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Article *in* New England Economic Review · February 1987

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The U.S. Trade Deficit: A Perspective from Selected Bilateral Trade Models

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In 1986, the United States recorded the largest merchandise trade deficit in its history, $153 billion. One-third of this imbalance occurred in trade with Japan; yet the United States also ran sizable trade deficits with the European Community ($23 billion), Canada ($23 billion), and Taiwan ($14 billion).

The rising trade deficit has contributed to a greater propensity for the Administration and Congress to "fight back" in the international trade arena. For instance, the President proclaimed in his most recent State of the Union address that "We will insist that trade is fair and free."[1] More pragmatically, the proposed "Trade and International Economic Policy Reform Act of 1987," introduced in the House of Representatives on January 6 of this year, would amend a 1986 law to include a new section: "Mandatory Negotiations and Actions Regarding Foreign Countries Having Unwarranted Trade Surpluses with the United States." In April the House approved an amendment to its omnibus trade bill that requires economic retaliation against countries having excessive trade surpluses with the United States.[2]

The presence of such legislative initiatives suggests a need to identify the sources of the sharp deterioration of the U.S. trade balance in order to shed light on whether retaliation is warranted for countries running historically large trade surpluses with the United States. This article extends the research presented in a previous article that examined whether or not retaliatory U.S. trade legislation was warranted in the case of Japan, whose annual trade surplus with the United States now exceeds $50 billion. Statistical evidence in that study indicated that much of the surge in the U.S. trade deficit with Japan could be explained by macroeconomic factors that partly reflect a substantial divergence in U.S. and Japanese fiscal policies in the early 1980s.[3]

This study extends that analysis by also examining the macroeconomic determinants of U.S. exports to and imports from Canada, (West) Germany, the United Kingdom, and France, whose bilateral trade

surpluses with the United States jointly account for another 30 percent of the U.S. trade deficit. A model is presented to explain statistically the variation of quarterly aggregate U.S. exports to and imports from each of these four countries plus Japan, caused by changes in the countries' incomes, prices and foreign exchange rates. In each of the 10 statistical models, at least 95 percent of the variation in U.S. exports to or imports from the particular trading partner between

This study concludes that automatic retaliation by the United States for these historically large bilateral trade imbalances is inappropriate.

1960 and 1982 can be explained by incomes, prices, and exchange rates. Moreover, each statistical model—based upon the pattern of trade between partners prior to 1983—explains the bulk of the sharp deterioration in the U.S. trade balance with the respective partner from the beginning of 1983 to the end of 1985. This study concludes that automatic retaliation by the United States for these historically large bilateral trade imbalances is inappropriate.

I. An Economic Model of Bilateral Trade Flows

Various methods exist for predicting the size of an aggregate trade flow between two countries over time. For instance, the Multicountry Model of the Board of Governors (which has several hundred equations) relates quarterly U.S. imports from Germany primarily to factors influencing the *demand* for German products in the United States: U.S. national income, the price of German exports to the United States, and the price of alternative foreign and domestic products available to U.S. consumers.[4] An alternative method specifies an additional equation relating this trade flow to factors influencing the *supply* of German exports to the United States—such as German gross national product (GNP), the price of German exports to the United States, and the price of German goods in alternative foreign and domestic markets—and estimates the demand and supply equations simultaneously.[5] Another alternative is to solve the demand and supply equations simultaneously for a reduced-form equation for the equilibrium value of U.S. imports from Germany.[6]

In this paper, bilateral trade flows between the United States and selected trading partners are predicted using the last technique mentioned. The advantage of this technique over the first is that a reduced-form equation incorporates supply factors. The advantage of this approach over a simultaneous-equations model is that a price index of the aggregate bilateral trade flow between the United States and a trading partner need not be calculated; no such indexes are published currently.[7]

The conceptual foundations for using this technique are summarized briefly here.[8] The value of U.S. imports from Germany (in marks) will be the reference point in describing the analytical framework. The conceptual framework for the other nine trade flows examined empirically later is analogous and thus need not be discussed explicitly.

The value of U.S. imports from Germany should be positively related to the value of U.S. national income for two reasons. First, a rise in U.S. income will raise the quantity of German goods demanded (other things equal). Second, the rise in the quantity of German products demanded will tend to raise the price and value of German exports to the United States.

A rise in the value of German GNP need not be associated with a higher value of German exports to the United States. A higher German GNP will be associated typically with greater capacity to export goods to all countries including the United States. But the larger German export supply to the United States will tend to lower the price of German exports to the United States. Consequently, a higher level of German GNP will be associated with a higher value of exports from Germany to the United States only if U.S. demand for German products is "price elastic," that is, if products from Germany and from domestic and other foreign markets are good substitutes in the United States.[9]

The exchange rate between the two countries' currencies has a theoretically unambiguous effect on the value of the trade flow (in marks) from Germany to the United States. An appreciation of the dollar in marks will make German exports more attractive in the United States, tending to increase the volume and price (in marks) of German exports to the United States; the converse would apply in the case of a depreciation of the dollar.

Two other variables should also be included to help predict bilateral trade flows, although both have theoretically ambiguous effects on such flows. On the demand side, higher prices for U.S. imports from non-German foreign markets and for domestically produced goods could increase or decrease the value of U.S. imports from Germany. Although the quantity demanded and price of German exports will rise as German products become relatively more attractive, this effect could be offset by the decline in U.S. import demand from all sources arising from the reduction in the U.S. standard of living. On the supply side, higher prices for German products in non-U.S. markets (including Germany) could increase or decrease the value of German exports to the United States. As domestic and non-U.S. foreign markets became more attractive to German firms, the quantity of German exports supplied to the United States would fall, tending to raise the price of U.S. imports from Germany. The value of these imports would decline if countries' products were good substitutes in the United States, but would rise if they were poor substitutes.[10]

Thus, five macroeconomic variables are conjectured to explain the quarterly variation in bilateral trade flows among several countries over time. However, only two of these variables—importer income and the exchange rate—have unambiguous expected effects on trade flows.

Changes in the values of bilateral trade flows should also be influenced by changes in the trade policies of a pair of trading countries. Changes in average tariff rates and in visible and invisible nontariff barriers could influence trade patterns. However, recent empirical evidence quantifying the impact of tariff rates, auto export restraints, and steel import quotas on U.S.-Japanese trade indicates that changes in these factors have little perceptible influence on quarterly trade flow variation.[11]

II. The Statistical Model

Empirical proxies for these theoretical macroeconomic variables were selected and used to explain quarterly aggregate bilateral trade flows between the United States and Japan, Canada, Germany, the United Kingdom, and France. Nominal gross national product was used to measure income in both exporter and importer. The exporter's wholesale price index served as a proxy for domestic prices and the prices of the exporter's products in markets other than the destination of the bilateral trade flow. The importer's wholesale price index served as a proxy for domestic prices and the prices of imports from markets other than the origin of the bilateral trade flow. The model also includes a time trend and seasonal dummy variables.

The tables in the appendix present the coefficients and corresponding t-statistics for the 10 trade-flow equations estimated over the period 1960:II to 1982:IV.[12] Several conclusions emerge, and are summarized briefly here.

First and foremost, the macroeconomic variables explain between 96 and 99 percent of the variation in quarterly trade flows in every equation.

Second, the coefficient estimates for importer income and the exchange rate—the only two variables with theoretically unambiguous effects on trade flows—have the expected signs across all equations, except one. A rise in importer income is associated with a rise in the value of the trade flow in all 10 cases, and the relationship is statistically significant in five cases. An appreciation of the importer's currency in terms of the exporter's currency is associated with a rise in the value of the trade flow in nine cases, and the relationship is statistically significant in four cases.

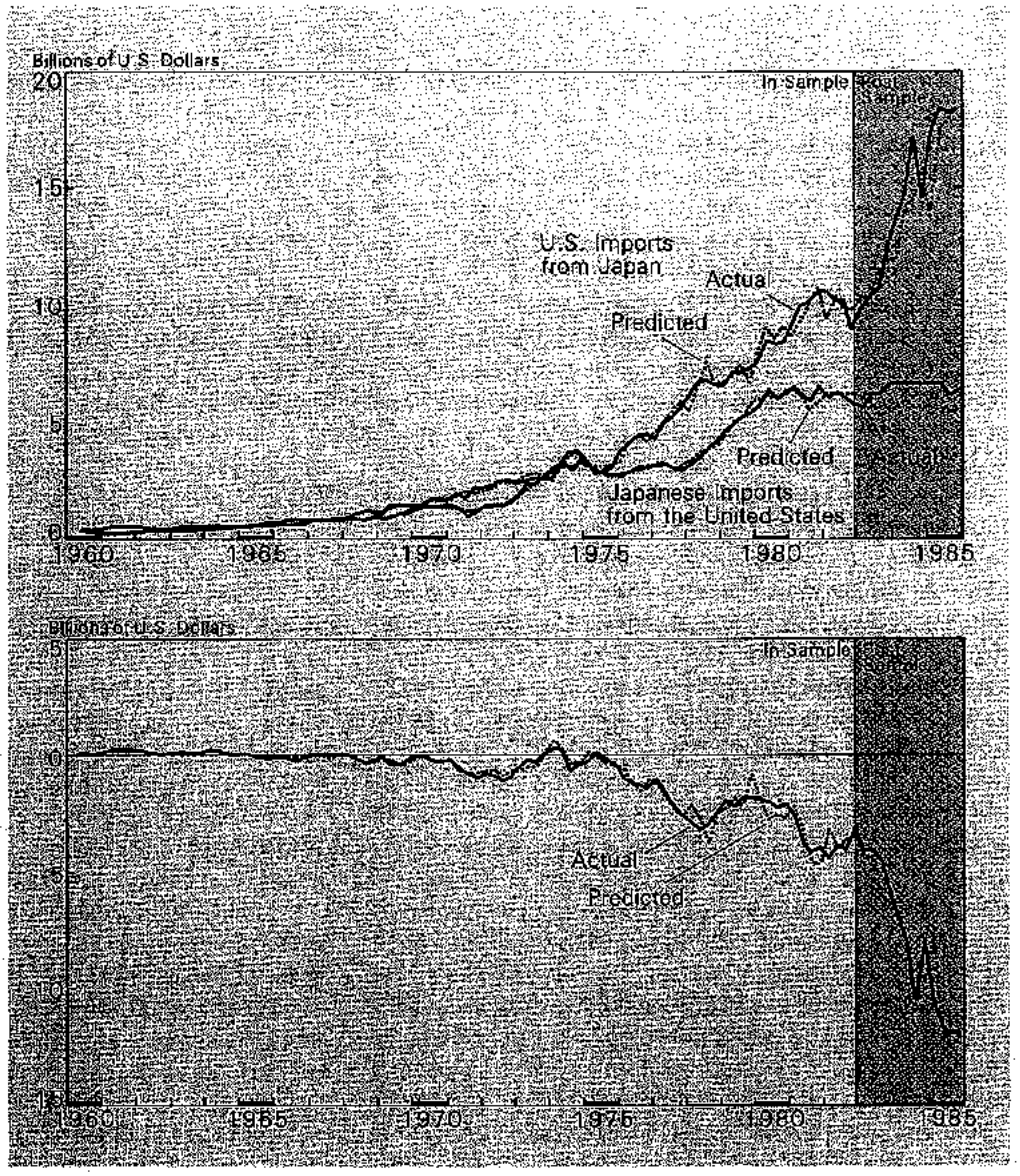
Third, coefficient estimates for the other macroeconomic variables—with theoretically ambiguous effects on trade flows—tend not to be very stable in sign across equations. This is partly attributable to the use of the *identical* specification and lag structure for all equations; that is, this study does not "choose" or "alter" the specification or lag structure depending upon the trade flow used.[13]

Charts 1 through 6 contrast the actual values of U.S. exports to and imports from these trading partners with the predicted values for the sample period and for the three years following the sample. Chart 1 illustrates the sharp deterioration of the U.S. trade balance with Japan since 1982. This sharp deterioration can be explained readily by changes in incomes, prices, and the foreign exchange rate of the two countries, even assuming the pre-1983 statistical relationship between these macroeconomic factors and U.S.-Japanese trade flows. Chart 2 illustrates that the sharp increase in the U.S. trade deficit with Germany since 1982 can also be explained readily by changes in income, prices, and the foreign exchange rate between the United States and Germany.

By contrast, the U.S. trade position with Canada has not deteriorated very rapidly in the post-1982 period, as shown in chart 3. One possible reason is that

Chart 1

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and Japan



Note: Quarterly data are actual and predicted U.S.-Japanese bilateral trade flows (measured c.i.f.). Predicted values are based upon regression results presented in the appendix tables.

Actual versus Predicted U.S. Merchandise Trade Balance with Japan

Note: Quarterly data (actual and predicted) are Japanese imports from the United States less U.S. imports from Japan (measured c.i.f.).

Source of data: International Monetary Fund, *International Financial Statistics* and *Direction of Trade Statistics*.

the dollar did not appreciate as much against the Canadian dollar, as opposed to the yen or mark, during the first half of the 1980s. Nevertheless, the deterioration of the U.S. trade balance with Canada can also be explained readily by changes in incomes, prices and the exchange rate.

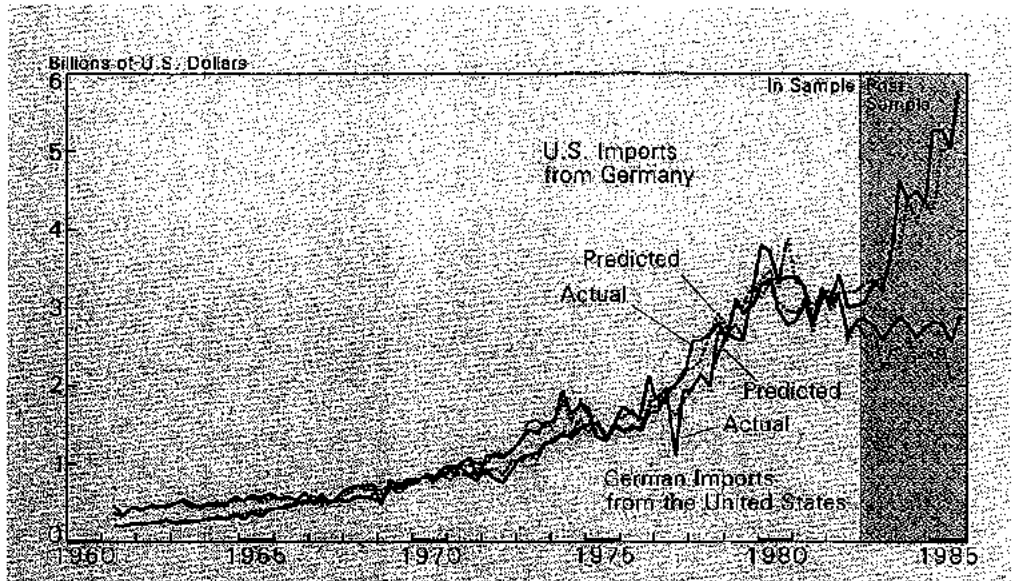
As chart 4 shows, the U.S. trade balance with the United Kingdom has fluctuated considerably between surplus and deficit. Despite this volatility, the macroeconomic model explains much of the change in U.S.-U.K. trade patterns, predicting fairly accurately the unprecedented deficits of the third and fourth quarters of 1985.

The U.S. trade balance with France moved from surplus to deficit in the post-1982 period, as demonstrated in chart 5. In fact, the model predicts that by the fourth quarter of 1985, the trade deficit should have been considerably larger than it actually was.

Finally, chart 6 contrasts actual U.S. aggregate exports to, imports from, and net exports to these five trading partners with the values predicted by the model. The results suggest that much of the sharp deterioration of the U.S. trade deficit since 1982 can be explained readily by changes in incomes, prices, and exchange rates, even assuming the relationships between these factors and trade flows prior to 1983.

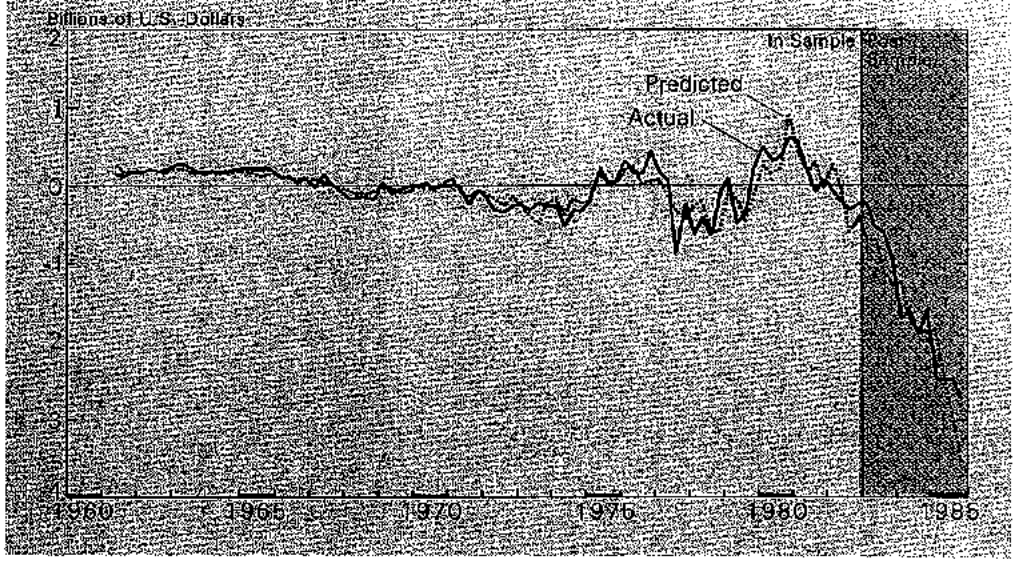
Chart 2

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and Germany



Note: Quarterly data are actual and predicted U.S.-German bilateral trade flows (measured c.i.f.). Predicted values are based upon regression results presented in the appendix tables.

Actual versus Predicted U.S. Merchandise Trade Balance with Germany



Note: Quarterly data (actual and predicted) are German imports from the United States less U.S. imports from Germany (measured c.i.f.).

Source of data: See Chart 1.

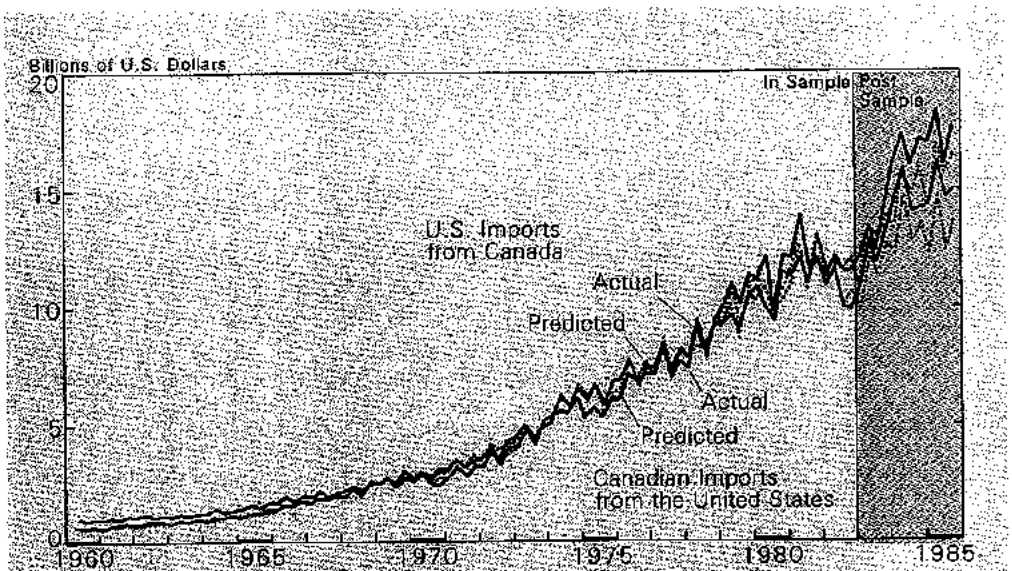
III. Policy Implications

This article has evaluated the extent to which macroeconomic factors can explain the expansion of U.S. trade deficits with five major trading partners. The evidence in this study corroborates the conclusion of a previous study that "the rise in the U.S.-Japanese trade deficit from 1980 to 1984 can be fully explained by changes in the exchange rate and rates of economic growth."[14]

Nevertheless, several caveats are in order. None of the variables used to explain the variation in trade flows is "exogenous." In reality, the explanatory variables are determined contemporaneously with the trade flows, mutually determined by such factors as relative monetary and fiscal policies. The higher growth rate in the United States relative to all of these five countries in 1983 and 1984—and all but Japan in 1985—and the inflation-adjusted appreciation of the dollar vis-à-vis the currency of each of these countries (except Canada) between 1982 and 1984, could be attributed materially to a relatively more expansionary fiscal policy in the United States. Fiscal policy became more expansionary between 1982 and 1985 in the United States but more restrictive during those years in Japan, Germany, the United Kingdom, and

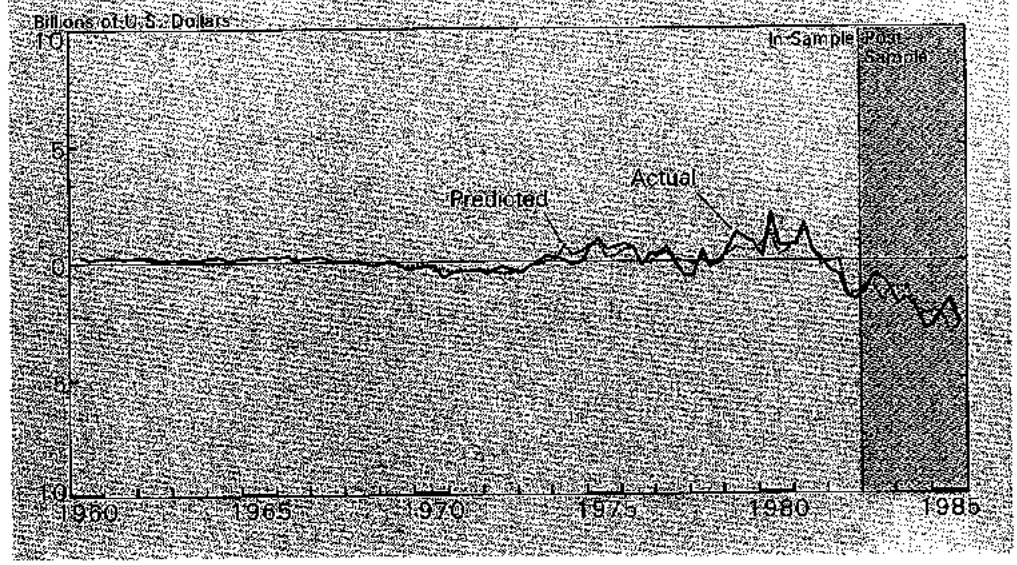
Chart 3

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and Canada



Note: Quarterly data are actual and predicted U.S.-Canadian bilateral trade flows (measured c.i.f.). Predicted values are based upon regression results presented in the appendix tables.

Actual versus Predicted U.S. Merchandise Trade Balance with Canada



Note: Quarterly data (actual and predicted) are Canadian imports from the United States less U.S. imports from Canada (measured c.i.f.).

Source of data: See Chart 1.

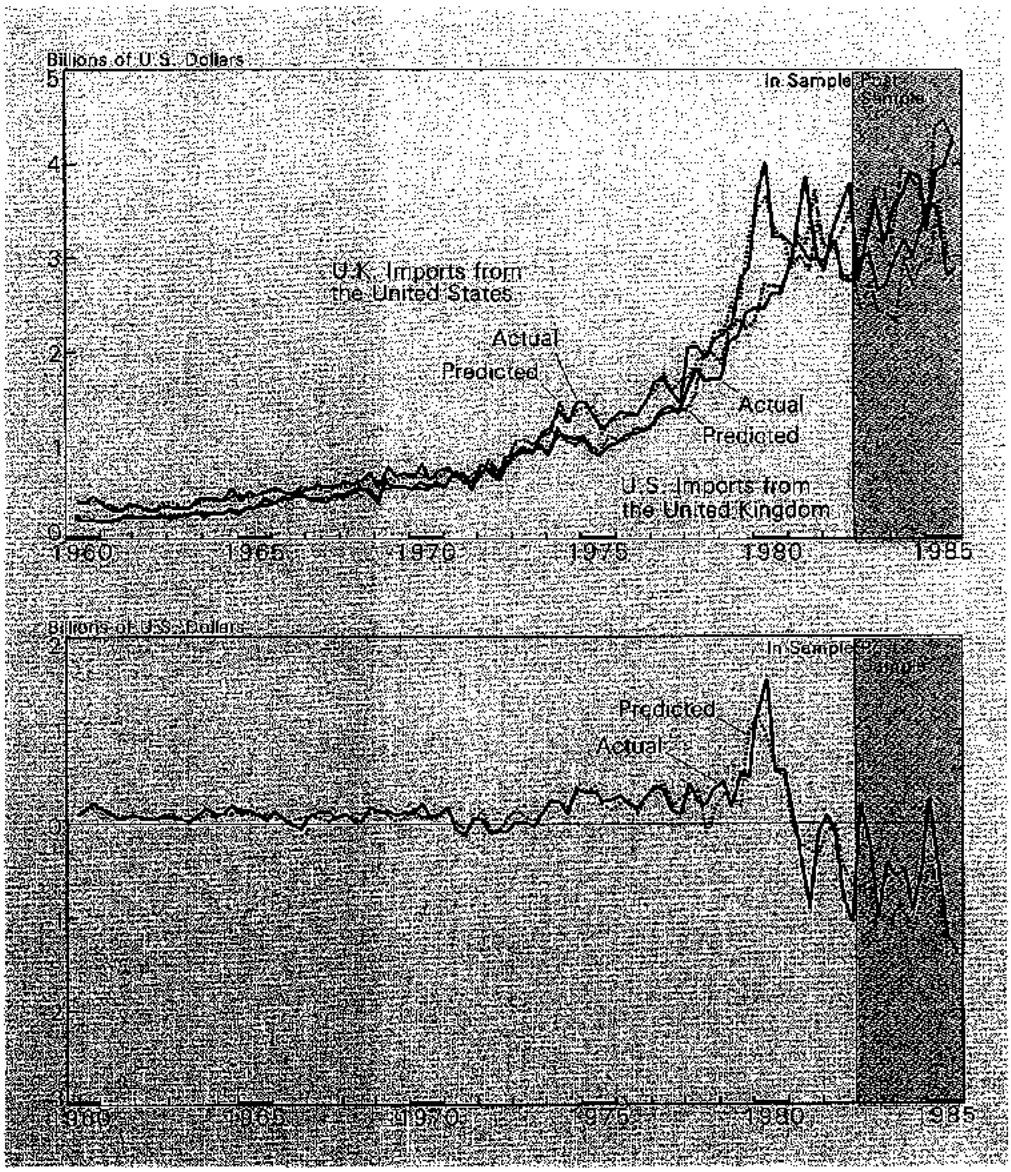
France.[15] Canada's fiscal policy became more expansionary in each of these years, partly explaining the absence of an inflation-adjusted appreciation of the U.S. dollar against the Canadian dollar or of a sharp deterioration of the U.S. trade balance with Canada.

This fiscal policy imbalance and its consequence for the U.S. current account can be related also to countries' savings-investment patterns. U.S. household and business savings covered U.S. investment spending and government deficits from 1970 to 1982, give or take 1 percent of GNP. But from 1982 to 1985, the excess of U.S. investment spending plus government deficits over domestic savings increased from 0.3 percent to 2.9 percent of GNP. By contrast, the excess of Japanese domestic savings over investment spending and government deficits rose from 0.6 percent to 3.1 percent of GNP between 1982 and 1985. In those same years, Germany's excess domestic savings rose from 0.6 percent to 2.1 percent of GNP. Between 1982 and 1984, the excess of French domestic savings over investment spending plus government deficits increased from −3.0 percent to −0.6 percent of GNP. As in the United States, Canada's excess of domestic investment spending plus government deficits over domestic savings grew, from −0.8 percent to 0.1 percent of GNP.

Critics might argue that the deterioration of fundamental U.S. competitiveness in manufacturing can

Chart 4

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and the United Kingdom



Note: Quarterly data are actual and predicted U.S.-U.K. bilateral trade flows (measured c.i.f.). Predicted values are based upon regression results presented in the appendix tables.

Actual versus Predicted U.S. Merchandise Trade Balance with the United Kingdom

Note: Quarterly data (actual and predicted) are U.K. imports from the United States less U.S. imports from the United Kingdom (measured c.i.f.).

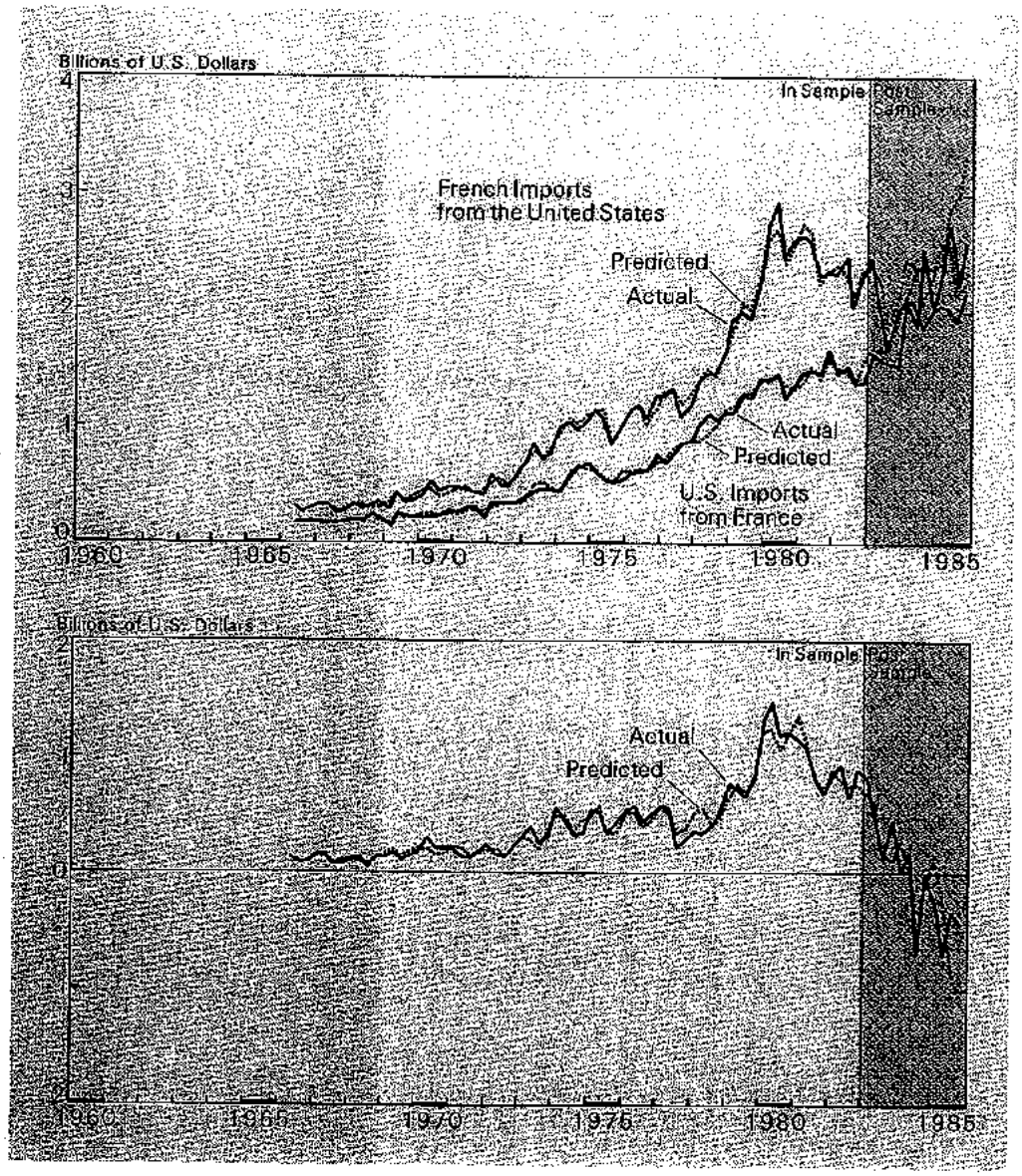
Source of data: See Chart 1.

better explain the massive U.S. trade deficit, rather than "the failure of the rest of the world to expand their economies."[16] Proponents of this view claim that the sharp decline in U.S. manufacturing's market share since 1980, although coinciding with the U.S. dollar's appreciation, is the principal cause of the massive post-1980 U.S. trade deficit. These proponents often conclude that a "dramatic devaluation" of the U.S. dollar will eventually occur, decreasing U.S. terms of trade, increasing foreign demand for U.S. goods, decreasing U.S. real expenditures and standard of living, and reversing the U.S. trade deficit.

This view is not inconsistent with the results of this study. For instance, chart 1 illustrated that the U.S. trade balance with Japan began deteriorating in 1975; at about the same time, U.S. manufacturing's market share began a downward trend, Japanese manufacturing's market share began an upward trend, and manufacturing annual fixed investment in Japan relative to the United States began increasing. The in-sample trade flow predictions shown in chart 1 and the associated coefficient estimates were likely influenced by these changing economic conditions. However, the post-sample predictions show that—even when relative production and structural competitiveness factors were frozen at their pre-1983 levels—the U.S. trade deficit's rapid deterioration could be predicted solely by the dollar's appreciation

Chart 5

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and France



Note: Quarterly data are actual and predicted U.S.-French bilateral trade flows (measured c.i.f.). Predicted values are based upon regression results presented in the appendix tables.

Actual versus Predicted U.S. Merchandise Trade Balance with France

Note: Quarterly data (actual and predicted) are French imports from the United States less U.S. imports from France (measured c.i.f.).

Source of data: See Chart 1

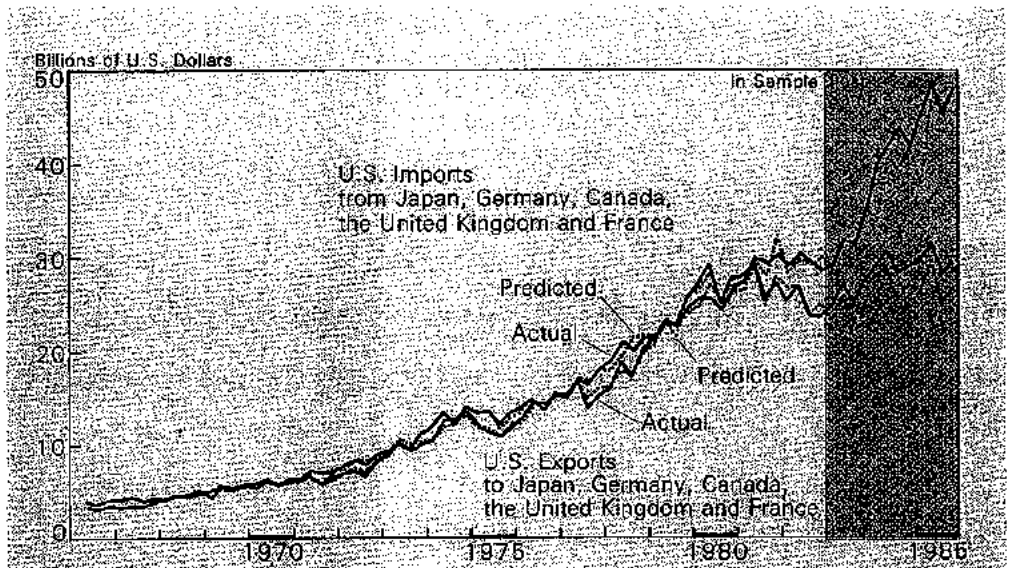
against the yen and stronger demand in the United States than in Japan.

Both views—this study's and the argument for the erosion of U.S. competitiveness—share the belief that a substantial depreciation of the dollar from the 1985 level is necessary to reverse the U.S. trade imbalance. The depreciation would call forth an eventual deterioration of U.S. terms of trade and perhaps a reduction in U.S. living standards. This study, moreover, suggests that more expansionary policies abroad could help significantly in reducing the U.S. trade deficit; the greater the stimulus abroad, the smaller the ultimate reduction in U.S. living standards needed to restore trade balance.

Other critics might argue that macroeconomic factors can explain *changes* in the U.S. trade deficit, but the *level* of U.S. exports—especially to Japan—suffers unnecessarily from high import tariffs, overt nontariff barriers, and subtle nontariff barriers. Regarding tariffs, the estimated tariff rate for semifinished and finished manufactured imports since the Tokyo Round is 6.0 percent for the European Community, 5.4 percent for Japan, and 4.9 percent for the United States—not dramatically different.[17] Regarding overt nontariff barriers, recent evidence suggests that these policies—such as import quotas, "voluntary" export restraints, import licensing, orderly market arrangements, safeguard measures, and re-

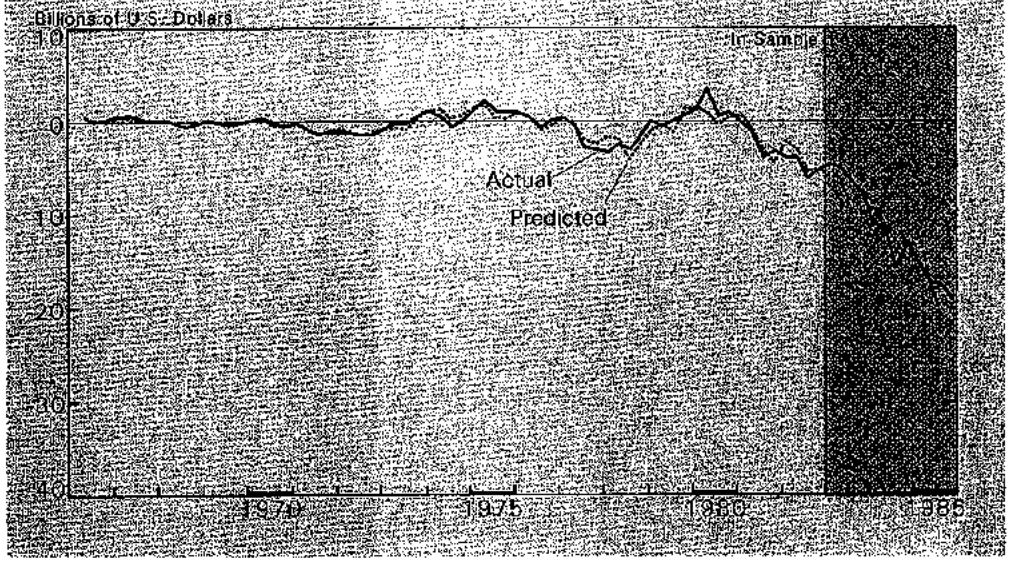
Chart 6

Actual versus Predicted U.S. Merchandise Trade Balance with Five Major Trading Partners



Note: Quarterly data are actual and predicted trade flows between the United States and five major trading partners (measured c.i.f.).

Actual versus Predicted Aggregate Bilateral Trade Flows between the United States and Five Major Trading Partners



Note: Quarterly data (actual and predicted) are the sum of Japanese, German, Canadian, British and French imports from the United States less U.S. imports from these five countries (measured c.i.f.).

Source of data: See Chart 1.

strictive applications of standards—may be as pronounced in the United States as in Japan. A World Bank study concluded that U.S. nontariff protection of nonfuel products is marginally higher than that of Japan.[18] The relative prominence of U.S. overt nontariff barriers is believed to be offset by the relative prominence of Japanese "invisible" nontariff barriers. For instance, the Japanese government has been accused of "targeting" certain industries, using special financing techniques, tax incentives, and other devices. Yet the U.S. International Trade Commission has indicated that such activity has been declining over the past 20 years.[19] Another study concluded that Japanese industrial targeting has not been a serious problem for the United States.[20] Still another study concluded that Japanese imports would increase by about 7 percent, with half of the increase coming from the United States, if Japan reduced its intangible trade barriers for affected products to the level prevailing in the United States and the European Community.[21]

In summary, this article has attempted to focus attention on the relative—not singular—importance of exchange rate changes and of divergent economic growth rates here and abroad for explaining much of the massive U.S. trade deficit. Much of the deficit can be explained by the sharp inflation-adjusted appreciation of the U.S. dollar vis-à-vis foreign currencies

and the robust U.S. expansion in output and demand in the years following the 1981–82 recession. But the slower growth of U.S. output in 1985 and 1986 and the 40 percent depreciation of the dollar against the yen and mark in the past two years cannot alone correct the U.S. trade imbalance. The German economy was stagnant in the fourth quarter of 1986, and German real GNP rose only 2.4 percent from the same quarter in 1985. In Japan, real GNP grew at an annual rate of only 2.5 percent in 1986, the slowest growth in 12 years; the unemployment rate rose to 3 percent in January, the highest rate since monthly reporting began in 1953. If the dollar's depreciation since February 1985 is measured not just against the yen and the mark but against a much wider sample of 40 currencies, the depreciation is only about 25 percent, after adjustment for relative rates of inflation.[22] Thus, with domestic inflation well in check, still further depreciation of the dollar may well be necessary to help reverse the U.S. trade imbalance. But dollar depreciation alone should not be relied upon to alleviate this deficit; greater policy stimulus abroad, in the presence of fiscal contraction in the United States, could make vital contributions.

Dollar depreciation alone should not be relied upon to alleviate the U.S. trade imbalance; greater policy stimulus abroad, in the presence of fiscal contraction in the United States, could make vital contributions.

Appendix

Coefficient estimates presented in appendix tables 1 and 2 summarize the results from estimating the following equation using the Cochrane-Orcutt estimation procedure:

$$(A1)\quad X_{ijt} = a + \sum_{k=1}^{4} b_k NGNP_{i,\,t-k} + \sum_{k=1}^{4} c_k NGNP_{j,\,t-k} + \sum_{k=1}^{4} d_k EX_{ij,\,t-k} + \sum_{k=1}^{4} e_k WPI_{i,\,t-k} + \sum_{k=1}^{4} f_k WPI_{j,\,t-k} + gQ1_t + hQ2_t + m\,Q3_t + n\,TIME_t$$

where X_{ijt} is the value of the aggregate trade flow from country i to country j in quarter t (measured c.i.f.), $NGNP_{i,\,t-k}$ is exporter i's nominal GNP in quarter $t-k$, $NGNP_{j,\,t-k}$ is importer j's nominal GNP in quarter $t-k$, $EX_{ij,\,t-k}$ is exporter i's currency value of one unit of importer j's currency in quarter $t-k$, $WPI_{i,\,t-k}$ is exporter i's wholesale price index in quarter $t-k$, $WPI_{j,\,t-k}$ is importer j's wholesale price index in quarter $t-k$, TIME is a time-trend variable, and Q1, Q2, and Q3 are seasonal dummy variables. Nominal GNP, the exchange rate, and wholesale price indexes are in natural logarithms. Trade flows, $NGNP_i$ and WPI_i are expressed in the exporter's local currency; $NGNP_j$ and WPI_j are expressed in the importer's local currency. The reason is that the exporter and importer explanatory variables in this reduced form are derived from bilateral export supply and import demand functions, respectively. Price and income factors influencing export supply should be denominated in the exporter's currency; price and income factors influencing import demand should be denominated in the importer's currency. All nominal GNP, exchange rate, and wholesale price index coefficients were constrained to follow second-order polynomial distributed lags in all 10 regressions.

Regarding macroeconomic variables, coefficient estimates for importer income and the exchange rate—which have theoretically unambiguous positive expected effects—are stable across equations and are frequently statistically significant. Coefficient estimates for exporter income, exporter WPI, and importer WPI—which have theoretically ambiguous expected effects—are less stable across equations. However, *within* any equation, the underlying theoretical model suggests that—given the elasticity of substitution (σ) is greater or less than one—the coefficient estimates for these three variables must be mutually consistent. The results indicate that this mutual consistency within equations typically holds.

Appendix Table 1

Reduced-Form Coefficient Estimates for Aggregate U.S. Exports to Selected Trading Partners

Right-Hand Side Variables	Expected Coefficient Sign if $\sigma < 1$	Importer (t-statistics in parentheses) Canada	Japan	Germany	U.K.	France	Expected Coefficient Sign if $\sigma > 1$
Exporter's Income	−	−.39 (−.71)	−.93 (−1.48)	1.44 (1.19)	5.63** (5.37)	2.28 (1.89)	+
Importer's Income	+	2.45** (4.39)	1.40** (5.37)	1.07 (1.02)	.55 (.55)	2.22* (2.24)	+
Appreciation of Importer's Currency	+	−.35 (−.66)	.30 (1.42)	1.05* (2.59)	.56* (2.54)	1.14** (3.99)	+
Exporter's Wholesale Price Index	+	1.19 (.86)	2.69** (4.91)	.58 (.48)	−3.43** (−4.81)	−2.43* (−2.21)	−
Importer's Wholesale Price Index	−	−2.07 (−1.40)	−1.61** (−3.97)	−1.70 (−1.15)	1.29 (1.53)	1.18 (1.61)	+
Quarter 1	n.a.	−.03* (−2.28)	.04* (2.06)	−.01 (−.43)	−.17** (−3.10)	.08** (2.70)	n.a.
Quarter 2	n.a.	.06** (4.06)	.05* (2.36)	.04* (1.15)	−.16* (−2.56)	.06** (2.53)	n.a.
Quarter 3	n.a.	−.10** (−6.13)	−.27 (−1.48)	−.09** (−3.05)	−.18** (−4.22)	−.07** (−2.30)	n.a.
Time	n.a.	−.01 (−1.30)	−.01 (−.91)	−.03 (−.99)	−.09** (−4.71)	−.06* (−2.34)	n.a.
Constant	n.a.	3.65 (1.46)	3.43 (.67)	2.43 (.27)	20.94** (4.01)	14.60* (2.50)	n.a.
Rho		.42*	.06	.25	.12	.06	
D.W. statistic		1.73	1.88	2.03	2.02	1.96	
Adjusted R^2		.99	.99	.96	.98	.99	
Root Mean Squared Error		.05	.06	.10	.10	.08	
Number of Observations		91	91	87	91	67	

Notes: σ = elasticity of substitution in consumption. * and ** denote statistical significance in two-tail t-tests at the 5 percent and 1 percent levels, respectively. n.a. denotes not applicable.

Sources of data: International Monetary Fund, *International Financial Statistics* and *Direction of Trade Statistics*.

Appendix Table 2

Reduced Form Coefficient Estimates for Aggregate U.S. Imports from Selected Trading Partners

Right-Hand Side Variables	Expected Coefficient Sign if $\sigma > 1$	Exporter (t statistics in parentheses)					Expected Coefficient Sign if $\sigma < 1$
		Canada	Japan	Germany	U.K.	France	
Exporter's Income	+	1.59** (2.66)	.67 (1.65)	−1.62 (−1.93)	−1.31 (−1.24)	.70 (−.71)	−
Importer's Income	+	.87 (1.49)	3.15** (3.20)	2.29** (2.39)	1.24 (1.13)	2.38 (1.96)	+
Appreciation of Importer's Currency	+	.80 (1.35)	1.14** (3.66)	.23 (.69)	.28 (1.21)	.24 (.84)	+
Exporter's Wholesale Price Index	−	−1.40 (−.84)	−.17 (−.26)	.95 (.80)	.85 (.96)	1.63* (2.21)	+
Importer's Wholesale Price Index	+	.06 (.04)	−.90 (−1.06)	2.23* (−2.28)	.46 (.62)	−1.20 (−1.07)	
Quarter 1	n.a.	.07** (−4.19)	−.04* (−2.14)	−.01 (−.46)	.07 (−1.36)	−.03 (−.82)	n.a.
Quarter 2	n.a.	.01 (.41)	.03 (1.24)	.03 (.83)	−.12 (−1.90)	.01 (−.05)	n.a.
Quarter 3	n.a.	.09** (−5.54)	.05** (2.66)	−.05 (−1.74)	−.11** (−2.69)	−.04 (−1.06)	n.a.
Time	n.a.	−.01 (−.67)	−.03 (−1.26)	.03 (1.36)	.02 (1.12)	−.23 (−1.44)	n.a.
Constant	n.a.	.38 (.14)	−10.73* (−2.08)	5.08 (.71)	−4.98 (−.91)	−10.30* (−2.30)	n.a.
$\hat{\rho}$		.33	.36	.13	.21	−.08	
D.W. statistic		1.87	1.88	2.02	1.94	1.99	
Adjusted R^2		.99	.99	.97	.98	.99	
Root Mean Squared Error		.06	.07	.09	.09	.09	
Number of Observations		91	91	87	91	67	

Notes: σ = elasticity of substitution in consumption. * and ** denote statistical significance in two-tail t tests at the 5 percent and 1 percent levels, respectively. n.a. denotes not applicable.

Sources of data: International Monetary Fund, *International Financial Statistics* and Division of Trade Statistics.

[1] President Ronald Reagan's State of the Union address, January 27, 1987.

[2] "Tough Retaliatory Trade Measure Is Approved Narrowly in House," *The New York Times*, April 30, 1987, p. 1.

[3] See Jeffrey H. Bergstrand, "United States-Japanese Trade: Predictions Using Selected Economic Models," *New England Economic Review*, May/June 1986, pp. 26–37.

[4] See Guy V. G. Stevens et al., *The U.S. Economy in an Interdependent World: A Multicountry Model*, Washington, D.C.: Board of Governors of the Federal Reserve System, 1984. That study approximated changes in the price of German products in the United States with the German aggregate export unit value index (converted into dollars); consequently, German exports to the United States and to other markets are assumed to be priced the same (in terms of marks). See also the International Monetary Fund, "Exchange Rate Volatility and World Trade," Occasional Paper No. 28, July 1984, Appendix IV.

[5] See, for example, Stephen E. Haynes, Michael M. Hutchison, and Raymond F. Mikesell, "U.S.-Japanese Bilateral Trade and the Yen-Dollar Exchange Rate: An Empirical Analysis," *Southern Economic Journal*, vol. 52, no. 4, April 1986.

[6] *Ibid.*

[7] Some attempts have been made to construct price indexes for U.S.-Japanese bilateral trade flows. Typically, aggregate export unit value indexes by single-digit commodity categories are weighted by bilateral import shares. This assumes that exports to various markets are priced identically (in exporter's currency).

[8] For a more formal description, see Jeffrey H. Bergstrand, "The Gravity Equation in International Trade: Some Microeconomic Foundations and Empirical Evidence," *Review of Economics and Statistics*, vol. 67, no. 3, August 1985, pp. 474–481.

[9] Formally, a higher level of German GNP will be associated with a larger trade flow value if the elasticity of substitution in consumption σ exceeds one.

[10] The price of German exports to the United States (in marks) is excluded from the right-hand side because it is endogenous.

[11] See Bergstrand, "United States-Japanese Trade: Predictions Using Selected Economic Models." Using the same methodology, that study showed that the effect of Japanese average tariff rates on Japanese imports from the United States was statistically insignificant and the effect of U.S. average tariff rates and steel import quotas on U.S. imports from Japan was statistically insignificant. Although Japanese "voluntary" auto export restraints were found to have a statistically significant positive relation with the value of U.S. imports from Japan, the restraints' effect on the trade flow value—as measured by the coefficient estimate—was quite small. Moreover, 99 percent of the variation in quarterly U.S. exports to and imports from Japan could be explained without tariff and nontariff-barrier variables.

[12] All macroeconomic independent variables entered each equation with a four-quarter, second-order polynomial distributed lag. Reported coefficients are the sums of coefficients for each variable. Estimation for Germany began in 1961:II and for France began in 1966:II because of data limitations.

[13] Similar instability of coefficients across trading pairs was found in the International Monetary Fund, "Exchange Rate Volatility and World Trade," which estimated bilateral import demand functions. Like this one, that study restricted the specification and lag structure to be *identical* across trade flows. This approach is contrasted with the estimation of bilateral import demand functions in the Multicountry Model of the Board of Governors of the Federal Reserve System; in that model, specification and lag structures vary across trade flows, generally yielding less coefficient instability across equations. Yet for any particular pair of countries, coefficient estimate signs in our study were mutually consistent in most regressions; see the appendix for details.

[14] C. Fred Bergsten and William R. Cline, *The United States-Japan Economic Problem*, Washington, D.C.: Institute for International Economics, October 1985, pp. 45–46.

[15] A more restrictive (easier) fiscal policy was approximated by a positive (negative) change in the country's inflation-adjusted structural budget balance. In 1983, 1984 and 1985, the U.S. change was negative all three years, while the Japanese and German changes were positive each year. In the United Kingdom and France, the changes were positive in two of the three years. The Canadian changes were negative in all three years.

[16] Paul R. Krugman and George N. Hatsopoulos, "The Problem of U.S. Competitiveness in Manufacturing," *New England Economic Review*, January/February 1987, p. 19. The authors adeptly summarize the argument for an erosion in U.S. competitiveness in manufacturing as the principal cause of the U.S. trade deficit.

[17] These average tariff rates are from Bela Balassa and Carol Balassa, "Industrial Protection in the Developed Countries," *The World Economy*, vol. 7, no. 2, June 1984.

[18] Julio J. Nogués, Andrzej Olechowski, and L. Alan Winters, "The Extent of Nontariff Barriers to Imports of Industrial Countries," World Bank Discussion Paper DRD115, Washington, D.C.: January 1985.

[19] U.S. International Trade Commission, *Foreign Industrial Targeting and the Effects on U.S. Industries, Phase 1, Japan*, U.S. International Trade Commission Publication No. 1437, Washington, D.C., October 1983.

[20] Paul R. Krugman, "The U.S. Response to Foreign Industrial Targeting," *Brookings Papers on Economic Activity*, No. 1, 1984.

[21] Dorothy Christelow, "Japan's Intangible Barriers to Trade in Manufactures," Federal Reserve Bank of New York *Quarterly Review*, Winter 1985–86, p. 11.

[22] *World Financial Markets*, February/March 1987 and October/November 1986; for a discussion of various measures of the dollar's depreciation, see "Dollar Index Confusion" in the October/November 1986 issue, pp. 14–19.