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Exporting the Inflation Tax

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As a result of its large current account deficits throughout most of the 1980s, the U.S. net international investment position is now negative, for the first time since World War I. As shown in figure 4-1, the U.S. net international investment position was approximately +5 percent of GNP in 1981; it is projected to be approximately -15 percent of GNP in 1990. The data concerning the U.S. net external position contain several errors in measurement and reflect arbitrary accounting conventions. But there is no doubt that during the 1980s the U.S. net external assets have been falling at a rate unprecedented in its modern history. This chapter analyzes the implications of this reduction in the U.S. net external asset position for the issue of macroeconomic policy coordination. The existing literature, surveyed briefly in the section "Monetary Policy Coordination and the Transfer Problem," has investigated some aspects of this question. Particular attention has been paid to the role of exchange rate management in helping to effect a real transfer between the United States and the rest of the world. Such a transfer eventually has to take place, if the United States restores its current account equilibrium.

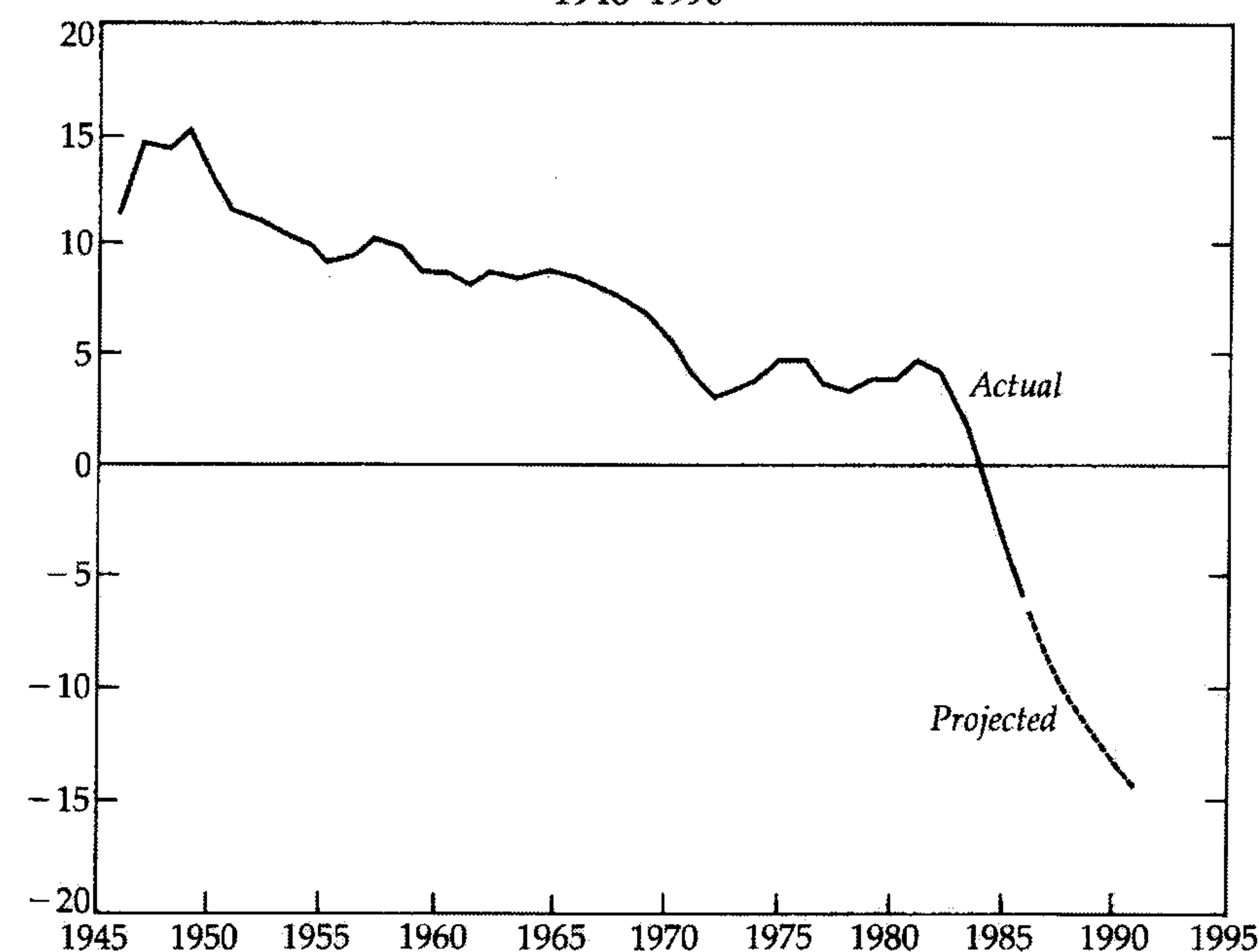
This chapter focuses on a different aspect of this same issue that has been neglected so far in the literature. A large part of the capital that flowed into the United States during the 1980s has been invested in nominal dollar denominated assets. The real market value of these assets can be changed by U.S. monetary policy. In particular, an unexpected dollar devaluation would reduce the purchasing power of the U.S. external obligations, and hence would redistribute wealth from foreign to U.S. citizens. This fact may influence the incentives of

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the U.S. monetary authorities as well as the market expectations about future policy. Consider for instance the following scenario. In response to an exogenous event, the U.S. monetary authorities have to choose between raising the interest rate or accepting a devaluation of the dollar. By choosing the first option, they would raise the burden of servicing the U.S. external debt. By choosing the second option, they would instead reduce the real value of foreign claims on domestic resources. Clearly, these new consequences raise the cost of a tighter policy and increase the attractiveness of a dollar devaluation. This is the sense in which the accumulation of large dollar denominated external liabilities may have changed the incentives of the U.S. monetary authorities. The section of this chapter that discusses "Who Gains and Who Loses from a Dollar Devaluation" attempts to assess the relevance of these incentives, by analyzing in detail the data on the U.S. net external position.

Internalizing the external effects of U.S. monetary policy creates a new role for international monetary coordination. The section on

FIGURE 4-1
U.S. NET EXTERNAL ASSETS AS A PERCENTAGE OF NOMINAL GNP,
1946-1990



SOURCE: R. Bryant, G. Holtham, and P. Hooper, *External Deficits and the Dollar — the Pit and the Pendulum* (Washington, D.C.: Brookings Institution, 1988).

"Exporting the Inflation Tax in a Noncooperative Regime" investigates what this role is and how the gains from coordination, if any, are distributed across countries and over time. Three questions are asked. First, the subsection on the "Noncooperative Monetary Regime" investigates how monetary policy in a debtor country is affected by the incentive to extract revenue from foreign creditors in the absence of international coordination. The main finding here is that, under some conditions, the debtor country manages to collect some inflation tax from abroad, despite the fact that inflation is fully anticipated and that there is no currency substitution. Next, the subsection on "Monetary Policy Coordination" considers how the gains from coordination are distributed across countries, and how their bargaining power is affected by changes in the stock of external debt outstanding. Coordination takes the form of a fixed exchange rate agreement. The main finding here is that the distribution of these gains and the countries' bargaining power are not stable over time. Consequently, the allocation of the burden of defending the fixed exchange rate is also not stable, but depends in a predictable way on the external debt outstanding in each period. This result suggests that the incentives of the fiscal authority in the debtor country may be shaped by the nature of the international monetary regime. The subsection on "Fiscal Incentives and the International Monetary Regime" explores this conjecture, and argues that international monetary coordination may weaken the incentives to balance the fiscal budget in the debtor country. Finally, there are some concluding remarks in the last section.

Monetary Policy Coordination and the Transfer Problem

The U.S. current account deficit cannot keep growing forever. Eventually its growth must be arrested and the U.S. external debt must be serviced. This will involve running a trade surplus and reversing the transfer of resources that is now occurring between the United States and the rest of the world. An important question addressed in the recent literature is whether international monetary policy coordination can facilitate this process.

Exchange Rate Management. Judging from their declarations, and perhaps also from their behavior, the policy makers of the major industrial countries seem to believe that the answer to this question is positive. The Plaza Agreement of September 1985 stressed the point that "exchange rates should play a role in adjusting external imbalances" and that the Group of Five (G-5) countries (France, Japan,

United Kingdom, United States, and West Germany) would "stand ready to cooperate more closely to encourage" some further orderly depreciation of the dollar against the other main currencies—a G-5 announcement, reported by Funabashi in *Managing the Dollar: From the Plaza to the Louvre*. Similarly, at the Louvre Accord of February 1987, after the large dollar devaluation, the policy makers of the G-6 countries "agreed that the substantial exchange rate changes since the Plaza Agreement will increasingly contribute to reducing external imbalances" and that they had "now brought their currencies within ranges broadly consistent with underlying economic fundamentals." As a result, "they agreed to cooperate closely to foster stability of exchange rates around current levels"—G-6 communiqué, reported in Funabashi. This call was reaffirmed at the June 1987 Venice Summit, at the September 1987 IMF–World Bank meeting, and in other more recent communiqués.

Originally, exchange rate management was conceived as part of a more grandiose program of international policy coordination. An important aspect of this program was fiscal contraction in the United States and fiscal expansion in the rest of the world. In the implementation of the program, however, the fiscal component was not carried out. As a result, since 1985 policy coordination in practice has meant almost exclusively nominal exchange rate management.

The original program, of accompanying fiscal policy coordination with nominal exchange rate management, was in accord with current economic thinking. A fiscal contraction in the United States, accompanied by fiscal expansion abroad, would have shifted aggregate demand away from U.S. goods (because of the magnitude of the import propensities in the United States and in the rest of the world). Hence, a depreciation of the dollar real exchange rate would have been required to avoid excess supply in the United States. Because of price "stickiness" and "desynchronization" in the commodities markets, such a real exchange rate reduction would have been most easily achieved by a nominal dollar devaluation, rather than through a process of generalized deflation in the United States. This point of view has been forcefully argued in Krugman's paper, "Adjusting to the World Economy," and is shared by many economists.

Nominal exchange rate management without any fiscal adjustment on the real side is, however, much more problematic. On the one hand, if the fiscal adjustment never occurs, in the long run managing the nominal exchange rate can result in inflation, with no effect on the real exchange rate. Branson, in "The Limits of Monetary Coordination as Exchange Rate Policy," raises a similar point when he argues that the real dollar appreciation in the first half of the 1980s was

an equilibrium reaction to a real shock, and hence that a monetary policy that stabilized the nominal exchange rate would have been counterproductive.

This point can be stated more generally as follows. The U.S. trade and current account deficits are real phenomena that result from an excess of investment over aggregate savings in the United States relative to the rest of the world. Reversing these deficits requires changes in real variables. Monetary policy coordination, by contrast, concerns nominal variables (such as nominal exchange rates or inflation rates). Consequently, monetary policy alone cannot correct the underlying real imbalances, although it can facilitate the adjustment process if these real variables are changed.

On the other hand, whether or not the real fiscal imbalances are corrected is not an exogenous event. Presumably, it is primarily determined by the domestic political incentives of U.S. policy makers. These incentives are not invariant across different monetary regimes. Suppose, for instance, that nominal exchange rate management succeeds, at least temporarily, in maintaining the dollar real exchange rate at just the "right" level. This might effect further improvements in the trade balance, but also might weaken the pressure on the U.S. fiscal authority to do something about its budget deficit. If fiscal policy in the United States were directed optimally by a benevolent social planner, then this consideration would not be a concern. If, however, as is more likely in the current circumstances, the U.S. budget deficit reflects a political market failure, then international monetary coordination may be counterproductive, since it may enhance the effects of the political distortion on the U.S. deficit. In other words, the economy would move from a second to a third best. This line of thought, neglected in much of the literature so far, is further elaborated in the subsection on "Fiscal Incentives and the International Monetary Regime."¹

Monetary Policy as a Fiscal Instrument. In the recent literature, both the advocates and the critics of exchange rate management have focused extensively on the transfer problem summarized in the previous pages. But in a world with real fiscal imbalances, there is also a second important reason for monetary policy coordination to matter. Monetary policy can also be regarded as a fiscal instrument, in many ways similar to a capital levy. An unexpected monetary expansion in the United States, by devaluing the dollar, acts like a capital tax on foreign holdings of U.S. nominal external debt. The opposite is true for a monetary contraction in the United States. As such, U.S. monetary policy has external effects abroad. This creates a potential role for

international monetary cooperation and exchange rate agreements, in addition to that discussed in the previous pages.²

Note that the base corresponding to this tax (the outstanding stock of U.S. external dollar liabilities) is partly determined by U.S. fiscal policy: the base is increased by U.S. budget deficits (to the extent that they are reflected in current account deficits); and vice versa for budget surpluses. This confirms the relevance of the issue raised at the end of the previous subsection. The incentives of the fiscal authority to balance the budget are likely to be affected by the nature of the international monetary regime—although here it seems harder to tell *a priori* in which direction.

The rest of the chapter looks at international monetary coordination from this point of view. Monetary policy is considered also as a fiscal instrument for redistributing wealth to or from foreigners. Budget deficits (or surpluses) are viewed also as a means to enlarge (or shrink) the tax base on which the monetary instrument can be applied in the future. Before turning to a more abstract analysis, in the next section we show that the relevance of this approach to international monetary coordination has been enhanced by the stream of large U.S. current account deficits that have accumulated during the 1980s.

Who Gains and Who Loses from a Dollar Devaluation

This section investigates how the U.S. incentives to reduce the market value of its net external liabilities by means of monetary policy changed throughout the 1980s. This requires a detailed analysis of the composition of the trend in the U.S. net international investment position depicted in figure 4-1.

Table 4-1 provides some information about the currency in which various categories of U.S. external assets and liabilities are denominated. The data are broken down by type of holder and by major type of asset. For some external assets and liabilities (essentially those held or issued by the U.S. government and its financial sector) the currency of denomination is reported in official publications. For other categories of issuer or holder (mainly the private sector other than financial intermediaries), the currency of denomination can only be estimated. The estimates are based on Hooper and Stekler's "Financing the U.S. Current Account Deficit: Who Bears the Exchange Rate Risk?"; these estimates were originally formulated for the years 1984 and 1985. In constructing table 4-1, it was assumed that the same (percentage) estimates can be applied to earlier and later periods. The way in which the general picture depends on these estimates will be discussed.

TABLE 4-1
CURRENCY EXPOSURE, 1980-1987
(billions of U.S. dollars)

U.S. External Assets and Liabilities	1980	1983	1984	1985	1986	1987
I. Foreign currency exposure of U.S. residents						
1. U.S. assets abroad in foreign currency						
1a. Reported	38.7	48.5	53.8	65.8	82.2	102.7
Nonbanks	2.9	3.1	2.6	2.3	2.5	3.2
Banks	5.1	8.2	12.5	16.8	28.7	51.3
Government						
Official reserve assets	26.8	33.7	34.9	43.2	48.5	45.8
Long-term	2.2	1.8	1.8	1.7	1.6	1.6
Short-term	1.7	1.7	2.0	1.8	0.9	0.8
1b. Estimated ^a	233.6	245.0	253.0	289.0	330.0	384.5
1c. Total (1a + 1b)	272.3	293.5	306.8	354.8	412.2	487.2
2. U.S. external liabilities in foreign currency						
2a. Reported	7.4	8.3	11.6	18.9	33.5	60.1
Nonbanks	3.7	3.1	3.0	3.6	3.8	5.1
Banks	3.7	5.2	8.6	15.3	29.7	55.0
2b. Estimated ^b	0.9	1.7	3.3	8.3	14.2	17.1
2c. Total (2a + 2b)	8.3	10.0	14.9	27.2	47.7	77.2
3. Net exposure of U.S. residents in foreign currency						
3a. Overall (1c - 2c)	264.0	283.5	291.9	327.6	364.5	400.0
3b. Partial (1a - 2c)	30.4	38.5	38.9	38.6	34.5	25.5
II. Dollar exposure of foreigners with respect to U.S. residents						
4. U.S. external liabilities in dollars						
4a. Reported	326.5	533.2	600.6	660.3	787.2	877.2
Nonbanks	17.9	22.2	26.4	24.3	22.0	22.1
Banks ^c	116.4	282.7	316.8	349.9	431.9	493.6
U.S. Treasury securities						
(held by private sector)	16.1	33.8	58.2	83.6	91.5	78.4
Foreign official assets	176.1	194.5	199.2	202.5	241.8	283.1
4b1. Estimated, ^d of which	157.1	250.8	291.9	391.2	515.0	589.2
4b2. Bonds	9.5	17.3	32.8	82.5	127.9	153.9
4c. Total (4a + 4b1)	483.6	784.0	892.5	1,051.5	1,302.2	1,466.4
4d. Partial (4a + 4b2)	336.0	550.5	630.4	742.8	915.1	1,031.1
5. U.S. claims on foreigners in dollars						
5a. Reported	290.0	534.0	541.2	541.2	597.5	609.1
Nonbanks	31.5	31.8	27.3	26.6	31.0	26.7
Banks	198.7	426.2	433.1	430.5	478.7	496.4
Government						
Long-term assets	59.8	76.0	80.8	84.1	87.1	86.0
5b. Estimated ^e	44.5	46.0	47.6	53.5	62.8	71.1
5c. Total (5a + 5b)	334.5	580.0	588.8	594.7	660.3	680.2

TABLE 4-1 (Continued)

U.S. External Assets and Liabilities	1980	1983	1984	1985	1986	1987
6. Net dollar exposure of foreigners with respect to U.S. residents ^f						
6a. Overall (4c - 5c)	149.1	204.0	303.8	456.8	641.9	786.2
6b. Partial (4d - 5c)	1.5	-29.0	44.6	148.1	254.8	350.9
7. Net gain from 10 percent dollar devaluation (percent of GNP)						
7a. (from 6a)	0.5	0.6	0.8	1.1	1.5	1.8
7b. (from 6b)	0.0	-0.1	0.1	0.3	0.6	0.8

a. 84.4 percent of direct investments, corporate bonds, and corporate stocks, computed as in B. Hooper and L. Stekler, "Financing the U.S. Current Account Deficit: Who Bears the Exchange Rate Risk?" (Board of Governors of the Federal Reserve System, Washington, D.C., 1986, mimeo).

b. 10 percent of bonds issued by U.S. corporations in foreign markets.

c. Except for liabilities to official institutions and nonmonetary organizations.

d. 100 percent of direct investment and corporate stock and 90 percent of corporate bonds (cf. B. Hooper and L. Stekler, "Financing the U.S. Current Account Deficit").

e. Direct investment, corporate bonds, and corporate stocks, less amount in line 1b.

f. U.S. is a net creditor if negative, net debtor if positive.

SOURCES: Federal Reserve Bulletin, Survey of Current Business, Economic Report of the President, various years.

Consider first the U.S. net position in foreign currency (lines 1-3 of table 4-1). The United States is a net creditor in foreign currency. Despite the deterioration of the aggregate U.S. net international position, the U.S. net position in foreign currency has actually improved throughout the 1980s (see line 3a). This is true even if one neglects the estimated component and only considers the assets and liabilities whose currency of denomination is reported in the official statistics (see line 3b). Note that the U.S. liabilities in foreign currency are relatively small, and that the bulk of U.S. assets abroad corresponds to line 1b of table 4-1. This line includes direct investment abroad, corporate stocks, and corporate bonds. Of these, only corporate bonds might contain large margins of error in the estimation of the currency of denomination. Since corporate bonds account for only about 20 percent of the total in line 1b, the margin of error in the estimation cannot be too large.

The counterpart of this finding is that the U.S. net debt position in dollars is much larger than its aggregate net international investment position, and has been rising even more rapidly than would be apparent from figure 4-1. As shown in line 6a, the U.S. net debt

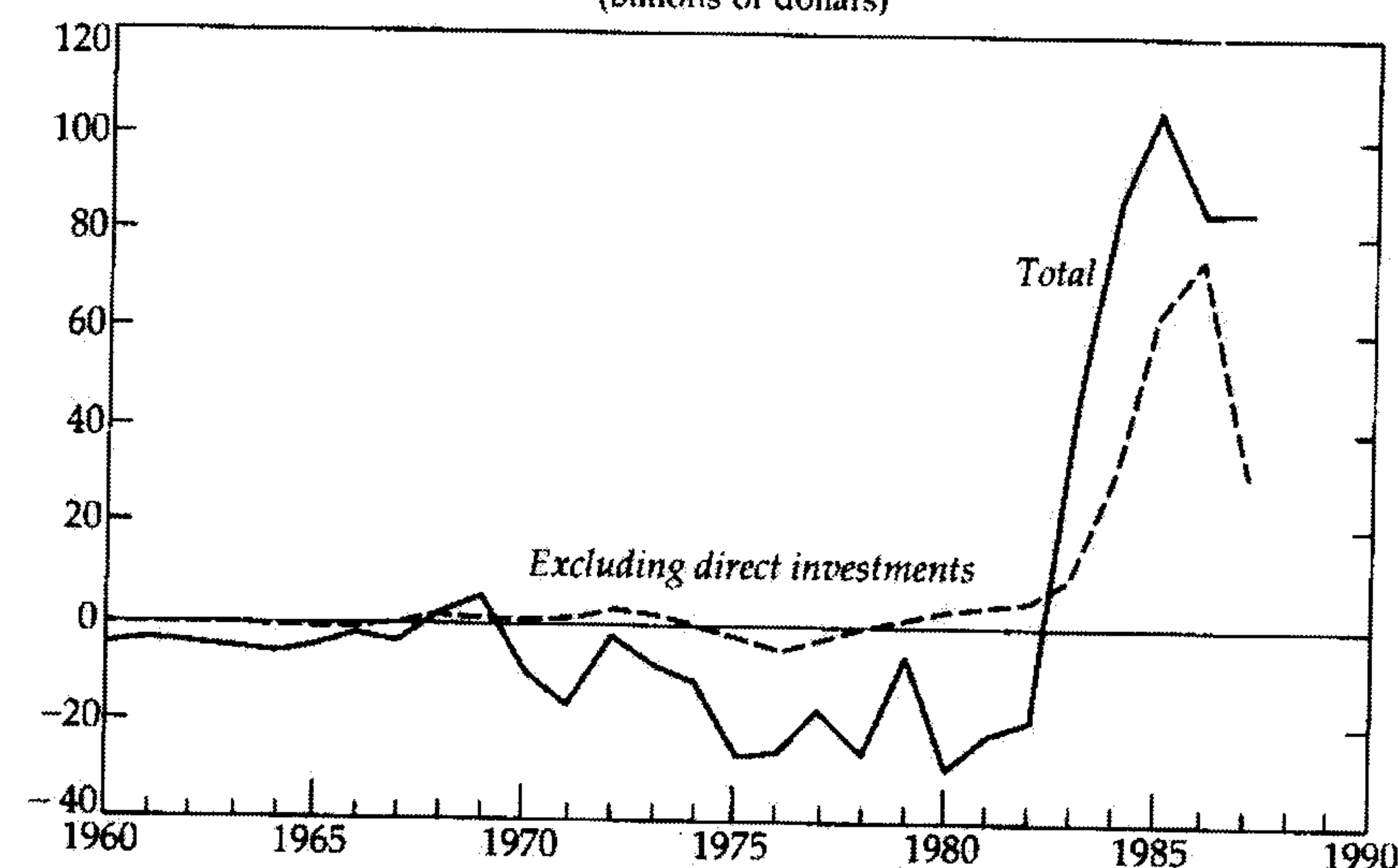
position in dollars in 1987 is more than five times as large as that in 1980. Its average rate of growth between 1983 and 1987 has been more than 40 percent per year. An even more rapidly ascending trend emerges if one neglects the estimated U.S. liabilities in dollars and only considers the assets and liabilities for which the currency of denomination is officially reported. Moreover, as indicated in line 4d, much of the increase in the U.S. external debt between 1984 and 1987 has been in nominal U.S. liabilities (reported liabilities and corporate bonds).

Line 7a of table 4-1 reports one measure of the net gain accruing to U.S. residents from an unexpected 10 percent devaluation of the dollar (accompanied by unexpected inflation), expressed as a percentage of U.S. GNP. This measure is computed by multiplying the U.S. net external debt denominated in dollars (line 6a) by 0.1, and then dividing it by nominal GNP. In 1983 this net gain was about $\frac{1}{2}$ percent of GNP. At the end of 1987 it was 1.8 percent, or about 50 percent of the U.S. trade deficit for that year. These are still relatively small numbers, but they are rapidly increasing.

It might be argued that the relevant net aggregate on which to measure the net gains from a dollar devaluation is smaller than the total net international investment position. In particular, corporate stocks and direct investments might be considered as real assets, whose market value would rise in the event of a dollar devaluation. Excluding these two items from the estimated U.S. liabilities denominated in dollars leaves us with the adjusted net aggregate reported in line 6b.³ The net gain from a 10 percent dollar devaluation computed from this aggregate is much smaller. At the end of 1987 it was still below 1 percent of GNP. But here, too, the trend is increasing very rapidly.

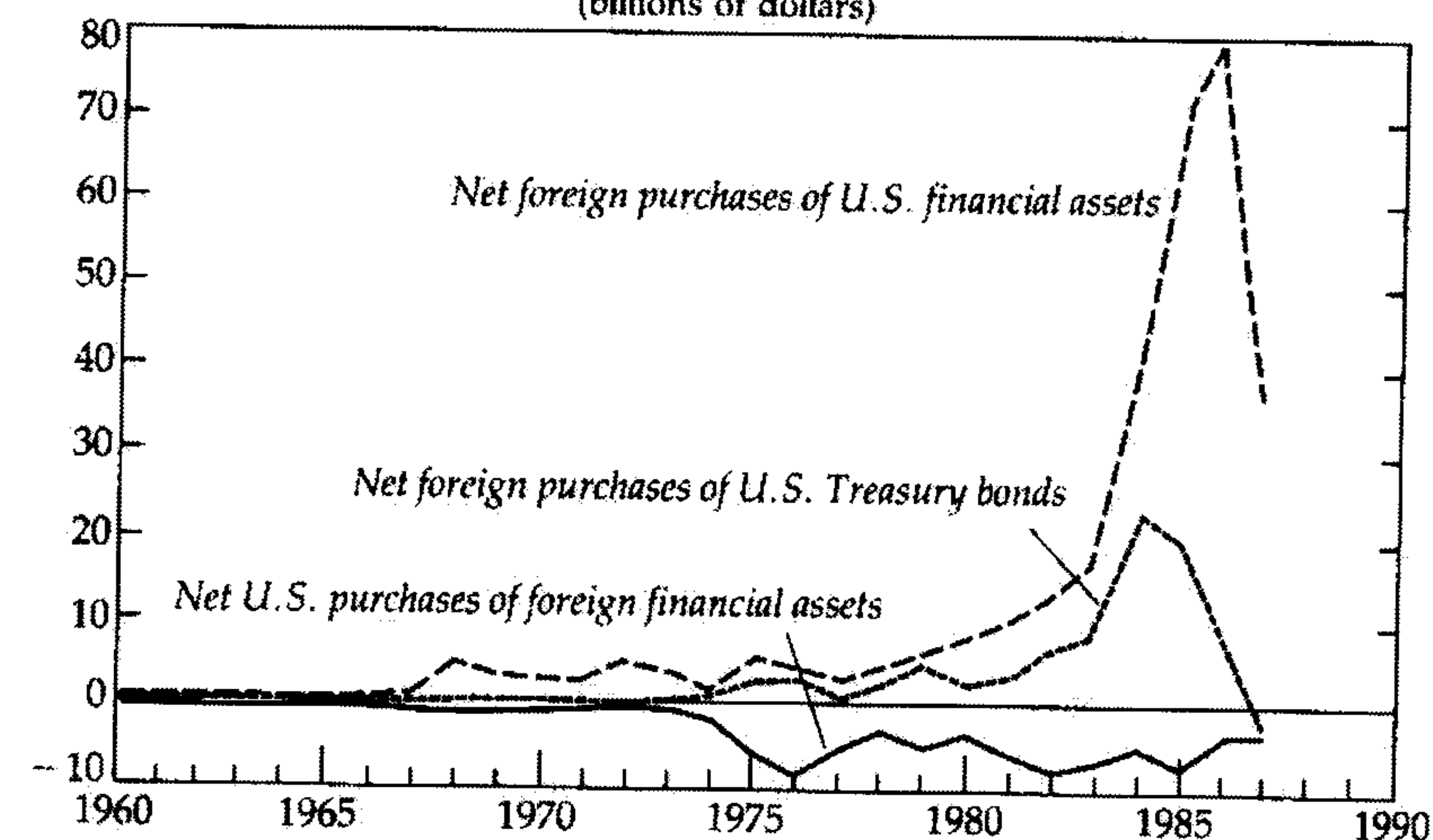
This trend is also shown in figures 4-2 and 4-3. Figure 4-2 depicts net private capital flows between the United States and the rest of the world. Two things are apparent. First, financial assets and not direct investment are responsible for most of the foreign capital inflows since 1982. Second, private capital inflows began to slow down during 1987; in that year, private capital flows were replaced by accumulation of dollar reserves by the foreign authorities. Figure 4-3 decomposes net private capital flows of financial assets in its two components: net purchases of U.S. financial assets by foreigners, and net purchases of foreign assets by U.S. residents. Whereas the latter have not changed significantly, foreign investors have sharply increased their net acquisition of U.S. financial assets since 1982. Also shown in figure 4-3 is the increase, up to 1987, of net purchases of U.S. Treasury liabilities by foreigners.

FIGURE 4-2
PRIVATE CAPITAL FLOWS, 1960-1987
(billions of dollars)



SOURCE: V. Grilli and G. Tabellini, "Il Debito Pubblico ed Estero Degli Stati Uniti Durante l'Amministrazione Reagan," ISPI Working Paper (Milan, 1988).

FIGURE 4-3
INTERNATIONAL TRANSACTIONS OF FINANCIAL ASSETS,
1960-1987
(billions of dollars)



SOURCE: Same as source for figure 4-2

The data reported in table 4-1 are subject to several important limitations and qualifications. Taking these qualifications into account can either raise or reduce the ultimate numbers shown in line 7 of the table. But these qualifications are unlikely to change the main conclusion, namely, that the net U.S. external position denominated in dollars deteriorated substantially between 1983 and 1987. The remainder of this section discusses these data limitations in more detail.

Perhaps one of the most important issues concerns the maturity of the nominal liabilities of table 4-1. If all liabilities were of very short term, then the scope for an unexpected dollar devaluation might be reduced, unless the devaluation was very swift and sudden. Conversely, if the maturity of U.S. liabilities was long, then even a gradual and long-sustained dollar devaluation could be unexpected. Hence, the maturity of U.S. net liabilities can determine the ease with which the U.S. monetary authorities can generate a policy surprise. Perhaps more important, the maturity of U.S. net liabilities can determine the effectiveness of reputational incentives. If some reputation mechanism is in effect, then an unexpected inflationary surprise would induce the private sector to revise upward its estimate of future inflation (or devaluation). This would tend to impose costs on U.S. borrowers if their liabilities were of short maturity (or if they had variable interest rates). But these costs would be much smaller if they had borrowed long; for then, U.S. borrowers would not need to refinance their obligations at higher interest rates. Hence, in the presence of some reputation mechanism, the net gain from an inflationary surprise is higher the longer is the maturity of outstanding obligations.

Table 4-2 provides some information about recent trends in the maturity composition of some categories of U.S. external liabilities. It is apparent from the last two lines of table 4-2 that after 1983 foreign net purchases of U.S. long-term liabilities have been a large percentage of the total capital inflows in the United States, and that they have been significantly larger than in the earlier part of this decade. With respect to the U.S. Treasury alone, the average maturity of the federal government debt held by private investors has also increased during the period under consideration: it was three years and nine months in 1980; it was five years and nine months in 1987.

According to the classification scheme used for the data in tables 4-1 and 4-2, a foreigner is defined to be a foreign resident. This implies that U.S. branches of foreign companies are not considered to be foreign investors, whereas foreign offices of U.S. companies are. From the point of view of the incentives of U.S. policy makers, however, a more appropriate definition of foreigner is based on cit-

izenship. Participation in the U.S. political process (through elections or otherwise) is more likely to be related to citizenship than to residence. Hence, it can be argued that the U.S. policy maker cares about the interests of its citizens, more than about those of its residents. Unfortunately, data on the net consolidated position of U.S. and foreign companies in general are not available. The U.S. Treasury does, however, provide some data on the consolidated foreign currency position of U.S. banks. According to Hooper and Stekler, these data suggest that U.S. banks in the aggregate did not have substantial foreign currency positions in 1985. This is consistent with the data reported in parts 1a and 2a of table 4-1. If, as it would seem likely, U.S. branches of foreign banks have a net creditor position in dollars, then the data of table 4-1 might underestimate the net debt position of the United States in dollars. Too little is known about the consolidated position of the nonbanking sector to attempt an estimate.

The foreign currency exposure of both foreigners and U.S. citizens can be altered by a variety of "off-balance-sheet" transactions. These transactions (such as forward contracts, options, futures, and swaps) would not show up in the balance-sheet data of table 4-1. Complete data on these transactions are not available. Based on estimates by market analysts and on Treasury surveys of U.S. corporations, however, something is known about the direction of these

TABLE 4-2
FOREIGN NET PURCHASES OF LONG-TERM NOMINAL ASSETS, 1980-1987
(in billions of U.S. dollars and percent)

<i>Assets</i>	1980	1981	1982	1983	1984	1985	1986	1987
U.S. Treasury bonds and notes								
Official institutions	3.9	11.7	14.5	0.8	0.5	8.1	14.2	31.1
Others	1.0	3.2	2.7	4.6	21.0	21.0	5.0	-5.2
Long-term securities of U.S. government corporations	2.5	1.5	-0.3	0.0	1.2	4.3	7.0	5.0
Corporate bonds	2.9	3.5	1.8	0.9	11.7	39.8	43.7	22.7
Total	10.3	19.9	18.7	6.3	34.4	73.2	69.9	53.6
% of net increase of total foreign asset in the United States	17.7	24.0	20.0	7.4	33.6	56.4	32.8	25.3

SOURCES: *Survey of Current Business*, *Treasury Bulletin*, various years.

transactions. Specifically, Hooper and Stekler conclude in their study that the sizable U.S. net long position in foreign currencies seems to extend to off-balance-sheet transactions as well, and that the increase in foreign dollar exposure that is apparent from table 4-1 is probably even larger if "off-balance-sheet" items are included.

Finally, the data of table 4-1 are likely to include margins of error from other sources as well. An indication of these measurement problems is provided by the large statistical discrepancy in the U.S. balance of payments accounts. Between 1975 and 1985 this discrepancy cumulated to \$190 billion. According once again to Hooper and Stekler, much of this discrepancy is presumed to reflect unrecorded increases in foreign holdings of claims on the United States, including U.S. currency. If this were the case, it would provide an additional argument for believing that the U.S. net debt position in dollars is even larger than reported in table 4-1.⁴

In summary, the general picture that emerges from these data is unequivocal. First, the U.S. net external debt position denominated in dollars is very much larger (in absolute value) than the overall U.S. net position. Second, the U.S. net dollar position deteriorated very rapidly after 1983. There is great uncertainty about the exact level of this position in any given year, but not about its direction or rate of change.

What are the implications of this general picture for the incentives of the U.S. monetary authorities with respect to exchange rate policy? Presumably, as argued above, the U.S. authorities do not care much about foreign interests in the United States (except possibly indirectly, through reputational considerations). In this case, and all other things being equal, the accumulation of external dollar liabilities that took place since 1983 raised the incentives for the U.S. authorities to generate an unexpected dollar devaluation (or, equivalently, it raised the cost of an unexpected appreciation of the dollar).

Naturally, the condition that other things have remained equal is very restrictive. An unexpected change in the dollar exchange rate is associated with a web of redistributions much more complicated than that corresponding to the aggregate framework of table 4-1. Thus it is entirely possible that the position of single individuals or corporations within the United States has changed in a way that would discourage the authorities from undertaking any unexpected dollar devaluation, rather than encourage them to do so. Moreover, U.S. exchange rate and monetary policy is determined by many other considerations, generally more important than the purely redistributive aspects discussed in the previous pages; in particular, the threat of losing the

reputation earned at a high price with the Volcker disinflation is probably a severe constraint on U.S. policy makers.

For these reasons, it is impossible to extrapolate any predictions about the future course of U.S. exchange rate policy from the previous discussion alone. All that can be said is that now there is an additional factor, which will undoubtedly become increasingly important, that must be considered by the U.S. monetary authorities.

It is then interesting to inquire about the implications of these new incentives for the equilibrium exchange rate and for U.S. monetary policy in general. Specifically, how is the market going to react to the perception of these new incentives? Is anything to be gained by coordinating monetary policy internationally, beyond any advantages that might already exist in the absence of these recent trends? How are these gains distributed among the United States and other countries? How is the U.S. bargaining position in any cooperative international agreement likely to be affected? These and other questions are addressed in the remainder of this paper. For reasons of space, here we only summarize the answers to these questions. The detailed analysis is found in a previous version of this chapter.

Exporting the Inflation Tax in a Noncooperative Regime

The Noncooperative Monetary Regime. We begin with the question of whether and how a debtor country that borrowed in its own currency can collect some inflation tax from foreign holders of its external debt. Throughout this subsection it is assumed that the monetary authorities in the debtor and creditor countries behave noncooperatively. The purpose of the analysis is to understand the incentives faced by the monetary authorities in the United States and in the other major industrial countries in the absence of international policy coordination, given the economic trends described in the previous section.

It is easy to show that, in the absence of international cooperation, the equilibrium rate of inflation in the debtor country increases with the size of the net nominal external claims to be repaid in the current period. Intuitively, the larger the net claims that are being repaid, the greater the redistribution associated with unexpected inflation, and hence the greater the incentive to inflate. If private lenders are fully informed and have rational expectations, they realize that issuing external debt alters the incentives of the monetary authorities in the debtor country; thus, they anticipate any forthcoming inflation. This implies that the equilibrium inflation rate is fully incor-

porated in the nominal interest rate when the debt is issued. Hence, the debtor country cannot directly collect any inflation tax from foreign debt holders.

Yet, despite this fact, without policy commitments a monetary policy of zero inflation is not credible, and hence would not be expected by foreign lenders. This result is well known in the existing literature on rules versus discretion in monetary policy (see for example Calvo's article "On the Time Consistency of Optimal Policy in a Monetary Economy" and Kydland and Prescott's "Rules Rather Than Discretion: The Inconsistency of Optimal Plans"). It is due to the fact that the rate of inflation in the debtor country is chosen only afterward that foreign investors have made an irrevocable decision to buy domestic nominal debt. Given this timing, it is optimal for the monetary authorities to try to devalue the outstanding debt obligations by creating inflation. But this ex post optimality is fully perceived by foreign investors, ex ante, before making their investment decision. As a result expected inflation drives up the nominal interest rate, and the debtor country is trapped in the equilibrium with high inflation.⁵

In this setup, however, unlike in a closed economy, the monetary authorities in the debtor country are not the only ones trapped in a time-consistent suboptimal equilibrium. If the outstanding debt is sufficiently large, the government of the creditor country also has a credibility problem: it cannot refrain from intervening in defense of the debtor currency. The reason is the same: to redistribute wealth in favor of its own citizens who hold nominal external claims. It can be shown that the creditor's intervention in defense of the debtor's currency tends to be larger in proportion to the amount of the stock of external debt outstanding. This intervention too is fully anticipated by the market; hence, it does not achieve any redistribution of income in favor of the debt holders. On the contrary, by intervening the creditor government pays seigniorage to the foreign authorities. This seigniorage is totally wasted from the point of view of the creditor government: more intervention by the creditor simply encourages the debtor country to print even more currency. Yet, despite this fact, the foreign authorities cannot refrain from intervening. They are not being irrational. Like the government of the debtor country, the foreign authorities are simply subject to an incentive compatibility condition. They cannot credibly precommit not to buy domestic currency. Anticipating their purchases, the domestic (debtor) central bank then keeps printing money, up to the point where the foreign authorities are fully satiated and domestic prices and the exchange rate are at the equilibrium level. This equilibrium level is fully anticipated by the market, which receives the required real rate of return on its lending.

This finding illustrates an important asymmetry concerning who gains and who loses in this attempt to export the inflation tax. For low levels of external debt the creditor government does not intervene in defense of the debtor currency. Hence, in this case the domestic country is the only loser, since it bears the full costs of inflation and yet extracts no seigniorage from abroad. If the level of debt is sufficiently large, however, the creditor country does intervene. Hence, in this second case, the losses are shifted to the foreign (creditor) country, and take the form of seigniorage revenue paid through the official intervention in the exchange rate market.

This discussion suggests that the authorities in the creditor country ought to discourage their own citizens from acquiring large quantities of external nominal assets. The foreign individual investor is atomistic and hence does not perceive that his investment decision alters the incentives of the policy maker in its own country: it is perfectly rational, from his point of view, to invest, taking as given the behavior of his own authorities. But his purchase decision has a negative externality: it increases the incentives of the authorities to bail him (and the other investors) out, by intervening in the foreign exchange market. Hence, by restricting the private acquisition of external assets, the foreign authorities can reduce the seigniorage that they pay abroad.

Since 1987, foreign central banks have substantially increased their purchases of dollar denominated assets (see the section "Who Gains and Who Loses from a Dollar Devaluation" and Hale's article, in the *Wall Street Journal*, "Accounting for the Dollar Glut"). This behavior on their part may be interpreted as evidence of policy coordination. However, the results of this subsection suggest another possible interpretation. According to the theoretical results presented above, an increase in foreign official intervention in defense of the dollar might be expected even in the absence of cooperation, given the remarkable increase in the U.S. external dollar obligations that took place since 1983.

Monetary Policy Coordination. Attempts of the debtor country to export the inflation tax abroad result in a net inefficiency for the world economy. This suggests that there are gains to be had from international policy coordination. This subsection investigates how these gains are distributed between the two countries if a coordinated monetary policy can be implemented.

By policy coordination we mean that the policy instruments at home and abroad are arranged to maximize social welfare in both countries, with weights on each country that depend on their relative

of the previous two subsections suggest that the fiscal authorities in the debtor country may have an incentive to use debt policy to gain a strategic advantage over its creditors. In particular, because of the strategic effects of external debt, the debtor may borrow more or less than he otherwise would. This subsection briefly investigates how the incentives to borrow for the debtor government are shaped by the nature of the international monetary regime.

For simplicity, I assume that the borrower can only issue debt denominated in domestic currency.⁷ The question is whether the real marginal cost of borrowing (inclusive of interest payments, the domestic costs of inflation, and the eventual transfers across countries) is higher with or without monetary cooperation. Note that there is no reason that the motives that induce the government to borrow (such as tax smoothing or intertemporal revenue redistribution) should be affected by the nature of the international monetary regime. Hence, a finding that the marginal cost of borrowing is lower under one regime than in the other implies that in equilibrium the government borrows more in that regime.

To answer this question, note first of all that the real interest payments must be the same under both regimes: since investors have rational expectations, they correctly anticipate the equilibrium inflation rate in either regime, and obtain the same real rate of return from their lending. Hence, the cost of borrowing can differ across the two regimes only because of the other two effects of issuing debt: the effect on domestic inflation (in the noncooperative equilibrium) and the effect on the international transfers associated with the exchange rate intervention.

In the absence of cooperation, the debtor country has to bear the costs of inflation. Hence the marginal cost of issuing external debt, besides the payment of interest, consists of the marginal output loss due to the forthcoming higher inflation. If on the other hand the countries cooperate, then inflation is zero. It can be shown that the marginal cost of borrowing is always lower with than without monetary cooperation. It can also be shown that the marginal cost of issuing debt is lowest if cooperation occurs *ex post*. This is because of the results described in the previous subsection: with *ex post* cooperation, the bargaining power of the debtor country increases with the size of its external debt obligations; hence, by issuing more debt, the borrowing country can reduce the transfers that it pays (increase the transfers received) under cooperation. As such, the marginal cost of issuing debt is lowest.

This finding may have important implications. The government of the borrowing country, anticipating that monetary policies will be

set cooperatively, should borrow more under a cooperative monetary regime than if monetary cooperation is ruled out. If government borrowing is optimal from the point of view of society as a whole, then cooperation is bound to be welfare improving for the debtor country. But if the fiscal deficit reflects some political distortion, then monetary cooperation would enhance the effect of this distortion. In this case, it is conceivable that monetary cooperation would be counterproductive, in the sense that economic welfare in the borrowing country would be higher in a monetary regime without cooperation than in the cooperative regime. This would happen if the beneficial effect of cooperation on the rate of inflation is more than offset by its adverse effect of enhancing the domestic political distortion. Investigating these issues more in detail, in a model where the political distortion is explicit, would be an interesting task for future research (see note 1).

Finally, note that the findings summarized above provide a counterexample to the widespread opinion that fixed exchange rate agreements may act as a discipline device on the fiscal authorities of a country. This idea probably makes a lot of sense for a small open economy that unilaterally pegs its nominal exchange rate to that of some other country. For in this case, a fixed exchange rate regime constrains the rate of domestic credit expansion, and hence may raise the cost of running a fiscal deficit.⁸ In the case of a large open economy like the United States, however, the burden of defending an exchange rate target is likely to fall on all countries participating in the exchange rate agreement, and not just on the weak currency country. The point of this subsection is to argue that the distribution of the burden of defending a fixed dollar exchange rate is not exogenous, but is likely to depend also on the amount of external debt outstanding: the larger the debt, the greater the U.S. *ex post* bargaining power, and hence the more the United States will benefit from the agreement. It is this factor that may weaken (rather than reinforce) the incentives to balance the budget for the U.S. authority in a fixed compared to a flexible exchange rate regime.

Conclusion

Since 1983, the United States has accumulated large external liabilities denominated in dollars. This has increased the attractiveness of an unexpected dollar devaluation for the U.S. authorities. The results of this chapter suggest that in the absence of international monetary cooperation these new incentives can lead to either of two outcomes or to a combination of both. They can lead to a high equilibrium

inflation rate in the United States and to a dollar devaluation. Alternatively, they can force the foreign monetary authorities to intervene in defense of the dollar by acquiring dollar denominated assets, thereby also placing a ceiling on the equilibrium rate of inflation in the United States. In this second case, the United States would be able to extract some seigniorage revenue from the creditor countries, even if its incentives are fully understood by foreign investors and inflation is perfectly anticipated.

Because inflation is costly, there are gains from international monetary policy coordination, but the distribution of these gains among countries can vary, depending on when coordination occurs. If it occurs *ex ante*, before the debt is issued, then monetary coordination would involve a transfer from the debtor to the creditor. Here cooperation essentially provides a commitment technology for the debtor country; hence, the debtor would be willing to pay a price to lend credence to a noninflationary policy.

If on the other hand cooperation occurs *ex post*, after the debt has been issued, then the direction of the transfer is reversed, with the creditor paying the debtor to induce him not to inflate. The reason is that once investors are locked into a nominal debt contract, inflation redistributes real resources from the creditor to the debtor; thus, the debtor country is in a stronger bargaining position *ex post* rather than *ex ante*, in direct proportion to its external debt outstanding.

Two general implications follow from these results. First, in a world with fiscal imbalances a cooperative monetary regime might not be stable over time, since the bargaining power of the countries involved would change with their external debt position, and hence the allocation of the burden of defending the exchange rates would also change. Second, engaging in monetary cooperation in such a world might weaken the incentives for the debtor country to correct its fiscal deficit. This happens because monetary cooperation reduces the cost of borrowing, particularly if cooperation, as it is likely, occurs *ex post*.

Naturally, these results only suggest the way in which the behavior of policy makers and financial investors in the major industrial countries may be affected by the current U.S. external deficit. In practice, several other factors play a much more important role in shaping this behavior; among them, probably one of the most important is the concern of the U.S. monetary authorities for their reputation, which would tend to weaken the incentives analyzed in this chapter.

Internationally Negotiable Inflation Taxes

A Commentary by Jacob S. Dreyer

Before commenting on Guido Tabellini's interesting essay, I will summarize his core observations and conclusions:

1. Accumulation of net external debt makes inflationary policies in the debtor country more tempting because a large part of the inflation tax burden is borne by foreigners.
2. There exists a unique equilibrium level of reserves denominated in the debtor country currency that the central bank of the creditor country is willing to accumulate.
3. This unique equilibrium level is a function of the actual (or, alternatively, prospective) size of net indebtedness and depends on whether the inflation tax is imposed on foreigners by the debtor unilaterally or is essentially negotiated by the debtor's and creditor's central banks.

The technology underlying Tabellini's essay is a two-country two-period-game theoretical model. The setup of the model and its basic assumptions are crucial for arriving at his results. I will discuss these assumptions and the setup later.

First, let me remark on the proposition that the rising net indebtedness itself intensifies temptations to tax via inflation. In the first part of his essay Tabellini presents numbers reflecting growing U.S. external debt, which in turn form the basis for subsequent inferences about rising incentives to pursue inflationary monetary policies in the United States.

This observation about intensifying inflationary incentives, while apparently self-evident, is not, strictly speaking, an external debt problem but an external balance sheet problem. Some ten years ago, when the United States was still a creditor country and its net external assets were close to 5 percent of GNP, many economists and the international financial community were engaged in a spirited debate.

The debate was about the dollar overhang, the inflationary incentives it creates, and the desirability of managing the implied risk of the ensuing wealth transfers through international cooperation, which was then presented in the guise of the substitution account of the International Monetary Fund (IMF). More than twenty years ago, when the creditor position of the United States was some 10 percent of its GNP, Jean-Jacques Servan-Schreiber, speaking about the "American challenge" to Europe, observed that U.S. corporations had been borrowing large amounts in the still-young Eurodollar market and using the proceeds to acquire real assets located in Europe. He postulated that such a mismatch in the currency denomination of the balance sheet may give the U.S. authorities a strong motive to inflate and thereby boost U.S. corporations' net worth at the expense of European lenders. Suspicions of the U.S. propensity to inflate predate its recent slide into a net debtor position.

For the sake of accuracy and fairness, this distinction between the net-asset and gross-balance-sheet positions in no way affects Tabellini's results. His formal model is set up in such a manner that a problem of denomination mismatch just cannot arise.

Another of his key findings is a demonstration that the bargaining power of the debtor country increases with the size of its debt. But Brazil, say, or Mexico, can extract substantial concessions from its creditors even though the debt is denominated in currencies other than their own. One would naturally expect that an issuer of debt denominated in his own currency would have an even greater leverage. In addition to such a debtor's ability to reduce the real value of his liabilities through inflation, he can resort to debt repudiation, default, suspension of interest payments, and other actions potentially available to debtors when creditors' claims are, as a practical matter, unenforceable. The greater the ability of a particular participant in such a game to impose on others a transfer of wealth in his own favor, through an inflation tax or otherwise, the greater is his bargaining power. This point is so self-evident that one hardly needs to develop a model of the bargaining parties' behavior to establish it.

Similarly, the bargaining power of the debtor is enhanced by the ability to sneak up, so to speak, on the creditors. In other words, if the creditors are faced with the *fait accompli* of unenforceable claims *already* accumulated, they would be willing to grant the debtor more generous concessions than they would if they had known *in advance* that the debtor intended to incur debts with uncertain prospects for their full repayment in real terms. This point is also so obvious as to not require further elaboration.

Much more interesting is Tabellini's finding that when the debt

level exceeds a certain threshold—that is, potential gains arising from imposing an *ex post* inflation tax on foreign holders of debt become sufficiently attractive—cooperative management of the exchange rate by the debtor and creditor countries may result in a lower rate of inflation in the debtor country than a non-cooperative exchange rate management would produce. In Tabellini's context, cooperation means in essence that the creditor country purchases a certain amount of the debtor's currency, and in exchange the debtor country keeps the inflation rate lower than it would without such purchases of its currency by the creditor's monetary authorities. Thus in Tabellini's discussion cooperation results in zero inflation. Under a cooperative arrangement of this sort, the debtor country agrees to a reduced inflation tax levy on foreigners in exchange for lower inflation at home. The creditor country transfers to the debtor less wealth than under a noncooperative regime resulting from the creditor's ability to persuade the debtor that his output gains because of lower inflation exceed the opportunity costs of a reduced wealth transfer.

Tabellini's statements are based upon a skillfully setup, economical, and transparent model that allows him to derive the equilibrium values (in terms of its relevant parameters) for the amount of debtor country currency purchased by the creditor's central bank. As mentioned, the model he employs and the assumptions he uses are, understandably, crucial for obtaining his results.

Crucial assumption one is that inflationary policy would be pursued by the debtor country for the *sole* purpose of imposing a tax on foreign holders of domestic nominal debt. Inflation in Tabellini's essay has no benefits at all; as the rate of inflation goes up, output losses rise more than proportionately. Quite logically therefore the Nash equilibrium presumes zero inflation. This assumption eliminates, however, all incentives to conduct inflationary policy even in an open economy with a neutral external balance let alone in a closed economy. If, contrary to this assumption but in unfortunate conformity with experience, some inflation is perceived by the government to be desirable (either as a demand stimulant in a Keynesian framework or as a means of taxing *domestic* holders of debt), then surely the trade-off specified by Tabellini would be affected, and consequently the bribe paid by the debtor to the creditor—that is, the equilibrium level of official reserves purchased by the latter—would be understated.

Another, and related, assumption is that nominal depreciation of the debtor's currency is uniquely related to the rate of inflation but has no other effects. The model employed does not distinguish between tradeables and nontradeables—that is, it leaves no room for reallocation of resources—and takes care of distributional effects by postulat-

ing a lump tax cum subsidy. The interest rate serves to translate future values into present values but is not otherwise related to the size of the debt, level of intervention, or rate of inflation. While Tabellini has to abstract from these effects of currency depreciation to make his model manageable, allowing for these effects affects the trade-off faced by the debtor and thus generally yields a different equilibrium level of the debtor's currency purchased by the creditor than the one derived in absence of such effects.

Next, support by the creditor of the debtor's currency value, that is, his foreign exchange intervention, is assumed to be always fully sterilized. If the assumption of total sterilization is relaxed and inflationary consequences of official intervention are allowed, the game becomes quite complicated. Now the creditor faces an additional cost of intervening because of inflation-induced output loss over and above the cost of the direct wealth transfer. It stands to reason that in this case his incentives to acquire the other country's currency would be diminished.

Furthermore, Tabellini postulates a peculiar difference in perceptions and behavior between private agents and monetary authorities. The wealth transfer occurs in his essay as a result of seigniorage extracted by the debtor from the creditor, which in fact means that foreign monetary authorities receive less than fully inflation-adjusted nominal interest rate on their reserve holdings. Both private and official foreign holders of the debtor's currency may misjudge future inflation when they purchase nominal debt. But curiously the same result holds when the inflation is fully anticipated. Even more curiously the seigniorage-producing transfer is present in a cooperative regime even though the creditor, through his purchases of the debtor's currency, determines the nominal exchange rate and thus, in Tabellini's setup, the debtor's rate of inflation.

Despite this litany of reservations, objections, and misgivings, I enjoyed Tabellini's essay. The model he chose to deal with the problem analyzed in the essay was cleverly conceived and skillfully executed. But by defining the problem of cooperative exchange rate management as purely a transfer problem between governments, the author sacrificed applicability of his findings to the ongoing policy debate.

It is a reasonable postulate that, *ceteris paribus*, the mounting external dollar liabilities of U.S. residents intensify temptations for a more inflationary monetary policy. There is little doubt that foreign governments have an interest in protecting the wealth position of their citizens against real depreciation of dollar-denominated claims they hold. This interest would, at the margin, make foreign govern-

ments more willing to support the exchange value of the dollar than they would be inclined otherwise. Everybody is in agreement with these propositions. Neither do I have a problem with Tabellini's conclusion that purchases of dollars by foreign central banks reduce pressures on the U.S. government to bring the fiscal deficit down (as do, for that matter, purchases of U.S. assets by private foreigners). This is true not only for current but also for expected purchases.

Beyond that, however, neither the equilibrium level of dollar purchases by foreign central banks nor the relationship between cooperative monetary policies and the U.S. rate of inflation depends primarily on the desire of foreign governments to shield dollar assets of their citizens from dollar depreciation. Regarding the latter, once allowance is made not only for interactions among governments but also for interactions between governments and private agents within each country, monetary cooperation is more likely to have an inflationary bias than an anti-inflationary one. Regarding the former, my reading of Funabashi and other interpreters of coordination accords is that managing the process of international wealth transfer is not at all the predominant motive of the negotiating parties. Their main motive appears to be a desire to reduce price and output fluctuations said to be caused by exchange rate movements. Whether joint exchange rate management is desirable is a separate matter. But given this objective, the paradigm chosen by Tabellini is applicable to neither a positive nor a normative analysis of international monetary cooperation.

