International Finance Discussion Papers

Number 324

June 1988

INCOME AND PRICE ELASTICITIES OF FOREIGN TRADE FLOWS: ECONOMETRIC ESTIMATION AND ANALYSIS OF THE US TRADE DEFICIT

Jaime Marquez

Abstract

This paper builds, estimates, and simulates a world trade model to provide a quantitative analysis of the behavior of the U.S. trade deficit. A key feature of this model is that international trade imbalances add up to zero. The analysis estimates income and price elasticities for bilateral import equations, tests for the properties of the error term, for parameter constancy, and for the choice of dynamic specification. The paper also re-examines the structural asymmetries in elasticities noted by Houthakker and Magee and tests whether the Marshall-Lerner condition holds. The reliability of the model as a whole is assessed with residual-based stochastic simulations. The paper finds that changes in relative prices account for the bulk of the deterioration of the US trade account, that reliance on either foreign or domestic growth to eliminate the US external imbalances entails significant changes in real income, and that the speed with which US net exports respond to exchange rate changes is sensitive to minor changes in own-price elasticities.

Income and Price Elasticities of Foreign Trade Flows:
Econometric Estimation and Analysis of the US Trade Deficit

Jaime Marquez[1]

1. Introduction

That the rest of the world will absorb the reduction of the US trade deficit is a matter of accounting: because this deficit is the trade surplus of the rest of the world, eliminating one means eliminating the other. What is not so evident is which countries will absorb this reduction, an issue of growing interest in view of the significant re-allocations of productive factors that are likely to emerge. That the US trade deficit will improve in response to a real depreciation of the dollar is not in doubt. What is not so clear is how long it will take, an important question given the constraints that external imbalances impose on the design of macroeconomic policy.

Given the significance of these issues, it is not surprising to find an increasing interest in explaining the behavior of the US trade deficit.[2]

---

[1] I want to thank Ralph Tryon for his comments and encouragement in this project. I have also benefited from the comments of Russell Cooper, Frank Diebold, Jonathan Eaton, Hali Edison, Sebastian Edwards, Neil Ericsson, Richard Haas, William Helkie, David Howard, Joe Gagnon, David Gordon, Peter Hooper, Maureen Kilkenny, Edward Leamer, Ross Levine, Cathy Mann, Paul Masson, Marc Noland, Adrian Pagan, and Peter Tinsley. I am also grateful to Carolyn Litynski and Michael Mabry for their excellent research assistance and to Linda Matthews for typing several drafts of this paper. The empirical tests are performed with the GIVE computer software developed by David Hendry and installed into TROLL by Ralph Tryon. Earlier versions of this paper have been presented in seminars at the Federal Reserve Board, the U.S. Department of Agriculture, the 1987 and 1988 meetings of the Society for Economic Dynamics and Control, and the 1987 Summer School in Dynamic Optimization, Dublin, Ireland. I am responsible for any remaining errors. This paper represents the views of the author and should not be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or other members of its staff.

[2] See Krugman and Baldwin (1987), Bryant and Holtham (1987), Helkie and Hooper (1987), Feldstein (1986), Hooper and Mann (1987), Eichengreen (1987), Cline (1988), Marris (1987), Hooper (1988).

However, as currently developed, the literature is not well suited to addressing the issues raised here. First, existing analyses do not account for all world trade and thus cannot identify how foreign deficits respond to the reduction of the US trade deficit. By focusing exclusively on US multilateral trade flows, the literature implicitly assumes that policies to reduce this deficit are independent of the distribution of countries absorbing it. Second, the trade elasticities are estimated with multilateral trade flows, a feature that introduces an aggregation bias, implies that the cross-price elasticities are zero, and contradicts the empirical evidence against multilateral trade equations found by Thursby and Thursby (1984).[3] Finally, as required by the literature on the persistence of the trade deficit, the adjustment period of US net exports to a given change in exchange rates is assumed to be both fixed and known. However, to the extent that this adjustment period is a function of trade elasticity estimates, which are random variables, existing analyses rest on a very restrictive assumption.

This paper eliminates these restrictions by building and estimating an econometric trade model to explain bilateral trade flows among all trading partners in the world: Canada, Germany, Japan, the United Kingdom, the United States, other industrial countries, OPEC, non-OPEC developing countries, and the rest of the world.[4] The (non-diagonal) entries in the resulting 9x9

---

[3] Exceptions include Bergsten and Cline (1985) and Haynes, Hutchison, and Mikesell (1986). These studies focus on US-Japan trade without considering other US bilateral trade flows. Houthakker and Magee (1969) are among the first to study the behavior of bilateral trade for the United States. This paper extends their analysis by considering all countries.

[4] This selection of country disaggregation is designed to match that of the FRB Multicountry Model (MCM).

trade matrix are modeled as bilateral import equations and the econometric specification used to estimate the associated trade elasticities is developed in section 2. Although the econometric estimation of these elasticities has a history of its own, the estimation of bilateral trade elasticities has received considerably less attention, especially for bilateral trade between industrial and developing countries, and between the latter and OPEC.[5]

To relate these estimates to previous studies, the paper re-examines the asymmetries in income elasticities noted by Houthakker and Magee (1969) and tests the Marshall-Lerner condition. Finally, because of their importance for the issues raised here, the paper tests the properties of the error term, the choice of dynamic specification, and the assumed parameter constancy. Section 3 presents the econometric estimates of income and price elasticities. The analysis finds a substantial dispersion of bilateral elasticities across countries, confirms the asymmetries found by Houthakker and Magee (1969), and cannot reject the Marshall-Lerner condition.

Section 4 assembles the bilateral trade equations into a world trade model. To determine the reliability of the model as a whole, the paper uses residual-based stochastic simulations and multiplier analysis. Based on the estimated model, section 5 uses counterfactual simulations to address two key questions: which countries will absorb the US trade deficit and how sensitive is the adjustment period of net exports to alternative parameter realizations. The evidence reveals three findings of interest. First, the response of

---

[5] See Goldstein and Khan (1985) and Magee (1975) for surveys of the literature. Other models estimating bilateral trade flows are Houthakker and Magee (1969), Hickman and Lau (1973), Armington (1969), and Edison et al (1987).

foreign trade accounts to a reduction in the US trade deficit is sensitive to the manner in which this deficit is reduced--that is, through dollar depreciation or income contraction. Differences in bilateral income and price elasticities across countries determine the type of response. Second, reliance on either foreign or domestic growth to eliminate the US external imbalance entails significant changes in income levels, both foreign and domestic. Finally, the adjustment period of the US trade deficit in response to changes in exchange rates is highly sensitive to minor perturbations of the elasticity estimates.[6]

---

[6] Existing Computable General Equilibrium models (Whalley 1985, Fretz et al 1986, Deardoff and Stern 1986, Srinivasan and Whalley 1986, and Schwartz and Krissoff, 1987) are not well suited to address the questions raised in this paper. First, they introduce a real-financial dichotomy that negates the role of changes in nominal exchange rates in affecting the structure of trade. Second, they lack dynamic considerations and thus leave unspecified both the period required for adjustment and the properties of the associated adjustment path. Finally, parameter values are not estimated but drawn from literature surveys, which precludes statistical inferences. This paper also relaxes some of the assumptions embodied in existing econometric trade models. For example, the World Trade Model of the International Monetary Fund uses multilateral trade flows for industrial countries disaggregated across commodities but it pays little attention to trade vis-a-vis developing countries (see Spence 1984, Deppler and Ripley 1978). The World Model of Project Link explains bilateral trade flows across commodities and with developing countries, but it assumes constant trade shares.

2. Empirical Analysis

2.1 Econometric Formulation

To estimate bilateral trade elasticities, the analysis relies on the imperfect-substitute model (Goldstein and Khan, 1985), in which imports of country k from country s are modeled as

$$(1)\quad \ln(M_{ks}/e_s P^*_s)_t = \alpha_0 + \alpha_{1ks}\ln y^P_{kt} + \alpha_{2ks}(\ln y_{kt} - \ln y^P_{kt})$$
$$+ \Sigma_j \alpha_{3ksj} \ln P_{ks,t-j}$$
$$+ \Sigma_j \alpha_{4ksj} \ln P_{kq,t-j}$$
$$+ \alpha_{5ks}\ln(M_{ks}/e_s P^*_s)_{t-1}$$
$$+ \delta D + u_{kst},$$

M_{ks} = dollar value of imports of country k from country s,

y^P_k = potential income of country k,

y_k = real income of country k,

P_{ks} = $e_s P^*_s / e_k P^*_{yk}$,

P_{kq} = $[\Pi_\rho (e_\rho P^*_\rho)^{\omega_\rho}]/e_k P^*_{yk}$, $\forall \rho \neq k, q \neq s$,

ω_ρ = fixed export-share of the ρth country in world exports,

P^*_s = export price of country s, in domestic currency

P^*_{yk} = price for domestic output, in domestic currency

e_s = exchange rate, (dollar/foreign),

D = dummy variable for one-time events,

$u_{kst} \sim N(0, \sigma^2_{ks})$, $E(u_{kst} \cdot u_{ks,t-j}) = 0 \; \forall j$.

According to (1), bilateral imports are homogeneous of degree zero in prices and imperfect substitutes both for domestic products and among themselves. The response of imports to income has two components: a secular effect, measured by the parameter α_1, and a cyclical effect captured by the parameter α_2.[7] The own-price elasticity is α_3, and the effect of competing prices from third countries is captured by the cross-price elasticity α_4. If $\alpha_4>0$, then M_{ks} and imports from a third country are said to be substitutes; if $\alpha_4<0$, then these imports are complements. The choice of a logarithmic formulation is based on the results from Box-Cox tests reported in appendix A. Finally, (1) also includes dummy variables to control for the effects of one-time events on imports.[8]

Equation (1) recognizes that the response of imports to changes in income or prices is subject to delays that might arise from contracts and delivery lags.[9] This paper assumes that these delays follow an Almon lag:

$$\alpha_{3ksj} = \lambda_{30} + \lambda_{31}j + \lambda_{32}j^2, \text{ for } j=0,\ldots,j_3,$$
$$\alpha_{4ksj} = \lambda_{40} + \lambda_{41}j + \lambda_{42}j^2, \text{ for } j=0,\ldots,j_4.$$

The (long-run) income and own-price elasticities associated with (1), η_{ks} and

---

[7] Haynes and Stone (1983) obtain a frequency decomposition for U.S. data and estimate income elasticities for each frequency. Their method is not applied here because it would require generating a series of trade matrices--one for each frequency, which is an overwhelming task given the size of the trade matrix used in this analysis (9x9).

[8] In addition to being bilateral, eq. (1) is not included in the list of models that Thursby and Thursby (1984) examine. In their notation, eq. (1) is
$Q_t=f(Y_t, Y_t/YT_t$, Almon on P_1 and P_2, Dummies for one-time events, $Q_{t-1})$.

[9] Equation (1) also assumes that the length of these lags is fixed; Gagnon (1987) and Husted and Kollintzas (1984) develop models that allow the speed of adjustment to change.

ξ_{ks} respectively, are constructed as [10]

(2) $$\eta_{ks} = \alpha_{1ks} /(1-\alpha_{5ks}) ,$$

(3) $$\xi_{ks} = \Sigma_j \alpha_{3ksj} /(1-\alpha_{5ks}) .$$

The corresponding elasticities for multilateral imports are

$$\eta_k = \Sigma_s \phi_{ks} \eta_{ks} ,$$
$$\xi_k = \Sigma_s \phi_{ks} \xi_{ks} ,$$

where $$\phi_{ks} = M_{ks}/\Sigma_i M_{ki} \ \forall i,k,s;\ i \neq k \neq s.$$

Finally, the residual u_{kst} is assumed to be white noise and the stochastic structure associated with country k's bilateral trade equations is

$$u_k = (u_{1k} \cdots u_{nk} \ \ u_{k1} \cdots u_{kn})' \sim N(0, \Omega_k),$$

where $$\Omega_k = \text{diag}(\sigma^2_{1k} \cdots \sigma^2_{nk} \ \ \sigma^2_{k1} \cdots \sigma^2_{kn}),$$

and n is the number of trading partners of country k, 9 in this case.

---

10 The cross-price elasticity is constructed as $\zeta_{ks} = \Sigma_j \alpha_{4ksj} /(1-\alpha_{5ks})$.

2.2 Hypothesis Testing

2.2.1 Error Properties and Choice of Dynamic Specification

The reliability of (1) depends on whether the residual exhibits serial independence, normality, and homoskedasticity. To test the first of these properties, the paper applies an F-test to the hypothesis that all the coefficients of an AR(4) for the residual are equal to zero. The hypothesis of normality is tested with the Jarque-Bera statistic (Jarque and Bera, 1980) and homoskedasticity is tested with an ARCH test (Engle, 1982).

To evaluate the validity of the Almon restrictions, the paper estimates (1) with and without the Almon restrictions and then performs an F-test. The associated F-statistic is

$$F_a = [(SSR_0 - SSR_1)/d_1]/[SSR_1/d_2] \sim F(d_1, d_2),$$

where SSR_0 is the sum of squared residuals with the Almon lag (H_0),

SSR_1 is the sum of squared residuals without the Almon lag (H_1),

d_1 = number of additional parameters under the alternative hypothesis,

d_2 = number of degrees of freedom.

To determine whether the overall dynamic specification of (1) is violated by the data, the analysis compares the sum of squared residuals for both (1) and an "unrestricted" dynamic specification. The latter is constructed by eliminating the Almon restrictions and including, as additional regressors, all predetermined variables lagged one period. If these additional regressors do not contribute significantly towards the reduction of the sum of squared residuals of (1), then it is not possible to reject the choice of dynamic specification embodied in (1). The test-statistic is constructed as F_a above, and it is denoted F_u.[11]

Finally, this paper tests for the constancy in structural parameters, an important consideration in view of both the need for accurate forecasts and the volatility in prices and exchange rates. This test is also useful for determining the extent to which the hysteresis hypothesis is supported by the data.[12] To test for parameter constancy, (1) is first estimated with data through 1983Q2 and then used to forecast imports through 1985Q2. Testing for parameter constancy amounts to applying an F-test to the hypothesis that the expected forecast error is zero (Chow 1960, p. 595).[13]

2.2.2. Trade Elasticities

The paper tests for the presence of structural asymmetries in income elasticities--namely, $\eta_k > \eta_k^*$ and the validity of the Marshall-Lerner condition--that is, whether $\xi_k + \xi_k^* < -1$, where $\eta_k^* = \Sigma_s \phi_{sk} \eta_{sk}$ and $\xi_k^* = \Sigma_s \phi_{sk} \xi_{sk}$. Given the relevance of these two tests to evaluating the effectiveness of changes in exchange rates in correcting world external

---

[11] It is evident that the selection of a dynamic specification entails a certain amount of data mining, a process that requires an increase in the size of the significance level for significance tests. As a result, this paper uses the 99 percent significance level.

[12] According to the hysteresis hypothesis, exchange rate changes produce asymmetric changes in the speed of response of trade flows. Losses in export markets, import penetration, and displacement of domestic production account for a slow adjustment in response to a depreciation (see Krugman and Baldwin, 1987). Krugman and Baldwin (1987) test hysteresis with dummy variables, which is formally equivalent to the Chow test performed here.

[13] Appendix B presents sequential Chow tests for the one-period ahead forecast errors.

imbalances, they are applied to each country's multilateral trade flows and to world trade. Testing these hypotheses for world trade serves as a consistency check on the country estimates given that world exports and world imports have the same income and price elasticities.

Because the elasticities relevant for these tests are constructed as the ratio of normal random variables (see eqs. 2 and 3), their distributions are not generally known in advance.[14] As a result, this paper generates these distributions empirically using the Monte Carlo procedure developed by Krinsky and Robb (1986).[15] To implement this procedure, the paper assumes that

$$(4) \qquad (\hat{\alpha}_{0ks} \; \ldots \; \hat{\alpha}_{3ks}(L) \; \ldots \; \hat{\alpha}_{5ks})' = \hat{\boldsymbol{\alpha}}_{ks}(L) \sim N(\boldsymbol{\alpha}_{ks}, \Sigma_{ks}),$$

and uses this assumption to generate a random sample of $\hat{\boldsymbol{\alpha}}_{ks}$, the jth drawing of which is denoted as $\hat{\boldsymbol{\alpha}}^{j}_{ks}$, j=1...4000. Substitution of each $\hat{\boldsymbol{\alpha}}^{j}_{ks}$ into (2) and (3) generates random samples for the long-run income and price elasticities, $\{\hat{\eta}^{j}_{ks}\}$ and $\{\hat{\xi}^{j}_{ks}\}$ respectively, from which it is possible to obtain the associated cumulative density functions, F^{η}_{ks} and F^{ξ}_{ks}.[16] The paper presents the median, the scaled median absolute deviation, and the 99 percent

---

[14] The conditions (Greenber and Webster, 1983) that permit deriving the exact density function of this ratio are not met in this paper.

[15] It is possible to re-parametrize (1) in order to estimate directly both the long-run elasticity and its associated standard error. However, this procedure gives only asymptotic results. The advantage of the Monte Carlo approach is that it avoids reliance on asymptotic properties.

[16] The reliability of this procedure depends on the assumption that (2) and (3) are continuous functions, an assumption that is violated if $\alpha_5=1$. Based on the evidence presented below (table 6), the continuity assumption is not violated by the data.

significance level for each of the empirically-generated elasticity distributions.[17]

2.3 The Data

Data on trade flows for all countries, except data on trade flows with respect to the Rest of the World (ROW), come from the Direction of Trade, published by the International Monetary Fund. Bilateral imports of country k from ROW are estimated as the difference between total imports of country k and the sum of country k's imports from countries other than ROW:[18]

$$M_{kr} = M_k - \Sigma_s M_{ks} \quad \forall s \neq r,\ k.$$

Similarly, data for bilateral exports of country k to the ROW bloc are constructed as the difference between total exports of country k and the sum of its bilateral exports to countries other than ROW:

$$X_{kr} = X_k - \Sigma_s X_{ks} \quad \forall s \neq r,\ k.$$

---

[17] The critical values associated with the 99 percent confidence interval are derived to ensure that the cumulative density at the tails of the distribution is the same for both critical values. An alternative procedure would be to derive these critical values to ensure that they have equal density.

[18] One implication of the residual nature of the ROW sector is that bilateral trade between ROW and another country bloc (e.g., OPEC) includes intra-trade of the latter country bloc. For example, exports of OPEC to ROW include exports of OPEC to OPEC; similarly, imports of OPEC from ROW include imports of OPEC from OPEC. Although treating ROW as a residual biases the estimate of its trade flows vis-a-vis other country blocs, this bias is the same for exports and imports and thus cancels out in the computation of trade accounts.

Given data on all bilateral trade flows with respect to ROW, total exports of this bloc are $X_r = \Sigma_s \psi_{sr} M_{sr}$, where ψ_{sr} is an adjustment factor that accounts for differences in recording practices, delivery lags, and CIF/FOB differentials. Total imports of ROW are $M_r = \Sigma_s X_{sr}$.

Real income for Canada, Germany, Japan, the United Kingdom, and the United States is defined as real GNP measured in domestic currency. For both industrial and developing countries, real income is measured as a geometric mean of industrial production for selected countries. Finally, in view of data difficulties, the paper assumes that OPEC's income equals OPEC's exports.[19]

Data on potential output for Canada, Germany, Japan, the United Kingdom, and the United States are generated using Cobb-Douglas production functions. These functions include labor (L), capital (K), oil, (O), and imports (M) as inputs and the associated parameters are estimated econometrically. Potential value added (y_k^p) equals

$$y_k^p = f(K_k^p, L_k^p, O_k, M_k) - (P_{mk} M_k / P_{yk}) ,$$

where f(.) is the predicted value of gross output, K_k^p is the level of the capital stock at full capacity, L_k^p is the labor force, and $(P_{mk} M_k / P_{yk})$ equals the value of imports in terms of domestic output. Data for potential output

---

19 As a result, the model determines OPEC's income endogenously. The countries included in the aggregate of developing countries (fixed weights in parentheses) are South Korea (32 percent), Mexico (36 percent), and Taiwan (32 percent). The countries included in the bloc of other OECD countries are Austria (5 percent), Belgium (15 percent), France (26 percent), Italy (18 percent), Netherlands (17 percent), Norway (4 percent), Sweden (8 percent), and Switzerland (7 percent).

of LDCs and the bloc of industrial countries are generated as a trend of actual output.

Trade prices are measured as multilateral export unit values with 1972=1. By being both multilateral and unit values, these export prices are not ideally suited for estimating bilateral price elasticities, but data on bilateral export prices are not available. Finally, the analysis uses only four bilateral exchange rates (against the US dollar): the Canadian dollar, the DM, the pound sterling, and the yen. Data for prices of LDCs, OPEC, and the bloc of other industrial countries are denominated in US dollars.

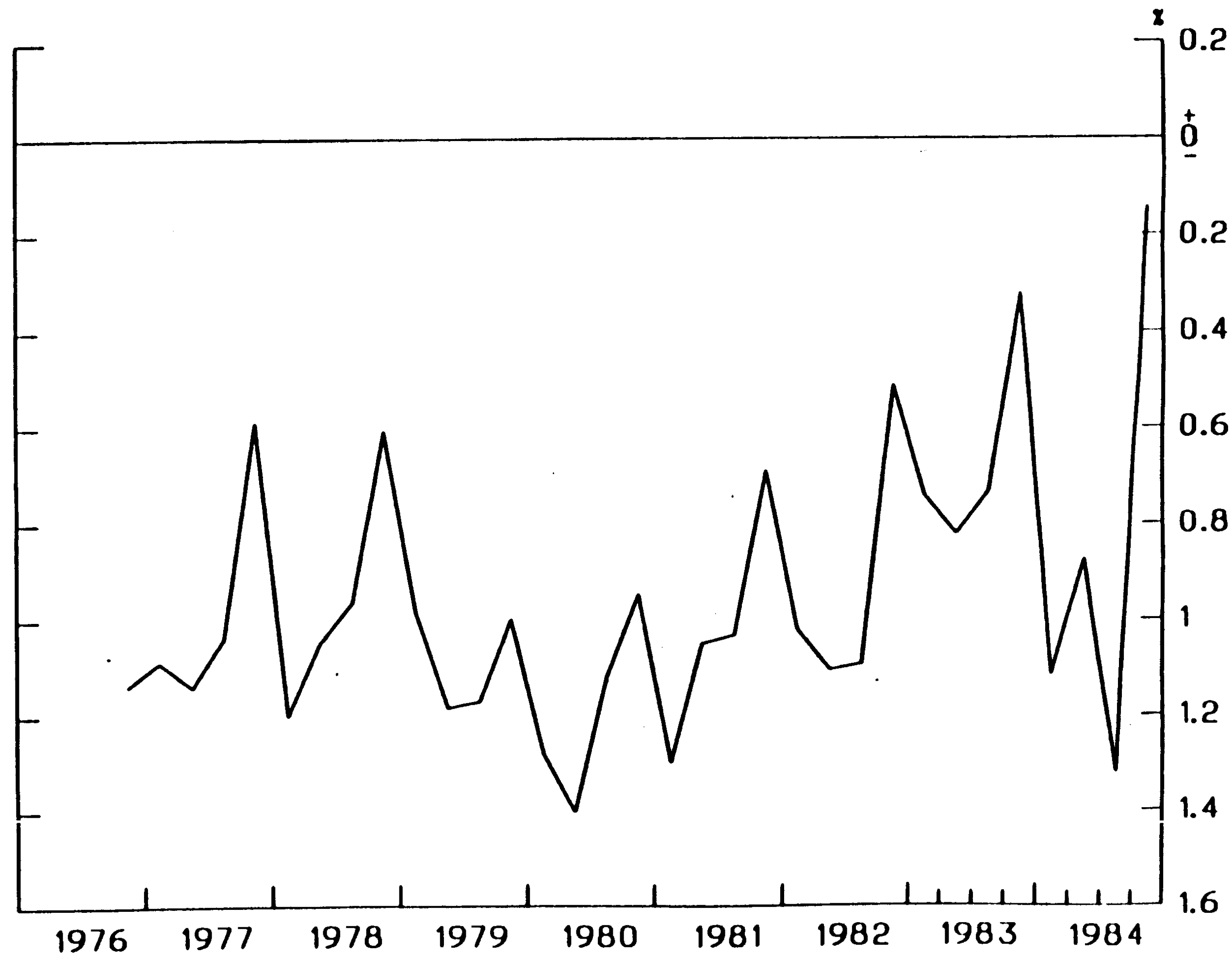
An issue relevant to the construction of the data is the statistical discrepancy between total world imports and total world exports. These discrepancies arise for several reasons: different recording practices across countries, incomplete coverage, asymmetric valuation of imports and exports for countries with incomplete reporting, and lags in recording a given trade flow as both an export and an import because of shipment delays.[20] Figure 1 presents the behavior of this discrepancy for 1976-1984 as a percentage of world imports. As the figure reveals, the average discrepancy fluctuates around 1 percent with a relatively large standard error. Rather than distributing this discrepancy across individual countries, this paper treats

---

[20] See International Monetary Fund (1987), pp. v-vi. Note that, despite treating the ROW sector as a residual category, world exports are not equal to world imports in this analysis because it is not assumed that $X_{sk} = M_{ks}$. In other words, there are two trade matrices: one for exports and one for imports, which for the reasons mentioned in the text, accounts for the discrepancy in world trade figures.

Figure 1

DISCREPANCY IN WORLD TRADE ACCOUNT
PERCENT OF WORLD IMPORTS



it as an exogenous variable.[21]

An examination of the evolution of the direction of trade (table 1) reveals several features of interest. First, the share of US imports in world trade has grown from 12 percent in 1970 to 15 percent in 1984 whereas the share of US exports has declined from 12.5 percent to 10.7 percent during the same period.[22] Second, OPEC's exports represented 6 percent of world trade in 1970, but this share increased to 15 percent in 1980 as a result of the large oil price increases and the small short-run price elasticity for oil consumption. By 1984, however, this share had declined to 10 percent. Third, between 1970 and 1984, Japan increased its share of the import market in all countries. Finally, the proportion of trade among developing countries, OPEC, and Centrally Planned Economies has shown a substantial increase.

---

[21] To the extent that the analysis focuses on trade responses, this exogeneity assumption ensures that the adding-up constraint holds because <u>changes</u> in world exports are still identical to <u>changes</u> in world imports.

[22] Exports of the United States do not include exports of products made by US multinationals operating in foreign countries.

Table 1
The Structure of International Trade:
Trade Matrices for Selected Periods
(percent)

EXPORTING COUNTRY	IMPORTING COUNTRY									
	Can	UK	Ger	Jap	US	Ind	LDCs	OPEC	ROW	Sum
1970Q4										
Canada	0.0	0.44	0.16	0.25	3.31	0.41	0.36	0.06	0.03	5.02
UK	0.21	0.0	0.33	0.11	0.66	2.36	1.43	0.30	0.17	5.56
Germany	0.12	0.38	0.0	0.17	0.95	6.12	1.58	0.27	0.31	9.89
Japan	0.18	0.10	0.15	0.0	1.75	0.67	2.15	0.31	0.37	5.69
US	2.57	0.76	0.94	1.50	0.0	2.60	3.30	0.53	0.26	12.5
Ind.	0.29	2.37	4.86	0.72	1.89	0.0	3.68	0.78	9.99	24.6
LDCs	0.23	1.10	1.11	1.31	2.50	3.01	0.0	0.36	6.04	15.7
OPEC	0.13	0.53	0.53	0.83	0.43	1.96	0.84	0.0	1.06	6.31
ROW	0.16	0.28	0.28	0.27	0.23	12.2	1.06	0.32	0.0	14.8
Sum	3.88	5.96	8.36	5.16	11.7	29.3	14.4	2.93	18.2	100
1975Q4										
Canada	0.0	0.15	0.07	0.23	2.38	0.22	0.23	0.06	0.34	3.68
UK	0.12	0.0	0.29	0.08	0.39	2.06	0.91	0.47	0.13	4.45
Germany	0.08	0.43	0.0	0.10	0.57	5.05	1.39	0.68	0.62	8.92
Japan	0.12	0.12	0.17	0.0	1.20	0.71	1.83	0.83	0.72	5.71
US	2.62	0.49	0.58	1.04	0.0	2.09	2.99	1.09	0.70	11.6
Ind.	0.24	2.23	4.23	0.72	1.34	0.0	3.59	1.50	9.95	23.8
LDCs	0.20	0.87	1.00	1.26	2.45	2.49	0.0	0.68	3.20	12.1
OPEC	0.27	0.63	0.87	2.08	1.84	3.41	2.32	0.0	1.96	13.4
ROW	0.16	0.17	0.33	0.23	0.29	11.6	2.97	0.56	0.0	16.3
Sum	3.81	5.09	7.54	5.74	10.5	27.6	16.2	5.87	17.6	100
1980Q4										
Canada	0.0	0.13	0.08	0.19	1.92	0.23	0.26	0.08	0.23	3.12
UK	0.07	0.0	0.54	0.12	0.44	2.37	0.87	0.49	0.10	5.00
Germany	0.05	0.52	0.0	0.10	0.46	4.68	1.23	0.54	0.38	7.96
Japan	0.13	0.16	0.27	0.0	1.40	0.76	2.12	0.84	0.51	6.20
US	2.02	0.54	0.56	1.04	0.0	1.84	3.25	0.77	0.43	10.4
Ind.	0.17	2.22	4.01	0.61	1.21	0.0	3.47	1.68	8.99	22.4
LDCs	0.16	0.62	0.98	1.29	2.69	2.77	0.0	0.77	4.25	13.5
OPEC	0.20	0.41	0.87	2.53	2.28	3.58	2.73	0.0	2.73	15.3
ROW	0.14	0.14	0.35	0.20	0.35	11.1	3.12	0.60	0.0	16.0
Sum	2.94	4.74	7.66	6.08	10.8	27.3	17.1	5.77	17.6	100
1984Q4										
Canada	0.0	0.10	0.06	0.22	3.10	0.19	0.29	0.06	0.27	4.29
UK	0.09	0.0	0.54	0.09	0.69	2.04	0.65	0.34	0.09	4.53
Germany	0.08	0.65	0.0	0.13	0.78	4.44	1.09	0.42	0.32	7.90
Japan	0.21	0.21	0.30	0.0	2.62	0.83	2.43	0.70	0.45	7.76
US	2.55	0.60	0.49	1.20	0.0	1.78	2.99	0.63	0.49	10.7
Ind.	0.24	2.20	3.62	0.72	1.90	0.0	3.14	1.42	8.40	21.7
LDCs	0.27	0.67	0.92	1.53	4.04	2.81	0.0	0.93	5.30	16.5
OPEC	0.07	0.15	0.35	1.91	1.06	1.83	2.19	0.0	2.32	9.89
ROW	0.16	0.14	0.39	0.21	0.73	9.82	4.39	0.92	0.0	16.7
Sum	3.67	4.72	6.67	6.01	14.9	23.7	17.2	5.42	17.6	100

Entries are bilateral imports as a share of world imports, expressed in percent; for a given period, the sum of shares across countries might not add up to 100 percent because of rounding. Source: Direction of Trade, International Monetary Fund.

3. Estimation Results

3.1 Trade Elasticities

This paper applies ordinary least squares to estimate the parameters associated with (1).[23] The estimation sample is based on quarterly data for 1973Q1 - 1985Q2 for imports of non-OPEC countries and 1973Q1 - 1984Q4 for imports of OPEC. Appendix C presents all of the estimated equations along with several summary statistics.

The evidence on secular income elasticities (table 2) offers several features of interest. First, bilateral income elasticities exhibit a large range of variation, a dispersion that weakens the case for aggregate import demand equations. Second, countries fall into one of two categories depending on whether their secular income elasticity is below or above one. The "low" income elasticity countries are Japan and LDCs; the "high" income elasticity countries are Canada, Germany, the United Kingdom, the United States, and other industrial countries; the income elasticities for OPEC's bilateral

---

[23] To simplify the analysis, this paper treats trade flows with respect to the rest-of-the-world (region r) as exogenous; as a result, there are 56 import demand equations (9^2 -9 -2*8). Estimation with both OLS and 2SLS gives similar parameter estimates. This finding would arise if the demand-supply system were recursive because in this case FIML and OLS give the same parameter estimates. To explore this possibility, the analysis estimates an import supply equation and finds (Appendix B) that the data do not violate the conditions needed to support a recursive system in 45 out of 56 cases. For the remaining 11 cases, reliance on ordinary least squares could introduce a simultaneity bias. Whether this bias actually exists depends on whether the residuals are correlated with all predetermined variables or with a subset of them (see Johnston, 1984 p.202, problem 5-13). Finally, this appendix presents Brown-Durbin-Evans results to test for parameter constancy in the processes determining the exogenous variables. Based on the notion of super exogeneity (Engle, Hendry, and Richard, 1983), the results support taking income and prices as exogenous for estimation for the majority of the equations.

Table 2
Secular Income Elasticities[f]

EXPORTING COUNTRY	IMPORTING COUNTRY: Can	Ger	Jap	UK	US	Ind	LDCs	OPEC	η^*_k
Canada	---	2.73	0.35	0.14	1.87	3.43	0.35	0.92	1.69
Std. Error		(0.9)	(0.1)	(1.6)	(0.3)	(0.8)	(0.2)	(0.4)	(0.2)
99% Band: l		0.5	0.1	-13.4	1.3	1.5	-0.1	-0.2	
u		5.1	0.7	15.7	2.5	5.6	0.8	2.0	
Germany	2.16	---	0.56	5.61	2.90	1.80	0.30	1.55	1.86
Std. Error	(0.5)		(0.3)	(1.7)	(0.7)	(0.3)	(0.1)	(0.5)	(0.2)
99% Band: l	0.9		-0.1	1.7	1.3	1.1	0.1	0.2	
u	3.5		1.2	10.9	4.7	2.6	0.6	3.1	
Japan	3.13	3.89	---	4.83	3.56	2.17	0.60	0.65	1.98
Std. Error	(0.8)	(1.1)		(1.6)	(1.0)	(1.8)	(0.2)	(0.3)	(0.4)
99% Band: l	1.0	1.5		0.8	1.2	-2.3	0.6	0.0	
u	5.2	6.7		9.0	6.3	7.2	1.2	1.4	
UK	0.0[r]	4.61	0.82	---	2.67	2.66	0.08	1.14	2.10
Std. Error		(0.2)	(0.5)		(0.7)	(0.6)	(0.1)	(0.4)	(0.3)
99% Band: l		4.1	-0.4		0.8	1.2	-0.1	0.1	
u		5.1	2.1		4.6	4.1	0.3	2.3	
US	2.01	1.95	0.79	4.11	---	2.32	0.54	0.96	1.52
Std. Error	(0.3)	(0.3)	(0.3)	(1.3)		(0.6)	(0.2)	(0.3)	(0.2)
99% Band: l	1.3	1.2	-0.1	0.8		0.7	-0.1	0.2	
u	2.9	2.7	1.7	7.4		3.9	1.3	1.8	
Ind.	1.29	2.15	-0.04	3.43	2.51	---	0.47	1.06	1.75
Std. Error	(0.6)	(0.5)	(0.3)	(1.0)	(0.5)		(0.2)	(0.4)	(0.2)
99% Band: l	0.3	1.0	-0.8	1.2	1.4		0.1	0.1	
u	2.9	3.6	0.7	6.0	3.7		0.9	2.1	
LDCs	2.83	2.29	1.22	1.45	3.04	2.61	---	0.53	2.26
Std. Error	(0.7)	(0.4)	(0.4)	(0.6)	(1.0)	(0.4)		(0.2)	(0.3)
99% Band: l	1.3	1.3	0.4	0.1	0.9	1.6		0.2	
u	4.6	3.4	2.3	3.3	7.0	3.7		1.2	
OPEC	0.0[r]	0.0[r]	-0.42	0.0[r]	0.0[r]	-0.18	0.10	---	-0.14
Std. Error			(0.5)			(0.5)	(0.2)		(0.2)
99% Band: l			-14.7			-1.8	-0.3		
u			11.2			1.3	0.5		
η_k[§]	1.89	2.15	0.34	3.09	2.27	2.01	0.39	1.07	
	(0.2)	(0.3)	(0.2)	(0.5)	(0.3)	(0.2)	(0.1)	(0.2)	
$\eta^*_k - \eta_k$[¢]	-0.20	-0.29	1.64	-0.98	-0.75	-0.25	1.87	-1.21	0.0007
	(0.3)	(0.37)	(0.44)	(0.62)	(0.35)	(0.33)	(0.34)	(0.28)	(0.41)

Notes

[f] For a given bilateral trade flow, the first entry represents the median of the distribution of $\hat{\eta}_{ks}$. The second entry represents the scaled median absolute deviation: median $[\hat{\eta}^j_{ks}$ -median $(\hat{\eta}^j_{ks})]/0.6745$, where $\hat{\eta}^j_{ks}$ is the long-run elasticity associated with the jth drawing, j = 1, ..., 4000. The third and fourth entries are the bounds for the 99% confidence band. The lower bound is given by $\hat{\eta}_l$ where $F^{\hat{\eta}_l}_{ks} = 0.005$; the upper bound is given by $\hat{\eta}_u$ where $1 - F^{\hat{\eta}_u}_{ks} = 0.005$.

[§] The multilateral income elasticity, η_k, is defined as $\eta_k = \Sigma_s \phi_{ks} \eta_{ks}$, and its variance is computed as $\hat{var}(\hat{\eta}_k) = \Sigma_s \phi^2_{ks} \sigma^2_{ks}$, where ϕ_{ks} = mean $[M_{ks}/\Sigma_l M_{kl}]$, σ^2_{ks} = square of the scaled median absolute deviation of the elasticity for imports of country k from country s.

[¢] The rightmost entry gives the difference between income elasticities for world imports and world exports.

[r] The coefficient is restricted to zero in estimation.

imports are near unity. Third, the income elasticity for multilateral imports ranges from 0.3 for Japan to 3.1 for the United Kingdom; multilateral exports have an income elasticity ranging between -0.1 for OPEC to 2.3 for LDCs.[24] The negative income elasticity for multilateral exports of OPEC might be the result of a reduction in oil dependence by non-OPEC countries or a bias in favor of non-OPEC oil suppliers.[25] Finally, based on the 99 percent confidence interval, the evidence suggests that 44 of the 56 elasticity estimates are statistically significant.

One of the questions more commonly analyzed in the trade literature is whether imports and exports have different income elasticities. These elasticity differentials can be used to determine whether a **ceteris paribus** world-wide expansion deteriorates the US trade account. To that end, the paper applies the one-tail test

$$H_0: \eta_k^* - \eta_k \geq 0 \quad \text{versus } H_1: \eta_k^* - \eta_k < 0.$$

Thus if $\hat{\eta}_k^* - \hat{\eta}_k < -1.65[\hat{var}(\hat{\eta}_k) + \hat{var}(\hat{\eta}_k^*)]^{\frac{1}{2}}$, then reject the null hypothesis.[26]

---

[24] The estimates of Warner and Kreinin (1983) range from 0.2 for the United Kingdom to 2.95 for the United States; those of Thursby and Thursby (1984) vary between 1.1 for the United Kingdom to 1.7 for the United States. The secular income elasticity for LDC multilateral exports is smaller than the cyclical estimate of Cline (1984).

[25] Note that some of the secular elasticities for imports from OPEC are constrained to zero. These constraints are needed in view of the collinearity between the real price of oil and potential GNP observed in the data. A change in the real price of oil affects imports from OPEC through two channels: the substitution effect and the effect on potential output. Unfortunately, the estimation results do not permit identifying the separate influences of these two channels.

[26] This test assumes that both $\hat{\eta}_k$ and $\hat{\eta}_k^*$ converge in distribution to independent normal variables.

The last row of table 2 presents the elasticity differential between exports and imports for each country and for the world. Based on the results, the income elasticity for U.S. imports is significantly greater than the income elasticity for US exports--a result first noted by Houthakker and Magee (1969).[27] The results also indicate that, for the world as whole, the income elasticity of world imports is not significantly different from the elasticity for world exports, an equality not imposed in estimation.

The pattern of cyclical income elasticities (table 3) is very similar to that exhibited by secular elasticity estimates. There are, however, some important differences worth noting. First, based on the 99 percent confidence interval, half of the elasticity estimates are not statistically significant, whereas 78 percent of the secular elasticity estimates are statistically significant. Second, the cyclical elasticity for multilateral exports of OPEC is 1.75, which is considerably larger than the corresponding secular elasticity estimate. Third, the cyclical elasticity estimates for imports from LDCs are smaller than their secular counterparts, a finding of interest for studying the outlook for LDC debtors. Finally, with the exception of Germany and OPEC, the elasticity differential between imports and exports is smaller than that exhibited by secular elasticities. Note also that world exports and world imports do not have statistically different cyclical elasticities.

---

[27] Although this result implies that the US trade account would deteriorate as a result of a world expansion, the actual path for the trade account depends on the paths of both relative prices and relative incomes, not just the latter. Consequently, it does not seem valid to argue against the possibility of a differential in trade elasticities on the basis of assumed income paths without specifying the paths for prices.

Table 3
Cyclical Income Elasticities[f]

EXPORTING COUNTRY	Can	Ger	Jap	UK	US	IND	LDCs	OPEC	η^*_k
	IMPORTING COUNTRY								
Canada	---	2.73	1.73	1.52	2.72	1.76	-0.25	0.09	2.25
Std. Error		(1.4)	(0.9)	(0.8)	(0.8)	(0.4)	(0.4)	(0.4)	(0.6)
99% Band: l		-0.9	-0.6	-0.5	0.7	0.7	-1.3	0.0	
u		6.3	4.1	3.6	4.8	2.8	0.8	0.2	
Germany	2.93	---	1.89	1.33	2.75	0.95	0.32	0.08	0.97
Std. Error	(0.8)		(0.8)	(0.6)	(0.8)	(0.2)	(0.1)	(0.03)	(0.2)
99% Band: l	0.9		-0.2	-0.2	0.7	0.4	0.1	0.0	
u	5.0		4.0	2.9	4.8	1.5	0.6	0.2	
Japan	1.44	1.01	---	-0.19	1.17	0.40	0.01	0.05	0.47
Std. Error	(0.9)	(0.8)		(0.7)	(0.6)	(0.3)	(0.1)	(0.02)	(0.2)
99% Band: l	-0.9	-1.0		-2.0	-0.4	-0.4	-0.3	0.0	
u	3.8	3.1		1.6	2.7	1.2	0.3	0.1	
UK	1.75	2.91	2.39	---	1.60	1.05	0.20	0.06	1.05
Std. Error	(0.7)	(0.6)	(1.6)		(0.7)	(0.3)	(0.1)	(0.02)	(0.2)
99% Band: l	-0.1	1.4	-1.7		-0.2	0.3	-0.1	0.0	
u	3.6	4.5	6.5		3.4	1.8	0.5	0.1	
US	2.50	2.15	0.97	0.99	---	0.98	0.11	0.05	1.00
Std. Error	(0.5)	(0.6)	(0.7)	(0.7)		(0.3)	(0.2)	(0.02)	(0.2)
99% Band: l	1.2	0.6	-0.8	-0.8		0.2	-0.4	0.0	
u	3.8	3.7	2.8	2.8		1.8	0.6	0.1	
Ind.	1.78	1.78	1.11	1.12	1.48	---	0.24	0.06	1.04
Std. Error	(0.6)	(0.4)	(0.7)	(0.4)	(0.5)		(0.1)	(0.02)	(0.2)
99% Band: l	0.2	0.7	-0.7	0.1	0.2		0.0	0.0	
u	3.3	2.8	2.9	2.2	2.8		0.5	0.1	
LDCs	1.95	1.74	0.53	1.54	0.09	1.27	---	0.47	0.84
Std. Error	(0.7)	(0.5)	(0.6)	(0.7)	(0.4)	(0.2)		(0.1)	(0.2)
99% Band: l	0.1	0.5	-1.0	-0.3	-0.9	0.8		0.2	
u	3.8	3.0	2.1	3.5	1.1	1.8		0.7	
OPEC	1.11	2.99	0.02	7.07	2.26	1.31	0.44	---	1.75
Std. Error	(0.7)	(1.2)	(1.0)	(1.5)	(1.5)	(0.3)	(0.2)		(0.4)
99% Band: l	-0.7	-0.1	-2.6	3.2	-1.6	0.5	-0.1		
u	2.9	6.1	2.6	10.9	6.1	2.1	1.0		
$\eta^{\S}_k$	2.24	1.97	0.62	1.69	1.54	1.21	0.21	0.14	
	(0.4)	(0.3)	(0.4)	(0.3)	(0.3)	(0.1)	(0.1)	(0.02)	
$\eta^*_k - \eta^{c}_k$	-0.02	-1.00	-0.15	-0.64	-0.54	-0.16	0.63	1.61	0.01
	(0.68)	(0.32)	(0.46)	(0.33)	(0.37)	(0.20)	(0.19)	(0.45)	(0.38)

[f] For notes see table 2.

The results for the own-price elasticity (table 4) indicate that the majority of these elasticities are negative (55 out of 56), but also that many of them are not statistically significant (27 out of 56) at the 1 percent significance level. The own-price elasticities for multilateral imports, ξ_k, are twice as large as their standard errors and range from -0.5 for the United Kingdom to -1.1 for OPEC. The own-price elasticities for exports, ξ_k^*, are also highly significant and range from -0.4 for the United Kingdom to -1.0 for the United States.

The magnitudes of the multilateral own-price elasticities are of interest because they determine the stability of the trading system. Specifically, the response of trade to changes in prices is said to be stable if it satisfies the Marshall-Lerner condition: $\xi_k + \xi_k^* < -1$. This condition is tested with a one-tail test:

$$H_0 : \xi_k + \xi_k^* \geq -1 \text{ against } H_1 : \xi_k + \xi_k^* < -1.$$

If $\hat{\xi}_k + \hat{\xi}_k^* < -1-1.65[\hat{var}(\hat{\xi}_k) + \hat{var}(\hat{\xi}_k^*)]^{1/2}$, then reject the null hypothesis.[28] The last row of table 4 computes the value for this condition and, based on the evidence, it is not possible to reject the Marshall-Lerner condition for any of the countries considered here. Furthermore, the entry in the lower-right corner represents the difference in the price elasticities for world imports and world exports, and as the evidence suggests, it is not possible to

---

[28] This test assumes that the own-price elasticities converge in distribution to independent normal variables.

Table 4
Price Elasticities[f]

EXPORTING COUNTRY	IMPORTING COUNTRY								
	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC	ϵ_k^*
Canada	---	-0.67	-0.36	-1.62	-0.80	-0.91	-0.95	-1.03	-0.83
Std. Error		(0.5)	(0.2)	(1.2)	(0.3)	(0.4)	(0.6)	(0.5)	(0.2)
99% Band: l		-2.2	-1.3	-25.0	-1.6	-2.0	-4.3	-3.9	
u		0.6	0.0	19.4	0.0	-1.2	0.3	-0.1	
Germany	-0.84	---	-1.31	-0.49	-1.70	-0.26	-1.42	-1.19	-0.65
Std. Error	(0.3)		(0.6)	(0.3)	(0.8)	(0.2)	(0.5)	(0.5)	(0.2)
99% Band: l	-2.2		-5.6	1.7	-4.2	-0.8	-4.3	-2.9	
u	-0.3		-0.1	10.9	2.5	0.1	-0.6	-0.3	
Japan	-1.28	-1.51	---	-0.29	-1.13	-0.78	-0.78	-0.91	-0.92
Std. Error	(0.6)	(0.6)		(0.4)	(0.6)	(0.8)	(0.4)	(0.3)	(0.2)
99% Band: l	-4.7	-3.3		-3.1	-6.4	-6.9	-2.2	-2.1	
u	-0.2	-0.4		1.3	0.2	2.0	0.1	-0.3	
UK	-0.46	-0.11	-0.74	---	-0.34	-0.55	-0.15	-0.81	-0.44
Std. Error	(0.2)	(0.2)	(0.6)		(0.4)	(0.3)	(0.1)	(0.4)	(0.2)
99% Band: l	-1.4	-0.6	-3.5		-3.4	-1.5	-0.6	-2.3	
u	0.0	0.4	0.6		1.0	0.1	0.2	0.2	
US	-0.99	-0.89	-0.72	-0.88	---	-0.72	-1.45	-0.52	-0.99
Std. Error	(0.3)	(0.3)	(0.4)	(0.6)		(0.4)	(1.2)	(0.3)	(0.4)
99% Band: l	-2.4	-1.8	-2.9	-10.7		-2.9	-34.7	-1.6	
u	-0.3	-0.3	-0.3	-0.9		0.0	15.2	0.1	
Ind.	-1.73	-0.73	-2.84	-0.13	-1.17	---	-0.67	-1.17	-0.83
Std. Error	(1.3)	(0.2)	(1.1)	(0.2)	(0.4)		(0.3)	(0.5)	(0.1)
99% Band: l	-5.6	-1.6	-7.5	-0.7	-2.7		-2.6	-2.9	
u	1.5	-0.3	-1.0	0.3	-0.4		0.0	-0.4	
LDCs	-1.17	-0.16	-1.22	-0.17	-0.45	-0.60	---	-1.33	-0.63
Std. Error	(0.4)	(0.2)	(0.5)	(0.2)	(0.3)	(0.2)		(0.4)	(0.1)
99% Band: l	-2.9	-0.7	-2.8	-0.8	-4.8	-1.4		-2.7	
u	-0.4	0.3	-0.2	0.3	-0.5	-0.3		-0.6	
OPEC	0.52	-0.25	-0.24	-1.94	-1.29	-0.19	-0.11	---	-0.55
Std. Error	(0.8)	(0.2)	(0.2)	(0.2)	(0.8)	(0.1)	(0.1)		(0.2)
99% Band: l	-16.0	-0.8	-6.8	-2.5	-9.9	-0.6	-0.5		
u	15.0	0.3	10.7	-1.4	-1.3	0.1	0.2		
ϵ_k [§]	-0.95	-0.60	-0.93	-0.48	-0.92	-0.49	-0.81	-1.14	
	(0.3)	(0.1)	(0.2)	(0.1)	(0.2)	(0.1)	(0.3)	(0.2)	
$\epsilon_k + \epsilon_k^*$ [¢]	-1.78	-1.25	-1.86	-0.91	-1.91	-1.32	-1.44	-1.69	-0.02
	(0.33)	(0.21)	(0.33)	(0.20)	(0.43)	(0.18)	(0.32)	(0.28)	(0.31)

Notes:

[f] For a given bilateral trade flow, the first entry represents the median of the distribution of $\hat{\epsilon}_{ks}$. The second entry represents the scaled median absolute deviation: median$|\hat{\epsilon}^j_{ks}$ -median $(\hat{\epsilon}^j_{ks})|/0.6745$, where $\hat{\epsilon}^j_{ks}$ is the long-run elasticity associated with the jth drawing, j = 1, ..., 4000. The third and fourth entries are the bounds for the 99% confidence band. The lower bound is given by $\hat{\epsilon}_l$ where $F_{ks}^{\hat{\epsilon}_l} = 0.005$; the upper bound is given by $\hat{\epsilon}_u$ where $1-F_{ks}^{\hat{\epsilon}_u} = 0.005$.

[§] The multilateral own-price elasticity is defined as $\epsilon_k = \Sigma_s \phi_{ks} \epsilon_{ks}$, and its variance is constructed as $\hat{var}(\hat{\epsilon}_k) = \Sigma_s \phi_{ks}^2 \sigma_{ks}^2$, where ϕ_{ks} = mean $[M_{ks}/\Sigma_l M_{kl})]$, σ_{ks}^2 = square of the scaled median absolute deviation of the elasticity for imports of country k from country s.

[¢] The rightmost entry gives the difference between own-price elasticities for world imports and world exports.

reject the hypothesis that world exports and world imports have the same price elasticity.

Finally, table 5 presents the estimated cross-price elasticities. As the table reveals, the econometric estimation of these elasticities proved extremely difficult and some of them are constrained to zero. According to these results, US exports to Germany, to the United Kingdom, to other OECD countries, and to developing countries will increase if third-country prices increase. Similarly, US imports from both Japan and Germany will increase if third-country prices increase. Finally, an increase in third-country prices lowers exports of LDCs to Germany and raises LDCs exports to Japan.

3.2 Test Results for Parameter Reliability

To evaluate the reliability of these estimates, tables 7-9 present test results for the assumptions of normality, serial independence, and homoskedasticity in the error term. The results from the Jarque-Bera test (table 7) indicate that the data do not violate the normality assumption for any of the 56 bilateral trade equations considered here. Based on the evidence of the F-tests for serial correlation (table 8), it is not possible to reject the assumption of serial independence for the residuals in 54 out of 56 cases. Finally, the results from the ARCH-tests (table 9) indicate that it is not possible to reject the assumption of homoskedastic errors for any of the 56 trade equations.

To examine further the reliability of the estimates, the paper tests for the choice of dynamic specification and for parameter constancy. On the basis of F-tests, it is not possible to reject the restrictions associated with the Almon distributed lag (table 10) for the equations in which they were used (30 in total). Furthermore, F-tests comparing the dynamic specification of (1)

Table 5
Cross-Price Elasticities[f]

EXPORTING COUNTRY	IMPORTING COUNTRY							
	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.00	0.00	1.30	0.00	-1.74	0.00	0.00
Std. Error				(1.2)		(1.2)		
99% Band: l				-2.3		-6.7		
u				7.1		1.2		
Germany	0.00	---	0.00	0.00	0.77	0.15	0.42	0.00
Std. Error					(0.8)	(0.2)	0.4	
99% Band: l					-1.2	-0.3	-0.9	
u					3.1	0.6	1.6	
Japan	0.00	0.77	---	0.00	-0.08	2.67	0.00	0.00
Std. Error		(0.4)			(0.5)	(3.6)		
99% Band: l		-0.2			-1.9	-51.1		
u		1.9			1.2	48.7		
UK	0.00	0.00	0.00	---	0.00	-0.73	0.00	0.00
Std. Error						(0.6)		
99% Band: l						-6.7		
u						1.0		
US	0.00	0.58	0.00	1.01	---	0.29	0.39	0.00
Std. Error		(0.3)		(0.6)		(0.9)	(1.1)	
99% Band: l		-0.2		-0.4		-2.3	-2.6	
u		1.4		2.6		3.1	3.7	
Ind.	0.95	0.12	2.30	0.00	0.00	---	0.41	0.00
Std. Error	(1.5)	(0.1)	(0.8)				(0.5)	
99% Band: l	-3.3	-0.2	1.0				-0.9	
u	6.3	0.5	4.6				1.9	
LDCs	0.00	-0.41	0.81	0.00	0.00	0.00	---	0.00
Std. Error		(0.2)	(0.5)					
99% Band: l		-1.1	0.0					
u		0.0	2.5					
OPEC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Std. Error								
99% Band: l								
u								

[f] For notes see table 4.

Table 6
Coefficient Estimate for
Lagged Dependent Variable
(t-statistic)

EXPORTING COUNTRY	IMPORTING COUNTRY							
	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.48 (4.0)	0.34 (2.5)	0.68 (5.3)	0.00[r]	0.53 (5.6)	0.41 (3.0)	0.52 (4.4)
Germany	0.54 (5.4)	---	0.65 (7.1)	0.59 (5.3)	0.33 (2.2)	0.31 (3.2)	0.69 (9.3)	0.74 (13.3)
Japan	0.60 (6.2)	0.51 (5.4)	---	0.60 (5.0)	0.55 (4.8)	0.72 (7.5)	0.63 (6.3)	0.63 (10.3)
UK	0.45 (3.7)	0.00[r]	0.62 (5.3)	---	0.58 (5.1)	0.42 (3.5)	0.34 (2.4)	0.73 (14.8)
US	0.13 (1.0)	0.25 (2.9)	0.75 (9.0)	0.59 (4.6)	---	0.52 (4.8)	0.83 (13.2)	0.74 (13.1)
Ind.	0.54 (4.6)	0.09 (0.6)	0.53 (5.4)	0.56 (4.8)	0.29 (2.4)	---	0.61 (5.8)	0.73 (13.2)
LDCs	0.42 (3.4)	0.14 (1.2)	0.56 (5.7)	0.35 (2.6)	0.52 (3.8)	0.21 (1.8)	---	0.00[r]
OPEC	0.82 (10.3)	0.60 (5.3)	0.61 (7.1)	0.00[r]	0.63 (6.2)	0.53 (7.1)	0.53 (5.1)	---

[r] Parameter constrained to zero in estimation.

Table 7
Significance Levels for Testing
Normality in the Residuals:
Jarque-Bera Statistic

EXPORTING COUNTRY	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
	IMPORTING COUNTRY							
Canada	---	0.66	0.48	0.86	0.12	0.18	0.15	0.76
Germany	0.31	---	0.67	0.47	0.18	0.73	0.61	0.26
Japan	0.21	0.21	---	0.05	0.24	0.82	0.20	0.49
UK	0.42	0.71	0.72	---	0.62	0.54	0.16	0.91
US	0.35	0.50	0.62	0.77	---	0.56	0.57	0.26
Ind.	0.31	0.35	0.31	0.77	0.40	---	0.08	0.39
LDCs	0.07	0.08	0.69	0.87	0.08	0.11	---	0.81
OPEC	0.22	0.35	0.29	0.10	0.26	0.49	0.31	---

The Jarque-Bera statistic is constructed as

$$JB = T\,[\mu_3^2/(6\mu_2^3) + (1/24)(\mu_4/\mu_2^2 - 3)^2] \sim \chi^2(2),$$

where μ_j is the jth central moment of the distribution of the estimated residuals. Entries in the table represent $Pr(\chi^2(2) < JB)$.

Table 8
Significance Levels for Testing
Serial Correlation in the Residuals
(degrees of freedom)

EXPORTING COUNTRY	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
	IMPORTING COUNTRY							
Canada	---	0.12 (4,42)	0.40 (4,41)	0.09 (4,42)	0.00 (4,42)	0.57 (4,42)	0.50 (4,42)	0.44 (4,35)
Germany	0.29 (4,42)	---	0.95 (4,41)	0.01 (4,42)	0.78 (4,42)	0.34 (4,42)	0.65 (4,42)	0.12 (4,35)
Japan	0.50 (4,42)	0.30 (4,42)	---	0.83 (4,42)	0.96 (4,42)	0.46 (4,42)	0.00 (4,42)	0.96 (4,35)
UK	0.54 (4,42)	0.33 (4,42)	0.72 (4,41)	---	0.57 (4,42)	0.50 (4,42)	0.66 (4,42)	0.98 (4,35)
US	0.30 (4,42)	0.15 (4,42)	0.63 (4,41)	0.49 (4,42)	---	0.30 (4,42)	0.60 (4,42)	0.55 (4,35)
Ind.	0.75 (4,42)	0.13 (4,42)	0.41 (4,41)	0.07 (4,42)	0.49 (4,42)	---	0.73 (4,42)	0.80 (4,35)
LDCs	0.92 (4,42)	0.85 (4,42)	0.80 (4,41)	0.71 (4,42)	0.31 (4,42)	0.69 (4,42)	---	0.09 (4,35)
OPEC	0.81 (4,40)	0.61 (4,42)	0.33 (4,37)	0.26 (4,32)	0.20 (4,33)	0.79 (4,42)	0.92 (4,40)	---

The test for serial correlation is based on

$$\hat{u}_t = \Sigma_j \phi_j \hat{u}_{t-j} \text{ for } j = 1, \ldots, 4,$$

where $\hat{u}_t$ is the regression residual. The null hypothesis of no serial correlation is $H_0: \phi_1 = \ldots = \phi_4 = 0$, which is tested with

$$F^* = ((SSR_0 - SSR_1)/4/(SSR_1/d_2)) \sim F(4, d_2),$$

where SSR_0 and SSR_1 are the sum of squared residuals under the null and the alternative hypothesis, respectively; d_2 is the number of degrees of freedom. Entries in the table represent $Pr(F(4, d_2) < F^*)$.

Table 9
Significance Levels for Testing
Homoskedasticity in the Residuals:
ARCH-Statistic

EXPORTING COUNTRY	IMPORTING COUNTRY							
	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.34	0.02	0.14	0.19	0.82	0.85	0.31
Germany	0.76	---	0.07	0.53	0.26	0.27	0.39	0.60
Japan	0.75	0.79	---	0.95	0.64	0.18	0.80	0.31
UK	0.78	0.29	0.78	---	0.45	0.46	0.84	0.53
US	0.87	0.50	0.74	0.23	---	0.44	0.43	0.09
Ind.	0.81	0.65	0.42	0.23	0.93	---	0.92	0.20
LDCs	0.59	0.92	0.41	0.13	0.58	0.89	---	0.40
OPEC	0.66	0.65	0.14	0.90	0.32	0.51	0.69	---

The test for homoskedasticity is based on $\hat{u}_t^2 = \gamma_0 + \gamma_1 \hat{u}_{t-1}^2$ where $\hat{u}$ is the regression residual. Under the null hypothesis of homoskedastic residuals, $\gamma_1 = 0$ which is tested with a t-test. The entries in the table show $Pr(|t_{T-K}|<t^*)$, where $t^* = \hat{\gamma}_1/[\sqrt{\hat{var}(\hat{\gamma}_1)}]$.

Table 10
Significance Levels for Testing
Almon Restrictions
(degrees of freedom)

EXPORTING COUNTRY	IMPORTING COUNTRY							
	Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.90 (1,39)	0.06 (4,37)	0.69 (8,31)	0.33 (1,39)	---	---	0.56 (6,30)
Germany	---	---	0.69 (4,37)	0.68 (5,37)	0.93 (6,29)	---	---	0.30 (6,30)
Japan	---	---	---	0.66 (5,37)	---	---	---	0.37 (6,30)
UK	---	---	---	---	---	---	0.01 (3,39)	0.72 (6,29)
US	0.78 (9,31)	---	0.76 (4,37)	0.49 (10,31)	---	---	---	0.86 (6,30)
Ind.	0.56 (4,35)	---	---	0.14 (5,37)	0.58 (6,34)	---	---	0.16 (6,30)
LDCs	---	---	0.44 (8,32)	0.52 (5,37)	0.61 (6,35)	---	---	---
OPEC	0.02 (3,38)	0.82 (2,38)	0.93 (6,29)	0.63 (16,18)	0.43 (16,18)	0.81 (3,37)	---	---

The test for Almon restrictions is based on

$$F_a = ((SSR_0 - SSR_1)/d_1/(SSR_1/d_2)) \sim F(d_1, d_2),$$

where SSR_0 is the sum of squared residuals using the Almon restrictions, SSR_1, is the sum of squared residuals without the Almon restrictions, and d_1 is the <u>total</u> number of Almon restrictions. Entries in the table represent $Pr(F(d_1, d_2) < F_a)$.

against an unrestricted dynamic specification (table 11) reveal that including additional lagged variables and eliminating the Almon restrictions does not provide a significant increase in the explanatory power of (1)--that is, the data do not reject the dynamic specification associated with (1) for any of the 56 cases considered here. Finally, the results associated with the Chow-test (table 12) indicate that it is not possible to reject the hypothesis of parameter constancy in 53 out of 56 trade equations.[29]

[29] The equations failing the Chow test are U.S. imports from both other industrial countries and from OPEC, as well as U.K imports from OPEC.

Table 11
Significance Levels for Testing Dynamic Specification (degrees of freedom)

EXPORTING COUNTRY	IMPORTING COUNTRY Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.51 (5,35)	0.26 (8,33)	0.40 (13,26)	0.82 (4,36)	0.89 (4,37)	0.83 (4,37)	0.27 (9,27)
Germany	0.03 (4,38)	---	0.58 (8,33)	0.32 (9,33)	0.89 (11,24)	0.92 (5,35)	0.22 (4,37)	0.26 (9,27)
Japan	0.14 (4,38)	0.42 (6,34)	---	0.81 (9,33)	0.80 (5,34)	0.52 (4,37)	0.21 (4,37)	0.56 (9,27)
UK	0.30 (6,37)	0.34 (5,26)	0.86 (4,37)	---	0.16 (4,32)	0.75 (4,37)	0.66 (5,37)	0.85 (10,25)
US	0.89 (13,27)	0.87 (6,34)	0.55 (8,33)	0.72 (15,26)	---	0.73 (4,37)	0.63 (4,37)	0.91 (9,27)
Ind.	0.74 (9,30)	0.64 (6,34)	0.78 (5,35)	0.15 (9,33)	0.76 (10,30)	---	0.83 (3,39)	0.69 (9,27)
LDCs	0.64 (4,38)	0.82 (6,34)	0.89 (13,27)	0.23 (9,33)	0.68 (10,32)	0.59 (3,39)	---	0.64 (2,26)
OPEC	0.86 (6,35)	0.94 (5,35)	0.90 (9,26)	0.69 (19,15)	0.33 (19,15)	0.87 (7,33)	0.13 (4,35)	---

The null hypothesis is represented by equation (1). The alternative hypothesis is constructed by including, as regressors, both the dependent and predetermined variables lagged one period. The test for dynamic specification is based on an F-test: $F_u = ((SSR_0 - SSR_1)/d_1/(SSR_1/d_2))$, where SSR_0 is the sum of squared residuals under the null hypothesis, SSR_1 is the sum of squared residuals under the alternative hypothesis, d_1 is the number of additional parameters, and d_2 is the number of degrees of freedom. Entries in the table represent $Pr(F(d_1, d_2) \leq F_u)$.

Table 12
Significance Levels for Testing Parameter Constancy (Chow Test) (degrees of freedom)

EXPORTING COUNTRY	IMPORTING COUNTRY Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	0.25 (8,32)	0.69 (8,33)	0.56 (8,31)	0.75 (8,32)	0.7[illegible] (8,[illegible])	0.15 (8,33)	0.35 (8,28)
Germany	0.47 (8,34)	---	0.23 (8,33)	0.00 (8,34)	0.90 (8,27)	0.6[illegible] (8,32)	0.19 (8,33)	0.64 (8,28)
Japan	0.74 (8,34)	0.43 (8,32)	---	0.37 (8,34)	0.85 (8,31)	0.42 (8,31)	0.16 (8,33)	0.81 (8,28)
UK	0.88 (4,39)	0.83 (8,23)	0.63 (8,33)	---	0.38 (8,28)	0.45 (8,33)	0.11 (8,34)	0.97 (8,27)
US	0.88 (8,32)	0.20 (8,32)	0.15 (8,33)	0.09 (8,33)	---	0.70 (8,33)	0.91 (8,33)	0.93 (8,28)
Ind.	0.92 (8,31)	0.77 (8,32)	0.34 (8,32)	0.00 (8,34)	0.99 (8,32)	---	0.21 (8,34)	0.70 (8,28)
LDCs	0.75 (8,34)	0.30 (8,32)	0.09 (8,32)	0.42 (8,34)	0.80 (8,34)	0.41 (8,34)	---	0.72 (8,21)
OPEC	0.40 (8,33)	0.92 (8,32)	0.83 (8,27)	0.19 (8,26)	0.96 (8,26)	0.93 (8,32)	0.55 (8,31)	---

To test for parameter constancy, all equations are first estimated with data ending in 1983 and then used to forecast trade volumes through 1985Q2. Under the null hypothesis of parameter constancy, the expected forecast error is zero. The test-statistic used is

$$F_c = ([\Sigma_j \hat{u}_j^2 - \Sigma_k \hat{u}_k^2]/T_2)/[\Sigma_k \hat{u}_k^2/(T_1 - K)] \sim F(T_2, T_1 - K),$$

where $\hat{u}_j$ is the estimated residual for $j = 1, T_1+T_2$; $\hat{u}_k$ is the forecast residual for $k = 1, T_1$; T_1 is the number of observations in the estimation period, T_2 is the number of observations in the forecast period; and K is the number of regressors. Entries in the table represent $Pr(F(T_2, T_1 - K) \leq F_c)$.

4. Model Validation

To study the dynamic response of trade to changes in prices and income, this section assembles the estimated equations into a world trade model in which each country's trade account, denominated in current dollars, is explained as the difference between multilateral exports and multilateral imports. Country k's multilateral imports are determined by the sum of 8 bilateral imports, 7 of which are explained with 7 import demand equations. The eighth bilateral trade flow is with respect to Centrally Planned Economies and is taken as exogenous.

In principle, multilateral exports of country k equal the sum of bilateral imports of other countries from country k. In practice, however, differences in reporting practices across countries, shipment delays, and CIF/FOB differentials introduce a discrepancy between the value of exports of country k to country s and the value of imports of country s from country k. This discrepancy is the more serious the higher the frequency of observation. To take into account these measurement problems, the model includes estimated bridge equations that link X_{ks} to M_{sk}:

$$\ln X_{ks} = \beta_{0ks} + \beta_{1ks}\ln M_{sk} + \text{error term}, \tag{5}$$

where M_{sk} is determined endogenously as in (1). In the absence of systematic measurement errors, one would expect that $\beta_0 = 0$ and $\beta_1 = 1$.[30]

---

[30] The model, which is shown in Appendix C, includes only twenty equations such as (5). Of these, $\beta_0 = 0$ in seven equations and $\beta_1 = 1$ in eleven equations.

Given equations (1) and (5), the trade account of country k is

$$
(6)\qquad \begin{cases} X_{kst} = \exp(\beta_{0ks} + \beta_{1ks}\ln M_{skt} + \text{error term}), \\ M_{kst} = M_{ks}(y_{kt},\ \mathbf{p}_{kt},\ \hat{\boldsymbol{\alpha}}_{ks}(L),\ \hat{u}_{kst}), \\ NX_{kt} = \sum_s X_{kst} - \sum_s M_{kst} = NX_k(\mathbf{y}_t,\ \mathbf{p}_{kt},\ \hat{\mathbf{u}}_{kt},\ \hat{\boldsymbol{\alpha}}_k(L)),\ \forall s \neq k, \end{cases}
$$

where

$$
\begin{aligned} \mathbf{y}_t' &= (y_{1t} \cdots y_{nt}), \\ \mathbf{p}_{kt}' &= (p_{k1t} \cdots p_{kst} \cdots p_{knt}), \\ \hat{\boldsymbol{\alpha}}_k(L) &= \text{vec}(\hat{\boldsymbol{\alpha}}_{1k}(L) \ \ldots\ \hat{\boldsymbol{\alpha}}_{nk}(L)\ \ \hat{\boldsymbol{\alpha}}_{k1}(L)\ \ldots\ \hat{\boldsymbol{\alpha}}_{kn}(L))', \end{aligned}
$$

where L is the lag operator and $\hat{\boldsymbol{\alpha}}_{kl}(L)$ is defined by equation (4). To ensure equality between world exports and world imports, the trade account of the bloc of other OECD countries (k=i) is determined as

$$
(7)\qquad X_{it} = M_{it} + \sum_k M_{kt} - \Sigma_k X_{kt}\ ,\ \forall k \neq i
$$

where

$$
M_{it} = \sum_s M_{ist} = \sum_s M_{ist}(y_{it},\ \mathbf{p}_{it},\ \hat{\boldsymbol{\alpha}}_{is}(L),\ \hat{u}_{ist}),\ \forall s \neq i.
$$

Although (7) guarantees that a reduction in the US trade deficit is absorbed by the rest of the world, it does not determine the extent to which a given country absorbs this deficit reduction.

4.1 Historical Tracking

Traditionally, econometric models are evaluated by deterministic methods--that is, model predictions are compared against actual values under the assumption that the error terms take their means--namely, zero. However, when applied to nonlinear models, deterministic methods lead to biased model predictions because the expectation of a function of a random variable is not, in general, equal to the function of the expectation of that variable. In other words, because M_{kst} is a nonlinear function of u_{kst}, it follows that

$$E[M_{kst}(y_{kt}, \mathbf{p}_{kt}, \hat{\boldsymbol{\alpha}}_{ks}(L), \hat{u}_{kst})] \neq M_{kst}[y_{kt}, \mathbf{p}_{kt}, \hat{\boldsymbol{\alpha}}_{ks}(L), E(\hat{u}_{kst})],$$

the latter being the deterministic prediction. Biased model predictions produce, in turn, biased measures of model performance.

To avoid these biases, the paper relies on residual-based stochastic simulations as developed by Brown and Mariano (1984). Implementing their approach requires simulating the model over the historical period for alternative values of the residuals. These alternative values are generated following McCarthy's method (McCarthy 1972)--that is,

$$u^{*}_{kst} = T^{-\frac{1}{2}} \hat{u}_{kst} \varphi_t, \ \varphi \sim N(0,1) \quad \forall k,s,t.$$

Under the assumption that both $E(\varphi_{t-j} \hat{u}_{kst-j})=0 \ \forall j$ and $E(u^{*}_{pqt} u^{*}_{kst}) = E(u^{*}_{pqt}) E(u^{*}_{kst})=0 \ \forall p, q, t$, it is possible to show (McCarthy, 1972) that $\mathbf{u}^{*}_{k} \sim N(0, \boldsymbol{\Omega}_k)$, which is the distribution of the original disturbances (see equation (1)). One advantage of residual-based stochastic simulations is that the number of drawings is equal to the sample size used in parameter estimation, which in this case equals 50.[31]

---

[31] For the purpose of generating random numbers, the seed for the normal distribution of φ is indexed by the replication number--that is there are 50 seeds, one for each replication. Fair (1986) reviews alternative procedures for evaluating model performance with stochastic simulations.

Based on these 50 stochastic simulations, the paper computes the (in-sample) Mean Absolute Percentage Error (MAPE) as

$$MAPE = \{\sum_t |M_{kst} - (\sum_\tau \hat{M}_{kst\tau}/50)|/M_{kst}\}/36, \quad t=1976Q1\text{-}1984Q4, \quad \tau=1,\ldots,50,$$

where $\hat{M}_{kst\tau}$ is the simulated value of M_{kst} for the τth drawing. According to table 13, the model exhibits relatively small errors in dynamic simulations with a MAPE ranging from 0.8 percent for total imports of other OECD countries to 3.5 percent for total imports of OPEC. For the United States, total exports have a MAPE of 2.8 percent and total imports have a MAPE of 2.5 percent. With respect to the trade account, the model exhibits a Mean Absolute Error (MAE) ranging from \$7.9 billion for the United States to \$2.1 billion for Canada. Note that multilateral trade flows exhibit lower MAPE's than the associated bilateral trade flows, a result that suggests that overpredictions in some trade flows are offset by underpredictions in other flows.

As an additional criterion for model evaluation, the analysis examines a regression of actual on mean predicted values:

$$M_{kst} = \psi_0 + \psi_1(\Sigma_\tau \hat{M}_{kst\tau}/50) + v_{kst}, \quad v_{kst} \sim N(0, \sigma_v^2).$$

If model predictions do not deviate systematically from actual values, then it must be true that <u>both</u> $\psi_0=0$ and $\psi_1=1$, a joint hypothesis tested with an F-statistic distributed as F(2,34). Based on the significance levels associated with H_0: $\psi_0=0$ and $\psi_1=1$ (table 13), there are 13 (out of 56) bilateral trade equations for which it is not possible to accept the above null hypothesis. Equations failing this test include multilateral imports of Canada, LDCs and

Table 13
Model Validation: Measures of Performance in
Stochastic Simulations
1976-1984

EXPORTING COUNTRY		IMPORTING COUNTRY: Can	Ger	Jap	UK	US	Ind	LDCs	OPEC	Total Export
Canada	MAPE[a]	---	9.5	5.9	8.5	4.4	6.2	6.8	11.9	3.2
	F-Test[b]		0.63	0.99	0.41	0.44	0.10	0.02	0.01	0.02
Germany	MAPE	8.7	---	4.9	4.6	4.7	1.9	3.1	9.5	1.6
	F-Test	0.01		0.34	0.62	0.56	0.15	0.21	0.02	0.09
Japan	MAPE	9.2	4.7	---	6.2	5.6	9.5	4.2	6.2	3.1
	F-Test	0.01	0.85		0.22	0.43	0.06	0.92	0.38	0.98
UK	MAPE	9.7	3.9	14.6	---	6.3	4.3	3.6	4.3	2.9
	F-Test	0.82	0.61	0.06		0.01	0.62	0.06	0.31	0.94
US	MAPE	3.0	4.6	5.0	6.3	---	4.4	8.4	8.3	2.8
	F-Test	0.12	0.87	0.22	0.95		0.09	0.00	0.43	0.00
Ind.	MAPE	5.4	1.7	4.7	3.8	4.1	---	3.1	5.1	1.3
	F-Test	0.01	0.23	0.95	0.11	0.19		0.03	0.06	0.71
LDCs	MAPE	7.2	2.6	3.6	6.4	3.5	2.3	---	7.0	1.0
	F-Test	0.00	0.53	0.07	0.20	0.35	0.85		0.61	0.53
OPEC	MAPE	18.7	6.6	4.3	17.5	9.6	4.8	5.9	---	2.6
	F-Test	0.00	0.16	0.10	0.00	0.16	0.13	0.02		0.06
Total Imports	MAPE	3.0	1.5	2.8	3.5	2.5	0.8	2.1	3.5	
	F-Test	0.04	0.52	0.09	0.18	0.82	0.29	0.02	0.04	
Trade Balance	MAE[c]	2.1	3.0	3.1	3.7	7.9	5.7	6.7	4.7	
	F-Test	0.03	0.07	0.15	0.19	0.54	0.00	0.14	0.66	

[a] Mean Absolute Percentage Error for 1976Q1-1984Q4 using the mean of simulated values from 50 stochastic simulations.

[b] F-Test for H_0:a=0 <u>and</u> b=1 in the regression $Y_{it}=a+b\bar{Y}_{it}$ where Y_{it} is the actual value of the ith variable and $\bar{Y}_{it}$ is the mean associated with 50 stochastic simulations. The entry represents Prob(F(2,34)>F-value).

[b] Mean absolute error, expressed in US $ billion.

OPEC; multilateral exports of Canada and the United States; and the trade balances of Canada and the bloc of other OECD countries.

4.2 Multiplier Analysis

To evaluate the properties of the model as a whole, the analysis examines the response of trade accounts to changes in exogenous variables:

Case 1: A 1 percent decline in the annual growth rate for the United States.

Case 2: A 1 percent increase in the annual growth rate of foreign countries.

Case 3: A 50 percent depreciation of the US dollar.

Case 4: Cases 1-3 combined.

These simulations use historical data over 1980Q1-1984Q4 as the baseline and the results are shown in table 14. Note that, by construction, they guarantee that the sum of trade account responses across countries adds up to zero.

A reduction in the U.S. growth rate of 1 percent produces, after five years, an improvement in the the US trade account of $31 billion.[32] This improvement stems from a reduction in US imports that translates into a deterioration of the trade accounts for the remaining countries. The countries absorbing the bulk of the improvement in the US trade deficit are Canada (28 percent), Japan (25 percent), and the bloc of other industrial countries (15 percent). The results also indicate that LDCs experience a

---

[32] This shock is applied to the growth rate of actual US GNP; US potential output remains on its baseline path.

Table 14
Response of Trade Accounts to Exogenous Changes in Income and Prices
(Deviations from Baseline, billions of US$)

	Years				
	80Q4	81Q4	82Q4	83Q4	84Q4
Case 1: Slower U.S. Growth[a]					
Canada	-1.25	-2.64	-3.76	-6.42	-8.88
United Kingdom	-0.35	-0.91	-1.64	-1.87	-2.65
Germany	-0.44	-1.21	-1.58	-2.58	-3.66
Japan	-0.68	-1.99	-2.58	-4.94	-7.75
Industrial	-0.89	-2.04	-2.76	-3.16	-4.58
LDCs	-0.13	-0.35	-0.49	-0.79	-1.00
OPEC	-1.54	-2.45	-1.91	-3.04	-2.85
United States	5.28	11.60	14.71	22.80	31.35
Case 2: Faster Foreign Growth[b]					
Canada	-1.68	-3.99	-5.18	-9.18	-12.86
United Kingdom	-1.19	-2.64	-3.43	-4.72	-6.70
Germany	-2.32	-3.53	-4.79	-5.97	-5.66
Japan	-1.32	-3.24	-4.49	-7.00	-9.04
Industrial	-0.80	-1.23	-1.89	0.18	-0.39
LDCs	1.06	1.82	2.41	4.03	5.61
OPEC	3.44	6.00	7.59	7.79	8.47
United States	2.81	6.81	9.79	14.87	20.57
Case 3: 50% dollar depreciation[c]					
Canada	-2.67	-6.07	-13.96	-21.97	-23.56
United Kingdom	2.97	-4.17	-1.43	-4.27	-6.22
Germany	11.43	6.13	5.40	1.31	6.18
Japan	-4.36	-7.83	-8.77	-8.56	-5.97
Industrial	-20.12	-16.43	-21.99	-14.71	-20.14
LDCs	-56.35	-75.63	-67.12	-63.02	-68.51
OPEC	76.72	53.48	40.85	33.22	29.36
United States	-7.63	50.53	67.02	78.00	88.86
Case 4: Cases 1-3 Combined					
Canada	-6.08	-14.12	-25.75	-42.69	-52.40
United Kingdom	0.85	-9.10	-8.60	-13.64	-19.51
Germany	7.09	-0.38	-3.32	-10.12	-5.83
Japan	-6.74	-13.94	-17.08	-22.29	-24.92
Industrial	-22.60	-21.10	-27.71	-17.63	-25.35
LDCs	-54.90	-73.40	-64.26	-58.20	-61.78
OPEC	79.68	59.51	50.44	42.34	39.78
United States	2.70	72.53	96.29	122.24	150.02

Notes: [a] U.S. growth is reduced by 1 percent per year;
[b] foreign growth rate increases by 1 percent per year;
[c] dollar depreciates 50 percent against all currencies.

small reduction in their trade account given the small cyclical income elasticity for US imports from LDCs (see table 3).

An expansion in foreign economic activity (Case 2) raises US exports and reduces the US trade deficit by $21 billion after five years.[33] The effect of this foreign expansion on foreign trade accounts depends on the magnitude of the income elasticity for exports relative to the magnitude of the income elasticity for imports. For OPEC and LDCs, the cyclical income elasticity for their exports is greater than the income elasticity for their imports, and therefore, their trade accounts improve in response to an expansion in non-US countries. For the remaining countries, the income elasticity for imports is greater than the income elasticity for exports, and therefore, their trade accounts deteriorate.

A 50 percent sustained real depreciation of the dollar against all currencies is effective in improving the US trade account.[34] There is a short-lived J-curve, and the U.S. trade account improves by $89 billion after five years. The results also indicate that Canada, the bloc of other OECD countries, and LDCs show deteriorations in their trade accounts, with LDCs experiencing a deterioration of $69 billion in their trade account. There are several reasons for this result. First, the dollar depreciation induces a revaluation of the dollar value of LDCs' baseline trade deficit. Second, the

---

[33] The income shock is applied to actual foreign GNP, leaving potential foreign GNP on its baseline path; US real income also remains on its baseline path.

[34] The analysis assumes that the "pass-through" coefficient is equal to one. Under the assumption that the prices of LDCs, OPEC, and other industrial countries remain constant in their currencies, P(fx), a dollar depreciation raises their prices denominated in dollars, P($), because P($)=P(fx) e($/fx), where e($/fx) is the bilateral dollar exchange rate, which by assumption is increasing in value.

depreciation of the US dollar relative to LDCs' currency increases US real net exports to developing countries, which reinforces the deterioration induced by the revaluation effects. Finally, the dollar depreciation has a depressing effect on third markets for LDC exports--that is, the export gains arising from complementarity are more than offset by the export losses arising from the substitution effects.[35]

To the extent that the events discussed in cases 1-3 can take place at the same time, it is of interest to determine their effects when operating simultaneously. The results reveal that after five years, the US trade account improves by $150 billion. Because international imbalances add up to zero in this model, the improvement in the US trade account implies a deterioration in foreign trade accounts and the countries experiencing the largest deteriorations are Canada ($52 billion) and the LDCs ($62 billion).[36]

---

[35] LDC exports have a cross-price elasticity of -0.41 with respect to Germany but 0.81 with respect to Japan (see table 5).

[36] If the model were linear, then the trade account responses from case 4 would exactly equal the sum of the trade account responses for cases 1-3. For the United States, the sum of these responses is $141 billion whereas the response in case 4 is $150 billion. The comparisons for other countries reveal small, but not negligible, differences between the sum of the trade account responses and the response of case 4. Based on these results, it is possible to conclude that the model is nonlinear.

5. Model Applications

5.1 The Absorption of the U.S. Trade Deficit

To study how foreign trade accounts respond to the elimination of the US trade deficit, the paper endogenizes the level of real income in the United States and exogenizes the US trade deficit, which is then set to zero both at once and permanently.[37] The resulting pattern of foreign balances depends on both the associated change in US real income and the assumed level of foreign income. For example, if the United States adjusts the deficit on its own, then foreign economies experience a deterioration of their external accounts because of the contraction in US demand for their products. By expanding their economic activity, foreign economies also experience a deterioration of their trade accounts, but in the process they both reduce the degree of adjustment that is needed by the United States and avoid the contraction in their own income that would arise if the United States were the only country adjusting. To examine this sensitivity, the analysis considers two possibilities: no foreign-income response (Case 1) and a foreign-income response (Case 2). These simulations are performed over 1980Q1-1984Q4 and, by construction, they guarantee that the improvement in the US trade account is equal to the historical trade deficit.

The results for Case 1 (table 15) exhibit several features of interest. First, reliance on US income alone to eliminate the US trade deficit requires

---

[37] Although the assumption of an immediate return to external balance is extreme, it is adopted here because it avoids the ambiguities associated with selecting any other target path for the trade account. The framework could also be used to determine the change in the exchange rate required to eliminate the trade deficit, but it is not presented here because of space considerations.

Table 15
Trade Account Effects of
Lowering the US Trade Deficit to Zero
(Deviations from Baseline, billions of US$)

	Years				
	80Q4	81Q4	82Q4	83Q4	84Q4
Case 1: Foreign Income Unchanged					
Trade Account Responses					
Canada	-3.76	-8.64	-11.05	-24.78	-26.18
United Kingdom	-2.27	-3.71	-5.54	-6.98	-9.61
Germany	-2.17	-4.75	-5.24	-9.43	-12.07
Japan	-4.20	-8.15	-9.01	-19.97	-30.82
Industrial	-4.96	-8.22	-9.46	-12.44	-16.43
LDCs	-0.82	-1.45	-1.78	-3.47	-4.50
OPEC	-8.08	-7.87	-5.35	-10.07	-8.52
United States	26.26	42.78	47.44	87.14	108.11
US real GNP[a] (% deviation)	-3.01	-6.76	-9.21	-17.14	-15.90
Case 2: Higher Foreign Income					
Trade Account Responses					
Canada	-4.73	-10.96	-13.48	-29.40	-32.45
United Kingdom	-3.28	-5.83	-7.94	-10.57	-14.84
Germany	-4.26	-7.60	-9.07	-13.95	-15.75
Japan	-5.15	-10.15	-11.71	-23.40	-34.41
Industrial	-5.28	-8.24	-9.51	-10.10	-13.66
LDCs	0.33	0.61	1.01	1.26	2.08
OPEC	-3.90	-0.62	3.27	-0.99	0.92
United States	26.26	42.78	47.44	87.14	108.11
US real GNP[a] (% deviation)	-2.42	-5.37	-6.76	-13.50	-11.39

Note: [a] Entries for US real GNP represent percent deviation from baseline.

a 15 percent fall in US real GNP after five years. Even this sizeable reduction in income is unrealistic because it assumes that prices, exchange rates, and real income in other countries remain unchanged in the face of contraction in US real income--that is, these are partial equilibrium results. To the extent that income in the United States does not adjust to such a level, the model predicts that the process of eliminating the US trade deficit will require a combination of further dollar depreciation, further expansion abroad, higher foreign prices, and lower US prices.[38] Second, the model indicates that the countries absorbing most of this reduction in the US trade deficit are Japan (29 percent), Canada (24 percent), the bloc of other OECD countries (15 percent), and Germany (11 percent).

The case of a foreign-income response (Case 2) is modeled as an increase of 1 percent per year in the growth rate of all non-US countries while US real income adjusts in order to support a zero trade deficit. Based on the simulation results, this foreign expansion raises the level of US real income consistent with balanced trade by 4.5 percent after five years. Intuitively, a foreign expansion raises US exports and improves the trade account. To avoid that surplus, US imports have to increase which implies an increase in US real income. Note that, because income elasticities differ across countries, the trade account effects of faster foreign growth are not the same for all non-US countries: the trade account improves for some countries but deteriorates for others. On balance, however, the non-U.S. balances must weaken. Finally, the foreign expansion alters the degree to which different

---

[38] This paper does not address the question of what combination of dollar depreciation and growth adjustment would be most effective or desirable for reducing the U.S. trade deficit.

countries would absorb the reduction in the US trade deficit. Specifically, the deterioration in the combined trade accounts of Japan, Germany, Canada, and other OECD countries would account for 89 percent of the improvement in the US trade account, compared with 79 percent in the absence of a foreign expansion.[39]

5.2 Quantifying the Uncertainty in the J-Curve.

To quantify the uncertainty surrounding the response of net exports to changes in exchange rates, the analysis defines the J-curve as

$$(8) \qquad \hat{J}_{kt} = NX_k(y_t, \lambda p_{kt}, \hat{u}_{kt}, \hat{\alpha}_k(L)) - NX_k(y_t, p_{kt}, \hat{u}_{kt}, \hat{\alpha}_k(L))$$

$$= J_{kt}(\hat{\alpha}_k(L), \hat{v}_{kt}, \lambda),$$

where $\hat{v}_{kt} = \sum_s (\exp(\hat{u}_{skt}) - \exp(\hat{u}_{kst}))$, λ is the shock to exchange rates, and the dynamic nature of the J-curve is embedded in the lag distribution of the parameter estimates, $\hat{\alpha}_k(L)$. Inspection of (8) reveals that the uncertainty associated with the J-curve stems from parameter uncertainty, $\hat{\alpha}_k(L)$, and model uncertainty, $\hat{v}_k$.

Uncertainty in the response of net exports to changes in exchange rates translates into uncertainty about the length of time required to restore external balance. Specifically, let T_k^* be the number of periods that it takes

---

39 A technical note describing the analytical solution associated with these simulations is available on request. Also, it is possible to examine the effects of a change in the distribution of world income with the level of world income fixed. These simulation results are also available on request.

for the J-curve to cross the "zero" line--that is, $J_{k,T_k^*} = 0$. For a fixed T_k^*, as assumed in the literature, the notion of deficit persistence is formally expressed as $J_{kt} < J_{k,T_k^*} = 0$ for some $t > T_k^*$. Unfortunately, only the estimate of T_k^*, $\hat{T}_k^*$, is known and is given by (8) as $\hat{T}_k^* = T_k(\lambda, \hat{\alpha}_k(L), \hat{v}_{kt})$. Therefore, the adjustment period is a random variable and a comparison between $\hat{T}_k^*$ and t is not informative for determining whether the deficit is persistent because $t \gtrless \hat{T}_k^*$ depending on the realizations of $\hat{\alpha}_k$ and $\hat{v}_{kt}$.[40]

From a policy standpoint, however, the question is not whether $\hat{T}_k^*$ is literally fixed, but how sensitive it is to alternative realizations of elasticity estimates and residuals. If the crossing date were to exhibit a large range of variation in response to these alternative realizations, then this evidence would indicate that the data do not permit identifying the adjustment date with any precision and, therefore, that it is not possible to establish whether the US trade deficit is persistent.

One difficulty in addressing this issue is that $\hat{J}_k$ is a nonlinear function, which complicates the derivation of analytical expressions for its moments. To bypass this difficulty, the paper performs Monte Carlo simulations that permit estimating the relative importance of parameter uncertainty and model uncertainty in accounting for the overall uncertainty of $\hat{J}_k$. Specifically, to evaluate the uncertainty associated with the residuals, this paper applies a 50 percent exchange rate shock ($\lambda = 1.5$) while simultaneously drawing random values for the residuals from their joint

---

[40] Note that $E(\hat{T}_k^*) \neq T_k[\lambda, E(\hat{\alpha}_k(L)), E(\hat{v}_{kt})]$ because $\hat{T}_k^*$ is a nonlinear function of its arguments.

density function.[41] The values of u_{kst} are drawn following the discussion in section 4; there are 50 drawings for each residual in the model and for each period from 1980Q1 to 1984Q4. The value of $\hat{J}_{kt}$ associated with the τth drawing of the residuals is

$$(9) \qquad \hat{J}_{kt\tau} = J_k(\lambda, \hat{\alpha}_k(L), \hat{v}_{kt\tau}) = \hat{J}_{kt\tau}(\lambda),$$

and the associated mean and 95 percent confidence interval, for each period, are

$$(10) \qquad \left\{ \begin{array}{l} \hat{J}^e_{kt}(\lambda) = [\Sigma_\tau \hat{J}_{kt\tau}(\lambda)]/50, \\ \{\hat{J}^e_{kt}(\lambda) - 2\sqrt{\hat{\mathrm{var}}_\tau[\hat{J}_{kt\tau}(\lambda)]}, \quad \hat{J}^e_{kt}(\lambda) + 2\sqrt{\hat{\mathrm{var}}_\tau[\hat{J}_{kt\tau}(\lambda)]}\}, \end{array} \right.$$

respectively. Figure 2 plots the time series for both the mean and the 95 percent confidence interval for the J-curve of the United States. For comparison purposes, the figure also shows the deterministic J-curve--that is, $\hat{J}^d_{kt} = J_k(\lambda, \hat{\alpha}_k(L), 0)$.

The evidence reveals several features of interest. First, the initial deterioration of nominal net exports ranges from \$30 billion to \$90 billion, at annual rates. After one year, nominal net exports improve and the range of uncertainty declines considerably, but it does not vanish and generally

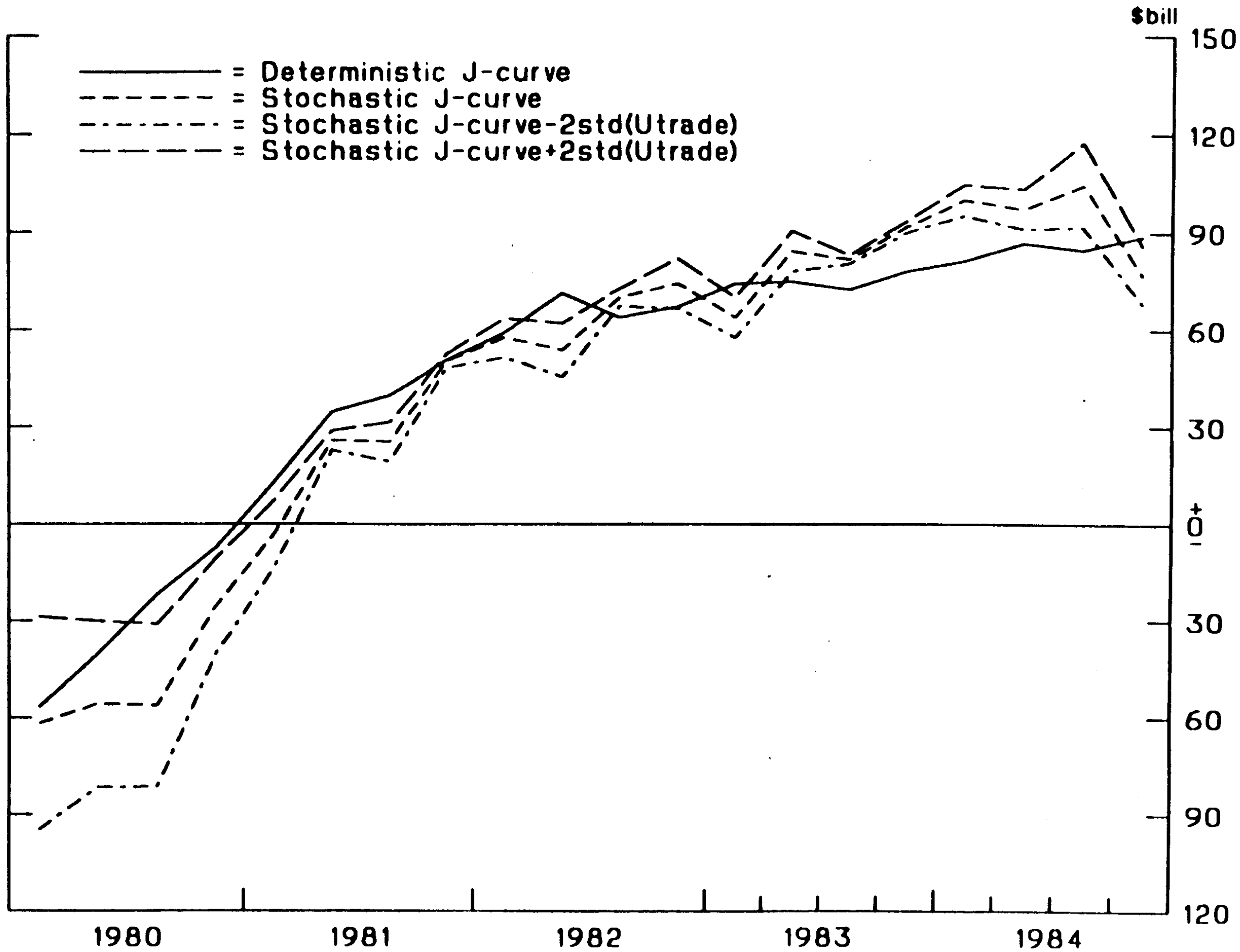
---

[41] For this purpose, it is important to note that the estimator of the variance of the residuals is statistically independent from the estimator of α; this independence justifies shocking both the residuals and the parameter estimates.

Figure 2

Uncertainty of Exchange Rate Effects

Response of the Nominal U.S. Merchandise Trade Account



U.S. dollar depreciates 50% against all currencies involves several billion dollars. Second, despite this uncertainty in the initial response, model uncertainty does not induce a large dispersion of crossing dates, which range between four and five quarters. In other words, $\hat{T}^*_{us}$ is robust to alternative realizations of model residuals. Finally, there are important differences between the deterministic J-curve and the mean of the stochastic J-curve, a difference due to the presence of nonlinearities.

To quantify the uncertainty associated with $\hat{\alpha}_k$, the paper applies an exchange rate shock while drawing alternative values for the parameter estimates from their distribution. Specifically, let $\hat{J}_{kt\epsilon}$ be the value of $\hat{J}_{kt}$ associated with the ϵth drawing of $\hat{\alpha}_k$, $\hat{\alpha}_{k\epsilon}$, where $\hat{\alpha}_{k\epsilon}(L) = (1+\Psi)\hat{\alpha}_k(L)$, with Ψ=0.1, 0.2, -0.1, and -0.2. All of these elasticity shocks are within one standard deviation of the point estimates of these elasticities (see table 4). Figure 3 shows the effects of these parameter changes for the J-curve of the United States.[42] Based on the evidence, a 20 percent reduction in the own-price elasticity (an increase in the associated absolute value) could increase the effect of a 50 percent depreciation by as much as \$60 billion, at an annual rate. A 20 percent increase in the own-price elasticities, on the other hand, dampens the improvement of the depreciation by approximately \$60 billion, at an annual rate. This symmetry of the J-curve to parameter changes is also present for a 10 percent change in parameters.

Associated with these parameter changes there is a dispersion of crossing dates, $\hat{T}^*_{us}$. To estimate this dispersion, figure 4 presents the J-curves

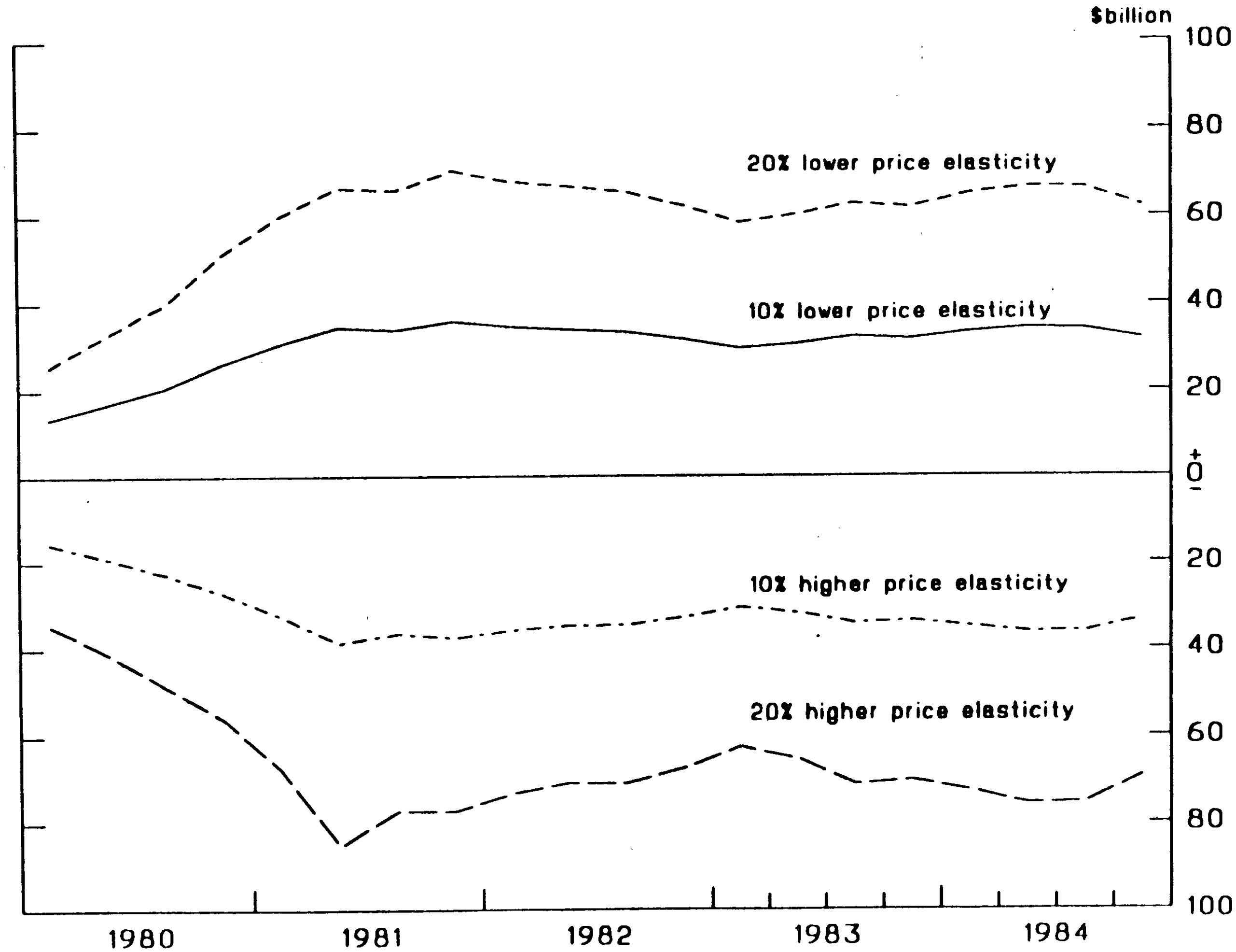
---

[42] The baseline for these comparisons is the J-curve for a 50 percent depreciation without parameter changes--that is, figure 3 shows $J_{kt}(\lambda,\Psi) - J_{kt}(\lambda, \Psi=0)$. This method allows for uncertainty about both initial and terminal conditions.

Figure 3

Effect of Parameter Uncertainty on the J-Curve: United States

Deviations from 50% Exchange Rate Shock with no Parameter Change



associated with each of these parameter changes. The evidence reveals two features. First, the adjustment period of net exports is subject to a wide range of variation with crossing dates varying from 1 to 12 quarters depending on the parameter shock.[43] Second, the response of the crossing date to the change in the own-price elasticity is not symmetrical. Relative to the case of no parameter change, a 20 percent reduction in the (actual) price elasticity shortens the adjustment period by 2 quarters whereas a 20 percent increase lengthens it by 8 quarters. To the extent that an appreciation of the dollar displaces domestic production, there is a reduction in the own-price elasticity for imports and exports which, based on these results, lengthens the adjustment period associated with a dollar depreciation.

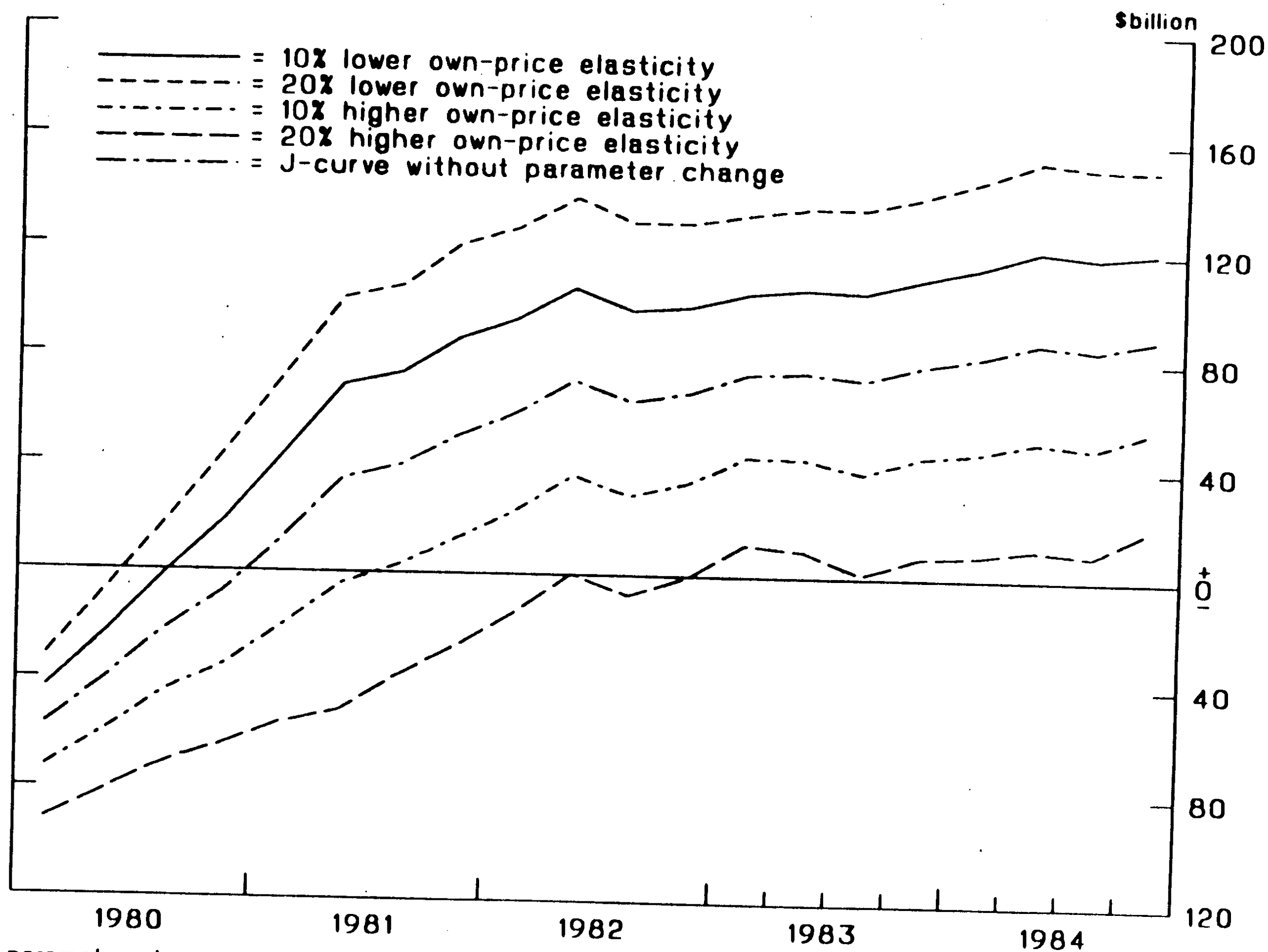
As it stands, the evidence suggests that the crossing date is more sensitive to parameter uncertainty than to model uncertainty and that the assumption of a fixed crossing date, as required by the literature on deficit persistence, is not supported by the data.

---

[43] This dispersion of crossing dates assumes that prices and incomes are exogenous. Allowance for endogenous responses of income and prices to the dollar depreciation is likely to exacerbate the associated uncertainty. Note that the probability that all of the US own-price elasticities change <u>simultaneously</u> by a given magnitude might be small. There is ongoing research to relax this limitation via stochastic simulations.

Figure 4

The J-Curve and Changes in Own-Price Elasticity: United States
50% Depreciation of the Dollar



parameter changes begin in 1980Q1 and are maintained until 1984Q4

6. Conclusions

This paper builds, estimates, and simulates a world trade model to study how the pattern of external imbalances responds to changes in income and prices. The econometric estimation of the associated income and price elasticities reveals a substantial dispersion of bilateral elasticities, confirms the findings of Houthakker and Magee (1969), and cannot reject the Marshall-Lerner condition.

Based on simulations of this model, the analysis finds that reliance on foreign expansion to eliminate a trade deficit of the size recorded by the United States in the mid 1980s requires extremely implausible increases in foreign growth rates. Similarly, eliminating this deficit through US growth alone would entail substantial losses in income. Finally, and in line with earlier studies, the paper finds that changes in relative prices have played the central role in the development of external imbalances during the 1980s. As a result, it seems that a depreciation of the dollar must play a major role in the process of eliminating US external imbalances.

The paper also quantifies the uncertainty associated with the response of US net exports to exchange rate changes. The findings indicate that the initial response of US net exports is subject to a wide margin of variation ranging between $30 and $90 billion, at annual rates. In addition, the paper finds that small changes in own-price elasticities induce a large range of variation in the adjustment period of US net exports to a given exchange rate shock. Uncertainty about the adjustment period translates, in turn, into uncertainty about the persistence of the US trade deficit.

Appendix A

Tests of Functional Form

Equation (1) is formulated in terms of the logarithms of the variables of interest. This formulation is very convenient because it provides a quick interpretation of the parameter estimates and because of its relatively good fit of the data.

To determine whether the data support the use of a double-logarithmic formulation, the paper performs Box-Cox tests in which the variables of (1) are re-defined as

$$\underline{M}_{ks} = (M_{ks}^{\lambda} - 1)/\lambda,$$
$$\underline{P}_{ks} = (P_{ks}^{\lambda} - 1)/\lambda,$$
$$\underline{P}_{kq} = (P_{kq}^{\lambda} - 1)/\lambda,$$
$$y_k = (y_k^{\lambda} - 1)/\lambda,$$

where λ is the Box-Cox parameter. If λ is zero, then (1) should be expressed in terms of the logarithms of the variables; if $\lambda = 1$, then (1) should be expressed as linear function of the levels of the variables involved.

To test for $\lambda=0$, the paper substitutes the above definitions into (1) (without logs) and performs a series of log-likelihood ratio tests where the log-likelihood function is constructed as (Khan and Ross, 1977)

$$L(\lambda) = -(T/2)\ln\hat{\sigma}^2(\lambda) + (\lambda-1)\textstyle\sum_t \log M_{kst}, \quad t=1,\ldots, T.$$

The log-likelihood ratio test is constructed as $\theta = L_{max}(\lambda) - L(\lambda=0)$ where L_{max} is the maximum value of likelihood function over the possible values of λ and $\theta \sim (1/2)\chi^2$ with one degree of freedom.

The results (Table A1) are based on a search over values of λ ranging from minus one to plus one with a step size of 0.1; out of 56 cases, only 13 specifications reject the hypothesis that $\lambda=0$. Despite this strong support for the logarithmic formulation, some of these tests are not particularly powerful. For example, table A1 presents the value of λ that maximizes the log-likelihood function. The results reveal very flat likelihood functions, as evidenced by the large values for the maximizing λ that cannot reject the hypothesis of $\lambda=0$. Of the 43 cases that support the logarithmic formulation, 17 have seemingly large values for lambda, which is indicative of low statistical power to discriminate between alternative functional forms.

Table A1
Box-Cox Tests for Functional From:
Log-Likelihood Ratio

EXPORTING COUNTRY	IMPORTING COUNTRY Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	--	0.38	1.28	1.43	4.60	1.05	0.73	3.82
maxλ	--	0.45	1.05	0.85	-0.75	0.95	0.45	0.75
Germany	1.55	--	0.00	0.00	0.04	0.87	0.57	0.05
maxλ	0.75	--	0.00	0.00	-0.15	-0.45	0.75	-0.15
Japan	0.00	0.43	--	0.05	0.17	4.05	3.75	0.23
maxλ	0.00	0.15	--	0.15	-0.15	0.95	-0.55	0.15
UK	0.29	3.22	0.00	--	0.97	0.17	0.00	0.39
maxλ	0.45	-0.45	0.00	--	0.45	-0.25	0.05	-0.55
US	0.52	2.70	0.84	0.50	--	0.00	2.42	0.54
maxλ	0.05	-0.95	0.95	-0.35	--	0.00	-0.95	-0.45
Ind	0.00	0.20	2.48	0.03	2.52	--	0.00	0.64
maxλ	0.00	0.35	1.05	0.15	-0.45	--	0.00	-0.35
LDCs	0.00	0.00	2.22	0.26	0.30	0.21	--	0.08
maxλ	0.00	0.00	0.75	-0.75	-0.15	-0.15	--	0.15
OPEC	21.34	0.76	2.34	2.37	1.33	0.21	1.55	--
maxλ	0.75	0.25	1.05	0.15	0.45	-0.15	-0.95	--

For a given bilateral trade flow, the top entry represents the log-likelihood ratio test and the second entry represents the value of λ that maximizes the likelihood function. If the likelihood ratio test is greater than 1.92, then reject hypothesis that $\lambda = 0$.

Appendix B

Simultaneity Biases and Single Equation Estimation

B.1 Recursiveness in Trade

To explore the reason for the similarity between the 2SLS and the OLS estimates, the paper examines whether the demand-supply system is recursive because in this case FIML and OLS give the same parameter estimates. To that end, the analysis estimates a simple import supply equation as

$$\text{(B1)}\quad \ln P_{kst} = \beta_0 + \beta_1 \ln(P_{oil} / (e_k P^*_{yk}))_t + \beta_2 \ln(P^*_s / P^*_{yk})_{t-1} + \beta_3 M_{skt} + v_{kst}\ .$$

The first relative price captures supply shocks whereas the second relative price measures the opportunity cost of selling abroad relative to selling at home. If estimated simultaneously with (1), these two relative prices would identify the import demand schedule.

Based on this import supply equation, the system is recursive if $\beta_3=0$ and $cov(u_{ks}, v_{ks})=0$. The results (Table B1) indicate that the data do not violate these two conditions in 45 out of 56 cases. For the remaining 11 cases, reliance on ordinary least squares might introduce a simultaneity bias.

B.2 Super exogeneity

B.2.1 Processes for Conditioning Variables

Greatly simplified, a conditioning variable is said to be super exogenous both if the parameters characterizing its marginal density are not constant over time and the parameters of the conditioning model (the bilateral import equation) are constant (Engle, Hendry, and Richard, 1983).

In this paper, the conditioning variables are the export prices, GNP deflators, the exchange rates, and the levels of income. To determine whether their marginal densities exhibit parameter constancy, the following processes are postulated for Canada, Germany, Japan, the United Kingdom, and the United States:

$$\ln y_k = \gamma \ln G_{k,t-1} + \mu \ln(L_{k,t-2}/ P_{k,t-1}),$$
$$\ln P_k^* = \gamma \ln G_{k,t-1} + \mu \ln(L_{k,t-2}/ P_{k,t-1}),$$
$$\ln P_{yk}^* = \gamma \ln G_{k,t-1} + \mu \ln(L_{k,t-2}/ P_{k,t-1}),$$
$$\ln e_k = \gamma \ln G_{k,t-1} + \mu \ln(L_{k,t-2}/ P_{k,t-1}),$$

where G_k is the level of real government purchases, and L_k is the level of money supply, which is being deflated by the overall absorption price index. For the three country blocs (OPEC, LDCs, and other industrial) there are no aggregate data for either government purchases or the money supply. Thus their government purchases are proxied by US government purchases and the money supply is proxied by the average value of the dollar.

The parameters of these processes are estimated with the Brown-Durbin-Evans recursive estimation algorithm starting in 1975Q1 and ending in 1985Q2; the first 8 observations (1973Q1-1974Q4) are reserved for the first estimate of these parameters. The time-series for each parameter (γ and μ) as well as its 95 percent confidence interval are shown in figures B.1-B.12. The evidence confirms the presence of structural changes in the processes determining the conditioning variables. This evidence, coupled with the results on Chow tests for the conditioning model (Table 12), supports the notion that these conditioning variables are super exogenous and thus can be taken as exogenous for estimation of bilateral trade equations.

B.2.2 Sequential Chow Tests

The Chow tests of Table 12 might be sensitive to the choice of 1973 as the cut-off date. To examine this possibility, the analysis estimates the parameters of (1) with the Brown-Durbin-Evans recursive estimator and uses the one-period ahead forecast error to perform sequential Chow tests. The estimation uses 1973Q1-1976Q4 as the initial sample.

The probability of rejecting the null hypothesis of parameter constancy is prob($F(1, T_j\text{-}K) < F_{ct}$), where $F_c = [(T_j\text{-}K)\hat{u}^2_{T_j} + 1]/\Sigma_j \hat{u}^2_j$ for j=1977Q1...T_j, and T_j=1977Q2...1985Q2. Figures B.13-B.20 display the time series for this probability for each of the bilateral trade equations.

Given the number of parameters estimated and the presence of response-delays in trade flows, a one-period ahead forecast error might not be powerful enough to detect changes in the parameters. Thus this analysis uses a 0.25 significance level as a criterion to reject the null hypothesis of parameter constancy. Out of the 56 equations, 14 fail to exhibit constant parameters (5 in Japan, 4 in Canada, 2 in LDCs, and 1 in Germany, the United Kingdom, and the United States). Although this evidence does not constitute a widespread rejection of super exogeneity, the number of violations is sufficiently large to suggest that these results are preliminary.

Table B1
Evidence on Recursiveness:[f]
Bilateral Trade Equations

EXPORTING COUNTRY	IMPORTING COUNTRY: Can	Ger	Jap	UK	US	Ind	LDCs	OPEC
Canada	---	-1.23 0.21	-0.95 -0.01	-0.41 -0.26	0.28 0.23	0.21 -0.11	0.51 -0.11	-0.57 -0.11
Germany	-2.24 -0.001	---	-1.74 0.17	-2.78 -0.14	-1.01 -0.07	-3.78 0.05	-2.67 -0.11	-0.71 0.26
Japan	-1.62 -0.07	-1.35 -0.33	---	-0.22 -0.24	-0.70 -0.13	-1.15 0.09	0.15 -0.22	-2.78 0.01
UK	-0.50 -0.13	0.28 -0.20	0.62 -0.40	---	1.67 -0.34	-1.57 -0.12	-1.27 0.02	-3.19 -0.24
US	-3.32 0.089	-1.28 0.15	-2.57 0.12	-0.87 -0.19	---	0.22 -0.18	-0.67 -0.19	-1.31 0.27
Ind.	-0.54 0.33	1.14 0.04	-1.01 -0.09	-2.45 0.05	-0.66 0.10	---	-0.85 -0.08	-4.34 -0.09
LDCs	-1.65 0.33	-0.75 0.13	-0.69 -0.14	0.32 0.33	-0.83 0.37	2.22 -0.12	---	0.44 -0.17
OPEC	0.22 -0.14	0.33 0.02	1.24 -0.13	1.04 -0.02	0.62 -0.13	-0.22 0.01	-0.68 0.23	---

[f] For a given bilateral trade flow, the top entry is the t-statistic for the volume of exports in the price equation (B1); the bottom entry is the correlation coefficient between the estimated residuals of (1) and those of (B1).

Figure B1

95% Confidence Interval for Coefficient

on Canadian Government Purchases

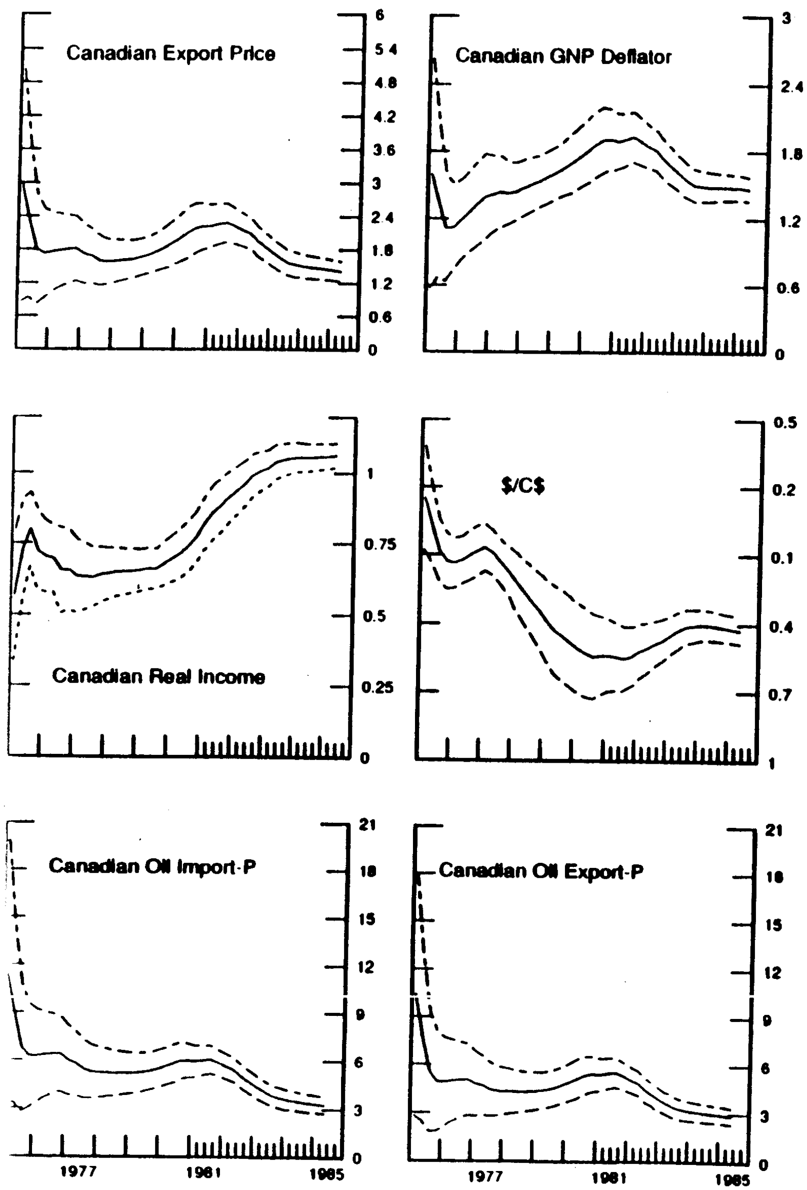


Figure B2

95% Confidence Interval for Coefficient

on Canadian Real Money Supply

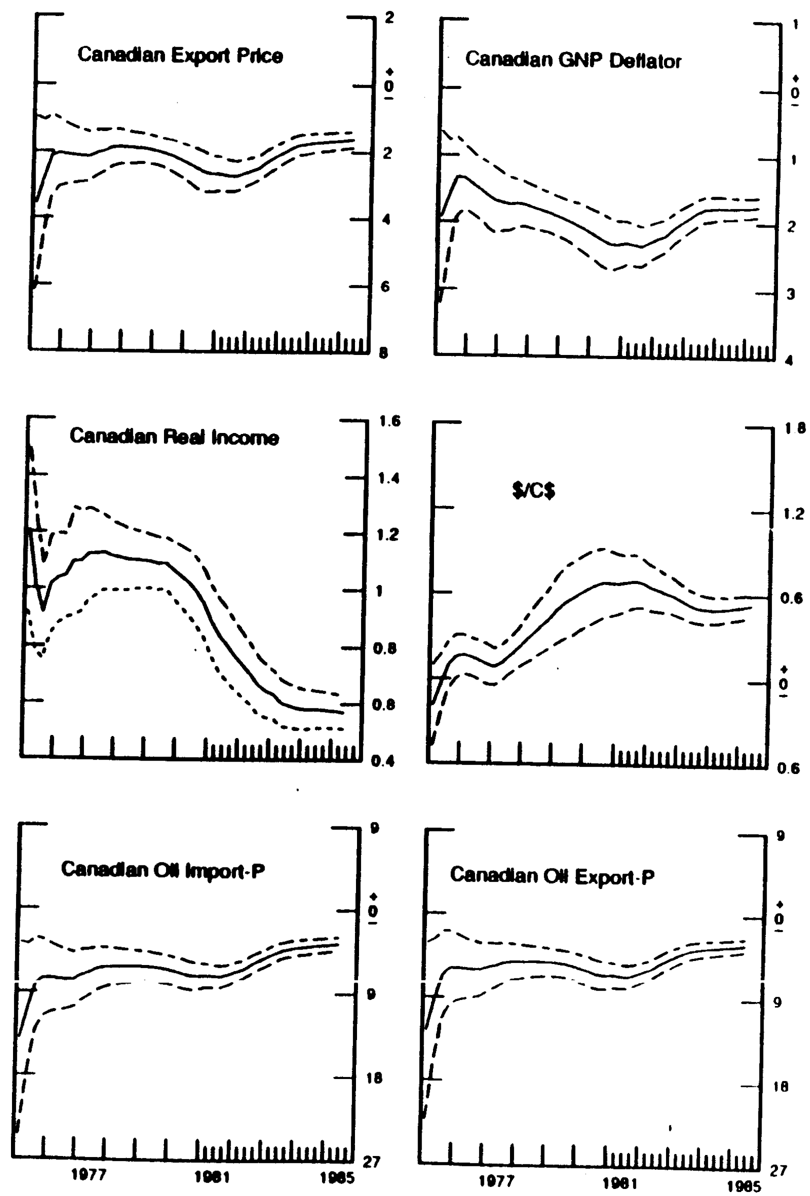


Figure B3

95% Confidence Interval for Coefficient
on German Government Purchases

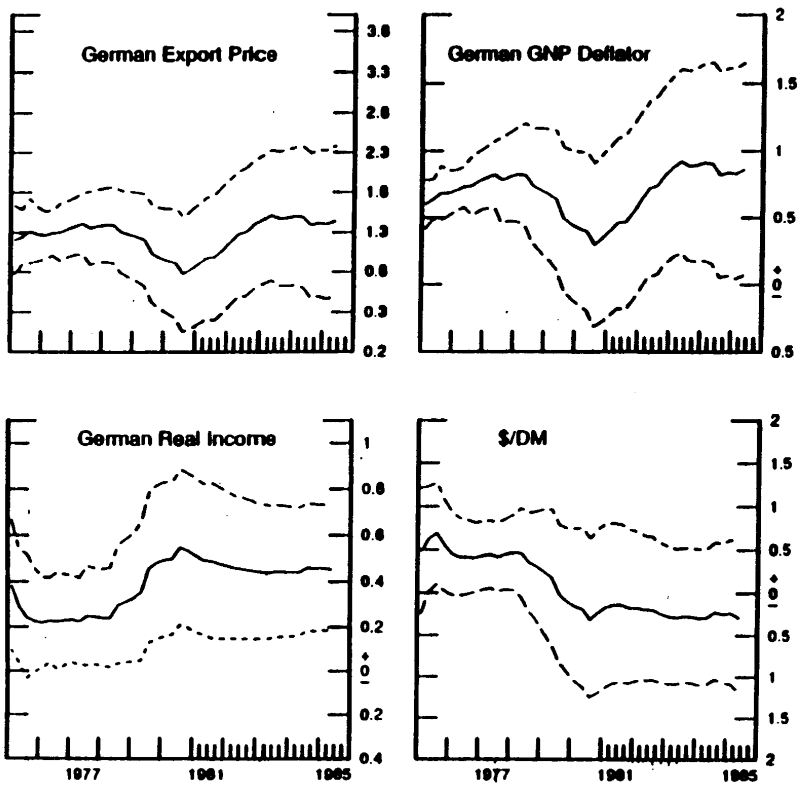


Figure B4

95% Confidence Interval for Coefficient
on German Real Money Supply

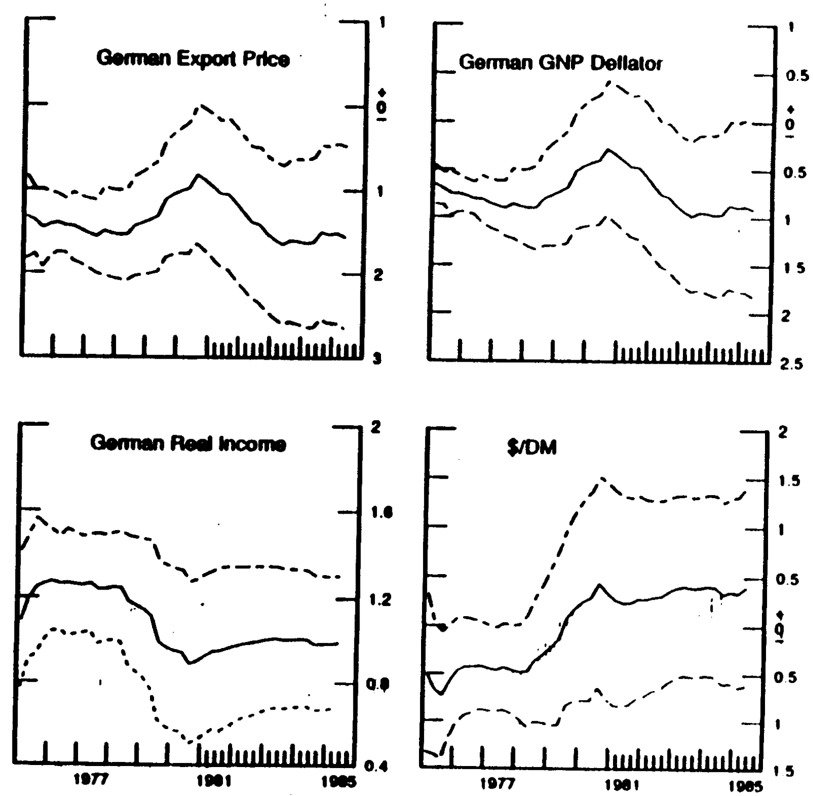


Figure B5

95% Confidence Interval for Coefficient
on Japanese Government Purchases

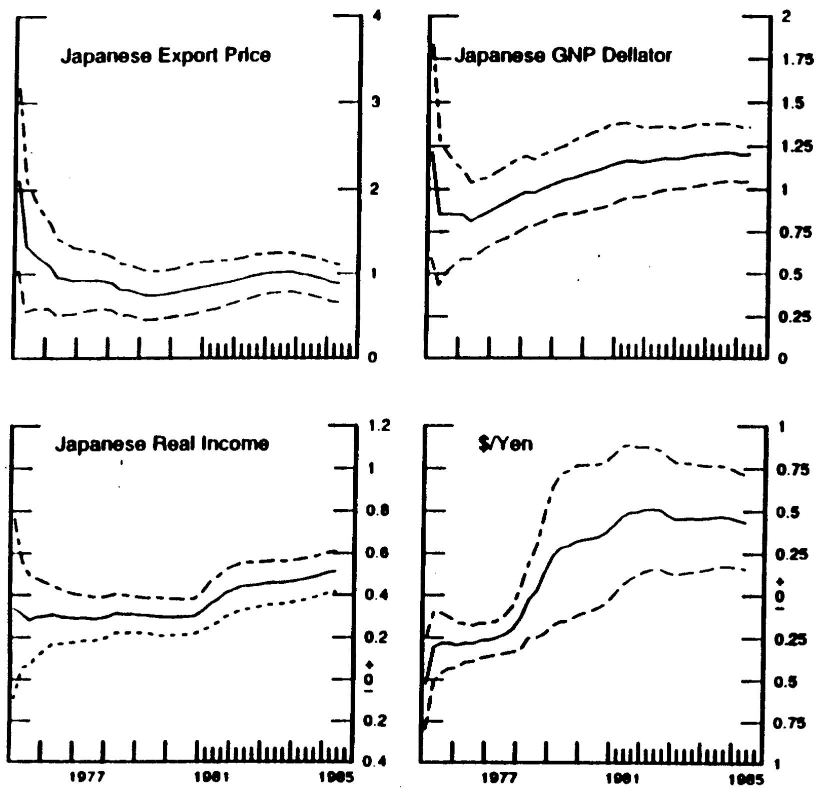


Figure B6

95% Confidence Interval for Coefficient
on Japanese Real Money Supply

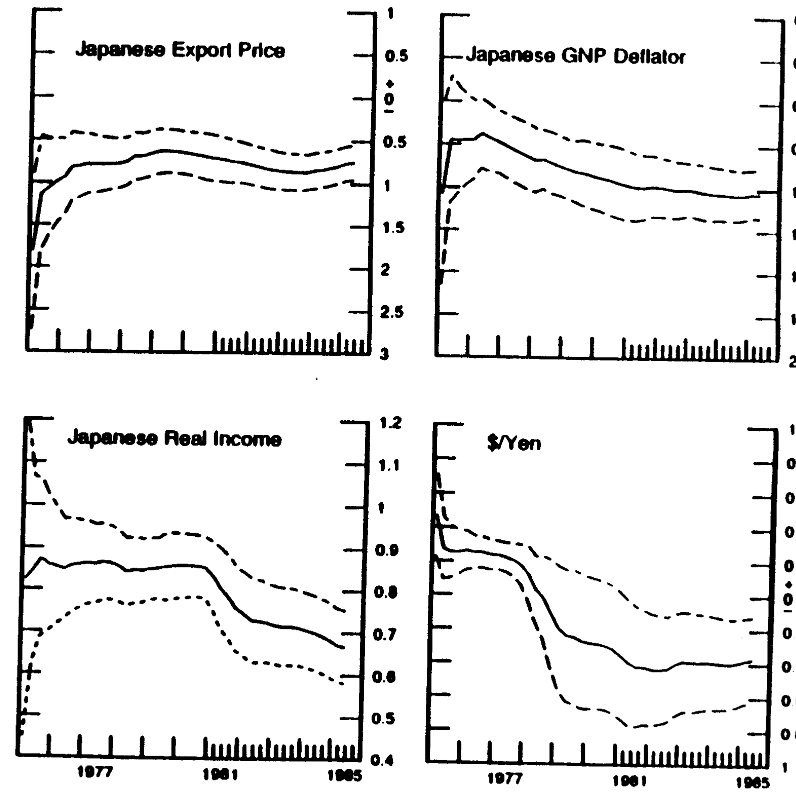


Figure B7

95% Confidence Interval for Coefficient on U.K. Government Purchases

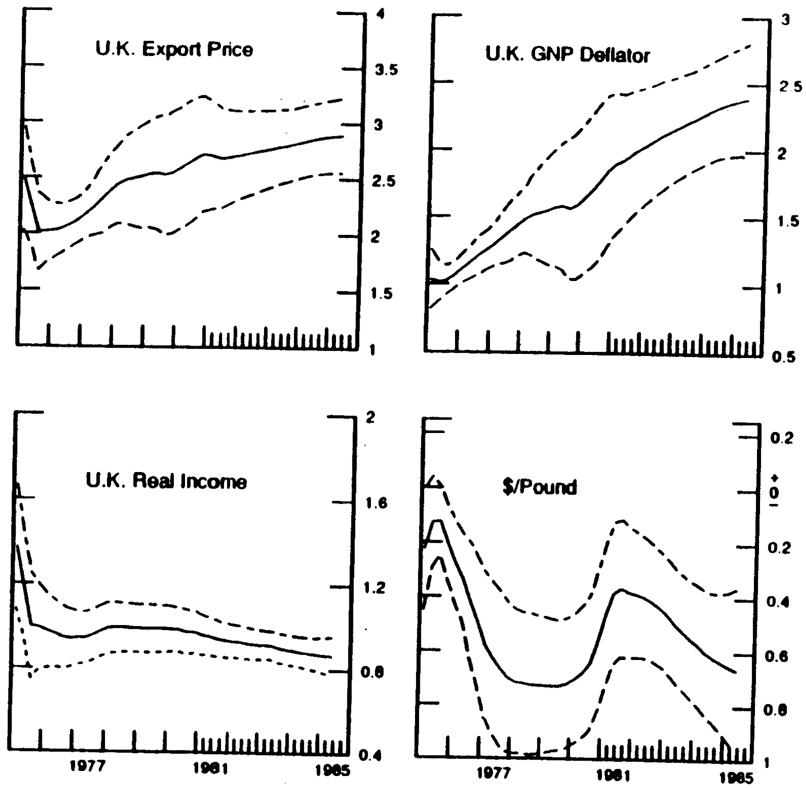


Figure B8

95% Confidence Interval for Coefficient on U.K. Real Money Supply

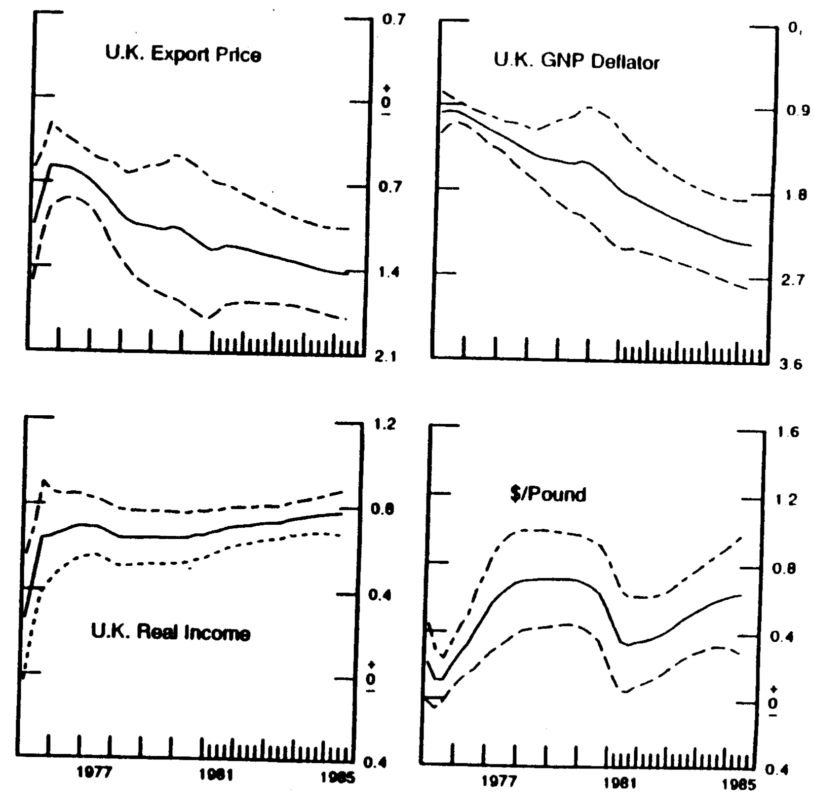
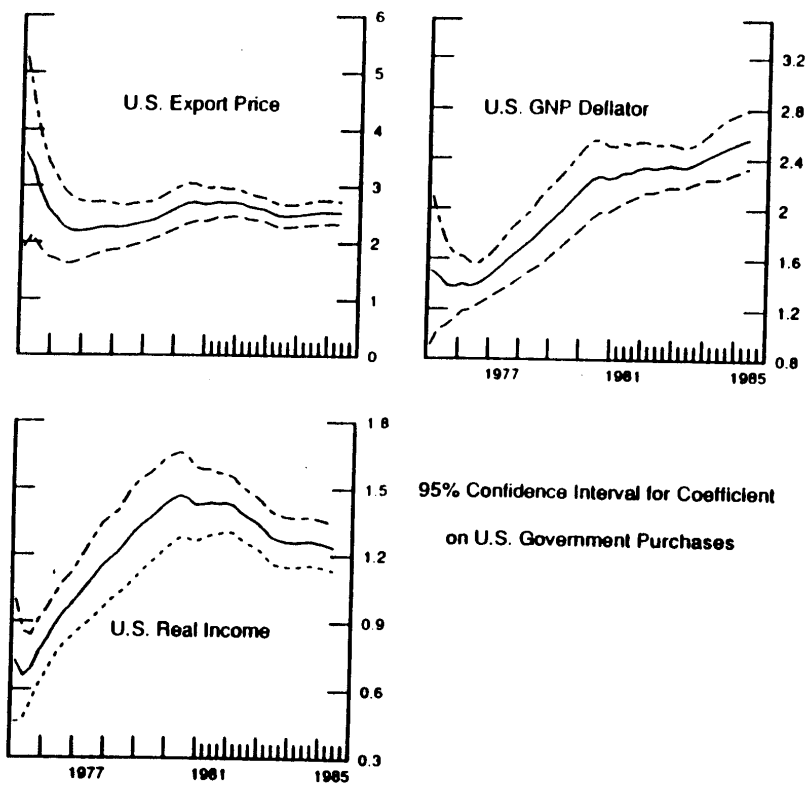
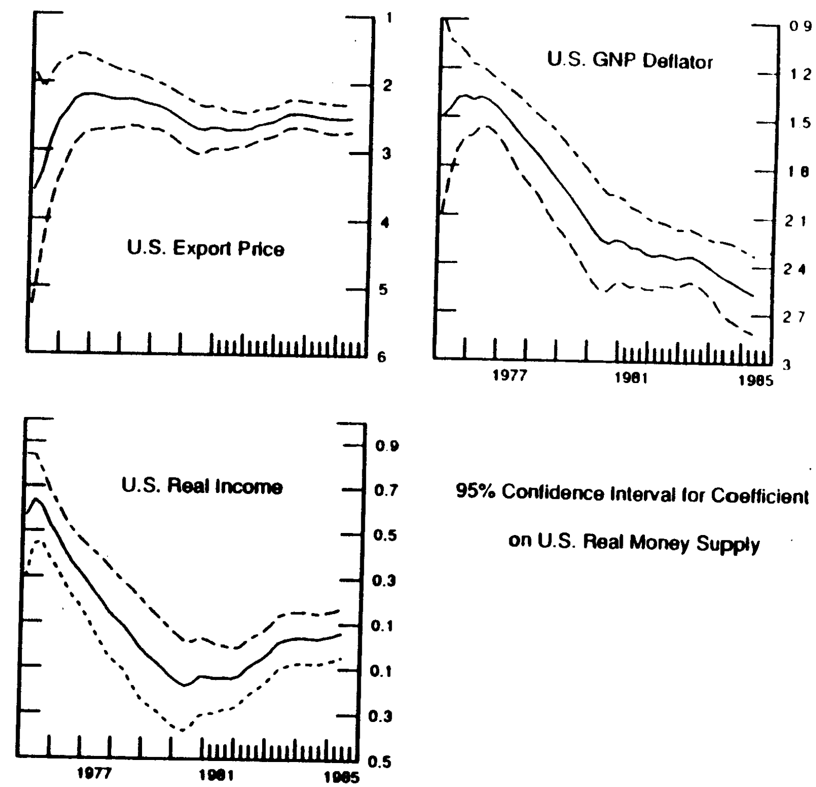


Figure B9



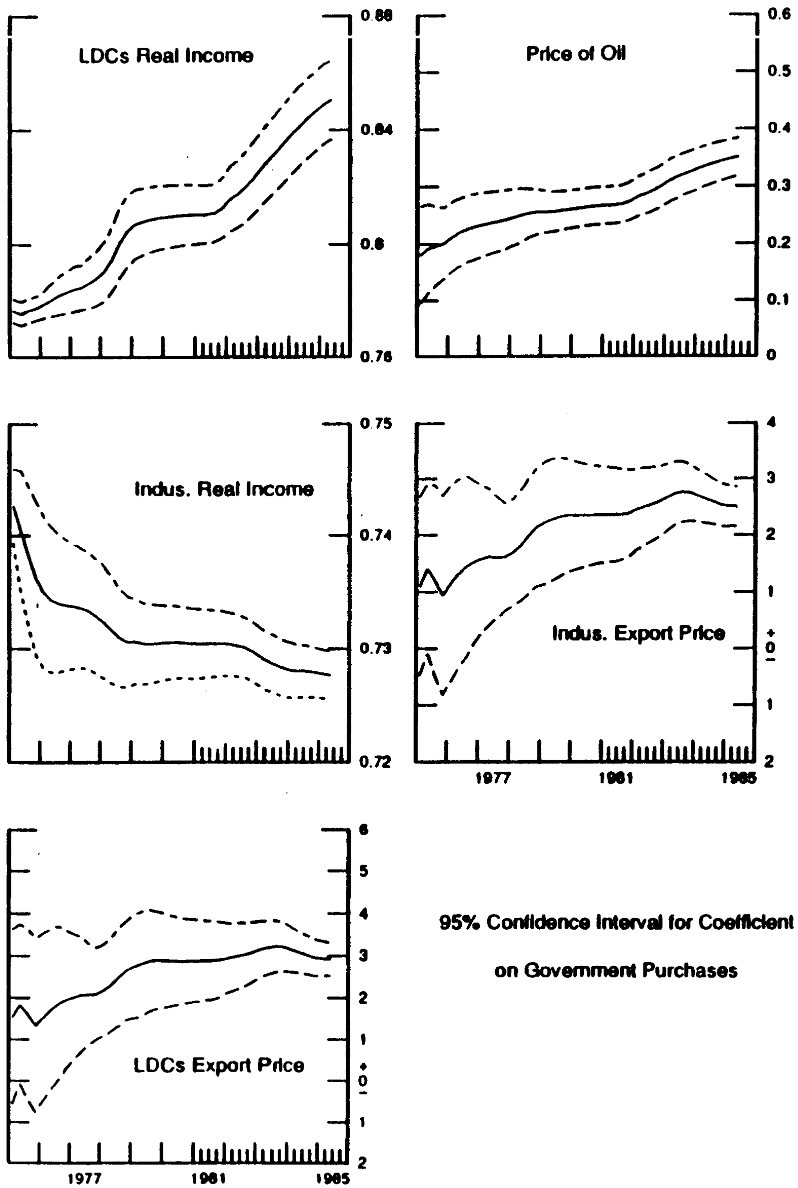
95% Confidence Interval for Coefficient
on U.S. Government Purchases

Figure B10



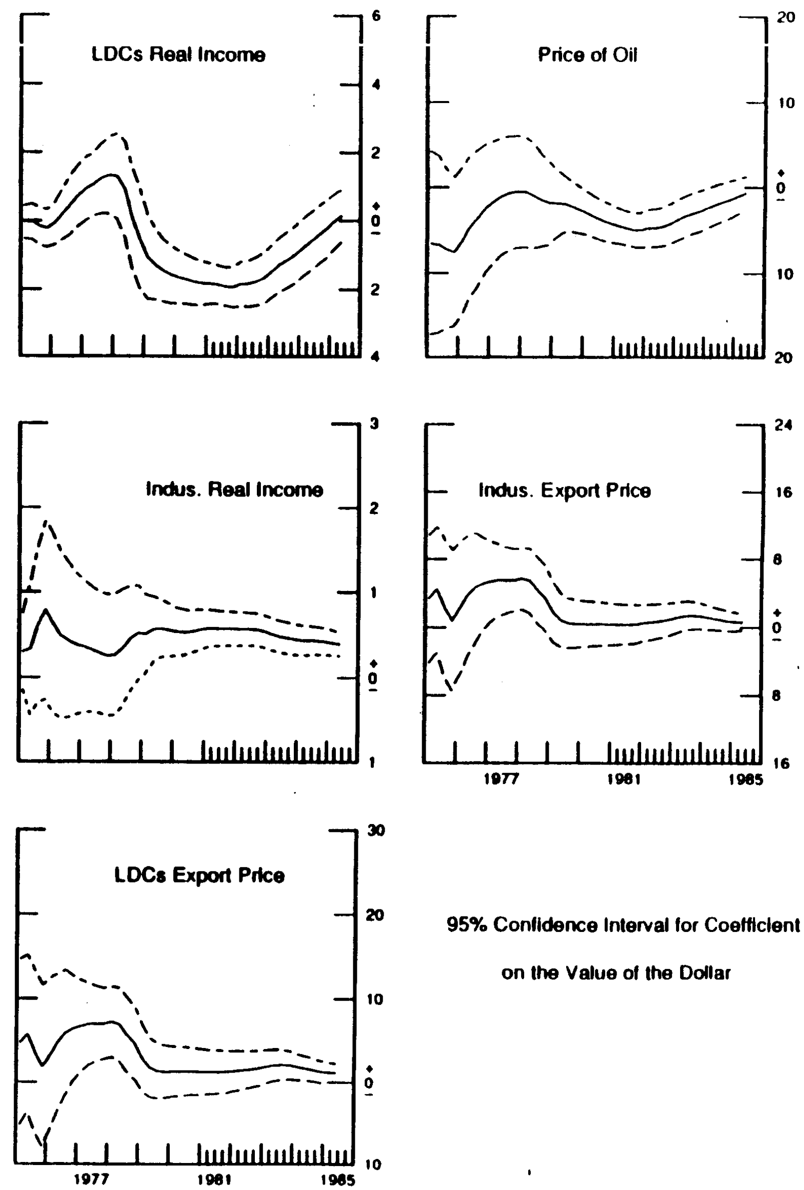
95% Confidence Interval for Coefficient
on U.S. Real Money Supply

Figure B11



95% Confidence Interval for Coefficient on Government Purchases

Figure B12



95% Confidence Interval for Coefficient on the Value of the Dollar

Figure B13

Probability of Rejecting Parameter Constancy

Sequential One-Period Ahead Chow-Tests: Canada

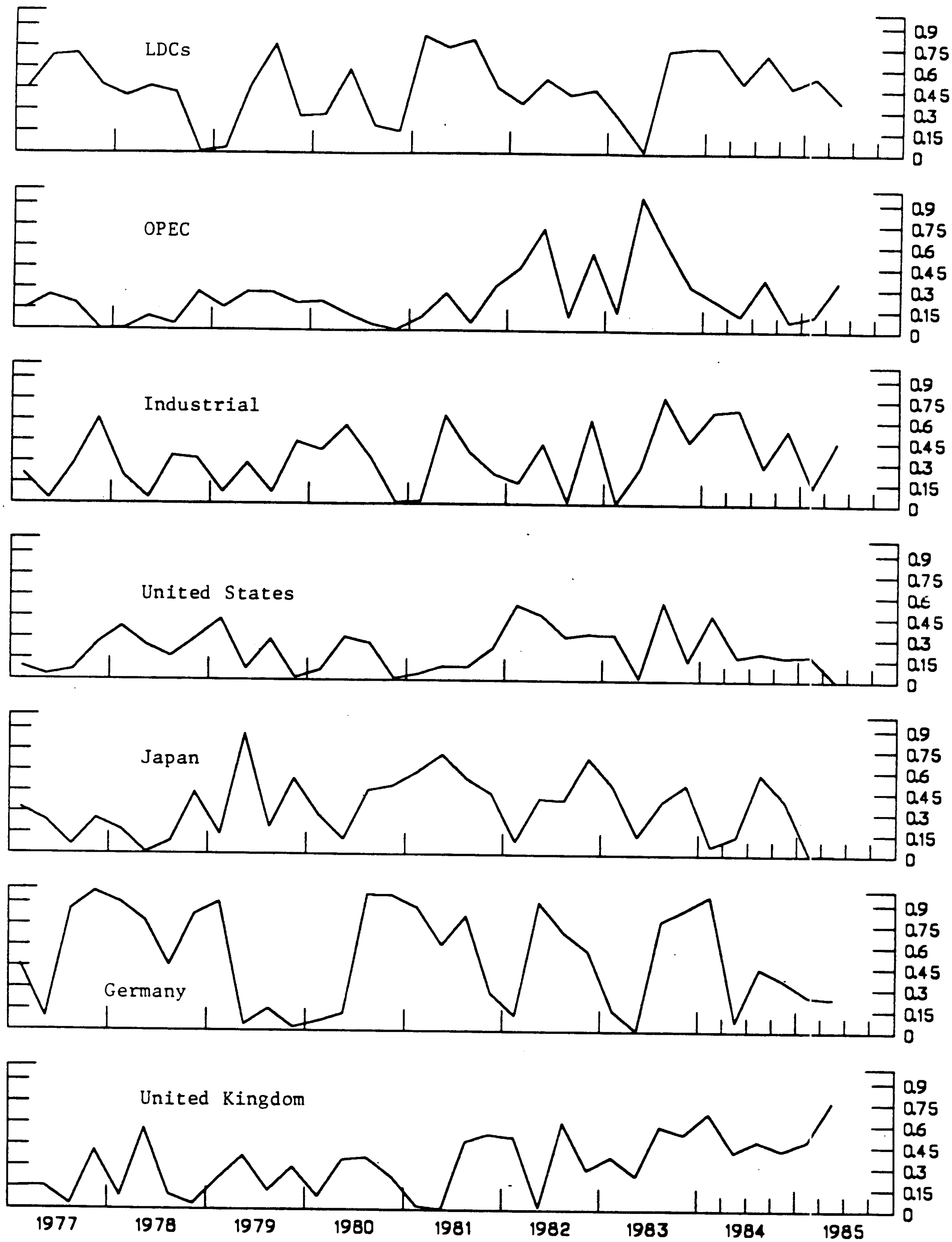


Figure B14

Probability of Rejecting Parameter Constancy

Sequential One-Period Ahead Chow-Tests: Germany

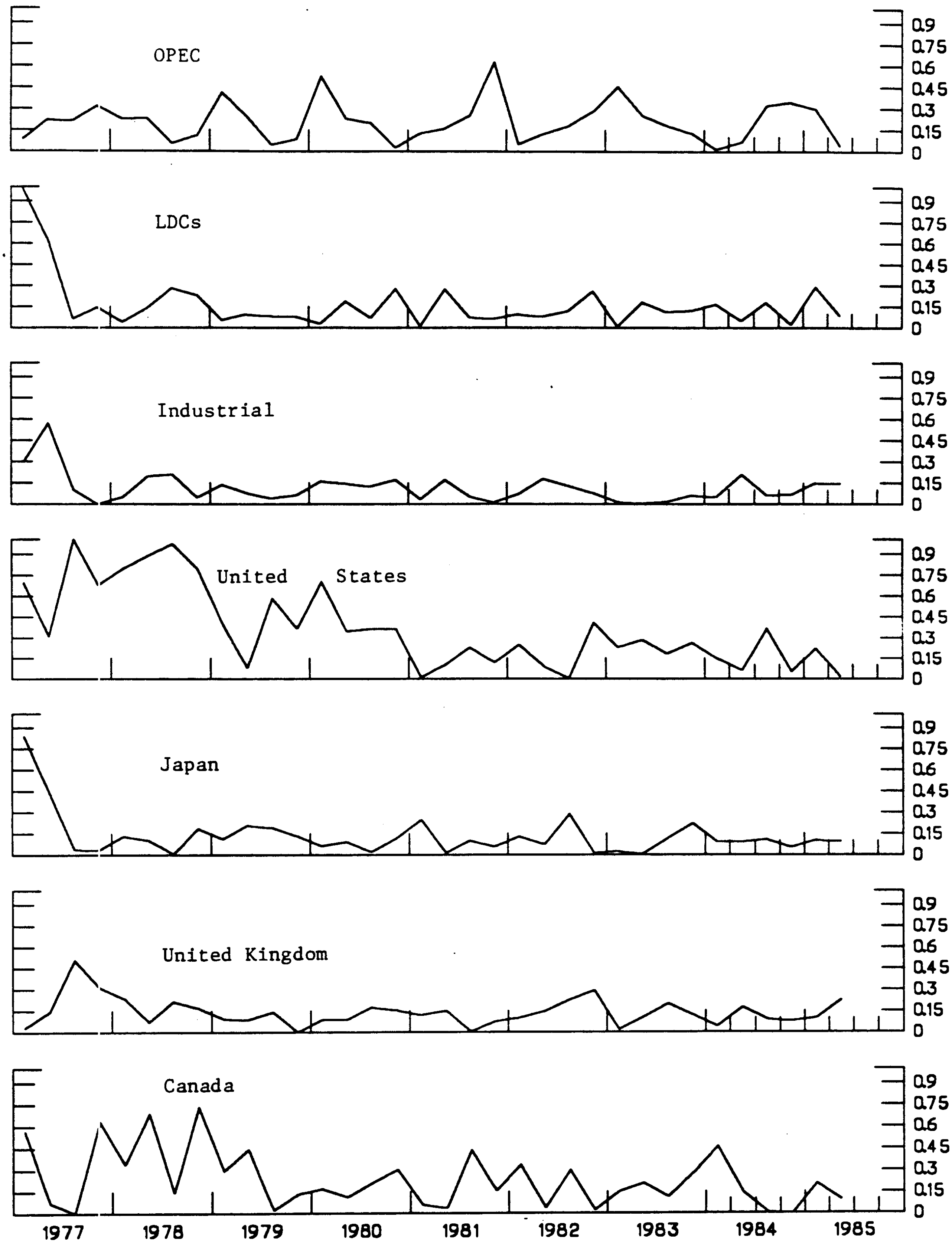


Figure B15

Probability of Rejecting Parameter Constancy

Sequential One-Period Ahead Chow-Tests: Japan

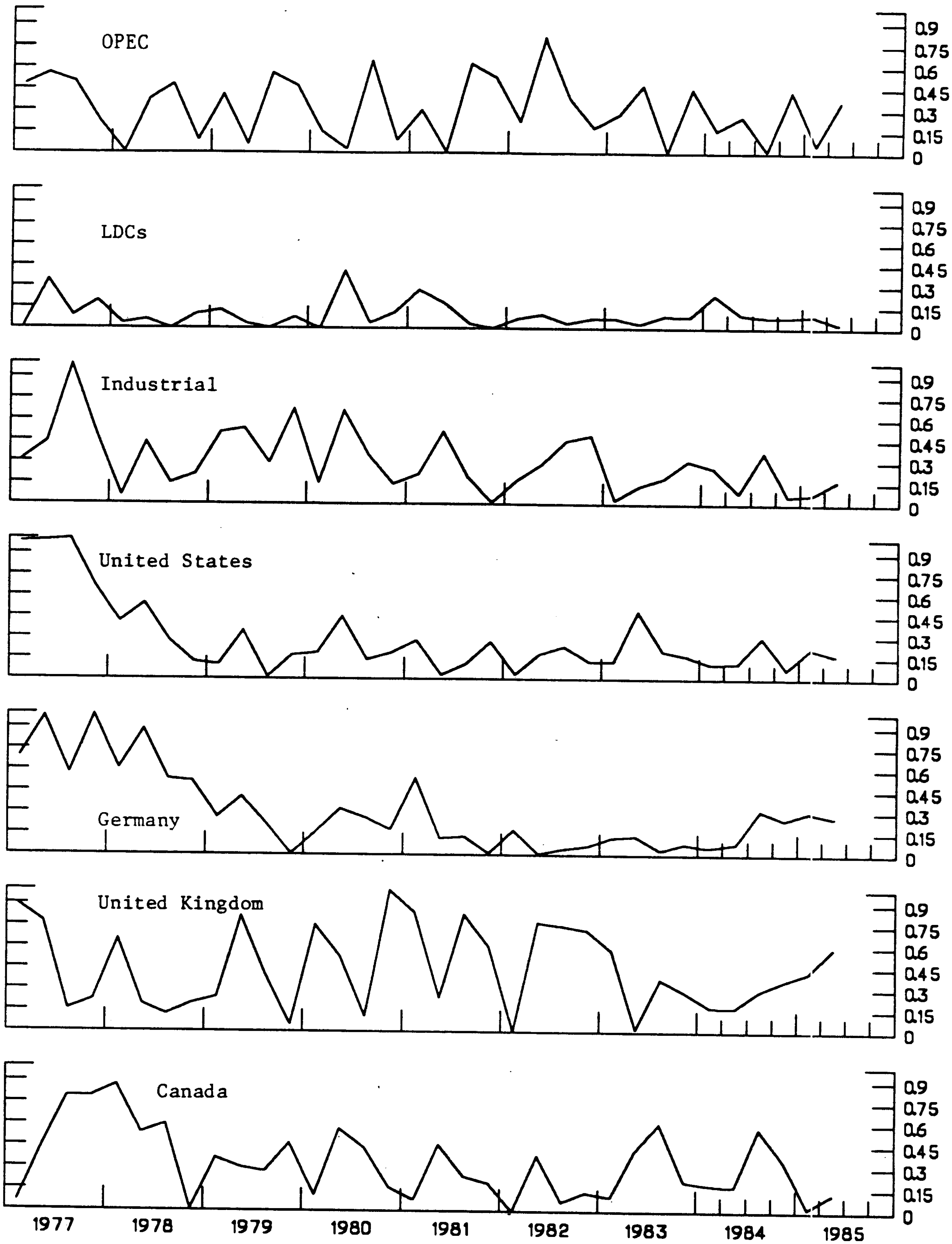


Figure B16

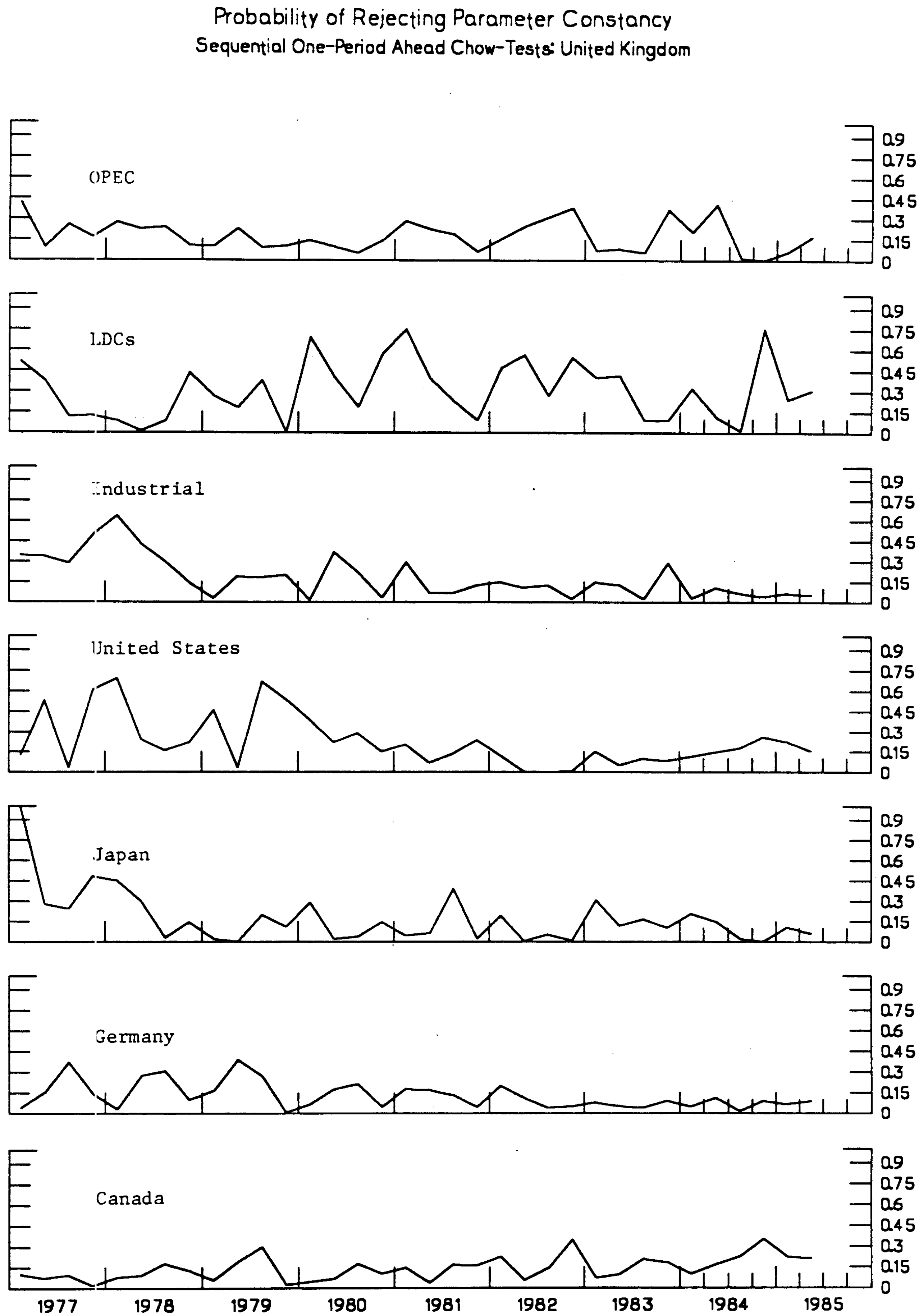

Probability of Rejecting Parameter Constancy
Sequential One-Period Ahead Chow-Tests: United Kingdom
OPEC
LDCs
Industrial
United States
Japan
Germany
Canada
0.9
0.75
0.6
0.45
0.3
0.15
0
1977
1978
1979
1980
1981
1982
1983
1984
1985

Figure B17

Probability of Rejecting Parameter Constancy
Sequential One-Period Ahead Chow-Tests: United States

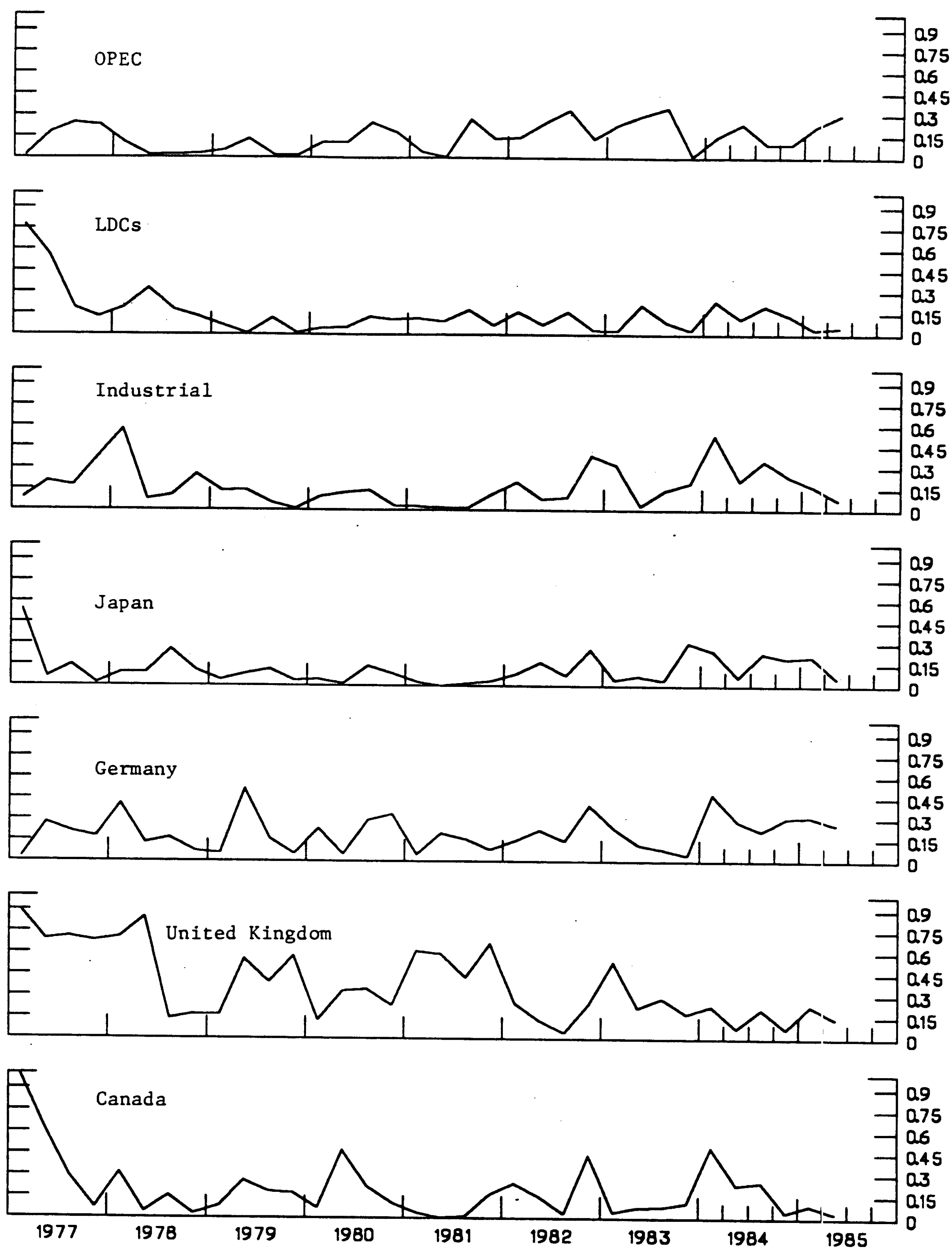


Figure B18

Probability of Rejecting Parameter Constancy

Sequential One-Period Ahead Chow-Tests: Rest of OECD

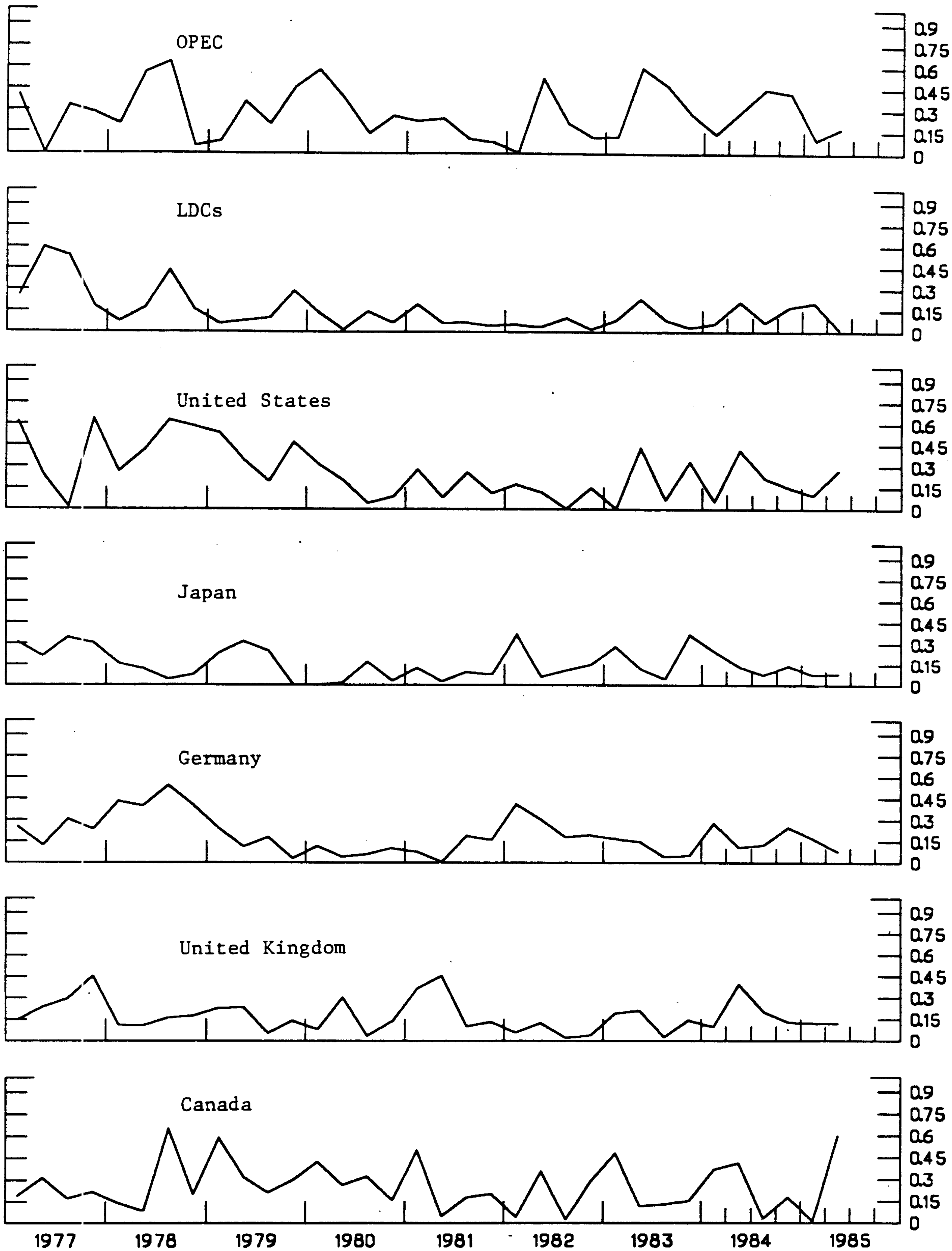


Figure B19

Probability of Rejecting Parameter Constancy
Sequential One-Period Ahead Chow-Tests: Non-OPEC LDCs

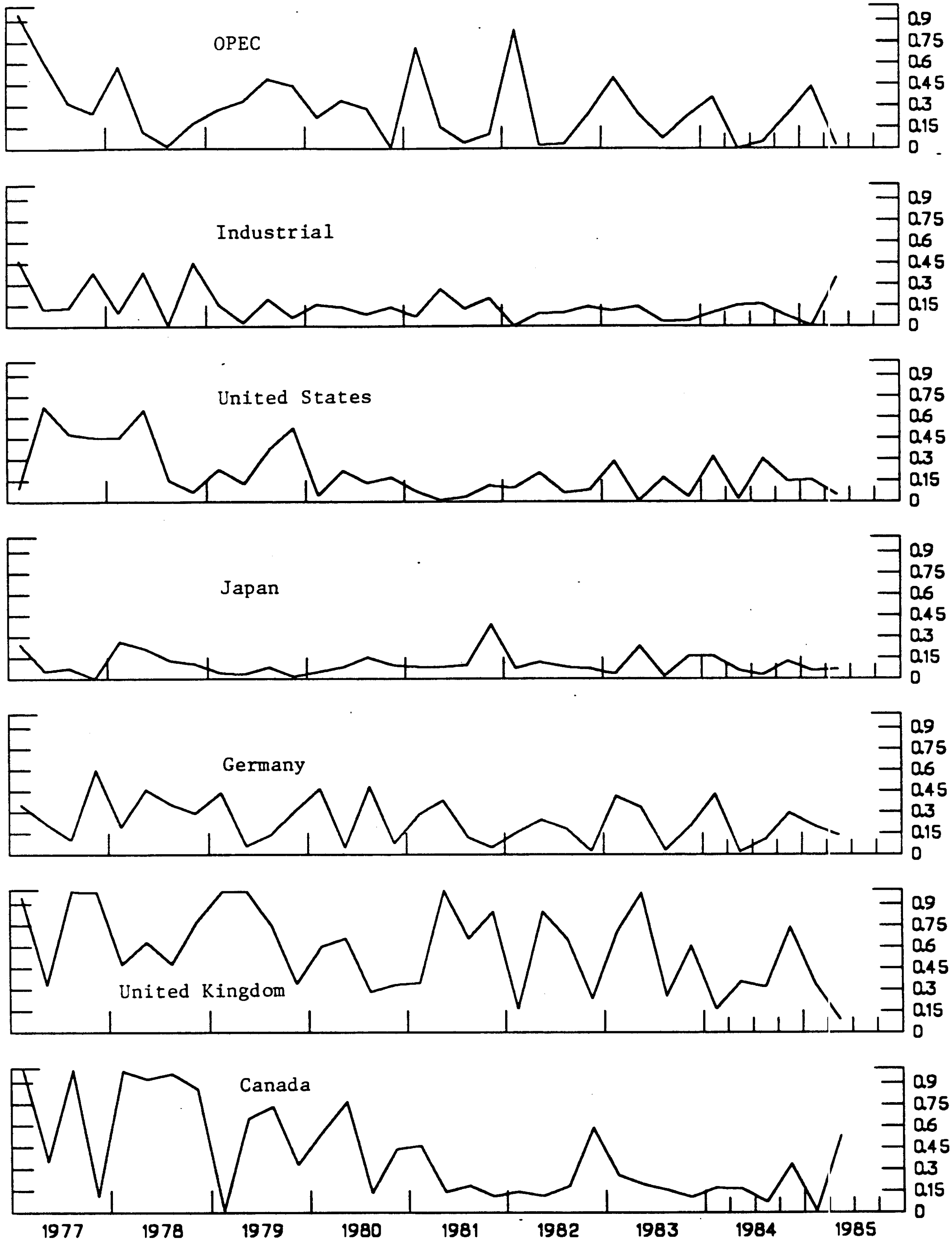
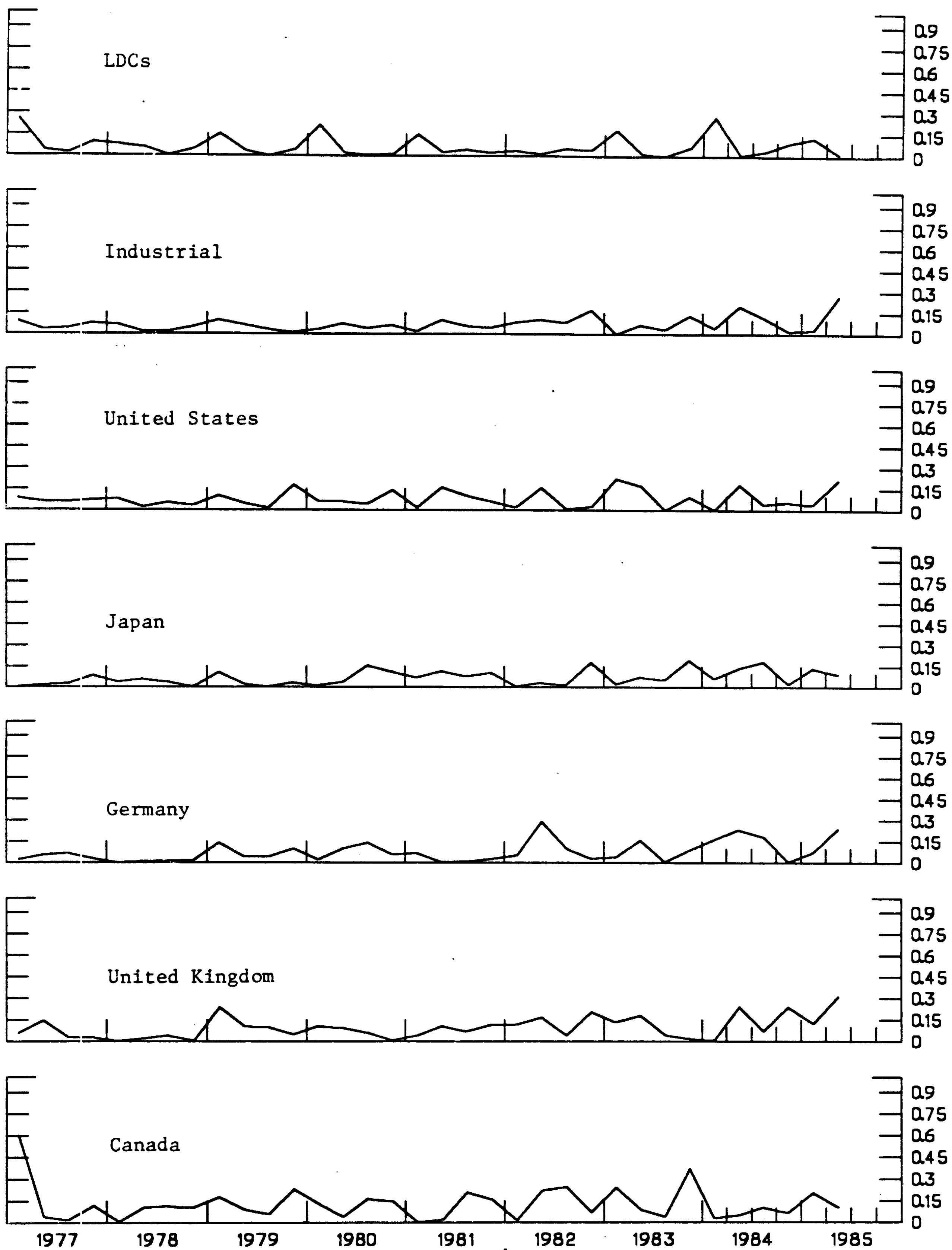


Figure B20

Probability of Rejecting Parameter Constancy

Sequential One-Period Ahead Chow-Tests: OPEC



References

Armington, P., 1969, Adjustment of trade balances: Some experiments with a model of trade among many countries, IMF Staff Papers, 27, 488-526.

Bergsten, F. and W. Cline, 1985, The US-Japan economic problem, Policy Analyses in International Economics, No. 13 (Institute for International Economics, Washington, D.C.).

Brown, B. and R. Mariano, 1984, Residual-based procedures for prediction and estimation in a nonlinear simultaneous model, Econometrica, 52, 321-344.

Bryant, R and G. Holtham, 1987, The US external deficit: Diagnosis, prognosis, and cure, Brookings Discussion Papers No. 55 (The Brookings Institution, Washington D.C.).

Chow, G., 1960, Tests of equality between sets of coefficients in two linear regressions, Econometrica, 28, 591-605.

Cline, W., 1984, International debt (MIT Press, Cambridge).

Cline, W., 1988, Medium-term prospects for the US external current account, Institute for International Economics, mimeo.

Deardorff, A. and R. Stern, 1986, The structure and sample results of the Michigan computational model of world production and trade, in Srinivasan and Whalley (eds.).

Deppler, M. and D. Ripley, 1978, The world trade model: Merchandise trade, IMF Staff Papers, 25, 147-206.

Edison, H., J. Marquez, and R. Tryon, 1986, The structure and properties of the FRB MultiCountry Model, International Finance Discussion Papers, No. 293 (Federal Reserve Board, Washington D.C.).

Eichengreen, B., 1987, Trade deficits in the long run, paper presented at the conference "The U.S. Trade Deficit-Causes, Consequences, and Cures," Federal Reserve Bank of St. Louis, October 23-24, 1987.

Engle, R., 1982, Autoregressive conditional heteroskedasticity with estimates of the variance of the United Kingdom inflation, Econometrica, 50, 997-1008.

Engle, R. D. Hendry, and J. Richard, 1983, Exogeneity, Econometrica, 51, 277-304.

Fair, R., 1986, Evaluating the predictive accuracy of models, in Z. Griliches and M. Intriligator (eds.), Handbook of Econometrics, vol. 3 (North-Holland, Amsterdam).

Feldstein, M., 1986, Correcting World Trade Imbalances, mimeo

Fretz, D. T. Srinivasan, and J. Whalley, Introduction, in Srinivasan and Whalley (eds.).

Gagnon, J., 1987, Adjustment Costs and International Trade Dynamic, Ph.D. dissertation, Stanford University.

Goldstein, M. and M. Khan, 1985, Income and price elasticities in foreign trade, in R. Jones and P. Kenen (eds.), Handbook of International Trade, vol. II (North-Holland, Amsterdam).

Greenberg E., and C. Webster, 1983, Advanced econometrics: A bridge to the literature (Wiley, New York).

Haynes, S. and J. Stone, 1983, Secular and cyclical responses of U.S. trade to income: An evaluation of traditional models, Review of Economics and Statistics, 65, 87-95.

Haynes, S., M. Hutchinson, R. Mikesell, 1986, Japanese financial policies and the US trade deficit, Essays in International Finance, No. 162, Princeton University.

Helkie, W. and P. Hooper, 1987, The US external deficit in the 1980s: An empirical analysis, International Finance Discussion Papers, No. 304 (Federal Reserve Board, Washington D.C.).

Hickman, B. and L. Lau, 1973, Elasticities of substitution and export demand in a world trade model, European Economic Review, 4, 347-380.

Hooper, P. and C. Mann, 1987, The U.S. External Deficit: Its Causes and Persistence, "The U.S. Trade Deficit-Causes, Consequences, and Cures," International Finance Discussion Papers, No. 316 (Federal Reserve Board, Washington D.C.).

Hooper, P., 1988, The dollar, external imbalances, and the US economy, Journal of Economic and Monetary Affairs, 2, 30-53.

Houthakker, H. and S. Magee, 1969, Income and price elasticities in world trade, Review of Economics and Statistics, 51, 111-125.

Husted, S. and T. Kollintzas, 1984, Import demand with rational expectations: Estimates for Bauxite, Cocoa, Coffee and Petroleum, Review of Economics and Statistics, 66, 608-618.

International Monetary Fund, 1987, Direction of Trade, (International Monetary Fund, Washington D.C.)

Jarque, C. and A. Bera, 1980, Efficient tests for normality, homoscedasticity, and serial independence of regression residuals, Economic Letters, 6, 255-259.

Johnston, J., 1984, Econometric methods, Third Edition (McGraw-Hill, New York).

Khan, M. and K. Ross, 1977, The functional form of the aggregate import equation, Journal of International Economics, 7, 149-160.

Krinsky, I., and L. Robb, 1986, On approximating the statistical properties of elasticities, Review of Economics and Statistics, 68, 715-719.

Appendix C
Estimated Structural Equations

Krugman, P. and R. Baldwin, 1987, The persistence of the US trade deficit, Brookings Papers on Economic Activity, 1, 1-56.

McCarthy, M., 1972, Some notes on the generation of pseudo-structural errors for use in stochastic simulation studies, in B. Hickman, ed., Econometric Methods of Cyclical Behavior (Columbia University Press, New York).

Magee, S., 1975, Prices, income, and foreign trade, in P. Kenen (ed.), International trade and finance: Frontiers for research (Cambridge University Press, Cambridge).

Marris, S., 1987, Deficits and the dollar: The world economy at risk, Policy Analyses in International Economics, No. 14 (Institute for International Economics, Washington, D.C.).

Spence, G., 1984, The world trade model: revised estimates, IMF Staff Papers, 31, 469-498.

Schwartz, N. and B. Krissoff, How strategies to reduce US bilateral trade deficits in manufactures affect US agricultural exports, US Department of Agriculture, Economic Research Service.

Srinivasan, T. and J. Whalley, 1986, (ed.) General equilibrium trade policy modeling, (MIT Press, Cambridge).

Thursby, J. and M. Thursby, 1984, How reliable are simple, single equation specifications of import demand? Review of Economics and Statistics, 66, 120-128.

Warner, D. and M. Kreinin, 1983, Determinants of international trade flows, Review of Economics and Statistics, 65, 96-104.

Whalley, J., 1985, Trade liberalization among major world trading areas, (MIT Press, Cambridge).

1. MCEV: (MCEV) CANADIAN IMPORTS FROM UK ($)

```
LOG(MCEV/(EEI * JAIME_EXUVI))   =  -.906852  +  1.75187 * (LOG(CGNP) - LOG(CGNPPOT))
                                   (2.39578)   (2.57314)

     +  LAGCOEF1 * (LOG(EEI(I) * JAIME_EXUVI(I)/(CEI(I) * CPGNP(I))))

     +  .449787 * LOG(MCEV(-1)/(EEI(-1) * JAIME_EXUVI(-1)))  -  .070393 * Q1  +  .045138 * Q2
       (3.70857)                                               (1.68978)       (1.09861)

     -  .085620 * Q3 + MCE_ERR * BETA
       (1.97727)

     CRSQ  = .685  S.E.R. =  .103  MEAN LHS = -3.68  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.004    NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.051	2.303
(-1)	-0.077	2.303
(-2)	-0.077	2.303
(-3)	-0.051	2.303
SUM:	-0.256	

2. MCE: (MCE) CANADIAN IMPORTS FROM UK 1972 PRICES

```
MCE  =  MCEV/(EEI * (JAIME_EXUVI/100))
```

3. MCGV: (MCGV) CANADIAN IMPORTS FROM GER($)

```
LOG(MCGV/(GEI * GPXGUV))   =  -4.8314  +  .999954 * LOG(CGNPPOT)
                             (4.48663)   (4.50994)

     +  2.93139 * (LOG(CGNP) - LOG(CGNPPOT))  -  .393559 * LOG(GEI * GPXGUV/(CPGNP * CEI))
       (3.74673)                                (3.94182)

     +  .538413 * LOG(MCGV(-1)/(GEI(-1) * GPXGUV(-1)))  -  .057965 * Q1  +  .060084 * Q2
       (5.36549)                                          (1.55924)       (1.62976)

     -  .147455 * Q3 + MCG_ERR * BETA
       (3.68265)

     CRSQ  = .82  S.E.R. =  .091  MEAN LHS = -.562  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.032   NOB = 50   ESTIMATED:  9/87
```

4. MCG: (MCG) CANADIAN IMPORTS FROM GER 1972 PRICES

```
MCG  =  MCGV/(GEI * GPXGUV)
```

5. MCJV: (MCJV) CANADIAN IMPORTS FROM JAPAN($)

```
LOG(MCJV/(JEI * JPXGUV))   =  -5.8522  +  1.24267 * LOG(CGNPPOT)
                             (3.95521)   (3.98426)

     +  1.44395 * (LOG(CGNP) - LOG(CGNPPOT))  -  .517518 * LOG(JEI * JPXGUV/(CPGNP * CEI))
       (1.62195)                                (3.11929)

     +  .601615 * LOG(MCJV(-1)/(JEI(-1) * JPXGUV(-1)))  -  .067089 * Q1  -  .031598 * Q2
       (6.23995)                                          (1.43616)       (.681272)

     -  .057539 * Q3 + MCJ_ERR * BETA
       (1.2193)

     CRSQ  = .886  S.E.R. =  .115  MEAN LHS = .206  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.948   NOB = 50   ESTIMATED:  9/87
```

6. MCJ: (MCJ) CANADIAN IMPORTS FROM JAPAN 1972 PRICES

MCJ = MCJV/(JEI * JPXGUV)

7. MCUV: (MCUV) CANADIAN IMPORTS FROM US ($)

```
LOG(MCUV/UPXGUV)  =  -6.01742  +  1.79566 * LOG(CGNPPOT)  +  2.49483 * (LOG(CGNP) - LOG(CGNPPOT))
                     (6.21352)    (6.8207)                    (5.45721)

     + LAGCOEF1 * (LOG(UPXGUV(I)/(CPGNP(I) * CEI(I))))  +  .130865 * LOG(MCUV(-1)/UPXGUV(-1))
                                                         (1.03902)

     -  .047536 * Q1  +  .071571 * Q2  -  .113498 * Q3 + MCU_ERR * BETA
       (2.48321)        (4.12381)        (4.13567)

     CRSQ  = .927  S.E.R. =  .039  MEAN LHS = 2.904  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.925   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.132	1.712
(-1)	-0.090	2.009
(-2)	-0.058	2.595
(-3)	-0.035	2.019
(-4)	-0.021	0.843
(-5)	-0.016	0.534
(-6)	-0.021	0.670
(-7)	-0.035	1.271
(-8)	-0.058	2.499
(-9)	-0.090	3.023
(-10)	-0.131	2.567
(-11)	-0.182	2.204
SUM:	-0.868	

8. MCU: (MCU) CANADIAN IMPORTS FROM US 1972 PRICES

MCU = MCUV/UPXGUV

9. MCLV: (MCLV) CANADIAN IMPORTS FROM LDC ($)

```
LOG(MCLV/LPXGUV)  =  -7.56801  +  1.63611 * LOG(CGNPPOT)  +  1.94802 * (LOG(CGNP) - LOG(CGNPPOT))
                     (4.768)      (4.7416)                    (2.71499)

     -  .687005 * LOG(LPXGUV/(CPGNP * CEI))  +  .419033 * LOG(MCLV(-1)/LPXGUV(-1))  -  .026230 * Q1
       (3.98157)                                (3.39263)                              (.798332)

     +  .055501 * Q2  +  .079723 * Q3 + MCL_ERR * BETA
       (1.61789)        (2.37223)

     CRSQ  = .913  S.E.R. =  .081  MEAN LHS = .35  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.871   NOB = 50   ESTIMATED:  9/87
```

10. MCL: (MCL) CANADIAN IMPORTS FROM LDC 1972 PRICES

MCL = MCLV/LPXGUV

11. MCIV: (MCIV) CANADIAN IMPORTS FROM OECD ($)

```
LOG(MCIV/IPXGUV)   =  -2.50705  +  .603119 * LOG(CGNPPOT)  +  1.78058 * (LOG(CGNP) - LOG(CGNPPOT))
                      (2.08602)    (2.36937)                  (3.05668)

     + LAGCOEF1 * (LOG(IPXGUV(I)/(CPGNP(I) * CEI(I))))

     + LAGCOEF2 * (LOG(CFPXFTW(I)/(CPGNP(I) * CEI(I))))  +  .53592 * LOG(MCIV(-1)/IPXGUV(-1))
                                                           (4.61324)

     -  .065427 * Q1  +  .027939 * Q2  -  .029637 * Q3 + MCI_ERR * BETA
       (2.40423)        (1.01093)        (1.06237)

     CRSQ  = .844  S.E.R. =  .067  MEAN LHS = .481  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.18   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	-0.163	1.472	-0.632	2.095
(-1)	-0.244	1.472	0.642	1.999
(-2)	-0.244	1.472	0.749	2.274
(-3)	-0.163	1.472	-0.311	0.979
SUM:	-0.814		0.448	

12. MCI: (MCI) CANADIAN IMPORTS FROM OECD 1972 PRICES

```
MCI  =  MCIV/IPXGUV
```

13. MCOV: (MCOV) CANADIAN IMPORTS FROM OPEC ($)

```
MCOV/(CPMGOL * CER)   =  -.841979  +  1.1109 * EXP(LOG(CGNP) - LOG(CGNPPOT))
                         (1.15981)    (1.51128)

     +  LAGCOEF1 * ((CER(I) * CPMGOL(I)/(CEI(I) * CPXGOL(I))))

     +  .816719 * (MCOV(-1)/(CPMGOL(-1) * CER(-1)))  +  .078139 * Q1  +  .008562 * Q2
       (10.2592)                                       (2.78829)        (.306368)

     +  .057502 * Q3 + MCO_ERR * BETA
       (2.05813)

     CRSQ  = .909  S.E.R. =  .068  MEAN LHS = .466  RANGE: 1973 Q1 TO 1984 Q4
     DW = 2.145   NOB = 48   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.021	0.802
(-1)	-0.032	0.802
(-2)	-0.032	0.802
(-3)	-0.021	0.802
SUM:	-0.106	

14. CFPXFTW: (CFPXFTW) CANADIAN IMPORT PRICES FROM MCM COUNTRIES

```
CFPXFTW  =  UPXGUV**0.328571 * (JPXGUV * JEI)**0.2 * (GPXGUV * GEI)**0.3 * (EPXGUV * EEI)**0.17
```

15. MCO: (MCO) CANADIAN IMPORTS FROM OPEC 1972 PRICES

```
MCO  =  MCOV/(CPMGOL * CER)
```

16. MCTV: (MCTV) TOTAL CANADIAN IMPORTS ($)

```
MCTV  =  MCEV + MCGV + MCJV + MCUV + MCIV + MCLV + MCOV + MCZV
```

17. CTRADE: (CTRADE) CANADIAN TRADE BALANCE

CTRADE = XCTV - MCTV

18. XCTV: (XCTV) CANADIAN EXPORTS TOTAL ($)

XCTV = XCEV + XCGV + XCJV + XCUV + XCIV + XCLV + XCOV + XCZV

19. XCEV: (XCEV) CANADIAN EXPORTS TO THE UK ($)

LOG(XCEV) = -.088145 + .943772 * LOG(MECV) - .010230 * Q1 - .030187 * Q2
(5.03177) (48.8788) (.51611) (1.52525)

- .037929 * Q3 + XCE_ERR * BETA
(1.90014)

CRSQ = .959 S.E.R. = .072 MEAN LHS = .385 RANGE: 1960 Q1 TO 1986 Q2
DW = 1.878 NOB = 106 ESTIMATED: 6/87

20. XCGV: (XCGV) CANADIAN EXPORTS TO GERMANY ($)

LOG(XCGV) = -.311306 + .913194 * LOG(MGCV) - .052766 * Q1 + .001985 * Q2
(12.0773) (60.1072) (1.5055) (.056918)

- .043083 * Q3 + XCG_ERR * BETA
(1.22433)

CRSQ = .972 S.E.R. = .127 MEAN LHS = -.869 RANGE: 1960 Q1 TO 1986 Q2
DW = 1.5 NOB = 106 ESTIMATED: 6/87

21. XCJV: (XCJV) CANADIAN EXPORTS TO JAPAN ($)

LOG(XCJV) = -.226135 + 1.03328 * LOG(MJCV) - .039684 * Q1 + .001677 * Q2
(5.46939) (53.424) (.693691) (.029317)

- .006317 * Q3 + XCJ_ERR * BETA
(.109409)

CRSQ = .965 S.E.R. = .208 MEAN LHS = .116 RANGE: 1960 Q1 TO 1986 Q2
DW = .53 NOB = 106 ESTIMATED: 6/87

22. XCUV: (XCUV) CANADIAN EXPORTS TO THE US ($)

LOG(XCUV) = -.170492 + 1.03189 * LOG(MUCV) + .013725 * Q1 + .013254 * Q2
(11.4945) (241.205) (1.14658) (1.10777)

+ .012761 * Q3 + XCU_ERR * BETA
(1.05582)

CRSQ = .998 S.E.R. = .044 MEAN LHS = 2.715 RANGE: 1960 Q1 TO 1986 Q2
DW = .718 NOB = 106 ESTIMATED: 6/87

23 MECV: (MECV) UK IMPORTS FROM CANADA--NOMINAL $

```
LOG(MECV/(CEI * CPXGUV))   =  -.047241  +  .043925 * LOG(EGNPPOT)
                             (.023288)    (.090471)

     +  1.51671 * (LOG(EGNP) - LOG(EGNPPOT))
       (1.82552)

     +  LAGCOEF1 * (LOG(CEI(I) * CPXGUV(I)/(EEI(I) * EPGNP(I))))

     +  LAGCOEF2 * (LOG(ECPCOMP(I)/(EEI(I) * EPGNP(I))))

     +  .676115 * LOG(MECV(-1)/(CEI(-1) * CPXGUV(-1)))  -  .035666 * Q1  +  .117444 * Q2
       (5.34856)                                          (1.02228)         (3.42915)

     -  .096808 * Q3 + MEC_ERR * BETA
       (2.6315)

     CRSQ  = .786  S.E.R. =  .084  MEAN LHS = .19  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.106   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	-0.060	1.836	0.243	1.108
(-1)	-0.099	1.836	0.125	1.215
(-2)	-0.119	1.836	0.044	0.273
(-3)	-0.119	1.836	0.000	0.001
(-4)	-0.099	1.836	-0.007	0.117
(-5)	-0.060	1.836	0.022	0.112
SUM:	-0.557		0.427	

24. MEC: (MEC) UK IMPORTS FROM CANADA --REAL $

```
MEC  =  MECV/(CEI * CPXGUV)
```

25. MEGV: (MEGV) UK IMPORTS FROM GERMANY--NOMINAL $

```
LOG(MEGV/(GEI * GPXGUV))   =  -8.87822  +  2.27815 * LOG(EGNPPOT)
                             (3.71818)    (3.76233)

     +  1.33089 * (LOG(EGNP) - LOG(EGNPPOT))
       (2.37969)

     +  LAGCOEF1 * (LOG(GEI(I) * GPXGUV(I)/(EPGNP(I) * EEI(I))))

     +  .591045 * LOG(MEGV(-1)/(GEI(-1) * GPXGUV(-1)))  -  .015747 * Q1  -  .012944 * Q2
       (5.31417)                                          (.659868)         (.540418)

     -  .056127 * Q3 + MEG_ERR * BETA
       (2.24409)

     CRSQ  = .973  S.E.R. =  .059  MEAN LHS = 1.416  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.046   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.022	2.214
(-1)	-0.036	2.214
(-2)	-0.043	2.214
(-3)	-0.043	2.214
(-4)	-0.036	2.214
(-5)	-0.022	2.214
SUM:	-0.202	

26. MEG: (MEG) UK IMPORTS FROM GERMANY --REAL $

```
MEG  =  MEGV/(GEI * GPXGUV)
```

27. MEJV: (MEJV) UK IMPORTS FROM JAPAN--NOMINAL $

```
LOG(MEJV/(JEI * JPXGUV))   =  -8.0167  +  1.9178 * LOG(EGNPPOT)
                             (3.25723)   (3.20669)

     -  .194255 * (LOG(EGNP) - LOG(EGNPPOT))
       (.281266)

     +  LAGCOEF1 * (LOG(JEI(I) * JPXGUV(I)/(EPGNP(I) * EEI(I))))

     +  .598201 * LOG(MEJV(-1)/(JEI(-1) * JPXGUV(-1)))  +  .090004 * Q1  +  .113102 * Q2
       (5.01832)                                          (2.56423)        (3.5553)

     +  .127013 * Q3 + MEJ_ERR * BETA
       (4.04346)

     CRSQ  = .963  S.E.R. =  .077  MEAN LHS = .339  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.28   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.013	0.794
(-1)	-0.022	0.794
(-2)	-0.027	0.794
(-3)	-0.027	0.794
(-4)	-0.022	0.794
(-5)	-0.013	0.794
SUM:	-0.124	

28. MEJ: (MEJ) UK IMPORTS FROM JAPAN --REAL $

```
MEJ  =  MEJV/(JEI * JPXGUV)
```

29. MEUV: (MEUV) UK IMPORTS FROM US--NOMINAL $

```
LOG(MEUV/UPXGUV)   =  -6.40587  +  1.68229 * LOG(EGNPPOT)  +  .99023 * (LOG(EGNP) - LOG(EGNPPOT))
                     (3.15483)    (3.25679)                  (1.40674)

     +  LAGCOEF1 * (LOG(UPXGUV(I)/(EPGNP(I) * EEI(I))))

     +  LAGCOEF2 * (LOG(EUPCOMP(I)/(EPGNP(I) * EEI(I))))  +  .589266 * LOG(MEUV(-1)/UPXGUV(-1))
                                                             (4.6091)

     +  .034664 * Q1  +  .008671 * Q2  -  .091886 * Q3 + MEU_ERR * BETA
       (1.07658)        (.255069)        (2.62238)

     CRSQ  = .855  S.E.R. =  .078999  MEAN LHS = 1.445  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.165   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	-0.040	1.987	0.045	1.860
(-1)	-0.066	1.987	0.074	1.860
(-2)	-0.080	1.987	0.089	1.860
(-3)	-0.080	1.987	0.089	1.860
(-4)	-0.066	1.987	0.074	1.860
(-5)	-0.040	1.987	0.045	1.860
SUM:	-0.371		0.416	

30. MEU: (MEU) UK IMPORTS FROM THE US --REAL $

```
MEU  =  MEUV/UPXGUV
```

31. MELV: (MELV) UK IMPORTS FROM LDCS --NOMINAL $

```
LOG(MELV/LPXGUV)  =  -2.88219  +  .947819 * LOG(EGNPPOT)  +  1.53729 * (LOG(EGNP) - LOG(EGNPPOT))
                     (2.1166)     (2.74739)                  (2.21121)

    + LAGCOEF1 * (LOG(LPXGUV(I)/(EPGNP(I) * EEI(I))))  +  .352323 * LOG(MELV(-1)/LPXGUV(-1))
                                                          (2.56709)

    + .062674 * Q1  +  .067952 * Q2  +  .050369 * Q3 + MEL_ERR * BETA
      (1.91548)        (2.12739)        (1.549)

    CRSQ  = .348  S.E.R. =  .079  MEAN LHS = 1.609  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2.094    NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.012	1.080
(-1)	-0.020	1.080
(-2)	-0.024	1.080
(-3)	-0.024	1.080
(-4)	-0.020	1.080
(-5)	-0.012	1.080
SUM:	-0.113	

32. MEL: (MEL) UK IMPORTS FROM LDCS --REAL $

MEL = MELV/LPXGUV

33. MEIV: (MEIV) UK IMPORTS FROM OTHER OECD--NOMINAL $

```
LOG(MEIV/IPXGUV)  =  -4.96903  +  1.50997 * LOG(EGNPPOT)  +  1.12319 * (LOG(EGNP) - LOG(EGNPPOT))
                     (3.67087)    (3.87846)                  (2.60929)

    + LAGCOEF1 * (LOG(IPXGUV(I)/(EPGNP(I) * EEI(I))))  +  .556631 * LOG(MEIV(-1)/IPXGUV(-1))
                                                          (4.83821)

    - .042124 * Q1  -  .015128 * Q2  -  .111669 * Q3 + MEI_ERR * BETA
      (2.11553)        (.752988)        (5.02822)

    CRSQ  = .943  S.E.R. =  .047  MEAN LHS = 2.861  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2.166    NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.006	0.779
(-1)	-0.011	0.779
(-2)	-0.013	0.779
(-3)	-0.013	0.779
(-4)	-0.011	0.779
(-5)	-0.006	0.779
SUM:	-0.060	

34. MEI: (MEI) UK IMPORTS FROM OTHER OECD --REAL $

MEI = MEIV/IPXGUV

35. MEOV: (MEOV) UK IMPORTS FROM OPEC --NOMINAL $

```
LOG(MEOV/OPOIL72)  =  2.65209  +  7.0711 * (LOG(EGNP) - LOG(EGNPPOT))
                     (10.8416)   (4.6483)

    +  LAGCOEF1 * (LOG(OPOIL72(I)/(EEI(I) * EPGNP(I))))  +  .105823 * Q1  -  .016073 * Q2
                                                         (1.13479)        (.175679)

    +  .027703 * Q3 + MEO_ERR * BETA
      (.307369)

    CRSQ  = .896  S.E.R. =  .201  MEAN LHS = -.558  RANGE: 1976 Q2 TO 1986 Q1
    DW = 1.431   NOB = 40   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.034	9.231
(-1)	-0.064	9.231
(-2)	-0.090	9.231
(-3)	-0.112	9.231
(-4)	-0.130	9.231
(-5)	-0.144	9.231
(-6)	-0.154	9.231
(-7)	-0.160	9.231
(-8)	-0.162	9.231
(-9)	-0.160	9.231
(-10)	-0.154	9.231
(-11)	-0.144	9.231
(-12)	-0.130	9.231
(-13)	-0.112	9.231
(-14)	-0.090	9.231
(-15)	-0.064	9.231
(-16)	-0.034	9.231
SUM:	-1.939	

36. MEO: (MEO) UK IMPORTS FROM OPEC --REAL $

MEO = MEOV/OPOIL72

37. METV: (METV) TOTAL IMPORTS OF THE UK --$

METV = MECV + MEGV + MEJV + MEUV + MEIV + MELV + MEOV + MEZV

38. XETV: (XETV) TOTAL EXPORTS OF THE UK -- NOMINAL $

XETV = XECV + XEGV + XEJV + XEUV + XEIV + XELV + XEOV + XEZV

39. ETRADE: (ETRADE) UK TRADE BALANCE

ETRADE = XETV - METV

40. XECV: (XECV) UK EXPORTS TO CANADA --NOMINAL $

```
LOG(XECV)  =  -.053247  +  .929451 * LOG(MCEV)  -  .073810 * Q1  -  .043554 * Q2
              (3.65609)   (63.2753)                (3.62568)        (2.13973)

    -  .064986 * Q3 + XEC_ERR * BETA
      (3.16478)

    CRSQ  = .975  S.E.R. =  .073999  MEAN LHS = -.033  RANGE: 1960 Q1 TO 1986 Q2
    DW = 2.126   NOB = 106   ESTIMATED:  6/87
```

41. XEGV: (XEGV) UK EXPORTS TO GERMANY --NOMINAL $

```
LOG(XEGV)   =  .040672  +  .942512 * LOG(MGEV)  -  .001625 * Q1  -  .007510 * Q2
              (2.87178)   (171.312)                (.087364)        (.403736)

     -  .036305 * Q3 + XEG_ERR * BETA
       (1.93283)

     CRSQ  = .996  S.E.R. =  .068  MEAN LHS = .828  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.983   NOB = 106   ESTIMATED:  6/87
```

42. XEJV: (XEJV) UK EXPORTS TO JAPAN --NOMINAL $

```
LOG(XEJV)   =  .900496 * LOG(MJEV)  -  .274376 * Q1  -  .227413 * Q2
              (45.415)                (6.27471)        (5.22701)

     -  .305266 * Q3 + XEJ_ERR * BETA
       (6.88463)

     CRSQ  = .967  S.E.R. =  .219  MEAN LHS = -.782  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.415   NOB = 106   ESTIMATED:  6/87
```

43. XEUV: (XEUV) UK EXPORTS TO THE US --NOMINAL $

```
LOG(XEUV)   =  -.041784  +  1.01765 * LOG(MUEV)  -  .044306 * Q1  -  .027039 * Q2
              (2.66803)    (149.418)                (2.49477)        (1.52331)

     -  .028481 * Q3 + XEU_ERR * BETA
       (1.58942)

     CRSQ  = .995  S.E.R. =  .064999  MEAN LHS = 1.28  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.716   NOB = 106   ESTIMATED:  6/87
```

44. ECPCOMP: (ECPCOMP) THIRD COUNTRY PRICE FOR UK-CANADA TRADE

```
ECPCOMP  =  (UPXGUV**0.343284 * (JPXGUV * JEI)**0.2 * (GPXGUV * GEI)
            **0.313433)**(1/(1 - 0.13))
```

45. EUPCOMP: (EUPCOMP) THIRD COUNTRY PRICE FOR UK-US TRADE

```
EUPCOMP  =  ((JPXGUV * JEI)**0.2 * (CPXGUV * EEI)**0.134328 * (GPXGUV * GEI)
            **0.313433)**(1/(1 - 0.3433))
```

46. MGEV: (MGEV) GERMAN IMPORTS FROM THE UK --NOMINAL $

```
LOG(MGEV/(EEI * JAIME_EXUVI))   =  -33.7207  +  4.61177 * LOG(GGNPPOT)
                                   (27.2951)    (20.4508)

    + 2.90971 * (LOG(GGNP) - LOG(GGNPPOT))
      (5.07679)

    + LAGCOEF1 * (LOG(EEI(I) * JAIME_EXUVI(I)/(GEI(I) * GPGNP(I))))  +  .518098 * D7731
                                                                        (7.67487)

    - .018409 * Q1  -  .026938 * Q2  -  .090364 * Q3 + MGE_ERR * BETA
      (.622883)        (1.00672)        (3.00664)

    CRSQ  = .978  S.E.R. =  .06  MEAN LHS = -2.278  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.263	1.064
(-1)	0.172	0.530
(-2)	0.375	1.167
(-3)	-0.144	0.441
(-4)	-0.197	0.586
(-5)	0.192	0.588
(-6)	0.321	1.020
(-7)	-0.312	0.990
(-8)	-0.445	1.426
(-9)	0.583	1.799
(-10)	0.210	0.565
(-11)	-0.601	2.348
SUM:	-0.109	

47. MGE: (MGE) GERMAN IMPORTS FROM THE UK --REAL $

```
MGE  =  MGEV/(EEI * (JAIME_EXUVI/100))
```

48. MGCV: (MGCV) GERMAN IMPORTS FROM CANADA --NOMINAL $

```
LOG(MGCV/(CEI * CPXGUV))   =  -9.79574  +  1.41943 * LOG(GGNPPOT)
                              (3.21896)    (3.14813)

    + 2.70389 * (LOG(GGNP) - LOG(GGNPPOT))
      (1.89251)

    + LAGCOEF1 * (LOG(CEI(I) * CPXGUV(I)/(GPGNP(I) * GEI(I))))

    + .482806 * LOG(MGCV(-1)/(CEI(-1) * CPXGUV(-1)))  -  .188369 * Q1  -  .040741 * Q2
      (4.02967)                                          (4.01762)        (.841971)

    - .017828 * Q3 + MGC_ERR * BETA
      (.374)

    CRSQ  = .725  S.E.R. =  .116  MEAN LHS = -.535  RANGE: 1973 Q1 TO 1985 Q2
    DW = 1.916   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.613	2.404
(-1)	0.318	1.585
(-2)	0.378	1.871
(-3)	-0.433	1.612
SUM:	-0.349	

49. MGC: (MGC) GERMAN IMPORTS FROM CANADA --REAL $

```
MGC  =  MGCV/(CEI * CPXGUV)
```

50. MGJV: (MGJV) GERMAN IMPORTS FROM JAPAN --NOMINAL $

```
LOG(MGJV/(JEI * JPXGUV))   =   -12.6377  +  1.87856 * LOG(GGNPPOT)
                               (4.01652)    (4.0361)

    +  1.01407 * (LOG(GGNP) - LOG(GGNPPOT))  -  .737357 * LOG(JEI * JPXGUV/(GPGNP * GEI))
      (1.29627)                                (3.65073)

    +  .377091 * LOG(GJPCOMP/(GPGNP * GEI))  +  .514425 * LOG(MGJV(-1)/(JEI(-1) * JPXGUV(-1)))
      (2.12976)                                (5.44499)

    -  .118525 * Q1  -  .027497 * Q2  -  .098918 * Q3  -  .348105 * D7411 + MGJ_ERR * BETA
      (4.16268)        (1.03949)        (3.62728)        (4.75398)

    CRSQ  = .975  S.E.R. =  .066  MEAN LHS = .589  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2.192   NOB = 50   ESTIMATED:  9/87
```

51. MGJ: (MGJ) GERMAN IMPORTS FROM JAPAN --REAL $

```
MGJ  =  MGJV/(JEI * JPXGUV)
```

52. MGUV: (MGUV) GERMAN IMPORTS FROM THE US --NOMINAL $

```
LOG(MGUV/UPXGUV)   =   -8.7571  +  1.46237 * LOG(GGNPPOT)  +  2.15389 * (LOG(GGNP) - LOG(GGNPPOT))
                      (6.43253)   (6.87777)                  (3.42584)

    -  .676056 * LOG(UPXGUV/(GPGNP * GEI))  +  .431814 * LOG(GUPCOMP/(GPGNP * GEI))
      (4.02952)                              (1.95219)

    +  .249013 * LOG(MGUV(-1)/UPXGUV(-1))  -  .039787 * Q1  -  .053619 * Q2  -  .148261 * Q3
      (2.8968)                              (1.52089)        (2.07693)        (5.61832)

    -  .461141 * D7731 + MGU_ERR * BETA
      (7.61598)

    CRSQ  = .891  S.E.R. =  .057  MEAN LHS = 1.478  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2.078   NOB = 50   ESTIMATED:  9/87
```

53. MGU: (MGU) GERMAN IMPORTS FROM THE US --REAL $

```
MGU  =  MGUV/UPXGUV
```

54. MGLV: (MGLV) GERMAN IMPORTS FROM LDCS --NOMINAL $

```
LOG(MGLV/LPXGUV)   =   -11.6676  +  1.94801 * LOG(GGNPPOT)  +  1.74064 * (LOG(GGNP) - LOG(GGNPPOT))
                      (6.39503)    (6.5288)                   (3.61565)

    -  .137308 * LOG(LPXGUV/(GPGNP * GEI))  -  .352286 * LOG(GFPXFTW/(GPGNP * GEI))
      (1.03589)                              (2.30592)

    +  .144077 * LOG(MGLV(-1)/LPXGUV(-1))  +  .030580 * Q1  -  .020542 * Q2  +  .004527 * Q3
      (1.22422)                              (1.97839)        (1.34788)        (.292689)

    -  .199818 * D7411 + MGL_ERR * BETA
      (4.6877)

    CRSQ  = .947  S.E.R. =  .038  MEAN LHS = 1.961  RANGE: 1973 Q1 TO 1985 Q2
    DW = 1.819   NOB = 50   ESTIMATED:  9/87
```

55. MGL: (MGL) GERMAN IMPORTS FROM LDCS --REAL $

```
MGL  =  MGLV/LPXGUV
```

56. MGIV: (MGIV) GERMAN IMPORTS FROM OTHER OECD --NOMINAL $

```
LOG(MGIV/IPXGUV)   =  -10.1431  +  1.94502 * LOG(GGNPPOT)  +  1.77874 * (LOG(GGNP) - LOG(GGNPPOT))
                     (5.44176)    (5.64768)                   (4.47704)

     -  .664719 * LOG(IPXGUV/(GPGNP * GEI))  +  .109773 * LOG(GFPXFTW/(GPGNP * GEI))
       (4.39183)                               (1.15903)

     +  .091571 * LOG(MGIV(-1)/IPXGUV(-1))  -  .010899 * Q1  -  .006130 * Q2  -  .087469 * Q3
       (.607951)                              (.636164)        (.409743)        (5.11077)

     -  .094282 * D7411 + MGI_ERR * BETA
       (3.28364)

     CRSQ  = .976  S.E.R. =  .026  MEAN LHS = 3.468  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.663   NOB = 50   ESTIMATED:  9/87
```

57. MGI: (MGI) GERMAN IMPORTS FROM OTHER OECD --REAL $

```
MGI  =  MGIV/IPXGUV
```

58. MGOV: (MGOV) GERMAN IMPORTS FROM OPEC --NOMINAL $

```
LOG(MGOV/OPOIL72)   =  .645121  +  2.9872 * (LOG(GGNP) - LOG(GGNPPOT))
                      (3.41378)   (2.48648)

     +  LAGCOEF1 * (LOG(OPOIL72(I)/(GEI(I) * GPGNP(I))))  +  .603227 * LOG(MGOV(-1)/OPOIL72(-1))
                                                           (5.33792)

     -  .084049 * Q1  -  .024643 * Q2  -  .001984 * Q3 + MGO_ERR * BETA
       (2.31607)        (.691896)        (.055266)

     CRSQ  = .949  S.E.R. =  .087  MEAN LHS = .352  RANGE: 1973 Q2 TO 1985 Q2
     DW = 2.182   NOB = 49   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.198	3.326
(-1)	0.016	0.589
(-2)	0.104	2.380
(-3)	0.068	2.589
(-4)	-0.093	1.664
SUM:	-0.102	

59. MGO: (MGO) GERMAN IMPORTS FROM OPEC --REAL $

```
MGO  =  MGOV/OPOIL72
```

60. MGTV: (MGTV) TOTAL IMPORTS OF GERMNAY --NOMINAL $

```
MGTV  =  MGCV + MGEV + MGJV + MGUV + MGIV + MGLV + MGOV + MGZV
```

61. XGTV: (XGTV) TOTAL GERMAN EXPORTS -- NOMINAL $

```
XGTV  =  XGCV + XGEV + XGJV + XGUV + XGIV + XGLV + XGOV + XGZV
```

62. GTRADE: (GTRADE) GERMAN TRADE BALANCE

```
GTRADE  =  XGTV - MGTV
```

63. XGCV: (XGCV) GERMAN EXPORTS TO CANADA --NOMINAL $

```
LOG(XGCV)  =  -.103284   +  .978974 * LOG(MCGV)  +  .005263 * Q1  -  .076495 * Q2
              (6.87515)     (125.174)               (.258594)         (3.7707)

     -  .038044 * Q3 + XGC_ERR * BETA
       (1.85576)

     CRSQ  = .993  S.E.R. =  .073999  MEAN LHS = -.709  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.997   NOB = 106   ESTIMATED:  6/87
```

64. XGEV: (XGEV) GERMAN EXPORTS TO THE UK --NOMINAL $

```
LOG(XGEV)  =  -.018881  +  1.00673 * LOG(MEGV)  -  .048344 * Q1  -  .031613 * Q2
              (1.3918)     (204.69)                (2.76064)         (1.80527)

     -  .008397 * Q3 + XGE_ERR * BETA
       (.47493)

     CRSQ  = .998  S.E.R. =  .064  MEAN LHS = 1.018  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.321   NOB = 106   ESTIMATED:  6/87
```

65. XGJV: (XGJV) GERMAN EXPORTS TO JAPAN --NOMINAL $

```
LOG(XGJV)  =    - .064936  +  .988247 * LOG(MJGV)  -  .063165 * Q1  -  .087822 * Q2
                 (3.81611)    (121.179)               (2.66369)         (3.70361)

     -  .060361 * Q3 + XGJ_ERR * BETA
       (2.52155)

     CRSQ  = .993  S.E.R. =  .086  MEAN LHS = -.348  RANGE: 1960 Q1 TO 1986 Q2
     DW = 2.086   NOB = 106   ESTIMATED:  6/87
```

66. XGUV: (XGUV) GERMAN EXPORTS TO THE US --NOMINAL $

```
LOG(XGUV)  =    + .009884  +  .99695 * LOG(MUGV)  -  .085561 * Q1  -  .083864 * Q2
                 (.602979)    (153.441)              (4.68036)         (4.58803)

     -  .060274 * Q3 + XGU_ERR * BETA
       (3.2656)

     CRSQ  = .996  S.E.R. =  .067  MEAN LHS = 1.449  RANGE: 1960 Q1 TO 1986 Q2
     DW = 2.398   NOB = 106   ESTIMATED:  6/87
```

67. GFPXFTW: (GFPXFTW) GERMAN IMPORT PRICES FROM MCM COUNTRIES

```
GFPXFTW  =  UPXGUV**0.396552 * (CPXGUV * CEI)**0.155172 * (EPXGUV * EEI)
               **0.206897 * (JPXGUV * JEI)**0.241379
```

68. GEPCOMP: (GEPCOMP) THIRD COUNTRY PRICE FOR UK-GERMANY TRADE

```
GEPCOMP  =  (UPXGUV**0.396552 * (CPXGUV * CEI)**0.155172 * (JPXGUV * JEI)
               **0.241379)**(1/(1 - 0.20689))
```

69. GJPCOMP: (GJPCOMP) THIRD COUNTRY PRICE FOR GERMAN-JAPAN TRADE

```
GJPCOMP  =  (UPXGUV**0.396552 * (CPXGUV * CEI)**0.155172 * (EPXGUV * EEI)
               **0.206897)**(1/(1 - 0.2414))
```

70. GUPCOMP: (GUPCOMP) THIRD COUNTRY PRICE FOR GERMAN-US TRADE

GUPCOMP = ((CPXGUV * CEI)**0.155172 * (EPXGUV * EEI)**0.206897 * (JPXGUV * JEI)**0.241379)**(1/(1 - 0.3965))

71. MJEV: (MJEV) IMPORTS OF JAPAN FROM THE UK --NOMINAL $

LOG(MJEV/(EEI * JAIME_EXUVI)) = -3.92249 + .313387 * LOG(JGNPPOT)
(1.74985) (1.76135)

+ 2.38657 * (LOG(JGNP) - LOG(JGNPPOT)) - .28811 * LOG(EEI * JAIME_EXUVI/(JPGNP * JEI))
(1.43452) (1.51905)

+ .618213 * LOG(MJEV(-1)/(EEI(-1) * JAIME_EXUVI(-1))) - .054207 * Q1 - .024031 * Q2
(5.31699) (.939302) (.415304)

- .052443 * Q3 + MJE_ERR * BETA
(.912559)

CRSQ = .608 S.E.R. = .14 MEAN LHS = -3.793 RANGE: 1973 Q2 TO 1985 Q2
DW = 1.457 NOB = 49 ESTIMATED: 9/87

72. MJE: (MJE) IMPORTS OF JAPAN FROM THE UK --REAL $

MJE = MJEV/(EEI * (JAIME_EXUVI/100))

73. MJGV: (MJGV) IMPORTS OF JAPAN FROM GERMANY --NOMINAL $

LOG(MJGV/(GEI * GPXGUV)) = -2.14599 + .19837 * LOG(JGNPPOT)
(1.9851) (2.19285)

+ 1.89118 * (LOG(JGNP) - LOG(JGNPPOT))
(2.40883)

+ LAGCOEF1 * (LOG(GEI(I) * GPXGUV(I)/(JPGNP(I) * JEI(I))))

+ .649263 * LOG(MJGV(-1)/(GEI(-1) * GPXGUV(-1))) - .038706 * Q1 - .036911 * Q2
(7.05225) (1.38154) (1.32486)

- .089864 * Q3 + MJG_ERR * BETA
(3.22673)

CRSQ = .88 S.E.R. = .067 MEAN LHS = -.081 RANGE: 1973 Q2 TO 1985 Q2
DW = 2.003 NOB = 49 ESTIMATED: 9/87

LAG	LAGCOEF1	T-STAT
(-0)	-0.066	2.968
(-1)	-0.106	2.968
(-2)	-0.119	2.968
(-3)	-0.106	2.968
(-4)	-0.066	2.968
SUM:	-0.464	

74. MJG: (MJG) IMPORTS OF JAPAN FROM GERMANY --REAL $

MJG = MJGV/(GEI * GPXGUV)

75. MJCV: (MJCV) IMPORTS OF JAPAN FROM CANADA --NOMINAL $

```
LOG(MJCV/(CEI * CPXGUV))   =  -2.19721   +  .228746 * LOG(JGNPPOT)
                              (2.23104)     (2.62815)

     +  1.7275 * (LOG(JGNP) - LOG(JGNPPOT))
       (1.97329)

     +  LAGCOEF1 * (LOG(CEI(I) * CPXGUV(I)/(JPGNP(I) * JEI(I))))

     +  .335343 * LOG(MJCV(-1)/(CEI(-1) * CPXGUV(-1)))  -  .005472 * Q1  +  .132925 * Q2
       (2.5323)                                            (.188195)        (4.19208)

     +  .024850 * Q3 + MJC_ERR * BETA
       (.835654)

     CRSQ  = .699  S.E.R. =  .069999  MEAN LHS = .607  RANGE: 1973 Q2 TO 1985 Q2
     DW = 1.982   NOB = 49   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.035	2.545
(-1)	-0.056	2.545
(-2)	-0.063	2.545
(-3)	-0.056	2.545
(-4)	-0.035	2.545
SUM	-0.243	

76. MJC: (MJC) IMPORTS OF JAPAN FROM CANADA --REAL $

```
MJC  =  MJCV/(CEI * CPXGUV)
```

77. MJUV: (MJUV) IMPORTS OF JAPAN FROM THE US --NOMINAL $

```
LOG(MJUV/UPXGUV)   =  -1.66279   +  .194961 * LOG(JGNPPOT)  +  .969227 * (LOG(JGNP) - LOG(JGNPPOT))
                      (1.93876)    (2.35053)                  (1.42002)

     +  LAGCOEF1 * (LOG(UPXGUV(I)/(JPGNP(I) * JEI(I))))  +  .750613 * LOG(MJUV(-1)/UPXGUV(-1))
                                                           (9.03957)

     -  .011751 * Q1  +  .014920 * Q2  -  .041722 * Q3 + MJU_ERR * BETA
       (.522819)        (.659253)        (1.84746)

     CRSQ  = .879  S.E.R. =  .055  MEAN LHS = 2.179  RANGE: 1973 Q2 TO 1985 Q2
     DW = 2.422   NOB = 49   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.026	2.247
(-1)	-0.041	2.247
(-2)	-0.047	2.247
(-3)	-0.041	2.247
(-4)	-0.026	2.247
SUM:	-0.181	

78. MJU: (MJU) IMPORTS OF JAPAN FROM THE US --REAL $

```
MJU  =  MJUV/UPXGUV
```

79. MJLV: (MJLV) IMPORTS OF JAPAN FROM LDCS --NOMINAL $

```
LOG(MJLV/LPXGUV)  =  -5.15718  +  .531167 * LOG(JGNPPOT)  +  .496952 * (LOG(JGNP) - LOG(JGNPPOT))
                     (3.47703)    (3.70138)                   (.861566)

     +  LAGCOEF1 * (LOG(LPXGUV(I)/(JPGNP(I) * JEI(I))))

     +  LAGCOEF2 * (LOG(JFPXFTW(I)/(JPGNP(I) * JEI(I))))  +  .562773 * LOG(MJLV(-1)/LPXGUV(-1))
                                                           (5.65233)

     -  .104462 * Q1  +  .028120 * Q2  -  .032288 * Q3 + MJL_ERR * BETA
       (5.57018)        (1.38938)        (1.74015)

     CRSQ  = .959  S.E.R. =  .045  MEAN LHS = 2.242  RANGE: 1973 Q2 TO 1985 Q2
     DW = 2.473    NOB = 49   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	-0.077	2.869	0.051	1.847
(-1)	-0.123	2.869	0.082	1.847
(-2)	-0.139	2.869	0.092	1.847
(-3)	-0.123	2.869	0.082	1.847
(-4)	-0.077	2.869	0.051	1.847
SUM:	-0.539		0.357	

80. MJL: (MJL) IMPORTS OF JAPAN FROM LDCS --REAL $

```
MJL  =  MJLV/LPXGUV
```

81. MJIV: (MJIV) IMPORTS OF JAPAN FROM OTHER OECD--NOMINAL $

```
LOG(MJIV/IPXGUV)  =  1.12533  -  .018592 * LOG(JGNPPOT)  +  1.11123 * (LOG(JGNP) - LOG(JGNPPOT))
                     (.769008)   (.148049)                   (1.6485)

     -  1.35703 * LOG(IPXGUV/(JPGNP * JEI))  +  1.09435 * LOG(JFPXFTW/(JPGNP * JEI))
       (3.93167)                               (3.21041)

     +  .526664 * LOG(MJIV(-1)/IPXGUV(-1))  -  .083946 * Q1  +  .003028 * Q2
       (5.40256)                               (3.73185)         (.128699)

     -  .024250 * Q3 + MJI_ERR * BETA
       (1.08585)

     CRSQ  = .905  S.E.R. =  .055  MEAN LHS = 1.67  RANGE: 1973 Q2 TO 1985 Q2
     DW = 1.94   NOB = 49   ESTIMATED:  9/87
```

82. MJI: (MJI) IMPORTS OF JAPAN FROM OTHER OECD --REAL $

```
MJI  =  MJIV/IPXGUV
```

83. MJOV: (MJOV) IMPORTS OF JAPAN FROM OPEC --NOMINAL $

```
LOG(MJOV/OPOIL72)  =  2.41979  -  .136844 * LOG(JGNPPOT)  +  .406278 * (LOG(JGNP) - LOG(JGNPPOT))
                     (1.47289)   (1.0589)                    (.402535)

    +  LAGCOEF1 * (LOG(OPOIL72(I)/(JPGNP(I) * JEI(I))))  +  .607906 * LOG(MJOV(-1)/OPOIL72(-1))
                                                            (7.12001)

    -  .043208 * Q1  -  .13764 * Q2  -  .086689 * Q3 + MJO_ERR * BETA
      (1.303)          (5.8749)        (2.6974)

    CRSQ  = .812  S.E.R. =  .059  MEAN LHS = 1.412  RANGE: 1974 Q1 TO 1985 Q2
    RHO =  -.367 (3.2)   NOB = 45   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.013	3.759
(-1)	-0.022	3.841
(-2)	-0.027	3.949
(-3)	-0.027	4.072
(-4)	-0.022	4.047
(-5)	-0.013	2.778
(-6)	-0.000	0.018
(-7)	0.018	1.466
SUM:	-0.108	

84. MJO: (MJO) IMPORTS OF JAPAN FROM OPEC --REAL $

MJO = MJOV/OPOIL72

85. MJTV: (MJTV) TOTAL IMPORTS FROM JAPAN --NOMINAL $

MJTV = MJCV + MJEV + MJGV + MJUV + MJIV + MJLV + MJOV + MJZV

86. XJTV: (XJTV) TOTAL EXPORTS OF JAPAN -- NOMINAL $

XJTV = XJCV + XJEV + XJGV + XJUV + XJIV + XJLV + XJOV + XJZV

87. JTRADE: (JTRADE) JAPANESE TRADE BALANCE

JTRADE = XJTV - MJTV

88. XJCV: (XJCV) EXPORTS OF JAPAN TO CANADA -- NOMINAL $

```
XJCV  =  .911927 * MCJV + XJC_ERR * BETA
        (120.091)

    CRSQ  = .993  S.E.R. =  .177  MEAN LHS = 1.497  RANGE: 1960 Q1 TO 1986 Q2
    DW = 2.016   NOB = 106   ESTIMATED:  6/87
```

89. XJEV: (XJEV) EXPORTS OF JAPAN TO THE UK -- NOMINAL $

```
LOG(XJEV)  =  .150297  +  .958288 * LOG(MEJV)  -  .139785 * Q1  -  .155209 * Q2
             (3.90476)   (69.3745)                (2.59877)        (2.88538)

    -  .067166 * Q3 + XJE_ERR * BETA
      (1.23708)

    CRSQ  = .979  S.E.R. =  .196  MEAN LHS = -.123  RANGE: 1960 Q1 TO 1986 Q2
    DW = 1.744   NOB = 106   ESTIMATED:  6/87
```

90. XJGV: (XJGV) EXPORTS OF JAPAN TO GERMANY -- NOMINAL $

```
LOG(XJGV)  =    -  .021660  +  1.02411 * LOG(MGJV)  -  .016214 * Q1  -  .071905 * Q2
                  (1.19732)   (174.631)                (.639458)        (2.83707)

     +  .032698 * Q3 + XJG_ERR * BETA
       (1.2778)

     CRSQ  = .997  S.E.R. =  .091999  MEAN LHS = -.071  RANGE: 1960 Q1 TO 1986 Q2
     DW = 2.303   NOB = 106   ESTIMATED:  6/87
```

91. XJUV: (XJUV) EXPORTS OF JAPAN TO THE US -- NOMINAL $

```
LOG(XJUV)   =  -.012868  +  1.00321 * LOG(MUJV)  -  .103151 * Q1  -  .036702 * Q2
              (.926522)    (249.519)               (6.99702)        (2.49016)

     -  .037370 * Q3 + XJU_ERR * BETA
       (2.51188)

     CRSQ  = .998  S.E.R. =  .054  MEAN LHS = 2.192  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.989   NOB = 106   ESTIMATED:  6/87
```

92. JFPXFTW: (JFPXFTW) JAPANESE IMPORT PRICES FROM MCM COUNTRIES

```
JFPXFTW  =  UPXGUV**0.353846 * (CPXGUV * CEI)**0.138461 * (EPXGUV * EEI)

              **0.206897 * (GPXGUV * GEI)**0.323077
```

93. MUEV: (MUEV) IMPORTS OF THE US FROM THE UK --NOMINAL $

```
LOG(MUEV/(EEI * JAIME_EXUVI))   =  -8.55781  +  1.13412 * LOG(UGNPPOT)
                                  (3.94959)    (3.75187)

     +  1.59694 * (LOG(UGNP) - LOG(UGNPPOT))
       (2.30187)

     +  LAGCOEF1 * (LOG(EEI(I) * JAIME_EXUVI(I) * UTARIFF(I)/UPGNP(I)))

     +  .575253 * LOG(MUEV(-1)/(EEI(-1) * JAIME_EXUVI(-1)))  -  .000026 * Q1  +  .099526 * Q2
       (5.06864)                                              (.000662)        (2.46605)

     +  .059237 * Q3 + MUE_ERR * BETA
       (1.50014)

     CRSQ  = .904  S.E.R. =  .091  MEAN LHS = -2.065  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.365   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.991	3.438
(-1)	0.592	1.394
(-2)	-0.035	0.078
(-3)	0.355	0.792
(-4)	-0.406	0.903
(-5)	-0.399	0.884
(-6)	0.735	2.176
SUM:	-0.148	

94. MUE: (MUE) IMPORTS OF THE US FROM THE UK --REAL $

```
MUE  =  MUEV/(EEI * (JAIME_EXUVI/100))
```

95. MUGV: (MUGV) IMPORTS OF THE US FROM GERMANY --NOMINAL $

LOG(MUGV/(GEI * GPXGUV)) = -12.6817 + 1.93026 * LOG(UGNPPOT)
(4.81247) (4.86119)

+ 2.75425 * (LOG(UGNP) - LOG(UGNPPOT))
(3.51151)

+ LAGCOEF1 * (LOG(GEI(I) * GPXGUV(I) * UTARIFF(I)/UPGNP(I)))

+ LAGCOEF2 * (LOG(UGPCOMP(I) * UTARIFF(I)/UPGNP(I)))

+ .330933 * LOG(MUGV(-1)/(GEI(-1) * GPXGUV(-1))) + .004717 * Q1 + .029175 * Q2
(2.20151) (.144067) (.893636)

- .047988 * Q3 + MUG_ERR * BETA
(1.40746)

CRSQ = .932 S.E.R. = .076 MEAN LHS = 1.57 RANGE: 1973 Q1 TO 1985 Q2
DW = 2.139 NOB = 50 ESTIMATED: 9/87

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	-0.096	2.640	-0.018	0.037
(-1)	-0.164	2.640	0.219	0.344
(-2)	-0.205	2.640	0.483	0.743
(-3)	-0.219	2.640	0.806	1.217
(-4)	-0.205	2.640	-0.868	1.325
(-5)	-0.164	2.640	-0.363	0.555
(-6)	-0.096	2.640	0.260	0.536
SUM:	-1.150		0.519	

96. MUG: (MUG) IMPORTS OF THE US FROM GERMANY--REAL $

MUG = MUGV/(GEI * GPXGUV)

97. MUJV: (MUJV) IMPORTS OF THE US FROM JAPAN --NOMINAL $

LOG(MUJV/(JEI * JPXGUV)) = -10.3444 + 1.59426 * LOG(UGNPPOT)
(3.94826) (4.00106)

+ 1.16886 * (LOG(UGNP) - LOG(UGNPPOT))
(2.12963)

+ LAGCOEF1 * (LOG(JEI(I) * JPXGUV(I) * UTARIFF(I)/UPGNP(I)))

- .038725 * LOG(UJPCOMP * UTARIFF/UPGNP) + .549535 * LOG(MUJV(-1)/(JEI(-1) * JPXGUV(-1)))
(.195528) (4.81053)

+ .027926 * Q1 + .049231 * Q2 + .034968 * Q3 + MUJ_ERR * BETA
(.958706) (1.6624) (1.17831)

CRSQ = .973 S.E.R. = .071 MEAN LHS = 2.62 RANGE: 1973 Q1 TO 1985 Q2
DW = 1.519 NOB = 50 ESTIMATED: 9/87

LAG	LAGCOEF1	T-STAT
(-0)	-1.034	2.982
(-1)	1.092	2.281
(-2)	-0.574	1.748
SUM:	-0.516	

98. MUJ: (MUJ) IMPORTS OF THE US FROM JAPAN --REAL $

MUJ = MUJV/(JEI * JPXGUV)

99. MUCV: (MUCV) IMPORTS OF THE US FROM CANADA --NOMINAL $

```
LOG(MUCV/(CEI * CPXGUV))   =  -10.2932   +  1.86032 * LOG(UGNPPOT)
                              (4.81929)     (6.36058)

     +  2.7251 * (LOG(UGNP) - LOG(UGNPPOT))
       (3.88447)

     +  LAGCOEF1 * (LOG(CEI(I) * CPXGUV(I) * UTARIFF(I)/UPGNP(I)))  -  .039549 * Q1
                                                                     (2.65507)

     +  .022661 * Q2  -  .098199 * Q3 + MUC_ERR * BETA
       (1.31712)        (6.45849)

     CRSQ  = .948  S.E.R. =  .05  MEAN LHS = 2.945  RANGE: 1972 Q4 TO 1985 Q2
     RHO =  .608 (4.8)   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.999	4.137
(-1)	0.053	0.310
(-2)	0.325	1.849
(-3)	-0.185	0.767
SUM:	-0.805	

100. MUC: (MUC) IMPORTS OF THE US FROM CANADA --REAL $

```
MUC  =  MUCV/(CEI * CPXGUV)
```

101. MULV: (MULV) IMPORTS OF THE US FROM LDCS --NOMINAL $

```
LOG(MULV/LPXGUV)   =  -9.06081   +  1.43891 * LOG(UGNPPOT)  +  .086317 * (LOG(UGNP) - LOG(UGNPPOT))
                      (3.73126)     (3.7317)                   (.234983)

     +  LAGCOEF1 * (LOG(LPXGUV(I) * UTARIFF(I)/UPGNP(I)))  +  .522463 * LOG(MULV(-1)/LPXGUV(-1))
                                                             (3.84985)

     +  .012781 * Q1  +  .005020 * Q2  +  .025215 * Q3 + MUL_ERR * BETA
       (.607366)        (.240889)        (1.17741)

     CRSQ  = .977  S.E.R. =  .052  MEAN LHS = 3.01  RANGE: 1973 Q1 TO 1985 Q2
     DH = 1.869   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.018	2.380
(-1)	-0.032	2.380
(-2)	-0.039	2.380
(-3)	-0.042	2.380
(-4)	-0.039	2.380
(-5)	-0.032	2.380
(-6)	-0.018	2.380
SUM:	-0.221	

102. MUL: (MUL) IMPORTS OF THE US FROM LDCS --REAL $

```
MUL  =  MULV/LPXGUV
```

103. MUIV: (MUIV) IMPORTS OF THE US FROM OTHER OECD--NOMINAL $

```
LOG(MUIV/IPXGUV)   =  -11.0066  +  1.78039 * LOG(UGNPPOT)  +  1.47671 * (LOG(UGNP) - LOG(UGNPPOT))
                      (5.91649)    (6.07863)                   (3.05965)

    +  LAGCOEF1 * (LOG(IPXGUV(I) * UTARIFF(I)/UPGNP(I)))  +  .288866 * LOG(MUIV(-1)/IPXGUV(-1))
                                                             (2.37048)

    -  .010306 * Q1  +  .007628 * Q2  -  .022243 * Q3 + MUI_ERR * BETA
      (.409347)        (.302318)        (.864078)

    CRSQ  = .954  S.E.R. =  .063  MEAN LHS = 2.431  RANGE: 1973 Q1 TO 1985 Q2
    DW = 2.222   NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.355	3.608
(-1)	-0.179	4.490
(-2)	-0.051	1.668
(-3)	0.030	0.596
(-4)	0.064	1.093
(-5)	0.051	0.995
(-6)	-0.010	0.278
(-7)	-0.117	2.364
(-8)	-0.272	2.519
SUM:	-0.839	

104. MUI: (MUI) IMPORTS OF THE US FROM OTHER OECD--REAL $

MUI = MUIV/IPXGUV

105. MUOV: (MUOV) IMPORTS OF THE US FROM OPEC --NOMINAL $

```
LOG(MUOV/OPOIL72)   =  1.47359  +  2.26283 * (LOG(UGNP) - LOG(UGNPPOT))
                      (3.36447)   (1.50846)

    +  LAGCOEF1 * (LOG(OPOIL72(I) * UTARIFF(I)/UPGNP(I)))  +  .633566 * LOG(MUOV(-1)/OPOIL72(-1))
                                                              (6.16408)

    -  .024352 * Q1  -  .029716 * Q2  +  .042953 * Q3 + MUO_ERR * BETA
      (.381529)        (.471041)        (.667227)

    CRSQ  = .928  S.E.R. =  .143  MEAN LHS = 1.256  RANGE: 1976 Q2 TO 1986 Q2
    DW = 2.063   NOB = 41   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.008	2.330
(-1)	-0.016	2.330
(-2)	-0.022	2.330
(-3)	-0.028	2.330
(-4)	-0.032	2.330
(-5)	-0.036	2.330
(-6)	-0.038	2.330
(-7)	-0.040	2.330
(-8)	-0.040	2.330
(-9)	-0.040	2.330
(-10)	-0.038	2.330
(-11)	-0.036	2.330
(-12)	-0.032	2.330
(-13)	-0.028	2.330
(-14)	-0.022	2.330
(-15)	-0.016	2.330
(-16)	-0.008	2.330
SUM:	-0.482	

106. MUO: (MUO) IMPORTS OF THE US FROM OPEC --REAL $

MUO = MUOV/OPOIL72

107. MUTV: (MUTV) TOTAL IMPORTS OF THE US --NOMINAL $

MUTV = MUCV + MUEV + MUGV + MUJV + MUIV + MULV + MUOV + MUZV

108. XUTV: (XUTV) TOTAL EXPORTS OF THE US --NOMINAL $

XUTV = XUCV + XUEV + XUGV + XUJV + XUIV + XULV + XUOV + XUZV

109. UTRADE: (UTRADE) US TRADE BALANCE

UTRADE = XUTV - MUTV

110. XUCV: (XUCV) EXPORTS OF THE US TO CANADA --NOMINAL $

```
LOG(XUCV)  =  -.026796  +  .950034 * LOG(MCUV)  -  .013906 * Q1  +  .008312 * Q2
              (2.00323)    (240.165)                (1.35367)        (.809043)

     +  .000543 * Q3 + XUC_ERR * BETA
       (.05235)

     CRSQ  = .998  S.E.R. =  .037  MEAN LHS = 2.637  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.279   NOB = 106   ESTIMATED:  6/87
```

111. XUEV: (XUEV) EXPORTS OF THE US TO THE UK --NOMINAL $

```
LOG(XUEV)  =  -.104944  +  1.03366 * LOG(MEUV)  -  .059005 * Q1  -  .084906 * Q2
              (5.28696)    (114.479)                (2.84959)        (4.10051)

     -  .046155 * Q3 + XUE_ERR * BETA
       (2.20582)

     CRSQ  = .992  S.E.R. =  .075  MEAN LHS = 1.334  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.823   NOB = 106   ESTIMATED:  6/87
```

112. XUGV: (XUGV) EXPORTS OF THE US TO GERMANY --NOMINAL $

```
LOG(XUGV)  =  -.364822  +  1.07299 * LOG(MGUV)  +  .015915 * Q1  -  .011594 * Q2
              (10.9192)    (69.8863)                (.484136)        (.352782)

     +  .016254 * Q3 + XUG_ERR * BETA
       (.489067)

     CRSQ  = .979  S.E.R. =  .12  MEAN LHS = 1.257  RANGE: 1960 Q1 TO 1986 Q2
     DW = .992   NOB = 106   ESTIMATED:  6/87
```

113. XUJV: (XUJV) EXPORTS OF THE US TO JAPAN --NOMINAL $

```
LOG(XUJV)  =  -.143099  +  1.01282 * LOG(MJUV)  -  .041308 * Q1  -  .092451 * Q2
              (8.80429)    (176.45)                 (2.57314)        (5.75836)

     -  .043979 * Q3 + XUJ_ERR * BETA
       (2.71351)

     CRSQ  = .997  S.E.R. =  .058  MEAN LHS = 1.84  RANGE: 1960 Q1 TO 1986 Q2
     DW = 1.745   NOB = 106   ESTIMATED:  6/87
```

114. UGPCOMP: (UGPCOMP) THIRD COUNTRY PRICE FOR US-GERMAN TRADE

```
UGPCOMP  =  ((CPXGUV * CEI)**0.165 * (EPXGUV * EEI)**0.215 * (JPXGUV * JEI)
             **0.245)**(1/(1 - 0.375))
```

115. UJPCOMP: (UJPCOMP) THIRD COUNTRY PRICE FOR US-JAPAN TRADE

UJPCOMP = ((CPXGUV * CEI)**0.165 * (EPXGUV * EEI)**0.215 * (GPXGUV * GEI)
0.375)(1/(1 - 0.245))

116. UCPCOMP: (UCPCOMP) THIRD COUNTRY PRICE FOR US-CANADA TRADE

UCPCOMP = ((EPXGUV * EEI)**0.215 * (GPXGUV * GEI)**0.375 * (JPXGUV * JEI)
0.245)(1/(1 - 0.165))

117. UEPCOMP: (UEPCOMP) THIRD COUNTRY PRICE FOR US-UK TRADE

UEPCOMP = ((CPXGUV * CEI)**0.165 * (GPXGUV * GEI)**0.375 * (JPXGUV * JEI)
0.245)(1/(1 - 0.215))

118. UFPXFTW: (UFPXFTW) U.S. IMPORT PRICES FROM MCM COUNTRIES

UFPXFTW = (CPXGUV * CEI)**0.165 * (EPXGUV * EEI)**0.215 * (GPXGUV * GEI)
0.375 * (JPXGUV * JEI)0.245

119. XEIV: (XEIV) EXPORTS OF THE UK TO OTHER OECD --NOMINAL $

LOG(XEIV/(EEI * JAIME_EXUVI)) = -6.2303 + 1.53892 * IGNPTRD
(4.47206) (4.91071)

+ 1.04727 * (LOG(ROWIPEEC) - IGNPTRD) - .320252 * LOG(EEI * JAIME_EXUVI/IPXGUV)
(3.842) (2.34379)

- .432223 * LOG(UEPCOMP/IPXGUV) + .418515 * LOG(XEIV(-1)/(EEI(-1) * JAIME_EXUVI(-1)))
(1.39455) (3.45643)

- .082212 * Q1 - .065332 * Q2 - .144812 * Q3 + XEI_ERR * BETA
(3.57901) (3.1521) (6.76881)

CRSQ = .912 S.E.R. = .046 MEAN LHS = -.666 RANGE: 1973 Q1 TO 1985 Q2
DW = 1.613 NOB = 50 ESTIMATED: 9/87

120. XEI: (XEI) UK EXPORTS TO OTHER OECD -- REAL $

XEI = XEIV/(EEI * (JAIME_EXUVI/100))

121. XGIV: (XGIV) EXPORTS OF GERMANY TO OTHER OECD --NOMINAL $

LOG(XGIV/(GEI * GPXGUV)) = -3.081 + 1.24233 * IGNPTRD + .952816 * (LOG(ROWIPEEC) - IGNPTRD)
(5.46947) (6.70395) (5.72815)

- .182959 * LOG(GEI * GPXGUV/IPXGUV) + .099950 * LOG(UGPCOMP/IPXGUV)
(1.64056) (.876437)

+ .307926 * LOG(XGIV(-1)/(GEI(-1) * GPXGUV(-1))) - .107172 * D7511 - .041585 * Q1
(3.22427) (3.98517) (3.26878)

- .048786 * Q2 - .114721 * Q3 + XGI_ERR * BETA
(4.18055) (9.96108)

CRSQ = .97 S.E.R. = .023 MEAN LHS = 3.631 RANGE: 1973 Q1 TO 1985 Q2
DW = 1.531 NOB = 50 ESTIMATED: 9/87

122. XGI: (XGI) GERMAN EXPORTS TO OTHER OECD -- REAL $

XGI = XGIV/(GEI * GPXGUV)

123. XJIV: (XJIV) EXPORTS OF JAPAN TO OTHER OECD --NOMINAL $

```
LOG(XJIV/(JEI * JPXGUV))  =  -1.9048  +  .518775 * IGNPTRD  +  .403429 * (LOG(ROWIPEEC) - IGNPTRD)
                            (1.08535)   (1.2739)             (1.24807)

     -  .191427 * LOG(JEI * JPXGUV/IPXGUV)  +  .673539 * LOG(UJPCOMP/IPXGUV)
       (1.07154)                              (.897134)

     +  .761778 * LOG(XJIV(-1)/(JEI(-1) * JPXGUV(-1)))  -  .131784 * Q1  -  .025751 * Q2
       (7.52895)                                          (4.58949)        (.878861)

     +  .013819 * Q3 + XJI_ERR * BETA
       (.470808)

     CRSQ  = .932  S.E.R. =  .07  MEAN LHS = 1.763  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.57   NOB = 50   ESTIMATED:  9/87
```

124. XJI: (XJI) JAPANESE EXPORTS TO OTHER OECD -- REAL $

XJI = XJIV/(JEI * JPXGUV)

125. XCIV: (XCIV) EXPORTS OF CANADA TO OTHER OECD --NOMINAL $

```
LOG(XCIV/(CEI * CPXGUV))  =  -6.99262  +  1.60257 * IGNPTRD
                             (4.47515)   (4.60902)

     +  1.75712 * (LOG(ROWIPEEC) - IGNPTRD)  -  .428261 * LOG(CEI * CPXGUV/IPXGUV)
       (4.22915)                               (2.43061)

     -  .82332 * LOG(UCPCOMP/IPXGUV)  +  .534988 * LOG(XCIV(-1)/(CEI(-1) * CPXGUV(-1)))
       (1.58756)                        (5.6131)

     -  .123899 * Q1  -  .030853 * Q2  -  .118089 * Q3 + XCI_ERR * BETA
       (3.64719)        (.943586)        (3.4564)

     CRSQ  = .747  S.E.R. =  .082  MEAN LHS = .565  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.341   NOB = 50   ESTIMATED:  9/87
```

126. XCI: (XCI) CANADIAN EXPORTS TO OTHER OECD -- REAL $

XCI = XCIV/(CEI * CPXGUV)

127. XUIV: (XUIV) EXPORTS OF THE UNITED STATES TO OTHER OECD --NOMINAL $

```
LOG(XUIV/UPXGUV)  =  -3.69356  +  1.11382 * IGNPTRD  +  .976349 * (LOG(ROWIPEEC) - IGNPTRD)
                     (3.27099)   (3.84355)             (3.38676)

     -  .348051 * LOG(UPXGUV/IPXGUV)  +  .133837 * LOG(UFPXFTW/IPXGUV)
       (2.46866)                        (.324734)

     +  .518745 * LOG(XUIV(-1)/UPXGUV(-1))  -  .042157 * Q1  -  .077695 * Q2
       (4.75385)                              (1.70143)        (3.03437)

     -  .172988 * Q3 + XUI_ERR * BETA
       (6.84305)

     CRSQ  = .874  S.E.R. =  .054  MEAN LHS = 2.713  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.252   NOB = 50   ESTIMATED:  9/87
```

128. XUI: (XUI) US EXPORTS TO OTHER OECD -- REAL $

XUI = XUIV/UPXGUV

129. MILV: (MILV) IMPORTS OF OTHER OECD FROM LDCS --NOMINAL $

```
LOG(MILV/LPXGUV)  =  -6.93328  +  2.04996 * IGNPTRD  +  1.26825 * (LOG(ROWIPEEC) - IGNPTRD)
                     (6.61021)   (6.90546)             (5.75356)

    -  .479371 * LOG(LPXGUV/IPXGUV)  +  .210052 * LOG(MILV(-1)/LPXGUV(-1))  -  .030655 * Q1
      (4.54299)                        (1.84452)                               (2.11164)

    -  .001593 * Q2  -  .051996 * Q3 + MIL_ERR * BETA
      (.11678)         (3.5709)

    CRSQ  = .967  S.E.R. =  .053  MEAN LHS = [illegible].935  RANGE: 1973 Q1 TO [illegible] Q2
    DW = 1.959    NOB = 50   ESTIMATED:  9/87
```

130. MIL: (MIL) IMPORTS OF OTHER OECD FROM LDCS --REAL $

```
MIL  =  MILV/LPXGUV
```

131. MIOV: (MIOV) IMPORTS OF OTHER OECD FROM OPEC --NOMINAL $

```
LOG(MIOV/OPOIL72)  =  1.41341  -  .087714 * IGNPTRD  +  1.31013 * (LOG(ROWIPEEC) - IGNPTRD)
                     (1.29999)   (.375051)              (4.03431)

    +  LAGCOEF1 * (LOG(OPOIL72(I)/IPXGUV(I)))  +  .533212 * LOG(MIOV(-1)/OPOIL72(-1))
                                                  (7.14767)

    -  .423281 * D7341  -  .508747 * D7411  -  .092216 * Q1  -  .095554 * Q2
      (5.99002)           (7.06979)           (3.48076)         (3.74225)

    -  .072872 * Q3 + MIO_ERR * BETA
      (2.80877)

    CRSQ  = .961  S.E.R. =  .062  MEAN LHS = 1.798  RANGE: 1973 Q1 TO 1985 Q2
    DW = 1.842    NOB = 50   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.018	2.093
(-1)	-0.027	2.093
(-2)	-0.027	2.093
(-3)	-0.018	2.093
SUM:	-0.091	

132. MIO: (MIO) IMPORTS OF OTHER OECD FROM OPEC --REAL $

```
MIO  =  MIOV/OPOIL72
```

133. XITV: (XITV) TOTAL EXPORTS OF OTHER OECD --NOMINAL $

```
XITV  =  MCTV + METV + MGTV + MJTV + MUTV + MLTV + MITV + MOTV + MZTV +
             XWTV_ERR - (XCTV + XETV + XGTV + XJTV + XUTV + XLTV + XOTV + XZTV)
```

134. MITV: (MITV) TOTAL IMPORTS OF OTHER OECD --NOMINAL $

```
MITV  =  XCIV + XEIV + XGIV + XJIV + XUIV + (MILV + MIOV) * 0.7 + MIZV
```

135. ITRADE: (ITRADE) OTHER OECD TRADE BALANCE

```
ITRADE  =  XITV - MITV
```

136. MZTV: (MZTV) TOTAL IMPORTS OF RESIDUAL REGION -- NOMINAL $

MZTV = XCZV + XEZV + XGZV + XJZV + XUZV + XIZV + XLZV + XOZV

137. XZTV: (XZTV) TOTAL EXPORTS OF RESIDUAL REGION -- NOMINAL $

XZTV = MCZV + MEZV + MGZV + MJZV + MUZV + MIZV + MLZV + MOZV

138. ZTRADE: (ZTRADE) REDIUAL REGION TRADE BALANCE

ZTRADE = XZTV - MZTV

139. XELV: (XELV) EXPORTS OF THE UK TO LDCS -- NOMINAL $

LOG(XELV/(EEI * JAIME_EXUVI)) = -.912372 + .053858 * LGNPTRD
(2.89744) (1.66331)

+ .203426 * (LOG(ROWIPLDC) - LGNPTRD)
(2.00185)

+ LAGCOEF1 * (LOG(EEI(I-1) * JAIME_EXUVI(I-1)/LPXGUV(I-1)))

+ .340447 * LOG(XELV(-1)/(EEI(-1) * JAIME_EXUVI(-1))) - .062280 * Q1 - .016251 * Q2
(2.44527) (3.29063) (.953048)

- .066606 * Q3 + XEL_ERR * BETA
(3.65228)

CRSQ = .298 S.E.R. = .043 MEAN LHS = -1.588 RANGE: 1973 Q1 TO 1985 Q2
DW = 1.85 NOB = 50 ESTIMATED: 9/87

LAG	LAGCOEF1	T-STAT
(-0)	-0.021	1.359
(-1)	-0.031	1.359
(-2)	-0.031	1.359
(-3)	-0.021	1.359
SUM:	-0.103	

140. XEL: (XEL) BRITISH EXPORTS TO LDCS --REAL $

XEL = XELV/(EEI * (JAIME_EXUVI/100))

141. XGLV: (XGLV) EXPORTS OF GERMANY TO LDCS -- NOMINAL $

LOG(XGLV/(GEI * GPXGUV)) = .353214 + .093021 * LGNPTRD + .325177 * (LOG(ROWIPLDC) - LGNPTRD)
(2.33933) (3.44421) (3.5108)

- .450963 * LOG(GEI * GPXGUV/LPXGUV) + .133004 * LOG(UGPCOMP/LPXGUV)
(4.47377) (1.16576)

+ .686506 * LOG(XGLV(-1)/(GEI(-1) * GPXGUV(-1))) - .145604 * Q1 - .061898 * Q2
(9.26714) (9.7978) (4.38306)

- .100343 * Q3 + XGL_ERR * BETA
(6.99272)

CRSQ = .902 S.E.R. = .035 MEAN LHS = 2.274 RANGE: 1973 Q1 TO 1985 Q2
DW = 2.066 NOB = 50 ESTIMATED: 9/87

142. XGL: (XGL) GERMAN EXPORTS TO LDCS --REAL $

XGL = XGLV/(GEI * GPXGUV)

143. XJLV: (XJLV) EXPORTS OF JAPAN TO LDCS -- NOMINAL $

```
LOG(XJLV/(JEI * JPXGUV))  =  .064777  +  .215446 * LGNPTRD  +  .012468 * (LOG(ROWIPLDC) - LGNPTRD)
                            (.428661)   (2.90715)              (.120586)

     - .289814 * LOG(JEI * JPXGUV/LPXGUV)  -  .218195 * LOG(UJPCOMP/LPXGUV)
       (2.48597)                              (1.28553)

     + .634191 * LOG(XJLV(-1)/(JEI(-1) * JPXGUV(-1)))  -  .15909 * Q1  -  .033861 * Q2
       (6.31528)                                          (8.49358)      (1.80634)

     - .062862 * Q3 + XJL_ERR * BETA
       (3.4825)

     CRSQ  = .975  S.E.R. =  .044  MEAN LHS = 2.759  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.079   NOB = 50   ESTIMATED:  9/87
```

144. XJL: (XJL) JAPANESE EXPORTS TO LDCS --REAL $

```
XJL  =  XJLV/(JEI * JPXGUV)
```

145. XCLV: (XCLV) EXPORTS OF CANADA TO LDCS -- NOMINAL $

```
LOG(XCLV/(CEI * CPXGUV))  =  -.557672  +  .211437 * LGNPTRD  -  .24507 * (LOG(ROWIPLDC) - LGNPTRD)
                             (1.41874)   (2.20551)              (.685626)

     - .5705 * LOG(CEI * CPXGUV/LPXGUV)  +  .245006 * LOG(UCPCOMP/LPXGUV)
       (1.91528)                            (.834649)

     + .40726 * LOG(XCLV(-1)/(CEI(-1) * CPXGUV(-1)))  -  .168379 * Q1  +  .073396 * Q2
       (3.04021)                                        (4.33395)       (1.78804)

     - .068665 * Q3 + XCL_ERR * BETA
       (1.69313)

     CRSQ  = .826  S.E.R. =  .095  MEAN LHS = .657  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.24   NOB = 50   ESTIMATED:  9/87
```

146. XCL: (XCL) CANADIAN EXPORTS TO LDCS --REAL $

```
XCL  =  XCLV/(CEI * CPXGUV)
```

147. XULV: (XULV) EXPORTS OF THE US TO LDCS -- NOMINAL $

```
LOG(XULV/UPXGUV)  =  .108578  +  .094242 * LGNPTRD  +  .111764 * (LOG(ROWIPLDC) - LGNPTRD)
                    (.581981)   (2.25373)              (.653252)

     - .265489 * LOG(UPXGUV/LPXGUV)  +  .065942 * LOG(UFPXFTW/LPXGUV)
       (1.52394)                       (.364921)

     + .826457 * LOG(XULV(-1)/UPXGUV(-1))  -  .025748 * Q1  +  .036043 * Q2
       (13.1891)                              (1.35526)       (1.8917)

     - .029191 * Q3 + XUL_ERR * BETA
       (1.5111)

     CRSQ  = .945  S.E.R. =  .047  MEAN LHS = 3.099  RANGE: 1973 Q1 TO 1985 Q2
     DW = 1.65   NOB = 50   ESTIMATED:  9/87
```

148. XUL: (XUL) US EXPORTS TO LDCS --REAL $

```
XUL  =  XULV/UPXGUV
```

149. MLIV: (MLIV) IMPORTS OF LDCS FROM OTHER OECD --NOMINAL $

```
LOG(MLIV/IPXGUV)   =  .526459  +  .181271 * LGNPTRD  +  .239779 * (LOG(ROMIPLDC) - LGNPTRD)
                     (3.20928)   (3.49623)             (2.76362)

     - .26218 * LOG(IPXGUV/LPXGUV)  +  .61077 * LOG(MLIV(-1)/IPXGUV(-1))  -  .172366 * Q1
      (2.39845)                      (5.77809)                              (9.22855)

     - .065035 * Q2  -  .149828 * Q3 + MLI_ERR * BETA
      (4.48147)        (9.46812)

     CRSQ  = .956  S.E.R. =  .036  MEAN LHS = 3.224  RANGE: 1973 Q1 TO 1985 Q2
     DW = 2.362   NOB = 50   ESTIMATED:  9/87
```

150. MLI: (MLI) IMPORTS OF LDCS FROM OTHER OECD -- REAL $

MLI = MLIV/IPXGUV

151. MLOV: (MLOV) IMPORTS OF LDCS FROM OPEC --NOMINAL $

```
LOG(MLOV/OPOIL72)   =  .581092  +  .045322 * LGNPTRD  +  .44051 * (LOG(ROMIPLDC) - LGNPTRD)
                      (2.22493)   (.596514)             (1.95766)

     - .055587 * LOG(OPOIL72/LPXGUV)  +  .527734 * LOG(MLOV(-1)/OPOIL72(-1))  -  .580985 * D7341
      (1.04201)                        (5.08365)                                (6.70051)

     + .083587 * Q1  +  .005453 * Q2  -  .001622 * Q3 + MLO_ERR * BETA
      (2.44314)        (.162164)        (.04848)

     CRSQ  = .757  S.E.R. =  .08  MEAN LHS = 1.572  RANGE: 1973 Q1 TO 1984 Q4
     DW = 2.022   NOB = 48   ESTIMATED:  9/87
```

152. MLO: (MLO) IMPORTS OF LDCS FROM OPEC -- REAL $

MLO = MLOV/OPOIL72

153. MLTV: (MLTV) TOTAL IMPORTS OF LDCS -- NOMINAL $

MLTV = XCLV + XELV + XGLV + XJLV + XULV + MLOV + MLIV + MLZV

154. XLTV: (XLTV) TOTAL EXPORTS OF LDCS -- NOMINAL $

XLTV = MCLV + MELV + MGLV + MJLV + MULV + MILV + MOLV + XLZV

155. LTRADE: (LTRADE) LDCS TRADE BALANCE

LTRADE = XLTV - MLTV

156. XEOV: (XEOV) EXPORTS OF THE UK TO OPEC -- NOMINAL $

```
LOG(XEOV/(EEI * JAIME_EXUVI))   =  -1.01452  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                                   (4.41635)

    +  LAGCOEF2 * (LOG(EEI(I) * JAIME_EXUVI(I)/OPOIL72(I)))

    +  .734025 * LOG(XEOV(-1)/(EEI(-1) * JAIME_EXUVI(-1)))  -  .354002 * D7911  -  .065990 * Q1
      (14.7932)                                               (5.21432)          (2.40111)

    +  .009074 * Q2  -  .087810 * Q3 + XEO_ERR * BETA
      (.347076)        (3.36736)

    CRSQ  = .903  S.E.R. =  .061  MEAN LHS = -2.187  RANGE: 1974 Q2 TO 1984 Q4
    DW = 2.168    NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.061	2.721	-0.044	2.143
(-1)	0.091	2.721	-0.066	2.143
(-2)	0.091	2.721	-0.066	2.143
(-3)	0.061	2.721	-0.044	2.143
SUM:	0.304		-0.219	

157. XEO: (XEO) BRITISH EXPORTS TO OPEC --REAL $

```
XEO  =  XEOV/(EEI * (JAIME_EXUVI/100))
```

158. XGOV: (XGOV) EXPORTS OF GERMNAY TO OPEC -- NOMINAL $

```
LOG(XGOV/(GEI * GPXGUV))   =  -1.19049  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                              (2.4712)

    +  LAGCOEF2 * (LOG(GEI(I) * GPXGUV(I)/OPOIL72(I)))

    +  .741196 * LOG(XGOV(-1)/(GEI(-1) * GPXGUV(-1)))  -  .150017 * Q1  -  .034825 * Q2
      (13.3009)                                          (4.42903)       (1.05602)

    -  .030280 * Q3 + XGO_ERR * BETA
      (.924343)

    CRSQ  = .899  S.E.R. =  .077  MEAN LHS = 1.565  RANGE: 1974 Q2 TO 1984 Q4
    DW = 1.709    NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.081	3.155	-0.061	3.409
(-1)	0.121	3.155	-0.092	3.409
(-2)	0.121	3.155	-0.092	3.409
(-3)	0.081	3.155	-0.061	3.409
SUM:	0.403		-0.307	

159. XGO: (XGO) GERMAN EXPORTS TO OPEC --REAL $

```
XGO  =  XGOV/(GEI * GPXGUV)
```

160. XJOV: (XJOV) EXPORTS OF JAPAN TO OPEC -- NOMINAL $

```
LOG(XJOV/(JEI * JPXGUV))  =  -.431843  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                             (1.20389)

    +  LAGCOEF2 * (LOG(JEI(I) * JPXGUV(I)/OPOIL72(I)))

    +  .631049 * LOG(XJOV(-1)/(JEI(-1) * JPXGUV(-1)))  -  .172144 * Q1  +  .000018 * Q2
      (10.2873)                                          (5.73285)        (.000636)

    -  .054669 * Q3 + XJO_ERR * BETA
      (1.8942)

    CRSQ  = .94   S.E.R. =  .068  MEAN LHS = 1.94  RANGE: 1974 Q2 TO 1984 Q4
    DW = 1.642    NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.048	2.517	-0.067	3.850
(-1)	0.072	2.517	-0.101	3.850
(-2)	0.072	2.517	-0.101	3.850
(-3)	0.048	2.517	-0.067	3.850
SUM:	0.240		-0.337	

161. XJO: (XJO) JAPANESE EXPORTS TO OPEC --REAL $

```
XJO  =  XJOV/(JEI * JPXGUV)
```

162. XCOV: (XCOV) EXPORTS OF CANADA TO OPEC -- NOMINAL $

```
LOG(XCOV/(CEI * CPXGUV))  =  -2.24573  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                             (2.49885)

    +  LAGCOEF2 * (LOG(CEI(I) * CPXGUV(I)/OPOIL72(I)))

    +  .516627 * LOG(XCOV(-1)/(CEI(-1) * CPXGUV(-1)))  -  .160765 * Q1  -  .020222 * Q2
      (4.37939)                                          (2.4056)         (.310185)

    -  .060261 * Q3 + XCO_ERR * BETA
      (.934627)

    CRSQ  = .739  S.E.R. =  .151  MEAN LHS = -.472  RANGE: 1974 Q2 TO 1984 Q4
    DW = 2.167    NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.089	2.233	-0.100	2.624
(-1)	0.134	2.233	-0.151	2.624
(-2)	0.134	2.233	-0.151	2.624
(-3)	0.089	2.233	-0.100	2.624
SUM:	0.445		-0.502	

163. XCO: (XCO) CANADIAN EXPORTS TO OPEC --REAL $

```
XCO  =  XCOV/(CEI * CPXGUV)
```

164. XUOV: (XUOV) EXPORTS OF THE US TO OPEC -- NOMINAL $

```
LOG(XUOV/UPXGUV)   =  -.419865  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                      (1.52119)

    +  LAGCOEF2 * (LOG(UPXGUV(I)/OPOIL72(I)))  +  .740456 * LOG(XUOV(-1)/UPXGUV(-1))
                                                 (13.0686)

    -  .104742 * Q1  +  .018150 * Q2  -  .062178 * Q3 + XUO_ERR * BETA
      (3.80917)        (.678492)        (2.33542)

    CRSQ  = .888  S.E.R. =  .062  MEAN LHS = 1.944  RANGE: 1974 Q2 TO 1984 Q4
    DW = 1.61   NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.050	3.187	-0.027	2.169
(-1)	0.075	3.187	-0.041	2.169
(-2)	0.075	3.187	-0.041	2.169
(-3)	0.050	3.187	-0.027	2.169
SUM:	0.251		-0.137	

165. XUO: (XUO) US EXPORTS TO OPEC --REAL $

XUO = XUOV/UPXGUV

166. MOIV: (MOIV) EXPORTS OF OTHER OECD TO OPEC -- NOMINAL $

```
LOG(MOIV/IPXGUV)   =  -.530978  +  LAGCOEF1 * (LOG(XOTV(I)/OPOIL72(I)))
                      (1.48289)

    +  LAGCOEF2 * (LOG(IPXGUV(I)/OPOIL72(I)))  +  .730433 * LOG(MOIV(-1)/IPXGUV(-1))
                                                 (13.2055)

    -  .184372 * Q1  -  .053294 * Q2  -  .15798 * Q3 + MOI_ERR * BETA
      (6.88797)        (2.10902)        (6.22609)

    CRSQ  = .958  S.E.R. =  .059  MEAN LHS = 2.495  RANGE: 1974 Q2 TO 1984 Q4
    DW = 2.612   NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT	LAGCOEF2	T-STAT
(-0)	0.057	2.883	-0.064	3.511
(-1)	0.086	2.883	-0.096	3.511
(-2)	0.086	2.883	-0.096	3.511
(-3)	0.057	2.883	-0.064	3.511
SUM:	0.287		-0.318	

167. MOI: (MOI) IMPORTS OF OPEC FROM OTHER OECD --REAL $

MOI = MOIV/IPXGUV

168. MOLV: (MOLV) EXPORTS OF LDCS TO OPEC -- NOMINAL $

```
LOG(MOLV/LPXGUV)   =  -1.21074   +  .464276 * LOG(XOTV/OPOIL72)
                      (2.11486)     (3.6311)

    + LAGCOEF1 * (LOG(LPXGUV(I)/OPOIL72(I)))  +  .000799 * LOG(MOLV(-1)/LPXGUV(-1))
                                                 (.005077)

    + .067447 * Q1  +  .048482 * Q2  +  .028572 * Q3 + MOL_ERR * BETA
      (3.37502)        (2.12902)        (1.46659)

    CRSQ  = .968  S.E.R. =  .06  MEAN LHS = 1.762  RANGE: 1974 Q1 TO 1984 Q4
    RHO =  .786 (6.7)   NOB = 43   ESTIMATED:  9/87
```

LAG	LAGCOEF1	T-STAT
(-0)	-0.783	4.326
(-1)	0.049	0.303
(-2)	-0.064	0.524
(-3)	0.014	0.121
(-4)	-0.189	1.681
(-5)	-0.125	1.130
(-6)	-0.015	0.145
(-7)	-0.137	1.463
SUM:	-1.250	

169. MOL: (MOL) IMPORTS OF OPEC FROM LDCS --REAL $

MOL = MOLV/LPXGUV

170. XOTV: (XOTV) TOTAL EXPORTS OF OPEC -- NOMINAL $

XOTV = (MCOV + MEOV + MGOV + MJOV + MUOV + MLOV + MIOV) * 0.8 + XOZV

171. MOTV: (MOTV) TOTAL IMPORTS OF OPEC -- NOMINAL $

MOTV = XCOV + XEOV + XGOV + XJOV + XUOV + (MOLV + MOIV)/CIFFOB + MOZV

172. OTRADE: (OTRADE) OPEC TRADE BALANCE

OTRADE = XOTV - MOTV

173. UNETX: (UNETX) US REAL TRADE BALANCE -- $

UNETX = MCU + MEU + MGU + MJU + XUI + XUL + XUO - MUC - MUE - MUG - MUJ - MUI - MUL - MUO

174. CNETX: (CNETX) CANADIAN REAL TRADE BALANCE -- $

CNETX = MUC + MEC + MGC + MJC + XCI + XCL + XCO - MCU - MCE - MCG - MCJ - MCI - MCL - MCO

175. ENETX: (ENETX) BRITISH REAL TRADE BALANCE -- $

ENETX = MUE + MCE + MGE + MJE + XEI + XEL + XEO - MEU - MEC - MEG - MEJ - MEI - MEL - MEO

176. GNETX: (GNETX) GERMAN REAL TRADE BALANCE -- $

GNETX = MUG + MCG + MEG + MJG + XGI + XGL + XGO - MGU - MGC - MGE - MGJ - MGI - MGL - MGO

177. JNETX: (JNETX) JAPANESE REAL TRADE BALANCE -- $

JNETX = MUJ + MCJ + MEJ + MGJ + XJI + XJL + XJO - MJU - MJC - MJE - MJG - MJI - MJL - MJO

178. LNETX: (LNETX) LDCS REAL TRADE BALANCE -- $

LNETX = MCL + MEL + MGL + MJL + MUL + MIL + MOL - XCL - XEL - XGL - XJL - XUL - MLI - MLO

CROSS REFERENCE LIST OF VARIABLES AND EQUATIONS

VARIABLE	EQUATION NUMBER
BETA	1 3 5 7 9 11 13 19 20 21 22 23 25 27 29 31 33 35 40 40 41 42 43 46 48 50 52 54 56 58 63 64 65 66 71 73 75 75 77 79 81 83 88 89 90 91 93 95 97 99 101 103 105 110 111 111 112 113 119 121 123 125 127 129 131 139 141 143 145 147 149 151 156 156 158 160 162 164 166 168
CEI	1 3 5 7 9 11 13 23 24 48 49 67 68 69 70 75 76 92 99 99 100 114 115 117 118 125 126 145 146 162 163
CER	13 15
CFPXFTW	11 14
CGNP	1 3 5 7 9 11 13
CGNPPOT	1 3 5 7 9 11 13
CIFFOB	171
CNETX	174
CPGNP	1 3 5 7 9 11
CPMGOL	13 15
CPXGOL	13
CPXGUV	23 24 45 48 49 67 68 69 70 75 76 92 99 100 114 115 117 118 125 125 126 145 146 162 163
CTRADE	17
D7341	131 151
D7411	50 54 56 131
D7511	121
D7731	46 52
D7911	156
ECPCOMP	23 44
EEI	1 2 14 23 25 27 29 31 33 35 45 46 47 67 69 70 71 72 92 92 93 94 114 115 116 118 119 120 139 140 156 157
EGNP	23 25 27 29 31 33 35
EGNPPOT	23 25 27 29 31 33 35
ENETX	175
EPGNP	23 25 27 29 31 33 35
EPXGUV	14 67 69 70 92 114 115 116 118
ETRADE	39
EUPCOMP	29 45
GEI	3 4 14 25 26 44 45 46 48 50 52 54 56 58 73 74 92 95 96 96 115 116 117 118 121 122 141 142 158 159
GEPCOMP	68
GFPXFTW	54 56 67
GGNP	46 48 50 52 54 56 58
GGNPPOT	46 48 50 52 54 56 58
GJPCOMP	50 69
GNETX	176
GPGNP	46 48 50 52 54 56 58
GPXGUV	3 4 14 25 26 44 45 73 74 92 95 96 115 116 117 118 121 122 141 141 142 158 159
GTRADE	62
GUPCOMP	52 70
IGNPTRD	119 121 123 125 127 129 131
IPXGUV	11 12 33 34 56 57 81 82 103 104 119 121 123 125 127 129 131 149 150 150 166 167
ITRADE	135
JAIME_EXUVI	1 2 46 47 71 72 93 94 119 120 139 140 156 157
JEI	5 6 14 27 28 44 45 50 51 67 68 70 71 73 75 77 79 81 83 83 97 98 114 116 117 118 123 124 143 144 160 161
JFPXFTW	79 81 92
JGNP	71 73 75 77 79 81 83
JGNPPOT	71 73 75 77 79 81 83
JNETX	177
JPGNP	71 73 75 77 79 81 83
JPXGUV	5 6 14 27 28 44 45 50 51 67 68 70 97 98 114 116 117 118 123 123 124 143 144 160 161
JTRADE	87
LGNPTRD	139 141 143 145 147 149 151
LNETX	178
LPXGUV	9 10 31 32 54 55 79 80 101 102 129 130 139 141 143 145 147 149 151 151 168 169
LTRADE	155
MCE	2 174 175
MCE_ERR	1
MCEV	1 2 16 40
MCG	4 174 176
MCG_ERR	3
MCGV	3 4 16 63
MCI	12 174
MCI_ERR	11
MCIV	11 12 16
MCJ	6 174 177
MCJ_ERR	5
MCJV	5 6 16 88
MCL	10 174 178
MCL_ERR	9
MCLV	9 10 16 154
MCO	15 174
MCO_ERR	13
MCOV	13 15 16 170
MCTV	16 17 133

VARIABLE	EQUATION NUMBER			
MCU	8	173	174	
MCU_ERR	7			
MCUV	7	8	16	110
MCZV	16	137		
MEC	24	174	175	
MEC_ERR	23			
MECV	19	23	24	37
MEG	26	175	176	
MEG_ERR	25			
MEGV	25	26	37	64
MEI	34	175		
MEI_ERR	33			
MEIV	33	34	37	
MEJ	28	175	177	
MEJ_ERR	27			
MEJV	27	28	37	89
MEL	32	175	178	
MEL_ERR	31			
MELV	31	32	37	154
MEO	36	175		
MEO_ERR	35			
MEOV	35	36	37	170
METV	37	39	133	
MEU	30	173	175	
MEU_ERR	29			
MEUV	29	30	37	111
MEZV	37	137		
MGC	49	174	176	
MGC_ERR	48			
MGCV	20	48	49	60
MGE	47	175	176	
MGE_ERR	46			
MGEV	41	46	47	60
MGI	57	176		
MGI_ERR	56			
MGIV	56	57	60	
MGJ	51	176	177	
MGJ_ERR	50			
MGJV	50	51	60	90
MGL	55	176	178	
MGL_ERR	54			
MGLV	54	55	60	154
MGO	59	176		
MGO_ERR	58			
MGOV	58	59	60	170
MGTV	60	62	133	
MGU	53	173	176	
MGU_ERR	52			
MGUV	52	53	60	112
MGZV	60	137		
MIL	130	178		
MIL_ERR	129			
MILV	129	130	134	154
MIO	132			
MIO_ERR	131			
MIOV	131	132	134	170
MITV	133	134	135	
MIZV	134	137		
MJC	76	174	177	
MJC_ERR	75			
MJCV	21	75	76	85
MJE	72	175	177	
MJE_ERR	71			
MJEV	42	71	72	85
MJG	74	176	177	
MJG_ERR	73			
MJGV	65	73	74	85
MJI	82	177		
MJI_ERR	81			
MJIV	81	82	85	
MJL	80	177	178	
MJL_ERR	79			
MJLV	79	80	85	154
MJO	84	177		
MJO_ERR	83			
MJOV	83	84	85	170
MJTV	85	87	133	
MJU	78	173	177	
MJU_ERR	77			
MJUV	77	78	85	113
MJZV	85	137		
MLI	150	178		
MLI_ERR	149			
MLIV	149	150	153	
MLO	152	178		
MLO_ERR	151			
MLOV	151	152	153	170
MLTV	133	153	155	
MLZV	137	153		
MOI	167			

VARIABLE	EQUATION NUMBER																	
MOI_ERR	166																	
MOIV	166	167	171															
MOL	169	178																
MOL_ERR	168																	
MOLV	154	168	169	171														
MOTV	133	171	172															
MOZV	137	171																
MUC	100	173	174															
MUC_ERR	99																	
MUCV	22	99	100	107														
MUE	94	173	175															
MUE_ERR	93																	
MUEV	43	93	94	107														
MUG	96	173	176															
MUG_ERR	95																	
MUGV	66	95	96	107														
MUI	104	173																
MUI_ERR	103																	
MUIV	103	104	107															
MUJ	98	173	177															
MUJ_ERR	97																	
MUJV	91	97	98	107														
MUL	102	173	178															
MUL_ERR	101																	
MULV	101	102	107	154														
MUO	106	173																
MUO_ERR	105																	
MUOV	105	106	107	170														
MUTV	107	109	133															
MUZV	107	137																
MZTV	133	136	138															
OPOIL72	35	36	58	59	83	84	105	106	131	132	151	152	156	158	160	162	164	166
	168	168																
OTRADE	172																	
Q1	1	3	5	7	9	11	13	19	20	21	22	23	25	27	29	31	33	35
	40	40	41	42	43	46	48	50	52	54	56	58	63	64	65	66	71	73
	75	75	77	79	81	83	89	90	91	93	95	97	99	101	103	105	110	111
	112	112	113	119	121	123	125	127	129	131	139	141	143	145	147	149	151	156
	158	158	160	162	164	166	168											
Q2	1	3	5	7	9	11	13	19	20	21	22	23	25	27	29	31	33	35
	40	40	41	42	43	46	48	50	52	54	56	58	63	64	65	66	71	73
	75	75	77	79	81	83	89	90	91	93	95	97	99	101	103	105	110	111
	112	112	113	119	121	123	125	127	129	131	139	141	143	145	147	149	151	156
	158	158	160	162	164	166	168											
Q3	1	3	5	7	9	11	13	19	20	21	22	23	25	27	29	31	33	35
	40	40	41	42	43	46	48	50	52	54	56	58	63	64	65	66	71	73
	75	75	77	79	81	83	89	90	91	93	95	97	99	101	103	105	110	111
	112	112	113	119	121	123	125	127	129	131	139	141	143	145	147	149	151	156
	158	158	160	162	164	166	168											
ROWIPEEC	119	121	123	125	127	129	131											
ROWIPLDC	139	141	143	145	147	149	151											
UCPCOMP	116	125	145															
UEPCOMP	117	119																
UFPXFTW	118	127	147															
UGNP	93	95	97	99	101	103	105											
UGNPPOT	93	95	97	99	101	103	105											
UGPCOMP	95	114	121	141														
UJPCOMP	97	115	123	143														
UNETX	173																	
UPGNP	93	95	97	99	101	103	105											
UPXGUV	7	8	14	29	30	44	52	53	67	68	69	77	78	92	127	128	147	148
	164	164	165															
UTARIFF	93	95	97	99	101	103	105											
UTRADE	109																	
XCE_ERR	19																	
XCEV	18	19																
XCG_ERR	20																	
XCGV	18	20																
XCI	126	174																
XCI_ERR	125																	
XCIV	18	125	126	134														
XCJ_ERR	21																	
XCJV	18	21																
XCL	146	174	178															
XCL_ERR	145																	
XCLV	18	145	146	153														
XCO	163	174																
XCO_ERR	162																	
XCOV	18	162	163	171														
XCTV	17	18	133															
XCU_ERR	22																	
XCUV	18	22																
XCZV	18	136																
XEC_ERR	40																	
XECV	38	40																
XEG_ERR	41																	
XEGV	38	41																
XEI	120	175																
XEI_ERR	119																	
XEIV	38	119	120	134														

VARIABLE	EQUATION NUMBER									
XEJ_ERR	42									
XEJV	38	42								
XEL	140	175	178							
XEL_ERR	139									
XELV	38	139	140	153						
XEO	157	175								
XEO_ERR	156									
XEOV	38	156	157	171						
XETV	38	39	133							
XEU_ERR	43									
XEUV	38	43								
XEZV	38	136								
XGC_ERR	63									
XGCV	61	63								
XGE_ERR	64									
XGEV	61	64								
XGI	122	176								
XGI_ERR	121									
XGIV	61	121	122	134						
XGJ_ERR	65									
XGJV	61	65								
XGL	142	176	178							
XGL_ERR	141									
XGLV	61	141	142	153						
XGO	159	176								
XGO_ERR	158									
XGOV	61	158	159	171						
XGTV	61	62	133							
XGU_ERR	66									
XGUV	61	66								
XGZV	61	136								
XITV	133	135								
XIZV	136									
XJC_ERR	88									
XJCV	86	88								
XJE_ERR	89									
XJEV	86	89								
XJG_ERR	90									
XJGV	86	90								
XJI	124	177								
XJI_ERR	123									
XJIV	86	123	124	134						
XJL	144	177	178							
XJL_ERR	143									
XJLV	86	143	144	153						
XJO	161	177								
XJO_ERR	160									
XJOV	86	160	161	171						
XJTV	86	87	133							
XJU_ERR	91									
XJUV	86	91								
XJZV	86	136								
XLTV	133	154	155							
XLZV	136	154								
XOTV	133	156	158	160	162	164	166	168	170	172
XOZV	136	170								
XUC_ERR	110									
XUCV	108	110								
XUE_ERR	111									
XUEV	108	111								
XUG_ERR	112									
XUGV	108	112								
XUI	128	173								
XUI_ERR	127									
XUIV	108	127	128	134						
XUJ_ERR	113									
XUJV	108	113								
XUL	148	173	178							
XUL_ERR	147									
XULV	108	147	148	153						
XUO	165	173								
XUO_ERR	164									
XUOV	108	164	165	171						
XUTV	108	109	133							
XUZV	108	136								
XWTV_ERR	133									
XZTV	133	137	138							
ZTRADE	138									

ALPHABETICAL LIST OF VARIABLES FOR MODEL

MNEMONIC	EQUATION	DEFINITION
CEI	(EXOG)	US-CANADA EXCHANGE RATE (US$/C$)--INDEX 1972
CER	(EXOG)	US-CANADA EXCHANGE RATE (US$/C$)
CFPXFTW	14	CANADIAN FOREIGN IMPORT PRICES
CGNP	(EXOG)	CANADIAN REAL GNP--DOMESTIC CURRENCY--1972
CGNPPOT	(EXOG)	CANADAIA POTENTIAL OUTPUT--DOMESTIC CURRENCY--1972
CIFFOB	(EXOG)	CIFFOB FACTOR
CNETX	174	CANADIAN REAL TRADE BALANCE -- $
CPGNP	(EXOG)	CANADIAN GNP DEFLATOR--DOMESTIC CURRENCY--1972
CPMGOL	(EXOG)	CANADA OIL IMPORT PRICE-DOMESTIC CURRENCY--1972
CPXGOL	(EXOG)	CANADA OIL EXPORT PRICE-DOMESTIC CURRENCY--1972
CPXGUV	(EXOG)	CANADIAN EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
CTRADE	17	CANADIAN TRADE BALANCE
D7341	(EXOG)	DUMMY = 1 IN 1974Q1
D7411	(EXOG)	DUMMY = 1 IN 1974Q1
D7511	(EXOG)	DUMMY = 1 IN 1975Q1
D7731	(EXOG)	DUMMY = 1 IN 1977Q3
D7911	(EXOG)	DUMMY = 1 IN 1979Q1
ECPCOMP	44	THIRD COUNTRY PRICE FOR UK-CANADA TRADE
EEI	(EXOG)	US-UK EXCHANGE RATE (US$/POUND)--INDEX 1972
EGNP	(EXOG)	BRITISH REAL GNP--DOMESTIC CURRENCY--1972
EGNPPOT	(EXOG)	BRITISH POTENTIAL OUTPUT--DOMESTIC CURRENCY--1972
ENETX	175	BRITISH REAL TRADE BALANCE -- $
EPGNP	(EXOG)	BRITISH GNP DEFLATOR--DOMESTIC CURRENCY--1972
EPXGUV	(EXOG)	BRITISH EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
ETRADE	39	UK TRADE BALANCE
EUPCOMP	45	THIRD COUNTRY PRICE FOR UK-US TRADE
GEI	(EXOG)	US-GERMANY EXCHANGE RATE (US$/DM)--INDEX 1972
GEPCOMP	68	THIRD COUNTRY PRICE FOR UK-GERMANY TRADE
GFPXFTW	67	GERMAN FOREIGN IMPORT PRICES
GGNP	(EXOG)	GERMAN REAL GNP--DOMESTIC CURRENCY--1972
GGNPPOT	(EXOG)	GERMAN POTENTIAL OUTPUT--DOMESTIC CURRENCY--1972
GJPCOMP	69	THIRD COUNTRY PRICE FOR GERMAN-JAPAN TRADE
GNETX	176	GERMAN REAL TRADE BALANCE -- $
GPGNP	(EXOG)	GERMAN GNP DEFLATOR--DOMESTIC CURRENCY--1972
GPXGUV	(EXOG)	GERMAN EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
GTRADE	62	GERMAN TRADE BALANCE
GUPCOMP	70	THIRD COUNTRY PRICE FOR GERMAN-US TRADE
IGNPTRD	(EXOG)	LOG OF OTHER OECD TREND OUTPUT--DOMESTIC CURRENCY--1972
IPXGUV	(EXOG)	OTHER OECD EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
ITRADE	135	OTHER OECD TRADE BALANCE
JAIME_EXUVI	(EXOG)	NON-OIL UNIT VALUE FOR THE UK--1972=1
JEI	(EXOG)	US-JAPAN EXCHANGE RATE (US$/YEN)--INDEX 1972
JFPXFTW	92	JAPANESE FOREIGN IMPORT PRICES
JGNP	(EXOG)	JAPANESE REAL GNP--DOMESTIC CURRENCY--1972
JGNPPOT	(EXOG)	JAPANESE POTENTIAL OUTPUT--DOMESTIC CURRENCY--1972
JNETX	177	JAPANESE REAL TRADE BALANCE -- $
JPGNP	(EXOG)	JAPANESE GNP DEFLATOR--DOMESTIC CURRENCY--1972
JPXGUV	(EXOG)	JAPANESE EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
JTRADE	87	JAPANESE TRADE BALANCE
LGNPTRD	(EXOG)	LOG OF LDCS TREND OUTPUT--DOMESTIC CURRENCY--1972
LNETX	178	LDCS REAL TRADE BALANCE -- $
LPXGUV	(EXOG)	LDCS EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
LTRADE	155	LDCS TRADE BALANCE
MCE	2	CANADIAN IMPORTS FROM UK 1972 PRICES
MCE_ERR	(EXOG)	RESIDUAL IN MCEV EQUATION
MCEV	1	CANADIAN IMPORTS FROM UK ($)
MCG	4	CANADIAN IMPORTS FROM GERMANY 1972 PRICES
MCG_ERR	(EXOG)	RESIDUAL IN MCGV EQUATION
MCGV	3	CANADIAN IMPORTS FROM GER($)
MCI	12	CANADIAN IMPORTS FROM OECD 1972 PRICES
MCI_ERR	(EXOG)	RESIDUAL IN MCIV EQUATION
MCIV	11	CANADIAN IMPORTS FROM OECD ($)
MCJ	6	CANADIAN IMPORTS FROM JAPAN 1972 PRICES
MCJ_ERR	(EXOG)	RESIDUAL IN MCJV EQUATION
MCJV	5	CANADIAN IMPORTS FROM JAP($)
MCL	10	CANADIAN IMPORTS FROM LDC 1972 PRICES
MCL_ERR	(EXOG)	RESIDUAL IN MCLV EQUATION
MCLV	9	CANADIAN IMPORTS FROM LDC ($)
MCO	15	CANADIAN IMPORTS FROM OPEC 1972 PRICES
MCO_ERR	(EXOG)	RESIDUAL IN MCOV EQUATION
MCOV	13	CANADIAN IMPORTS FROM OPEC ($)
MCTV	16	TOTAL CANADIAN IMPORTS ($)
MCU	8	CANADIAN IMPORTS FROM US 1972 PRICES
MCU_ERR	(EXOG)	RESIDUAL IN MCUV EQUATION
MCUV	7	CANADIAN IMPORTS FROM US ($)
MCZV	(EXOG)	CANADIAN IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MEC	24	UK IMPORTS FROM CANADA --REAL $
MEC_ERR	(EXOG)	RESIDUAL IN MECV EQUATION
MECV	23	UK IMPORTS FROM CANADA--NOMINAL $
MEG	26	UK IMPORTS FROM GERMANY --REAL $
MEG_ERR	(EXOG)	RESIDUAL IN MEGV EQUATION
MEGV	25	UK IMPORTS FROM GERMANY--NOMINAL $
MEI	34	UK IMPORTS FROM OTHER OECD --REAL $
MEI_ERR	(EXOG)	RESIDUAL IN MEIV EQUATION
MEIV	33	UK IMPORTS FROM OTHER OECD--NOMINAL $

MNEMONIC	EQUATION	DEFINITION
MEJ	28	UK IMPORTS FROM JAPAN --REAL $
MEJ_ERR	(EXOG)	RESIDUAL IN MEJV EQUATION
MEJV	27	UK IMPORTS FROM JAPAN--NOMINAL $
MEL	32	UK IMPORTS FROM LDCS --REAL $
MEL_ERR	(EXOG)	RESIDUAL IN MELV EQUATION
MELV	31	UK IMPORTS FROM LDCS --NOMINAL $
MEO	36	UK IMPORTS FROM OPEC --REAL $
MEO_ERR	(EXOG)	RESIDUAL IN MEOV EQUATION
MEOV	35	UK IMPORTS FROM OPEC --NOMINAL $
METV	37	TOTAL IMPORTS OF THE UK --$
MEU	30	UK IMPORTS FROM THE US --REAL $
MEU_ERR	(EXOG)	RESIDUAL IN MEUV EQUATION
MEUV	29	UK IMPORTS FROM US--NOMINAL $
MEZV	(EXOG)	BRITISH IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MGC	49	GERMAN IMPORTS FROM CANADA --REAL $
MGC_ERR	(EXOG)	RESIDUAL IN MGCV EQUATION
MGCV	48	GERMAN IMPORTS FROM CANADA --NOMINAL $
MGE	47	GERMAN IMPORTS FROM THE UK --REAL $
MGE_ERR	(EXOG)	RESIDUAL IN MGEV EQUATION
MGEV	46	GERMAN IMPORTS FROM THE UK --NOMINAL $
MGI	57	GERMAN IMPORTS FROM OTHER OECD --REAL $
MGI_ERR	(EXOG)	RESIDUAL IN MGIV EQUATION
MGIV	56	GERMAN IMPORTS FROM OTHER OECD --NOMINAL $
MGJ	51	GERMAN IMPORTS FROM JAPAN --REAL $
MGJ_ERR	(EXOG)	RESIDUAL IN MGJV EQUATION
MGJV	50	GERMAN IMPORTS FROM JAPAN --NOMINAL $
MGL	55	GERMAN IMPORTS FROM LDCS --REAL $
MGL_ERR	(EXOG)	RESIDUAL IN MGLV EQUATION
MGLV	54	GERMAN IMPORTS FROM LDCS --NOMINAL $
MGO	59	GERMAN IMPORTS FROM OPEC --REAL $
MGO_ERR	(EXOG)	RESIDUAL IN MGOV EQUATION
MGOV	58	GERMAN IMPORTS FROM OPEC --NOMINAL $
MGTV	60	TOTAL IMPORTS OF GERMNAY --NOMINAL $
MGU	53	GERMAN IMPORTS FROM THE US --REAL $
MGU_ERR	(EXOG)	RESIDUAL IN MGUV EQUATION
MGUV	52	GERMAN IMPORTS FROM THE US --NOMINAL $
MGZV	(EXOG)	GERMAN IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MIL	130	IMPORTS OF OTHER OECD FROM LDCS --REAL $
MIL_ERR	(EXOG)	RESIDUAL IN MILV EQUATION
MILV	129	IMPORTS OF OTHER OECD FROM LDCS --NOMINAL $
MIO	132	IMPORTS OF OTHER OECD FROM OPEC --REAL $
MIO_ERR	(EXOG)	RESIDUAL IN MIOV EQUATION
MIOV	131	IMPORTS OF OTHER OECD FROM OPEC --NOMINAL $
MITV	134	TOTAL IMPORTS OF OTHER OECD --NOMINAL $
MIZV	(EXOG)	OTHER OECD IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MJC	76	IMPORTS OF JAPAN FROM CANADA --REAL $
MJC_ERR	(EXOG)	RESIDUAL IN MJCV EQUATION
MJCV	75	IMPORTS OF JAPAN FROM CANADA --NOMINAL $
MJE	72	IMPORTS OF JAPAN FROM THE UK --REAL $
MJE_ERR	(EXOG)	RESIDUAL IN MJEV EQUATION
MJEV	71	IMPORTS OF JAPAN FROM THE UK --NOMINAL $
MJG	74	IMPORTS OF JAPAN FROM GERMANY --REAL $
MJG_ERR	(EXOG)	RESIDUAL IN MJGV EQUATION
MJGV	73	IMPORTS OF JAPAN FROM GERMANY --NOMINAL $
MJI	82	IMPORTS OF JAPAN FROM OTHER OECD --REAL $
MJI_ERR	(EXOG)	RESIDUAL IN MJIV EQUATION
MJIV	81	IMPORTS OF JAPAN FROM OTHER OECD--NOMINAL $
MJL	80	IMPORTS OF JAPAN FROM LDCS --REAL $
MJL_ERR	(EXOG)	RESIDUAL IN MJLV EQUATION
MJLV	79	IMPORTS OF JAPAN FROM LDCS --NOMINAL $
MJO	84	IMPORTS OF JAPAN FROM OPEC --REAL $
MJO_ERR	(EXOG)	RESIDUAL IN MJOV EQUATION
MJOV	83	IMPORTS OF JAPAN FROM OPEC --NOMINAL $
MJTV	85	TOTAL IMPORTS FROM JAPAN --NOMINAL $
MJU	78	IMPORTS OF JAPAN FROM THE US --REAL $
MJU_ERR	(EXOG)	RESIDUAL IN MJUV EQUATION
MJUV	77	IMPORTS OF JAPAN FROM THE US --NOMINAL $
MJZV	(EXOG)	JAPANESE IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MLI	150	IMPORTS OF LDCS FROM OTHER OECD -- REAL $
MLI_ERR	(EXOG)	RESIDUAL IN MLIV EQUATION
MLIV	149	IMPORTS OF LDCS FROM OTHER OECD --NOMINAL $
MLO	152	IMPORTS OF LDCS FROM OPEC -- REAL $
MLO_ERR	(EXOG)	RESIDUAL IN MLOV EQUATION
MLOV	151	IMPORTS OF LDCS FROM OPEC --NOMINAL $
MLTV	153	TOTAL IMPORTS OF LDCS -- NOMINAL $
MLZV	(EXOG)	LDCS IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MOI	167	IMPORTS OF OPEC FROM OTHER OECD --REAL $
MOI_ERR	(EXOG)	RESIDUAL IN MOIV EQUATION
MOIV	166	EXPORTS OF INDSUST TO OPEC -- NOMINAL $
MOL	169	IMPORTS OF OPEC FROM LDCS --REAL $
MOL_ERR	(EXOG)	RESIDUAL IN MOLV EQUATION
MOLV	168	EXPORTS OF LDCS TO OPEC -- NOMINAL $
MOTV	171	TOTAL IMPORTS OF OPEC -- NOMINAL $
MOZV	(EXOG)	OPEC IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MUC	100	IMPORTS OF THE US FROM CANADA --REAL $
MUC_ERR	(EXOG)	RESIDUAL IN MUCV EQUATION
MUCV	99	IMPORTS OF THE US FROM CANADA --NOMINAL $
MUE	94	IMPORTS OF THE US FROM THE UK --REAL $

MNEMONIC	EQUATION	DEFINITION
MUE_ERR	(EXOG)	RESIDUAL IN MUEV EQUATION
MUEV	93	IMPORTS OF THE US FROM THE UK --NOMINAL $
MUG	96	IMPORTS OF THE US FROM GERMANY--REAL $
MUG_ERR	(EXOG)	RESIDUAL IN MUGV EQUATION
MUGV	95	IMPORTS OF THE US FROM GERMANY --NOMINAL $
MUI	104	IMPORTS OF THE US FROM OTHER OECD--REAL $
MUI_ERR	(EXOG)	RESIDUAL IN MUIV EQUATION
MUIV	103	IMPORTS OF THE US FROM OTHER OECD--NOMINAL $
MUJ	98	IMPORTS OF THE US FROM JAPAN --REAL $
MUJ_ERR	(EXOG)	RESIDUAL IN MUJV EQUATION
MUJV	97	IMPORTS OF THE US FROM JAPAN --NOMINAL $
MUL	102	IMPORTS OF THE US FROM LDCS --REAL $
MUL_ERR	(EXOG)	RESIDUAL IN MULV EQUATION
MULV	101	IMPORTS OF THE US FROM LDCS --NOMINAL $
MUO	106	IMPORTS OF THE US FROM OPEC --REAL $
MUO_ERR	(EXOG)	RESIDUAL IN MUOV EQUATION
MUOV	105	IMPORTS OF THE US FROM OPEC --NOMINAL $
MUTV	107	TOTAL IMPORTS OF THE US --NOMINAL $
MUZV	(EXOG)	US IMPORTS FROM THE RESIDUAL REGION--NOMINAL $
MZTV	136	TOTAL IMPORTS OF RESIDUAL REGION -- NOMINAL $
OPOIL72	(EXOG)	NOMINAL OIL PRICE INDEX FOR OPEC--1972=1
OTRADE	172	OPEC TRADE BALANCE
Q1	(EXOG)	DUMMY VARIABLE = 1 IN FIRST QUARTER - ZERO OTHERWISE
Q2	(EXOG)	DUMMY VARIABLE = 1 IN SECOND QUARTER - ZERO OTHERWISE
Q3	(EXOG)	DUMMY VARIABLE = 1 IN THIRD QUARTER - ZERO OTHERWISE
ROWIPEEC	(EXOG)	OTHER OECD REAL GNP
ROWIPLDC	(EXOG)	LDCS REAL GNP
UCPCOMP	116	THIRD COUNTRY PRICE FOR US-CANADA TRADE
UEPCOMP	117	THIRD COUNTRY PRICE FOR US-UK TRADE
UFPXFTW	118	US FOREIGN IMPORT PRICES
UGNP	(EXOG)	US REAL GNP--DOMESTIC CURRENCY--1972
UGNPPOT	(EXOG)	US POTENTIAL OUTPUT--DOMESTIC CURRENCY--1972
UGPCOMP	114	THIRD COUNTRY PRICE FOR US-GERMAN TRADE
UJPCOMP	115	THIRD COUNTRY PRICE FOR US-JAPAN TRADE
UNETX	173	US REAL TRADE BALANCE -- $
UPGNP	(EXOG)	US GNP DEFLATOR--DOMESTIC CURRENCY--1972
UPXGUV	(EXOG)	US EXPORT UNIT VALUE--DOMESTIC CURRENCY--1972
UTARIFF	(EXOG)	MULTILATERAL US TARIFF--INDEX 1972=1
UTRADE	109	US TRADE BALANCE
XCE_ERR	(EXOG)	RESIDUAL IN XCEV EQUATION
XCEV	19	CANADIAN EXPORTS TO THE UK ($)
XCG_ERR	(EXOG)	RESIDUAL IN XCGV EQUATION
XCGV	20	CANADIAN EXPORTS TO GERMANY ($)
XCI	126	CANADIAN EXPORTS TO OTHER OECD -- REAL $
XCI_ERR	(EXOG)	RESIDUAL IN XCIV EQUATION
XCIV	125	EXPORTS OF CANADA TO OTHER OECD --NOMINAL $
XCJ_ERR	(EXOG)	RESIDUAL IN XCJV EQUATION
XCJV	21	CANADIAN EXPORTS TO JAPAN ($)
XCL	146	CANADIAN EXPORTS TO LDCS --REAL $
XCL_ERR	(EXOG)	RESIDUAL IN XCLV EQUATION
XCLV	145	EXPORTS OF CANADA TO LDCS -- NOMINAL $
XCO	163	CANADIAN EXPORTS TO OPEC --REAL $
XCO_ERR	(EXOG)	RESIDUAL IN XCOV EQUATION
XCOV	162	EXPORTS OF CANADA TO OPEC -- NOMINAL $
XCTV	18	CANADIAN EXPORTS TOTAL ($)
XCU_ERR	(EXOG)	RESIDUAL IN XCUV EQUATION
XCUV	22	CANADIAN EXPORTS TO THE US ($)
XCZV	(EXOG)	CANADIAN EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XEC_ERR	(EXOG)	RESIDUAL IN XECV EQUATION
XECV	40	UK EXPORTS TO CANADA --NOMINAL $
XEG_ERR	(EXOG)	RESIDUAL IN XEGV EQUATION
XEGV	41	UK EXPORTS TO GERMANY --NOMINAL $
XEI	120	UK EXPORTS TO OTHER OECD -- REAL $
XEI_ERR	(EXOG)	RESIDUAL IN XEIV EQUATION
XEIV	119	EXPORTS OF THE UNITED KINGDOM TO OTHER OECD --NOMINAL $
XEJ_ERR	(EXOG)	RESIDUAL IN XEJV EQUATION
XEJV	42	UK EXPORTS TO JAPAN --NOMINAL $
XEL	140	BRITISH EXPORTS TO LDCS --REAL $
XEL_ERR	(EXOG)	RESIDUAL IN XELV EQUATION
XELV	139	EXPORTS OF THE UK TO LDCS -- NOMINAL $
XEO	157	BRITISH EXPORTS TO OPEC --REAL $
XEO_ERR	(EXOG)	RESIDUAL IN XEOV EQUATION
XEOV	156	EXPORTS OF THE UK TO OPEC -- NOMINAL $
XETV	38	TOTAL EXPORTS OF THE UK -- NOMINAL $
XEU_ERR	(EXOG)	RESIDUAL IN XEUV EQUATION
XEUV	43	UK EXPORTS TO THE US --NOMINAL $
XEZV	(EXOG)	BRITISH EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XGC_ERR	(EXOG)	RESIDUAL IN XGCV EQUATION
XGCV	63	GERMAN EXPORTS TO CANADA --NOMINAL $
XGE_ERR	(EXOG)	RESIDUAL IN XGEV EQUATION
XGEV	64	GERMAN EXPORTS TO THE UK --NOMINAL $
XGI	122	GERMAN EXPORTS TO OTHER OECD -- REAL $
XGI_ERR	(EXOG)	RESIDUAL IN XGIV EQUATION
XGIV	121	EXPORTS OF GERMANY TO OTHER OECD --NOMINAL $
XGJ_ERR	(EXOG)	RESIDUAL IN XGJV EQUATION
XGJV	65	GERMAN EXPORTS TO JAPAN --NOMINAL $
XGL	142	GERMAN EXPORTS TO LDCS --REAL $
XGL_ERR	(EXOG)	RESIDUAL IN XGLV EQUATION

MNEMONIC	EQUATION	DEFINITION
XGLV	141	EXPORTS OF GERMANY TO LDCS -- NOMINAL $
XGO	159	GERMAN EXPORTS TO OPEC --REAL $
XGO_ERR	(EXOG)	RESIDUAL IN XGOV EQUATION
XGOV	158	EXPORTS OF GERMNAY TO OPEC -- NOMINAL $
XGTV	61	TOTAL GERMAN EXPORTS -- NOMINAL $
XGU_ERR	(EXOG)	RESIDUAL IN XGUV EQUATION
XGUV	66	GERMAN EXPORTS TO THE US --NOMINAL $
XGZV	(EXOG)	GERMAN EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XITV	133	TOTAL EXPORTS OF OTHER OECD --NOMINAL $
XIZV	(EXOG)	OTHER OECD EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XJC_ERR	(EXOG)	RESIDUAL IN XJCV EQUATION
XJCV	88	EXPORTS OF JAPAN TO CANADA -- NOMINAL $
XJE_ERR	(EXOG)	RESIDUAL IN XJEV EQUATION
XJEV	89	EXPORTS OF JAPAN TO THE UK -- NOMINAL $
XJG_ERR	(EXOG)	RESIDUAL IN XJGV EQUATION
XJGV	90	EXPORTS OF JAPAN TO GERMANY -- NOMINAL $
XJI	124	JAPANESE EXPORTS TO OTHER OECD -- REAL $
XJI_ERR	(EXOG)	RESIDUAL IN XJIV EQUATION
XJIV	123	EXPORTS OF JAPAN TO OTHER OECD --NOMINAL $
XJL	144	JAPANESE EXPORTS TO LDCS --REAL $
XJL_ERR	(EXOG)	RESIDUAL IN XJLV EQUATION
XJLV	143	EXPORTS OF JAPAN TO LDCS -- NOMINAL $
XJO	161	JAPANESE EXPORTS TO OPEC --REAL $
XJO_ERR	(EXOG)	RESIDUAL IN XJOV EQUATION
XJOV	160	EXPORTS OF JAPAN TO OPEC -- NOMINAL $
XJTV	86	TOTAL EXPORTS OF JAPAN -- NOMINAL $
XJU_ERR	(EXOG)	RESIDUAL IN XJUV EQUATION
XJUV	91	EXPORTS OF JAPAN TO THE US -- NOMINAL $
XJZV	(EXOG)	JAPANESE EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XLTV	154	TOTAL EXPORTS OF LDCS -- NOMINAL $
XLZV	(EXOG)	LDCS EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XOTV	170	TOTAL EXPORTS OF OPEC -- NOMINAL $
XOZV	(EXOG)	OPEC EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XUC_ERR	(EXOG)	RESIDUAL IN XUCV EQUATION
XUCV	110	EXPORTS OF THE US TO CANADA --NOMINAL $
XUE_ERR	(EXOG)	RESIDUAL IN XUEV EQUATION
XUEV	111	EXPORTS OF THE US TO THE UK --NOMINAL $
XUG_ERR	(EXOG)	RESIDUAL IN XUGV EQUATION
XUGV	112	EXPORTS OF THE US TO GERMANY --NOMINAL $
XUI	128	US EXPORTS TO OTHER OECD -- REAL $
XUI_ERR	(EXOG)	RESIDUAL IN XUIV EQUATION
XUIV	127	EXPORTS OF THE UNITED STATES TO OTHER OECD --NOMINAL $
XUJ_ERR	(EXOG)	RESIDUAL IN XUJV EQUATION
XUJV	113	EXPORTS OF THE US TO JAPAN --NOMINAL $
XUL	148	US EXPORTS TO LDCS --REAL $
XUL_ERR	(EXOG)	RESIDUAL IN XULV EQUATION
XULV	147	EXPORTS OF THE US TO LDCS -- NOMINAL $
XUO	165	US EXPORTS TO OPEC --REAL $
XUO_ERR	(EXOG)	RESIDUAL IN XUOV EQUATION
XUOV	164	EXPORTS OF THE US TO OPEC -- NOMINAL $
XUTV	108	TOTAL EXPORTS OF THE US --NOMINAL $
XUZV	(EXOG)	US EXPORTS TO THE RESIDUAL REGION--NOMINAL $
XWTV_ERR	(EXOG)	RESIDUAL IN XITV EQUATION
XZTV	137	TOTAL EXPORTS OF RESIDUAL REGION -- NOMINAL $
ZTRADE	138	RESIDUAL REGION TRADE BALANCE

International Finance Discussion Papers

IFDP NUMBER	TITLES	AUTHOR(s)
311	Realignment of the Yen-Dollar Exchange Rate: Aspects of the Adjustment Process in Japan	Bonnie E. Loopesko Robert E. Johnson
310	The Effect of Multilateral Trade Clearinghouses on the Demand for International Reserves	Ellen E. Meade
309	Protection and Retaliation: Changing the Rules of the Game	Catherine L. Mann
308	International Duopoly with Tariffs	Eric O'N. Fisher Charles A. Wilson
307	A Simple Simulation Model of International Bank Lending	Henry S. Terrell Robert S. Dohner
306	A Reassessment of Measures of the Dollar's Effective Exchange Value	B. Dianne Pauls William L. Helkie
305	Macroeconomic Instability of the Less Developed Country Economy when Bank Credit is Rationed	David F. Spigelman
304	The U.S. External Deficit in the 1980s: An Empirical Analysis	William L. Helkie Peter Hooper
303	An Analogue Model of Phase-Averaging Procedures	Julia Campos Neil R. Ericsson David F. Hendry
302	A Model of Exchange Rate Pass-Through	Eric O'N. Fisher
301	The Out-of-Sample Forecasting Performance of Exchange Rate Models When Coefficients are Allowed to Change	Garry J. Schinasi P.A.V.B. Swamy
300	Financial Concentration and Development: An Empirical Analysis of the Venezuelan Case	Jaime Marquez Janice Shack-Marquez
299	Deposit Insurance Assessments on Deposits at Foreign Branches of U.S. Banks	Jeffrey C. Marquardt

International Finance Discussion Papers

IFDP NUMBER	TITLES	AUTHOR(s)
	1988	
324	Income and Price Elasticities of Foreign Trade Flows: Econometric Estimation and Analysis of the US Trade Deficit	Jaime Marquez
323	Money, Interest, and Capital in a Cash-in-Advance Economy	Wilbur John Coleman II
322	The Simultaneous Equations Model with Generalized Autoregressive Conditional Heteroskedasticity: The SEM-GARCH Model	Richard Harmon
321	Adjustment Costs and International Trade Dynamics	Joseph E. Gagnon
320	The Capital Flight "Problem"	David B. Gordon Ross Levine
	1987	
319	Modeling Investment Income and Other Services in the U.S. International Transactions Accounts	William Helkie Lois Stekler
318	Improving the Forecast Accuracy of Provisional Data: An Application of the Kalman Filter to Retail Sales Estimates	B. Dianne Pauls
317	Monte Carlo Methodology and the Finite Sample Properties of Statistics for Testing Nested and Non-Nested Hypotheses	Neil R. Ericsson
316	The U.S. External Deficit: Its Causes and Persistence	Peter Hooper Catherine L. Mann
315	Debt Conversions: Economic Issues for Heavily Indebted Developing Countries	Lewis S. Alexander
314	Exchange Rate Regimes and Macroeconomic Stabilization in a Developing Country	David H. Howard
313	Monetary Policy in Taiwan, China	Robert F. Emery
312	The Pricing of Forward Exchange Rates	Ross Levine

Please address requests for copies to International Finance Discussion Papers, Division of International Finance, Stop 24, Board of Governors of the Federal Reserve System, Washington, D.C. 20551.