POLICY RESEARCH WORKING PAPER 1967

Agriculture and the Macroeconomy

Maurice Schiff
Alberto Valdés

This paper surveys the literature on the interaction between agriculture and the macroeconomy in both industrial and developing countries, identifying what the authors believe to represent its most significant contributions and shortcomings.

The World Bank
Development Research Group
Trade
and
Rural Development Department
August 1998

Summary findings

Based on an economywide perspective, this paper begins with a discussion of the bias against exports and agriculture that characterized the economic literature and the development strategies in many developing countries after World War II. This is followed by an analysis of how the macroeconomic environment affects agricultural price incentives. Specifically, the paper discusses how policies concerning industrial protection, exchange rates, and interest rates and other fiscal policies can strongly influence the economic incentives for agriculture compared with other sectors, identifying the most relevant literature and alternative approaches used on this issue. It then proceeds to examine how the real exchange rate can be affected by exogenous shocks, such as the foreign terms of trade, with emphases on the Dutch Disease phenomenon and agriculture. The paper next examines the influence of interest rates on incentives in agriculture, arguing that, surprisingly, this has been a neglected area in the literature.

The paper explores the effects on agriculture of structural adjustment programs implemented since the early 1980s in developing countries. The final section surveys the literature on agriculture and the macroeconomy in industrial countries, focusing on the impact of the exchange rate on export competitiveness in the United States, the cost of agricultural protection for the overall economy in Europe and Japan, and the increased importance of fluctuations in money markets for the farm sector and the additional instability they generate.

This paper — a joint product of Trade, Development Research Group, and the Rural Development Department — will be published in B. Gardner and G. Rausser, eds., *Handbook of Agricultural Economics*, North Holland Publishers. Copies of this paper are available free from the World Bank, 1818 H Street NW, Washington, DC 20433. Please contact Alberto Valdés, room S8-015, telephone 202-473-5491, fax 202-522-3307, Internet address avaldes@worldbank.org. Maurice Schiff may be contacted at mschiff@worldbank.org. August 1998. (37 pages)

Elsevier Science
Handbook of Agricultural Economics
Ed. by B. Gardner and G. Rausser

Agriculture and the Macroeconomy

Maurice Schiff and Alberto Valdés
World Bank

Introduction

Until the mid-1980s, most analysts of agricultural policies were preoccupied with the direct effects of sectoral pricing and trade policies on output, resource use, and income distribution. Since that time, however, a number of analyses have suggested that the indirect effects of economy-wide policies on agricultural incentives have been greater than the impact of policies directed specifically toward agriculture. Conversely, in some cases, agricultural policies have had significant effects on macroeconomic variables.

This chapter surveys literature on the relationship and interaction between agriculture and the macroeconomy, in both developing and industrialized countries. It presents an organized discussion of this literature, identifying what the authors believe to represent the most significant contributions and shortcomings of the existing scholarship on agricultural economics. We begin with a discussion of the bias against exports and agriculture that characterized development economics following the Second World War and the decolonization of many developing countries. During this time, export pessimism drove the shift from agriculture toward industry, and the substitution of imported industrial products with domestically produced goods. This substitution occurred irrespective of comparative advantage or disadvantage. The effects of import-substituting policies on agricultural incentives and economic growth were profound. A reorientation towards more open economies followed, beginning in South America in the mid-1970s, and becoming more profound in the mid-1980s. The changes were influenced by trade and development economists who began to investigate the potential contribution that opening the trade regime could make to overall economic growth.

In an analysis of agricultural incentives from an economy-wide perspective, it was found that the "indirect" effects of macroeconomic and industrial policies were no less important to agriculture than the "direct" sector-specific agricultural policies. Two key relationships were central in this analysis: the relative price of agricultural to non-agricultural products, and the price of tradable to non-tradable (or "home") goods, i.e. the real exchange rate. We examined the factors that determine the equilibrium real rate of exchange, and that shift actual exchange rates toward equilibrium. These factors include both policy-induced domestic forces (such as changes in technology and productivity), and exogenous international forces (like changes in a country's foreign terms of trade).

Exogenous factors include the relative prices of a country's imports and exports (its terms of trade) and the variables that go into determining them. One of the determinants is an export commodity boom (in some cases resulting in "Dutch disease" phenomenon), whose effect on other tradables has proven to be profound. Foreign capital flows are also significant in determining exchange rates, the price of inputs, and the cost of borrowing money. We discuss below the importance of interest rates to these capital flows, as well as their effects on agricultural investment itself.

We then explore the effects of structural adjustment programs. These began during the 1970s, and gained currency throughout the developing world during the 1980s, as countries sought to correct their macroeconomic imbalances, especially overvalued exchange rates, that resulted from years of industrial protection and budget deficits.

In the final section, we compare and contrast the experience of the industrialized "North," where agriculture accounts for a far lower proportion of national incomes and economic growth, to that of the developing "South", where substantially greater levels of exchange rate misalignment and industrial protection have imposed severe indirect taxation on agriculture. In stark contrast to the Southern experience, Northern agriculture enjoyed substantial protection even while industrial protection declined over time. We explore the macroeconomic implications of agricultural protection in the North for international prices and agricultural competitiveness, giving special attention to US agricultural tradables and the European Community's experience under the Common Agricultural Policy.

Development Strategies in the South After World War II: A Historical Perspective

The historical setting in which countries conceived and implemented development strategies in the decades following World War II is an appropriate place to start. The central issue of the time was finding and then cultivating a developing economy's "lead" sector, the sector capable of serving as its "engine of growth". This "engine" would presumably provide the income necessary to nourish and sustain economic development, while fostering a self-reliance that would prevent a society from depending upon international market forces that were outside a small country's capacity to affect. Economists recalled the collapse of primary commodity markets during the Depression, and of the disruptions in these markets during the Second World War. Their fear of such dependency led many development economists to ally themselves with what became known in economics as the "structuralist school" and "dependency theory."

The sector which seemed capable of providing the "engine", particularly in the aftermath of the colonial experience, was industry. Agriculture was viewed, by many, as the station of the colony, the provider of primary products demanded by industrial countries. Persisting in this peripheral role would be tantamount to a *de facto* perpetuation of colonialism, hence the term neo-colonialism. But the nationalistic impulse among developing countries, many of which were newly independent, was not alone in leading many in the developing world to spurn agriculture and to discount its potential contribution to economic growth. Agrarian society by its very nature was regarded as socially and economically backward, governed by tradition, impervious to market signals, and devoid of links to other sectors that could bring the benefits of progress in agricultural production to the economy as a whole.[1]

[1] Another concern was the perceived secular decline in real agricultural prices which was blamed on an inelastic demand for agricultural products. The assumption was that the shift in the supply of agricultural products over time associated with technical progress was larger than the shift in demand. On the other hand, Martin and Warr (1993) and Gelhar et al. (1994) have argued that Rybczynski effects associated with the accumulation of capital in the process of growth result in a shift of resources away from the labor-intensive sector (agriculture) to the capital-intensive one (industry), which should dampen the negative effects on relative agricultural prices.

The academic acceptance of these presumptions without proper empirical evidence, and the overwhelming pre-eminence that scholars afforded industrial policy as a result, represented a monumental failure on the part of development economists. The illogic of this course was characterized succinctly by Theodore W. Schultz at the beginning of *Transforming Traditional Agriculture* (1964), when he wrote that "economists who have been studying growth have, with few exceptions, put agriculture aside in order to concentrate on industry, despite the fact that every country has an agriculture sector and in low-income countries it is generally the largest sector." Schultz' work set into motion an academic reexamination of the anti-export, anti-agricultural prejudice of dependency doctrine that would ultimately provide many of the theoretical underpinnings of the policy realignments of the 1980s.

The preoccupation with the limits of traditional and subsistence agriculture that was so characteristic of structuralists and dependency literature led to a neglect of agriculture in general. The fear of depending on agricultural exports led to a neglect of the potential contributions export revenues might deliver to growing, capital-starved economies. And yet, one of the outstanding attributes shared by nearly all developing countries was that their exports were overwhelmingly agricultural.

Another attribute shared by most developing countries was that their imports were, in large measure, industrial products. The unfortunate alternative to pursuing productivity gains in exportables was to replace imports with products made domestically. The prescription of import-substituting industrialization followed from the structural and dependency doctrines' assumptions about agriculture. The reasoning was that if industry lacked competitive advantage, it must be fostered artificially. The industry must be shielded from powerful foreign competitors by import barriers until it became capable of competing, regardless of whether or not this was a realistic expectation. Whatever costs had to be incurred by other sectors, including agriculture, to pay for this protection were justified on these grounds. The costs of this protection were felt widely across entire economies, with disastrous effects on growth.

One theory that had a significant impact on economic policy was that of "balanced growth," articulated by Rosenstein-Rodan (1943) and Ragner Nurkse (1952). They predicted that rapid growth in developing economies would not be achieved through increased exports of primary commodities, and argued that development strategies should place greater emphasis on industrialization. Recognizing the limits imposed by the small size of domestic markets, balanced growth theory prescribed the simultaneous promotion of a variety of different industries in a way that would foster complementary demand among those industries for one another's products. A central premise in Rosenstein-Rodan and Nurkse's work (as well as that of Ranis-Fei, A. Lewis, and others), was the assumption that a large surplus of labor was employed at zero marginal product in rural areas. This surplus would prevent labor bottlenecks from occurring that might otherwise constrain balanced growth. Underlying the concept of a balanced growth path was the perception that resources for investment were severely limited. This, coupled with the

belief that a certain minimum level of investment was required to capture the external economies of sectoral growth and move a country to a higher growth path, was the "big push" advocated by Rosenstein-Rodan (1943, 1957). And it was here that the debate over where resources should be concentrated came to a choice between agriculture and industry.

The "structuralist school," embodied in the works of Prebisch (1950), Singer (1950), and Myrdal (1957), drew similar conclusions, strongly emphasizing the forces which limited demand for primary products. The structuralist view, prevalent at the time, was that agriculture in general, and the traditional agriculture that was characteristic of developing economies in particular, was slow and weak in its response to market signals, owing to such constraints as imperfect factor mobility.[2]

Pessimism about the potential of agricultural exports to "lead" economic development was based on a number of factors (Valdés, 1991). Agricultural exports tended to consist of a small number of commodities, more reliant on natural resources as inputs than other commodities. For this reason, the agricultural sector was perceived as having few or weak linkages with the rest of the economy, and thus unable to serve as an "engine of growth." Demand for many of these primary commodities was presumed to be inelastic, both with respect to their prices and to income. It was argued that dependence on a few export commodities implied that import capacity would be determined by the prices of these commodities on the international market, making income subject to boom-bust cycles which governments could do little or nothing about. There were those who felt that the lack of control over foreign exchange earnings made outward-oriented development strategies seem irresponsible.

Given that many countries were indeed experiencing declining demand for their primary agricultural products (Meier, 1989), it is perhaps not surprising that these ideas came to profoundly influence the formulation of development strategies in many developing countries. In the 1950s, these countries began pursuing higher economic growth through policies of import-substituting industrialization. High import tariffs and concessional credit lines favored industry, while low import tariffs and relatively high export taxes on agricultural products revealed the extent to which the prevailing export pessimism was embraced by Third World policy-makers. Resources had to be purposefully channeled to the non-farm sectors which were thought capable of contributing to and sustaining faster growth within the overall economy. Agriculture in this view was there to serve simply as a resource base.

---

[2] The belief that agricultural output was not responsive to changes in price was also propounded in industrialized countries. This arose from the experiences of the US during the Depression (1919-22 and 1929-33), as articulated by Galbraith (1938). However, D.G. Johnson (1950) disputed the validity of this hypothesis as applied to the Depression, and also disputed its applicability during times of full employment.

As understandable as the popularity of the structuralist school was, their emphasis on factors that would limit the demand for primary products led them to discount the possible benefits that opening new markets for new primary products might have. Moreover, the assumption that agriculture had few and weak linkages to the rest of the economy caused structuralists to disregard these linkages in their strategy. In fact, little empirical evidence was produced regarding the strength or extent of the interrelationship between agriculture and the larger economy (Valdés, 1991).

Beginning in the early 1960s, the structuralist and dependency-theory schools faced increasing criticism. Schultz's *Transforming Traditional Agriculture*, and pioneering cross-country studies on trade policy and development by Little, Scitovsky, and Scott (1970), Anne Krueger and Jagdish Bhagwati (1978), and Bela Balassa (1982), argued that in terms of both growth performance and employment generation, export-oriented development strategies had performed better than import-substituting ones during the post-World War II period.

By the mid-1980s, developing countries had grown increasingly disillusioned with import-substituting strategies, and a major reorientation has been taking place ever since. The new approach involves a more open economy, and recognizes the active role that agriculture can play as a major tradable sector in most developing countries.

The Macroeconomic Environment and Agricultural Price Incentives

Governments affect agriculture directly through sector-specific measures including tariffs, input and credit subsidies, price controls, quantitative restrictions (QRs), and government expenditures and taxes. Indirectly, government policies often have unintended effects on agriculture. Policies concerning industrial protection, exchange rates and interest rates, and other fiscal and monetary policies can strongly influence the incentives for agriculture vis-à-vis other sectors. For example, border protection has often been used to protect domestic manufacturing, and restrictive trade policies, accompanied by fiscal deficits, often result in exchange rate misalignment. Agriculture is also affected indirectly by exogenous changes in the world prices of non-agricultural commodities, such as oil and minerals, and by foreign capital flows. Because sectoral growth is affected by resource flows between sectors, and because these flows adjust to the relative opportunities offered by different sectors over time, an economy-wide view of returns is necessary for understanding the dynamics of agricultural growth and employment.

Traditionally, agricultural economics has defined the effect of economic policies on incentives in terms of the nominal tariff, or sometimes the tariff equivalent (including QRs), faced by agriculture, or what we referred to above as "direct" price interventions. Alternatively, in a general equilibrium framework, agricultural incentives could be defined in terms of the relative price of agricultural to non-agricultural products. The difference between the two concepts lies in the definition and the measurement of price

interventions. Most studies have taken the price of the non-agricultural sector as given, and have restricted their analysis to the effects of sectoral or direct policies on agricultural prices. Some studies did adjust for exchange rate misalignment, generally employing nominal exchange rates (we will argue below that the real exchange rate is more appropriate). For examples of the nominal exchange rate adjustment approach, see Valdés (1973), Taylor and Phillips (1991), Byerlee and Sain (1986), and Lattimore and Schuh, (1979).

Agriculture's ability to compete for resources domestically and globally is directly affected by economy-wide policies. These policies have important effects on relative agricultural prices through the real exchange rate and the price of non-agricultural tradable activities. We proceed below with a discussion of nominal and real exchange rates, followed by a description of the evolution of our understanding of how macroeconomic policies affect agricultural incentives. The remainder of the section discusses, in turn, exogenous effects (in particular export-commodity booms), interest rates, and structural adjustment programs.

The Real Exchange Rate

There are two major concepts of the exchange rate, namely the nominal and the real rates. The nominal rate is an undeflated conversion factor between one currency and another. It corresponds to the exchange rate a government can announce or fix. The nominal equilibrium rate is the rate at which the demand and supply of foreign exchange (to finance both current account and autonomous capital account transactions) are equal for a given set of trade taxes. The purchasing power parity (PPP) relates the purchasing power of one currency to that of another, by adjusting the nominal rate for relative inflation. Neither the PPP nor the nominal equilibrium rate necessarily imply an optimum exchange rate, nor do they correspond to the shadow price of foreign exchange used in social project evaluation. The PPP is considered to be misaligned when its value differs from the base period value. The concept of effective exchange rate, a commodity-specific rate that expresses the price of foreign exchange including all import or export taxes, is useful in analyzing individual activities.

In contrast, the real exchange rate (RER) is a relative price that reflects the competitiveness of the tradable sector (import substitutes and exportables). The RER varies according to the definition used (e.g., with respect to the deflator). Following Salter (1959), Swan (1960), Dornbusch (1974), and others, the RER introduces the concept of a home goods (or non-tradable) sector. A key factor on which the distinction between tradables and non-tradables is based is their price-formation mechanism. Both prices and quantities of home goods are determined by domestic supply and demand. In contrast, for small open economies, the domestic prices of tradables are determined by world markets together with the nominal exchange rate, trade taxes, and subsidies.

The various definitions of the RER that are used in agricultural economics literature have resulted in some confusion.[3] One version is the purchasing power parity index mentioned above. Most early studies that attempted to measure the impact of the RER on agricultural incentives used the PPP approach (for example, Valdés, 1973; Binswanger and Scandizzo, 1983, and more recently Byerlee and Sain, 1986). There are at least three problems with the PPP concept of the RER. The first is the possibility that the base period RER may be misaligned as a result of macroeconomic disequilibrium. Secondly, even if the RER is in equilibrium in the base period, there is no reason to assume that this equilibrium will remain unchanged over time, owing to such factors as changes in the terms of trade and international interest rates. Thirdly, the base period PPP is obtained under given trade policy distortion, while we are interested in the equilibrium RER that would prevail in the absence of trade policy distortions. This requires a model of RER determination not found in the PPP adjustment.

A now widely accepted definition of the real exchange rate is the ratio of the price of tradables to non-tradables:

$$(1) \quad RER = \frac{P_T}{P_{NT}}$$

in which P_T is the price of tradables and P_{NT} is the price of non-tradables. The RER can serve as a proxy for a country's international competitiveness (Edwards, 1988). An increase in the RER (a depreciation) represents an improvement in the country's international competitiveness given relative prices in the rest of the world. Conversely, a decrease in the RER (an appreciation) indicates a decline in the country's international competitiveness. Changes in the RER can occur as a result of policy-induced effects that reflect a misalignment in the RER, and as a result of exogenous factors that reflect a change in the equilibrium value of the RER.

In empirical estimation, the RER is often proxied as

$$(2) \quad RER = \frac{E_o P^*}{P}$$

where E_0 is the nominal exchange rate, expressed as local currency per unit of foreign currency, P* is the foreign price index for tradables (often approximated by the wholesale price index), and P is the domestic price index, presumably heavily weighted by the home goods sector (as with the consumer price index).

It is important to clarify the concept of equilibrium RER (ERER). Several conceptual and empirical definitions of the ERER are used in the literature, including the PPP. Edwards (1988) defined the ERER as that level of RER at which the economy is

[3] See Hinkle and Nsengumiva (1995) for a detailed discussion on the various definitions of the real exchange rate.

accumulating or decumulating foreign assets at the "desired rate," and at which the demand for domestic goods equals supply. This definition can be refined to consider an ERER for a given trade policy regime, such as the ERER that would prevail under free trade. An important feature of this definition is its treatment of the ERER as a general equilibrium concept.

Edwards' calculation was based on the idea of "macroeconomic fundamentals", and provides a useful framework for the discussion at hand. The "macroeconomic fundamentals" that determine the RER can be divided into external and internal factors. The internal factors can be divided into those influenced by policy decisions, and those that are exogenous to policy. Domestic policy variables include import tariffs and export taxes, quantitative restrictions on imports and exports, exchange and capital controls, other taxes and subsidies, and the level and composition of government expenditure.[4] Domestic effects that are exogenous to domestic policies include productivity changes and technological progress, among others. External factors include international prices, international transfers (such as private capital flows and foreign aid), and world real interest rates.

Changes in any of the variables will have an impact on the level of the RER, and most will affect the level of the ERER. For example, an increase in the world price of importables relative to exportables (i.e. a deterioration of the terms of trade) reduces the quantity of importables demanded, and induces a change in the level of the ERER (the direction of the change is ambiguous due to the negative income effect). An increase in import tariffs will have a similar effect on the domestic relative price of importables, reducing the quantity of importables demanded, and resulting in demand switching to non-tradables and exportables. This in turn exerts upward pressure on the price of non-tradables, causing the ERER to shift downwards (i.e. to appreciate), given the existing trade policy regime and other determinants. Sustainable, or permanent, increases in government expenditure can also cause the ERER to decrease, owing to the increase in aggregate demand. Even if increases in government spending are financed through taxes, the ERER may appreciate due to the public sector's higher propensity to spend on non-tradables (such as labor).

The ERER is, therefore, not a constant, but follows a discernible trend, a fact of critical importance when considering the effects of policy decisions. Elbadawi (1994), for instance, found India's ERER from 1967 to 1981 not only close to the actual RER, but that the ERER depreciated along with the actual RER. This does not imply that the rupee

---

[4] Williamson (1994) pointed out that the evidence for the relevance of the composition of government expenditure was weak. Both Edwards (1994) and Elbadawi (1994) included it as a variable in estimating ERERs. In Williamson's view, the size of government expenditure was the important factor, not its composition.

was not overvalued, but simply that the actual depreciation was just sufficient to offset the reduction in protection, leaving the margin of overvaluation almost unaffected.

Conversely, changes in the RER do not necessarily reflect disequilibrium. For example, technological progress in the production of importables (which will result in an improvement in the foreign terms of trade), or increased capital inflows, will both result in an appreciation of the RER. Insofar as the changes in these factors are permanent, the ERER will also appreciate.

While the ERER is determined by real variables, the actual RER responds to both real and monetary variables. Typically, the RER is misaligned when the monetary and fiscal policies in place are inconsistent with the chosen nominal exchange rate regime. When the nominal exchange rate is fixed, any increase in domestic credit that exceeds growth in the domestic demand for money (i.e. expansive monetary policy) will result in excess demand for both tradables and non-tradables. Excess demand for tradables translates into higher trade deficits, loss of international reserves, and/or higher net foreign borrowing, none of which affect domestic prices. Excess demand for non-tradables results in higher prices, and thus appreciation of the RER. If this appreciation is not the result of equilibrium changes in the macroeconomic variables, it implies a deviation of the actual RER from its equilibrium value.

It is also possible to construct another estimate of misalignment by comparing the ERER under the conditions of free trade to the actual RER. This construction was used by Schiff and Valdés (1992) in computing the indirect effect of trade and macroeconomic policies on agricultural incentives.

Policy-Induced Effects

In order to examine the impact of policy on agricultural incentives, we examine the impact on the value added among agricultural goods relative to that among non-agricultural goods. Both types of goods can be divided into tradables and home goods, i.e.

$$(3)\quad \frac{VA_A}{VA_{NA}} = \frac{\beta VA_{A_T} + (1-\beta)VA_{A_H}}{\alpha VA_{I_T} + (1-\alpha)VA_{I_H}} \qquad \alpha, \beta < 1$$

where VA_A is value added in the agricultural sector, VA_{NA} is valued added in the non-agricultural sector, and VA_I is value added in the non-agricultural tradable (or industrial) sector. The subscripts $_T$ and $_H$ refer to tradable and home (non-tradable) goods, respectively. Since most agricultural goods are tradable, the value of β is usually taken to be very close to one. The expression simplifies to the following form,

$$(4)\ \frac{VA_A}{VA_{NA}} = \frac{VA_A}{\alpha VA_I + (1-\alpha)VA_H} \qquad \alpha < 1.$$

This can be re-written as:

$$(5)\ \frac{VA_A}{VA_{NA}} = \frac{VA_A/VA_H}{\alpha VA_I/VA_H + (1-\alpha)} \qquad \alpha < 1.$$

Many studies use relative prices instead of value added, in which case the expression becomes:

$$(6)\ \frac{P_A}{P_{NA}} \equiv \frac{P_A/P_H}{\alpha P_I/P_H + (1-\alpha)} \qquad \alpha < 1$$

The relative price (or value added) of agricultural goods to non-agricultural goods can change as a result of changes in the price (or value added) of agricultural, industrial, or home goods. Protection of industry will affect agricultural relative prices in three ways. The first is through the real exchange rate, i.e. the price of tradables relative to non-tradables. Appreciation of the RER lowers both P_A/P_H and P_I/P_H, thus lowering P_A/P_{NA}. Secondly, industrial protection raises the domestic prices of industrial goods (P_I), therefore lowering the relative price of agricultural goods. Thirdly, it lowers agriculture's value added by raising the cost of agricultural inputs.

Protectionist policies could theoretically result in higher P_H, higher P_I, lower VA_A, or any permutation of the three, depending on what macroeconomic policies are followed. An increase in the price of non-agricultural goods, resulting from industrial protection using tariffs or other restrictions, will lower the relative price of agricultural products. Industrial protection may also result in higher prices of agricultural inputs such as fertilizer, which will reduce the value added of agriculture (Schiff and Valdés, 1992). Finally, an increase in the relative price of home goods (i.e. an appreciation of the real exchange rate) will adversely affect the relative price of agriculture to non-agriculture (since the value of α is usually significantly less than 1), thus reducing the value of the numerator more than the value of the denominator in equations (5) and (6).

Early discussions of the bias against agriculture as a result of industrialization policies pursued by developing countries is found in Diaz-Alejandro's (1970) study of Argentina, and Little, Scitovsky, and Scott's (1970) study of seven developing economies in the 1950s and 1960s. Diaz-Alejandro used relative prices to examine the impact of protectionist policies on agriculture, while Little, Scitovsky, and Scott examined effective protection through an analysis of value added. In the early 1980s, influenced by the work of Sjaastad (1980), the Trade Policy Program at the International Food Policy Research Institute (IFPRI) adapted and extended the "true protection" approach to analyze the issue

of how industrial policies affected the price of agricultural tradables relative to non-tradable goods (for a synthesis of this research, see Valdés, 1986). Later, Krueger, Schiff, and Valdés (1988) and Schiff and Valdés (1992) adapted the "elasticities" approach to exchange rate determination in conjunction with an explicit treatment of non-agricultural prices (P_{NA}). These works explored the combined effect of direct (sector-specific) and indirect (economy-wide) policies on agriculture in a sample of eighteen developing countries. A sketch of these various approaches is presented below.

The Diaz-Alejandro Approach

Diaz-Alejandro (1970) examined the case of Argentina from 1930 to 1964, studying the impact of policy on the relative prices of final goods. He focused exclusively on one ratio, P_A/P_I, finding that exports (virtually all of which were agricultural commodities) and the rural sector in general were effectively discriminated against by Argentine macroeconomic policies. Diaz-Alejandro's hypothesized bias against exports and agriculture was supported empirically by both data on the evolution of the external and internal terms of trade, and crop-specific data.

Diaz-Alejandro focused on the relative prices between agricultural and industrial commodities. He used a proxy that he called the "external terms of trade", or the ratio of export prices to import prices. The second proxy he used was the "internal terms of trade", or the ratio of wholesale prices of rural products to those of non-rural goods. He then calculated an index of the ratio of internal to external terms of trade as a summary measure of the net effect of government policies on relative prices.

Table 1. Argentina: Agricultural Domestic and External Terms of Trade (1935-39 = 100)

Years	Internal TOT	External TOT	Ratio Int/Ext
1925-29	132	111	119
1930-34	87	79	110
1935-39	100	100	100
1940-44	62	89	70
1945-46	74	120	62
1947-49	80	169	47
1950-52	68	124	55
1953-55	68	114	60

1956-58	78	93	84
1959-61	85	91	93
1962-64	93	89	104

Source: Diaz-Alejandro (1970)

Between 1925 and 1949, when the overwhelming majority of Argentina's exports were agricultural products, the internal terms of trade of agricultural goods deteriorated relative to Argentina's external terms of trade as a result of domestic policies. In the period from 1930 to 1939, Diaz-Alejandro calculated the average index value as 105.[5] The second period, from 1945 to 1955, covered the Peron years, during which policies were severely biased against agriculture. This period was characterized by extensive import-substituting industrialization, and the index average dropped to 55. During the final period, from 1955 to 1964, the index averaged 94, as the bias against rural goods diminished.

The Effective Protection Approach

The concept of effective protection, developed by Corden (1966) and Balassa (1965), was used in cross-country studies of the manufacturing sector by Balassa (1965), and by Little, Scitovsky, and Scott (1970). In their analysis of seven developing countries in the 1950s and 1960s, Little et al. (1970) compared domestic value added to value added at world prices. They found extremely high levels of protection for manufacturing in several of the countries, as high as 313 percent in India in 1961 (the lowest being 27 percent in Mexico in 1960). In four of the seven cases, nominal protection exceeded 100 percent, far higher than could be justified by those who argued in favor of protection of infant industries.

The protection of manufacturing worked against agriculture by reducing both the relative incentive (or demand) to invest in the production of agricultural goods, and the resources available (supply) for this investment. This was especially true of agricultural tradables, since protection (through quotas, tariffs, and other controls) enabled overvalued currencies to persist. Little et. al. found nominal protection for agricultural exports ranging from -10 percent to zero in their sample. Considering that the domestic prices of manufactured agricultural inputs exceeded world prices in general, effective protection of agriculture was even lower, and lower still when compared with the high levels of protection afforded manufacturing.

The "True Protection" Approach

[5] Diaz-Alejandro excluded the World War II period, 1940-44.

On the premise that an import tariff is an implicit tax on exports (the Lerner Symmetry Theorem), Sjaastad (1980) derived an incidence parameter, ω, using a three-sector model of a small open economy. The incidence parameter, ω, measures the effect of an increase in import prices (such as would result from an increase in tariffs) on the domestic price of non-tradables. The term (1-ω) measures the change in the price of importables to non-tradables, something Sjaastad referred to as the "true tariff". The application of this approach to agriculture by IFPRI's Trade Program during the 1980s focused on the impact of changes in P_I/P_H (true industrial protection) on agricultural prices relative to the prices of non-tradables (P_A/P_H). When a policy of industrial protection such as an import tariff is put into place, the domestic price of imports rises, attracting resources to protected sectors, and shifts consumer demand away from them, resulting in excess demand in the other sectors. This in turn leads to a rise in the price of non-tradables, and a reduction in the relative price of unprotected tradables (including agricultural exportables), in effect acting as a tax on them. This effect is reinforced by wage pressures generated by the higher cost of living due to the rise in the price of imports.

The incidence parameter, ω, reveals the extent to which the burden of the change in relative prices is divided among different sectors. If importables and home goods are close substitutes, either in consumption or production, the most notable effect of higher tariffs is to reduce the price of exportables relative to the price of home goods. The equation that Sjaastad used in his empirical estimation was:

$$(7)\ \ln(P_h / P_x) = a + \omega \ln(P_m / P_x)$$

where ω, the incidence parameter, reflects proportional changes in the price of home goods relative to exportables as a function of proportional changes in the price of importables relative to exportables, P_h is the price of home goods, P_X the price of exportables, P_m the price of importables, and *a* is a constant.

Table 2. Estimates of the Incidence Parameter (ω) as it Affects Agriculture

Country	Author	Value of ω
Argentina	Sjaastad*	0.4 to 0.5
Chile	Sjaastad*	0.5 to 0.6
Colombia	Garcia	about 0.9
Nigeria	Oyejide	0.6 to 0.9
Peru	Valdés	about 0.7
Philippines	Bautista	about 0.8
Zaire	Tshibaka	about 0.8

* Sjaastad's studies of Argentina and Chile analyzed the entire tradable sector, while the others analyzed agriculture only.
Source: Valdés (1986)

Table 2 presents the estimated incidence parameters of seven country studies, five of which focused specifically on the agriculture sector. These studies found a fairly high level of substitution between home goods and importables, implying a strong negative impact on the relative price of exportables to home goods. For example, Bautista (1987) found a persistent and significant bias in relative price incentives against agricultural exports in the Philippines during the period from 1950 to 1980. The bias was not surprising considering the Philippine's strategy of import-substituting industrialization through the 1950s and 1960s. The surprise was that this bias persisted through the 1970s, when the government was supposedly committed to export promotion. Bautista's study also found that a 10 percent increase in the domestic price of importables was associated with an 8 percent decline in the domestic price of agricultural exports relative to home goods. This was essentially a significant tax on agricultural exportables. In Peru, Valdés (1985) found that raising the uniform tariff of manufactured goods by 10 percent imposed an implicit 5.6 percent tax (with respect to home goods) on the production of importables (e.g. rice), and an implicit 6.7 percent tax on the production of exportables (e.g. cotton and sugar).

The Mundlak general equilibrium econometric approach

The previous studies examined the impact of policy on incentives, but did not examine the impact of policy on supply response. Most studies of agriculture's aggregate supply response have used a partial equilibrium approach, and thus have failed to take into account the effects of relative price changes on intersectoral resource flows over time. More specifically, they have failed to take into account relative price changes associated with economy-wide macroeconomic policies. An important contribution to correcting this inadequacy was pioneered by Mundlak and his colleagues. Employing a general equilibrium approach, Mundlak, Cavallo, and Domench (1989) analyzed the experience of Argentina from 1913 to 1984. Argentina grew faster than many countries (including Brazil, Canada, and the US) until 1930, at which point it began to lag behind. Mundlak et.al. found that Argentine agriculture was heavily taxed post-World War II, directly through export taxes, and indirectly through trade restrictions and protection of non-agricultural goods (note that these findings are consistent with those of Diaz-Alejandro's study of Argentina). Simulations in a general equilibrium framework suggested that Argentina would have achieved a much higher rate of economic growth if it had crafted policies that permitted it to benefit from its comparative advantage in agricultural exports. Such policies would have ensured that incentives reflected true terms of trade, without distortions.

In their study on Chile, Coeymans and Mundlak (1993) applied a five-sector econometric model to the period 1962-82, and found that economy-wide policies were far more important than sector-specific policies in influencing the sectoral allocation of labor, capital, and overall growth. Changes in the RER affected sectoral prices according to the sector's tradability. In the case of Chile, mining and agriculture had the largest tradable components, suggesting that their product prices would be the most responsive to changes in the RER. In their simulations, Coeymans and Mundlak found that mining and agriculture did indeed respond strongly to changes in the RER. Chile's long-run aggregate supply elasticity for agriculture was estimated to be 1.4, while Argentina's was estimated at 1.8.

The Krueger, Schiff and Valdés approach

The taxation of agriculture through sector-specific price interventions, and through trade, exchange rate, and other macroeconomic policies was examined for a wider sample of developing countries in Krueger, Schiff, and Valdés (1988) and in Schiff and Valdés (1992-a,b). They examined direct protection as the difference between relative producer prices and border prices (P_A/P_{NA}) at the official exchange rate. They also measured both the effect of exchange rate overvaluation, using the elasticities approach, and the effect of industrial protection on agriculture's relative price.

As derived in Schiff and Valdés (Chapter 2, 1992), the measures of intervention were calculated as follows. The direct nominal protection rate is estimated as

$$(8)\quad NPR_D = \frac{\frac{P_i}{P_{NA}} - \frac{P'_i}{P_{NA}}}{\frac{P'_i}{P_{NA}}} = \frac{P_i}{P'_i} - 1$$

where NPR_D measures the effect of price controls, export taxes or quotas, and other sectoral policies on the domestic producer price, P, of tradable agricultural product i (P_i); P'_i is the border price (P_{iB}) converted into local currency at the official nominal exchange rate E_0 and adjusted for transport, storage and other costs, and quality differences, so that $P'_i = P_{iB}E_0$; P^*_i is the border price of product i at the equilibrium nominal exchange rate E^* and adjusted as before so that $P^*_i = P_{iB}E^* = P'_i E^*/E_0$; P_{NA} is the nonagricultural sector price index, which consists of a tradable share α with a price P_{NAT} and of a nontradable share 1- α with a price P_{NAH}, so that $P_{NA} = \alpha P_{NAT} + (1-\alpha) P_{NAH}$; and P^*_{NA} is the nonagricultural sector price index, where the price index of the tradable part is evaluated at E^* and in the absence of trade interventions (t_{NA}) affecting nonagricultural tradables, so that $P^*_{NA} = \alpha P_{NAT} [E^*/(1+ t_{NA}) E_o] + (1-\alpha) P_{NAH}$.

The indirect nominal protection rate would be

$$(9)\quad NPR_I = \frac{\frac{P'_i}{P_{NA}} - \frac{P^*_i}{P^*_{NA}}}{\frac{P^*_i}{P^*_{NA}}} = \frac{\frac{P'_i}{P_{NA}}}{\frac{P^*_i}{P^*_{NA}}} - 1$$

$$= \frac{\frac{P'_i}{P_{NA}}}{\frac{E^*}{E_0}\frac{P'_i}{P^*_{NA}}} - 1 = \frac{P^*_{NA}E_0}{P_{NA}E^*} - 1$$

It measures the effect of the difference between the nominal exchange rate, E_0, and the equilibrium exchange rate, E^*, and of the effect of trade policy on P_{NAT}. NPR_I is the same for all tradable products since P_i does not appear in equation (9).

The total nominal protection rate is

$$(10)\quad NPR_T = \frac{\frac{P_i}{P_{NA}} - \frac{P^*_i}{P^*_{NA}}}{\frac{P^*_i}{P^*_{NA}}} = \frac{\frac{P_i}{P_{NA}}}{\frac{P^*_i}{P^*_{NA}}} - 1$$

Because the denominator of equation (8) differs from that of equations (9) and (10), $NPR_D + NPR_I \neq NPR_T$. To make the three measures comparable, we define another direct protection rate,

$$(11)\quad npr_D = \frac{\frac{P_i}{P_{NA}} - \frac{P'_i}{P_{NA}}}{\frac{P^*_i}{P^*_{NA}}}$$

which measures the impact of direct policies ($P_i/P_{NA} - P'_i/P_{NA}$) as a percentage of the relative price that would prevail in the absence of all interventions (P^*_i/P^*_{NA}), the same denominator used in equations (9) and (10). Then, $npr_D + NPR_I = NPR_T$.

Schiff and Valdés found that indirect taxation, NP_{RI}, generally exceeded direct taxation, npr_D (see Table 3 below). Taxation of agriculture as a result of direct price intervention averaged 8 percent, while indirect taxation (the product of macroeconomic policies and industrial protection) taxed agriculture in excess of 22 percent, for a total taxation of 30 percent. Industrial protection policies in most of the countries examined had a more adverse impact on agriculture than did exchange rate overvaluation.

As shown in Table 3, sub-Saharan African countries had both the highest direct and highest indirect taxation of agriculture, with a total tax on agriculture higher than 50 percent. The group of ten representative taxers had an average total rate of taxation of 36 percent. Of the 18 developing countries in the sample, only Korea and Portugal appeared to be net protectors of agriculture.

In a nutshell, the most striking findings of Schiff and Valdés were:

- The indirect tax on agriculture from industrial protection and macroeconomic policies was about 22 percent on average for the eighteen countries during

1960-85, nearly three times the direct tax from agricultural pricing policies (which was about 8 percent). The total (direct plus indirect) was thus 30 percent.

- Industrial protection policies taxed agriculture more than did real overvaluation of the exchange rate.
- High taxation of agriculture was associated with low growth in agriculture, and low growth in the economy.
- Surprisingly, most countries protected importables. On average, the direct protection of importables was about 18 percent, and the direct taxation of exportables about 16 percent, for an average impact (on the relative price of importables to exportables) of about 40 percent. These distortions within agriculture increased between the early 1960s and the mid-1980s.
- Direct price policies stabilized domestic agricultural prices relative to world prices, with an average reduction in variability of 25 percent, and even more when world prices were highly volatile. Indirect policies contributed little, if anything, to price stability.
- Public investment in agriculture did not compensate for adverse price policies.
- The effect of removing agricultural price interventions was not regressive. In most countries, removing direct (or total) interventions changed the real incomes of the poorer urban and rural groups by less than 5 percent (up or down). More often than not, the rural poor gained from removing the interventions.
- The contribution of agriculture to fiscal revenues has fallen over time, and is, on average, small.

Using a similar approach, Dorosh and Valdés (1990) found a strong import-substituting, anti-export bias in Pakistan during the period 1960 to 1987. Import quotas, rather than tariffs, were used as the primary instrument of protection. However, implicit import tariffs on principal importables ranged between 130 and 220 percent in the 1960s, declining to still-high levels of between 40 and 55 percent from the mid-1970s onward. Direct taxation of agricultural exportables averaged 15 percent from 1972 to 1987. The cost of this taxation was compounded by indirect taxation of 38 percent through a combination of trade and exchange rate policies. Transfers out of agriculture, resulting from both direct and indirect policies, averaged about 36 percent of agricultural value added. Simulations revealed that in the absence of all interventions, farm income from Pakistan's five leading crops would have been 40 percent higher between 1983 and 1987.

Table 3. Direct and Indirect Rates of Nominal Protection, 1960-84

(period averages in percentages)

Country	Period	Indirect Protection	Tax due to industrial protection	Direct Protection	Total Protection
Extreme taxers					**-51.6**
Cote d'Ivoire	1960-82	-23.3	-23.2	-25.7	-49.0
Ghana	1958-76	-32.6	-32.4	-26.6	-59.5
Zambia	1966-84	-29.9	-21.4	-16.4	-46.3
Representative taxers					**-36.4**
Argentina	1960-84	-21.3	-39.5	-17.8	-39.1
Colombia	1960-83	-25.2	-37.8	-4.8	-30.0
Dominican Republic	1966-85	-21.3	-20.8	-18.6	-39.9
Egypt	1964-84	-19.6	-27.5	-24.8	-44.4
Morocco	1963-84	-17.4	-13.4	-15.0	-32.4
Pakistan	1960-86	-33.1	-44.9	-6.4	-39.5
Philippines	1960-86	-23.3	-33.0	-4.1	-27.4
Sri Lanka	1960-85	-31.1	-40.1	-9.0	-40.1
Thailand	1962-84	-15.0	-13.9	-25.1	-40.1
Turkey	1961-83	-37.1	-57.4	5.3	-31.8
Mild taxers					**-15.8**
Brazil	1969-83	-18.4	-21.4	10.1	- 8.3
Chile	1960-83	-20.4	-37.4	-1.2	-21.6
Malaysia	1960-83	-8.2	-9.9	-9.4	-17.6
Protectors					**10.4**
Korea, Republic of	1960-83	-25.8	-26.7	39.0	13.2
Portugal	1960-84	-1.3	-1.0	9.0	7.7
Sample Average	1960-84	-22.5	-27.9	-7.9	-30.3

Notes: The tax on agriculture resulting from industrial protection, t_{na}, is given by $[1/(1 + t_{na})]-1$. Direct protection is measured as the difference between relative producer and border prices at the official exchange rate, after adjusting for transportation, storage, and other relevant margins, and divided by the relative price in the absence of all interventions. Sample average is a simple unweighted cross-country average.
Source: Schiff and Valdés (1992-a).

Using measures of direct and indirect taxation similar to those applied by Schiff and Valdés, Amin (1996) considered the case of Cameroon. As a member of the *Communaute Financiere Africaine* (CFA), Cameroon has fixed its currency, in nominal terms, to the French franc. During the period 1963 to 1992, the CFA franc became

increasingly overvalued, owing to both the mounting strength of the French franc, and to a number of adverse shocks to the country's terms of trade, the most important of which related directly to Cameroon's two major agricultural exports, coffee and cocoa. The study ended before the devaluation of the CFA franc that took place in January 1994. Amin estimated that the level of over-valuation peaked at 77 percent in *(when)*. The agricultural sector was taxed directly, with coffee and cocoa producers typically receiving less than one-half of the f.o.b. price. The results Amin obtained for Cameroon are in line with those obtained by Schiff and Valdés in their sample, although it should be qualified that under the nominal exchange rate arrangements of the CFA, Cameroon's policy flexibility to accommodate adverse exogenous shocks was severely limited.

Agriculture was similarly taxed elsewhere in sub-Saharan Africa, owing to the widespread perception among developing countries that industrialization was the key to economic growth. Import substitution and tight trade controls conspired to transfer resources out of agriculture and into industry. In his study on Nigeria, Oyejide (1993) found that all crops suffered negative nominal (direct) protection from 1969 to 1983. This taxation declined from -0.27 in 1969-71 to -0.01 by 1981-83, mainly as a result of increased protection of cereals, but export crops remained heavily taxed. Indirect taxation increased throughout the entire period, compounding the effect of direct taxation on exportables, and more than offsetting any direct protection to agricultural importables.

Macroeconomic and industrial policy have come under increasing scrutiny by economists seeking to explain the poor economic performance of agriculture in many sub-Saharan African countries during the past two decades. Ghurra and Grennes (1993) confirmed a negative relationship between RER misalignment and economic performance, using pooled data, for the years 1972 to 1987, for thirty-three sub-Saharan African countries. They tested this relationship with three different measurements of RER misalignment. These included one measure based on purchasing power parity, one derived from an Edwards-type model in which the ERER was estimated as a function of macroeconomic variables, and one that used the black-market premium of the exchange rate.

Ghurra and Grennes found that the RER had been substantially overvalued in most of the countries in their sample, regardless of which measure of RER misalignment was used. Botswana, the country with the least misalignment, had experienced the highest rate of growth. The poorest economic performers, such as Ghana and Uganda, also had the most misaligned real exchange rates. Estimates of the RER, irrespective of which measure was used, revealed an unambiguously negative relationship between misalignment of the RER and export growth. Their results also suggest that export growth was adversely affected by macroeconomic instability.

Exogenous Effects including Dutch Disease

Having examined the impact of industrial and macroeconomic policies on the real exchange rate, we can proceed to understanding how the RER can be affected by exogenous factors such as changes to an economy's terms of trade. Such changes may result from the boom or bust of an important commodity, from technological change, from changes in productivity, or from medium- or long-term changes in foreign capital flows. The effects these have on the equilibrium RER will, in the absence of intervention, affect the RER. A change in the RER will, in turn, have an impact on all tradables, not confining itself to the sector experiencing the boom, bust, technological change, or change in productivity.

Such phenomena have been popularly referred to as the Dutch disease. Dutch disease has been associated with significant temporary (medium-term) increases in export revenues from oil, gas, coffee, or more recently from the increased foreign capital inflows that tend to follow structural adjustment and trade liberalization. It is characterized by the simultaneous co-existence of advancing and declining subsectors within the traded-goods sector, during which time declining RERs profoundly inhibit the ability of non-booming subsectors to export or compete with imports. In developing countries, the agricultural sector has usually been the traded goods subsector that suffers most from this decline. Examples of Dutch disease associated with commodity booms include the natural gas boom in the Netherlands, oil export booms in the UK, Nigeria, Mexico, and Venezuela, and coffee booms in Colombia and other countries.

A widely accepted theoretical model of the Dutch disease phenomenon was developed by Corden and Neary (1982), and is summarized here. We then examine several country-specific applications of this model. Corden and Neary developed a variant of the Salter "dependent economy" model to analyze the impact of a booming export subsector on the RER and on the economy as a whole. They were interested in both the short- and long-term impacts of the boom on production, employment, wages, and profitability. They distinguished between two effects, the resource movement effect, and the spending effect.

The spending effect occurs through the higher real income resulting from the commodity boom. As long as neither traded goods nor non-traded goods are inferior, the increase in income will raise demand for both types of goods. The short-term effects of this increased demand will include higher prices for non-traded goods, and an increase in imports. The higher price of non-traded goods relative to traded goods implies an appreciation of the RER, and a loss of competitiveness among non-booming exports.

The higher price of home goods and boom-sector activity attracts factors of production, at the expense of traditional exports, which are usually agricultural in developing countries. This is part of the resource movement effect. Simple models of Dutch disease assume that labor is the only mobile factor, though Corden and Neary also examined cases in which capital is mobile across sectors. For purposes of illustration, we restrict our discussion to cases in which labor is assumed to be the only factor that is

mobile across sectors, keeping in mind that some of these outcomes may be reversed when capital is also mobile across sectors (as demonstrated by Corden and Neary, 1982).

With labor the only factor that is mobile across sectors, the impact will remain confined to the wage rate. A commodity boom causes wages to increase in the booming subsector, thereby inducing labor to move out of both the home-goods sector and the non-booming traded-goods sector. The spending effect will tend to raise the price of non-traded goods, placing upward pressure on wages in these sectors as well, also inducing labor to move out of the non-booming traded goods sector. This last sector is squeezed the most, and employment and production in the sector will fall further than in the others.

To the extent that it is the equilibrium RER that changes, policy prescriptions are neither obvious nor unambiguous. One issue is whether it is advisable to pursue a policy that prevents the RER from appreciating fully, by depreciating the nominal exchange rate. In addition, the model assumes that the increase in income is spent by factors, when in reality a significant share of this increase is likely to be collected by the government as taxes. The level and composition of government spending of this revenue increase will therefore influence the subsequent magnitude and direction of the spending effect.

In his analysis of the coffee boom in Colombia, Edwards (1985) found that higher coffee prices resulted in an accumulation of international reserves, and a higher rate of growth of the money supply. The resultant higher rate of inflation, for a given rate of change of the nominal exchange rate, results in an appreciation of the RER, which leads to a loss of competitiveness in the non-coffee tradable goods sectors. The RER will appreciate even more if the fiscal deficit increases, and is financed, even if only partially, by money creation. If, as was the case in Colombia, the rate of devaluation of the nominal exchange rate is decreased, the RER appreciation will be correspondingly greater, as will be the squeeze on the non-coffee tradable goods sector.

Oyejide (1993) found that the structural changes that occurred in Nigeria between 1960 and 1984, particularly during the oil boom of the 1970s, reflected a similar story. Agriculture accounted for almost 60 percent of Nigeria's export revenue prior to the oil boom, when it then dropped to 25 percent. During the same period, agriculture's share of non-oil GDP fell from an average of 60 percent during 1960-65, to about 30 percent between 1978 and 1981. Agriculture's share in employment likewise fell, from 75 percent in 1970 to 59 percent in 1982. The fact that agriculture's share of non-oil GDP fell by 50%, but agricultural employment fell by only about 20%, reflected the low degree of labor mobility in this sector. The two non-oil tradable sectors, agriculture and manufacturing, were both losers relative to oil in the structural changes that occurred in the wake of the oil boom. Oil revenues accrued mainly to the government, and public spending rose rapidly between 1970 and 1980. In spite of increased revenues, fiscal deficits grew between 1975 and 1983, and the current account remained in deficit, as Nigeria accumulated both internal and external debt.

The oil boom did yield one favorable effect on agriculture, as increased revenues from oil reduced the government's reliance on taxation of agricultural exports. Poor agricultural performance during the 1970s led the government to focus more attention on the sector, as evidenced by reforms of Nigeria's agricultural marketing boards, the institution of generous input subsidies, increased direct protection to importables, and lower taxation of exportables. None of these policy changes were sufficient, however, to compensate the agricultural sector for the effects of inflation and appreciation of the RER, as real producer crop prices fell, or, at best, remained constant.

The oil boom of the 1970s led to a similar situation in Venezuela. But the case of Indonesia, another oil-exporting developing country, provides a marked contrast to the experiences of Nigeria and Venezuela, and an instructive counterexample to the Dutch disease phenomenon. Following a more prudent macroeconomic management of their oil-boom windfall, Indonesia's RER did not appreciate to any significant degree, and exports remained diversified. Clearly, how a government manages a commodity boom is important in determining its ultimate effect on the economy and on economic growth.

For Chile and New Zealand, structural reform triggered changes in the equilibrium RER (Valdés, 1994). Prior to these reforms, both countries were inward looking and highly regulated. Each had high rates of protection, extensive government intervention in both product and factor markets, and low rates of agricultural and economic growth.

Chile undertook reform in two stages. In the first stage, from 1973 to 1983, the Government focused on general economic reforms, in response to an urgent need to correct fundamental macroeconomic imbalances. Sweeping trade liberalization took place, as tariffs were cut drastically, quantitative restrictions were removed, and most price controls and all multiple exchange rates were eliminated. Interest rate ceilings were also gradually withdrawn, and input subsidies eliminated.

Although trade liberalization initially resulted in depreciation of the RER, a turnaround occurred, and the RER began appreciating between 1979 and 1982 as a result of capital inflows and wage indexation. Following a deep recession in 1983 that led to a devaluation and a real depreciation, agriculture began to recover. Around 1990, following capital inflows, the RER began to appreciate, leading once more to a slowdown in agricultural growth.

The stabilization program initiated by New Zealand in 1984 led to high interest rates, an inflow of foreign capital, and the appreciation of their RER. On the trade front, the Government liberalized agriculture and removed farm subsidies, even though industrial protection remained high. Sandrey and Scobie (1994) estimated that by 1992, agriculture in New Zealand faced an 11 percent implicit tax as a result of industrial protection. Argentina and a number of other countries in Latin America have recently experienced similar circumstances to those of New Zealand, as capital inflows increased

in the wake of structural reforms. Similar evidence is emerging in Russia, Estonia, and Poland.

So far we have stressed the importance of the relationship of capital inflows to competitiveness of agriculture. Long-term capital inflows are essential for development, even though the comparative advantage of some sectors may be affected. Capital inflows do, however, entail some risk, by generating inflationary pressures and appreciation of the RER. These risks are higher with short-term inflows, particularly if international interest rates are expected to rise, and when investors sense financial fragility, as we have seen in relation to the 1994 "Tequila" crisis in Mexico, and the 1997 "Asian flu" crisis in East and South East Asia. The result can be abrupt capital outflows which, although less likely to occur in foreign direct investment, remain difficult to anticipate. The recent experience of middle-income countries has demonstrated the difficulty of judging *ex ante* whether a particular inflow is likely to be permanent or transitory. Countries like Chile, Colombia, and India have attempted to restrict short-term capital inflows by imposing high taxes on them, a temporary solution at best. The issue will become increasingly important as a growing number of countries choose to liberalize their economies. It is far from obvious what, if any, policy action is optimal. An obvious one is to first reform the domestic financial sector.

Interest Rates

In spite of the substantial body of literature on rural financial markets in less-developed countries, there is very little applied research on the interface between domestic capital markets and agriculture. This omission is the more surprising in light of economic reforms in Latin America and eastern and central Europe, where dramatic increases in real interest rates have occurred. By raising the cost of capital, higher domestic interest rates have the largest adverse effect on capital-intensive industries. Research presented by Mundlak (1997) on a large sample of developing countries shows that because agriculture is capital intensive, it is more sensitive than non-agriculture to changes in interest rates and less sensitive to changes in the cost of labor. The capital/labor ratio in agriculture increases over time and, Mundlak concluded, "...policies that cause a rise in interest rates are more damaging to agriculture and to agricultural investment in particular."

Changes in the interest rates have macroeconomic consequences well beyond their direct effect on investment and production decisions. An important article by Snape (1989) elucidated the interactions between real exchange rates, interest rates and agriculture, using Salter's "dependent economy" model. Snape considered four scenarios of the interaction between real exchange rates and real interest rates. Two were policy-induced (fiscal and monetary expansion), and two were induced by exogenous changes (in the savings rate and in world interest rates).

In considering the case of fiscal expansion, in which the government would finance its increased budget deficit by borrowing from the private sector, Snape made two assumptions. He assumed that the economy was at full employment, and that an increase in public expenditure would not be offset by an increase in private savings. This meant that no private savings were put aside to pay future taxes that would be necessary to meet payments on interest and principal on the new public borrowing. In the absence of international capital flows, increased public borrowing would result in higher real interest rates, and private investment would be crowded out. Foreign capital inflows would finance increased public borrowing, and real interest rates would remain constant (unless the country risk premium rises with the level of external borrowing). The additional foreign exchange would result in an appreciation of the real exchange rate.

In a floating exchange rate regime, this would occur through an appreciation of the nominal exchange rate. If the nominal exchange rate was fixed, the capital inflow would result in a balance of payments surplus, and an accumulation of foreign exchange reserves. If this increase in international reserves was not sterilized, the rate of inflation would increase, and the real exchange rate would appreciate. Sterilization of foreign exchange reserves (by selling Treasury bills in the open market) could delay appreciation of the RER, but fiscal expansion would result in a higher interest rate, which, in turn would continue to attract capital inflows, resulting in further appreciation of the RER. A once-and-for-all fiscal expansion would result in higher interest rates in the absence of capital flows or in an appreciation of the RER in the presence of capital flows, regardless of the nominal exchange rate regime in place. Thus, under both scenarios, agriculture would be harmed by fiscal expansion.

We have already seen that an increase in world real interest rates would raise the cost of borrowing and servicing public debt, resulting in a reduction in real absorption and a depreciation of RER. Thus, while the production of tradables would be positively affected by the depreciation of the RER, it would be negatively affected by an increase in world interest rates.

Prior to economic reforms in the mid-1980s, much of global agriculture benefited from subsidized credit lines. When these subsidies were removed, the farm and agroprocessing sectors faced high market interest rates. The experience of early reformers such as Chile and New Zealand, and later Argentina and Mexico, along with others, showed that in spite of the opening of the capital account, domestic real interest rates remained much higher than international interest rates for a period of several years. Interest rates were higher primarily because the cost of intermediation in the domestic capital market remained high. Costs were high due to a relatively uncompetitive capital market in an obsolete regulatory framework. Rodriguez (1994, cited in Brock, 1996), calculated the spread between local currency lending rates and the US Treasury bill rate, adjusted for exchange rate depreciation, at 23 percentage points in Argentina in 1993, and 59 points in Uruguay in 1992. There is ample evidence, therefore, of the critical

importance of including the financial sector early on in the process of overall economic reform.

Structural Adjustment

A growing number of developing countries have implemented structural adjustment programs, with the support of the World Bank, aimed at reducing fiscal imbalances, redefining the role of the public sector, and accelerating growth (Goldin and Winters, 1992). Structural adjustment programs affect agriculture in a number of ways. Redressing fiscal imbalances typically involves reductions in both agricultural and non-agricultural subsidies. The impact of these reductions on agriculture's relative value added is ambiguous *a priori*, and depends on the initial distribution of subsidies across sectors. We see in equation (5) that a reduction in subsidies to intermediate inputs would cause value added in all affected sectors to fall, with an ambiguous relative impact on agriculture.

As seen in equations (5) and (6), a reduction in government expenditures results in a depreciation of the RER, which in turn increases agriculture's relative prices and value added. The relative price changes affect relative factor rewards, the distribution of income, and ultimately rural-urban migration patterns over time.

Trade liberalization, another major component of structural adjustment programs, improves agricultural incentives in two ways, through lower industrial prices, and through the depreciation in the RER.

In view of the potential benefits of structural adjustment, how can it best be carried out? Three issues emerge in response to this question. The first is the sequence of reforms (Edwards, 1991), which reduces to the question of whether trade liberalization should precede capital account liberalization or vice versa. The second issue centers on the "small-country assumption". In the countries that influence world prices, increased exports can theoretically result in lower revenues, but this is, generally, not supported by evidence, with the exception of a few cases such as coffee in Brazil and cocoa in Cote d'Ivoire (Panagariya and Schiff, 1991).

Thirdly, we should be interested in the effects of structural adjustment on public spending. Public expenditure cuts are an inescapable component of structural adjustment, and will undoubtedly include cuts in spending on agriculture. Van Blarcom, Knudsen, and Nash (1993) analyzed a sample of 32 countries in which public spending on agriculture had been cut some time after 1970. They concluded that much of the public spending on agriculture in these countries had been directed toward relatively unproductive purposes. In Mexico, for instance, 85 percent of public spending on agriculture in 1989 went to untargeted food and input subsidies administered primarily through state agencies. According to the authors' calculations, if spending on untargeted subsidies was cut in half, spending on irrigation, research, and extension could be doubled at the same time as overall sectoral spending was reduced by 28 percent. As a result, public investment in agriculture

declined, as fiscal pressures created by funding these subsidies escalated. The point is, that a reduction in public spending on agriculture need not have a negative impact on agricultural output as long as the allocation of public spending is targeted to public goods.

Van Blarcom et.al. developed a set of guidelines for structural adjustment in agriculture. These included: (i) reduce industrial protection and remove the misalignment of the RER; (ii) reduce subsidies and effectively target the remaining subsidies to services that foster growth; (iii) increase the public goods component of public spending on agriculture (such as research and extension); (iv) privatize state-owned enterprises in conjunction with price liberalization in order to end the drain on fiscal resources; and (v) build greater transparency into the public sector's budget process so that public funds are allocated in a context of clearly defined sector strategies and explicitly stated goals.

Support services that can be transferred to the private sector should be transferred. Recurrent costs should be adequately funded, particularly operations and maintenance costs of public infrastructure. Indeed, the *World Development Report 1994* (World Bank, 1994) identified these recurrent costs as generating some of the highest social returns of any type of public spending. One way of ensuring adequate funding for recurrent costs is through cost recovery measures. The user charges for water, power, and fertilizer often account for a small fraction of their actual cost in many countries, and should be increased to reflect the cost of providing them.

The North

Agricultural policies in industrialized countries (the North) have taken fundamentally different forms than those in developing countries (the South), and the contrasts are instructive. Agricultural sectors in the North generally comprise a small proportion of the economy relative to the urban-industrial sectors. Northern agriculture has remained highly protected, while Northern industry is afforded generally low rates of protection. Furthermore, low industrial protection, coupled with lower levels of exchange rate misalignment, has resulted in a substantially lower level of indirect taxation of agriculture than in developing countries.

The United States

The nature of the relationship between the macroeconomy and relative prices in agriculture for the US was detailed in several pioneering studies by Schuh (1974, 1989). Schuh's (1974) analysis for the US began with the 1950s. The US dollar was considered overvalued, but under the Bretton Woods agreement, the US agreed to a fixed nominal exchange rate relative to gold. The exchange rate overvaluation adversely affected the competitiveness of US agriculture, particularly for exportables, at a time of burgeoning levels of grain stocks. The US resorted to providing massive food aid, in essence as an implicit export subsidy, and by the end of the 1960s, had added explicit export subsidies as

well. But these efforts did not succeed in lowering the level of stocks sufficiently, given the level of exports at the prevailing exchange rate. By ____, as real price supports were reduced or eliminated, about 60 million acres of land were taken out of production.

In his 1989 article, Schuh argued that the combined effect of an overvalued dollar and the commodity programs in place induced an income transfer to consumers, while the land set-aside program made land more scarce, and induced the adoption of land-substituting inputs. The Bretton Woods system was abandoned when the US devalued its currency in 1972, and the dollar depreciated roughly 25%. The depreciation, combined with an unstable monetary policy that resulted in negative real interest rates and varying inflation rates, contributed to an agricultural boom that was sustained through the 1970s. The boom came to an end with the OPEC oil price increase of 1979. In the 1980s, taxes were cut, but public expenditures were not. The result was a growing fiscal deficit at a time when the Federal Reserve chose to maintain tight monetary policies. Real interest rates climbed, and capital inflows increased, leading to an appreciation of the real exchange rate.

The increase in interest rates ended the land market boom, at the same time that the US imposed a grain embargo on the Soviet Union. US agriculture faced three simultaneous shocks: declining domestic prices due to the appreciation in the RER, the collapse of the land market, and the loss of the Soviet grain market. Asset values and farm income also collapsed. US agriculture began to recover only after significant agricultural acreage was retired, and the Government has only partially scaled back from the relatively high implicit and explicit subsidies it continues to provide for key commodities.

A number of lessons can be learned from the US experience. First, as with the developing countries, changes in the real exchange rate are important to agriculture. Second, changes in macroeconomic conditions are likely to inspire changes in direct interventions, such as agricultural commodity-support programs. Through their effects on the structure of incentives and on commodity programs, macroeconomic events indirectly influence productivity change as well as the distribution of benefits between producers and consumers.

Another lesson relates to short-term price instability. Traditionally, prior to the early 1970s price instability in agricultural markets was explained largely by the inelastic nature of food demand, and on the supply side, by weather patterns, rapid technological change, and asset fixity. In an important contribution on the US experience,Rausser, Chalfant and Stamoulis (1985) examine the increased importance of money markets on the farm sector and the additional source of instability that it generates. Because agricultural markets behave as "flex price" while other markets behave as "fixed price" (e.g. stickiness of non-food prices) in the short run, overshooting in agricultural commodity markets will occur, even if expectations are formed rationally. This amount to either a tax (in the case of deflation) or a subsidy (in the case of inflation) to agriculture through relative price changes. For example, anticipated money growth, according to their econometric estimates, causes a much greater response in food prices (the flex-prices) than for non-agricultural

goods. Under negative shocks, the implicit taxes resulting from overshooting imposed on US agriculture were limited by the price support policy, which introduced a downward price inflexibility for the supported commodities, but which in turn cause the incidence of the macroeconomic policy tax on agriculture to shift towards the cost of mantaining stocks.

The implications of these findings for other economies needs to be examined. One would expect that, unlike the US, most LDCs are price takers in grain markets and so (at a given nominal exchange rate), domestic farm prices would change relatively less than those of home goods after a monetary shock, which would not induce overshooting. This is likely to apply to most Latin American countries but not necessarily to other ones. For instance, state trading in agricultural commodities is still pervasive in India. In that case or in the case of non-tariff barriers, the domestic price may be unrelated to the world price and overshooting may occur as well.

The EU and their Common Agricultural Policy

The fiscal burden of the Common Agricultural Program (CAP) has inspired substantial analyses of the impact of agricultural protection on macroeconomic variables in studies such as Gylfason (1995), and Stoeckel, Vincent, and Cuthbertson (1989). Gylfason argued that although partial equilibrium analysis found that deadweight losses resulting from farm policies represented about 1 percent of GDP, long-term general equilibrium considerations were shown to raise the loss estimates to about 3 percent of GDP. The CAP has been responsible for higher consumer food prices and an increased tax burden. Total per capita agricultural transfers per full-time farmer equivalent[6] averaged $17,700 in the EU, compared with a median labor income of $12,000 in 1992.

Based on general equilibrium models described in the volume edited by Stoeckel et.al., various authors quantified the impact of agricultural protection on relative prices to manufacturing, manufacturing output, and employment. The studies found that industrial countries would benefit from removing agricultural protection because manufacturing output and exports would increase, as would employment.

Stoeckel and Breckling (1989) examined the effects of removing both the CAP and national agricultural protection in the four largest EU countries, namely Germany, France, Italy, and the United Kingdom. They found that the elimination of both measures of protection could generate an increase in aggregate output of over 1 percent, create 3 million new jobs, and lead to a 5 percent increase in manufacturing exports to the rest of the world.

Dicke, Donges, Gerken, and Kirkpatrick (1989) focused on the case of West Germany, the largest economy in the EU and the largest contributor to the CAP. They also found that Germany would experience gains from liberalization similar to those estimated

[6]Full-time farmer equivalent is defined as 2200 hours of work in agriculture annually.

by Stoeckel and Breckling. Total public subsidies to German agriculture are, at present, equal to about 70 percent of the sector's gross value added at domestic prices. Assuming an increase of 10 percent in world agricultural prices and constant wages, agricultural liberalization would result in a reduction in the rate of unemployment from 9 to 5 percent, along with a 3 percent gain in real GDP, and a 5 percent increase in foreign trade. Their results on employment support Stoeckel, Vincent, and Cuthbertson's (1989) estimate that continued support of agriculture could result in an increase in unemployment of up to 3 million workers in the EU. Given the small share of agriculture in the economy of the EU and Germany, the effects found in the above studies seem rather large.

Japan and New Zealand

A similar study by Vincent (1989) on Japan's agricultural economy also appears in the Stoeckel et.al. volume. Japan, which has the highest agricultural protection levels in the OECD, would enjoy benefits from liberalization similar to those of the EU. Vincent found that agricultural liberalization in Japan could result in a 3 percent increase in revenues from manufactured exports in the short run, and an increase in average real wages of about 2.5 percent.

In New Zealand, extensive reforms have resulted in the virtual elimination of agricultural protection.[7] The reform program began in earnest in 1984, and during its initial phases had severe adverse effects on agriculture (Sandrey and Scobie, 1994). Subsidies were removed early in the reforms, at the same time as the real exchange rate experienced a substantial appreciation, aggravating the problems faced by the agriculture sector. Since that time however, public sector deficits have been eliminated, and compensatory microeconomic reforms have been implemented. As a result, New Zealand's agriculture sector has become increasingly competitive in international markets.

Concluding Comments

A basic concept underlying the analysis presented in this paper is that of 'neutrality'. By that, we mean 'intersectoral neutrality' or the equal treatment of all sectors. In other words, we considered the case of intersectorally neutral policies as the counterfactual or 'anti-monde' to which the actual policies were compared. Neutrality was selected as the 'anti-monde' based on efficiency considerations. In the absence of power on the world market and externalities, the Pareto efficient solution is to treat all sectors equally.

[7]Australia and New Zealand were the only two industrial countries that taxed agriculture by providing relatively higher protection to manufacturing.

We submit this as a paradigm, i.e., from the viewpoint of efficiency, agriculture should not be taxed relative to other sectors and neither should it be favored. Nevertheless, developing countries have traditionally taxed the agricultural sector while developed countries have protected it, and both have incurred efficiency losses.

Based on Schiff and Valdés (1992), it was shown that the taxation of agriculture in developing countries resulted in a slowdown in agricultural growth and in overall economic growth, and that the slowdown was caused essentially by indirect taxation policies rather than by the direct ones. A number of LDCs have undertaken structural adjustment reforms in the last fifteen years, including trade policy reform and stabilization efforts, and this has reduced the level of indirect taxation. One reason often given for direct taxation of agriculture is to keep food prices low for urban consumers and to obtain export tax revenue. The benefits from food subsidies were captured mainly by urban households. However, the majority of the poor are often located in the rural areas rather than in the cities, and it is the rural poor who gain most from the removal of price interventions. As for export tax revenues, their contribution to fiscal revenues has fallen over time, and is, on average, small. For LDCs who depend heavily on them will have to look for alternative sources of revenue by implementing a tax reform and/or will have to raise the efficiency of the public sector and/or reduce its size.

In the developed countries, protection of agriculture has had adverse general equilibrium effects by raising costs and reducing production and employment in the manufacturing sector. A number of studies have found the cost in terms of higher unemployment to be significant. Moreover, a GATT study found that the policy had a negative impact on poor consumers.

Since the Uruguay Round, agriculture has been integrated into the trade rules of the WTO, and most LDCs have joined the WTO. This gives us hope that future multilateral negotiations will continue to lower the bias against agriculture in LDCs, and in favor of agriculture in developed countries.

References

Amin, A.A. (1996), "The effects of exchange rate policy on Cameroon's agricultural competitiveness", *Research Paper # 42,* Nairobi, Kenya: African Economic Research Consortium.

Bautista, R.M., and A. Valdes (1993), "The relevance of trade and macroeconomic policies for agriculture," in Bautista, R.M. and A. Valdes, eds., "*The bias against agriculture: trade and macroeconomic policies in developing countries,*" Washington D.C.: ICEG and IFPRI.

Balassa, B. (1965), "Tariff protection in industrial countries: An evaluation," *Journal of Political Economy*, 73 (Dec.): 573-94.

Balassa, B. (1970), "Growth strategies in semi industrial countries," *Quarterly Journal of Political Economics*, 84, (Feb.): 24-47.

Balassa, B. (1982), "Adjustment to External Shocks in Developing Countries", *World Bank Staff Working Paper 472*, Washington D.C.: World Bank.

Bawghati, J. (1978), *Anatomy and consequences of exchange control regimes*, Cambridge: Ballinger.

Binswanger, H., and P.L. Scandizzo (1983), "Patterns of Agricultural Protection", *Agricultural Research Unit Report 48*, Washington D.C.: World Bank.

Byerlee, D., and G. Sain (1986), "Food pricing policy in developing countries: Bias against agriculture or for urban consumers?", *American Journal of Agricultural Economics*, Vol. 68, (Nov.): 961-9.

Coeymans, J.E., and Y. Mundlak (1993), "Sectorial Growth in Chile: 1962-82," *Research Report 95*, Washington D.C.: IFPRI.

Corden, W.M. (1966), "The structure of a tariff system and the effective protection rate," *Journal of Political Economy*, 74, (June): 221-237.

Corden, W.M., and P. Neary (1982), "Booming sector and deindustrialization in a small open economy," *Economic Journal 92,* (December): 835-48.

Diaz-Alejandro, C.F. (1970), *Essays on the economic history of the Argentine Republic*, New Haven, Conn., USA.: Yale University Press.

Dicke, H., J.B. Donges, E. Gerken, and G. Kirkpatrcik (1989), "Effects of agricultural trade liberalization on West Germany's economy", in Stoeckel, A.B., D. Vincent and S. Cuthbertson eds., *Macroeconomic consequences of farm support policies,* Durham, N.C.: Duke University Press.

Dorosh, P.A., and A. Valdes (1990), "Effects of exchange rate and trade policies on agriculture in Pakistan", *Research Report 84*, Washington D.C.: IFPRI.

Dornbusch, R. (1974), "Tariffs and non-traded goods." *Journal of International Economics*, (May): 177-85.

Edwards, S. (1985), "Coffee, money and inflation in Colombia", in Thomas, V., ed., *Linking macroeconomic and agricultural policies for adjustment with growth: the Colombian experience*, Baltimore: Johns Hopkins University Press.

Edwards, S. (1988), *Exchange rate misalignment in developing countries*, Washington D.C.: World Bank.

Edwards, S. (1994), "Real exchange rate determination of real exchange rate behavior: Theory and evidence of developing countries," in Williamson, J., ed., *Estimating equilibrium exchange rates*, Washington D.C.: Institute for International Economics.

Elbadawi, I.A. (1994), "Estimating equilibrium long run real exchange rates", in J. Williamson, ed., *Estimating equilibrium real exchange rates*, Washington D.C.: Institute for International Economics.

Garcia Garcia, J. (1993), "Effects of the coffee boom and government expenditures on agricultural prices in Colombia" in Bautista, R.M. and A. Valdes, eds., *The bias against agriculture: trade and macroeconomic policies in developing countries*, Washington D.C.: ICEG and IFPRI.

Galbraith, J.K. (1938), "The maintenance of agricultural production during the depression: The explanation reviewed," *Journal of Political Economy*, Vol. XLVI, (June): 305-23.

Gardner, B.I. (1997), "Policy reform in agriculture: An assessment of the results in eight countries", *mimeo*, University of Maryland.

Gelhar, M.J., T.W. Hertel and W. Martin (1994), "Economic Growth and the Changing Structure of Trade and Production in the Pacific Rim", *American Journal of Agricultural Economics,* 76: 1101-10 (December).

Ghurra, D. and T. Grennes (1993), "The real exchange rate and macroeconomic performance in sub-Saharan Africa", *Journal of Development Economics,* Vol 42: 155-74.

Goldin, I., and L.A. Winters, eds., (1992), *Open economies: structural adjustment and agriculture*, Cambridge: Cambridge University Press .

Gylfason, T. (1995), "The macroeconomics of European agriculture", *Princeton Studies in International Finance, # 78,* Princeton, N.J.: Princeton University.

Hinkle and Nsengumiva (1995)

Johnson, G.D. (1950), "The nature of the supply function for agricultural products", *American Economic Review,* 40, (Sept.): 539-64.

Krueger, A.O. (1978), "Liberalization attempts and consequences," in *Foreign trade regime and economic development*, vol. 10, Cambridge: Ballinger.

Krueger, A.O., M. Schiff, and A. Valdes (1988), "Agricultural incentives in developing countries: measuring the effects of sectorial and economy wide policies," *World Bank Economic Review,* Vol. 2, #3: 255-271.

Kyle. S. (1992), "Pitfalls in the measurement of the real exchange rate effects on agriculture", *World Development,* Vol. 20, # 7: 1009-19.

Lattimore, R.G., and G.E. Schuh (1979), "Endogenous policy determination: The case of the Brazilian beef sector," *Canadian Journal of Agricultural Economics*, 27(2), (July): 1-16.

Lewis, W.A. (1954), "Economic development with unlimited supplies of labor," *Manchester School of Economic and Social Studies*, 22 (May): 139-91.

Little, I., T. Scitovsky, and M. Scott (1970), *Industry and trade in some developing countries*, Oxford: Oxford University Press and OECD.

Loo, T., and E. Tower (1989), "Agricultural protectionism and less developed countries: the relationship between agricultural prices, debt servicing capacties and the need for development aid," in Stoeckel A.B., D. Vincent

and S. Cuthbertson, eds., *Macroeconomic consequences of farm support policies,* Darhum, N.C.: Duke University Press.

Martin, W. and P.G. Warr (1993), "Explaining the Relative Decline of Agriculture: A Supply-Side Analysis for Indonesia," *World Bank Economic Review* (September).

Meier, G.M. (1989), *Leading issues in economic development*, New York and Oxford: Oxford University Press.

Meier, G.M. (1995), *Leading issues in economic development*, New York and Oxford: Oxford University Press.

Mundlak, Y. (1997), "The dynamics of agriculture", in proceedings of the XIII International Conference of Agricultural Economics, Sacramento, California, August 10-16, 1997.

Mundlak, Y., D. Cavallo, and R. Domenech (1989), "Agriculture and Economic Growth in Argentina, 1913-84," *Research Report 76*, Washington D.C.: IFRI.

Myrdal, G. (1957), *Economic nationalism and internationalism*, Melbourne, Australia: Australian Institute of International Affairs.

Nurke, R. (1952), "Some international aspects of the problem of economic development," *American Economic Review*, 42 (May): (Supplement) 571-83.

Nurke, R. (1961), "Trade theory and development economics", In Howard S. Ellis, ed., *Economic development for Latin America,* New York: St. Martin's Press.

Oyejide, T.A. (1993), "The oil boom, macroeconomic policies and Nigerian agriculture: Analysis of a 'Dutch disease' phenomenon," in Bautista, R.M. and A. Valdes, eds., *The bias against agriculture: trade and macroeconomic policies in developing countries*, Washington: ICEG and IFPRI.

Panagariya, A., and M. Schiff (1991), "Taxes versus quotas: The case of cocoa exports," in I. Goldin and L.A. Winters (eds.), *Open Economies: Structural Adjustment and Agriculture*, Cambridge University Press: Cambridge.

Prebisch, R. (1950), *El Desarrollo de America Latina y sus Problemas Principales*, New York: United Nations, 1950.

Prebisch, R. (1959), "Commercial Policy in the Underdeveloped Countries", *American Economic Review*, 49 (May): (Supplement): 251-73.

Ranis, G. and J.C.H. Fei (1961), "A theory of economic development," *American Economic Review*, 51 (Sept.): 533-65.

Rausser, G.C., J.A. Chalfant and K.G. Stamoulis (1985), "Instability in Agricultural Markets: The US Experience", International Association of Agricultural Economics.

Rodriguez, C. (1994), "Interest Rates in Latin America. World Bank Internal Discussion Paper No. IDP-140 (April), quoted in Brock, P.L.(1996), "*High real interest rates, guarantor risks and bank recapitalizations*", mimeo, World Bank.

Rosenstein-Rodan, P.N. (1943), "Problems of industrialization of Eastern and South-Eastern Europe," *Economic Journal*, 53 (June/Sept.): 202-11.

Rosenstein-Rodan, P.N. (1957), *Notes on the theory of the 'big push'*, Cambridge: MIT.

Sadoulet, E., and A. De Janvry (1995), *Quantitative development policy analysis*, Baltimore: Johns Hopkins University Press.

Salter, W.E.G. (1959), "Internal and external balance: The role of price and expenditure effects," *The Economic Record*, Vol. 35, (August): 226-38.

Sandrey, R.A., and G.M. Scobie (1994), "Changing international competitiveness and trade: Recent experience in New Zealand agriculture", *American Journal of Agricultural Economics,* Vol 78, # 5: 1140-46.

Schiff, M., and A.Valdes (1992a), *The political economy of agricultural pricing policy Vol. 4. A Synthesis of the Economics in Developing Countries*, Baltimore: Johns Hopkins University Press.

_____ **(1992b)**, *The Plundering of Agriculture in Developing Countries*, World Bank, Washington, D.C.

Schuh, G.E (1974), "The exchange rate and US agriculture", *American Journal of Agricultural Economics,* Vol 56, # 1: 1-13.

_____ **(1989)**, "Macro linkages and agriculture: the United States experience," in Maunder, A. and A. Valdes, eds., *Agriculture and Governments in an Interdependent World,* Proceedings of the Twentieth International Conference of Agricultural Economists, Dartmouth.

Shultz, T.W. (1964), *Transforming Traditional Agriculture*, New Haven: Yale University Press.

Singer H.W. (1950), "The distribution of gains between investing and borrowing countries," *American Economic Review*, 40 (May): 473-85.

Sjaastad, L.A. (1980), "Commercial policy, "true tariffs", and relative prices," in Black, J. and B. Hindley, eds, *Current Issues in Commercial Policy and Diplomacy*, New York, N.Y.: St. Martin's Press.

Snape, R.H. (1989), "Real exchange rates, real interest rates and agriculture", in Maunder, A. and A. Valdes, eds., *Agriculture and Governments in an Interdependent World,* Proceedings of the Twentieth International Conference of Agricultural Economists, Dartmouth.

Stoeckel, A.B., and J. Breckling (1989), "Some economywide effects of agricultural policies in the European Community: a general equilibrium study," in Stoeckel, A.B., D. Vincent and S. Cuthbertson, eds., *Macroeconomic consequences of farm support policies*, Durham, N.C.: Duke University Press.

Stoeckel, A.B., J. Breckling and S. Cuthbertson (1989), "Overview," in Stoeckel, A.B., D. Vincent and S. Cuthbertson, eds., *Macroeconomic consequences of farm support policies*, Durham, N.C.: Duke University Press.

Swan, T.W. (1960), "Economic control in a dependent economy", *Economic Record*, 36 (July): 51-60.

Taylor, D. and T.P. Phillips (1991), "Food pricing policy in developing contries: Further evidence on cereal producer prices," *American Journal of Agricultural Economics*, Vol.73, No.4: 1036-46.

Valdes, A. (1973), "Trade policy and its effect on the external agricultural trade of Chile 1945-1965," *American Journal of Agricultural Economics*, Vol.55, No.2. (May): 1973.

_____ **(1986a)**, "Exchange rates and trade policy: help or hindrance to agricultural growth?" in *Agriculture in a Turbulent World Economy*, Proceedings of the Nineteenth International Conference of Agricultural Economists, Gower.

_____ **(1986b)**, "Impact of trade and macroeconomic policies on agricultural growth: the South American experience", in *Economic and Social Progress in Latin America 1986 Report,* Inter-American Development Bank.

_____ **(1991)**, "The role of agricultural exports in development," in Timmer, C.P., ed., *Agriculture and the state*, Ithaca, N.Y.: Cornell University Press.

_____ **(1994)**, "Agricultural reforms in Chile and New Zealand: A review," *British Journal of Agricultural Economics*, 45, (May): 189-201.

_____ **(1996)**, "Surveillance of agricultural price and trade policy in Latin America during major policy reforms", *Discussion* Paper # 349, Washington D.C.: World Bank.

Valdes, A., and A. Siamwalla (1988), "Foreign trade regime, exchange rate policy and the structure of incentives," in Mellor, J.W. and R. Ahmed, eds., *Agriculture Price Policy for Developing Countries*, Baltimore: The Johns Hopkins University Press.

Van Blarcom, B., O. Knudsen, and J. Nash (1993), "The role of public expenditures for Agriculture," *World Bank Discussion Paper #216*, Washington D.C.: World Bank.

Vincent, D. (1989), "Effects of agricultural protection in Japan: an economywide analysis," in A.B. Stoeckel, D. Vincent and S. Cuthbertson, eds., *Macroeconomic consequences of farm support policies*, Durham, N.C.: Duke University Press.

Williamson, J., ed. (1994), *Estimating equilibrium exchange rates*, Washington D.C.: Institute for International Economics.

World Bank (1994), *World Development Report 1994*, Washington D.C.: The World Bank.

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS1952	Enterprise Isolation Programs in Transition Economies	Simeon Djankov	August 1998	R. Vo 33722
WPS1953	Trade Policies and Incentives in Indian Agriculture: Methodology, Background Statistics and Protection, and Incentive Indicators, 1965–95—Background Paper 1, Sugar and Sugarcane	Garry Pursell	August 1998	L. Tabada 36896
WPS1954	Politicians and Firms in Seven Central and Eastern European Countries	Stijn Claessens Simeon Djankov	August 1998	R. Vo 33722
WPS1955	Appraising Workfare Programs	Martin Ravallion	August 1998	P. Sader 33902
WPS1956	Benefit Incidence and the Timing of Program Capture	Peter Lanjouw Martin Ravallion	August 1998	P. Sader 33902
WPS1957	Bidding for Concessions	Michael Klein	August 1998	J. Dytang 37161
WPS1958	Total Strangers or Soul Mates? Antidumping and Competition Policies in Latin America and the Caribbean	J. Luis Guash Sarath Rajapatirana	August 1998	J. Troncoso 37826
WPS1959	Is There a Credit Crunch in East Asia?	Wei Ding Ilker Domaç Giovanni Ferri	August 1998	F. Fernandes 80453
WPS1960	Calm After the Storms: Income Distribution in Chile, 1987–94	Francisco H. G. Ferreira Julie A. Litchfield	August 1998	G. Ilogon 33732
WPS1961	Protecting the Environment and the Poor: A Public Goods Framework Applied to Indonesia	Gunnar S. Eskeland Chingying Kong	August 1998	C. Bernardo 31148
WPS1962	The Political Economy of Privatization: An Empirical Analysis of Bank Privatization in Argentina	George R. G. Clarke Robert Cull	August 1998	P. Sintim-Aboagye 38526
WPS1963	Commodity Risk Management and Development	Donald F. Larson Panos Varangis Nanae Yabuki	August 1998	P. Kokila 33716
WPS1964	Public Investment and Economic Growth in Mexico	Ulrich Lächler David Alan Aschauer	August 1998	C. Lazcano 37776

Policy Research Working Paper Series

	Title	Author	Date	Contact for paper
WPS1965	Manufacturing Firms in Developing Countries: How Well Do They Do, and Why	James Tybout	August 1998	L. Tabada 36869
WPS1966	Sulfur Dioxide Control by Electric Utilities: What Are the Gains from Trade?	Curtis Carlson Dallas Burtraw Maureen Cropper Karen L. Palmer	August 1998	T. Tourougui 87431