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ABSTRACT

United States exports may not necessarily increase when the dollar falls on the world market. Conventional thinking is that a weaker dollar means more demand for U.S. products because they become less expensive than goods from countries with stronger currencies. However, developing countries whose export revenues are denominated in the weakening dollar can lose income because the weaker dollars they earn on their exported goods buy less on the world market. When the dollar slumps, therefore, U.S. farm product sales to some developing countries may also drop. An analysis of the effects of changes in currency exchange rates from 1980 to early 1987 on the capacity of 14 developing countries to buy imports showed that 7 of the 14 have seen a deterioration in import-buying power because of the dollar's drop since 1985. Four developing countries have shown modest improvements. The three top U.S. farm markets among the 14 developing countries--Korea, Taiwan, and Mexico--have not been affected by recent currency fluctuations. (Author/KC)

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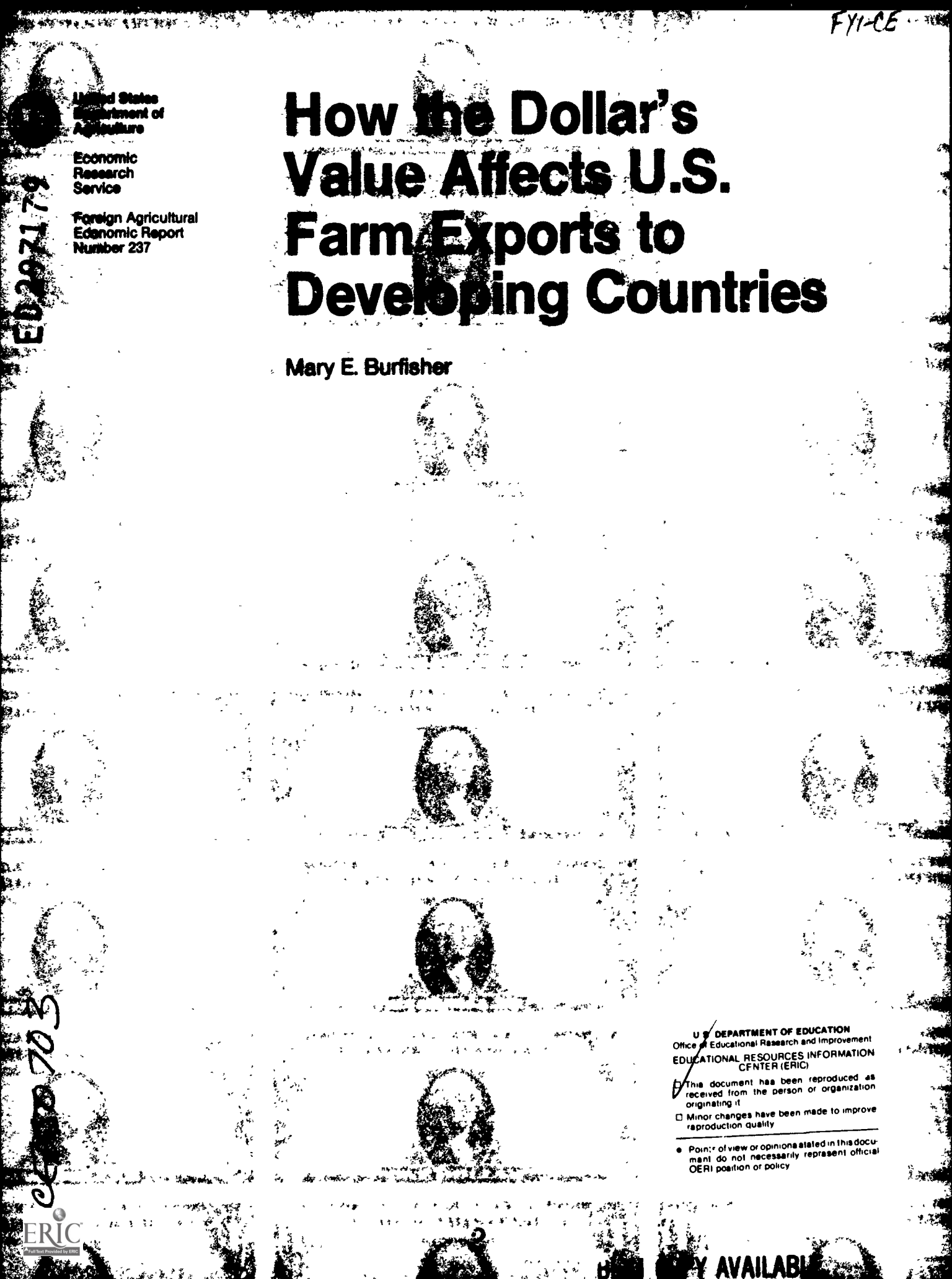
Economic Research Service

Foreign Agricultural Economic Report Number 237

How the Dollar's Value Affects U.S. Farm Exports to Developing Countries

Mary E. Burfisher



HOW THE DOLLAR'S VALUE AFFECTS U.S. FARM EXPORTS TO DEVELOPING COUNTRIES. By Mary E. Burfisher. Agriculture and Trade Analysis Division, Economic Research Service, U.S. Department of Agriculture. Foreign Agricultural Economic Report No. 237.

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Keywords: Developing countries, depreciation, terms of trade, agricultural exports, exchange rates.

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SUMMARY

U.S. exports may not necessarily increase when the dollar falls on the world market. Conventional thinking is that a weaker dollar means more demand for U.S. products because they become less expensive than goods from countries with stronger currencies. But, developing countries whose export revenues are denominated in a weakening dollar can lose income because the dollars they earn on their exported goods buy less on the world market. When the dollar slumps, therefore, U.S. farm product sales to some developing countries may also drop.

This report measures the effects of changes in currency exchange rates from 1980 to early 1987 on the capacity of 14 developing countries to buy imports. These countries accounted for 50 percent of all U.S. agricultural exports to developing countries in 1986. Developing countries paid out more than $10.8 billion for U.S. farm products in 1986, about 41 percent of U.S. world agricultural sales.

Dependence of developing country trade on major world currencies may alter analysts' current predictions of world sales of U.S. farm goods. A fall in developing country import-buying power works against the stimulating effects that a depreciating dollar is expected to have on demand for U.S. exports. On the other hand, developing countries whose exports are sold for stronger currencies than the dollar could purchase more U.S. goods.

An analysis of the currencies used in their trade showed that 7 of the 14 developing countries have seen a deterioration in import-buying power because of the dollar drop since 1985. Four developing countries have shown modest improvements. The three top U.S. farm markets among the 14 developing countries, Korea, Taiwan, and Mexico, have not been affected by recent currency fluctuations.

How The Dollar's Value Affects U.S. Farm Exports to Developing Countries

Mary E. Burfisher

INTRODUCTION

The deterioration of U.S. agricultural trade has been attributed in part to the rising value of the U.S. dollar in the early 1980's, compared with the currencies of competitors, which made U.S. agricultural exports relatively expensive (3, 6, 12).[1] The depreciation of the dollar probably will improve U.S. export competitiveness, helping increase the U.S. market share of world agricultural trade. However, because developing countries depend on hard currencies to set world prices for their exports and to conduct trade, exchange rate realignments can influence developing countries' import-purchasing power by altering external terms of trade (price of imports in terms of exports). Reductions in import-purchasing power can work against the stimulating effects of dollar depreciation on the demand for U.S. farm products.

This report measures the contribution that exchange rate realignments have made from 1980 to the first quarter of 1987, in real (adjusted for inflation) terms of trade for 14 developing countries. These countries represent almost 50 percent of U.S. agricultural sales to developing countries in 1986 (table 1). Developing countries paid out more than $10.8 billion for U.S. farm products in 1986, about 41 percent of U.S. world agricultural sales. Exports of seven of the developing countries are mainly denominated in dollars, but their imports are mostly paid for in other currencies. Their import-buying power has deteriorated since the dollar began to decline in 1985. Four developing countries have shown modest improvements, and the three top U.S. farm markets, Korea, Taiwan and Mexico, among these 14 developing countries have not been affected by dollar depreciation.

BACKGROUND

Developing countries have become important U.S. agricultural export markets, accounting for over 40 percent of U.S. farm exports by 1986 (table 2). Consequently, their response to dollar depreciation significantly affects U.S. farm exports. U.S. exports to both developing and developed country markets peaked in 1981. Growth in U.S. farm exports to developing countries between 1982 and 1984 helped offset the fall in agricultural exports to developed countries during that period. U.S. agricultural exports to both markets declined sharply in 1985, despite the drop in value of the dollar beginning in February of that year. However, U.S. farm exports to developing countries fell 10 percent in 1986, while exports to developed countries fell 2 percent.

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[1]Underlined numbers in parentheses cite sources listed in the References section.

Table 1--U.S. agricultural exports to selected developing countries, 1986

Country	Value of exports
	1,000 dollars
Brazil	565,935
Burkina	6,696
Cameroon	6,240
Ghana	20,330
Indonesia	189,940
Ivory Coast	3,837
Kenya	14,717
Korea	1,305,687
Mexico	1,082,255
Nigeria	149,051
Philipp s	256,135
Senegal	21,040
Taiwan	1,170,242
Venezuela	455,661
Subtotal	5,247,766
All developing countries	10,828,398
World total	26,231,066

Table 2--U S. agricultural exports to developing and developed countries, 1980-86

Item	1980	1981	1982	1983	1984	1985	1986
	Million dollars						
Developing countries	14,562	15,965	12,833	14,200	14,922	11,988	10,828
Developed countries	21,317	22,088	19,601	18,818	18,576	14,493	14,253
World	41,233	43,339	36,622	37,826	36,099	29,041	26,231
	Percent						
Developing countries	35	37	35	38	41	41	41
Developed countries	52	51	54	50	51	50	54

Some distinctive features of developing countries' exchange rate arrangements may cause them to respond differently to dollar depreciation than do developed countries. Developing countries commonly peg exchange rates to major currencies. Pegging can affect how a developing country's import demand responds to the depreciation of a major currency. For example, when a developing country pegs to the U.S. dollar, then dollar depreciation has no effect on the domestic currency price of U.S. goods in the developing country, and by itself does not stimulate increased demand for that good. However, if there are competing suppliers, demand for the U.S. good may rise as consumers shift toward the relatively cheaper U.S.

product. Pegging can directly affect a developing country's income and, consequently, its import demand, if a rise in the value of the currency to which the developing country is pegged causes its exports to become uncompetitive in third countries and to decline (1). Pegged exchange rates also tend to respond slowly to foreign exchange market developments. The high proportion of U.S. farm exports to countries with fixed exchange rate regimes may account for the slow response of U.S. farm exports to the weaker dollar (7, 8).

Another important feature of developing countries' foreign exchange positions is their dependence on hard currencies to transact their world trade and to set the prices of many of their exports. This feature exposes developing countries to changes in their external terms of trade when exchange rates of leading world currencies realign, regardless of the developing countries' foreign exchange arrangements.

This realignment changes developing countries' terms of trade because developing countries typically use different currencies for exports and for imports. The U.S. dollar is the primary export currency for many developing countries. The dollar is used to set commodity prices and/or to denominate their export trade. Developing countries use a more diverse set of currencies for their imports. A surplus in a hard currency is accumulated when there is an imbalance in the currencies used in developing countries' trade. For example, a developing country that exports goods denominated in dollars and imports goods denominated mainly in yen holds a surplus of dollars, which must be converted to yen to pay for imports. When the dollar depreciates against the yen, the developing country's terms of trade deteriorate as the import-purchasing power of its export revenues declines. Net wealth may also fall if trade flows generate the country's reserve currency, and the import-purchasing power of those reserves declines. Developing countries whose exports are denominated in nondollar currencies (for example, the yen) but whose imports are denominated mainly in dollars have a dollar deficit. A depreciation of the dollar against the yen contributes to an improvement in the developing country's terms of trade.

The effect of exchange rate realignments on terms of trade is an important consideration when assessing the prospects for dollar depreciation to stimulate developing countries' demand for U.S. farm products. "Terms of trade" is a measure of foreign income, which is a key determinant of U.S. farm exports (2, 3, 7). If dollar depreciation hurts a developing country's terms of trade, the developing country may reduce its demand for U.S. farm exports.

Many factors, including prices, domestic supply, and trade policies combine to determine the final agricultural import demand of developing countries. Of increasing importance is the effect of debt service obligations on foreign exchange availability and agricultural imports (for example, see 14).

MODEL

We used a simple, partial equilibrium model with two goods to trace the effects of currency realignments on the terms of trade and on substitution among goods denominated in different currencies. This model has no backward linkages between changes in external terms of trade and foreign and domestic supply and demand responses for exports, imports, and import substitutes. Prices only change when exchange rates change. We hold prices constant to trace the isolated effects of exchange rate movements, as opposed to exogenous price movements, on developing country terms of trade and import behavior. Such an approach is consistent with some reasonable assumptions about elasticities in a general equilibrium framework. Most of the countries in this analysis are small, and their domestic supply and demand responses do not affect world prices for their exports and imports. (Some exceptions exist; for example, the domestic supply response of the Ivory Coast and Brazil for cocoa can

be expected to significantly affect world prices.) The approach also implies that foreign demand for developing countries' exports does not change much when foreign prices fluctuate because of exchange rate movements. Low price elasticity of demand for developing country exports would tend to support a stable world price in this model.

Figures 1-3 illustrate the effect of exchange rate realignments on three types of small countries: a country with balanced trade in each currency, a country with a surplus in a depreciating currency (dollar), and a country with a surplus in an appreciating currency (yen).

Figure 1 illustrates the model of a small country with balanced trade in each currency. This model is implicit in the expectation that developing countries' import demand will increase in response to a depreciation of the dollar. When a small country holds a balance in its vehicle currencies (for example, the dollar and the yen), its dollar (yen) export revenues exactly cover its dollar (yen)-denominated import costs. In this case, exchange rate realignments have no effect on terms of trade. The developing country simply shifts toward greater consumption of dollar-denominated goods as their relative price falls, in a movement from points A to B. (If its export basket remains unchanged, the substitution in the developing country's import basket implies that the country no longer maintains a net balance in each currency. The country becomes subject to terms of trade effects due to currency realignments.)

Figure 2 shows a small country with a surplus in the dollar, a depreciating currency. The model shows a developing country that exports goods denominated solely in dollars and imports goods denominated in both dollars and yen. As the dollar depreciates, the relative domestic currency price of dollar goods declines against the price of yen goods, in a shift of the price line from P1 to P2. Relative prices change regardless of the developing country's exchange rate arrangement. If the developing country pegs to the dollar, then the domestic currency price of its exports is unchanged while the relative price of its imports rises. If the developing country pegs to the yen, then the domestic currency price of its imports is unchanged, but the relative price of its exports falls. If the developing country's currency is fixed to some weighted basket, then the relative prices of its exports and imports fall and rise, respectively, by amounts determined by the weights. If the exchange rate is flexible, dollar depreciation still causes the purchasing power of the dollar-denominated exports to fall with respect to yen-denominated imports in both foreign and domestic currency terms.

Figure 2 shows how a dollar depreciation causes a contraction in consumption of both dollar and yen goods, thus working against the stimulating effects of the dollar depreciation on consumption of dollar goods. No substitution means a deterioration in terms of trade, causing consumption of both goods to contract along a ray, in a movement from points A to B. The decline in the relative price of dollar goods can be expected to induce some substitution toward consumption of the goods, in a movement from points B to C. The magnitude of this latter movement will depend upon the elasticity of substitution between dollar- and yen-denominated goods. In the short run, we reasonably assume a relatively low elasticity, due to long-term contracts, traditional suppliers, and a commodity composition of bilateral trade that limits substitution among trade partners. But, substitution toward dollar goods is likely to be great enough to offset the decline in consumption because of deteriorating terms of trade. The assumption that the positive substitution effect toward dollar goods dominates the fall in demand for those goods as terms of trade decline underlies the construction of figure 2. Figure 2 shows that on net, purchases of dollar goods rise and yen goods fall as the developing country's import basket moves from points A to C. Dollar depreciation causes dollar exports to the developing country to increase, but they rise by less than they might have if terms of trade had not also fallen.

How Exchange Rate Realignments Alter Terms of Trade

Figure 1
Currency-balanced country

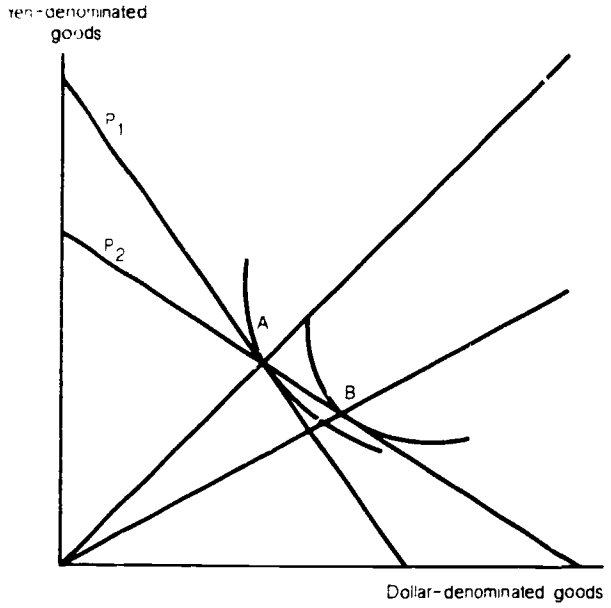

Figure 2
Dollar-surplus country

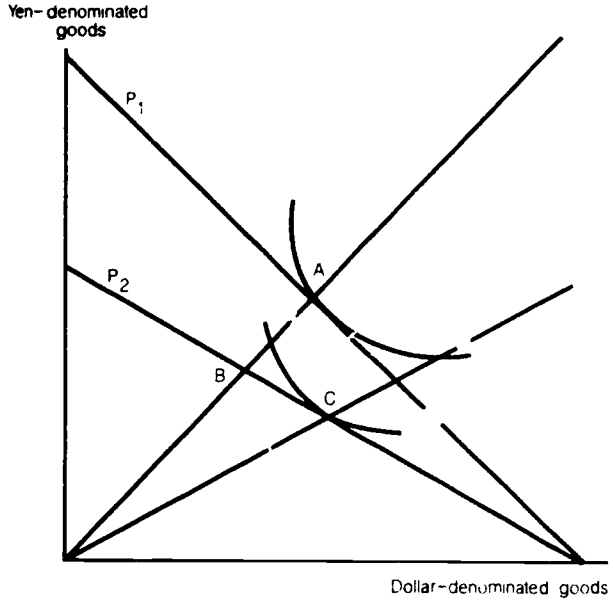

Figure 3
Dollar-deficit country

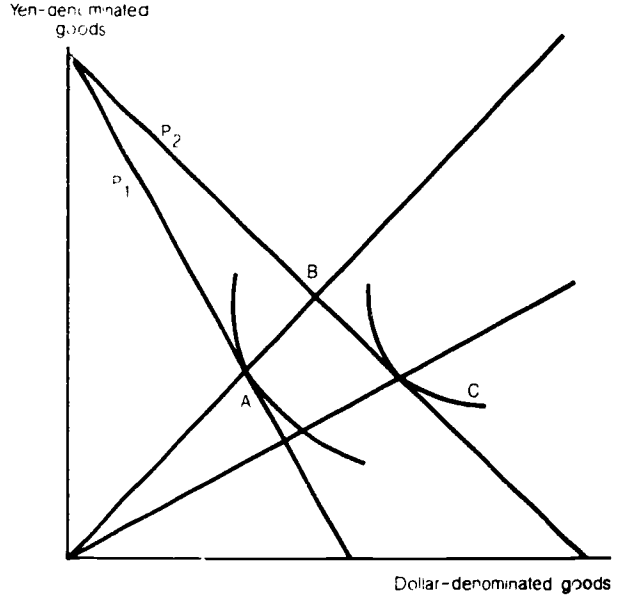

Figure 3 shows a small country that holds a surplus in the yen, an appreciating currency (export goods denominated in yen and import goods denominated in dollars). A dollar depreciation reduces the cost of dollar-denominated goods relative to yen-denominated goods in a shift of the price line from P1 to P2. If world demand for the developing country's exports (which in this example are denominated in the yen, an appreciating currency) is assumed to be relatively inelastic, then export prices in terms of yen remain unchanged. The increase in the purchasing power of the yen causes imports of both dollar- and yen-denominated goods to increase, in the absence of substitution, in a movement from points A to B. The depreciation of the dollar also causes the developing country to substitute toward cheaper dollar goods, reducing its purchases of yen goods, as shown by the movement from points B to C. Dollar exports to the developing country, therefore, increase by more than they would have if just relative prices had changed. Improved terms of trade also contribute to increased demand for dollar-denominated goods.

DOMESTIC RESPONSES TO CHANGED TERMS OF TRADE

A change in a country's external terms of trade stimulates changes in its domestic supply of, and demand for, exports, imports, and import substitutes. For example, when terms of trade deteriorate as the price of exports relative to imports falls, a country becomes biased against producing exports. Production of import substitutes increases as import prices rise and import demand declines. The degree to which an economy adjusts depends on the degree of price responsiveness and factor mobility within the country and expectations regarding the duration of the price changes. The effect of domestic resource distribution on developing countries' import demand is determined by the ability of the agricultural sectors to shift between production of agricultural exports and agricultural import substitutes.

Domestic shifts in supply and demand can be expected to have no effect on world prices of their traded goods when the developing country is small. But if the developing country is large, a shift in its domestic supply could affect world price and, thus, the developing country's terms of trade. For example, if dollar depreciation reduces the domestic currency price of cocoa, the Ivory Coast's domestic supply could decline. If world elasticity of demand is low, the decline in supply would cause the world price of cocoa to rise. The commodity price increase would contribute to an improvement in the Ivory Coast's terms of trade, offsetting to some degree the deterioration in terms of trade caused by dollar depreciation.

Commodity prices are, of course, the central component of terms of trade. Changes in world prices reflect both world demand conditions and domestic supply adjustments to changing terms of trade and other domestic factors. Price indices for the leading commodity exports of developing countries generally have declined since 1980, with a small but temporary rebound for some commodities in 1983 and 1984. Indices of manufactured goods have also fallen but by less. Price movements alone have, therefore, tended to cause developing countries' terms of trade to deteriorate since 1980, with some recovery in 1983 and 1984 (16). Depending on developing countries' net trade position in major currencies, exchange rate movements can reinforce or work against the effect of price movements on external terms of trade.

METHODOLOGY

The degree to which major currency realignments can affect a small country's terms of trade depends on its net trade position in the major currencies. A common characteristic of developing countries is a bilateral trade imbalance, where transactions for many developing country exports, such as coffee and rubber, are denominated in dollars. Imports, by contrast, are typically transacted in a more diverse basket of currencies.

To measure the effect of currency realignments on terms of trade, we assigned vehicle currency weights to each country on the basis of the proportion of their trade denominated in five major currencies.[2,3] In assigning weights, we made several assumptions. We based vehicle currency assignments, in part, on the location of the major world exchange for a particular commodity. Most primary and nonfood agricultural products, including coffee, rubber, cotton, and fuel were assumed to be priced in U.S. dollars. We also assigned imports

[2]These currencies are the U.S. dollar, pound sterling, yen, deutschemark, and French franc.

[3]In some cases, the world price of a commodity is set in one currency, such as the dollar, but trade in that commodity between a developing country and its trade partner may be conducted in a second currency, such as the yen. In the absence of long-term contracts, the price of the good for the developing country is determined by the current dollar-yen exchange rate. And, assigning the trade to the currency in which the world price is set is appropriate.

of rice from Burma, Thailand, and Pakistan to the dollar. Trade in cocoa and tea was assigned to the pound sterling.[4] All other trade was denominated in the currency of the bilateral trade partner. The five major currencies included in this analysis accounted for an average of 72 percent of exports and 78 percent of imports in the 14 developing countries (table 3).

We employed a 3-year average of trade, based on the most recent United Nations data, to calculate vehicle currency weights for imports and exports (app. II). Vehicle currency market shares were assumed constant, and shares of the subset of trade conducted in the five major currencies were normalized to sum to one.

A country's terms of trade, in domestic currency terms, is calculated as the relative foreign prices of its exports and imports, multiplied by its exchange rates with its trade partners. By holding prices constant, we can assess the contribution of the exchange rate alone to changes in real (adjusted for inflation) terms of trade of a small country by incorporating the vehicle currency weights derived above into the following term, hereafter referred to as the real exchange rate terms of trade (RER):[5]

$$RER = \Sigma_i (\alpha_{ij} - \beta_{ij})(\ln e_{ij} + \ln P_i^o),$$

where α_{ij} = export weight for ith partner of small country j,
β_{ij} = import weight for ith partner of small country j,
$\Sigma_i \alpha_{ij} = \Sigma_i \beta_i j = 1$,
P_i^o = the wholesale price index in the partner country,
e_{ij} = domestic currency price per unit of i currency.

TRENDS IN REAL EXCHANGE RATE TERMS OF TRADE

The U.S. dollar holds a central role as the vehicle currency for both the imports and exports of the developing countries in this study. The pound sterling holds a secondary role as a vehicle currency for developing country exports, mainly because cocoa and tea contracts are priced or transacted in pounds. Many of the 14 developing countries have deficits in yen, deutschemarks, and French francs. Table 4 organizes the currency trade weights for each country according to net dollar balances.

When the exchange rate is expressed in units of foreign currency per U.S. dollar, then a rise in the real exchange rate (adjusted for inflation) index indicates a real depreciation of the foreign currency against the dollar. The dollar began to strengthen in 1979, reaching a peak in 1984 (table 5). Since 1985, the dollar has fallen sharply against this study's four other currencies.

The trade patterns of seven of the countries in the study yield positive dollar balances, or dollar "surpluses." The dollar is the primary vehicle currency for exports whereas currencies used for imports tend to be more diversified. So, movements in real exchange rate terms of trade have in general corresponded with real movements of the dollar. Three of these countries--Indonesia, Kenya, and Nigeria--hold large dollar surpluses but have sizable deficits

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[4]The corresponding Standard International Trade Classification (SITC) codes assigned to the dollar were SITC 071 SITC 2, except 22, 27, and 28, and SITC 3. Rice from Burma, Thailand, and Pakistan was also assigned to the dollar. Trade in SITC 072 and 074 was assigned to the pound sterling.

[5]See appendix I for derivation of RER.

Table 3--Share of five major world currencies in denominating developing countries' trade 1/

Country	Imports	Exports
	Percent	
Brazil	82	52
Burkina	73	40
Cameroon	80	70
Ghana	72	65
Indonesia	81	93
Ivory Coast	75	63
Kenya	79	64
Korea	84	64
Mexico	86	8
Nigeria	73	99
Philippines	80	71
Senegal	68	74
Taiwan	89	68
Venezuela	72	99
Average	78	72

1/ Share of U.S. dollar, yen, French franc, pound sterling, and deutschemark in pricing or transacting exports and imports.

Source: (14).

in currencies experiencing the greatest appreciation. The deterioration in their real exchange rate terms of trade since 1984 has been particularly marked (fig. 4).

Nigeria, for example, suffered a 31-percent decline in real exchange rate terms of trade between 1984 and the first quarter of 1987. Nigeria is a petroleum exporter, with 97 percent of export earnings denominated in dollars. Only 16 percent of its imports are denominated in dollars, but nearly 25 percent is denominated in yen and deutschemarks. Thus, Nigeria accumulates a sizable dollar surplus beyond its imports of dollar-denominated goods, converting its dollars into yen and deutschemarks to purchase Japanese and German imports. Setting aside the effects of declining petroleum prices, we saw that dollar depreciation alone caused a worsening of Nigerian terms of trade, as the purchasing power of dollar-denominated exports fell against Japanese and German imports.

Petroleum-exporting countries have experienced dollar depreciation and a fall in their export price. This price development has exacerbated the recent decline in terms of trade caused by the weakened dollar for Nigeria, Cameroon, Indonesia, and Venezuela.

The remaining three dollar-surplus countries, Burkina, Cameroon, and Ivory Coast, are former French colonies, having strong ties to France as a traditional supplier. These former colonies' leading exports are mainly denominated in dollars, which are used to purchase imports from France. This pattern accounts for the deterioration in their terms of trade since 1984 (fig. 4). When adjusted for inflation, the franc and the deutschemark experienced the greatest appreciation against the dollar since 1984 among the currencies in the study.

Korea, Taiwan, and Mexico, the top three U.S. agricultural export markets, maintain a near balance in trade in each currency. They are, therefore, not exposed to the effects of

Table 4--Vehicle currency trade weights 1/

Currency	Dollar-surplus countries						
	Burkina	Cameroon	Indonesia	Ivory Coast	Kenya	Nigeria	Venezuela
Dollar	0.29	0.50	0.41	0.16	0.54	0 76	0.27
Pound	0.02	0.19		0.32	-0.12	-0.25	-0.04
Yen	0.00	-0.07	-..28	-0.08	-0.17	-0.17	-0.10
French franc	-0.24	-0.53	-0.04	-0.36	-0.08	-0.16	-0.04
Deutschemark	-0.08	-0.09	-0.07	-0.05	-0.17	-0.18	-0.09

	Dollar-balanced countries				Dollar-deficit countries		
	Ghana	Korea	Mexico	Taiwan	Brazil	Philippines	Senegal
Dollar	0.01	0.02	0.04	0.02	-0.15	-0.09	-0.07
Pound	0.04	0.03	0.07	0.03	0.13	0.02	0.05
Yen	0.04	-0.08	-0.03	-0.12	0.00	0.05	0.01
French franc	-0.05	0.00	-0.02	0.01	0.01	0.00	0.03
Deutschemark	-0.04	0.02	-0.06	0.05	0.02	0.02	-0.02

1/ Share of currency in exports minus share in imports.

Sources: (14) and app. table 2.

currency realignments on their terms of trade (fig. 5). Korea and Taiwan have sizable export surpluses with the United States but use these dollars to purchase petroleum.

The Philippines, Brazil, and Senegal have small dollar deficits and show a decline in the real exchange rate component of their terms of trade in the late 1970's through 1984. Since 1985, they have benefited modestly from the recent dollar depreciation (fig. 6). These three countries rely heavily on dollar-denominated imports but run surpluses in appreciating currencies. The Philippines benefits from its export surplus to Japan, while Senegal runs a trade surplus with France. Brazil's surplus of pounds is due to use of the pound to set world cocoa prices.

TRENDS IN AGRICULTURAL IMPORT BEHAVIOR

The record of agricultural imports by the 14 developing countries in this study is typical of the experience of developing countries during the past 15 years. Their agricultural imports surged significantly beginning in the early 1970's. However, agricultural imports dropped sharply for all countries except Taiwan between 1981 and 1983 (table 6). This decline resulted from foreign exchange constraints, declining incomes, and better harvests in many countries.

Agricultural imports by 10 countries in this study continued to decline through 1986. However, four countries, Indonesia, Brazil, Ivory Coast, and Cameroon, increased their agricultural imports in 1986. Only one of these, Brazil, has benefited from the depreciation of the dollar.

Table 5--Real exchange rate movements, 1972-87 1/

Year	Yen	French franc	Deutschemark	Pound
		1980=100		
1972	1.36	1.02	1.11	1.40
1973	1.23	0.93	1.00	1.49
1974	1.20	0.81	0.93	1.42
1975	1.29	0.94	1.06	1.46
1976	1.23	1.02	0.96	1.57
1977	1.05	0.97	0.88	1.25
1978	0.94	0 89	0.82	1.15
1979	1.22	0.85	0.83	1.07
1980	1.00	1.00	1.00	1.00
1981	1.17	1.24	1.17	1.25
1982	1.25	1.33	1.18	1.39
1983	1.28	1.54	1.35	1.49
1984	1.42	1.66	1.56	1.80
1985	1.14	1.24	1.18	1.36
1986	0.97	1.06	0.93	1.24
1987	0.93	1.00	0.90	1.12

1/ Foreign currency per U.S. dollar. 1987 data is for first quarter.

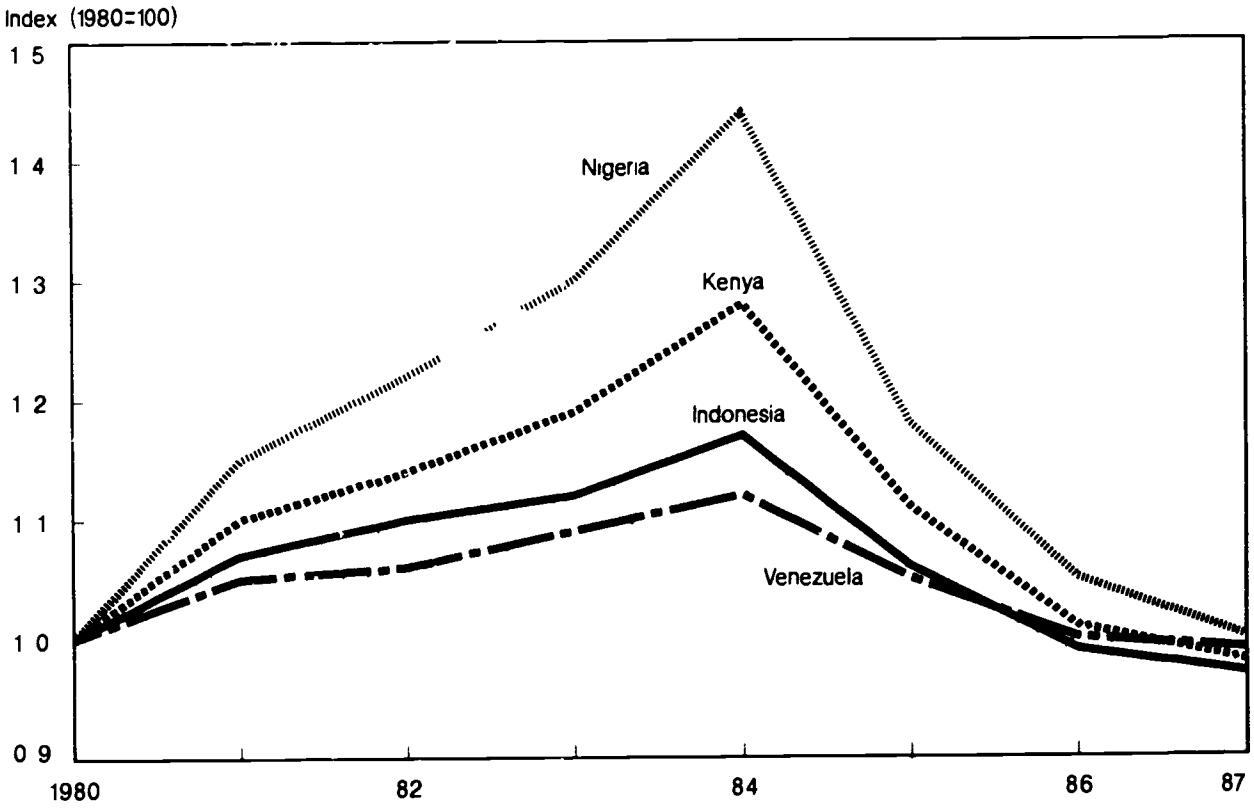
Source: (8).

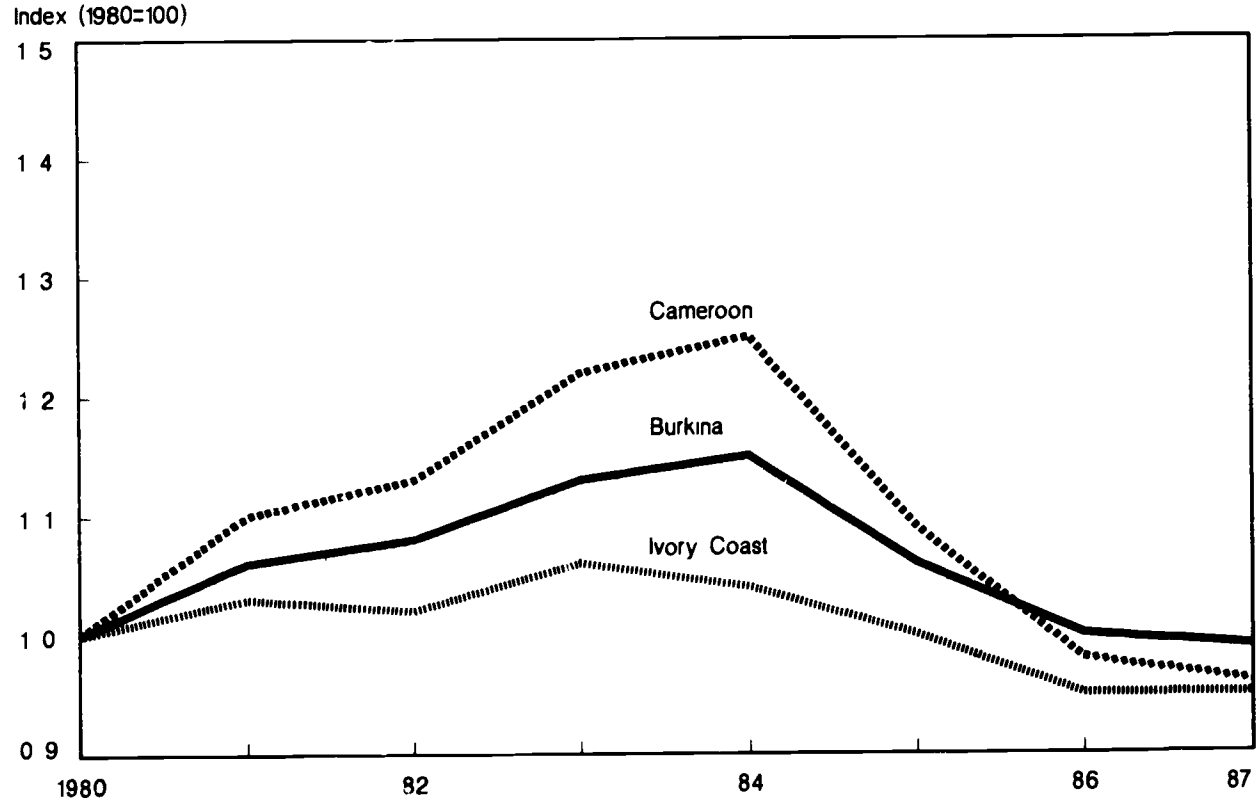
The U.S. market share in this study's leading developing country markets increased slightly from 1980 to 1984, a period of dollar appreciation. Both the value of U.S. agricultural exports and the U.S. market share fell during 1985 and 1986 despite the effect of dollar depreciation in reducing the relative price of U.S. farm products. These trends are consistent with a slowed response of developing countries to exchange rate realignments due to fixed exchange rate regimes, and with low elasticities of substitution due to such factors as traditional ties to suppliers, long-term contracts, and commodity composition of trade.

These characteristics, in turn, indicate the importance of developing countries' terms of trade in determining their import demand. If a developing country's dollar export revenues lose their purchasing power against imports in appreciating currencies, the inability to shift toward cheaper, dollar-denominated imports exacerbates the decline in its import-purchasing power. The negative effect of a fall in terms of trade on consumption of all imported goods becomes more important relative to the positive substitution effect toward consumption of the cheaper dollar goods.

Figure 4

Exchange rate terms of trade of dollar-surplus countries[1]

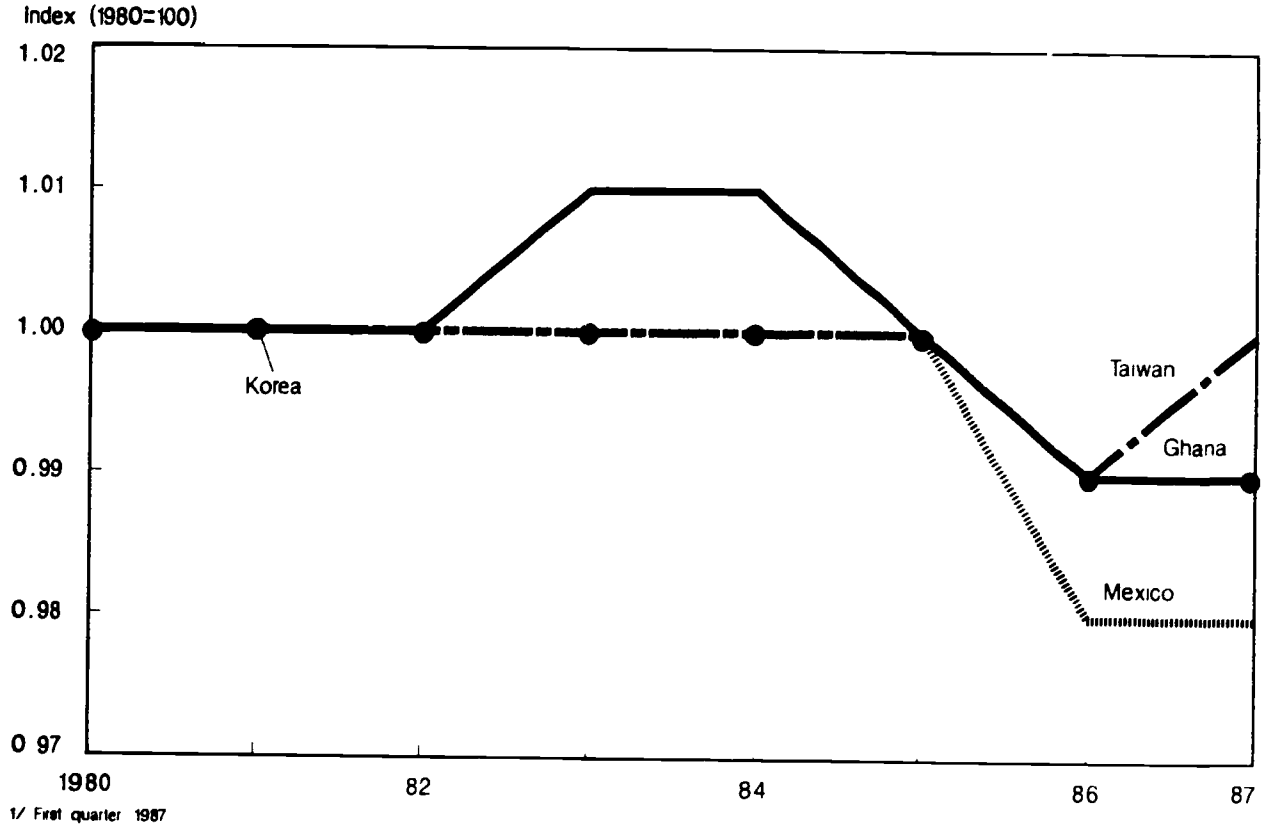




1/ First quarter, 1987

Figure 5

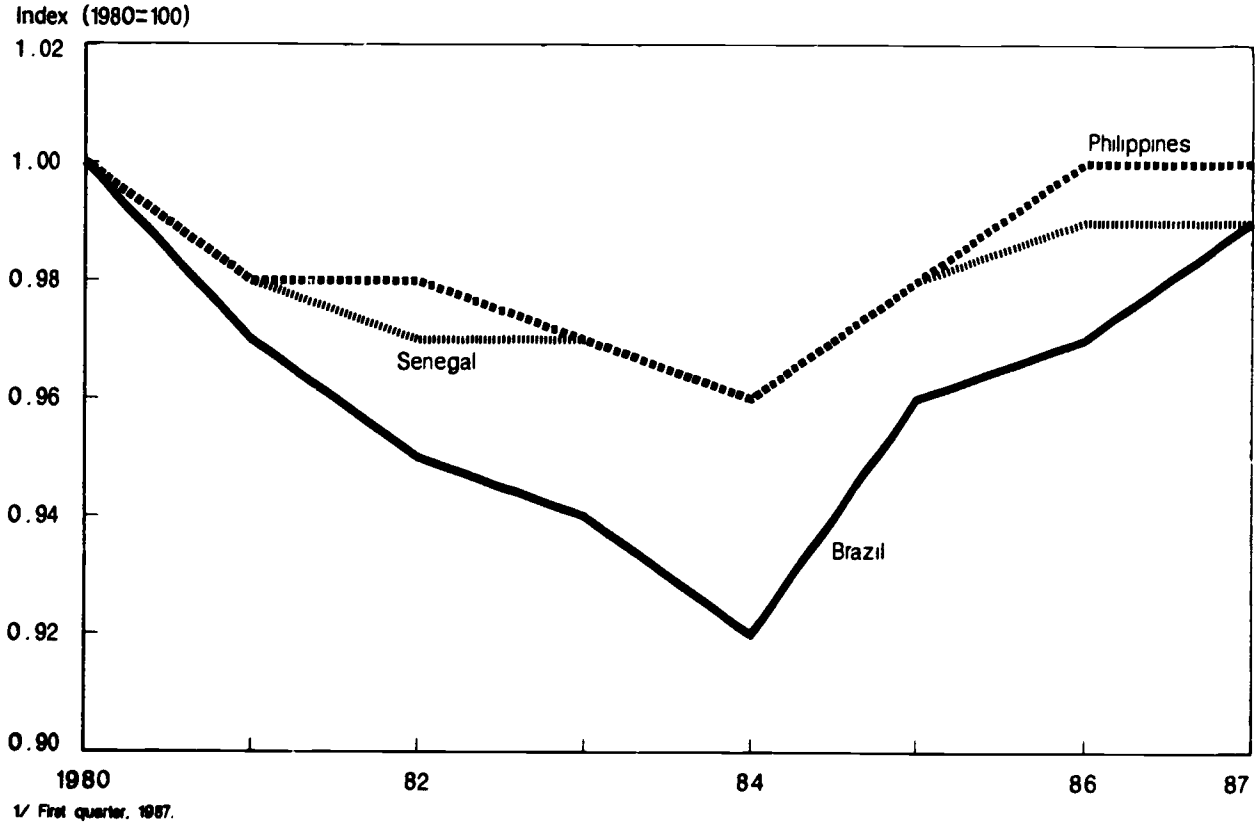
Exchange rate terms of trade of dollar-balanced countries[1]



1/ First quarter 1987

Figure 6

Exchange rate terms of trade of dollar-deficit countries[1]



1/ First quarter, 1987.

Table 6--Agricultural imports and U S market share of selected developing countries, 1980-86

Importing country and year	Total	U S	U S share
	1,000 dollars		Percent
Brazil			
1980	754,412	680,421	0.90
1981	774,944	710,486	0 92
1982	574,370	525,900	0 92
1983	527,472	478,707	0 91
1984	538,445	508,289	0 94
1985	526,263	470,127	0 89
1986	776,843	565,935	0.73
Burkina			
1980	30,044	9,110	0 30
1981	36,167	13,321	0 37
1982	28,566	6,678	0 23
1983	26,855	14,553	0 54
1984	33,121	9,570	0.29
1985	45,137	21,989	0 49
1986	27,685	6,696	0.24
Cameroon			
1980	99,216	6,293	0.06
1981	104,814	7,238	0.07
1982	101,340	8,459	0 08
1983	94,627	5,478	0.06
1984	101,011	6,486	0.06
1985	104,294	14,588	0.14
1986	140,157	6,240	0 04
Ghana			
1980	59,232	26,661	0 45
1981	78,381	15,911	0.20
1982	30,004	18,861	0.63
1983	43,758	24,454	0.56
1984	38,948	23,497	0 60
1985	41,017	29,816	0.73
1986	35,070	20,330	0.58
Indonesia			
1980	521,682	414,084	0.79
1981	481,769	401,246	0.83
1982	490,665	442,981	0.90
1983	489,754	419,333	0.86
1984	447,029	396,255	0 89
1985	195,149	170,108	0 87
1986	223,832	189,940	0.85
Ivory Coast			
1980	171,822	28,102	0 16
1981	146,103	16,406	0 11
1982	126,132	19,701	0 16
1983	113,890	7,998	0 07
1984	101,634	5,215	0 05
1985	106,127	9,782	0 09
1986	116,106	3,837	0 03
Kenya			
1980	63,720	36,236	0 57
1981	71,692	33,023	0 46
1982	44,734	21,766	0 49
1983	40,582	24,886	0.61
1984	53,449	23,012	0 47
1985	66,843	41,232	0 62
1986	43,263	14,717	0 34
Korea			
1980	1,924,381	1,797,420	0.93
1981	2,395,483	2,008,371	0 84
1982	1,649,306	1,581,196	0 96
1983	1,898,790	1,839,726	0.97
1984	1,720,823	1,650,197	0.96
1985	1,489,264	1,412,795	0.95
1986	1,414,752	1,305,687	0 92
Mexico			
1980	2,588,826	2,467,763	0 95
1981	2,501,149	2,431,286	0.97
1982	1,214,151	1,156,291	0.95
1983	1,976,665	1,942,368	0.98
1984	2,028,054	2,014,990	0.99
1985	1,445,818	1,439,302	1.00
1986	1,095,349	1,082,255	0.99
Nigeria			
1980	991,956	348,150	0.35
1981	1,298,766	544,009	0 42
1982	1,052,867	468,117	0.44
1983	708,352	399,050	0.56
1984	491,358	334,493	0.68
1985	424,461	313,151	0.74
1986	283,354	149,051	0 53
Philippines			
1980	339,847	319,206	0 94
1981	356,788	350,811	0 98
1982	382,151	323,546	0 85
1983	370,212	318,497	0 86
1984	338,519	332,084	0.98
1985	320,402	292,242	0 91
1986	282,892	256,135	0.91
Senegal			
1980	101,599	20,703	0 20
1981	116,957	26,921	0 23
1982	90,262	12,216	0.14
1983	84,724	35,752	0.42
1984	100,651	12,527	0 12
1985	97,887	26,564	0 27
1986	89,382	21,040	0.24
Taiwan			
1980	1,228,046	1,095,049	0.89
1981	1,282,222	1,154,884	0.90
1982	1,319,344	1,144,639	0.87
1983	1,500,543	1,307,907	0.87
1984	1,664,037	1,457,940	0.88
1985	1,425,092	1,230,863	0.86
1986	1,419,681	1,170,242	0.82
Venezuela			
1980	893,918	700,631	0.78
1981	1,094,931	893,422	0.82
1982	818,207	670,849	0 82
1983	743,521	664,927	0.89
1984	858,416	782,518	0.91
1985	716,931	638,229	0.89
1986	527,924	455,661	0.86

Sources: U.N. and USDA/ERS data.

CONCLUSIONS

The dependence of developing countries on major world currencies to set world prices for their exports and to denominate their world trade exposes them to changes in their import-purchasing power when the values of the major currencies fluctuate. An implication is that efforts to affect foreign demand for U.S. exports through the realignment of the dollar can have unintended consequences on the import-purchasing power of our developing country export markets. Depending on developing countries' trade patterns, changes in their terms of trade can offset or reinforce the import-stimulating effects of dollar depreciation on the prices of U.S. farm exports. This possibility suggests that efforts to lower the dollar price, rather than the relative price, of U.S. farm products would be a more direct and effective route to increasing sales of U.S. farm exports to developing country markets.

Finally, this study isolated the impact of currency realignments on developing countries' terms of trade. Many other factors, including prices, trade, and production policies and debt servicing obligations, influence final agricultural import demand.

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APPENDIX I: Derivation of Real Exchange Rate Terms of Trade

The vulnerability of the terms of trade of a small country to exchange rate realignments among partner currencies can be shown by using the simplest case of a small country (j) that exports solely to a large country (u) and imports solely from a large country (z) (4, 11). The small country's nominal terms of trade (t) in domestic currency terms can then be expressed solely in terms of the exchange rate between its two trading partners:

$$(1)\quad t = e_{uj}P_x^u / e_{zj}P_m^z$$

where P_x^u = foreign currency price of j's exports to u;
P_m^z = foreign currency price of j's imports from z;
e_{ij} = domestic currency price per unit of i currency; and
e^* = price in currency z per unit of u currency (for example, yen/dollar).

Then, since $e_{zj} = e_{uj}/e_{uz}$:

$$(2)\quad t = e_{zj}P_x^u / (e_{uj}/e_{uz})P_m^z$$

$$(3)\quad t = e^*P_x^u / P_m^z .$$

If relative prices in the small country's trade partners are fixed (although the price levels themselves may change), then P^u and P^z can represent the general price levels within these two countries, and the subscripts x and m can be dropped. Proportionate changes in this small country's nominal terms of trade can be expressed by solving the log form of (3) and rearranging terms:

$$(4)\quad \dot{t} = \dot{p}^u - \dot{p}^z + \dot{e}^* .$$

One source of the real effects of major currency realignments on a small country's terms of trade is from changes in the equilibrium exchange rate (e^*) due to fundamental changes in the real underlying economic forces, such as supply and demand characteristics, that determine exchange rates. A second source is differential rates of change in the price levels of the small country's trading partners (for example, $\dot{P}^u - \dot{P}^z = 0$). When the price level in one country changes in a perfectly competitive market, exchange rate movements are expected to perfectly offset the price change, and purchasing power parity (PPP) between the two countries is maintained. For example, when PPP holds, high inflation rates in one country relative to another are offset by a depreciation in the nominal exchange rate of the former against the latter. Arbitrage should ensure that PPP is maintained among trade partners. This principle can be written as:

$$(5)\quad \dot{e}^* = \dot{p}^u - \dot{p}^z .$$

When PPP holds, changes in nominal exchange rates have no real effect on a small country's terms of trade. However, much recent literature shows that PPP does not hold, with a tendency for both substantial and persistent deviations from PPP (5, 10, 13). Changes in price levels and exchange rates are not likely to be perfectly offset, because of real and monetary shocks, protection or sticky prices, low price or interest demand elasticities, and/or expectations. These departures inflict real costs on small countries' terms of trade. Deflating the terms of trade measures the real changes in terms of trade due to differences in the rates of change of relative price levels.

By using the simplest case, we can therefore express changes in a small country's real terms of trade (rt) solely in terms of the changes in price levels in its trade partners.

$$(6)\quad \dot{rt} = \dot{e} + \dot{P}^{u} - \dot{P}^{z} + \dot{P}^{z0} - \dot{P}^{u0}$$

where P^{i0} = price level in country i.

The above example can be generalized to describe a small country with many trade partners, or vehicle currencies, for both exports and imports (2). Trade is assumed to be balanced. Nominal terms of trade in the multicurrency case can be expressed as:

$$(7)\quad t = \pi (e_{ij} P_{ij}^{x})^{\alpha_{ij}} / \pi (e_{ij} P_{ij}^{m})^{\beta_{ij}}$$

where α_{ij} = export weight for ith partner of small country j,
β_{ij} = import weight for ith partner of small country j,
$\Sigma_i \alpha_{ij} = \beta_{ij} = 1$,
and π is a product term.

Proportionate changes in the nominal terms of trade can be written:

$$(8)\quad \dot{t} = \Sigma_i (\alpha_{ij} - \beta_{ij}) \dot{e}_{ij} + \Sigma_i \alpha_{ij} \dot{P}_{ij}^{x} - \Sigma_{ij} \beta_{ij} \dot{P}_{ij}^{m}.$$

In (9), the small country's terms of trade are again expressed solely as a function of currency realignments among vehicle currencies.

Changes in the small country's real terms of trade also depend on the differential in inflation rates associated with vehicle currencies:

$$(9)\quad \dot{rt} = \Sigma_i (\alpha_{ij} - \beta_{ij})(\dot{e}_{ij} + \dot{P}_i^{0}) + \Sigma_i \alpha_{ij} (\dot{P}_{ij}^{x} - \dot{P}_i^{0}) - \Sigma_i \beta_{ij} (\dot{P}_{ij}^{m} - \dot{P}_i^{0}).$$

As in (8), equation (9) follows from $\Sigma_i (\alpha_{ij} - \beta_{ij}) (-\dot{P}_j^{0}) = 0$.

Equation (9) derives an expression for changes in the real terms of trade for a small country, separated into the price and exchange rate components. The first expression on the right-hand side of the equation measures the real RER.

We use RER to measure the impact of current exchange rate realignments on the real terms of trade of the 14 developing countries that are important U.S. farm export markets:

$$(9')\quad RER = \Sigma_i (\alpha_{ij} - \beta_{ij})(\ln e_{ij} + \ln P_i^{0}).$$

For each country, e_{ij} is the price in units of domestic currency per unit of foreign currency, indexed as (1.0 = 1972). P_i^{0} is the wholesale price index in the partner country, also indexed as (1.0 = 1972).

When a country is a net exporter ($\alpha_{ij} - \beta_{ij} > 0$) in a currency that is depreciating relative to other vehicle currencies, it suffers a deterioration in the RER component of terms of trade. The RER component contributes to an improvement in terms of trade when the country is a net exporter in an appreciating currency. The terms of trade of countries with a trade balance in vehicle currencies ($\alpha_{ij} - \beta_{ij} = 0$) are not affected by vehicle currency realignments.

APPENDIX II: Data Sources

Exchange rates and wholesale price indices are from the International Monetary Fund's International Financial Statistics. We calculated currency trade weights by using the three most recent years available from United Nations trade tapes, as listed below:

Country	Years
Burkina	1973-75
Ghana	1974-76
Kenya 1/	1977-79
Cameroon	1980-82
Indonesia	1982-84
Ivory Coast	1980-82
Nigeria 1/	1981-83
Philippines	1981-83
Senegal	1979-81
Brazil	1978-80
Korea 1/	1983-85
Mexico	1974-76
Taiwan	1975-77
Venezuela	1979,81 (exports); 1979-81 (imports)

1/ Trade partners' data were used for these countries.

Appendix table 1--Currency trade shares in exports and imports 1/

Item	Brazil	Burkina	Cameroon	Ghana	Indonesia	Ivory Coast	Kenya
Exports:							
Dollar	0.61	0.53	0.71	0.46	0.94	0.57	0.68
Pound	0.15	0.08	0.23	0.26	0.01	0.35	0.28
Yen	0.08	0.02	0.00	0.13	0.04	0.00	0.01
French franc	0.05	0.35	0.05	0.01	0.00	0.07	0.01
Deutschemark	0.11	0.02	0.01	0.15	0.01	0.01	0.02
Imports:							
Dollar	0.76	0.24	0.21	0.44	0.53	0.41	0.14
Pound	0.03	0.06	0.04	0.22	0.03	0.03	0.40
Yen	0.08	0.02	0.07	0.08	0.32	0.08	0.17
French franc	0.04	0.59	0.53	0.06	0.05	0.43	0.09
Deutschemark	0.09	0.10	0.10	0.19	0.08	0.06	0.19

	Korea	Mexico	Nigeria	Philippines	Senegal	Taiwan	Venezuela
Exports:							
Dollar	0.66	0.83	0.98	0.57	0.33	0.64	0.99
Pound	0.06	0.10	0.01	0.06	0.10	0.04	0.00
Yen	0.21	0.03	0.00	0.28	0.03	0.21	0.01
French franc	0.02	0.01	0.00	0.02	0.52	0.02	0.00
Deutschemark	0.05	0.03	0.00	0.07	0.03	0.09	0.00
Imports:							
Dollar	0.63	0.79	0.22	0.66	0.40	0.62	0.72
Pound	0.02	0.03	0.26	0.03	0.05	0.01	0.04
Yen	0.29	0.05	0.17	0.23	0.02	0.32	0.12
French franc	0.02	0.03	0.16	0.02	0.48	0.01	0.04
Deutschemark	0.04	0.09	0.19	0.05	0.05	0.04	0.09

1/ See Appendix II for data years.

Source: Author's calculations based on U.N. trade data.

Appendix table 2--Real exchange rate terms of trade, 1972-87 1/, 2/, 3/

Year	Dollar-surplus countries						
	Burkina	Cameroon	Ivory Coast	Indonesia	Kenya	Nigeria	Venezuela
	(1980=100)						
1972	1 01	0 98	0.93	1 10	1 12	1 17	1 06
1973	0.97	0.91	0 87	1 06	1 08	1 13	1.03
1974	0.94	0 84	0.84	1 04	1 05	1 07	1.02
1975	0 98	0 92	0 89	1 08	1 10	1.15	1 04
1976	0 99	0 94	0 89	1.06	1 09	1 15	1 04
1977	0.98	0 93	0.92	1 01	1.01	1 04	1 00
1978	0.95	0.90	0.90	0 97	0.97	0.97	0 98
1979	0.95	0.90	0 93	1.04	1.00	0 99	1 00
1980	1.00	1.00	1 00	1.00	1.00	1.00	1 00
1981	1.06	1 10	1.03	1.07	1.10	1 15	1.05
1982	1.08	1.13	1.02	1 10	1 14	1.22	1 06
1983	1.13	1.22	1 06	1.12	1 19	1.30	1.09
1984	1.15	1.25	1.04	1 17	1 28	1 44	1.12
1985	1.06	1.09	1.00	1 06	1 11	1 18	1.05
1986	1 00	0 98	0 95	0.99	1 01	1 05	1 00
1987	0.99	0 96	0 95	0 97	0 98	1.00	0.99

Year	Dollar-balanced countries				Dollar-deficit countries		
	Ghana	Korea	Mexico	Taiwan	Brazil	Philippines	Senegal
	(1980=100)						
1972	0.98	1 01	0 99	1 02	0 96	0.97	0 98
1973	0.97	1.00	0 98	1 02	0 95	0 98	0.98
1974	0.97	1 00	0 97	1.02	0.96	0 98	0.99
1975	0.97	1.01	0.98	1.02	0.95	0 98	0 98
1976	0.97	1 00	0.97	1.01	0 95	0 98	0.97
1977	0.98	1.00	0.98	1 01	0 97	0 99	0 99
1978	0.98	0.99	0 97	1.00	0 99	1.00	0.99
1979	0.97	1.02	0 99	1 03	1.00	0 99	1.00
1980	1.00	1 00	1 00	1.00	1 00	1.00	1 00
1981	1.00	1 00	1 00	1.00	0 97	0 98	0.98
1982	1.00	1.00	1.00	1 00	0.95	0 98	0 97
1983	1.01	1.00	1 01	1.00	0.94	0 97	0 97
1984	1.01	1.00	1.01	1 00	0.92	0.96	0.96
1985	1 00	1.00	1.00	1 00	0 96	0 98	0 98
1986	0.99	0.99	0.98	0.99	0.97	1.00	0.99
1987	0.99	0.99	0.98	1.00	0.99	1.00	0.99

1/ First quarter, 1987.
2/ "Real exchange rate terms of trade" refers to the contribution of exchange rate realignments to changes in real (deflated) terms of trade.
3/ " Dollar-surplus" refers to the countries whose merchandise trade patterns result in a surplus of U.S. dollars. "Dollar-deficit" refers to countries whose merchandise trade patterns result in a deficit of U.S. dollars "Dollar-balanced" refers to countries that earn and spend an approximately equal value of dollars

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