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MODELING INVESTMENT INCOME AND OTHER SERVICES IN THE  
U.S. INTERNATIONAL TRANSACTIONS ACCOUNTS

by

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### Abstract

This paper presents the services account sector of a model of U.S international transactions (the USIT model) that is maintained in the Division of International Finance of the Federal Reserve Board. Part I presents the models for payments and receipts on direct investment, other investment income, and non-investment services. Part II reports on simulations that indicate the sensitivity of the model's forecast to changes in its predetermined variables such as interest rates and exchange rates. In particular, we explore the implications of large current account deficits and the resulting accumulation of net claims by foreigners on the United States for the services balance.

Modeling Investment Income and Other Services in  
the U.S. International Transactions Accounts

by  
William Helkie and Lois Stekler<sup>1</sup>

Movements of net services have taken on an increasingly important role in U.S. international transactions over the past two decades. Any effort to analyse and project developments in the U.S. external balance must include an effort to quantify factors influencing net service transactions. This paper presents the services account sector of a model of U.S. international transactions (the USIT model) that is maintained in the Division of International Finance at the Federal Reserve Board.

As shown in Table 1, U.S. net service receipts grew rapidly in the 1970s, reaching a peak of \$44 billion in 1981. This large net surplus on services resulted in a growing gap between the balance on merchandise trade on the one hand and the balance on goods and services and current account on the other. In the 1980s, however, the sharp appreciation of the U.S. dollar had a negative impact on trade in services as well as trade in goods. U.S. noninvestment services became less competitive with foreign-produced services. Net investment income declined because profits earned abroad by U.S. direct investors were equivalent to fewer dollars, and other investment income fell because the current account deficits were accompanied by a rapid increase in U.S. net

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1. The authors wish to thank other members of the staff, and in particular Peter Hooper and Kathryn Morisse, for their contributions to the development of these models. This paper represents the views of the authors and should not be interpreted as reflecting those of the Board of Governors of the Federal Reserve System or other members of its staff.



debt to foreigners. The decline in the foreign exchange value of the dollar since early 1985 has tended to reverse the decline in net receipts from direct investment and other services and, hence, to counter in part the impact of continued increases in net U.S. foreign indebtedness.

Part I of this paper describes the USIT model of the services sector in the U.S. balance of payments accounts. The components include payments and receipts on direct investment, other investment, and non-investment services. Part II explores the sensitivity of the services balance to changes in underlying factors such as interest rates, and exchange rates. In particular, we explore the implications for the services balance of the accumulation of net foreign claims on the United States.<sup>2</sup>

#### I. The Services Sector Model

The services sector model is divided into three major parts: a) direct investment, b) other investment income, and c) other services. Structural equations were estimated for receipts and payments in each category, using quarterly data. Structural models were preferred over time-series techniques because of our interest in making conditional simulations and forecasts, e.g., assessing the impact of changes in underlying assumptions about economic activity, interest rates, or exchange rates in such exercises. The choice of explanatory variables in these models was constrained to some extent by the need to use variables for which projections could be readily obtained.

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2. An appendix that provides a documented listing of the model is available on request.

A) Direct Investment Receipts and Payments

This section presents (1) the direct investment receipts and payments equations, (2) the regression estimates for these equations, (3) the direct investment asset stock equations, and (4) the regression estimates for these equations.

A.1. The direct investment receipts and payments equations

The general approach used to model direct investment receipts and payments is to assume that earnings depend on the scale of investment and on the variables that cause fluctuations in nominal dollar profit rates.<sup>3</sup> The models for both receipts and payments are analogous. However, the receipts side is disaggregated into three industry categories: manufacturing, petroleum, and other.<sup>4</sup> The general model for nominal receipts is presented first, followed by the modifications necessary for individual industries, and finally by the modifications necessary to apply the model to payments.

Actual receipts (nominal) on U.S. direct investment abroad (YR) in a particular year can be characterized as the product of both long-run or expected receipts (EYR), and temporary or unexpected factors ( $X_i$ ). If

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3. Previous models of direct investment receipts and payments (Bond 1977, 1979 and Kwack 1979) have used the Department of Commerce estimates of the U.S. direct investment position as the measure of the scale of investment and some interest rate (e.g. the rate on long term U.S. government bonds) as the measure of rate of return. We rejected this approach because a dollar added to the direct investment position in 1985 is not likely to have the same impact on earnings as a dollar added in 1975 and because, while movements in interest rates might coincide with movements in profits resulting from cyclical factors or inflation, it seemed preferable to model the impact of these factors directly.

4. Data by industry are available from the Survey of Current Business, U.S. International Transactions, Table 5.

nothing unexpected happens, the  $X_i$  are defined equal to one and actual receipts equal expected receipts.

$$YR = (EYR) \cdot \prod_{i=1}^n X_i^{ai} \quad (1)$$

In order to explore the determination of expected receipts, consider a specific direct investment project that requires a certain dollar expenditure this period ( $I$ ), and is expected to produce a certain level of average earnings, constant in real terms, in perpetuity.<sup>5</sup> The expected real rate of return on the project ( $r$ ) equals expected annual earnings in foreign currency ( $EN$ ) divided by the foreign currency value of the initial investment ( $I/e_0$ , where  $e_0$  equals the exchange rate when the investment is made).<sup>6</sup>

$$EN = r \cdot I/e_0 \quad (2)$$

If inflation and exchange rate changes do not alter real rates of return on investment in a predictable way, then expected nominal earnings in a currency increase at the same rate as average prices.<sup>7</sup>

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5. Lags will be considered later. The assumption of a perpetual income stream is not as far-fetched as it may first appear if capital consumption allowances accurately reflect depreciation in the economic sense. The Department of Commerce data exclude depreciation from both income and new investment. The reinvestment of capital consumption allowances maintains the productivity of the capital stock.

6.  $e_0$  equals the exchange rate (cents per unit of foreign currency) in the year when the investment was made.  $e_t$  equals the current exchange rate.

7. If inflation or exchange rate changes alter relative prices, in particular the price of the product produced by the investment relative to the costs of inputs, then real rates of return are affected.

$$EN \cdot \frac{P_t}{P_o} = r \cdot \frac{I}{e_o} \cdot \frac{P_t}{P_o} \quad (2a)$$

Expected nominal earnings converted to dollars equal the rate of return times the initial investment adjusted for subsequent exchange rate and price changes.

$$EN \cdot \frac{P_t}{P_o} \cdot e_t = r \cdot I \cdot \frac{P_t}{P_o} \cdot \frac{e_t}{e_o} \quad (2b)$$

Total expected U.S. receipts on direct investment (EYR) equal the sum over all previous investments (i=1 to n) of the rate of return on each investment multiplied by the initial amount invested, adjusted for subsequent price and exchange rate changes.

$$EYR_t = \sum_{i=1}^n r_i \cdot I_i \cdot \left( \frac{P_t}{P_o} \cdot \frac{e_t}{e_o} \right)_i \quad (3)$$

To simplify, assume that r is the same for all investments; then expected receipts can be approximated by average r times the "current" dollar value of previous investments.

$$EYR_t = r \cdot \sum_{i=1}^n I_i \cdot \left( \frac{P_t}{P_o} \cdot \frac{e_t}{e_o} \right)_i = r \cdot AR_t \quad (3a)$$

The "current" dollar value of previous investments,  $AR_t$  does not correspond to the Department of Commerce data on the U.S. direct investment position. The Commerce data is book value, the sum over past years of nominal investment flows; it is neither in constant nor current dollars. We constructed a time series for the variable AR by starting with the Department of Commerce asset position at the end of 1971 and for each subsequent quarter (1) inflating the asset position by world average

price increases adjusted for exchange rate changes and (2) adding the current direct investment outflow (DI) in that quarter.

$$AR_t = AR_{71} \cdot \left( \frac{P_t}{P_{71}} \cdot \frac{e_t}{e_{71}} \right) + DI_{72} \cdot \left( \frac{P_t}{P_{72}} \cdot \frac{e_t}{e_{72}} \right) \quad (3b)$$

$$+ \dots + DI_{t-1} \cdot \left( \frac{P_t}{P_{t-1}} \cdot \frac{e_t}{e_{t-1}} \right)$$

Actual receipts may not always equal receipts that are expected over the long run. Short-run transitory or unexpected factors ( $X_1$ ) influence profits by altering demand for the firm's output, by changing the relative prices of inputs and outputs, or by creating inventory profits. While many such factors influence receipts, only a few are included in this study. The influence of the cyclical behavior of aggregate demand on profits is represented by a capacity utilization variable. Capacity utilization (CU) is measured by the average level of foreign GNP relative to its potential. Other factors include the reporting of inventory profits due to inflation or exchange rate changes when first in-first out (FIFO) accounting is used, and the inflation of nominal profits when depreciation charges fail to reflect replacement costs. In order to capture these effects the percentage change in prices adjusted for exchange rate changes ( $P_t \cdot e_t / P_{t-1} \cdot e_{t-1}$ ) is included in the equations for manufacturing and other industries for the years before 1982. After this date a switch in accounting standards (from Financial Accounting Standard (FAS) 8 to FAS 52) meant that in most cases the impact of changes in exchange rates were reported separately as capital gains or losses.

Capital gains or losses present special problems; they are included in the all-inclusive concept of earnings used by the Department of Commerce in the balance of payments accounts. For example, if the subsidiary of a U.S. firm bought an asset ten years ago and then sells it today at a higher nominal price, but the same real price, the Department of Commerce data will show higher income for this year. The estimated model would be unlikely to predict accurately the size or timing of such realized gains even though some of the variables in the model might influence such capital gains. The model would also be unlikely to capture unrealized capital gains or losses due to the revaluation of balance sheets or to understated inventory and depreciation charges when the dollar depreciates.<sup>8</sup> Because of the difficulties of explaining these capital gains we have chosen to exclude them from both receipts and payments, and to estimate them separately.

The capital gains equations do not attempt to model the timing of capital gains or losses resulting from the sale of assets at prices differing from book value. For simulation purposes, these capital gains and losses are assumed to be zero. On the other hand, gains or losses on direct investment receipts resulting from the revaluation of balance sheets when exchange rates vary, or resulting from the impact of exchange rate changes on inventory or depreciation charges taken directly to equity under FAS 52, are expected to vary with percentage changes in the foreign exchange value of the dollar ( $e/e(-1)$ ). Because of the switch of

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8. These were included in profits reported to stockholders between 1976 and 1981 under FAS8, but now are taken direct to equity under FAS52 and show up as capital gains or losses in the balance of payments accounts.

accounting standards from FAS 8 to FAS 52 in 1982, a dummy is used to divide the sample period.

Finally, we have chosen to separate transactions with Netherlands Antilles finance affiliates from transactions with other affiliates in the other industry category. One of the primary functions of these affiliates was to raise funds in the Euromarkets to finance the domestic operations of U.S. corporations. Neither capital nor income flows between the United States and these finance affiliates is likely to be determined by the same variables that determine other direct investment flows. For this reason payments to these affiliates are projected judgmentally, based upon current levels and projections of net Eurobonds outstanding at these affiliates.<sup>9</sup>

The framework used in modeling direct investment payments is very similar to that used for receipts. One difference is that payments are not disaggregated by industry. Of course, U.S. variables are substituted for corresponding foreign variables.

#### A.2. Regression results: direct investment receipts and payments

The regression results for direct investment receipts and payments are shown in table 2. While the coefficients have the expected signs and generally are statistically significant, the standard error of the regressions range from 8 to 18 percent for the receipts categories and is 19 percent for payments. It is very difficult to capture all the special factors that cause fluctuations in direct investment receipts and

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9. Since the repeal of the withholding tax by the United States in mid-1984, most Eurobonds have been issued directly from the United States. The amounts outstanding at Netherlands Antilles affiliates have been falling.

Table 2

Regression Results for Direct Investment Income Equations 1/

	<u>Direct Investment Income Receipts</u>			<u>Direct Investments</u>
	<u>Manufacturing</u>	<u>Petroleum</u>	<u>Other</u>	<u>Income Payments</u>
Intercept	2.44 (1.28)	-1.44 (-0.61)	-0.86 (-2.80)	-2.76 (-2.81)
Capacity utilization (CU)	6.42 (1.98)	9.51 (2.45)	3.64 (4.49)	6.60 (3.35)
Current value of stock (AR)	0.48 (2.78)	0.88 (3.89)	0.78 (27.62)	0.95 (9.25)
Price change <u>2/</u> ( $P_t \cdot e_t / P_{t-1} \cdot e_{t-1}$ )	2.99 (3.04)	--	0.96 (1.63)	--
Rho	0.70 (6.76)	0.75 (7.98)	0.18 (1.29)	0.75 (10.07)
R <sup>2</sup>	0.76	0.86	0.97	0.95
SER	0.159	0.176	0.082	0.187
DW	2.29	1.85	1.87	2.28

1/ Equations are in logarithmic form; the numbers in parentheses are t-statistics.  
2/ Adjusted for exchange rate changes in the receipts equations.

payments. Receipts in manufacturing and the petroleum industry appear more sensitive to fluctuations in overall foreign capacity utilization than "other" industries, which includes real estate and finance. The response of earnings to higher price levels, exchange rate changes and asset growth is far less than proportionate only in the case of manufacturing. Price changes appear to have an important impact on earnings (presumably through inventory profits) only in the case of manufacturing.

The regression results for the capital gains or loss equations in manufacturing and "other" are shown in table 3. No significant relationship was apparent for the petroleum industry, so capital gains are assumed to be zero for that industry in our simulations. Since the capital gains experienced by a corporation as the result of exchange rate changes depend on the firm's management of foreign exchange risk, changes in exchange rate expectations, attitudes toward risk, or methods of risk management would alter the observed relationship between gains and exchange rate changes over time. Therefore, the coefficients may not be stable.

### A.3. Direct investment asset stock equations

In order to simulate or forecast direct investment receipts and payments using the model described above, projections of the current dollar value of previous investments (AR) and therefore direct investment capital flows are also necessary. Conceptually we model these direct investment capital flows using a sources and uses of funds approach.<sup>10</sup>

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10. There is a vast theoretical literature on direct investment, suggesting many considerations in addition to the ones discussed below. (e.g., taxes, protectionism, export penetration). However, previous (Footnote continues on next page)

Table 3  
Regression Results for Capital Gains/Loss Equations 1/

	<u>Direct Investment Income Receipts</u>			<u>Direct Investment</u>
	<u>Manufacturing</u>	<u>Petroleum</u>	<u>Other</u>	<u>Income Payments</u>
Intercept	-100.9 (-1.28)	--	-8.5 (-0.21)	--
Exchange rate/ exchange rate (-1) 2/	-25262.4 (-8.10)	--	-14152.4 (-8.94)	--
R <sup>2</sup>	0.65		0.70	
SER	461.6		234.6	
DW	2.01		2.36	

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1/ The independent variables are in logarithmic form; the numbers in parentheses are t-statistics. The dependent variable is in levels.

2/ Coefficients for the period 1982Q1 on.

Direct investment capital flows (DI) and the resulting direct investment position are not viewed as objectives in their own right for multinational corporations. They are reviewed instead as a residual resulting from production, financing and location decisions. The size of direct investment flows is expected to be influenced by all factors that, in turn, influence other sources and uses of funds of foreign affiliates.

The main sources of funds for a foreign affiliate would include the following:

- DIE - direct investment equity and intercompany account flows
- RE - reinvested earnings
- DEP - depreciation charges, and
- B - net borrowing of funds from unaffiliated external sources.<sup>11</sup>

The main uses of funds would include the following:

- I - investment expenditures in plant and equipment, and
- $\Delta$ INV - changes in inventories.

Since sources of funds equal uses of funds, the following equations must hold:

$$DIE + RE + DEP + B = I + \Delta INV \quad (4)$$

$$DI = DIE + RE - I + \Delta INV - DEP - B \quad (5)$$

Each of the variables on the right-hand side of equation (5) is, in turn, a function of other variables. No attempt was made to estimate these

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(Footnote continued from previous page)

direct investment equations incorporated in larger models (Kwack, 1979, for example) tend to view direct investment capital flows as reflecting only investment in productive capacity.

11. To simplify, the possibility of the affiliate selling equities to parties other than the parent is ignored.

relationships separately because adequate data is not available. Instead these functional relationships were substituted into equation (5) to derive a single equation for direct investment capital flows. The functional equations for each of these right-hand side variables are described below. For ease of exposition we have presented equations with all relationships contemporaneous, although in estimating we frequently have incorporated distributed lags.

Investment in plant and equipment (real) depends on replacement needs, the growth in demand for output, and the relative attractiveness to the multinational corporation (MNC) of expanding production abroad compared with expanding production in the United States. Replacement needs (REP) are some fraction of the existing stock of assets. The growth in demand for output is assumed to parallel the growth in real GNP. Since the MNC can supply that increased demand by expanding production in the United States or abroad, changes in relative costs are expected to influence the location of investment. Relative costs are measured by changes in relative wage rates adjusted for exchange rate changes ( $\Delta\text{COMP}$ ).<sup>12</sup>

This model of real investment can be summarized by the following equation:

$$I/P = a_1 \Delta\text{GNP} + a_2 \Delta\text{COMP} + \text{REP} \quad (6)$$

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12. Relative wage rates were not adjusted for productivity changes on the grounds that most of the differences in productivity across countries reflect differences in technology and capital intensity. It was assumed that a MNC can use the same technology anywhere. The use of relative wage rates as a measure of relative costs will be in error to the extent that changes in relative wage rates reflect changes in human capital.

Multiplying through by prices to get an equation for nominal investment yields:

$$I = a_1 P * \Delta GNP + a_2 P * \Delta COMP + P * REP \quad (7)$$

where I = nominal investment in dollars,

P = average foreign prices adjusted for exchange rate changes in the outflow equations, and U.S. prices in the inflow equations,

COMP = average foreign wage rates converted to dollars divided by the U.S. wage rate (twelve-quarter moving average),

GNP = real U.S. GNP in the capital inflow equations and a weighted average of foreign GNP indices in the capital outflow equations (distributed lag), and

REP = real economic depreciation of the capital stock, assumed to be a constant proportion of the real capital stock (DIK).

The change in the value of inventories ( $\Delta INV$ ) depends on the change in quantity and the change in price. If actual inventories equal desired, and if the desired volume of inventories is a function of aggregate demand (GNP), then the change in inventories can be approximated by the following equation:

$$\Delta INV = b_1 P * \Delta GNP + b_2 \Delta P * GNP \quad (8)$$

The price variable ideally would be the price index for the goods held in inventories. For the petroleum direct investment outflow equation, a price index for crude petroleum was tried, but for other industries, general price indices were used.

Depreciation charges (DEP) depend on accounting rules and on the nominal size of previous investments; they are assumed to be a constant

fraction of the book value of investment.<sup>13</sup> If depreciation charges were equal to the current replacement costs for worn out or obsolete equipment, then the depreciation term would just cancel out the replacement term in the investment function ( $P * REP$ ). But inflation is likely to cause differences between depreciation charges and replacement costs. Thus,

$$DEP_t = c_1 * DIP_{t-1} \quad (9)$$

where  $DIP_t$  = direct investment position (book value) at time t.

Net borrowing from outsiders (B) by the foreign affiliates depends on the relative cost to the MNC of borrowing by the home office or by the foreign affiliates. This borrowing is assumed to be a function of the difference between domestic U.S. and Eurodollar interest rates. Both short and long-term differentials were tried.

$$B = d_1 (URTBILL - URES) \quad (10)$$

where URTBILL = rates on U.S. Treasury bills or A rated utility bonds

URES = LIBOR or Eurodollar bond interest rates

In addition, if the need for borrowing from outsiders is related to the level of profits and reinvested earnings (as it would be if fluctuations in reinvested earnings were not compensated for entirely by movements in direct investment equity and intercompany accounts), then there is a simultaneity problem. Moreover, the estimated impact of

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13. This approximation is admittedly very crude. Also, the book value of plant and equipment investments is unavailable; therefore the book value of the direct investment position was substituted.

changes in GNP on direct investment capital flows would reflect the impact on profits and reinvested earnings as well as on investment in productive capacity and inventories.

Substituting equations (7), (8), (9), and (10) into equation (5) and combining terms produces equations of the following form:

$$\begin{aligned} \text{DI} = & f_1 (P * \Delta\text{GNP}) + f_2 (P * \Delta\text{COMP}) + \\ & f_3 (\Delta P * \text{GNP}) + f_4 (\text{DIK} * P) + \\ & f_5 (\text{DIP}_{t-1}) + f_6 (\text{URTBILL} - \text{URES}) \end{aligned} \quad (11)$$

The expected signs of the coefficients  $f_1$ ,  $f_3$  and  $f_4$  are positive and  $f_5$  is negative. The expected signs of  $f_2$  and  $f_6$  are positive in the capital inflow equation and negative in the capital outflow equations.

Direct investment capital outflows were disaggregated and estimated separately for three industries: petroleum, manufacturing, and all other. Direct investment inflows were not disaggregated. Many of the independent variables were expected to influence capital flows over an extended period of time. Therefore distributed lags or moving averages were used. The sample period for outflows starts in 1972Q1. (Quarterly data were not available for earlier quarters by industry.) Seasonal factors were taken into account by the use of seasonal dummies.

The capital outflows in all cases were adjusted to exclude capital gains. This is clearly appropriate, for example, in the case of unrealized currency translation gains; reinvested earnings are inflated by these gains. It also seems appropriate in the case of a realized capital gain or loss resulting, for example, from the sale of an asset at less than its book value if the proceeds are not paid out as dividends.

None of the explanatory variables included in the models are likely to explain the timing of the realization of these gains or losses.

A.4. Regression results: direct investment asset stocks

The regression results for the equations included in the model are shown in table 4. In general, direct investment capital flows seem to be larger, the more rapid GNP growth in the receiving country, the higher replacement costs for capital, and the less adequate depreciation charges. However, the explanatory power of the equations is not very high; in particular, the variables included explain little of the variation of direct investment outflows in the petroleum industry. Not all the variables theoretically relevant are included in every equation. Variables that were insignificant or had signs inconsistent with theory were dropped. In particular we were never able to estimate a relationship between direct investment flows and the relative costs of producing in the United States and abroad. Rather than conclude that relative costs play no role, we would guess that the negative results reflect the difficulty of accurately measuring relevant comparative costs, particularly because the investment decision depends on forward-looking expectations of such costs. In addition, the role of price increases in causing increased inventory investment was insignificant in all industries, as was the relative cost of raising funds here and abroad.

B) Other Investment Income

Other investment income in the U.S. balance of payments accounts includes four components: U.S. government investment income receipts and payments, and private receipts and payments on investment excluding

Table 4

Regression Results for Direct Investment Capital Flow Equations 1/

	<u>Direct Investment Capital Outflows</u>			<u>Direct Investment</u>
	<u>Manufacturing</u>	<u>Petroleum</u>	<u>Other</u>	<u>Capital Inflows</u>
Intercept	2210.2 (3.01)	3690.0 (2.08)	2425.9 (4.20)	-137.7 (0.49)
Price * change in GNP (P * Δ GNP)	2663.0 (4.72)	456.9 (0.35)	1797.3 (3.27)	0.157 (1.96)
Price * Real asset (DIK * P)	0.044 (2.79)	0.096 (1.99)	0.063 (4.38)	0.003 (2.21)
Nominal Asset (DIP <sub>-1</sub> )	-0.088 (-2.88)	-0.175 (-1.94)	-0.099 (-4.07)	-0.129 (-1.85)
Rho	-0.37 (-2.78)	0.15 (1.10)	0.02 (0.14)	0.03 (0.11)
R <sup>2</sup>	0.38	0.10	0.45	0.76
SER	714.4	1084.3	520.8	941.9
DW	1.86	1.93	1.97	1.98

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1/ The numbers in parentheses are t-statistics.

direct investment.<sup>14</sup> Only the government receipts and payments reflect actual reported data. The Department of Commerce estimates private receipts and payments on investment by breaking down the appropriate stock of assets (or liabilities) into components and multiplying these components by an assumed appropriate rate of return that is gathered by a survey. Our model of all four components of other investment income mimics this procedure as do most other models of portfolio investment income; earnings are assumed to be the product of the stock of assets times an average rate of return. Historical observations for this average rate of return were imputed as the ratio of earnings (Y) to the aggregate asset stock (A).<sup>15</sup> Regressions were then used to establish the average relationship between these imputed interest rates and observed interest rates. The U.S. Treasury bill rate (r) was used for both receipts and payments because the bulk of both claims and liabilities are dollar denominated. In addition, the lagged dependent variable is included in the regressions to take into account the fact that some of the assets have maturities of longer than a quarter and that their rate of return will depend on earlier interest rates.

$$Y/A = g_1 + g_2(r) + g_3(Y/A)_{-1} \quad (12)$$

The regression results for the implicit interest rates are shown in table 5. The corrected R<sup>2</sup>s are .98 or higher except in the case of the implicit interest rate on government receipts (R<sup>2</sup> = .85). This somewhat lower explanatory power is perhaps not surprising since a large

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14. Survey of Current Business, Table 1, U.S. International Transactions, lines 13, 14, 28 and 29.

15. Only annual data is published for the U.S. investment position. Quarterly data can be estimated by using reported capital flows and interpolating quarterly data from the annual valuation adjustments.

Table 5

Regression Results for the Implicit Interest Rates  
on Portfolio Investment Income 1/

	Private Receipts	Government Receipts	Private Payments	Government Payments
Intercept	0.18 (2.83)	0.07 (0.72)	-0.06 (-1.21)	0.03 (0.83)
90 day T-bill rate	0.50 (12.53)	0.08 (1.30)	0.51 (11.83)	0.19 (7.93)
Implicit Interest rate (t-1)	0.45 (12.38)	0.82 (9.35)	0.47 (9.81)	0.80 (25.61)
R <sup>2</sup>	0.98	0.85	0.98	0.99
SER	0.028	0.097	0.049	0.033
DW	2.40	2.75	2.05	2.11

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1/ Equations are in logarithmic form; the numbers in parentheses are t-statistics.

part of U.S. government claims on foreigners are the product of foreign aid and do not reflect market interest rates and because U.S. government interest receipts are reported rather than estimated. The long-run elasticity of the implicit interest rate on government claims with respect to a change in the Treasury bill rate is also much lower than for the other implicit rates, probably for similar reasons; the other coefficients imply a roughly proportionate impact of changes in Treasury bill rates on the implicit interest rates.

When simulating other investment income, in addition to the equations above, assumptions about interest rates and the relevant asset stocks are also necessary. Interest rates are set exogeneously. The details of our method for modeling the asset stocks are still evolving, but the general framework constrains the changes in assets and liabilities to be consistent with balance in the U.S. international transactions accounts. A common method for doing this is to estimate independently equations for the major components of capital flows and to use the statistical discrepancy to balance the accounts.<sup>16</sup> We rejected this approach for two related reasons. First, given the poor performance of most capital flow equations, this method tends to produce swings in the statistical discrepancy far outside the range of recent experience. Second, estimates of investment income are based only on recorded capital flows; large errors in the statistical discrepancy would cause large errors in simulations of changes in investment income. We chose instead to use net private claims as the balancing item in the accounts.

The derivation of each component of the capital account is summarized in table 6 along with the source for each component. The

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16. See, for example, Proctor, 1982.

Table 6

Derivation of Changes in Private Claims and Liabilities

1. Current account balance and unilateral transfers less net portfolio investment income. Current account model.
2. Statistical discrepancy. Exogeneous.
3. Net direct investment capital inflow. Structural model described in previous section of paper.
4. Changes in government liabilities to foreigners. Structural model based upon foreign official intervention function adjusted judgmentally for likely changes in OPEC and LDC assets in the United States as well as private purchases of Treasury securities.
5. SDR allocations. Exogeneous.
6. Changes in government claims on foreigners. Exogeneous (-indicates increases).
7. Change in net private claims on foreigners. Line (7) = - 1 \* (lines 1 + 2 + 3 + 4 + 5 + 6).

derivation of line 4 requires further explanation. U.S. government liabilities to foreigners are assumed to depend on foreign official claims plus net private foreign purchases of Treasury securities. Foreign official claims on the United States are assumed to increase when foreign governments intervene to support the dollar in foreign exchange markets; intervention is assumed to depend on exchange rate movements and the stock of official reserves held in the United States. The regression results are shown in table 7. Private foreign purchases of Treasury securities were small until 1984. They are exogeneous, as are OPEC and LDC official holdings.

The change in net private claims on foreigners (line 7) projected by this method has to be split between changes in claims and changes in liabilities in order to project receipts and payments. Because the rates of return earned on claims and liabilities differ, this split affects net earnings as well. Log-linear trends are used to project both private claims and liabilities. The resulting regressions are shown in table 8. Use of a shorter sample period (e.g., starting in 1973 instead of 1965) would have resulted in faster average growth rates. Using the lower rates, based on the longer sample period, implies a slowdown in the growth of international intermediation through U.S. banks from the very rapid pace reached in the 1970s. Net private claims produced by these trend projections are then compared with the net projected by using the balance of payments constraint, and the discrepancy between the two is calculated. The gross changes in claims and liabilities projected by the trend equations are then adjusted to eliminate the discrepancy. Since the mean absolute size of the errors in

Table 7

Regression Results for Change in Government Liabilities  
to Foreigners 1/

Intercept	6074 (2.12)
Exchange Rate/Exchange Rate (-1)	-71519 (-3.21)
Trend	808 (3.04)
Government liabilities to foreigners (-1)	-2.09 (-2.63)
R <sup>2</sup>	0.21
SER	5089
DW	1.47

---

1/ Exchange rate variables are in logarithmic form; the numbers in parentheses are t-statistics.

Table 8

Regression Results for Private Liabilities and Claims  
Trend Equations 1/

	<u>Claims</u>	<u>Liabilities</u>
Intercept	9.88 (246.7)	10.47 (361.6)
Time (1=1965Q1)	.0420 (48.95)	.0312 (50.26)
R <sup>2</sup>	.97	.97
SER	.177	.128
DW	.036	.056

---

1/ Dependent variables are in logarithmic form; the numbers in parentheses are t-statistics.

the claims and liabilities trend equations were approximately equal, the adjustments used are also equal.

C) All Other Services

We have aggregated all services other than investment income. Included in "all other" services are travel, passenger fares, other transportation, fees and royalties, other private services, and U.S. government miscellaneous services.<sup>17</sup> We assume that imports of these services are related in general to the same variables that determine imports of goods; the real level of these services imports is a function of relative prices and income. In addition, expenditures on transportation and insurance are likely to be related to the level of trade.

$$\ln \frac{MS}{PMS} = h_1 + h_2 \ln \frac{PMS}{PGNP} + h_3 \ln GNP + h_4 \ln MG \quad (13)$$

$$\ln \frac{XS}{PXS} = j_1 + j_2 \ln \frac{PXS}{PF} + j_3 \ln FGNP + j_4 \ln XG \quad (14)$$

where:

- FGNP = weighted average foreign GNP
- GNP = U.S. GNP
- MG = U.S. imports of goods
- MS = U.S. imports of other services (nominal)
- PF = weighted average foreign consumer prices adjusted for exchange rate changes.
- PGNP = U.S. GNP deflator
- PMS = other services payments implicit price deflator
- PXS = other services receipts implicit price deflator
- XG = U.S. exports of goods
- XS = exports of other services (nominal)

---

17. See Survey of Current Business, Table 1, U.S. International Transactions, lines 4 through 11 for receipts and 19 through 26 for payments. Transfers under U.S. military agency sales contracts (line 3) and direct defense expenditures (line 18) are forecasted judgmentally.

The regression equations for all other service receipts and payments are shown in table 9. The  $R^2$ s are reasonably high and the coefficients have the expected signs and are statistically significant. The regression results seem to indicate that the income elasticities of foreign demand for U.S. "other" services and U.S. demand for foreign "other" services are approximately the same size. The price elasticity of foreign demand for U.S. services appears slightly lower than the price elasticity of demand for foreign services. The impact of trade volume on other services is approximately symmetric. In addition to the other services receipts and payments equations, the model includes equations for the import and export price deflators. (See table 10.) These equations are designed to mimic the way these price deflators are constructed. The implicit price deflator for other services exports is related to the U.S. CPI and GNP deflator. The implicit price deflator for other services imports is related to the U.S. GNP deflator and weighted average foreign consumer prices adjusted for exchange rate changes.

## II. Simulation Results

The model presented in Part I can be used to analyze the impact on the U.S. services balance of changes in various explanatory variables. To do so, the services account model is simulated under the following shocks:

- a) a 100 basis point increase in the U.S. Treasury bill rate,
- b) a 10 percent depreciation of the weighted average dollar,
- c) 1 percentage point (annual rate) higher foreign GNP growth rate.
- d) 1 percentage point (annual rate) higher U.S. GNP growth rate.

Table 9

Regression Results for other Services (Excluding Investment Income) 1/

	<u>Receipts</u>	<u>Payments</u>
Intercept	-3.08 (-9.26)	-8.40 (-9.27)
Relative Price	-0.48 (-9.60)	-0.62 (-7.88)
GNP <u>2/</u>	0.75 (14.73)	0.73 (5.11)
Real U.S. Exports (Imports) <u>3/</u>	0.22 (5.36)	0.27 (5.25)
Rho	0.42 (4.07)	0.58 (6.14)
R <sup>2</sup>	0.99	0.97
SER	0.017	0.024
DW	2.14	1.84

1/ Equations are in logarithmic form; the numbers in parentheses are t-statistics.

2/ Foreign GNP for receipts; U.S. GNP for payments.

3/ Exports for receipts; imports for payments.

Table 10

Regression Results for Other Service (Excluding Investment Income)  
Price Equations 1/

	<u>Receipts</u>	<u>Payments</u>
Intercept	-0.001 (-0.01)	3.06 (6.38)
U.S. GNP Deflator <u>2/</u>	0.389 (4.03)	0.433 (4.63)
Consumer Price	0.611 (7.73)	0.676 (7.87)
Rho	--	0.87 (17.7)
R <sup>2</sup>	1.0	0.999
SER	0.008	0.013
DW	0.67	1.49

---

1/ Equations are in logarithmic form; the numbers in parentheses are t-statistics.

2/ Fixed-weight price index for receipts.

- e) 1 percentage point (annual rate) higher foreign inflation rate,
- f) 1 percentage point (annual rate) higher U.S. inflation rate, and
- g) A \$100 billion increase per year in U.S. net indebtedness to foreigners, evenly divided between increases in U.S. portfolio liabilities to foreigners and reductions in U.S. portfolio claims on foreigners.

These simulations include only partial equilibrium direct impacts of changes in the above variables. For example, a change in U.S. interest rates affects investment income only through its direct impact on the rates of return earned on claims and liabilities, and not indirectly through its possible effects on U.S. GNP and exchange rates. The simulation results are shown in tables 11-17. The simulation results indicate the deviation from the base case solution for the years 1985 and 1986. Since the simulations are partial equilibrium in nature, these simulations should not be treated as estimates of what actually would have happened historically under the counter-factual assumptions. They are designed merely to illustrate the partial-equilibrium properties of the model.

A) Higher U.S. Interest Rates (Table 11)

A 100 basis point increase in the U.S. Treasury bill rate, ceteris paribus, increases net service receipts over the base case solution by \$0.5 billion in the first year when the United States was a net creditor to the rest of the world on portfolio investment, but reduces net receipts by \$0.9 billion in the second year, when the United States shifted to a net debtor position on portfolio investment. The size of the impact depends not just on the size of the interest rate shock, but also on the U.S. net asset position. In addition, because of the method we use to constrain the balance of payments to sum to zero,

Table 11  
U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

Bill. Dollar Change from Control Solution

100 Basis Point Higher U.S. T-bill Rate

	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986
<b>Direct Investment Income:</b>										
Receipts	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
<b>Other Investment Income: 1/</b>										
Receipts	3.39	4.91	5.65	6.06	6.33	6.60	6.93	7.26	5.00	6.78
Payments	2.66	4.14	5.13	5.94	6.65	7.32	8.08	8.78	4.47	7.71
Net Income	0.73	0.77	0.51	0.12	-0.32	-0.72	-1.15	-1.51	0.53	-0.92
<b>Other Service Income: 1/</b>										
Receipts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Service Income: Total</b>										
Receipts	3.39	4.91	5.65	6.06	6.33	6.60	6.93	7.26	5.00	6.78
Payments	2.66	4.14	5.13	5.94	6.65	7.32	8.08	8.78	4.47	7.71
Net Income	0.73	0.77	0.51	0.12	-0.32	-0.72	-1.15	-1.51	0.53	-0.92

1/ Excludes Military Receipts and Payments

any change in net service receipts implies a simultaneous change in portfolio claims and liabilities, and hence an additional change in net portfolio income receipts. This small factor affects all the simulations.

B) Dollar Depreciation (Table 12)

A 10 percent depreciation of the dollar relative to the base case throughout the two-year simulation period increases U.S. net service receipts by \$6.5 billion in the first year and \$3.7 billion in the second relative to the base case solution. There are several channels through which exchange rate levels affect service income receipts and payments. U.S. government interest payments on foreign official holdings of Treasury securities go up because the model relates the size of official holdings to exchange market intervention and exchange rate developments. Direct investment income is larger when the value of the dollar is lower because of capital gains resulting from balance sheet translations and because the same amount of income in foreign currency now translates to a larger number of dollars. Direct investment capital flows are also affected by the exchange rate. Other services receipts net are larger because depreciation improves the competitive position of U.S.-provided services, but this gain is partially offset in nominal terms by the increase in the dollar cost of foreign services as a result of the depreciation. In this partial analysis, net income from private portfolio investment is essentially unaffected because both claims and liabilities are assumed to be denominated in dollars, and because no account is taken of the feedback between the exchange rate, the

Table 12  
 U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

	10% Depreciation of U.S. Dollar											
	1985			1986			1986			1986		
	q1	q2	q3	q4	q1	q2	q3	q4	q1	q2	q3	q4
Direct Investment Income:												
Receipts	19.25	2.80	3.25	2.90	3.71	3.67	3.59	3.20	7.05	7.05	7.05	3.54
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	19.25	2.80	3.25	2.90	3.71	3.67	3.59	3.20	7.05	7.05	7.05	3.54
Other Investment Income: 1/												
Receipts	0.14	0.20	0.07	-0.04	-0.13	-0.20	-0.24	-0.29	0.09	0.09	0.09	-0.21
Payments	0.27	0.50	0.44	0.41	0.40	0.37	0.35	0.35	0.40	0.40	0.40	0.36
Net Income	-0.13	-0.30	-0.37	-0.44	-0.53	-0.56	-0.59	-0.64	-0.31	-0.31	-0.31	-0.58
Other Service Income: 1/												
Receipts	0.31	0.66	1.03	1.41	1.81	2.19	2.48	2.69	0.85	0.85	0.85	2.29
Payments	0.57	1.00	1.30	1.47	1.49	1.53	1.52	1.56	1.08	1.08	1.08	1.53
Net Income	-0.26	-0.34	-0.26	-0.05	0.32	0.66	0.96	1.13	-0.23	-0.23	-0.23	0.77
Service Income: Total												
Receipts	19.70	3.66	4.35	4.28	5.39	5.66	5.83	5.60	8.00	8.00	8.00	5.62
Payments	0.84	1.49	1.74	1.87	1.88	1.90	1.87	1.91	1.49	1.49	1.49	1.89
Net Income	18.86	2.16	2.61	2.40	3.50	3.77	3.96	3.69	6.51	6.51	6.51	3.73

1/ Excludes Military Receipts and Payments

merchandise trade component of the current account, the interest rate, and the levels of portfolio claims and liabilities.<sup>18</sup>

C) Foreign GNP Growth (Table 13)

A 1 percentage point higher (annual rate) growth rate in foreign GNP increases net service receipts by \$1.5 billion in the first year and \$4.3 billion in the second relative to the base case solution. The largest impact is on direct investment receipts: more rapid foreign growth means both higher profit rates and, over time, increased investment. Other service receipts are also affected because higher foreign GNP increases demand for U.S. services. In these partial estimates no account is taken of the interaction between foreign GNP, prices, exchange rates, or trade.

D) U.S. GNP Growth (Table 14)

A 1 percentage point (annual rate) higher growth rate of U.S. GNP reduces net service receipts by \$0.6 billion in the first year and \$1.5 billion in the second year relative to the base case solution. U.S. GNP affects net service receipts through several direct channels. Direct investment payments are larger, both because profits of foreign-owned affiliates are higher and because more rapid growth of the U.S. economy encourages foreigners to invest more in the United States. Payments for other services (excluding investment income) also increase with U.S. income. Direct investment receipts, portfolio investment receipts and payments, and other services receipts are not directly affected by the rate of growth of U.S. GNP. Keep in mind that the simulation does not

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18. At least 77 percent of U.S. private portfolio claims and 95 percent of liabilities were clearly denominated in dollars at the end of 1985. In addition, a large percentage of foreign bonds held by U.S. residents are also dollar denominated, increasing the total for claims to as much as 90 percent.

Table 13  
 U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

Bil. Dollar Change from Control Solution

1 % Higher Growth Rate for Foreign GNP, A.R.

	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986
Direct Investment Income:										
Receipts	0.54	1.02	1.64	1.94	3.13	3.67	3.85	4.03	1.29	3.67
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	0.54	1.02	1.64	1.94	3.13	3.67	3.85	4.03	1.29	3.67
Other Investment Income: 1/										
Receipts	-0.00	-0.00	-0.00	-0.00	0.00	0.01	0.02	0.03	-0.00	0.02
Payments	0.00	0.00	0.00	0.00	-0.00	-0.01	-0.02	-0.02	0.00	-0.01
Net Income	-0.00	-0.00	-0.00	-0.00	0.00	0.02	0.04	0.06	-0.00	0.03
Other Service Income: 1/										
Receipts	0.09	0.17	0.26	0.35	0.45	0.56	0.66	0.78	0.22	0.61
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	0.09	0.17	0.26	0.35	0.45	0.56	0.66	0.78	0.22	0.61
Service Income: Total										
Receipts	0.63	1.19	1.90	2.29	3.58	4.24	4.53	4.85	1.50	4.30
Payments	0.00	0.00	0.00	0.00	-0.00	-0.01	-0.02	-0.02	0.00	-0.01
Net Income	0.63	1.19	1.89	2.29	3.58	4.24	4.55	4.87	1.50	4.31

1/ Excludes Military Receipts and Payments

Table 1<sup>4</sup>  
 U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

Bil. Dollar Change from Control Solution

1 % Higher Growth Rate for U.S. GNP, A.R.

	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986
Direct Investment Income:										
Receipts	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Payments	0.17	0.32	0.47	0.58	0.65	0.85	1.29	0.81	0.38	0.90
Net Income	-0.17	-0.32	-0.47	-0.58	-0.65	-0.85	-1.29	-0.81	-0.38	-0.90
Other Investment Income: 1/										
Receipts	-0.00	-0.00	-0.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.00	-0.02
Payments	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.03	0.00	0.02
Net Income	-0.00	-0.00	-0.01	-0.01	-0.02	-0.03	-0.04	-0.06	-0.01	-0.04
Other Service Income: 1/										
Receipts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Payments	0.08	0.17	0.25	0.35	0.45	0.55	0.63	0.74	0.21	0.59
Net Income	-0.08	-0.17	-0.25	-0.35	-0.45	-0.55	-0.63	-0.74	-0.21	-0.59
Service Income: Total										
Receipts	-0.00	-0.00	-0.00	-0.01	-0.01	-0.02	-0.02	-0.03	-0.00	-0.02
Payments	0.25	0.49	0.72	0.93	1.11	1.41	1.94	1.58	0.60	1.51
Net Income	-0.25	-0.50	-0.73	-0.94	-1.12	-1.43	-1.96	-1.61	-0.60	-1.53

1/ Excludes Military Receipts and Payments

take into account indirect effects through the impact of GNP on the merchandise trade component of the U.S. current account, interest rates, and prices.

E) Foreign Prices (Table 15)

A 1 percentage point (annual rate) increase in the foreign inflation rate raises U.S. net service receipts by \$0.1 billion in the first year and \$0.4 billion in the second relative to the base case solution. Foreign prices have a direct impact on other services; the higher the relative price of foreign services, the larger the demand for U.S. services by both foreign and U.S. residents. The nominal value of imports does not fall by the full reduction in volume because foreign prices have increased. Direct investment receipts increase in nominal terms when foreign prices increase because nominal profits earned abroad are larger. Other investment income is not directly affected.

E) U.S. Prices (Table 16)

A 1 percentage point (annual rate) increase in the U.S. inflation rate leaves U.S. net service receipts approximately unchanged in both years relative to the base case solution. Several effects appear to cancel each other out. U.S. prices have a direct impact on other services; the higher the relative price of U.S. services, the higher the quantity imported and the lower the quantity exported. On the other hand, the nominal value of U.S. exports rises if the price increase on exports outweighs the quantity reduction. Direct investment payments increase in nominal terms when U.S. prices increase, because nominal profits are higher. Other investment income is not directly affected.

Table 15  
U.S. Services Transactions on Current Account  
(Billions of U.S. Dollars, SAAR)

	1 % Higher Growth Rate for Foreign Prices, A.R.											
	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986	1985	1986
<b>Bil. Dollar Change from Control Solution</b>												
<b>Direct Investment Income:</b>												
Receipts	0.06	0.11	0.19	0.23	0.36	0.42	0.48	0.48	0.15	0.44	0.15	0.44
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	0.06	0.11	0.19	0.23	0.36	0.42	0.48	0.48	0.15	0.44	0.15	0.44
<b>Other Investment Income: 1/</b>												
Receipts	-0.00	-0.00	-0.01	-0.01	-0.02	-0.03	-0.03	-0.04	-0.01	-0.03	-0.01	-0.03
Payments	0.00	0.00	0.01	0.01	0.01	0.02	0.02	0.03	0.00	0.02	0.00	0.02
Net Income	-0.00	-0.01	-0.01	-0.02	-0.03	-0.05	-0.06	-0.07	-0.01	-0.05	-0.01	-0.05
<b>Other Service Income: 1/</b>												
Receipts	0.01	0.02	0.05	0.08	0.12	0.18	0.24	0.31	0.04	0.21	0.04	0.21
Payments	0.01	0.04	0.07	0.10	0.14	0.18	0.21	0.26	0.06	0.20	0.06	0.20
Net Income	-0.01	-0.01	-0.02	-0.02	-0.02	-0.00	0.03	0.05	-0.02	0.02	-0.02	0.02
<b>Service Income: Total</b>												
Receipts	0.07	0.13	0.23	0.30	0.46	0.58	0.69	0.75	0.18	0.62	0.18	0.62
Payments	0.01	0.04	0.07	0.11	0.15	0.20	0.24	0.29	0.06	0.22	0.06	0.22
Net Income	0.05	0.09	0.16	0.18	0.31	0.38	0.45	0.46	0.12	0.40	0.12	0.40

1/ Excludes Military Receipts and Payments

Table 16  
 U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

Bi1. Dollar Change from Control Solution

1 % Higher Growth Rate for U.S. Prices, A.R.

	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986
Direct Investment Income:										
Receipts	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Payments	0.00	0.02	0.05	0.07	0.08	0.12	0.19	0.12	0.04	0.13
Net Income	-0.00	-0.02	-0.05	-0.07	-0.09	-0.12	-0.19	-0.12	-0.04	-0.13
Other Investment Income: 1/										
Receipts	0.00	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.01	0.05
Payments	-0.00	-0.00	-0.01	-0.02	-0.02	-0.03	-0.04	-0.05	-0.01	-0.04
Net Income	0.00	0.01	0.02	0.04	0.06	0.08	0.09	0.12	0.02	0.09
Other Service Income: 1/										
Receipts	0.11	0.21	0.30	0.39	0.48	0.57	0.65	0.73	0.25	0.61
Payments	0.09	0.18	0.27	0.38	0.48	0.59	0.68	0.80	0.23	0.64
Net Income	0.02	0.03	0.03	0.01	0.00	-0.02	-0.04	-0.07	0.02	-0.03
Service Income: Total										
Receipts	0.11	0.22	0.31	0.41	0.52	0.61	0.70	0.80	0.26	0.66
Payments	0.09	0.20	0.31	0.43	0.54	0.68	0.83	0.87	0.26	0.73
Net Income	0.02	0.02	0.00	-0.02	-0.03	-0.06	-0.13	-0.07	0.01	-0.07

1/ Excludes Military Receipts and Payments

G) U.S. Net Indebtedness (Table 17)

A \$100 billion increase per year in the U.S. net foreign indebtedness divided evenly between increases in portfolio liabilities to foreigners and reductions in U.S. portfolio claims on foreigners reduces U.S. net other investment income by \$3.8 billion in the first year and \$10.0 billion in the second. (In addition, if the increase in net indebtedness were the result of a deterioration of the current account and higher imports, then payments to foreigners for other services such as freight and insurance would also be higher.) These simulations assume that the marginal assets acquired by foreigners earn the same rate of return as the average. Historically the average rate of return earned on U.S. claims has been higher than the rate paid on liabilities. If massive foreign inflows to finance large U.S. current account deficits were concentrated in higher return assets, net other investment income would be even lower than indicated by these simulations. The simulation results indicate that, holding other things constant, it would take about four years of debt accumulation of this magnitude (\$100 billion per year) to turn the U.S. services balance from a surplus of \$25 billion in 1986 to a deficit. The longer the United States runs large current account deficits, the larger the swing in the merchandise trade balance that would be necessary if a balanced U.S. current account position were to be achieved in the long run.

Table 17

U.S. Services Transactions on Current Account  
 (Billions of U.S. Dollars, SAAR)

Bil. Dollar Change from Control Solution

\$100 Billion Increase in U.S. Foreign Borrowing

	1985 q1	1985 q2	1985 q3	1985 q4	1986 q1	1986 q2	1986 q3	1986 q4	1985	1986
Direct Investment Income:										
Receipts	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
Other Investment Income: 1/										
Receipts	-0.58	-1.70	-2.74	-3.80	-4.73	-5.49	-5.95	-6.65	-2.20	-5.71
Payments	0.42	1.25	2.00	2.73	3.47	4.01	4.39	5.11	1.60	4.25
Net Income	-1.00	-2.95	-4.74	-6.53	-8.21	-9.50	-10.34	-11.76	-3.81	-9.95
Other Service Income: 1/										
Receipts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Net Income	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Income: Total										
Receipts	-0.58	-1.70	-2.74	-3.80	-4.73	-5.49	-5.95	-6.65	-2.20	-5.71
Payments	0.42	1.25	2.00	2.73	3.47	4.01	4.39	5.11	1.60	4.25
Net Income	-1.00	-2.95	-4.74	-6.53	-8.21	-9.50	-10.34	-11.76	-3.81	-9.95

Excludes Military Receipts and Payments

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