by Griliches (1959), who obtained a value of about 1.2, and by Tweeten and Quance (1969), who obtained values of about 1.5; for Australia, Pandey (1982) obtained values close to 1.0.

that the cost of economic policies that discriminate against agriculture cannot be justified in terms of overall growth.

Concluding Comments

Agricultural price intervention is unlikely to be effective in the absence of appropriate trade and macroeconomic policies. Although the realization is emerging that the macroeconomic factors have a special significance for agriculture, which is a highly tradeable sector, they have so far remained outside the scope of an appropriate strategy for agricultural development. In the past, empirical research on foreign trade regimes in developing economies usually emphasized the consequences for domestic industry, but gave only slight and occasional attention to agriculture. This omission is curious, given the economic importance of agriculture for most developing countries. On the other hand, agricultural economists have focused mainly on agricultural policies that affect resource reallocation within the sectors. But agricultural growth necessarily requires resource flow between sectors. This flow is conditioned by returns in agriculture relative to other sectors.

Emphasis on agricultural incentives does not imply that the importance of government expenditure policy should be underplayed. Both policy instruments are needed. Their complementarity implies that social returns to government expenditures are partly a function of incentives to farmers, and vice versa. The impact on output of a more neutral structure of incentives to agricultural producers is increased by effective use of government investments.

Since the late 1970's and early 1980's, Latin American countries have faced complex issues of adjustment and growth. The difficulties have been attributed to both the international economic environment and domestic economic policies. While international economic conditions—such as lower export prices for several products and higher real interest rates in the early 1980's—are crucial to an understanding of the current economic environment, this study has emphasized domestic economic policies. The domestic economic environment, it is submitted, has often not been favorable to agricultural growth in Latin America. For most of the period, trade has been a major opportunity for growth in Latin American agriculture, an opportunity that has been largely forgone. The combination of the current external and macroeconomic conditions and the required adjustment to the foreign debt problem will necessarily require an expansion of the most efficient exportable and import-competing sectors. Foremost among those sectors is agriculture. Have countries given the signals consistent with the increased scarcity of foreign exchange? What can we expect if better incentives are given? The current situation offers an opportunity for revitalizing the agricultural sector in Latin America.

Export diversification and expansion constitute perhaps the principal structural change that many countries in the region need to make. The success of such a change could depend on agricultural growth. The purpose of

this chapter was not to recommend a specific policy or an absolute best course of action in a particular country, but to elucidate the relationship between trade and macroeconomic policies and agricultural growth. However, some direct implications for policy change emerge. Foremost among them is that correct real exchange rate alignment is crucial if the opportunities for growth offered by international trade, in particular those for agricultural growth in Latin America, are to be made the most of.

APPENDIX

For a given agricultural product, let Pa/Pna measure the sector's actual price ratio at the official exchange rate, and let Pa*/Pna* measure what would have been the ratio in the absence of interventions, when the exchange rate is adjusted. The effect of both macroeconomic and agricultural policies on the agricultural terms of trade can then be expressed as:

$$\frac{Pa/Pna}{Pa^*/Pna^*} - 1 \qquad (1)$$

The term Pa* is defined as $Pa_w^*E^*$, where Pa_w^* and E* represent the world price and the adjusted exchange rate, respectively. What is usually referred to as the price effect of agricultural price policy, which is associated with agricultural trade restrictions and direct price controls,[14] is captured by $(Pa - Pa_w^*Eo)$, where Eo represents the official exchange rate. The term Pna is a weighted average of the actual price index of nonagricultural real goods and services, and includes the price indices of importables (Pm), exportables (Px), and home goods (Ph). The term Pna* adjusts for policies for the nonagricultural sector, and the exchange rate adjustment applies to both Pa* and Pna*.

Let us first consider possible adjustments for trade policy only. The effect of trade restrictions can be captured by T, the uniform tariff equivalent, which represents the hypothetical value of a tariff which one would get by substituting a single measure for the prevailing structure of trade barriers to imports and exports, which results in the same total volume but not the same composition of trade, when the nominal exchange rate or the price of home goods is not adjusted. Empirical estimates of T are available for Argentina, Chile, and Peru for the 1960's and the 1970's. A second parameter, w, represents the incidence parameter and captures the effect that changes in the prices of importables and exportables (resulting from changes in tar-

[14]As defined above, Pa/Pa* is equivalent to the so-called nominal protection coefficient (NPC), adjusted for the exchange rate but not for differential rates of protection on intermediate inputs. In contrast, NPC at the official exchange rate is a simpler concept; it is used in the day-to-day policy debate, and supported by numerous empirical estimates available in Latin America. Adjustments for exchange rate to Pa* unfortunately complicate our life, but are essential in most cases.

iffs and/or subsidies) will have on the price of home goods. Available estimates of $ for Argentina, Chile, Colombia, Brazil, Peru, and Uruguay suggest values of between 0.5 and 0.8 in these countries, which implies that exporters and producers of unprotected import-competing goods have been paying at least half the cost of industrial protection programs (Clements and Sjaastad, 1981, and Valdés, 1985). The rise in the price of home goods resulting from protection (measured by $) lowers the "true" price of exportables and unprotected importables relative to the home goods sector.

So far the adjustments introduced above have dealt exclusively with corrections for trade policy throughout the economy. We can now introduce the adjustments required for the effect on the RER resulting from noncommercial policies such as fiscal and monetary policies and foreign capital flows. Let E*/E stand for the exchange rate adjustment, also affected by trade policy; E* and E represent the equilibrium and actual exchange rate, respectively. Then, both the direct and indirect adjustment in Pna* can be expressed as:

$$Pna^* \simeq a_1 \frac{Pm}{(1+t_m)} \frac{E^*}{E} + a_2 \frac{Px}{(1-t_x)} \frac{E^*}{E} + a_3 \frac{Ph}{(1+t)w}$$

when there are no direct taxes or subsidies. Economy-wide interventions can be summarized as the effect on Pna and the impact of E*/E on Pa:

$$\frac{Pa/Pna}{\frac{E^*}{E} Pa/Pna^*} - 1 = \frac{1/Pna}{\frac{E^*}{E} Pna^*} - 1.$$

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