The original documents are located in Box B2, folder "Balance of Payments (1)" of the Arthur F. Burns Papers at the Gerald R. Ford Presidential Library.

BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM

Office Correspondence

Date March 7, 1969.

To Board of Governors

From Robert Solomon

Subject: Euro-dollar Borrowings and C.D. Attrition

I commend to the Board's attention the attached analysis by Mr. Hersey. This note was specifically inspired by Governor Maisel's remarks at the Money Market Review on February 28, but it is also of more general significance. It states an analytical conclusion--that Euro-dollar borrowings do not add to total credit availability or affect the general level of interest rates in the U.S. economy, whatever their effect in helping the borrowing banks to postpone adjustments in their investments and loans--a conclusion to which my colleagues and I have come as we continue to think about the process of Euro-dollar borrowings.

RS

Attachment.

Chron. Memo

To: Mr. Robert Solomon

From: A. B. Hersey

Subject: Borrowing of Euro-dollars as an Offset to CD Attrition

The first part of this memorandum summarizes very briefly the mechanisms of what happens when U.S. banks offset CD attrition by borrowing Euro-dollars. The second part takes note of some results. The third part deals with the question of what "leakages" can be said to be involved if we look at the borrowing of Euro-dollars as a credit expansion process. (The term "leakages" is used here in the sense in which it is used in multiplier theory.) This leads into the question of limits on the use of Euro-dollars.

Mechanics of U.S. banks' borrowing Euro-dollars.

What happens when banks losing large-denomination CD money attempt to avoid asset adjustments by borrowing Euro-dollars through their branches? (Let us disregard the bidding of deposits away from one bank by another.) New Euro-dollar deposits come into existence as part of a process typified by the following events: (1) some foreign business or bank shifts out of liquid assets in some other currency into Euro-dollars, disposing of its former asset in a foreign money market and buying dollars in the foreign exchange market; it may either acquire a Euro-dollar deposit or repay a Euro-dollar loan; (2) a foreign central bank, selling dollars in the foreign exchange market, liquidates U.S. Treasury bills in the U.S.

market to replenish the working account from which its dollar sales are made; (3) some U.S. short-term investor acquires the Treasury bills.

The first two elements of the process were very clearly evident in January when German banks were moving into Euro-dollars on an unusually large scale and the Bundesbank was losing reserves heavily. At times when movements into Euro-dollars are smaller than they were in January, the association of reserve changes with movements into Euro-dollars may show up less clearly, taking the form of a smaller gain in foreign official reserves than would otherwise have occurred.

Results for U.S. bank assets, bank liquidity, and total credit.

1. The process described above is thought of as being triggered by U.S. banks' bidding for Euro-dollar funds in consequence of CD attrition. Suppose now that the U.S. banks had not succeeded in getting additional Euro-dollars. In that case they would have had to make other adjustments -- in the Federal funds market, at the Federal Reserve discount window, or by selling Treasury bills or other assets. Thus one result of the successful bidding -- assuming that the Euro-dollar borrowing are for a reasonably long period such as a month or more -- is that the banks involved temporarily escape the need for making other adjustments. In comparison with the alternative of selling bills, they keep their total assets and liabilities

larger than they would otherwise have been. They retain a cushion of liquidity they would otherwise have lost.

2. The reserve requirements of the banks suffering CD attrition are reduced by 6 per cent of the loss of CD's. Whatever effects this may have, given Federal Reserve policy actions at the time, will be the same whether or not the banks offset the CD attrition by obtaining Euro-dollar funds not subject to reserve requirements. However, in so far as Federal Reserve policy actions are geared to total bank credit or to the bank credit proxy adjusted for Euro-dollars (rather than to the unadjusted proxy), successful bidding for Euro-dollars (which makes bank assets larger than they would otherwise be) may cause Federal Reserve policy shortly afterwards to be slightly more restrictive, and interest rates slightly higher, than if the banks had failed to obtain the Euro-dollars and so had had to reduce their assets.

3. Disregarding effects mentioned in the preceding paragraph, whether CD attrition is accompanied by successful bidding for foreign funds through the Euro-dollar market or by unsuccessful bidding and then by asset adjustments or other borrowings, in either case the U.S. banks' actions have the effect of transmitting liquidity pressures out into U.S. financial markets. In the first case, foreign central banks are impelled to sell U.S. Treasury bills (or buy fewer than otherwise); in the second case, the U.S. banks themselves transmit the pressure

through bill sales or other adjustments.[1/] To repeat, even though banks that borrow Euro-dollars escape immediate pressure themselves, their actions have the effect of passing on pressure to the rest of the system.

4. Similarly, whether or not the bidding for additional funds through the Euro-dollar market is successful, nonbank creditors in the United States who (in the aggregate) are giving up CD's will (in the aggregate) have to absorb Treasury bills or similar instruments -- from foreign central banks in one case, from the U.S. banks in the other -- so that in either case total credit for U.S. residents will be unaffected.[2/]

1/ Asset adjustments either by the foreign central banks or by the banks suffering CD attrition clearly tend to transmit pressure; some other bank must lose reserves in settlement for purchases of the assets sold. Borrowing at the Federal Reserve discount window does not transmit liquidity pressures to other parts of the system; instead the borrowing bank itself remains under pressure to make adjustments; the transmission of pressures is thus merely delayed. The analysis here skips entirely the question of what expansive effects on the reserve position of other banks the withdrawal of CD's (from banks that borrow Euro-dollars) may have. We might assume, for example, that Federal Reserve policy is sufficiently restrictive to cancel out these expansive effects for other banks. All that is being analyzed here is the difference if any between what happens in the case of successful bidding for Euro-dollars to offset CD attrition and what happens in the case of unsuccessful bidding and consequent absence of that offset.

2/ This assumes sale of liquid assets to nonbanks as the adjustment route if bidding for Euro-dollars is unsuccessful. Borrowing at the Federal Reserve discount window or borrowing Federal funds from a bank with excess reserves or sale of liquid assets to a bank with excess reserves would postpone the necessity of a sale of liquid assets to nonbanks.

The initial effects of CD attrition are to leave total credit unaffected, and this is no more so and no less so if the banks losing CD's offset their loss of liabilities by obtaining Euro-dollars.

5. To sum up, the one clear difference between what happens when Euro-dollars are obtained to offset CD attrition and what happens when CD attrition is not offset is that the impairment of the liquidity position of the banks directly concerned is avoided if they get Euro-dollars. To that extent, and for those banks, progress of the monetary policy squeeze on bank liquidity, intended to bring changes in member bank policies on investments and on loans, is delayed. However, if Federal Reserve policy is influenced by what happens to total bank credit, monetary policy may tend to become more restrictive shortly after. Moreover, apart from Federal Reserve policy reactions, neither the transmission of liquidity pressures through the U.S. banking system nor the flow of total credit for U.S. residents is made any different by the successful bidding for Euro-dollars, since getting the Euro-dollars forces Treasury bill sales by foreign central banks in place of asset liquidation by U.S. banks.

"Leakages" and other limits.

In the conventional theory of multiple expansion of bank credit on the basis of an injection of deposits and reserves from outside the system, the process is described as one in which expansion of

loans and investments causes a spiraling growth of deposits, limited by certain leakages:

(a) for the system as a whole the leakages are reserve requirements and drain of currency into circulation;

(b) for individual banks or groups of banks, the leakages are deposit withdrawals by their borrowers less deposit acquisitions resulting from the expansion process elsewhere in the system, plus net increase in reserve requirements.

Consider now the Euro-dollar banking system. When it increases its assets in the form of Euro-dollar loans it may possibly experience some multiple expansion. But when the asset increase occurs only in balances due from head offices, the leakage is 100 per cent. No part of the funds loaned is redeposited by the head offices in Euro-dollar banks.

Next, take the system consisting of the U.S. banking system plus the Euro-dollar banking system. When U.S. banks obtain Euro-dollars through their branches (as an alternative to selling Treasury bills or other assets) this combined system increases its liabilities in the form of Euro-dollar deposit liabilities and its assets in the form of Treasury bills (as compared with what would otherwise have happened). But the mechanics of the process require that the new supply of Treasury bills come from foreign central banks, who do not add the dollars they get to any deposits they may have either in the U.S. banking system or the Euro-dollar banking system but rather sell those dollars. Again there is a 100 per cent leakage. After the initial injection of deposits into the Euro-dollar system no multiple expansion takes place.

The question then arises as to what limits there are on the initial injections of deposits reloaned to head offices. The limits on expansion of U.S. banks' liabilities to the Euro-dollar market derive from (1) limits on the willingness of U.S. banks to pay higher and higher interest rates; (2) the finite nature of flows of new saving that might be expected to flow into Euro-dollar deposits; and (3) the finite nature of the portfolios of persons who may shift out of other assets to acquire Euro-dollars, and various considerations affecting their willingness to shift.

These limitations did not prevent very large expansion of liabilities to foreign branches at times when people were shifting on a large scale out of sterling or French francs or German marks into Euro-dollars. In February there was no flight out of sterling or French francs, and the German and Italian central banks were abstaining from providing their commercial banks with forward exchange cover at attractive rates -- while market rates for the forward dollar against their currencies were at a discount -- and consequently there was much less willingness to shift into Euro-dollars than there had been at some earlier times.

Chairman Burns

SPECIAL

BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM

Office Correspondence

Date February 3, 1970

To Chairman Burns

From Margaret Garber M.G.

Subject: Preliminary Balance of Payments Indicators.

CONFIDENTIAL (FR)

Coverage of weekly indicators

Attached is a table showing weekly and monthly data on settlement items in the U.S. balance of payments. The weekly data on liabilities to foreigners are based on reports of the Federal Reserve Bank of New York and on information obtained by the Bank from large banks throughout the United States. Weekly data cover liquid and nonliquid liabilities to foreign official institutions, and liquid liabilities to international and regional organizations and to commercial banks abroad, including foreign branches of U.S. banks, as well as changes in U.S. reserve assets.

Liquid liabilities to other "private" foreigners are not covered in this weekly series.

The monthly figures on liabilities to foreigners that are used in the published accounts are based on reports to the Treasury by all banks and banking institutions in the United States with liabilities to foreigners of over $500,000. These monthly reports give details by country and by type of liability.

The weekly indicators of settlement items in the balance of payments essentially represent a sampling of the most important

elements of the liquidity and official settlements balances; the coverage is incomplete, and because of the need for quick reporting, errors are frequent and sometimes large. Nevertheless, with due regard to the erratic behavior inherent in weekly data covering a highly volatile phenomenon, these indicators serve reasonably well to suggest tendencies in the over-all international accounts.

Liquid liabilities include demand deposits and time deposits with original maturities of one year or less, other short-term (mainly certificates of deposit, bankers' acceptances and commercial paper), marketable U.S. Treasury securities and nonmarketable convertible U.S. Treasury bonds and notes issued to foreign official institutions.

Nonliquid liabilities include foreign official time deposits and CD's with original maturities of more than one year and nonmarketable nonconvertible U.S. Treasury bonds and notes issued to foreign official institutions.

U.S. reserve assets include the total U.S. gold stock, Treasury and System holdings of convertible foreign currencies, reserve position in the IMF and special drawing rights.

Recent changes in settlement items

In the week ended January 28, 1970 the balance of payments on the liquidity basis showed a deficit of $164 million. There was very little change in liabilities to foreign branches of U.S. banks and to

other commercial banks abroad; liquid liabilities to foreign official institutions increased $295 million while U.S. reserve assets increased $115 million.

There was a deficit of $200 million on the official settlements basis in the latest week. Liquid and nonliquid liabilities to foreign official institutions rose $315 million, reflecting principally increases in holdings at the New York Federal Reserve Bank of the United Kingdom and Germany. The increase in U.S. reserve assets was related mainly to a net increase of $102 million in holdings of foreign currencies through a swap drawing of $200 million by Italy from the System and a swap repayment of $100 million by the United Kingdom.

For the period January 1-28 there was a deficit of $1.8 billion on the liquidity basis. However, this deficit was affected adversely by the Treasury redemption of four mark-denominated Treasury notes, totaling $500 million equivalent, issued to the German Federal Bank under the second military offset agreement. Before this and other special transactions, shown in the first column of the table, the liquidity deficit amounted to $1.2 billion for the four week period. The official settlements deficit for the same period amounted to $.5 billion.

All of the figures just mentioned for the January 1-28 period exclude the initial allocation by the IMF to the United States of $867

million of SDR. With this increase in reserve assets taken into account both of the over-all measures of balance would be more favorable.

Monthly data now available show that in December 1969 there was a surplus of $2.7 billion on the liquidity basis. Liabilities to foreign branches of U.S. banks and other private foreigners combined declined $1.6 billion. On the other hand, U.S. reserve assets rose by almost $1.0 billion, owing mainly to gold purchases from Germany ($500 million) and the Bank for International Settlements ($200 million) and to purchases of dollars from the IMF by Germany and the United Kingdom which increased the U.S. reserve position in the IMF. On the official settlements basis there was a surplus of $1.1 billion in December.

For the year 1969 the liquidity deficit, as it will be published about mid-February, was $6.7 billion or perhaps a bit higher. In the year "special" transactions with foreign governments were adverse to this balance by about $1 billion, as nonliquid claims on the United States were reduced. Before these special transactions, the liquidity deficit amounted to $5.7 billion. There was a surplus of $2.9 billion on the official settlements basis for the year.

Attachment

CONFIDENTIAL--(F.R.)

Settlement Items in the United States Balance of Payments
(In millions of dollars)

Period	Changes in Selected U.S. Liabilities to Foreigners: Nonliquid: to official foreigners	Changes in Selected U.S. Liabilities to Foreigners: Liquid: to official foreigners	Changes in Selected U.S. Liabilities to Foreigners: Liquid: to private foreigners a/: foreign branches	Changes in Selected U.S. Liabilities to Foreigners: Liquid: to private foreigners a/: Other	Changes in Selected U.S. Liabilities to Foreigners: Liquid: to private foreigners a/: total	Changes in Selected U.S. Liabilities to Foreigners: Liquid: Total	Changes in U.S. Reserve Assets (signs reversed): Gold	Changes in U.S. Reserve Assets (signs reversed): Convertible foreign currencies	Changes in U.S. Reserve Assets (signs reversed): Reserve position in the IMF	Changes in U.S. Reserve Assets (signs reversed): Special drawing rights	Changes in U.S. Reserve Assets (signs reversed): Total	U.S. Surplus (- or Deficit (+: Official transactions basis	U.S. Surplus (- or Deficit (+: Liquidity basis
	1	2	3	4	5 (3+4)	6 (2+5)	7	8	9	10	11	12 (1+2+11)	13 (6+11)
Week-ended 1969-70													
Dec. 24	- 10r	-453r	-184	70	-114	-567r	2	9	1		12	-451r	-555r
Dec. 31	--	-387	-1,398	256	-1,142	-1,529	-498	28	- 82		-552	-939	-2,081
Jan. 7	- 38	416	820r	-388r	432r	848r	- 28	125	1		98	476	946r
Jan. 14	-250	91r	521	- 34r	487r	3578r	6	-103	- 4	-23	-124	-283r	454r
Jan. 21	-269p 270	390p 54	-509p	331p 296	-178p 213	212p 141	--	76	- 18	- 2	56	140 177p	197 268p
Jan. 28	20	295	- 1	- 15	- 16	279	- 1	-102	- 5	- 7	-115	200	164
1969 Jan. 1-28	-538	1,156	831	-141	690	1,846	-23	- 4	-26	-32	- 85	533	1,761
Aug.	-173	1,060	194e	172e	366	1,426	- 10	-233	- 16		-259	628	1,167
Sept.	-178	1,436	-280e	- 72e	-352	1,084	- 10	-398	-140		-548	710	536
Oct.	-134p	175p	-349e	558e	209p	384p	- 26	456	- 3		427	468p	811p
Nov. p/	- 45	- 677	n.a.	n.a.	886	209	19	476	- 179		316	- 406	525
Dec. p/	- 16	- 140			-1,563	-1,703	-688	84	- 360		- 964	-1,120	-2669
IQ	45	-1,707	2,821e	207e	3,028	1,321	56	- 72	- 32		- 48	-1,710	1,273
IIQ	-361	- 545	4,454e	176e	4,630	4,085	-317	245	-227		-299	-1,205	3,786
IIIQ	-512	2,244	1,135e	256e	1,391	3,636 5	- 11	-441	-234		-686	1,046	2,949
IVQ p/	- 195	- 642	n.a.	n.a.	- 468	-1,110	-695	1016	-542		-221	-1,058	-1,331
YEAR p/	-1,023	- 650	n.a.	n.a.	8,581	7,931	-967	748	-1035		-1,254	-2,927	4,677

Note: The data for the week ended January 7 exclude changes in United States monetary reserves arising from the allocation of Special Drawing Rights.

a/ Changes in U.S. deposit liabilities to private nonbank foreigners reported by member banks are included in the monthly but not in the weekly series. Changes in U.S. liabilities to international and regional nonmonetary organizations are included in the monthly series as liabilities to private foreigners, but in the weekly a part unfortunately remains in the "official" category.

e - estimates based on daily figures with somewhat incomplete coverage.
p - preliminary
r - revised

Balance of Payments Division
Federal Reserve Bank of New York
January ~~23~~, 30, 1970

[c. 1970 or 1971]

PREFATORY NOTE

The two attached papers examine the effects on the U.S. balance of trade of the excess demand and inflation that prevailed in the United States in the second half of the 1960's. These two independent studies come to the same general conclusion: had the U.S. economy been held to a noninflationary high-employment growth path after 1964, the United States would have had a substantial trade surplus in 1969.

Mr. George Henry's paper simulates U.S. trade on the basis of forecasting equations for exports and imports. Mr. Henry is an economist in the Division's Special Studies Section.

The paper by Professor Adams and Mrs. Junz is based on the OECD world trade model and examines the effects not only of U.S. economic performance on trade flows but also the effects of different assumptions regarding the economic performance of other industrial countries. Professor Adams is on the faculty of the University of Pennsylvania and is a consultant to the Board. Mrs. Junz is a Senior Economist in the Europe and British Commonwealth Section of the Division of International Finance.

Robert Solomon,
Adviser to the Board,
and Director,
Division of International Finance.

United States Merchandise Trade, 1965-1969

by

George B. Henry

The period 1965-1969 witnessed a dramatic decline in the United States' foreign balance on merchandise account. A surplus for merchandise transactions (census basis, excluding military grant shipments) of about $7 billion in 1964 was reduced to $0.8 billion by 1968 ($1.3 billion in 1969). The severity of the decline has necessarily become a matter of concern. However, it appears that a crucial distinction for policy-making -- that between cyclical and longer-run fundamental changes in the U.S. trade position -- has not been adequately drawn. In particular, it is important to know to what extent the trade deterioration can be attributed to the inflationary conditions which prevailed in the United States during the period in question. An estimate can be obtained by simulating trade equations.

This paper reports some simulations that have been generated using forecasting equations.[1/] On the basis of these simulations, the entire deterioration of the trade balance from 1964 to 1969 can be explained by the excess demand and price inflation that prevailed in the United States during the period. The analysis implies that, had the economy followed a non-inflationary, full-employment growth path, the trade balance would not have weakened.

The paper is divided into two sections. Section I describes the equations and the data employed in their estimation. Section II provides a general summary and analysis of the simulation exercise.

I

The equations that are employed in this paper have variables expressed in current dollars, having been expressly designed for short-term forecasting. Thus they provide estimates of trade flows for any period expressed in prices of that period and do not require companion estimates of traded goods prices. The import equations are estimated using data from the first quarter of 1955 to the fourth quarter of 1968.

1/ The form of the export equation was borrowed without modification from the work of Evelyn Parrish at the U.S. Department of Commerce. The import equations are my own except that the GAP variable was first used by Miss Parrish. In the near future the Survey of Current Business will publish the latest results of her work.

They fit that data very well.[2/] The export equation is estimated using data from the first quarter of 1958 to the fourth quarter of 1968 and is also quite respectable, although somewhat less reliable than the import equations.

Before we describe the individual equations and the reasoning behind each independent variable, one general comment on methodology should be made. The essential characteristic of a forecasting equation is that reasonably accurate estimates of its independent variables be available for a year or more into the future. This requirement inhibits disaggregation, that is, it inhibits forecasting by commodity groups and/or geographical areas and typically forces work to a very high level of aggregation, as in this paper. It does more. One may desire a measure of the pressure on manufacturers' capacity, but settle for the much grosser concept of the GNP gap; one may desire a variable for inventories of materials, yet settle for all manufacturers' inventories; one may desire to estimate using capital flows to particular areas of the world, yet settle for

---

2/ All such equations should be interpreted as applying to experience within the limits of the sample. This caveat is more important the less is the theoretical plausability of the equation, since if we do not know the mechanism underlying the explanation, we cannot be very confident of its applying under other circumstances. The equations used in this paper employ entirely reasonable explanatory variables and exhibit reasonable elasticities. The mean income elasticity of demand for imports is around 1.6; the mean price elasticity is around 1.3.

the total U.S. direct investment outflow. In general, one has to compromise somewhat more on the selection of variables than if an historical study were being undertaken. On the other hand, the resultant equation must predict changes in the dependent variable rather closely. So, while forecasting equations are by no means uniquely suited for simulation exercises, they are not disqualified either.

Imports

Table I presents the equations used in this paper. Table II describes each variable and the data employed. The first equation (Total Import Equation) is the best forecasting equation that I have been able to develop.[3/] The equation predicts the seasonally adjusted quarterly values of all U.S. imports except for imports of Canadian automotive products. The U.S.-Canadian agreement of 1965 vastly stimulated trade of automotive goods in both directions; we eliminated these items since their rapid growth has not depended on the course of the general economy but on an exogenous factor, the negotiated agreement.

The two most important factors affecting U.S. imports are the level of U.S. national income and the relationship between foreign

3/ The remarks below apply with only minor modification to equation II (Non-regulated Goods Import Equation) as well.

Table I

Trade Equations

(t statistic in parentheses)

(I) "Total" Import Equation

$$M = -7.7223 + \underset{(27.256)}{0.0128}\ GNP + \underset{(1.850)}{0.0146}\ RP + \underset{(3.520)}{0.0499}\ USWPI + \underset{(5.076)}{0.0062}\ GAP - \underset{(1.954)}{0.0087}\ I/O + \underset{(2.251)}{0.0640}\ CIP - \underset{(11.360)}{0.0449}\ T - \underset{(4.372)}{0.2319}\ D$$

$\bar{R}^2$ = .998 Durbin-Watson = 1.74

Standard Error = $0.067 billion Degrees of Freedom = 47

Table I (continued)

Trade Equations

(t statistic in parentheses)

(II) Non-Regulated Goods Import Equation

$$
\begin{aligned}
NRM = {} & -7.5589 + \underset{(28.490)}{0.0128}\ FS + \underset{(6.414)}{0.0228}\ CBI \\
& + \underset{(3.664)}{0.0263}\ RP + \underset{(2.021)}{0.0214}\ USWPI \\
& + \underset{(2.805)}{0.0040}\ GAP + \underset{(1.341)}{0.0371}\ CIP \\
& \underset{(11.110)}{-0.0422}\ T \quad \underset{(3.526)}{-0.1820}\ D
\end{aligned}
$$

$\bar{R}^2$ = .997 Durbin-Watson = 1.76

Standard Error = $0.066 billion Degrees of Freedom = 47

Table I (continued)

Trade Equations

(t statistic in parentheses)

(III) Export Equation

$$NX = 1.5070 + \underset{(6.787)}{0.0592}\ FIP - \underset{(2.575)}{0.0254}\ RPX_{-2} + \underset{(2.611)}{0.0036}\ FUTL_{-2} + \underset{(3.819)}{0.172}\ M_{-4} + \underset{(1.299)}{0.171}\ USDIO_{-3} - \underset{(3.144)}{0.0491}\ T$$

$\bar{R}^2 = .992$ Durbin-Watson = 1.93

Standard Error = $0.087 billion Degrees of Freedom = 37

Table II

Definition of Variables

M	=	U.S. imports in billions, quarterly, seasonally adjusted and adjusted for strike distortions, excluding imports of automotive products from Canada.
GNP	=	Gross National Product in billions, seasonally adjusted annual rates.
RP	=	U.S. wholesale price index for manufactures over weighted foreign wholesale price index of manufactures, 1963 = 100.
USWPI	=	U.S. wholesale price index of manufactures, 1963 = 100.
GAP	=	$[(\text{Actual real GNP/potential real GNP}) - 0.97]^2$ with appropriate sign added.
I/O	=	Ratio: (All manufacturers' inventories to orders) x 100.0.
CIP	=	Dummy variable (=1.0 in quarter when change in industrial production index [for all manufactures] becomes negative; = 0.0 elsewhere).
T	=	Trend: 1,2,3, . . . (1955-I = 1).
D	=	Dummy for Mideast war of 1967: 1967-II = 1; 1967-III = 1; zero elsewhere.
NRM	=	U.S. imports in billions, quarterly, seasonally adjusted and adjusted for strike distortions, excluding imports of automotive products from Canada, and less imports of fuel and lubricants and less imports of coffee, cocoa and sugar.
FS	=	U.S. final sales (demand) in billions: GNP less changes in business inventories (CBI), seasonally adjusted annual rates.
CBI	=	Changes in business inventories in billions, seasonally adjusted annual rates.
NX	=	U.S. nonagricultural exports in billions, quarterly, seasonally adjusted and adjusted for strike distortions. Data exclude exports of automotive products to Canada and exports of aircraft.
FIP	=	Industrial production in Western Europe, Canada, and Japan, weighted by U.S. exports, 1963 = 100.
RPX	=	U.S. wholesale price index of manufactured goods over weighted foreign wholesale price index of manufactures, 1963 = 100.
FUTL	=	Reciprocal of the weighted average of unused capacity in Western Europe, Canada and Japan; thus, FUTL = 100/unused capacity.
USDIO	=	U.S. private foreign direct investment net outflow in billions, quarterly.

prices and U.S. prices. The level of GNP (at seasonally adjusted, annual rates) is our measure of national income. We expect that a change in it will cause a change in imports in the same direction. Table I indicates a coefficient for the GNP variable of +0.0128. Since we are predicting quarterly imports with quarterly GNP expressed at annual rates, this implies that, if all other factors remain unchanged, a $1 billion increase in GNP in any quarter (i.e., an annual rate of $4 billion) will result in approximately a $50 million increase in U.S. imports in that quarter.

Two price variables enter the equation. The first, RP, is simply the ratio of the domestic wholesale price index of manufactures to a weighted average of foreign price indices. It measures relative movements in prices; when U.S. prices are higher relative to foreign prices, we expect imports to be greater. The coefficient of the RP variable, +0.0146, indicates that for a one point increase in the relative price of U.S. goods, some $15 million in additional U.S. imports are induced. There is also entered separately the level of U.S. wholesale prices (USWPI). Thus, for a given level of relative prices, the higher are domestic prices, the greater will be the value of imports. Since the dependent variable is in value terms, even if the physical quantities demanded remained unchanged, a higher level of world prices would increase the value of imports. Moreover, a constant relative price, with widening absolute differential, may

well result in an increase in the quantity of imports. The coefficient of the USWPI variable, +0.0499, indicates that for a one point increase in the price of U.S. goods, some $50 million in additional U.S. imports are induced.

Three cyclical variables, each serving a somewhat different function, are included in the equation. The GAP is a proxy for the pressure of demand in the United States (the variable is based on the Council of Economic Advisors' calculation of the difference between actual and potential GNP). The pressure of demand variable is assumed to reflect changes in non-price competitiveness, i.e., changes in delivery lags, credit terms, quality of product and quality of after-sales service, etc. Thus, an increase in the pressure of demand (i.e., adverse movements in the non-price "product characteristics") results in an increase in U.S. imports. The coefficient of the GAP variable, +0.0062, indicates that for a one point increase in the variable, about $6 million in additional U.S. imports are induced. The variable itself is a non-linear function of the gap, however. If, for example, actual GNP moves from 94 per cent to 95 per cent of potential, over $30 million in imports are induced.

Imports of materials can be expected to respond rather quickly to changes in inventories of materials. Some materials are not available domestically so that all changes in demand are reflected in changes in imports. The movement of the inventory/order ratio (I/O)

is an indicator of the relationship between desired and actual inventories (on the assumption that some desired norm exists). Thus, we expect the resultant negative relationship between imports and the level of I/O. The coefficient of the I/O variable, -0.0087, indicates that for a one per cent increase in inventories as a percentage of orders, there is a $9 million reduction in U.S. imports.

The change in industrial production variable (CIP) improves the performance of the equation around turning points. It takes the value 1.0 when industrial production initially turns down and is zero elsewhere. In the first quarter that industrial production turns down, imports tend to be greater than would be expected on other factors alone by $64 million. It appears that the result is simply another aspect of the "inflationary psychology" phenomenon. That is, businessmen have tended, at least recently, to be disbelieving about the prospects for a downturn in the economy. Thus imports, which require ordering some time before delivery, will be unusually high until the fact of a downturn becomes inescapable.

The equation includes two additional dummy variables. The trend dummy (T) assumes the value of 1.0 in the first quarter of 1955 and increases by one in each subsequent quarter. The coefficient of -0.0449 indicates that if the level of GNP, prices, and everything else remained absolutely the same from one quarter to the next, imports would fall by some $45 million per quarter. One can devise

explanations for this phenomenon. But in all honesty, the primary justification is the much superior predictive ability of the equation when the trend dummy is included. The final dummy variable (D) takes the value of 1.0 in 1967-II and 1967-III and is zero elsewhere. It purports to capture the unusual effects on imports of the Mideast war of 1967. The coefficient of -0.2319 indicates that imports were reduced to $232 million below what they would otherwise have been in each of the two periods.

The total result is a good forecasting equation for imports. The $\bar{R}^2$ is high (0.998), the Durbin-Watson statistic good (1.74) and the t statistics are all acceptable (a 95 per cent significance level is 2.02; a 99 per cent significance level is 2.69). The equation's performance was excellent at turning points. There were five major peaks of actual imports during the sample period. At four of these, predicted imports peaked in the same period as actual imports. For the last, predicted imports were virtually unchanged in the quarter subsequent to the actual peak. For the conventional measure of the equation's accuracy, we look at the standard error of the estimate, about $67 million. Thus, a prediction by the equation will be within $134 million of the actual value of quarterly imports ($4.4 billion, on average, for the period of fit) about 95 per cent of the time.

Simulations are presented for two alternative import equations. The first (Total Import Equation) has been described in detail

above. The second (Non-Regulated Goods Import Equation) is similar to the first except that it excludes imports of coffee, cocoa and sugar, and fuels and lubricants, items whose entry to the United States is restricted by quotas. To the extent that quotas are effective, changes in United States economic activity and price performance will not affect the amount of regulated goods imported.

Exports

The export equation predicts quarterly values of U.S. exports of goods except for agricultural exports, automotive exports to Canada, and exports of aircraft.

The most important factor affecting U.S. exports is the level of foreign economic activity. A weighted average of foreign industrial production indices (FIP) is our index of foreign activity and is analogous to U.S. GNP in the import equation. Table I indicates a coefficient for the FIP variable of +0.0592. This implies that if all other factors remain unchanged, a one point increase in FIP in any quarter will induce approximately $60 million in U.S. exports.

The relative price variable is lagged two quarters with the implication that foreign importers react to changes in relative prices about six months after the fact. The coefficient of -0.0254 indicates that, for a one point increase in the relative price of U.S. goods, there is a $25 million reduction in U.S. exports.

The foreign utilization variable (FUTL) is a proxy for the pressure of demand abroad and is analogous to the GAP variable in the import equations. Thus, an increase in the pressure of demand abroad (i.e., adverse movements in the non-price "product characteristics" of foreign goods) results in an increase in U.S. exports. As with relative prices, FUTL is estimated to have its impact on U.S. exports two quarters after it changes. The coefficient of +0.0036 indicates that for a one point increase in the variable, about $4 million in additional U.S. exports are induced. FUTL, however, is a non-linear function of the utilization rate. If, for example, the foreign utilization rate moves from 94 to 95 per cent of capacity, almost $12 million in U.S. exports are induced.

The value of U.S. imports (M), lagged one year, is a proxy variable for the availability of foreign exchange abroad. Its coefficient of +0.172 indicates that a $1 million increase in U.S. imports will result in a $172 thousand increase in U.S. exports four quarters later.

The value of U.S. net direct investment outflow (USDIO) is entered as a separate variable in the belief that U.S. exports are intimately related to such investments. The coefficient of +0.171 indicates that a $1 million increase in the U.S. net direct investment outflow will result in a $171 thousand increase in U.S. exports three quarters later.

The equation includes a trend dummy variable (T) which assumes the value of 1.0 in the first quarter of 1958 and increases by one in each subsequent quarter. The coefficient of -0.0491 indicates that if all else remained constant from one quarter to the next, exports would fall by some $49 million per quarter. As with the import equation, the primary justification is the much superior predictive ability of the equation when the trend dummy is included.

The equation has an $\bar{R}^2$ of about 0.99 and a Durbin-Watson statistic of 1.93. It does have one low t statistic. The standard error of the estimate of $87 million implies that a prediction by the equation will be within $174 million of the actual value of quarterly exports ($4.3 billion, on average, for the period of fit) about 95 per cent of the time.

II

One of the virtues of this simulation exercise is that its procedures are readily understandable. Having estimated equations that appear to capture the major forces affecting U.S. trade performance, we simply make alternative hypothetical assumptions about the course of the U.S. economy and permit the equations to generate alternative estimates of what the U.S. trade performance would have been.

Assumptions

(1) Base Case; Inflationary, excessive real growth: All independent variables are entered in the trade equations at their actual values. The predicted values for imports and exports are the base with which we will compare the equations' predictions under alternative assumptions.

(2) Assumption 1; Non-inflationary, full employment growth: The foreign experience remains as it actually occurred. In general, the U.S. economy is assumed to pursue a non-inflationary, full-employment growth path from the second quarter of 1964 through 1969. Specifically, U.S. GNP expands at a rate of 5-1/4 per cent per annum from the third quarter of 1964. This reflects real growth of 3-3/4 per cent[4/] and an increase in the GNP deflator of 1-1/2 per cent per annum. Wholesale prices hold constant (as they did in the early 1960's).

(3) Assumption 2; Non-inflationary, excessive real growth: In an attempt to derive an estimate of the impact of inflation, as conceptually, if not always practically, separate from extraordinary real growth rates, a substitute assumption has been introduced (this has been employed only for the Total Import Equation, giving us a total

---

4/ This is a slightly conservative estimate of the real growth potential of the nation. The Council of Economic Advisors estimates that, around the beginning of 1966, real U.S. output potential began expanding at a 4 per cent annual rate.

of three simulations). Assumption 1 is modified by assuming real GNP growth to be what it actually was in 1964-69, but with an increase in the price deflator of only 1-1/2 per cent per year. In general, the U.S. economy is assumed to pursue an excessive real, but non-inflationary, growth path from the second quarter of 1964 through 1969. As a first approximation, we may consider the improved trade balance under Assumption 2 (relative to the Base Case) as the result of avoiding price inflation. The trade deterioration which does occur under Assumption 2 (relative to Assumption 1) might thus be considered the consequence of excessive real growth.

Simulation Results

The results are displayed below in Tables III-V for the years 1964-1969.[5/] Column 1 (BASE) of each table gives the import results for the base case. Column 2 (SIMUL.) gives the import results for the simulation of Assumption 1 or Assumption 2. Column 3 (B-SIM) is the difference between columns 1 and 2. Column 4 (X^S) is the simulation for exports, consistent with Assumption 1 or 2, since it uses column 2 as one of the inputs. Column 5 (X^B) is the base case result for exports. Column 6 (X^S-X^B) is the difference between columns 4 and 5. Column 7

5/ For the purposes of the simulation exercise, the constant terms of the equations have been adjusted to equalize actual and predicted values for the full year 1964.

Table III

Non-Inflationary, Full Employment Growth
Total Import Equation

	(1) BASE	(2) SIMUL.	(3) B-SIM.	(4) X^S	(5) X^B	(6) X^S-X^B	(7) ATTRIBUTABLE DETERIORATION
1964	18.5	18.4	0.1	18.1	18.1	0.0	0.1
1965	20.9	19.3	1.6	19.3	19.2	0.1	1.7
1966	24.4	20.2	4.2	20.8	20.8	0.0	4.2
1967	25.4	21.0	4.4	21.5	21.7	-0.2	4.2
1968	29.7	22.7	7.0	23.4	23.5	-0.1	6.9
1969	33.0	24.0	9.0	26.5	26.7	-0.2	8.8

Table IV

Non-Inflationary, Full Employment Growth
Non-Regulated Goods Import Equation

	(1) BASE	(2) SIMUL.	(3) B-SIM.	(4) X^S	(5) X^B	(6) $X^S - X^B$	(7) ATTRIBUTABLE DETERIORATION
1964	18.5	18.3	0.2	18.1	18.1	0.0	0.2
1965	20.9	19.1	1.8	19.3	19.2	0.1	1.9
1966	24.4	20.1	4.3	20.7	20.8	-0.1	4.2
1967	25.2	20.9	4.3	21.4	21.7	-0.3	4.1
1968	29.7	23.1	6.6	23.4	23.5	-0.1	6.5
1969	32.8	24.3	8.5	26.5	26.7	-0.2	8.3

Table V

Excessive Real Growth Only
Total Import Equation

	(1) BASE	(2) SIMUL.	(3) B-SIM.	(4) X^S	(5) X^B	(6) X^S-X^B	(7) ATTRIBUTABLE DETERIORATION
1964	18.5	18.4	0.1	18.1	18.1	0.0	0.1
1965	20.9	20.3	0.6	19.3	19.2	0.1	0.7
1966	24.4	22.7	1.7	20.9	20.8	0.1	1.8
1967	25.4	22.8	2.6	21.9	21.7	0.2	2.8
1968	29.7	25.1	4.6	23.7	23.5	0.2	4.8
1969	33.0	25.8	7.2	26.9	26.7	0.2	7.4

(ATTRIBUTABLE DETERIORATION) is equal to the sum of columns 3 and 6, and is the trade balance deterioration attributable to expansion in the base case relative to the alternative.

The inflationary boom of 1965-1969 is seen to have been an extremely important influence on U.S. merchandise trade during that period (as may be seen in Tables III and IV). Inflation and excessive real growth are estimated to have impared the annual trade balance by $6.5-6.9 billion by 1968.[6/] Contributing to the total, imports were $6.6-7.0 billion greater in 1968 under the base case than they would have been under Assumption 1. This import deterioration was slightly offset by induced exports of $100 million. The lower ends of these estimates are based on the assumption that trade restrictions render certain categories of U.S. imports independent of general economic activity (Table IV).

The actual deterioration in the balance between 1964 and 1968 was just under $6.0 billion, having fallen from a deficit of $400 million to a deficit of $6.4 billion.[7/] Thus the simulations

---

6/ The results are included for 1969, but are not very helpful. All sets of equations predict a further move toward deficit, when in fact, a small improvement occurred in the balance on these items. This results in large measure from the inability of the export equation to predict exports at a cyclical peak, partially because of the absence of cyclical explanatory variables. The equation was well off in predicting exports for 1969, although it had done tolerably well until that point.

7/ Recall that we have reference to the balance of "non-agricultural exports less exports of aircraft and automotive products to Canada" and "imports less automotive imports from Canada".

indicate that if growth had proceeded as in Assumption 1, the U.S. merchandise trade balance would not have weakened.[8/]

Our estimates for the separate effects of excessive real and price growth can be seen in simulation Tables III and V. In 1968, the total deterioration attributable to inflation and excess real growth (Table III) is $6.9 billion. Had only the excess real growth occurred (Table V), the deterioration would have been $4.8 billion. Thus, some $2.1 billion might be referred to as the "price effect".[9/]

Special Features of the Results

(1) The equations seem reliable. Comparisons have been drawn throughout between what the equations predicted under actual circumstances and what the equations predicted under alternative assumptions. But, in fact, the import equation predictions have been very close to the actual results. Indeed, the average error in predicting 1969 quarterly imports (i.e., four quarters beyond

---

8/ We can compare the earlier period, 1960-1964, when the growth in nominal GNP was between 5 and 5-1/2 per cent per annum. The U.S. wholesale price index was virtually unchanged and the weighted foreign price index rose some 6 per cent in total (as it did from 1964-1968). The balance, defined the same way, improved by 700 million from 1960-1964. Of course, in the early 1960's, a sizable gap existed between potential and actual GNP.

9/ These are crude guesses. Excessive real growth and inflation are related. Moreover, the import equations do not explicitly distinguish between changes in real GNP and movements in the GNP deflator.

the sample period) was only about $30 million or less than 1/2 of 1 per cent. This inspires some confidence that we are doing more than simulating an arbitrary set of equations. These equations capture the actual movements of trade flows tolerably well. On the other side of the coin, it should be noted that the export equation does not perform nearly so well outside the sample period. The average underestimate of quarterly exports in 1969 was some $200 million, or a little over 3 per cent. As noted in footnote 6, this has introduced error into the simulations for 1969.

(2) There are no lags in the import equations. A burst of inflation and rapid growth in GNP in 1965-1966 resulted in very rapid increases in imports. The relative slowdown in 1967 quickly halted the deterioration in the balance of trade. Exports are predicted more accurately, however, with most variables lagged two or more quarters.

(3) Finally, the trade deterioration caused by inflation has been on the import side. In fact, U.S. exports are found to depend in small part on prior levels of U.S. imports. After a short time, U.S. exports are thus stimulated by "excessive imports". Our simulations indicate that this stimulatory effect more than offsets the direct impact of the decline in price competitiveness on our exports, though to be entirely convincing, the result would have to be tested further.

Qualifications and Conclusion

Several qualifications must be offered with the results. (1) The standard errors of the equation coefficients have been ignored. Thus, the numbers generated in the simulation exercise are properly viewed as the midpoints of confidence intervals. (2) There is only one interrelationship between the U.S. economy and the rest of the world in the equations, i.e., U.S. imports induce U.S. exports with a lag. In fact, there are many others. For example, price increases abroad may have been "exported" by the United States. A 25 per cent variation in the dollar value of U.S. imports would surely have had some effect on foreign industrial production. Had the United States not expanded so rapidly, other countries might have taken steps to stimulate their exports and reduce their imports. Accounting for any of these factors would tend to reduce the trade balance deterioration attributed to our rate of expansion. (3) The results follow from the assumptions about the course of economic activity here and abroad. Different assumptions will yield different results. In particular, it is worth reiterating that a somewhat conservative annual growth rate for U.S. potential real output (3-3/4 per cent) has been assumed.10/

10/ Had a 4 per cent growth rate been assumed, the trade balance deterioration attributable to inflation and excessive real growth would be reduced by about $500 million (to a range of $6.0-6.4 billion).

Despite these qualifications, the results are revealing. They caution against policy prescriptions based on the assumption that structural or fundamental changes in U.S. competitiveness have occurred. Instead, they argue for the efficacy of sensible U.S. demand management in achieving an adequate balance on merchandise trade.

Preliminary

A Note on the Effect of the 1965-69 Boom in the United States on World Trade

by

F. Gerard Adams and Helen B. Junz

The U.S. trade surplus, which had run at a healthy $5 billion annual rate in the early 1960's, declined sharply after the middle of the decade until mid-1969, by which time it had eroded to virtually nothing. The magnitude of this decline has necessarily raised questions about the underlying causes and about the future trend of the U.S. trade balance. Basically, the questions regarding causality are aimed at determining whether a fundamental and structural shift has occurred in the U.S. competitive position in world markets or whether the severe deterioration in the trade position is temporary -- and particularly cyclical -- in nature. The answer to this question has obvious policy implications. Specifically, this note addresses itself to the question of the effect of inadequate demand management policies -- here and abroad -- upon trade flows, utilizing a simple application of an updated version of the OECD world trade model[1/] to put quantitative dimensions on this effect. The

1/ F. G. Adams, H. Eguchi and F. Meyer-zu-Schlochtern, An Econometric Analysis of International Trade, OECD, Paris, 1969.

model, which was designed to isolate pressure of demand and price effects from other influences upon trade flows, is a good vehicle for such calculations. Like all such models though, it can indicate only the approximate range of magnitudes involved. Within this limitation, the model has been used to contrast a base solution -- which assumes that economic activity and prices moved as they actually did throughout the period -- with alternative solutions postulating first, what would have happened if instead of moving above its potential growth path, the U.S. economy had grown at its potential rate after 1964, and, second, what would have happened if other industrial countries had kept their economies fully employed throughout the period.

The results of these comparisons show that the inflationary boom that gripped the United States after 1964 had a very considerable impact upon trade flows. It reduced the U.S. trade surplus markedly and it augmented the surpluses of Japan and, though less substantially, those of European countries, notably Germany and Italy. If the U.S. economy had followed a non-inflationary growth path from 1965 onward -- that is if real GNP had grown about in line with the underlying growth rate of productive capacity -- the U.S. trade balance in the first half of 1969 would have been at least $3-1/2 billion larger than it was in fact.

This result is based on the assumption that Canadian economic activity would also have grown at a slower rate, but that the economies of the rest of the world would have developed as they actually did.

Given the historically close inter-relationship between economic activity in the United States and Canada, it is only reasonable to assume that Canadian demand management policies could not have fully offset the effects of significantly slower growth of U.S. demand. Furthermore, the Canadian authorities probably would not have been inclined to adopt such policies consistently since Canada, during a major part of the 1965-69 period, was trying to reduce inflationary pressures.

For the other industrial countries, however, it is not unreasonable to assume that economic activity could have proceeded along actual trends. In fact, a number of European countries experienced a considerable amount of slack during some part of the simulation period, notably Germany, France and Belgium in 1966-early 1968 and Italy during most of the period. It was only during 1969 that these economies began to experience supply constraints. Therefore, a further question was asked, namely, how trade flows would have been affected if the industrial countries outside North America had adopted demand management policies so as to keep their economies fully employed, at the same pressure of demand as they experienced in the second half of 1964, while the United States and Canada grew at non-inflationary rates. The results of this simulation yield an improvement in the U.S. trade balance in the first half of 1969 of just over $6 billion.

The study thus suggests that if the United States avoids excess demand, the U.S. trade balance can benefit considerably. If

other industrial countries, at the same time, act upon their commitment to high- employment goals, the improvement in the U.S. trade position could be even greater. This conclusion is supported by the recent improvement in the U.S. trade surplus, which in May-July 1970, has run at an annual rate of $4-1/2 billion. However, this level has been achieved at U.S. activity rates well below capacity, while many other countries are experiencing rather higher rates of demand pressure than they wish to see. Thus the "full employment trade surplus" of the United States may be less than the actual trade surplus now, but the trade balance still shows a rising trend. It is difficult to predict to what extent the effects of the past years of inflation -- in terms of lost market opportunities -- can be rolled back. But, given the responsiveness of trade flows to alternative economic conditions, the world cyclical constellation currently offers a better than average possibility of recouping lost ground, if U.S. demand management policies are successful in preventing excess demand, while the economy returns to an adequate growth path.

The Updated OECD Trade Model

The updated version of the OECD trade model used in these calculations was prepared by Mr. Yajima at OECD in Paris during 1969.[2/]

2/ The authors wish to thank Mr. Yajima for providing the card deck and for his assistance in adapting it to the present purpose.

While it maintains the character of the original OECD trade model,[3/] it has been reestimated on data for the period 1955 to 1968 and it has undergone some structural modifications. The basic model consists of a set of import and export equations. These equations, shown for the updated version in Appendix Table I, form an interrelated system. Imports are predicted for each country -- the countries are the seven most important OECD countries, other OECD as a group, and non-OECD also as a group -- on the basis of economic activity variables such as industrial production or GNP, pressure of demand, and relative prices. The pressure of demand effect (PD) is measured by the ratio of actual industrial production to its semi-log trend value. This serves as a simple, but useful, measure of business cycle position and avoids dealing with uncertain data on such variables as unemployment or inventory change. Pressure of demand has been introduced non-linearly in some cases by including only values when industrial production is above trend (PD+). Imports of the non-OECD countries, principally developing countries, are a function of their exports (lagged), capital inflows, and reserve changes.

Estimated imports then enter into the export equations in the form of an import market variable (S), which represents the exports which each country would have if its trade share in world markets remained at its base year (1963) level. Relative prices and relative pressure of

3/ Adams et al., op. cit.

demand are the other principal factors determining each country's exports. Total estimated exports are adjusted to equal total imports, but the adjustment required represents only a small percentage of the total. The model does not include feedbacks from the trade balance to economic activity or prices. This is appropriate here since our simulations assume that each country uses available policy instruments to achieve stipulated economic conditions in the domestic economy.

The specification of the updated model differs from the original in certain respects. The updated model has been estimated entirely in log-log form, on semiannual data. Pressure of demand has been measured by establishing the level of industrial production relative to a semi-log trend of industrial production. In the case of the United States and Canada, GNP has been used as the activity variable rather than industrial production. With regard to import prices, the model has been refined to measure import prices as a weighted average of the export prices of the supplier countries. This average is deflated by the GNP deflator of the importing country. A number of dummy variables have been introduced to allow for special circumstances such as strikes and data aberrations. The data have been adjusted to eliminate the impact of the U.S./Canadian Auto Agreement. The elasticities of exports with respect to the import market variable (S) have been determined empirically by regression in the updated version of the OECD model.[4/]

4/ They had been constrained to equal 1.0 in the earlier version of the OECD model.

OECD Trade Model Simulation of Non-Inflationary Growth in the United States

Simulations of the OECD trade model involved estimation of a base case, using the values of the exogenous variables as they actually occurred, and alternative solutions, substituting different values based on assumptions of moderate non-inflationary growth in the United States and Canada and/or more rapid expansion of activity and prices in other industrial countries. The simulations cover the period 1964 to mid-1969. The equation constants were adjusted to equalize the estimated values and the actual values of imports and exports in each country over the average of the year 1964 in order to provide an appropriate starting point for the simulations.

The results of the base case simulations, when compared with the actual values, show that the model generally tracks the actual movements that occurred, though aberrations in the measure of pressure of demand (PD) and prices occasionally obscure short-term movements. But these occasional deviations of estimated values from actual movements do not impose real limitations upon the simulation results. The basic assumption in the simulation calculations is that estimation errors in the simulation with actual values -- the base case simulation -- carry over also to the simulations with postulated values. The effect of the variation in economic conditions on trade flows is then measured by the difference between the base case simulation and those with assumed values. Thus estimating errors reflecting short-term deviations of simulated values from actual movements are eliminated and the derived effects can

be taken to denote the difference between actual trade flows and those that would have occurred under different economic conditions.

Simulation Assumptions

The following simulation cases were considered:

Base Case:

The base case introduces all exogenous variables at their actual values during the sample period.

Alternative Case I: Moderate non-inflationary growth in the United States.

The statistics on economic growth and inflation in the United States show a fairly clear break between 1964 and 1965, which saw the beginning of rapid economic expansion and acceleration of the rate of price increase. It was assumed, consequently, that beginning in the first half of 1965, the U.S. economy expands at a rate corresponding to that for potential real GNP (using the Council of Economic Advisors' estimate for the mid-1960's of an annual rate of expansion of 3.75 per cent) -- and that the GNP deflator and export prices increase at the rate of 1.5 per cent p.a. as in the early 1960's. By the first half of 1969 this results in GNP approximately 4 per cent and in prices 7.7 per cent below actual levels. Alternative calculations assuming a 4 per cent growth rate for GNP (the CEA's estimate of the annual potential rate of growth for 1966-69) yield a first half 1969 level about 3 per cent below actual. Elimination of cyclical throughs and peaks during the 1965- mid-1970 period would have yielded levels of output very close to those that actually occurred.

Steady growth of real GNP at a 3-3/4 per cent or a 4 per cent annual rate would have resulted in a first half 1970 GNP level just below or just above actual, respectively.

Alternative Case Ia: Moderate non-inflationary growth in Canada as well as in the United States.

While the present model lacks feedback features, it is clear that economic expansion in Canada is greatly dependent on developments in the United States. Consequently, in addition to the assumption of moderate growth in the United States, it was thought appropriate also to assume slower growth and smaller price increases in Canada. Therefore, it was assumed that Canadian GNP would have expanded at an annual rate of 4.5 per cent beginning with the first half of 1965 and that the rate of price increase would have been 1.5 per cent p.a. as in the United States. By the first half of 1969 the assumed real GNP and the corresponding GNP deflator would have been 3 per cent and 8-1/4 per cent, respectively, below actual levels.

Alternative Case II: More rapid expansion and price increase in other industrial countries.

In many of the major industrial countries outside the United States and Canada, economic activity expanded at a slower pace after 1964 than in preceding years and a sharp upward surge of activity and prices did not occur until 1968. In fact, Germany experienced a recession in 1966-67 and France, Italy and Japan, all at some time during the period had under-utilized resources. The United Kingdom pursued stringent stabilization policies during a major part of the period. In order to test how much this non-concordance of cyclical

paths contributed to trade developments, in this simulation it is assumed that growth was such as to maintain the 1964 level of resource utilization and that prices continued to increase at about the same rate as was recorded from the second half of 1963 to the end of 1964. The specific assumptions about economic growth and rates of inflation for the major industrial countries other than the United States and Canada are as follows:5/

	France	Germany	Italy	U.K.	Japan
	Assumptions Alternative Case II				
GNP deflator, % change p.a.	4.0	3.0	7.0	5.0	5.0
Export prices, % change p.a.	4.0	4.0	2.0	3.0	0
	Position in first half 1969a/ Index numbers, 1963 = 100				
Industrial production, actual	140	142	144	123	212
assumed	138	141	147	123	214
GNP deflator, actual	124	117	123	104	128
assumed	126	119	147	110	129
Export prices, actual	111	109	100	107	103
assumed	124	124	111	99	102

a/ Price changes adjusted for exchange rate changes.

In general, the growth assumptions lead to levels of output and cyclical positions in the first half of 1969 that are rather similar to those which actually prevailed. But price levels are higher because

5/ In this simulation it was assumed that there is no feedback so that activity in the United States and Canada were taken at their actual levels. It should be noted that imports, exports, and prices in the United States and Canada are affected insofar as they depend on relative prices or pressures of demand.

elimination of cyclical throughs resulted on average in higher pressure of demand after 1964 than actually occurred. While it is questionable, at least in some cases, whether these relatively high pressures of demand could have been sustained throughout the period, the assumptions underlying this simulation either approximate quite reasonably or understate the cyclical positions actually prevailing in the first half of 1970. For example, the rates of inflation, as measured by the GNP deflator, in the first half of this year were as follows:

France 5-3/4 per cent, Germany 7-1/2 per cent, Italy 6-3/4 per cent, United Kingdom 5-1/2 per cent, Japan 6-1/2 per cent.

In all cases, except Italy, this was above the rates assumed for the simulations. Pressure of demand in France, Germany, and Japan was higher than in 1964 and in the United Kingdom and Italy it was about the same. In further work it might be interesting to test additional alternatives which would attempt to approximate a more realistic growth path for each of these countries. This would involve postulating different and changing values for the economic growth and prices variables of each country. The more global assumptions chosen for the present study suffice here, because it addresses the general question of the effect on trade flows of alternative rates and combinations of economic activity in major industrial countries.

Alternative Case III: Moderate non-inflationary growth in the United States and more rapid expansion and price increase in other industrial countries.

This case corresponds to a combination of Alternative Cases I and II.[6/]

6/ Canada is taken at its actual levels.

Alternative Case IIIa: Moderate non-inflationary growth in Canada as well as in the United States and more rapid expansion and price increase in other industrial countries.

This is a combination of Alternative Cases Ia and II.

Simulation Results for Non-Inflationary Growth in the United States

Taking the United States first, simulations I and Ia show that slower economic expansion combined with a very moderate rate of price increase would have resulted in substantially lower imports and somewhat increased exports (see tables 1 and 2).7/ In case I, where activity rates were changed only in the United States, the U.S. trade balance in the first half of 1969 would have been $4.5 billion higher than it actually was. In case Ia, it is rather more realistically assumed that lower activity rates in the United States should be combined with slower growth in Canada also. Constraining the expansion of the Canadian market results by the first half of 1969 in a $1 billion lower export improvement for the United States and the improvement in the U.S. trade balance, in this case, is $3.5 billion.

The impact of more rapid expansion in the other industrial countries (case II) on U.S. imports occurs through the relative price term. While in this case U.S. imports would have been lower than estimated in the base case for the entire period 1965 through 1968, the import

7/ As noted on page 7 comparisons should be made between the base case and the alternatives. This is particularly important for the 1967 period, because the U.S. equation did not catch the temporary slowdown of U.S. imports at that time.

Table 1. Effect on U.S. trade of moderate non-inflationary growth in the U.S. (Case I)
(billions of 1963 and current $, seasonally adjusted, annual rates)

		Change from actual:			
		Exports	Imports	Trade Balance	Trade Balance
			1963 dollars		current dollars
1965	I	+ .0	- .4	+ .5	- .4
	II	+ .2	-1.1	+1.4	+1.4
66	I	+ .2	-1.8	+2.0	+2.1
	II	+ .9	-2.0	+2.9	+3.0
67	I	+ .4	-1.6	+2.1	+2.2
	II	+ .9	-1.8	+2.6	+2.8
68	I	+ .9	-2.3	+3.3	+3.5
	II	+1.1	-2.8	+3.9	+4.3
69	I	+1.4	-2.8	+4.1	+4.5

Totals may not add due to rounding.

Table 2. Effect on U.S. trade of moderate non-inflationary growth in the U.S. and Canada (Case Ia)
(billions of 1963 and current $, seasonally adjusted, annual rates)

		Change from actual:			
		Exports	Imports	Trade Balance	Trade Balance
			1963 dollars		current dollars
1965	I	- .1	- .4	+ .4	+ .4
	II	- .0	-1.1	+1.1	+1.1
66	I	- .3	-1.8	+1.5	+1.6
	II	+ .2	-2.0	+2.2	+2.3
67	I	- .1	-1.6	+1.5	+1.6
	II	+ .3	-1.8	+2.1	+2.2
68	I	+ .3	-2.3	+2.6	+2.9
	II	+ .3	-2.8	+3.1	+3.4
69	I	+ .4	-2.8	+3.2	+3.5

Totals may not add due to rounding.

estimate for the first half of 1969 obtained by simulation II corresponds to the result of the base case. U.S. exports, on the other hand, would have been substantially higher throughout the entire period.

Finally the two assumptions -- slower growth in North America and faster growth elsewhere -- are put together in simulations III and IIIa and the results show that the two effects are cumulative (see Table 3). If the United States and Canada were growing more slowly and other countries more rapidly, the impact on U.S. imports is to produce a smooth path (a reflection of the smooth path of activity and prices assumed in the simulations) substantially below the results of Simulation Ia (non-inflationary growth in North America). By the first half of 1969, however, when other industrial countries were approaching similar cyclical positions in the simulations as in actuality, U.S. imports in simulation IIIa begin to approximate those obtained in simulation Ia. The impact on U.S. exports of more rapid economic expansion and higher rates of inflation in industrial countries other than Canada is pronounced. The balance of trade impact of simulation IIIa rises to between $5 and $6 billion (1963 dollars) from the second half of 1967. In the first half of 1969 it amounts to $5.6 billion in 1963 dollars and $6.1 billion in current dollars.

With regard to Canada, where activity and prices in the simulations are assumed to move parallel to those in the United States economy, the impact is also comparable. Though the balance of trade impact is similar to that for the United States, it is of course smaller in absolute magnitude. Thus, simulations Ia and IIIa yield an improvement in the Canadian trade balance of up to $1.5 billion (1963 dollars) and $2 billion

Table 3. Effect on trade flows of slower rates of growth in U.S. and Canada combined with higher rates in other industrial countries (Case IIIa)

(billions of 1963 $, seasonally adjusted, annual rates)

A. Exports

Change from actual:

	U.S.	Canada	France	Germany	Italy	U.K.	Japan	Other OECD	Non OECD
1965 I	+ .3	+ .0	+ .0	+ .4	.0	+ .1	- .1	+ .2	+ .4
II	+ .8	- .1	- .2	+ .3	- .3	+ .2	- .3	+ .3	+ .2
66 I	+ .5	- .3	+ .1	+ .1	- .3	+ .2	- .8	+ .3	+ .0
II	+1.2	- .2	+ .0	- .4	- .3	+ .2	- .7	+ .7	+ .0
67 I	+1.2	- .0	+ .3	- .4	- .1	+ .3	- .5	+1.5	+ .8
II	+2.0	- .1	- .2	- .7	- .4	+ .3	- .5	+1.5	+ .5
68 I	+2.4	+ .2	- .6	- .9	- .4	+ .0	- .3	+1.6	+ .6
II	+2.6	+ .1	- .8	-1.9	-1.4	- .1	- .6	+ .5	- .6
69 I	+2.5	+ .2	- .9	-2.6	-1.5	- .3	- .6	- .3	- .7

Table 3. (continued)

B. Imports

Change from actual:

		U.S.	Canada	France	Germany	Italy	U.K.	Japan	Other OECD	Non OECD
1965	I	- .4	- .2	+ .9	- .3	+ .8	- .0	+ .6	0	- .0
	II	-1.4	- .4	+ .7	+ .2	+ .7	+ .0	+ .9		+ .2
66	I	-2.3	- .9	+ .8	+ .2	+ .9	- .0	+ .9	By	+ .1
	II	-2.4	- .8	+ .7	+1.3	+ .9	+ .5	+ .4	def-	- .1
67	I	-2.4	-1.0	+1.2	+2.6	+ .9	+1.0	+ .7	ini-	- .0
	II	-3.0	- .9	+1.2	+2.3	+1.2	+ .9	+ .4	tion	+ .3
68	I	-3.4	-1.1	+2.0	+2.0	+1.9	+ .7	+ .5		+ .1
	II	-4.1	-1.4	- .6	+ .9	+2.1	+ .5	+ .2		+ .2
69	I	-3.1	-1.7	-1.5	- .2	+2.1	- .0	+ .6	0	- .4

Table 3. (continued)

C. Trade Balance

Change from actual:

		U.S.	Canada	France	Germany	Italy	U.K.	Japan	Other OECD	Non OECD
1965	I	+ .7	+ .2	+.9	+.8	-.8	+.1	- .7	+.2	+.5
	II	+2.2	+ .3	-0.9	+.2	-1.0	+.1	-1.3	+.3	+.0
66	I	+2.8	+.6	-0.8	-.1	-1.2	+.2	-1.6	+.3	-.1
	II	+3.6	+ .6	-.7	-1.7	-1.2	-.3	-1.1	+.7	+.1
67	I	+3.6	+ .9	-.9	-3.0	-1.0	-.7	-1.2	+1.5	+.8
	II	+5.0	+ .8	-1.4	-3.0	-1.6	-.7	-.8	+1.5	+.2
68	I	+5.9	+1.3	-2.6	-2.9	-2.1	-.7	-.8	+1.6	+.5
	II	+6.7	+1.5	- .2	-2.7	-3.5	-.7	-.8	+1.5	-.7
69	I	+5.6	+1.9	+0.6	-2.4	-3.6	-.3	-1.3	-.3	-.2

(1963 dollars) per annum, respectively. This is remarkably close to the improvement actually registered in the first half of 1970 when the cyclical constellation was quite similar to that assumed in simulation IIIa, though the U.S. rate of inflation was rather higher and pressure of demand in the United States rather lower than assumed.

The impact on other countries of the postulated economic developments in the United States and Canada (simulations I and Ia) varies (see Table 4). The effect is most pronounced on the exports of Japan and the Japanese trade balance deteriorates by up to $2 billion (1963 dollars) per annum. For all other countries the effect is much smaller ranging from a maximal annual loss of $3/4 billion for Germany to $1/4 billion for the United Kingdom (both 1963 dollars). These results would support the conclusion that the exchange rate adjustments which took place in 1968 and 1969 reflected adjustments to structural imbalances that were independent of U.S. cyclical developments in 1965-1969.

Since simulations II and IIIa assume steady high rates of growth and accelerated price increases in the industrial countries other than the United States and Canada, it is not surprising that the main impact is concentrated on the imports of these countries. It is interesting to note, however, that the assumptions used are such as to smooth out the path of imports so that the level of imports reached by the first half of 1969 under the simulation II and IIIa assumptions is not very different from that in the base case. Since utilization of resources in Italy has been rather lower than in other industrial countries in recent years, the simulation assumptions make a more significant difference

Table 4. Effect on trade balances of non-inflationary growth in North America (Case Ia)

(billions of 1963 $, seasonally adjusted, annual rates)

	Change from actual:								
	U.S.[1/]	Canada	France	Germany	Italy	U.K.	Japan	Other OECD	Non OECD
1965 I	+ .4	+ .2	+.0	-.0	-.0	-.0	- .2	-.0	-.1
II	+1.1	+ .2	-.1	-.1	-.1	-.1	- .4	-.1	-.4
1966 I	+1.5	+ .5	-.1	-.2	-.2	-.1	- .8	-.2	-.3
II	+2.2	+ .5	-.3	-.3	-.2	-.2	- .9	-.3	-.5
1967 I	+1.5	+ .8	-.2	-.4	-.2	-.2	- .9	-.2	-.1
II	+2.1	+ .7	-.3	-.4	-.2	-.2	-1.0	-.3	-.3
1968 I	+2.6	+1.0	-.4	-.5	-.3	-.2	-1.3	-.3	-.5
II	+3.1	+1.2	-.5	-.6	-.4	-.2	-1.7	-.4	-.4
1969 I	+3.2	+1.5	-.6	-.7	-.5	-.3	-1.9	-.4	-.4

1/ An indication of the impact of alternative assumptions is obtained by assuming in case Ia that the U.S. grows at 4.0 per cent in place of 3.75 per cent. The figures would be for the U.S.:

65I	+ .4	67I	+1.4
65II	+1.0	67II	+1.8
66I	+1.2	68I	+2.4
66II	+2.0	68II	+2.8
		69I	+2.6

in this case than in others. Particularly the assumed rate of inflation is from a balance of payments point of view unsustainably high. However, recent developments seem to bear out the reasonableness of the general simulation results. The combination of slower expansion in the United States and Canada and more rapid expansion in Europe and Japan results in substantial balance of trade deterioration spread among the major continental European countries (see Table 3). The change, as stated above, is largest for Italy. The German trade balance is less favorable by an annual rate of between $2 and $3 billion (1963 dollars). The highest impact is registered in 1967 and in the first half of 1968, since economic activity in Germany was well below potential during that period. The impact on France, $1 to $2.6 billion (1963 dollars) p.a., is also greatest during the second half of 1968, when actual inflationary pressures began to equal those assumed in simulation IIIa. Perhaps one of the more interesting effects is that more rapid growth of activity and prices in European countries substantially improves the trade balance of Japan (compare simulation IIIa with simulation Ia) despite the assumption of somewhat higher growth and inflation in Japan itself.

Alternative Pressure of Demand Simulations

In order to appraise better the role of varying degrees of pressure of demand and corresponding price trends, an additional set of simulations has been carried out assuming alternative values -- ranging from boom conditions to economic slack -- for pressure of demand and prices for the U.S. economy over the period from the end of 1964 to the first

half of 1969. To carry out these calculations it was necessary to modify the OECD model to substitute import equations using industrial production and activity variables for the United States and Canada. The change also includes a new treatment of import prices, linking import prices to the weighted export prices of the supplier countries (PM*) by a regression relationship. The new equations for the United States and Canada are shown in Appendix Table II.

Assumptions for Pressure of Demand Simulations

Alternative simulations were run using the period from mid-1964 to mid-1969 as a basis. It was assumed that outside the United States and Canada economic activity and prices took their observed actual path. For the United States and Canada it was assumed that the rate of expansion of industrial activity corresponded to trend (4.6 per cent p.a. and 5.6 per cent p.a., respectively). The alternative runs assume that growth can be maintained at a constant relative level above or below the trend line; that is, with continuous more or less slack as measured by the pressure of demand (PD) variable. Accordingly alternative PD's have been assumed and, on the basis of available empirical evidance, corresponding growth rates for the GNP deflator (PY) and export prices (PX) have been introduced.

The alternatives considered were:

	Per cent change annual rate			
	United States		Canada	
PD	PY	PX	PY	PX
104	3.0	2.1	3.2	1.9
102	2.6	1.8	2.6	1.5
100	2.2	1.5	2.0	1.1
98	1.8	1.2	1.4	0.9
96	1.4	1.0	0.8	0.4

Results of Pressure of Demand Simulations

The results of these simulations for the United States are summarized in Table 5. The second half year of 1964 is the base point, but the first half of 1965 represents the first point to which the simulation assumptions apply (exports and imports take a sharp shift from second half 1964 to first half 1965 as a result). The time path of exports and imports from the initial simulation point depends on the underlying assumptions about industrial production, pressure of demand, and prices. It is important to note that the rate of change in prices has been adjusted corresponding to the level of PD assumption and that the effect of alternative price and growth assumptions builds up over time.

Table 5 shows that substantially different balance of trade patterns result under different PD assumptions. The approximate impact may be gauged by comparing deviations in the estimated trade balances from the balance obtained by assuming PD = 100. In the first half of 1969, the U.S. trade balance under assumption of economic boom (PD = 104)

Table 5. Effect of varying levels of pressure of demand, at constant growth rates, upon the U.S. trade balance expressed as deviations from PD = 100
(billions of 1963 $, seasonally adjusted, annual rates)

		PD = 104	PD = 102	PD = 100	PD = 98	PD = 96
1965	I	- .6	- .3	0	+ .3	+ .6
	II	- .7	- .4	0	+ .3	+ .6
66	I	- .8	- .4	0	+ .4	+ .8
	II	-1.0	- .5	0	+ .5	+ .9
67	I	-1.2	- .6	0	+ .6	+1.1
	II	-1.3	- .7	0	+ .7	+1.3
68	I	-1.5	- .7	0	+ .8	+1.5
	II	-1.7	- .8	0	+ .9	+1.7
69	I	-1.9	- .9	0	+1.0	+2.2

is $4.1 billion (1963 dollars) less than under assumption of slack (PD = 96). The time paths observed from the first simulation point are also different: under the assumption of economic slack (PD = 96), the trade balance shows a growing improvement over the moderate growth assumption (PD = 100) from $.6 billion (1963 dollars) in the first half of 1965 to $2.2 billion in the first half of 1969; the deterioration of the trade balance in the comparison of boom (PD = 104) with moderate growth, moves from $.6 billion to $1.9 billion over the same period. It is important to note that the impact observed depends almost entirely on the path of imports. The export results are obscured by the assumption that changes in U.S. economic conditions are accompanied by similar changes in Canadian economic activity. Since Canada is an important market for U.S. exports, a lower PD for the United States, for example, will result in lower U.S. exports, despite an export gain in other markets, because Canadian expansion, PD and prices have been moderated at the same time as the U.S. figures.8/

Of course, it is not realistic to assume growth paths which, over a great length of time, deviate continuously and substantially from reasonably high employment conditions. Furthermore, particularly under the boom assumptions, price changes probably would accelerate -- and, indeed, have accelerated -- a great deal more than has been built into the model. Nevertheless, the present simulations were intended to disentangle the possible effects of differential pressure of demand conditions -- at constant rates of growth -- upon trade flows. And the results demonstrate that these effects can be considerable.

8/ Similar runs making alternative assumptions about economic conditions outside the United States may also be run.

Conclusion

The calculations made in this study present an approximate measure of the impact of various types of alternative economic conditions on trade. The study indicates that the past few years of inflationary pressures in the United States have had substantial effects on the trade balance. Quantification of these effects show that if demand management policies had succeeded in achieving a steady non-inflationary growth path for the United States economy from 1965 onward, the U.S. trade balance would have been at least $3-1/2 billion higher in the first half of 1969 than it actually was. If other industrial countries at the same time had achieved continuous high employment of resources throughout the period, the first half 1969 trade surplus might have been $6 billion higher.

Furthermore, it can be shown that different rates of capacity utilization, although combined with identical rates of growth, have substantially different effects on the U.S. trade balance.

APPENDIX

Table I

Import and Export Equations of Updated OECD Trade Model
Log - Log Formulations

IMPORTS

France	$M = -.09 + 1.29\ IP - 1.49\ PM + 1.19\ PD^{+} + .02\ LIB - .03\ D$
Germany	$M = 1.23 + 1.69\ IP - .27\ PM - .35\ PD - .33\ PD.$
Italy	$M = .35 + 1.23\ IP + 1.14\ \Delta PY + .71\ PD - 1.04\ PM - .10D$
U.K.	$M = -1.54 + 1.62\ IP - .29\ PD + .004DSUR$
U.S.	$M = 4.37 + 1.48\ GNP - .41\ PM - .99\ PDN$
Canada	$M = -.47 + 1.08\ GNP - 1.24\ PM + 1.29\ PD^{+}$
Japan	$M = 1.46 + .82\ IP - .77\ PM + .62\ PD^{+} + .54\Delta IP$
Other OECD	$M = -1.80 + 1.39\ IP$
Non OECD	$M = -.25 + .50\ X_{-1} + .25\ NCAP_{-1} + .32\ RES_{-1}$

EXPORTS

France	$X = 3.28 + 1.02\ S - 1.41\ PX + .69\ PD. + .08\ D$
Germany	$X = 3.84 + 1.24\ S - 1.18\ PX + .04\ PD. + .03\ D1 - .01D_2.$
Italy	$X = 3.83 + 1.62\ S - 1.50\ PX - .06\ D$
U.K.	$X = 1.53 + .56\ S - .24\ PX + .37\ PD. + .19\ D$
U.S.	$X = 2.28 + .80\ S - .83\ PX + .54\ PD. + .01\ D1 + .19\ D_2$
Canada	$X = 4.62 + .90\ S - .79\ PX - .10\ PD. - .08\ D$
Japan	$X = -1.58 + 2.07\ S - 1.12\ PX + .39\ PD. + .22D1 + .13\ D_2$
Other OECD	$X = .11 + 1.09\ S - .17\ \Delta PX - .12\ PD.$
Non OECD	$X = 1.77 + .87\ S - .26\ PD.$

APPENDIX -2-

Table II

Import and Import Price Equations for the United States and Canada for Pressure of Demand Simulations

United States

$$M = 5.807 + .816IP + .333PD - 1.39\hat{PM}/ + .096DST$$

$$\hat{PM} = -.478 + .764\ PM^{*} - .002TIM - .077PD + .428PDN$$

Canada

$$M = 4.022 + .840IP + .602PD - 1.303\hat{PM}/$$

$$\hat{PM} = 2.791 + .828PM^{*} + .003TIM - .448PD$$

APPENDIX -3-

Definition of Variables

All indexes are 1963 = 100
Price variables are in U.S. $ after allowing for parity changes
All weights are drawn from the 1963 trade matrix.

M Import volume index

IP Industrial Production index

PM Weighted average of export prices of supplier countries/ GNP deflator of importing country

PM^* Weighted average of export prices of supplier countries

$\hat{PM}$ Estimated import price

$\hat{PM}/$ Estimated import price/GNP deflator of importing country

DST Steel strike dummy, second half year 1959

TIM Time trend

PD Ratio of industrial production over its semi-log trend level

PD^+ Values of PD greater than 100, all other values are assumed to be 100

PD. Weighted average of PD in the market countries

PDN Weighted average of PD in countries supplying the U.S. market

LIB Trade liberalization variable

PY GNP deflator

X Exports volume index

NCAP Net capital flows

RES Foreign exchange reserves

S Market variable -- weighted average of estimated imports -- corresponds to export estimates assuming constant market share in all markets

PX Export unit value index manufactured goods only

D various dummy variables