International Capital Flows and Agricultural Exports

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1. Introduction

Interest in the relationship between international capital flows and exports revived recently following the international debt repayment problems of several developing countries and the decline in U.S. agricultural exports since 1980. This paper will consider the recent export decline as well as the more general relationship between lending and agricultural exports.

Although particular agricultural exports have been important throughout its history, the United States did not become a persistent agricultural exporter until 1960 (Economic Report of the President 1985, p. 342). Agricultural exports and the agricultural trade balance increased sharply in 1973 and again in 1979-80 (see Table 1). In each of these cases the price of oil increased and the dollar depreciated in real terms. Subsequently, exports decreased (constant 1967 dollars) from $16.7 billion in 1980 to $9.0 billion in 1985, and the real agricultural trade balance declined from $9.7 billion to $2.8 billion during the same period. The 1985 decline has returned exports to the pre-1973 level.

High prices of primary products stimulated capital flows to developing countries in the 1970s (Makin). Forecasts of permanently high commodity prices made both lenders and borrowers overly optimistic about debt repayment capacity. However, declining commodity prices and the emergence of debt repayment problems sharply curtailed lending in the 1980s. As capital inflows diminished, debtor countries restricted imports and promoted exports to repay earlier debt. At the same time the United States switched from being a net lender, which it had been since 1914, to a net borrowing country. Net claims of Americans against the rest of the world reached a peak of $147 billion in 1982, but three years later they became negative. These

developments led to the question of how much of the decrease in U.S. agricultural exports could be attributed to the decline in lending.

International trade provides a direct link between national product markets. International capital flows reinforce the interdependence brought about by trade. However, the relationship between capital flows and U.S. exports is complex. A reduction in lending to traditional U.S. customers may reduce U.S. exports by inducing borrowers to reduce national expenditure for a given level of national income. However, the reduction in lending may also alter comparative costs and the pattern of demand in borrowing countries in ways that may be either favorable or unfavorable to U.S. exports. On purely theoretical grounds the effect of lending on U.S. exports is ambiguous, which may help to explain the difficulty in isolating a strong empirical relationship between the variables.

The paper is organized in the following way. Section two considers the direct effect of lending on national expenditure. Sections three and four discuss the indirect effect of lending through relative prices and exchange rates, respectively. Section five considers the effect of debt problems of low income countries on U.S. exports.

2. Direct Effect of Capital Flows on U.S. Exports

It is revealing to note the following accounting identities among major international and domestic macroeconomic variables:

$$C = K + R = S - I + (T - G)$$

C is the current account balance, the balance of trade in goods and services (exports minus imports), plus net transfers abroad. It must equal capital exports (K) plus increases in official monetary reserves (R). These two variables measure increases in net claims against the rest of the world,

which must equal net national saving. The right side shows national saving as private domestic saving (S), less private domestic investment (I), plus government saving, the difference between tax revenue (T) and government spending (G).

Transactions of a nation with the rest of the world can be analyzed in the goods and services market, where income and price effects are thought of as primary determinants of the trade balance. They can also be analyzed in the asset market, where decisions concerning saving and investment are most important. That these two apparently different views are really opposite sides of the same coin is a reflection of Walras' Law.

Table 2 shows the current account balance of the U.S. since 1980. There was a sharp change in the current account from surplus to deficit, and the capital account showed an equivalent switch from outflow to inflow. In principle, all macroeconomic variables are simultaneously determined, however a popular interpretation of the 1980s experience is that some combination of (a) an increase in private investment relative to private saving and (b) an increase in the government budget deficit brought about a capital inflow and a current account deficit.

Of course, changes in the current account balance must show up as changes in components of the current account. Agriculture was unlikely to be exempted from forces requiring major declines in exports and/or increases in imports. In a sense, agricultural exports have been exposed to greater competition. In addition to other U.S. goods exports and foreign exports, they must also compete in foreign markets with additional sales of U.S. capital assets.

The situation of LDC debtors is more frequently analyzed in terms of capital market changes. It is useful to use a slightly altered form of the equation above for them:

$$B = (K + N) + R$$

where N = interest payments to foreign creditors and B is the current account balance less interest payments.

The appearance of debt problems for LDC debtors can be interpreted as requiring an increase in (K+N), net transfers from debtors to the rest of the world. That increase has necessitated an increase in B, an increase which can be brought about either by a rise in exports (including exports which compete with U.S. agricultural exports) or by a drop in imports (including U.S. agricultural products).

3. Indirect Effect of Capital Flows via Relative Prices and Exchange Rate

In addition to the effect of capital flows on national expenditure relative to national income, lending may influence exports indirectly by altering relative prices. According to the traditional formulation of the transfer problem, the change in a country's terms of trade attributable to a transfer depends on the marginal propensities to spend on home and foreign goods of the two countries (H.G. Johnson). Such a change in the terms of trade would evidence itself as a change in the real exchange rate. For example, a capital inflow (or reduced outflow) to the United States would strengthen the dollar, which would decrease the competitiveness of agricultural exports. The importance of capital flows for exports depends on the frequency and magnitude of changes in lending, the response of exchange rates to capital flows, and the response of agricultural exports to the exchange rate.

The United States government has attempted to promote exports by offering loans and grants conditional on the purchase of U.S. products. Food aid, subsidized credit, loan guarantees, and explicit export subsidies are examples. However, to the extent that concessional exports substitute for commercial exports, these programs have the same effects on U.S. agricultural exports as unconditional capital outflows. In spite of the intent of Congress, there is evidence that substitution against U.S. commercial exports has occurred (Krueger). Furthermore, the effect of export promotion by the United States has been mitigated by the existence of export subsidies offered by all competing countries. As a first approximation, it may be useful to treat all export promotion schemes as unconditional capital flows.

International lending has always influenced U.S. agriculture. British capital financed exports of Virginia tobacco during the colonial period. European capital participated in the financing of railroads that opened up Great Plains agriculture in the nineteenth century. Schuh has emphasized the importance of international capital flows for U.S. agriculture in recent years. There have been attempts to measure the degree of integration of international capital markets. According to Feldstein and Horioka, capital markets are perfectly integrated if a nation's investment rate is unrelated to its national savings rate. Their empirical results support lack of perfect integration, but the test has been subject to criticism (Penati and Dooley). However, even if capital is not perfectly mobile among countries, there is some agreement that the degree of capital mobility has increased over time (Obstfeld). An implication is that agriculture and all other domestic markets may be more exposed to international capital flows.

The recent theoretical and empirical literature on exchange rate determination has also emphasized the importance of capital flows (Frenkel and Mussa; Levich). In contrast, the earlier purchasing power parity and elasticities approaches emphasized the effect of prices of traded products on exchange rates. The asset market approach, by stressing the money and bond markets, ascribes the large and persistent deviations from purchasing power parity to capital flows. Since the adoption of floating exchange rates in 1973, changes in real exchange rates have been large, and they have not been anticipated in the sense of being incorporated into forward premia or international interest differentials (Levich).

4. Response of Exports to Exchange Rate Changes

Given that real exchange rates have varied, how responsive have agricultural prices and quantities been? Goldstein and Khan have recently surveyed the literature on price and income effects for trade in general, but they devoted little attention to agriculture. In addition to the problems of model specification (Chambers and Just; Gardiner and Dixit) and econometric estimation (Goldstein and Khan; Thompson), measuring the exchange rate appropriate for agricultural trade is not a trivial problem (Dutton and Grennes 1985a, 1985b). Since some country aggregation is unavoidable in most empirical work, an effective exchange rate index must be constructed. Issues arise with respect to the form of the index and the weights assigned to importing countries and competing exporters. Regularly published indices (e.g. U.S.D.A., Federal Reserve Board, and Morgan Guaranty Trust) are not perfectly correlated, and during the period of the strong dollar (1980-85) they showed substantially different rates of dollar appreciation.

Capital flows may also reduce trade indirectly by increasing uncertainty about exchange rates. Most studies of the total volume of U.S. trade have failed to find exchange rate uncertainty to be a major barrier to trade (Hooper and Kohlhagen; Cushman; and Akhtar and Hilton). However, there is some evidence indicating that exchange rate movements have altered the commodity composition of trade (Maskus) and the pattern of trade among countries (Thursby and Thursby). Thus, agricultural exports might be particularly sensitive to exchange rate volatility because (1) rates between the dollar and major agricultural importers (e.g., Japan) are particularly volatile, or (2) conditions of U.S. agriculture (e.g., relative openness) may make it more sensitive to exchange rate movement than other sectors of the economy. For example in his study of U.S. trade from 1974-84, Maskus found that agricultural trade was the most sensitive to exchange rate movement of the seven product categories considered. Further disaggregation might reveal a differential impact among specific agricultural products. How to measure exchange risk is a problem common to these studies. Since agents can deal with anticipated changes, recent studies have measured exchange risk by the difference between actual and anticipated changes, where the latter are represented by time series or forward market forecasts.

5. Debt Problems of Low Income Countries and U.S. Exports

The World Bank provides data on the public external debt of 16 major purchasers of U.S. agricultural exports. These data do not include figures for Taiwan or Iran, both major debtors and major U.S. customers. Using 1976-78 USDA export weights, these comprise 22.9 % of U.S. agricultural exports. The exports of the 16 debtors grew in real terms at the rapid rate of 13.8% per year between 1970 and 1979. After that point, real debt of those

countries continued to grow, but at the dramatically slower rate of 5.0%/year. One interpretation is that the perceived credit worthiness of the debtors was altered significantly. A related variable meant to represent the foreign exchange constraint is real transfers to those countries (net new borrowing less interest payments). For the 16 countries, net transfers increased between 1970 and 1978 at 21.4% per annum; between 1978 and 1983 they declined in excess of 34% per year and became negative in 1984.

Agricultural exports to those countries over the 1970-83 period also exhibited marked growth and then marked decline, suggesting a possible connection between debt (or net transfers) and exports to the debtor countries. Of course, there are some major differences in the patterns of the series. Agricultural exports to the 16 debtor countries peaked in 1981; whereas, both debt growth and net transfers peaked two to three years earlier. (See Shane and Stallings for a recent analysis of debt and agricultural trade.)

It is not obvious from theory what effect debt growth would have on imports of U.S. products, particularly intermediate and final consumption products. A nation in the process of investing heavily to build its capital stock could be expected to borrow to import capital goods. Its borrowing would then be reflected in imports of capital goods, but not necessarily in imports of consumption goods like food. Sachs asserts that much of the LDC borrowing of the 1970's went into increased domestic investment.

Such investment, by fostering income growth, would increase demand for importable consumption items by amounts depending on income elasticities of demand. But such growth would also alter supply conditions in the borrowing countries and could thereby reduce excess demands for particular imports.

The net effect of these changes in demand and supply forces for agricultural products cannot be determined a priori. That this issue arises in agriculture is evident from objections of agricultural interests to certain development loans. For example, objections were raised to a World Bank loan to Argentina which was conditional on the government's reducing export taxes on agricultural products (New York Times, May 19, 1986, p. 26). Also, AID loans to promote foreign palm oil production have been criticized because they foster competition with U.S. soybean exports.

Another reason to borrow is to smooth consumption. If a shock, say an oil price increase, results in transitorily lower income, then borrowing would prevent current consumption from reflecting the full effect of the shock. Such borrowing would of course affect imports of agricultural products.

A third hypothesis suggested by theory is borrowing with intent to default. Eaton and Gersovitz, for example, show that a nation may benefit by incurring large liabilities and then defaulting. Of course, such a course of action requires unwise lenders. It does not appear yet that this phenomenon is an important explanation of borrowing.

A fourth possibility to explain the heavy borrowing of the 1970's is poor policy. Populations may have been poorly represented by their agents (government officials) in the conduct of foreign exchange policy. Dornbusch argues that an overvalued currency played a major role in Argentina, Brazil, and Chile. In Argentina, where capital export was easy, it was to the advantage of those in the know to convert domestic assets into foreign ones; the government was left with the necessity of borrowing abroad to finance the process. In Brazil and Chile it was recognized by individuals that overvalu-

ed exchange rates made imports temporarily cheap; the rates caused a shift in purchases of consumption items, particularly durable consumption items, toward the years of overvaluation.

Of these four reasons for debt, the second, and to some extent the third and fourth, provide a connection between the accumulation of debt and imports of consumption goods like food. They imply the possibility of a close relationship between U.S. agricultural exports and the amount of net resources transferred each period to the LDC's. However, to make more definite statements, empirical evidence is required. One indicative fact is the similarity of trends between net transfers to debtor countries and agricultural exports to those countries. As described above, the two series rise through the 1970's and then begin a decline, with the turning point for exports lagging that for transfers.

A finer piece of evidence comes from a regression equation. The numbers below are from estimation with panel data for debtor countries which import U.S. agricultural exports. The period involved is 1972-84. The dependent variable is the real value of imports of each country per capita. As can be seen, the per capita transfer variable (XFER) has a definite positive effect. While not significant by conventional standards, it is sufficiently large relative to its standard error to warrant attention. That variable shows up independently of the effect of income (GDP), prices (U.S. and competitor agricultural prices), two exchange rate variables (dollars per unit of importing country currency, EXCH, and dollars per unit of competing country currency, COMPEXCH), a competitor country agricultural price variable (COMPPRIX), and the oil price, interacted with dummy variables for oil exporters and non-exporters (OIL and NOOIL). A separate intercept is

included for each country. The equation, estimated with a maximum likelihood routine and with an autoregressive parameter (constrained constant across countries), is presented below. (t values are in parentheses; contact the authors for detailed information on estimation.)

$$Y = \underset{(8.81)}{0.49}\ YLAG + \underset{(1.75)}{.080}\ PRICE - \underset{(0.03)}{.001}\ PRICE_{-1} - \underset{(1.87)}{.028}\ PRICE_{-2}$$

$$+ \underset{(0.88)}{1.77}\ GDP + \underset{(1.77)}{.013}\ XFER - \underset{(0.53)}{2.30}\ EXCH - \underset{(0.44)}{2.78}\ COMPEXCH$$

$$- \underset{(0.05)}{0.78}\ COMPPRIX + \underset{(1.64)}{31.61}\ OIL + \underset{(1.00)}{19.58}\ NOOIL + INTERCEPTS, \qquad RHO = \underset{(9.71)}{0.15}$$

As can be seen, long run effects are estimated to be about twice as large as short run effects. The estimated long run price elasticity is near zero. The coefficient of the XFER variable indicates an elasticity at means of imports with respect to net transfers into a debtor country of about 0.26. Roughly, this number implies that in 1983 $1 billion more in net transfers would have induced $0.4 billion in additional exports.

6. Summary

International capital flows reinforce the interdependence among countries brought about by international agricultural trade. Lending has a direct effect on trade as well as an indirect effect operating through relative prices and exchange rates. The relationship between lending and exports is complex, and an increase in lending to developing countries need not increase U.S. agricultural exports. Capital flows in general have altered the real exchange rate and influenced U.S. exports. However, trade and lending to developing countries with debt problems were a small fraction of U.S. agricultural exports and world capital flows, and it is difficult to make a strong case that debt problems of those countries have been a major deterrent to U.S. exports since 1980.

REFERENCES

Akhtar, M.A., and R. Spence Hilton. "Effects of Exchange Rate Uncertainty on German and U.S. Trade." Quarterly Review Federal Reserve Bank of New York, Spring 1984, pp. 7-16.

Chambers, Robert, and Richard E. Just. "A Critique of Exchange Rate Treatment in Agricultural Trade Models." Amer. J. Agr. Econ. 61 (1979): 249-57.

Council of Economic Advisers. Economic Report of the President, 1985. Washington: U.S. Government Printing Office, 1985.

Cushman, David O. "The Effects of Real Exchange Rate Risk on International Trade." J. of International Econ., August 1983, pp. 45-64.

Diaz-Alejandro, Carlos. "Latin American Debt: I Don't Think We Are in Kansas Anymore." Brookings Papers on Economic Activity 1984:2, pp. 335-403.

Dornbusch, Rudiger. "External Debt, Budget Deficits, and Disequilibrium Exchange Rates." In G. W. Smith and J.T. Cuddington, eds. International Debt and the Developing Countries. Washington: The World Bank, 1985.

Dutton, John, and Thomas Grennes. The Measurement of Effective Exchange Rates Appropriate for Agricultural Trade. N.C. State University Economics Research Report no. 51, November, 1985a.

Dutton, John, and Thomas Grennes. "Alternative Measures of Effective Exchange Rates." NCSU Working Paper No. 73, September 1985b.

Eaton, Jonathan, and Mark Gersovitz. Poor-Country Borrowing in Private Financial Markets and the Repudiation Issue. Princeton Studies in International Finance No. 47. International Finance Section, Department of Economics, Princeton University, June 1981.

Feldstein, Martin, and Charles Horioka. "Domestic Saving and International Capital Flows." Economic Journal 90 (1980): 314-29.

Frenkel, Jacob, and Michael Mussa. "Asset Markets, Exchange Rates, and the Balance of Payments." in R.W. Jones and P.B. Kenen, eds., Handbook of International Economics vol. II, New York: Elsevier Science, 1985.

Goldstein, Morris, and Mohsin Khan. "Income and Price Effects in Foreign Trade." in R.W. Jones, and Peter B. Kenen, eds., Handbook of International Economics, vol. II. New York: Elsevier Science, 1985.

Hooper, Peter, and Steven Kohlhagen. "The Effect of Exchange Rate Uncertainty on the Prices and Volume of International Trade." J of International Econ 8 (1978): 438-511.

Johnson, D. Gale. "World Commodity Market Situation and Outlook." in Bruce Gardner, ed. U.S. Agricultural Policy: the 1985 Farm Legislation. Washington: American Enterprise Institute, 1985.

Johnson, Harry G. "The Transfer Problem and Exchange Stability." in Johnson, ed. International Trade and Economic Growth. Cambridge: Harvard University Press, 1961.

Krueger, Anne O. "Aid in the Development Process." World Bank Research Observer 1 (1986): 57-78.

Levich, Richard. "Empirical Studies of Exchange Rates: Price Behavior, Rate Determination, and Market Efficiency." in R.W. Jones and Peter B. Kenen, eds., Handbook of International Economics, vol. II. New York: Elsevier Science, 1985.

Makin, John. The Global Debt Crisis. New York: Basic Books, 1984.

Maskus, Keith. "Exchange Rate Risk and U.S. Trade: A Sectoral Analysis." Federal Reserve Bank of Kansas City Economic Review, March 1986, pp. 16-28.

Morgan Guaranty Trust. World Financial Markets. "LDC Capital Flight." March 1986, pp. 13-15.

Obstfeld, Maurice. "Capital Mobility in the World Economy: Theory and Measurement." NBER Working Paper No. 1692, August 1985.

Penati, A., and Michael Dooley. "Current Account Imbalances and Capital Formation in Industrial Countries 1949-81." IMF Staff Papers, March 1984.

Sachs, Jeffrey. "The Current Account and Macroeconomic Adjustment in the 1970's." Brookings Papers on Economic Activity 1, 1981, pp. 201-68.

Schuh, G. Edward. "International Agriculture and Trade Policies: Implications for the United States." in Bruce Gardner, ed. U.S. Agricultural Policy: the 1985 Farm Legislation. Washington: American Enterprise Institute, 1985.

Shane, Mathew D., and David Stallings. Trade and Growth of Developing Countries Under Financial Constraint. International Economics Division, Economic Research Service, U.S. Department of Agriculture, June 1984.

Thompson, Robert L. A Survey of Recent U.S. Developments in International Agricultural Trade Models. IED-ERS, U.S. Department of Agriculture, September 1981.

Thursby, Jerry G. and Marie C., "Bilateral Trade Flows, the Linder Hypothesis, and Exchange Risk." Mimeo. Department of Economics, Ohio State University, May 1986.

Table 1. Agricultural Exports of the United States

	Agricultural Exports Current Dollars (billion)	Agricultural Exports Constant 1967 Dollars	Agricultural Trade Balance Current Dollars	Agricultural Trade Balance Constant 1967 Dollars
1970	$ 7.3	$ 6.3	$ 1.5	$1.3
1971	7.7	6.3	1.9	1.6
1972	9.4	7.5	2.9	2.3
1973	17.7	13.3	9.3	7.0
1974	21.9	14.8	11.7	7.9
1975	21.9	13.6	12.6	7.8
1976	23.0	13.5	12.0	7.0
1977	23.6	13.0	10.2	5.6
1978	29.4	15.0	14.6	7.5
1979	34.7	16.0	18.0	8.3
1980	41.2	16.7	23.9	9.7
1981	43.3	15.9	26.6	9.8
1982	36.6	12.7	21.2	7.3
1983	36.1	12.1	19.5	6.5
1984	37.8	12.1	18.5	5.9
1985	29.0	9.0	9.1	2.8

Source: Economic Report of the President 1985, p. 342 and Foreign Agricultural Trade of the United States, January/February 1986, p. 5.

Table 2. Components of Saving and Investment, U.S. Billions of Current Dollars

	C	S	I	(T-G)
1980	12.9	478.3	437.0	-34.5
1981	10.6	538.9	515.5	-29.7
1982	-1.0	557.1	447.3	-110.8
1983	-32.7	600.6	501.9	-130.8
1984	-91.0	693.0	674.0	-108.5
1985	-115.3	694.3	669.3	-141.0

Source: Survey of Current Business, various issues.

Table 3. Real Values of Agricultural Imports, Public Debt, and Net Transfers of 15 Major Importers of U.S. Agricultural Products, in Billions of 1980 Dollars

	Imports	Public Debt	Net Transfers
1970	$ 2.7	$ 57.4	$ 4.6
1971	2.9	65.1	4.7
1972	2.9	75.1	8.6
1973	5.4	88.1	11.3
1974	7.2	99.5	13.3
1975	7.1	113.8	19.3
1976	6.4	133.9	19.2
1977	6.3	158.6	21.0
1978	6.8	189.7	25.4
1979	7.1	198.8	16.8
1980	9.2	199.5	8.7
1981	10.0	203.4	10.4
1982	7.0	216.7	7.9
1983	7.9	244.0	4.6
1984	6.2	254.8	-2.9

Sources: Foreign Agricultural Trade of the U.S. and World Bank Debt Tapes