Research Articles

Japanese Monetary Policies and U.S. Agricultural Exports

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Abstract. Accelerated Japanese monetary expansion failed to appreciably influence imports of U S crops despite notable increases in the nominal yen/dollar exchange rate, according to COMGEM, a U S macroeconomic model that incorporates non-U S macroeconomic linkages and an Armington model of foreign demands for U S crops Expansionary monetary policies also led to higher Japanese inflation and raised real national income, offsetting the negative import effects of higher nominal exchange rates COMGEM simulated three 1986-90 Japanese monetary expansion rates, given unchanged U S macroeconomic patterns, to determine the influences of Japanese monetary shocks on imports of U S crops

Keywords: Macroeconomic linkages, U S corn and wheat exports to Japan, Armington theory, policy transmission mechanisms, purchasing power parity, Japanese inflation and real national income, yen/dollar exchange rates

The agricultural trade literature is replete with studies examining the effect of foreign exchange rates on exports of U S agricultural commodities Schuh's often-cited article on the growing importance of exchange rates to U S agriculture has stimulated econometric interest in this area for more than a decade (24)[1] Reviews of literature by Schuh (25) and Thompson (28) point to many contributions by agricultural economists to quantifying the effects of exchange rates on U S agricultural exports More recent efforts by Batten and Belonga among others have added significantly to this literature (4, 5) Chambers (8) and Chambers and Just (9) have argued that exchange rate effects should be evaluated in a general equilibrium context, and Reinhart (23) has suggested that foreign economic growth does matter

Little has been done, however, to link the effects of foreign monetary policies to U S agricultural exports

[1] Italicized numbers in parentheses refer to items in the References at the end of this article

The Federal Reserve has tried for several years to urge Japan and our other major trading partners to adopt expansionary monetary policies to stabilize the balance of trade Whether the adoption of expansionary monetary policies of our major trading partners would improve economic conditions in U S agriculture is of considerable interest to U S farmers and policymakers

We have two objectives in this article The first objective is to econometrically estimate trade flow equations for Japanese imports of U S corn and wheat The import demand equations are based on Armington demand theory, which reflects the two-stage import decision procedure without departing from Hicksian demand theory The second objective is to use the Japanese import demand equations with other equations that capture the linkage between Japanese monetary policy and import demand to determine how expansionary Japanese monetary policies affect projected Japanese imports of U S corn and wheat

We summarize the assumptions and structure of Armington's theory of import demand for commodity consignments differentiated by kind and by origin' We discuss the specification and estimation of a model of Japanese import demand for U S wheat and corn and then present out-of sample validation results for these estimated equations Finally, we examine the effect of selected monetary policies on Japanese imports of U S wheat and corn

Armington Model of Import Demand

A major criticism of U S agricultural trade models is that they frequently focus on total U S exports of a particular commodity to an aggregate rest-of-the-world sector (28) One approach to relaxing this assumption is the multiregion structure of international demand developed by Armington that differentiates commodities by kind and by origin (1, 2) Evidence suggests that a commodity's supplies from different exporting nations are seldom viewed by importing nations as perfect substitutes (2, 17) Sources of differentiation can include political alliances, actual quality differences, and degree of procurement risk (14, 28) A good or market in Armington's terminology represents a commodity (for

example, wheat), whereas a product is a good differentiated by kind and origin (for example, U S versus Canadian wheat)

Armington demand theory rests on three assumptions First, the preferences of an importing nation's consumers are assumed to be homogeneously separable Second, elasticities of substitution in the importing nation are constant Third, there is a common elasticity of substitution for all product pairs within a particular market These three assumptions together imply homogeneously separable, constant elasticity-of substitution utility functions for importing nations These assumptions further suggest that consumers in the importing nations follow a two-stage budget procedure (13) We assume here that consumers in Japan initially maximize their utility subject to a budget constraint Japanese consumers are then assumed to minimize their expenditures in each market (wheat and corn) subject to their first-stage market demand (2)

The structure of the Armington demand model is summarized in equations 1 and 3 The first equation represents a Marshallian market demand for the ith good that results from maximizing the importing consumers' utility subject to an income constraint The third equation represents a Hicksian demand for the ith good supplied by the jth exporting nation subject to the level of stage-one market demand [2]

$$x_i = h^i(RLY, p_1, \ , p_i, \ , p_n) \tag{1}$$

$$x_{ij} = g^{ij}(x_i, p_{i1}, \ , p_{ij}, \ , p_{im}) \tag{2}$$

which can be restated as follows

$$x_{ij} = b_{ij}{}^{oi} x_i (p_{ij}/p_i){}^{oi} \tag{3}$$

where $i = 1, \ , n$ and $j = 1, \ , m$ and where n represents the number of goods, m represents the number of exporting regions, x_i is the quantity index of the ith good demanded from all sources (that is, the first-stage demand), h^i is the first-stage Marshallian demand for the ith good, RLY is the importing nation's real national income, x_{ij} is the second-stage demand for the ith good supplied by the jth exporting nation, g^{ij} is the second-stage Hicksian demand for the ijth product, p_i is the index of m number of real export prices for the ith good expressed in the importing nation's currency, p_{ij} is the real export price for the ith commodity supplied by the jth exporting nation, b_{ij} is a constant demand parameter associated with the demand for the ijth product, and o_i is the importing nation's constant elasticity of substitution associated with each product pair in the ith market

[2] Notations denoting the identity of the importing nation and the period have been suppressed here for ease of exposition

Armington's justification for limiting the number of utility function arguments through aggregation enhances econometric estimation by requiring a smaller number of variables (21) Phlips demonstrates that, under conditions of weak separability implied by Armington models, one can estimate product demands using only the product's market price and constraint data as opposed to such parameters of the entire consumption set (21) Eliminating these collinear arguments mitigates problems of multicollinearity

Country-specific variables may be added to equations 1 and 3 since Armington developed his general theory to capture any importing nation's demand for any particular product We developed ancillary equations capturing the linkage between Japan's monetary policy and selected macroeconomic variables in the general economy that affect Japan's import demand

Data and Choice of Estimator

The trade flow and price data used here to measure the quantities demanded in the first- and second-stage demand equations for Japanese imports of wheat were obtained from *World Wheat Statistics* published by the International Wheat Council (16) Similar data for corn were provided by the U S Department of Agriculture's Foreign Agricultural Service (29) Quantities in each instance are expressed in 1,000 metric tons The price data for these and other commodities were obtained from *International Financial Statistics* published annually by the International Monetary Fund (15) Longmire and Morey measured the real exchange rate by dividing the deflated Japanese yen by the deflated U S dollar (19) Data on the yen/dollar exchange rate, Japanese consumer price index, Japanese gross domestic product, and Japanese current account balance used here are from *International Financial Statistics* The sample used to estimate the coefficients in the equations we specify consists of annual observations, and it varies with certain equations, but falls within 1956-83

Japan is one of many U S client regions endogenized in the COMGEM macroeconomic model used here (20) The estimated equations in the following section constitute part of the multiregion, multicrop Armington trade sector in this annual commodity-specific general equilibrium macroeconomic model (3) Because COMGEM, an annual model, contains some 600 equations, we used the ordinary-least-squares (OLS) regression technique to estimate the coefficients in the Japanese equations

Japanese Agricultural Import Demand and Linkage Equations

The equations in table 1 include those associated with the first- and second-stage import demand for corn and

Table 1—Estimated demand and linkage equations for Japan[1]

Total wheat imports (1960–83)

$$TLWTJP = 3890 + 0.0354*RLYJP - 0.0474*WTWAPJP - 63.0*PETP$$
$$(5.12) \qquad (-2.20) \qquad (-1.07)$$
$$R^2 = 0.865 \quad d = 1.30 \tag{1.1}$$

Imports of U S wheat (1960–83)

$$\ln(USWTJP) = -5.51 + 1.57*\ln(TLWTJP) - 1.13*\ln(PUSWT/WTWAP)_{t-1}$$
$$(20.1) \qquad (-0.83)$$
$$R^2 = 0.951 \quad d = 2.14 \tag{1.2}$$

Total corn imports (1959–83)

$$TLCOJP = 10800 + 0.0447*RLYJP - 0.0324*COWAPJP$$
$$(2.66) \qquad (-0.282)$$
$$- 0.186*SOYPUSJP + 2370*DUMMYBW$$
$$(-2.56) \qquad (3.51)$$
$$R^2 = 0.953 \quad d = 1.02 \tag{1.3}$$

Imports of U S corn (1958–83)

$$\ln(USCOJP) = -4.30 + 1.44*\ln(TLCOJP) - 1.91*\ln(PUSCO/COWAP)$$
$$(24.9) \qquad (-0.896)$$
$$R^2 = 0.967 \quad d = 1.97 \tag{1.4}$$

Real national income (1956–83)

$$RLYJP = 4280 + 2.94*RLM1JP$$
$$(30.8)$$
$$R^2 = 0.973 \quad d = 0.64 \tag{1.5}$$

Consumer price index (1956–83)

$$CPIJP = 0.544 + 0.0000306*NOMM1JP$$
$$(32.9)$$
$$R^2 = 0.976 \quad d = 1.46 \tag{1.5}$$

Real exchange rate (1956–83)

$$RLXRTJP = -17.2 + 213.0*RLCHGM1JP - 356.0*RLCHGM1US$$
$$(4.95) \qquad (-1.57)$$
$$- 4.34*RLBCAJP + 0.887*RLUSDEF + 0.959*RLXRTJP_{t-1}$$
$$(-2.19) \qquad (2.08) \qquad (14.8)$$
$$R^2 = 0.953 \quad h = 1.86 \tag{1.7}$$

Real yen-denominated world average price for wheat
$$WTWAPJP = RLXRTJP*WTWAP \tag{1.8}$$

Real yen-denominated world average for corn
$$COWAPJP = RLXRTJP*COWAP \tag{1.9}$$

Where
COWAPJP	= Real world average price of corn during July/June marketing year, in real yen per metric ton
COWAP	= Real world average price of corn, in real dollars per metric ton, by calendar year
CPIJP	= Japanese consumer price index, 1967 base
DUMMYBW	= Dummy variable for floating exchange rates after the Bretton-Woods Agreement, 0 before 1973, 1 after 1972
PETP	= Crude petroleum price index
NOMM1JP	= Nominal Japanese M1 money supply, in billions of yen
PUSCO	= Real U S export price of corn, in real dollars per metric ton, U S gulf ports, by calendar year
PUSWT	= Real U S export price of wheat, CIF Rotterdam, during July/June marketing year, in real dollars per metric ton
RLBCAJP	= Real Japanese balance on current account, in billions of real U S dollars
RLCHGM1JP	= Real change in the Japanese M1 money supply
RLCHGM1US	= Real change in the U S M1 money supply
RLYJP	= Real national income (real gross domestic product) of Japan in billions of 1967 yen
RLM1JP	= Real Japanese M1 money supply in billions of real yen
RLUSDEF	= Real U S Federal budget deficit, in billions of real U S dollars
RLXRTJP	= Real Japanese/U S exchange rate, in real yen per real U S dollar, and based on the "rf" yen/dollar nominal exchange rate published by the International Monetary Fund (15)
SOYPUSJP	= Real U S price of soybeans, CIF Rotterdam, in deflated yen per metric ton, by calendar year
TLWTJP	= Total wheat imports by Japan from all sources during July/June marketing year, 1,000 metric tons
TLCOJP	= Total corn imports by Japan from all sources during July/June marketing year, in 1,000 metric tons
USCOJP	= Japanese imports of U S corn during July/June marketing year, in 1,000 metric tons
USWTJP	= Japanese imports of U S wheat during the July/June marketing year, in 1,000 metric tons
WTWAP	= Real world average price of wheat, CIF Rotterdam, during July/June marketing year, in real dollars per metric ton
WTWAPJP	= Real world average price of wheat during July/June marketing year, in real yen per metric ton

[1] Values in parentheses after an equation's title denote the equation's sample period Values in parentheses below each coefficient represent Student t test statistics The term "ln" denotes the natural logarithm operator CIF denotes cost-in freight The term "h" denotes the Durbin h-statistic

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wheat as well as equations that endogenize the effects of changes in Japanese macroeconomic policies on Japan's imports of corn and wheat Capturing the linkage between Japanese monetary policy and Japan's demand for U S crops requires accounting for such macroecono mic policy transmission mechanisms as nominal and real yen/dollar exchange rates, the Japanese consumer price index (CPI), and real Japanese economic growth

Statistical Results

Equations 1 1 and 1 3 in table 1 represent the first-stage or total import demands for wheat and corn by Japan Cross-price arguments are excluded from the equation for Japanese market demand for wheat because initial regression analyses showed that the coefficients on these variables were insignificant The weak t-statistic associated with the coefficient for the price for crude petroleum, a proxy for shipping costs in equation 1 1, may have arisen from the variable's collinearity with the Japanese real national income variable The weak t-statistic associated with the real yen-valued world average price (WAP) of corn may arise because the price variable (COWAPJP defined by equation 1 9 and used in equation 1 3) is a poor indicator of the corn price's world average trends We located only one non-U S export price for corn with enough historical observations to use in this article Consequently, the real dollar-valued corn WAP (COWAP in equation 1 9), and hence the real yen-valued price or COWAPJP, may include an inadequate number of corn export prices and may poorly depict the real corn price's world average trends (3) The coefficient for the U S soybean price variable was significant in equation 1 3 All other variables in both first-stage demand equations carried significant coefficients and had the expected signs

Equations 1 2 and 1 4 in table 1 represent Japan's second-stage demands for U S wheat and corn, respectively Some Armington modelers of U S cotton have strayed from Armington demand theory by estimating second-stage demands in nonlogarithmic form and without the U S price in the denominator of the Armington price ratio (27) We follow Armington's specification more closely Second-stage demands were estimated in logarithmic form with the U.S price included in the denominator of the Armington price ratio The coefficients associated with the logged first stage demands, generated in nonlogarithmic terms in equations 1 1 and 1 3, were highly significant The highly significant coefficients on these first-stage demands suggest strong sample evidence in support of a two-stage Japanese optimization process for determining corn and wheat imports

The weak t-statistics for the second-stage Armington price ratios in equations 1 2 and 1 4 may have resulted from one or both of the following reasons First, a major cause for weak t-statistics may be the small number of world export prices incorporated in the denominator of these ratios Only one non-U S corn export price and two non-U S wheat export prices had adequate histor ical observations for use here Babula and Duffy re ported significant Armington price ratios for cotton when more non-U S export prices were available for inclusion in the denominator of the Armington price ratio (3, 10) Second, the weak t-statistics for the coeffi cients on Armington price ratios may suggest that there is weak sample evidence to support Armington's as sumptions about the substitution elasticity Recall that the price ratio coefficients are estimates of the substi tution elasticities for Japan's import markets for corn and wheat

The price elasticities of Japanese demand for U S corn and wheat calculated by using Armington's "direct price elasticity" formula are $-0\,757$ and $-0\,681$, respectively (3) We located no previous econometric estimates of the price elasticity of Japanese demand for U S corn and wheat against which one can compare these estimates [3] The implied price elasticity of the world demand for U S wheat in COMGEM's Armington based agricul tural trade sector (which includes the Japanese equa tions presented here), however, is $-1\,64$ (3) The esti mate does not differ appreciably from elasticities reviewed by Gardner and Dixit (12) For example, Bredahl, Meyers, and Collins (7) reported an elasticity of $-1\,67$, Ray and Parvin (22) found an elasticity of $-1\,50$, and Seeley (26) reported an elasticity of $-1\,49$ The implied price elasticity of the world demand for U S corn is $-1\,32$ in COMGEM's agricultural trade sector, which can be compared with the estimate of $-1\,31$ reported by Bredahl, Meyers, and Collins (7) and with the estimate of $-1\,18$ reported by Gardner (11)

Equations 1 5 through 1 9 in table 1 capture linkages between Japanese imports of U S crops and the imple mentation of both U S and Japanese macroeconomic policies Following Batten and Belongia (4, 5) and Bessler and Babula (6), the real rather than the nominal exchange rate was used in equation 1 7 Following Chambers and Just (9), the exchange rate includes both monetary and nonmonetary variables An increase in the real yen supply is hypothesized to strengthen the real value of the dollar relative to the yen and to increase the real yen/dollar exchange rate An increase

[3] Grennes and others (14) synthesized a price elasticity of Japanese demand for U S wheat of $-2\,06$ In doing so, they *assumed* a coefficient associated with the logged Armington price ratio of $-3\,0$ Equation 1 2 in table 1 of our study reports a coefficient of $-1\,13$ associated with this variable, although it is not significantly different from zero at the 10 percent level The difference between their assumed coefficient of $-3\,0$ and our estimate of $-1\,13$ in equation 1 2 explains much of the difference between their synthesized elasticity of $-2\,06$ and our estimated elasticity of $-0\,681$

in the real U S money supply, however, is hypothesized to appreciate the real value of the yen relative to the dollar and to reduce the real yen/dollar exchange rate U S fiscal policy is also captured through the effects that the real U S Federal budget deficit has on the real yen/dollar exchange rate and on real yen-denominated world average crop prices Higher real U S Federal budget deficits are hypothesized to increase the demand for the dollar relative to the yen and thereby appreciate the real yen/dollar exchange rate

Japanese monetary policy influences the first stage, and then the second-stage, Japanese demands for wheat and corn through effects on the real Japanese exchange rate (and hence on the real yen-valued crop prices) and on real national income Finally, the real world average prices for corn and wheat play a key role in determining trade flows The real yen-denominated world average prices of crops influence Japan's total import demands for wheat and corn These first-stage demand arguments are the products of the real dollar-denominated world average price and the real yen/dollar exchange rate as shown in equations 1 8 and 1 9 The dollar-denominated real world average price for the commodity also serves as the denominator of the Armington price ratio, which influences the Japanese second-stage demand as shown in equations 1 2 and 1 4

Validation Beyond the Sample

Thompson has criticized agricultural trade models because they often fail to validate the model beyond the sample period (28) To counter this criticism, we simulated the equations presented in table 1 within the COMGEM model for the 1 year beyond the sample period for which data were available when the analysis was done Recall that Japan represents but one client region in COMGEM's agricultural trade sector (3) The percentage forecast error 1 year beyond the sample period for total U S exports of wheat was – 1 29 percent, whereas the percentage forecast error for total U S corn exports was 2 82 percent

The percentage forecast errors associated with the Japanese first-stage or total market demand for wheat and corn imports 1 year beyond the sample period were 2 5 percent and – 12 3 percent, respectively The percentage forecast errors associated with the nonlogged second-stage demand for Japanese imports of U S wheat and corn were 11 03 and 1 90 percent, respectively Finally, the percentage forecast errors associated with the real Japanese national income, consumer price index, and real exchange rate variables 1 year beyond the sample period were – 10.9 percent, 0 7 percent, and 4 95 percent, respectively

Analysis of Alternative Japanese Monetary Policies

Japan is an extremely important U S trading partner, accounting for 8 7 percent of U S wheat exports and 27 4 percent of U S corn exports in 1982–84 (3, pp 140–41) Japan also accounted for a third of the unprecedented $100 billion increase in U S nominal annual trade deficits during 1980–85 (23) Many have attributed the growing Japanese/U S trade imbalance to "structural" factors such as a Japanese affinity for its own goods and its protectionist trade policies Reinhart (23) refutes this hypothesis, contending that the growing imbalance with Japan has arisen because of macroeconomic disturbances Reinhart specifically suggests that the increased U S. trade deficit with Japan is due to a strong value of the dollar relative to the yen and to the narrowing of the annual growth rate differential between real national incomes in Japan and the United States

Scenario Design

We examined three Japanese monetary policy scenarios, each cast within the context of a continuation of current U S and non-Japanese foreign macroeconomic policies [4] The baseline monetary policy scenario assumed a series of 3 27-percent annual growth rates in the Japanese M1 money supply, the average annual growth rate in Japanese M1 observed in 1983–85 We used this baseline as a basis of comparison for two alternative series of annual growth rates in the Japanese money supply A "moderate-growth" monetary policy scenario assumes a series of 6 02-percent annual growth rates in Japan's M1 money supply, the average annual growth rate in Japan's M1 during 1978–82 Finally, a "high-growth" monetary policy scenario assumes a series of 16 8-percent annual growth rates in Japan's M1 money supply, the annual growth rate in 1972

Klein (18, p 2) notes that this type of scenario analysis is useful, but cannot be validated Consequently, the Japanese monetary policy scenarios were limited to observed experience in the post-1971 era of floating exchange rates

Nominal vs. Real Exchange Rates

Part of the debate as to whether nominal or real exchange rates explain real U S export consignments relates to the concept of purchasing power parity If an increase in the nominal yen/dollar exchange rate is offset by a lower ratio of U S to Japanese general price levels, purchasing power parity holds and *real* exchange rates

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[4] It is unlikely that the macroeconomic policies of other nations would not respond to changes in Japanese monetary policies assumed in these scenarios Nonetheless, these policy reactions are not systematically predictable, and we assumed that they are constant

Table 2—Change from baseline values for selected variables under alternative Japanese monetary growth rates, 1986-90

Item	1986	1987	1988	1989	1990
	Percent				
Moderate money growth					
US wheat exports to Japan	0 2	0 5	0 7	0 9	1 1
US corn exports to Japan	0	1	1	2	2
Nominal exchange rate	3 1	6 9	11 3	14 9	17 1
Real exchange rate	8	2 2	4 1	5 0	4 6
Japan's consumer price index	2 2	4 6	6 9	9 5	12 0
Japan's real national income	4	8	1 1	1 4	1 7
High money growth					
US wheat exports to Japan	1 1	2 0	2 9	3 7	4 4
US corn exports to Japan	1	4	5	8	9
Nominal exchange rate	15 1	35 5	61 1	85 1	102 8
Real exchange rate	3 7	9 7	16 8	20 1	17 4
Japan's consumer price index	11 0	23 5	37 9	54 2	72 7
Japan's real national income	1 8	3 4	4 7	5 9	6 8

remain unchanged Thus, the real yen-denominated world average prices for wheat and corn in the first-stage equations would remain unaltered and would not cause changes in Japan's imports of these commodities Although strict purchasing power parity is rarely observed in the real world, particularly in the short run, the forces underlying this concept should be captured when one investigates trade flows and market shares

The results presented in table 2 show that moderate- and high-growth Japanese monetary policy scenarios sharply increase the nominal yen/dollar exchange rates over baseline levels in 1986-90 The nominal exchange rate (and hence the nominal crop prices valued in yen) under the moderate-growth monetary scenario is 17 1 percent higher than the baseline value by 1990 The rate in 1990 would be almost 103 percent higher than the baseline value under the high-growth monetary policy scenario Table 2 shows, however, that U S wheat and corn exports to Japan over this period do *not* change appreciably from baseline values despite the substantial increase in nominal exchange rates

These results contrast sharply with the implications one draws from earlier studies by Schuh (*24, 25*), Johnson and others (*17*), and Chambers and Just (*9*), which suggest that an increase (decrease) in nominal exchange rates would discourage (encourage) exports Although such a situation can occur in periods of slowly rising prices, these studies appear to ignore the possibility that monetary policies leading to higher nominal exchange rates may also boost inflation rates, which cheapen the real value of the domestic currency and lower real exchange rates [5] The increases in real yen/

dollar exchange rates (and hence in crop prices valued in real yen) associated with the assumed annual percentage changes in the Japanese money supply were much lower than their nominal counterparts (table 2)

Real Economic Growth

Real Japanese national income (table 1) represents a significant determinant of Japan's total import demand for wheat and corn (see equations 1 1 and 1 3) Table 2 suggests that the series of annual growth rates in Japan's M1 money supply assumed in the monetary policy scenarios for moderate and high growth corresponded to higher real Japanese M1 levels and raised the real national income of Japan These higher levels of annual real national income enhanced Japanese first-stage import demands for wheat and corn, and in turn, Japanese second-stage demands for U S supplies of these commodities We can explain the modest increase in Japan's imports of U S corn and wheat, rather than the sharp decrease one might have expected in light of the sharply higher nominal annual exchange rates reported in table 2, with analysis of two additional transmission mechanisms (1) higher Japanese inflation and (2) higher real national income in Japan The higher Japanese inflation increased the real exchange rate's denominator, and it provided increases in real exchange rates (and hence in crop prices valued in real yen) that were less than increases in nominal exchange rates The higher real economic growth in Japan positively influenced Japanese imports of U S crops Table 2 suggests that these two factors counteracted the negative effect of higher annual nominal yen/dollar exchange rates, and they actually led to modest expansion in Japanese imports of U S corn and wheat This result supports

the yen, (2) the yen valued prices of U S crop exports to have declined, and (3) U S crop exports to have risen Yet this sequence of events failed to occur In fact, the general trade imbalance with Japan rose by an unprecedented amount in 1981-85 (*23*)

recent conclusions by Batten and Belongia, who assert that real, rather than nominal, exchange rates influence real economic variables such as U S exports of farm products (4, 5) Real Japanese economic growth is a major determinant of Japan's imports of U S crops, a finding that coincides with Reinhart's (23) more general conclusion that real growth is a key determinant of Japan's imports of general U S merchandise

Conclusions

Purchasing power parity forces account for changes in relative Japanese/U S inflation rates under alternative Japanese monetary policies They appear to be important, although imperfect, explanations of Japan's re sponse in U S crop imports to alternative Japanese monetary policies Alternative Japanese monetary policies have combined effects on Japan's inflation rates, real and nominal yen/dollar exchange rates, and real national income These combined effects, with offsetting influences on Japan's imports of U S crops, illustrate how essential it is for analysts to account for the inflation and national income linkages, as well as the nominal exchange rate linkage, when they model agricultural trade flows Consequently, analysts should avoid analyzing such flows in a partial equilibrium context

Higher annual growth rates in Japan's M1 money supply would not appreciably influence (that is, reduce) Japan's imports of U S wheat and corn In fact, the more rapid expansion of Japan's M1 money supply would modestly increase imports of U S wheat and corn each year Higher nominal yen/dollar exchange rates would be offset by a higher Japanese consumer price index and higher growth in real national income Thus, the adoption of more expansionary monetary policies by the Japanese Government should not be seen by U S farmers and farm policymakers as a necessary signal for decreased sales of U S farm products to Japan Further analysis is needed to determine if imports of U S crops by our other agricultural trading partners would be more sensitive than Japan to efforts to expand their economies

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In Earlier Issues

It is common knowledge that nonsampling errors, or response errors, are often large enough to cause serious trouble Estimation of number of farms is a good example A small area sample for use in estimating the number of farms in the United States with a sampling error of less than 1 percent can be easily designed, but means have not been found for holding the nonsampling error to a negligible quantity because of the problem of defining a farm and following the definition in the field Differences in farm counts as large as 10 or 15 percent have been observed between surveys when the sampling standard errors were known to be as low as 2 or 3 percent

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