

INTERNATIONAL FINANCIAL MARKETS and AGRICULTURAL TRADE

edited by
THOMAS GRENNES

Westview Press

International Financial Markets and Agricultural Trade

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Thomas Grennes

Westview Press
BOULDER, SAN FRANCISCO, & LONDON

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Published in 1990 in the United States of America by Westview Press, Inc., 5500 Central Avenue, Boulder, Colorado 80301, and in the United Kingdom by Westview Press, Inc., 13 Brunswick Centre, London WC1N 1AF, England

Library of Congress Cataloging-in-Publication Data
International financial markets and agricultural trade / [edited by]

Thomas J. Grennes.

p. cm.

ISBN 0-8133-7811-7

1. Foreign exchange. 2. International finance. 3. Produce trade.

I. Grennes, Thomas.

HG3851.I49 1990

382'.41—dc20

89-9062
CIP

Printed and bound in Canada



The paper used in this publication meets the requirements of the American National Standard for Permanence of Paper for Printed Library Materials Z39.48-1984.

10 9 8 7 6 5 4 3 2 1

Preface

The papers contained in this volume originally were presented at a conference on International Finance and Agricultural Trade in San Antonio, Texas, in December 1988. The conference was sponsored by the International Agricultural Trade Research Consortium. Interest in the subject of the conference was stimulated by several recent events including (1) the twin budget and trade deficits of the United States, (2) large swings in the value of the dollar, and (3) the Uruguay Round of GATT negotiations that are focusing on agricultural trade.

I would like to acknowledge the assistance of several people who performed tasks related to the organization of the conference, including Nancy Schwartz of the Office of Management and Budget, David Orden of Virginia Polytechnic and State University, Karl Meilke of the University of Guelph, and Laura Bipes of the University of Minnesota. David Blandford of Cornell University presided as chairman of the Trade Consortium.

Publication of the book was supported by the Center for Economics and Business at North Carolina State University. Typing was ably done by Rita Edmond and editorial assistance was provided by Ann Phillips, both of the Department of Economics and Business at North Carolina State.

Thomas Grennes

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The Link Between Financial Markets and World Agricultural Trade

Thomas Grennes

1. AGRICULTURAL TRADE

The agricultural sector in the United States and most other countries is strongly influenced by world economic conditions. Natural disturbances such as floods and drought are transmitted across national borders by trade. Changes in a large country's agricultural trade policy have a foreign impact as well as a domestic effect. In general, any forces that influence excess demands or supplies provide a link between national agricultural markets. Financial markets are an important part of the link between national product markets, particularly in the presence of floating exchange rates. Interest rates and exchange rates are the channels through which monetary and fiscal policy influence agricultural markets.

The average level of protection is higher for agricultural products than for manufactured goods as a result of exempting agriculture from the series of multilateral trade negotiations sponsored by the General Agreement on Tariffs and Trade (GATT). However, liberalization of agricultural trade is one of the main topics of the current Uruguay Round of GATT negotiations. Most high-income countries protect agriculture using a variety of instruments including tariffs, quotas, and export subsidies. In most cases the border measures are in place to prevent trade from interfering with domestic price support programs that transfer income to farmers. The United States has employed price support policies since the 1930s, and the result has been agricultural protectionism. In 1987 the Reagan administration made the remarkable proposal to the GATT to eliminate all trade-distorting subsidies to agriculture by the year 2000. The proposal has been resisted strongly by the European Community and Japan, and it remains to be seen whether a compromise will emerge. A factor in favor of liberalization is the high economic and budgetary cost of continued protection. In addition, competitive subsidization by the United States and the European Community has resulted in conditions that approach economic warfare.

Since exchange rates alter relative prices, they are related to protection. Currency devaluation is equivalent to a tariff on all imports and a subsidy on all exports. Thus, for a given level of tariffs, a country can change the level of agricultural protection by maintaining an overvalued or undervalued currency. For example, empirical studies of agricultural protection in low-income countries have found that a major source of negative protection is the use of overvalued currencies (World Bank 1986). Also, during the period from 1980 to 1985 when the dollar was rising in value, there was a large decrease in net agricultural exports of the United States.

Exchange rates and protection are inseparable in a world of floating exchange rates. Because of commodity arbitrage, domestic prices will change when exchange rates change even if foreign prices are constant. If a country commits itself to maintain a certain level of protection using any of the common measures (nominal protection, the tariff equivalent of quotas, or producer subsidy equivalent), the domestic price of the protected product must change in response to an exchange rate change.¹

In the GATT negotiations there has been some discussion about what is the appropriate exchange rate and what is the appropriate foreign price for each product and country. The issue is important for agricultural policy because the volatility of exchange rates will influence the volatility of domestic prices. In the past the use of import quotas and variable levies has insulated domestic prices from the effect of exchange rate changes.

2. DEVELOPMENTS IN INTERNATIONAL FINANCIAL MARKETS

Floating exchange rates have prevailed in most countries since 1974, but the international monetary system continues to evolve. The optimum degree of coordination of monetary and fiscal policy remains an open issue. Other important developments are deregulation of financial markets in the United States and the opening of the Japanese financial market. Although floating rates have become the norm for national currencies, the European Monetary System has become a currency bloc with fixed rates among members whose currencies float jointly against those of nonmembers. The Delors Plan has called for closer monetary cooperation that would lead to a single Community central bank.

Dissatisfaction with floating rates has increased. Common complaints are excessive volatility of rates, misalignment of rates, and insufficient independence for the makers of monetary and fiscal policy. In an attempt to provide greater stability, central bankers of the

Group of Seven countries (United States, Japan, West Germany, France, Italy, Canada, and United Kingdom) apparently have agreed on a target range for exchange rates among major currencies. Although the existence of the Plaza Accord of 1985 and the Louvre Accord of 1987 has been widely reported in the press, the public never has been informed about what the target exchange rate range is, how it was established, or what factors might cause it to change. Presumably it is related to some notion of a confidence interval around an equilibrium exchange rate that can only be determined by some economic model. Unfortunately there is no consensus about what constitutes the appropriate model of exchange rate determination. However, in all prominent models, the equilibrium rate depends on monetary and fiscal policy in all countries. Hence, a range compatible with initial policies may not be compatible with subsequent policies.

For whatever reason, both nominal and real exchange rates have been more volatile since 1974 than during the earlier fixed-rate period. This increase in volatility may be an inherent feature of the floating exchange rate regime itself or it may be a result of greater volatility of the underlying variables such as monetary and fiscal policy. Many economic variables have been more volatile since 1974, including prices of primary products and prices of financial assets. During the floating rate period, exchange rates have not been more volatile than other asset prices or primary product prices. Also there has been no apparent increase in volatility since 1980 (see Pearce, chapter 7).

One possible effect of an increase in the volatility of exchange rates is a reduction in the volume of trade. In addition, overshooting of exchange rates or agricultural prices may act like a tax or a subsidy to the agricultural sector. This would make agriculture vulnerable to changes in monetary policy.

3. IMPORTANCE FOR TRADE OF REAL EXCHANGE RATES

To show the effect of exchange rates on trade, the inflation component must be removed from nominal exchange rates. Otherwise one would conclude mistakenly that currency depreciation caused by inflation would increase exports and increase imports. Countries like Argentina and Brazil do not improve their competitive situation when they experience a large nominal currency depreciation accompanied by a similar inflation rate. The demand for a country's exports depends on their prices in currency of the importing country, which depends on both the nominal exchange rate and the price in currency of the exporting country.

Several methods have been used for converting nominal rates into real exchange rates. The simplest and oldest method is to invoke Purchasing Power Parity (PPP). The real rate is then defined to be the nominal rate adjusted for the difference between domestic and foreign inflation rates. However, lack of empirical support for the accuracy of PPP in the short run has led people to seek an alternative measure.

Balassa (1964), Kravis and Lipsey (1983), and others have pointed out the problem created for PPP by the existence of a class of nontraded goods. This problem and others have led some people to use as a measure of the real rate the ratio of prices of traded goods to those of nontraded goods. Theoretical support for the idea comes from the Swan-Salter model of the dependent economy first developed in the 1950s. This measure of real rates and its relationship with the PPP measure is discussed in the chapters by L. Paul O'Mara and Sebastian Edwards.

Although bilateral exchange rates are useful for certain purposes, it is often convenient to construct an effective exchange rate index, which is an average rate between a particular country and the rest of the world. A weighted average must be constructed, but the weights can be based on a country's bilateral trade or they can be based on global trade weights. Edwards' paper finds the distinction between bilateral rates and multilateral rates to have some empirical importance. Other choices to be made are those between wholesale and consumer prices and the use of geometrical or arithmetic means.

Another issue involving weights is whether to include all traded goods or only those goods whose trade one is interested in analyzing. For example, the Economic Research Service of the U.S. Department of Agriculture publishes trade-weighted dollar indexes based on total agricultural trade and on trade for individual products such as wheat, corn, soybeans, and cotton. The Economic Research Service recently revised its dollar index published in the monthly Agricultural Outlook by including exchange rates for both countries importing from the United States and competing exporters (Stallings 1988).² An earlier index omitted competitor countries and gave the impression that changes in exchange rates between the United States, Canada, France, Australia, Argentina, and other exporters do not affect U.S. agricultural exports.

An observed exchange rate may be misaligned relative to its equilibrium value. Since an equilibrium value must be derived from an underlying economic model, there are many possible measures of misalignment. A direct application of PPP provides one measure (McKinnon 1988), and productivity-augmented versions of PPP also

have been used (DeGrauwe and Verfaillie 1988). Williamson (1985) has constructed a measure based on the notion of a "long-run sustainable current account balance." Edwards discusses these issues and presents his own model. He also considers the effect of misalignment on exports and economic growth.

4. PURCHASING POWER PARITY AND THE LAW OF ONE PRICE

PPP appears in both relative and absolute forms. Studies that disaggregate to narrow product categories tend to use the absolute version, often called the Law of One Price. Studies based on large product aggregates tend to use the relative version. Chapter two by Lawrence Officer considers these issues and the relationship between the aggregate and disaggregate studies.

A second issue involving PPP is its relative accuracy in the short run and the long run. Large and persistent short-run deviations have been found in nearly all recent studies. In their study of the adjustment process Frankel and Meese (1987) have estimated that from 9 to 14 percent of deviations from PPP have been eliminated in an average year.

A more fundamental criticism of PPP is that an exchange rate that moves away from equilibrium may never return to its initial real value. An efficient markets interpretation of PPP is that the real exchange rate follows a random walk (Roll 1979). Nominal exchange rates would not be forecastable and real rates should show no tendency to revert to their mean values. An alternative arbitrage version implies that real exchange rates should be mean-reverting in the long run. PPP would provide an anchor for the real rate. Thus, a time series of exchange rates should exhibit negative serial correlation. Frankel and Meese found some mean reversion in a study of the U.S. dollar-U.K. pound rate from 1869 to 1984. However, they claim that the post-1974 period of floating doesn't provide enough data to perform a satisfactory test of the mean reversion hypothesis.

5. THE LAW OF ONE PRICE AT DISAGGREGATE LEVELS

Officer in his survey of empirical studies of the Law of One Price at the disaggregate level finds only weak support for the hypothesis. He uses data from the International Comparison Project to relate prices of various product groups. The data are based on retail prices, and the largest deviations are for alcoholic beverages and tobacco. Since it is likely that these deviations are attributable to differential

taxes, Officer suggests that a proper test would compare wholesale prices at the border. In addition to taxes, retail prices include tariffs, quotas, domestic transport costs, and marketing margins, and therefore large differences in retail prices are consistent with perfect commodity arbitrage. The literature on agricultural trade dealing with incomplete price transmission deals with several factors (for example, variable levies) that may prevent foreign price changes from being fully transmitted to domestic producers and consumers. Possible deviations from the Law of One Price due to incomplete commodity arbitrage are only one factor.

Goodwin's paper considers the specification of traditional tests of the Law of One Price that use contemporaneous prices. In his expectations-augmented model, prices in one market are compared with prices expected to prevail in a second market at the time of delivery. The results suggest that the traditional formulation is misspecified.

6. EFFICIENCY OF THE FOREIGN EXCHANGE MARKET

Since exchange rate changes alter domestic agricultural prices, it is important to know whether the foreign exchange market efficiently processes information. Do exchange rate changes reflect changes in market fundamentals or merely noise? Douglas Pearce surveys the literature on international finance that borrows from the literature on stock market efficiency. Some of the same techniques have been applied to commodity markets, as shown by Pearce and his discussant, John Kitchen.

Several aspects of market efficiency are considered. Are exchange rates excessively volatile? Pearce presents data showing that exchange rates have not been more volatile than other asset prices or primary commodity prices, and that volatility has not increased since 1980. Variance bounds tests introduced by Shiller (1981) also are discussed.

Does the exchange rate follow a random walk? It need not in an efficient market if the underlying fundamentals do not follow a random walk. Monthly data are consistent with a random walk for the exchange rate, but daily data are not. An alternative approach to weak form efficiency is to search for trading rules that produce extraordinary profits.

Another aspect of information efficiency is whether the forward exchange rate is an unbiased forecast of the future spot rate. One difficulty in testing this proposition is that an efficient foreign exchange market may produce a biased forecast if there is a time-varying risk

premium. Survey data have been used in an attempt to separate bias in forecasts from risk premia.

Market efficiency also can be assessed by considering whether prices react to new information. In particular, the unexpected portion of money supply announcements has been shown to affect interest rates and the stock market. Conversely, changes in the money supply that are anticipated by market participants should have no effect. Pearce also considers the effect of money announcements on exchange rates.

If foreign exchange markets fail tests of efficiency, what are the likely explanations? Three possibilities are offered by Pearce: (1) Expectations are not formed rationally, (2) rational speculative bubbles develop, and (3) government policy regimes change.

7. FISCAL POLICY, EXCHANGE RATES, AND TRADE

The effect of the recent budgetary and trade deficits of the United States are discussed by Douglas Purvis. During the period 1980-85, the dollar increased in value and the trade deficit increased. Also, the agricultural trade surplus of the United States decreased. Budget deficits have been offered as a possible explanation. However, the dollar decreased in value from 1985 to 1988. The decrease in the trade deficit and the increase in the agricultural trade surplus have been weaker than expected. Since budget deficits have remained large, it is difficult to attribute the declining dollar to fiscal policy. One problem is that theoretical models do not predict a definite sign for the effect of fiscal policy on exchange rates and empirical studies also show mixed results.

Purvis surveys the theoretical literature on the effects of fiscal policy on exchange rates. He includes the Mundell-Fleming model that incorporates capital mobility and emphasizes the short-run effects of aggregate demand. Extensions of the model considered include incorporations of the supply side of the economy, explicit treatment of expectations formation, and the treatment of portfolio balance.

A decrease in the trade deficit of the United States requires some combination of (1) an increase in private saving, (2) a decrease in private investment, or (3) a decrease in the budget deficit. Purvis considers the alternatives of a hard-landing brought on by a recession-induced decline in private investment and a soft-landing brought about by greater fiscal discipline and greater private saving.

NOTES

1. The relationship among the rate of protection (t), the domestic currency price (P), the foreign currency prices (P^*), and the exchange rate (π) can be expressed as:

$$t = \frac{P}{\pi P^*} - 1$$

2. An annual series for the agricultural trade-weighted dollar from 1960-87 appears in Stallings (1988, p. 23). A quarterly series from 1970 and a monthly series from 1975 are available from the Economic Research Service.

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The Law of One Price: Two Levels of Aggregation

Lawrence H. Officer

1. INTRODUCTION

The traditional statement of the law of one price (LOP) is that there is a unique price of a commodity or commodity basket worldwide, irrespective of the country of output or of absorption, where the respective domestic-country prices of the commodity or commodity basket are expressed in a common currency via market exchange rates. A reformulation of the law is presented below (Section 3), but the thrust of the paper is the review and coalescence of two hitherto disjoint strands of literature on the LOP: studies at the aggregate [gross-domestic-product (GDP)] level and those at a disaggregate level.

Interestingly, in both strands, the focus is less on the LOP itself than on the theoretical explanation and empirical testing of deviations from the LOP. There, however, the similarity ends; and conjunction of the approaches never begins. The present study, in contrast, after exploring the reasons for divergences from the LOP at the disaggregate level, uses this analysis for econometric explanation of deviations from the LOP at the GDP level. Further, a uniform data set is used to investigate the LOP at both levels of aggregation.

In Section 2 concepts of the price level--crucial in formulating and testing the LOP--are defined, with special attention paid to the underlying index-number measure, neglected in both branches of the literature. In Section 3 the LOP is formulated in terms of these price-level concepts and classified using a threefold schemata. The LOP at the disaggregate level is treated in Section 4 and at the GDP level in Section 5. In both sections existing approaches to testing the LOP are reviewed and their weaknesses discerned, enabling development of new techniques of investigating the law while avoiding these limitations. The techniques are applied to a commonly based data set in Sections 4 and 5. Conclusions of the study are presented in Section 6, and a data appendix follows.

2. PRICE-LEVEL CONCEPTS

2.1. Meaning of Price Level

In macroeconomic theory, a "price level" is the inverse of the commodity value of money. For a single commodity, the price level is its absolute (money) price. For a basket of commodities, it is a weighted average of the absolute prices of the individual commodities in the basket. So the price level in this sense has dimension "number of units of domestic currency per physical unit of commodity." In official statistics, the price level of a basket of commodities is always expressed as an intertemporal index number, representing the price level in the current period relative to a base period, in which case the price level is dimensionless.

In sharp contrast, the term "price level" as used in the present study involves an intercountry comparison. It is an interspatial relative price level: the price level of the commodity or commodity basket in the domestic country compared to its price level in another country (or group of countries). Just as for the domestic macroeconomy, the price level in this sense can be defined alternatively with dimension (yielding "absolute purchasing power parity") or without dimension (providing either "relative purchasing power parity" or the "real price level").

2.2. Purchasing Power Parity

Purchasing power parity (PPP) defines the intercountry relative price level as a ratio of respective own-currency price levels. Depending on whether the price comparison is at a point in time or over time, absolute PPP is distinguished from relative PPP. In either case, an underlying index-number concept must be selected (except for the special situation of a single commodity).

2.2.1. Absolute Form

The absolute PPP for a given domestic country (say, country j), denoted as PPP_j^A is the ratio of the number of units of currency j to the number of units of numeraire currency, each with the same purchasing power over the given commodity basket. Thus, absolute PPP has dimension "number of units of domestic currency per unit of numeraire currency." Following the terminology of Kravis, Heston and Summers (1982, p. 72, n. 2), a "numeraire" country or currency is merely a reference point, having only a scalar effect on the PPPs of a

set of countries, while a "base" country has a distinct and nonproportionate influence on the PPPs.

Consider three alternative index-number concepts for PPP: Laspeyres, Paasche, and Geary-Khamis. Let p_{ij} (q_{ij}) denote the own-currency price (physical quantity, production or absorption) of commodity i in country j , and b (u) the subscript designation of the base (numeraire) country. Then, with m countries and n commodities, PPP_j^A is defined as follows for the respective indices:¹

$$\text{Laspeyres: } PPP_j^A = \frac{\sum_{i=1}^n p_{ij} q_{ib}}{\sum_{i=1}^n p_{ib} q_{ib}} \quad (1)$$

$j = 1, \dots, m$

$$\text{Paasche: } PPP_j^A = \frac{\sum_{i=1}^n p_{ij} q_{ij}}{\sum_{i=1}^n p_{ib} q_{ij}} \quad (2)$$

$j = 1, \dots, m$

As a special case of both indices, for a single commodity i , $PPP_j^A = p_{ij}/p_{ib}$.

For the Laspeyres and Paasche indices, the base and numeraire countries are identical ($b = u$). For the Geary-Khamis index, equation (2) applies, but p_{ib} is the "international price" of commodity i and is defined as follows:

$$\text{Geary-Khamis: } p_{ib} = \frac{\sum_{j=1}^m (p_{ij}/PPP_j)}{\sum_{j=1}^m q_{ij}} \quad (3)$$

$i = 1, \dots, n$

Thus the international price of a given commodity is the average of the individual-country prices each normalized by the PPP of the pertinent country and weighted by the relative quantity (output or absorption) of that country.

The Laspeyres index involves valuing the base-country's commodity basket alternatively at j -country and base-country prices and taking the ratio. The Paasche index values country j 's commodity basket at its own and at base-country prices and takes the ratio. Both indices--as well as the Fisher "ideal" index, their geometric mean--possess the property of "characteristicity" in the sense that the price comparison (say, of the n -commodity basket underlying PPP_j^A between any two