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ON THE INTERNATIONAL CAPITAL OWNERSHIP PATTERN AT THE TURN OF THE TWENTY FIRST CENTURY

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Abstract

This paper studies the trends of current accounts and accompanying capital movements from a growth-theoretic perspective and attempts to predict the credit-debt structure among major industrialized countries (the United States, Japan and West Germany), at the turn of the twenty-first century. The past movements of national savings and investment support the "habitat" view by Feldstein and Horioka that the supply of savings create investment where it is generated. Rapid increases in the United States foreign debt may imply, however, the relevance of the "traditional" view that capital moves so as to equate its rates of return. The simulation exercises show that the ratio of external debt to capital stock in the United States will rise to 30-40% over the long run in the absence of the recovery of its savings ratio to the historical standard of the 1970s.

On the International Capital Ownership Pattern at the Turn of the Twenty First Century[1]

Koichi Hamada and Kazumasa Iwata

In 1987, the current account surplus of Japan was about 87 billion dollars or about 3.5 percent of its GNP. The current account surplus of West Germany was about 80 billion Marks, i.e. 45 billion dollars or close to 4 percent of its GNP. On the other hand, the current account deficit of the United States with Japan and West Germany were respectively 54 billion dollars and 22 billion dollars in 1986.

Needless to say, the accumulation of current account surplus (or deficit) implies that a nation accumulates net credit (or liability) to the rest of the world. At the end of 1986, the United States holds net external debt amounting to 264 billion dollars (6.3% of nominal GNP), while Japan and Germany hold net foreign assets amounting to 180 billion dollars (8.6% of nominal GNP) and 64 billion dollars (8.6% of nominal GNP) respectively. Table 1 indicates that Japan and West Germany are emerging as major capital exporting countries, and that the United States is shifting its position from one of capital exporter to capital importer.

How far will these trends continue and what will the credit-liability structure among major industrial countries become? This paper is an attempt to assess these trends of current accounts and accompanying capital movements from

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a growth-theoretic perspective and to predict credit-debt structure among major industrialized countries in the long run, say, at the turn of the twenty-first century. We take the United States, Japan and West Germany as specimens of major industrialized countries.

The changing international credit-debt structure depends on the path of net national excess savings over investment, which in turn depends on the intertemporal consumption choice of economic agents. In the "traditional" view; (e.g. A. MacDougall 1960, Kemp 1962), capital as a factor of production moves in such a way as to equate its rates of return among countries. In the world where capital movements are getting more and more liberalized, the difference in saving ratios has a significant long-run consequence. Hamada (1966) and Ruffin (1979) extended the traditional view on capital movements by applying the neoclassical growth theory, and derived a simple formula for the asymptotic credit (or debt) capital ratio in the world economy where the capital market is integrated.[2] Hamada (1966) also proposed a hypothesis on the determinants of capital movements that was tested with the U.S.-Canadian example. Hamada and Iwata (1985) applied this approach to the recent trend in capital export of Japan to the United States and showed that capital movements take more or less similar patterns to those predicted by the theoretical model after the deregulation of Japanese capital control in 1980.

On the other hand, Feldstein and Horioka (1980), and Feldstein (1983) provide empirical evidences that national investment moves closely with national savings. According to them, due to various reasons including capital control

[2] Ontisuka (1974) applied a similar approach to a small open economy. His contribution lies in his explicit attention to adjustment costs involved in investment activities and consideration of the stage of development of a national economy from a debtor to a creditor.

and imperfection of the world capital market, the picture that national investment is created by the supply of savings is more realistic than the picture we described above under the assumption of perfect capital mobility. Their view created a series of disputes on the degree of international capital mobility. Some (e.g. Sachs 1981, Obstefeld 1986a,b) cast doubt on this view which we may call the "habitat" view, while others found results on saving and investment relationships similar to the Feldstein-Horioka paper. (For a summary of empirical analysis on this problem, see Dooley, Frankel, and Mathieson (1987)).

If their view were correct in its most extreme form, i.e., if national savings supply were to create its own demand completely, the imbalance in current account would be only a temporary phenomenon. After proper adjustments, the U.S. current account will return to an equilibrium. Recent trends in the current account of the three major economies, however, seem to suggest that the imbalances may be chronic and that they may be related to various long-term macroeconomic parameters.

We believe that the truth lies in the middle between the extreme form of the Feldstein-Horioka view and our conjecture that capital movements are determined by macroeconomic parameters and underlying economic behaviour that determines the course of economic growth. In the light of recent imbalances of current account in these countries, the United States, Japan and West Germany, we hope to show that growth-theoretic parameters have significant implications for the international credit-debt structure. We will depend on a multi-country version of the Solow-type growth model with a single product. Among many factors neglected or simplified in this paper, let us point out here two important ones. First, the effects of relative prices or real exchange rates are neglected. Some of our results may be affected if we introduce more than two commodities and allow relative prices to change. For example, progressive real appreciation of Japanese and German currencies may lead to lower net exports, and eventually, through income and wealth effects, to lower household saving rates in these countries. Further studies are needed to answer this kind of question, although our intuition that a country with a lower time-preference will become a substantial lender seems to hold in a more general setting.

Secondly, the role of fiscal policy, and, in particular, that of deficit spending is not fully analyzed in this paper, except that our simulation exercises implicitly assume specific paths of fiscal expenditures and deficits in the future. If we were to adopt the Neo-Recardian position — a position that seems to be hardly justifiable from recent behavior of United States national savings ——, the actual and expected path of fiscal deficit would not matter. Still, the actual and expected path of government expenditures could. A more strucutred study of fiscal policies is to be left for future research.

In Section 2, we develop a multi-country growth model as a frame of reference for the discussion of the long-run equilibrium of the asset-liability structure in the world economy. Section 3 is an overview of macroeconomic variables of these three countries, and presents a conjecture concerning the possible long-run state of the world economy. In Section 4, we present some simulation results, which suggest that, if the saving patterns of these three countries remain more or less the same as in the past decade, the United States will emerge as a heavily indebted economy vis-a-vis Japan and West Germany. The increase in the U.S. savings ratio will be a more effective remedy to reduce the U.S. indebtedness than the decrease in the Japanese or German savings ratio. (For the analysis of the current-account imbalance between the United States and Japan, see, e.g. Frankel (1988), Fukao (1988) and Ueda (1988)).

2. The Long-Run Model of International Lending

Let us construct a multi-country growth model that sheds light on the long-run property of the asset-liability structure resulting from different saving behavior among nations, under neoclassical assumptions on capital movements. Assume for simplicity that two countries produce the same good by identical linear homogenous well-behaved production functions. The presentation below is done for a two-country case, but the result can be generalized for any number of countries

$$P(t) = F(K(t),\ N(t)) = Nf(k(t)),$$
$$P^*(t) = F(K^*(t),\ N^*(t)) = N^*f(k^*(t)) \qquad (1)$$

where P(t), K(t), N(t) and k(t) = K(t)/N(t) are output, capital stock, labor and per-capita capital stock respectively of the home country at time t. f(k(t)) is a per-capita production function. The starred variables are for the foreign country. Assume that he labor force is growing at an identical exponential rate of λ, that is $N(t) = N(0)e^{\lambda t}$ and $N^*(t) = N^*(o)e^{\lambda t}$ where N(t) is the labor force at time t. The relative size of the countries is expressed by $\theta = N(t)/(N(t) + N^*(t))$ and $\theta^* = N^*(t)/(N(t) + N^*(t))$ so that $\theta+\theta^*=1$. Neglecting any adjustment costs involved in domestic as well as foreign investment, we obtain

$$\dot{K}(t) = S(t) + \dot{B}(t)\ ,\ \dot{K}^*(t) = S^*(t) - \dot{B}(t) \qquad (2)$$

or

$$\dot{X}(t) = \dot{K}(t) - \dot{B}(t) = S(t),\ \dot{X}^*(t) = \dot{K}^*(t) + \dot{B}^*(t) = S^*(t) \qquad (3)$$

where $S_j(t)$ and $K_j(t)$ are savings and capital stock. B(t) and X(t) indicate borrowing and net assets of the home country. Capital stock and savings are measured net of depreciation, and labor is measured by efficiency units. The dot indicates time derivatives, $\dot{X}(t) = \frac{dX}{dt}$, for example.

We assume that capital movements take place in such a way as to equate the rates of return to capital.

$$\partial F(K(t), N(t)) / \partial K(t) = \partial F(K^*(t), N^*(t)) / \partial K^* \qquad (4)$$

or

$$f'(k(t)) = f'(k^*(t)) = r(k(t)) \qquad (5)$$

Equation (5) implies also the equality of factor intensity:

$$k(t) = k^*(t)$$

Alternative models can be developed depending on the assumptions concerning saving behavior.

<u>Assumption</u> (i) The ratio of savings out of net domestic product is constant. The saving function under this hypothesis is given by

$$S(t) = sF(K(t), N(t)), \quad S^*(t) = s^*F(K^*(t), N^*(t))$$

Then the total world accumulation $\dot{\bar{K}}(t)\left(\equiv \dot{K}(t) + \dot{K}^*(t)\right)$ is equal to the total saving $\bar{S}(t)\left(\equiv S(t) + S^*(t)\right)$. Accordingly,

$$\dot{\bar{K}}(t) = \bar{S}(t) = sF(K(t), N(t)) + s^*F(K^*(t), N^*(t))$$

We also assume $s < s^*$. Under the assumption of equality of the rates of return to capital, and denoting $\bar{N} = N+N^*$,

$$\dot{\bar{K}}(t)/\bar{N}(t) = \bar{s}\ f(k(t)), \qquad (7)$$

where $\bar{\rho} = \theta s + \theta^* s^*$ is the average saving ratio of the world. Under the assumption of constant growth rates of the labor force, (7) can be written in terms of per capita capital k(t),

$$\dot{k}(t) = \bar{s}f(k(t)) - \lambda k(t) \qquad (8)$$

On the other hand, the change in the liability of the home country equals to the required rate of capital growth minus domestic savings,

$$\dot{B}(t) = \dot{K}(t) - S(t) = \theta\ \dot{\bar{K}}(t) - sF(K(t),\ N(t)), \qquad (9)$$

Thus, $\dot{B}(t)\ /\ N(t) = (\bar{s} - s)f(k(t))$, so that in terms of per capita borrowing of the home country b(t)

$$\dot{b}(t) = (\bar{s} - s)f(k(t)) - \lambda b(t) \qquad (10)$$

Equations (8) and (10) constitute a dynamical system for the evolution of variables k(t) and b(t). By construction, the per capita borrowing of the foreign country $b^*(t)$ satisfies,

$$\theta b(t) + \theta^* b^*(t) = 0 \qquad (11)$$

Suppose that at the initial moment (t = 0), capital is allocated in such a way as to equate its rates of return across countries. Then (8) and (10) will give the evolution of the common per capita capital and the net foreign debt (or net foreign asset if negative) of the two countries.

Under the assumption of the well-behaved production function, (8) is the standard Solow growth model and has a stationary and stable equilibrium of k, such that

$$k/f(k) = \bar{s}/\lambda. \tag{12}$$

The stationary solution of per capita borrowing is then given by

$$b = (\bar{s} - s)\ f(k)/\lambda. \tag{13}$$

From (12) and (13) we obtain

$$b/k = (\bar{s} - s)/\bar{s}. \tag{14}$$

Or if we define the per-capita wealth of the home country by $x(\equiv k - b)$

$$x/k = s/\bar{s} \tag{15}$$

Obviously, *under the assumption of constant saving ratio out of domestic production, the ratio of borrowing of a country to the existing capital stock approaches a constant which depends on the degree to which the world (weighted) average saving ratio exceeds the saving ratio of the country. The ratio of net wealth to existing capital approaches the ratio of domestic saving ratio to the* *world average saving ratio*. Needless to say, the country whose saving ratio is higher than the world average, i.e. the foreign country in this two-country model, emerges as a rentier country with a negative value of b in the long run. In this simplified world the shortage of the saving ratio from the world average implies a substantial level of international debt.

Of course, assumption (i) is oversimplified. It would be more natural to assume constant saving ratio out of national income.

Assumption (ii) the ratio of savings out of national income net of interest payments is constant.

We define national income of the two countries as

$$Y(t) = P(t) - r(k(t))B(t), \quad Y^*(t) = P^*(t) + r(k(t))B(t) \tag{16}$$

where $r(t)B(t)$ is the interest payments on debt to the foreign country. This saving hypothesis is written as

$$S(t) = sY(t), \quad S^*(t) = s^*Y^*(t) \tag{17}$$

Exactly by the same reasoning as was used to derive (8) and (10), we obtain

$$\dot{k}(t) = \bar{s}f(k(t)) - \lambda k(t) - (\theta s\, b(t) + \theta^* s^* b^*(t))r(k(t)) \tag{18}$$

where $\bar{s}$ is the average saving ratio, and

$$\dot{b}(t)=(\bar{s}-s)f(k(t)) - (\theta s b(t) + \theta^* s^* b^*(t))r(k(t)) - \lambda b(t). \tag{19}$$

Equations (18) and (19) describe the evolution of variable k(t) and b(t). Under Assumption (ii) the equilibrium capital intensity will be higher than under Assumption (i) for the following reasons. Countries with higher saving ratios accumulate foreign assets and those with lower saving ratios accumulate foreign debt. The combination of these accumulations will result in a higher aggregate saving ratio for the world economy. Also the magnitude of foreign debt and asset relative to domestic capital will be larger than under Assumption (i). In other words, the distribution of net assets will be more uneven than expressed in (14), because under Assumption (ii) the country with net foreign debt will save less, and the country with net foreign assets will save more than under Assumption (i). For a detailed analysis of the two-country model, see Hamada (1966) and Ruffin (1979).

Assumption (iii) Savings are a constant fraction of the amount of profits.

In other words, we will assume that national savings are proportional to profits,

$$S(t) = [r(k(t)) - \rho]X(t), \quad S^{*}(t) = [r(k(t)) - \rho^{*}]X^{*}(t) \qquad (20)$$

where ρ and ρ^{*} are a parameters specific to the two countries. For simplicity let us assume $\rho > \rho^{*}$. This saving behavior corresponds to the optimal saving of a representative consumer with the rate of time preference (discount factor) ρ

in the neighborhood of the balanced path.[3] This assumption is thus justified by microeconomic optimizing saving behavior.

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[3] Consider a closed economy optimal saving problem where the representative individual is maximizing

$$\int_0^\infty u(c)e^{-\rho t}dt$$

given k_o and subject to

$$\dot{k} = f(k) - c - \lambda k.$$

Then the optimal consumption path is given by

$$(*) \quad \gamma\frac{\dot{c}}{c} = r(k) - \lambda - \rho,$$

where γ is the elasticity of marginal utility with respect to consumption, or, in other words the degree of realtive risk aversion.

In the neighborhood of the stationary state per-capita saving approaches λk and $\dot{c}/c$ is close to zero. Then from (*) with $\dot{c}/c = 0$, one obtains $\dot{S}/N \doteq (r-\rho)k$. In our open model, this implies (20).

The system of differential equations can be written in terms of per capita net asset x(t).

$$\dot{x}(t) = [r(k(t)) - \rho - \lambda]x(t), \quad \dot{x}^*(t) = [r(k(t)) - \rho^* - \lambda]x^*(t) \qquad (21)$$

where $k(t) = \theta x(t) + \theta^* x^*(t)$.

This system of differential equations has a non trivial steady-state equilibrium if

$$r(k(t)) - \rho - \lambda = 0 \quad , \quad x > 0, \text{ and } x^* = 0$$

or

$$r(k(t)) - \rho^* - \lambda = 0, \; x^* > 0, \text{ and } x = 0. \qquad (22)$$

It is easy to show (cf. Hamada 1965) that only the equilibrium corresponding to

$$r(k(t)) - \rho^* - \lambda = 0, \quad x^* > 0, \text{ and } x = 0 \qquad (23)$$

namely the equilibrium that corresponds to non-zero net assets for the more patient saving behavior (the foreign country), is stable. The solution indicates a state of "imperialistic" expansion of a country with a lower value of time preference.

The reader may feel uneasy about the strong assumption of country-specific but constant rates of time preference. One can agree that the richer a nation becomes, the more eager will it be to spend. This implies that the rate of time preference is an increasing function of income or wealth. In fact, this condition is a necessary condition for a stable asset holding behavior of a small country facing competitive world capital market, (see Obstfeld (1982) and Uzawa (1968)). Hence, let us consider the following

<u>Assumption</u> (iiia) Savings are related to profits in such a way that the ratio of savings to profits be a decreasing function of per-capita net wealth.

This can be expressed by the saving behavior given by (20), but ρ and ρ^* are now increasing functions of x(t) and $x^*(t)$ such that

$$d\rho/dx > 0, \ d\rho^*/dx^* > 0.$$

If the two countries have the same schedule of time preference, then regardless of the initial distribution the world economy will approach a steady-state solution with an identical value of net wealth such that

$$r(k) - \lambda = \rho(x) = \rho^*(x^*). \tag{25}$$

In other words, by construction of per-capita net wealth and per-capita capital

$$k = x = x^*.$$

Only under these conditions of identical time preference schedule, the current account balance will disappear on the steady-state path. However, if the time preferences are uniformly different, i.e., for any value of x

$$\rho(x) \geq \rho^{*}(x),$$

Then the steady state solution will become the solution of

$$r(k) - \lambda = \rho(x) = \rho^{*}(x^{*}) \tag{26}$$

where

$$k = \theta x + \theta^{*} x^{*}.$$

The case for $\theta = \theta^{*} = 1/2$ is illustrated in Figure 1. If country 1, say the United States, is less patient in its saving behavior than country 2, say Japan, the United States will turn out to be a debtor country even in the steady state path (recall that $k - x = b$ is the net borrowing of the home country).[4]

3. <u>The Overview of Macroeconomic Data for the U.S., Japan and Germany</u>

Given the theoretical framework as a background, let us examine major macroeconomic time series after 1960 for the U.S., Japan and Germany.

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[4] The rate of time preference may not be a decreasing function of wealth. If one is about to starve today and tomorrow as well, one may prefer today's increase in consumption much stronger than tomorrow's. If that is the case, then $\rho(x)$ will be a decreasing function for values of x in the neighborhood of zero. However, we do not explore the implication of such an assumption here.

Figure 2A indicates net national saving rates defined as the ratio of net saving to NNP for the three countries.[5] In each country the net saving ratio seems to have a downward trend, and notably so after 1970.

If we take the weighted average of these three countries,[6] the weighted average saving ratio is 11.8% for 1970-86 (see Table 2). If the recent 17 years' saving ratios were good indicators of the future average savings, and if the world were to consist of only these three countries, then the perfect capital mobility model under <u>Assumption</u> (i) in the previous section would imply that Japan becomes a major creditor country. In the long run, 38[=(11.8-7.3)/11.8]% of the United States would be owned by the two foreign countries. Japan would own about 98%[=(23.4-11.8)/11.8], and West Germany about 13%[=(13.2-11.8)/11.8] of their respective domestic capital abroad. In the long run a large portion of caital stock in the United States will be owned by foreign countries. In fact, the simulation exercise in Section 4 indicates that more than 40% of U.S. capital will be owned by foreigners in 2010 if the difference in saving ratios should remain at the same magnitude as observed in the 1980s.

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[5] In the United States, government expenditures are not divided into government consumption and public investment. This fact makes the U.S. government savings figures less than they actually are. In addition, it is difficult to estimate properly the capital consumption of the U.S. public capital stock. Here we rely on the conventional national account data published by the OECD, thus neglecting the adjustment needed for the precise international comparison of net national saving (see, Hayashi 1988).

[6] The weights are calculated by the relative national income (expressed in U.S. dollars) in each year, and then averaged by the length of the period.

Figure 2B shows recent annual time series of net investment ratios (net fixed investment plus inventory investment divided by net national product) of these countries. They move more or less in a similar fashion to net savings rates. This linkage supports in general the "habitat" theory of capital movements by Feldstein and Horioka. However, only in the recent five years have the two ratios diverged from each other significantly. This discrepancy resulted in the substantial current-account surpluses for Japan and West Germany, and the substantial current-account deficit for the United States (see Figures 3A, 3B, and 3C). Notably, the bilateral current account surpluses of Japan and Germany vis-a-vis the United States increased significantly in the 1980s. This corresponds to the decline of the savings ratio in the United States in the 1980s. These facts give at least a weak case for the possible validity of the traditional view of the capital movement in the present world economy where international capital control is becoming less and less effective.

Another important evaluation of aggregate savings is its relationship to profits. For, under Assumption (iii), the ratio of savings to profits would eventually determine capital ownership in the world. Figures 4A and 4B plot the ratio of saving to non-residential net private capital including private inventories, and the average rate of return to non-residential net private capital including private inventories, respectively. Both of them are measured at replacement cost except for the case of Germany, where the depreciation and capital stock at replacement cost are unavailable. With respect to Japan and the United States, capital consumption adjustments are made on profit, net saving and net capital stock. Incidentally, net national savings in Figure 2A are calculated by the depreciation method based on the historic cost. For the series of profits in the United States and in Japan we adopted enterprise income (operating surplus plus property income excluding net property income from abroad in the corporate and noncorporate enterprise sector). In the case of German profits we employed the figure estimated by Gorzig (1987).

We observe that profit rates tend to converge after the early 1970s, although the rate in Japan remains higher than other countries except between 1972-73, and in 1976 and 1979.

The Japanese saved substantially less than profits until the beginning of the 1970's. Since 1971, however, the Japanese saved an amount almost equivalent to profits. West Germany saved slightly less than profits until the early 1970's, but now they save significantly less than their profits. In the United States people saved significantly less than their profits during most of the years under observation. The analysis in the last section with Assumption (iii) implies that Japan would be a large creditor, say, a neo-imperialist country if these tendencies were to continue (see Table 3).

4. Simulation of the Indebtedness of the United States

Based on the theoretical model combined with parameters such as the saving ratios, the rates of technical progress and the rates of increase in employment in the three countries, we can carry out a simulation exercise over medium- and long-term developments of external borrowing by the United States from Japan and Germany. This allows us to examine the question of what the likely long-run consequence of accumulating external debt in the United States will be, and how long it will take for the path to reach the neighborhood of a steady state where the ratio of external debt to net private capital stock more or less stabilizes. We can also draw implications for policy choices on the external imbalances in the three countries. In order to analyze the intermediate-run implications for the flow of funds in the world economy as a basis for the simulation, we will draw the moving equilibrium values of capital flows derived from our theoretical model.

Consider a two-country model (m=2) consisting of equations (1) to (5) in Section 2, and assume the saving behavior expressed by equation (16), i.e. Assumption (ii). It has been shown (Hamada 1966, Hamada-Iwata 1985) that the amount of borrowing by country 1 from country 2 required to equate the net returns of capital is written as (here we omit the time variable t).

$$\dot{B}_1 = (s_2 - s_1) \frac{K_1K_2}{K^2} P + (\lambda_1 - \lambda_2) \frac{K_1K_2}{\bar{K}} + \frac{s_1K_2+s_2K_1}{\bar{K}} rB_1 . \qquad (27)$$

The subscript indicate the country so that B_1 is the external debt of country 1 to country 2. If the two economies are producing a single good under the same production function, and if capital is movable so as to equate the marginal productivities of capital in two countries, then the changes of international debt will depend upon

(i) the difference in savings ratios,

(ii) the difference in labor growth rates, and

(iii) a compensating term for the international interest payments transfer.

Equation (27) can be rewritten as

$$\dot{B}_1 \left(\frac{K_1K_2}{\bar{K}}\right) = \frac{S_2}{K_2} - \frac{S_1}{K_1} + (\lambda_1 - \lambda_2) \qquad (28)$$

The empirical studies mentioned above, included the extension of the analysis by allowing different production functions, different rates of labor augmenting technical progress, and introducing the effect of capital flows to and from the rest of the world other than the two countries in question.

The normalized theoretical value of increase in indebtedness $\dot{D}$ is written

$$\dot{D}_1 \equiv \dot{B}_1 \frac{K_1K_2}{\bar{K}} \tag{29}$$

$$= \left(\frac{S_2}{K_2} - \frac{S_1}{K_1}\right) + \left[(\lambda_1 - \lambda_2) + (g_1 - g_2)\right] - \frac{K_2}{\bar{K}}\dot{\bar{B}}_1 + \frac{K_1}{\bar{K}}\dot{\bar{B}}_2$$

where g_1 and g_2 are the rates of labor augmenting technical progress in the two countries, and $\dot{\bar{B}}_i$ (i=1,2) is the inflow of capital to country i from the rest of the world.

It is also possible to extend the expression for this theoretical value of capital movements to the three-country case as

$$\dot{B}_1 \text{ (from Japan and Germany to the U.S.)} \tag{30}$$

$$= \frac{K_1K_2}{K}\left(\frac{S_2}{K_2} - \frac{S_1}{K_1}\right) + \frac{K_1K_2}{\bar{K}_1}\left\{(\lambda_1 - \lambda_2) + (g_1 - g_2)\right\} - \frac{K_2}{\bar{K}}\dot{\bar{B}}_1 + \frac{K_1}{\bar{K}}\dot{\bar{B}}_2$$

$$+ \frac{K_1K_3}{K}\left(\frac{S_3}{K_3} - \frac{S_1}{K_1}\right) + \frac{K_1K_3}{\bar{K}}\left\{(\lambda_1 - \lambda_3) + (g_1 - g_3)\right\} - \frac{K_3}{\bar{K}}\dot{\bar{B}}_1 + \frac{K_1}{\bar{K}}\dot{\bar{B}}_3 ,$$

where country 1, 2, and 3 correspond to the U.S., Japan, and Germany. Equation (30) is the basic equation utilized in our simulation.

In carrying out the simulation exercise, we have not included land, although the fit between theoretical and actual values in the case of U.S.-Japan capital movement was much better with land. The reasons are as follows. First, the figure of land value in Germany is not available. Secondly, the increase in land value is difficult to predict. The following results may overestimate the borrowing from Japan, because the rate of capital accumulation is exaggerated by the exclusion of land in the denominator. (For the theoretical treatment of land in a growth model, see Nichols (1970), and Eaton (1988)).

Turning to the procedure of the simulation exercise, we first set the initial values and parameters of the model. The values of real net domestic product, net capital stock and net borrowing by the United States from Japan ($46 billion) and Germany ($34 billion) are those for 1985. We assume that capital stock at the initial period (1985) is allocated so as to equate the rates of returns among countries. Net debt of the United States to Japan is taken from the Survey of Current Business, but we estimated net debt from Germany. This is because only U.S. net debt to the European Community is available in the Survey of Current Business.

From the saving function we can derive net national savings, which are formulated as the function of net national product (net domestic product minus interest payments). The interest rate is assumed to be constant at 4% which is close to the actual rate on external borrowing by the United States from abroad.

With respect to savings ratios, we provide three different scenarios:

<u>Case</u> A: Savings ratios will remain constant at the level observed in the 1980s; the U.S. (4.4%), Japan (20.3%) and Germany (9.2%).

<u>Case</u> B: The Japanese savings ratio will decline substantially due to the aging of the population and the concomitant rise of tax burden including the contribution to social security; it is assumed to decline gradually from 20.3% to 10% in 2019.

Case C: In addition to the change in the Japanese savings rate in Case B, the U.S. savings rate is assumed to increase from 4.4% to 8% in 1995 due to the sizable cut of the budget deficit and recovery of the personal saving rate to a historical standard.

Case A is a simple extrapolation of the status quo to the future and is designed to demonstrate how external debt would rise in the absence of policy actions in the long-run.

Case B examines the impact of changes in the Japanese savings ratio on the U.S. external debt. The Japanese savings ratio is often regarded by foreign observers as excessively high (see, however, Hayashi (1986) for the factors that may exaggerate the Japanese savings ratio.). This scenario seems, however, realistic because Japanese household savings may be reduced if the tax burden should rise from 36% in 1986 to more than 45% in the early 21st century. The Annual Economic Report on the Japanese Economy in 1985 (EPA 1985) examined the possibility based on the life cycle hypothesis and concluded that the household savings ratio is likely to decline by 7-13 percentage points until the mid 2010s. So Case B is consistent with the forecast made in the Annual Report.

Case C is the most desirable scenario, but it is uncertain whether it will be actually realized. Determined political commitment is required to attain the increase of the net national savings ratio even if we take the non neo-Ricardian view. The improvement in the savings ratio will be even more difficult if we take the neo-Ricardian view.

Under these scenarios, we simulate the borrowing by the United States from Japan and Germany based on equation (29). We assume that the rate of technical progress and the rate of increase in employment will remain at the same rates as those observed in the 1980s. From recent data, the rates of labor-augmenting technical progress in the three countries seems to have converged within a narrow range from 1.1% to 2.2% in the 1980s. On the other hand, employment growth was quite strong in the United States (1.3% increase on a yearly average), while that in West Germany was very weak (0.7% decrease). The rate of increase in employment in Japan lies in between the two countries and is 0.8%. We assume that the trend of strong employment growth in the United States will continue over the long-run. In addition to a low national savings ratio, strong employment growth attracts foreign capital to the United States. (If the United States labor force increased at a slower rate, the amount of indebtedness will be smaller).

We take into consideration the international interest payments transfer by the United States to Japan and Germany in the simulation, but we ignore interest payments by the United States, Japan and Germany to the rest of the world and the interest payment between Japan and Germany.

As will be shown later, interest payments constitute not a negligible part of external borrowing by the United States, since the external debt accumulates rapidly, given the sizable difference of saving ratios among the three countries in the future.

We obtain the capital stock in the next period after deriving the national saving and net external borrowing (lending). Given the rates of technical progress and employment growth, we can calculate the net domestic product in the next period. Thus the capital stock, the net borrowing (lending) and the net domestic product are endogenously determined together with the external debt and interest payments abroad.

Simulation results are presented in Figure 5A, 5B and 5C. All figures are expressed in 1985 constant U.S. dollars. In Case A the U.S. debt from Japan and Germany grows rapidly from $80 billion in 1985 to $1620 billion in 2000 and $4337 billion in 2015, while current-account deficits vis-a-vis Japan and

Germany in terms of nominal GNP will remain at about the same level as that in 1986. The interest payments by the United States to Japan and Germany will amount to $65 billion in 2000 under the assumption of constant world interest rates at 4%. The current account deficit of the United States with Japan and Germany will be $141 billion in 2000 and $235 billion in 2015. This implies that the interest payment constitutes 46% of the current-account deficit. This share in the current-account will rise to 74% in 2015. Net private capital stock will increase about 3.1% annually in the United States during the period from 1985 to 2000. The ratio of debt to net private capital stock will rise from 2% in 1985 to 23.5% in 2000 and 38.7% in 2015, and this upward trend will still continue after 2030. The ratio of debt from Japan to net capital stock will stop increasing at the end of the 2120s, and will settle at around 34%, so will the sizable share of capital in the United States being owned by the Japanese.

In _Case_ B the rate of increase of capital stock in Japan will become lower than that in _Case_ A because of the gradual decline of the Japanese savings ratio until 2019. It will slow down from 5.9% to 5.7% during the period from 1985 to 2000. But the growth rate of capital stock in the United States is not affected significantly. The U.S. current-account deficit with Japan and Germany will be $109 billion in 2000 and $138 billion in 2015. As compared with _Case_ A, the U.S. current-account deficit is about 60% in 2015. The deficit with Germany, however, will be virtually unaffected. Net external debt from Japan and Germany will amount to $1434 billion in 2000 and $3277 billion in 2015. This amount is about three quarters of the net debt for 2015 calculated in _Case_ A. Accordingly, the ratio of external debt to capital stock tends to show a convergence to the value of 30% in the 2020s. The ratio of debt from Japan to capital stock will peak out at the level of 22% in the mid-2010s.

In Case C the U.S. capital stock will increase more rapidly than those in cases A and B. It will increase by 4.4% annually. External debt will be $1238 billion in 2000 and $2809 billion in 2015, reflecting the significant reduction of current-account deficits with Japan and Germany. Accordingly, the ratio of external debt to capital stock will reach the peak of about 16% in 2010, and then decline. The ratio of debt from Japan to capital stock will peak out at around 13% in 2008.

The result indicates that the recovery of the national savings ratio in the United States over the medium-term is crucial in achieving lower external debt ratio and sound economic growth. The decline of the savings ratio in Japan over the long-term will help reduce the borrowing from Japan. But other countries with high savings like newly industrialized countries (NICs) may well replace Japan in the role of capital exporters to the United States. In order for the United States to avoid the excessive dependence on foreign capital, the effective way is to raise the national savings ratio, possibly through the reduction in the budget deficit and the recovery of the household savings rate to its historical standards (cf Figure 2A).

5. Concluding Remarks

In this paper we started with the discussion of the two alternative approaches to international capital movements: the "traditional" view that capital moves to equate its rate of return across countries, and the "habitat" view that the supply of savings creates its own demand in the very country where it is generated. The time series data for the United States, Japan and Germany indicate that past movements of national savings and investment may generally support the habitat view. At the same time, however, rapid increases in the United States' foreign debt imply that the traditional view of capital movement, in particular the theory of determinants of capital movements based on growth accounting, may be significantly meaningful in the future. In that case, the low savings ratio in the U.S. economy may drive itself into a heavily indebted economy.

In addition to the two important factors mentioned in the introduction, there are many factors neglected or simplified in the rather naive setting of our model. Just to name a few: changes in industrial structure, unemployment and under capacity utilization of capital, (adjustment costs) involved in the installment of investment (particularly in a foreign country), distinction of portfolio and indirect investment, the effect of exchange rate changes on evaluation of capital, the effect of asymmetric corporate income tax across countries, and so forth. Also, even with the same level of aggregation as used in this paper, one could make the discussion more interesting as well as realistic by making demographic structures, saving behavior and technological progress to be endogenous. The entire landscape would also be changed if developing countries resume their borrowing for development, along with recovery of their credit credibility that was seriously damaged by the debt crisis in the past ten years.

Despite the shortcomings of our model and the simplicity of the calculation method, the theoretical values obtained succeeds in tracing fairly well the actual development of external borrowing by the United States from Japan and notably Germany in the 1980s (see Hamada and Iwata (1985)). The simulation exercise based on the "traditional" view demonstrates that the ratio of external debt to capital stock in the United States will rise to 30-40% over the long run in the absence of efforts to recover its savings ratio to historical standards of the 1970s. The reduction in the high savings ratio in Japan or in Germany may help reduce the dependence of the United States on foreign capital, but it will have a much weaker effect than the increase in the savings ratio in the United States. If the United States wishes to avoid the high external debt-capital ratio observed in developing countries at present, it should aim to increase its national savings ratio.

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Figure 1

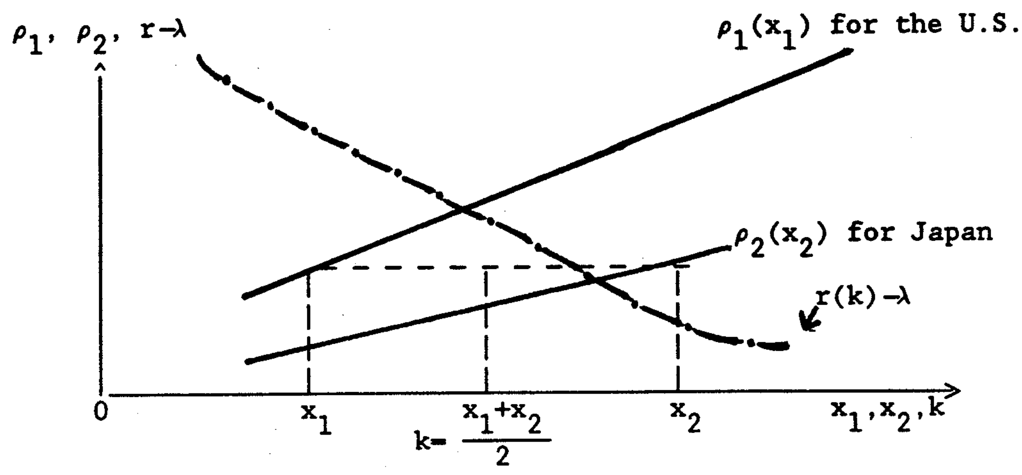

Figure 4A. S/K Ratio
in the U.S.,Japan and Germany

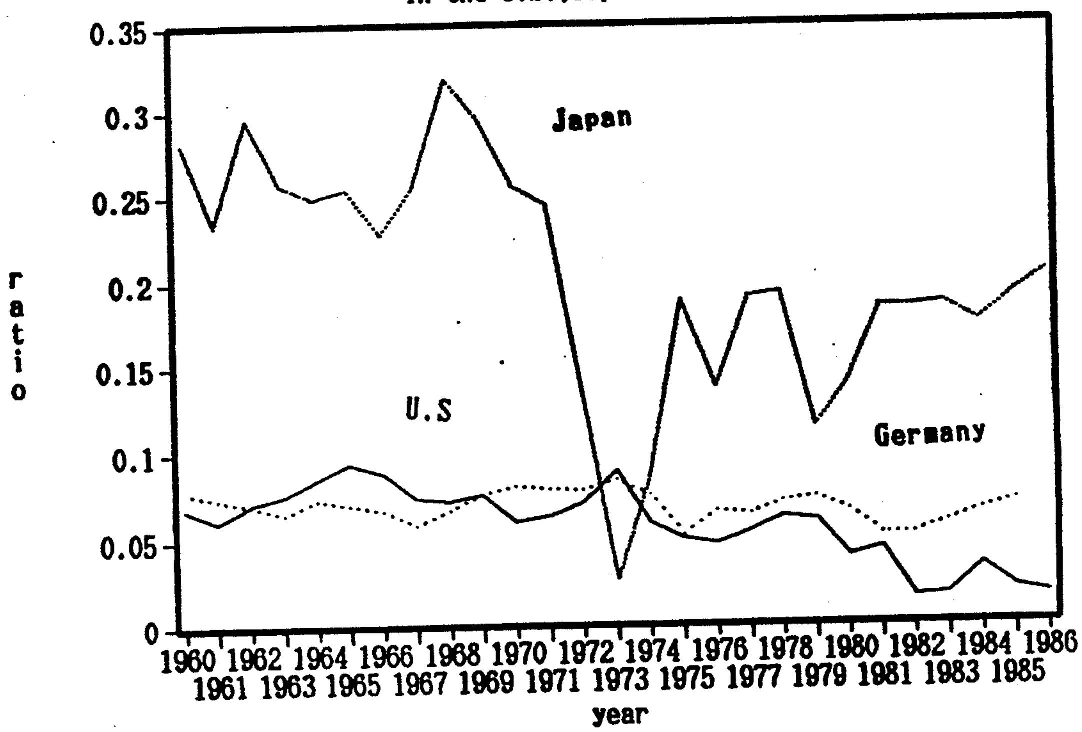

Figure 4B. Profit Rate
in the U.S.,Japan and Germany

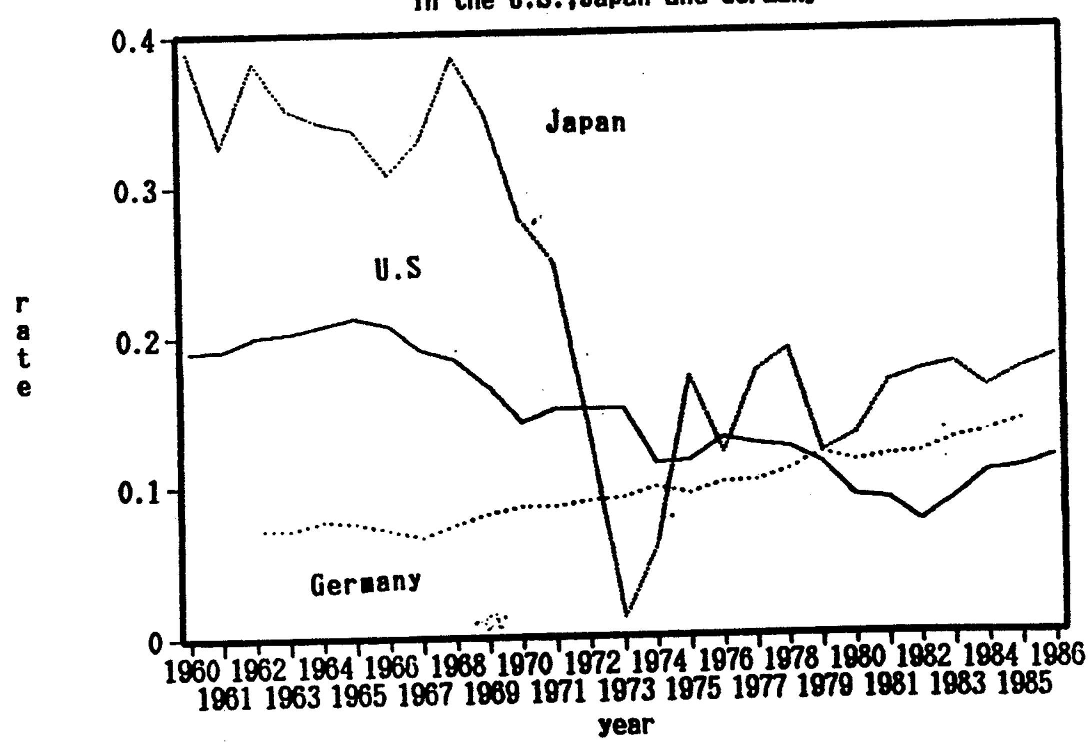

Figure 5A (Case A)
Simulation B/K Ratio

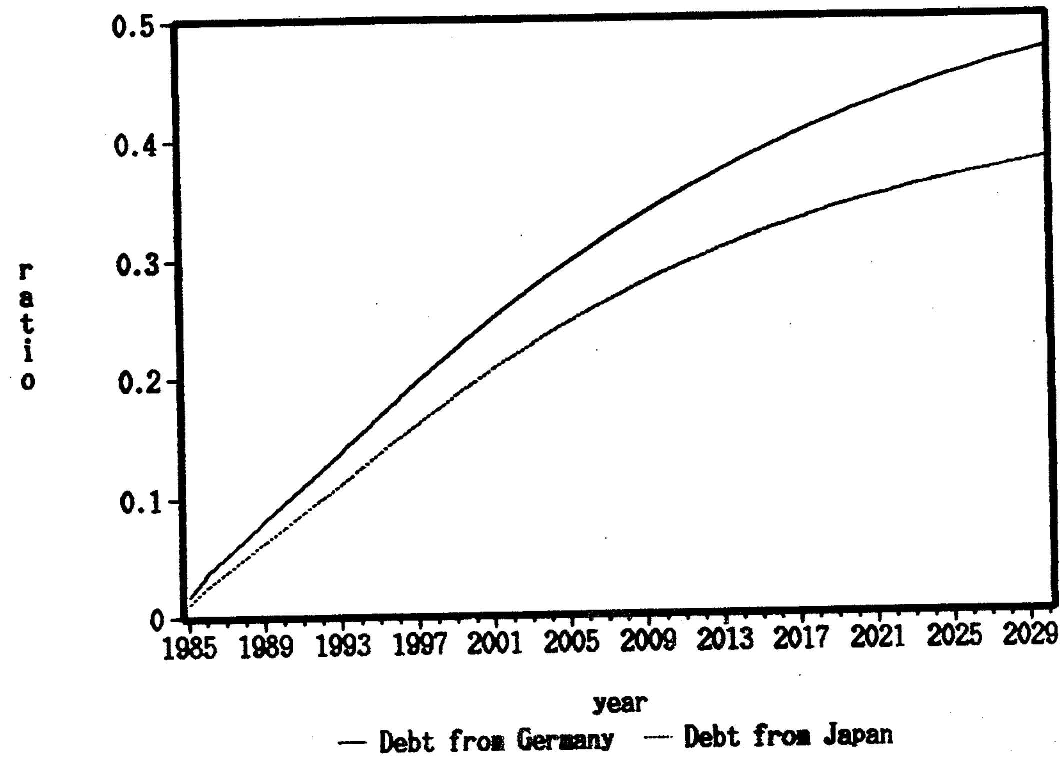

Figure 5A (Case A)

Simulation Net Borrowing from Japan and Germany

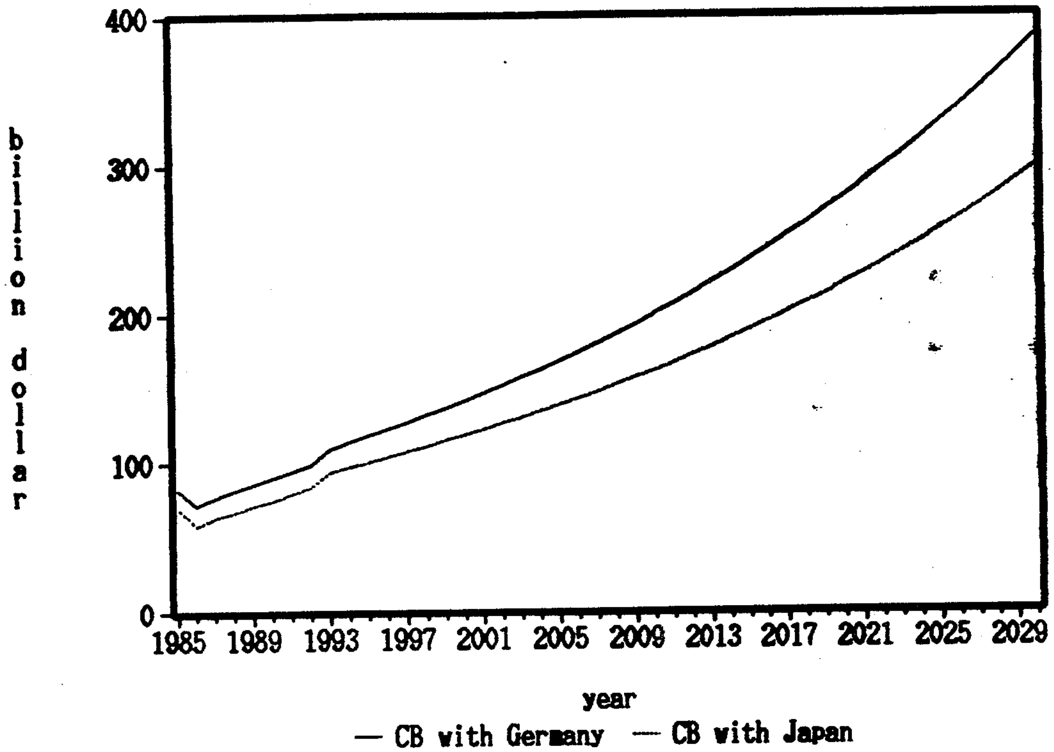

Figure 5B (Case B)
Simulation B/K Ratio

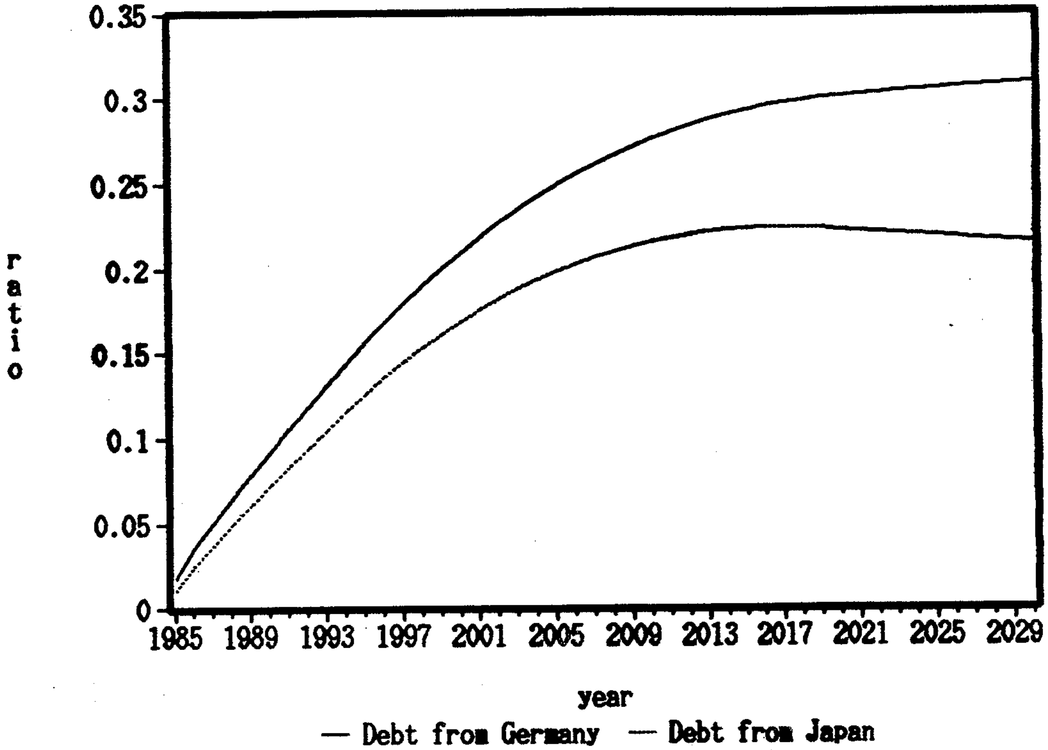

Figure 5B (Case B)

Simulation Net Borrowing from Japan and Germany

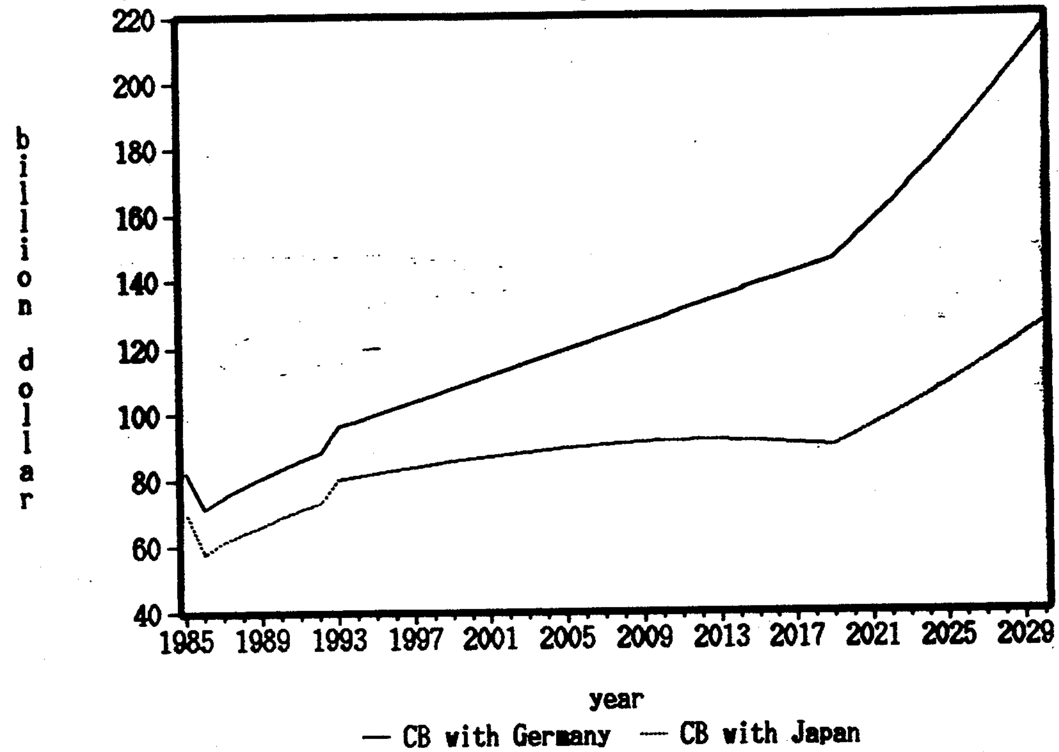

Figure 5C (Case C)
Simulation B/K Ratio

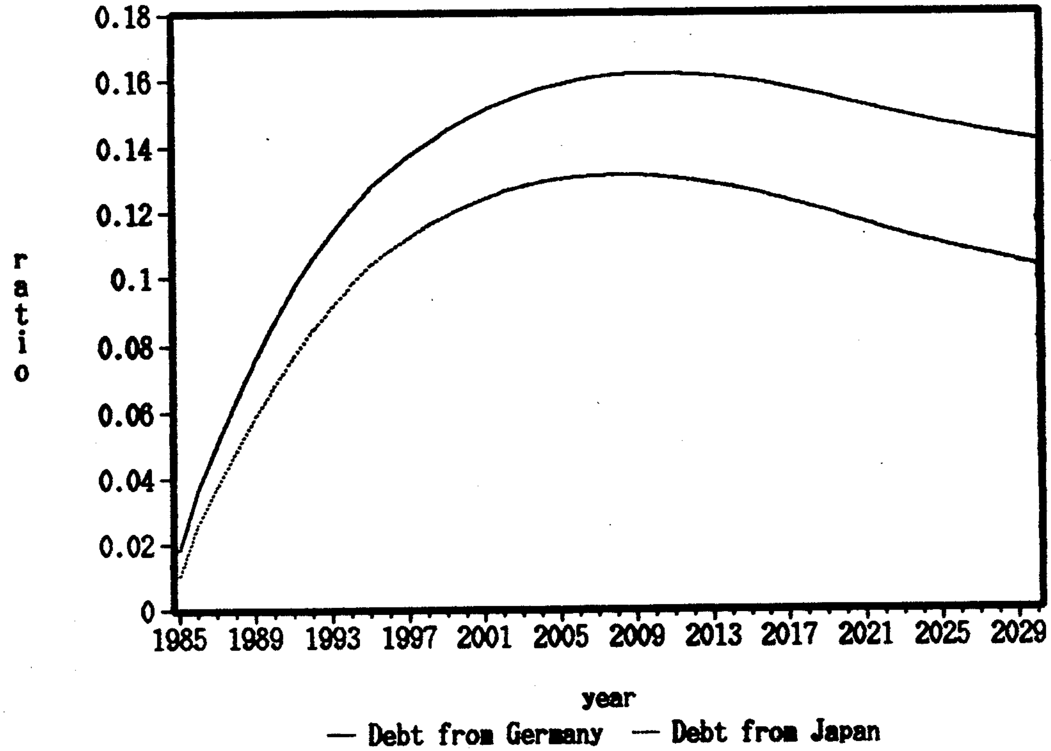

Figure 5C (Case C)

Simulation Net Borrowing from Japan and Germany

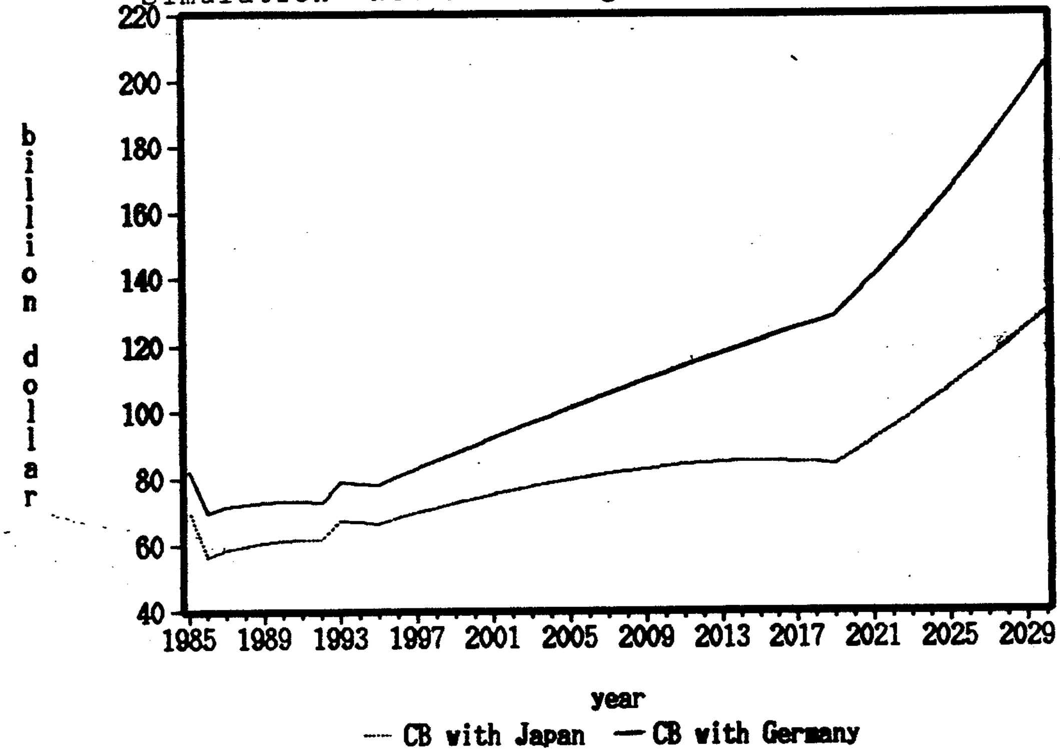

Table 1 External Assets and Liabilities in the U.S., Japan and Germany

billion dollar

End of the Year	United States			Japan			Germany		
	FA	FD	NFA	FA	FD	NFA	FA	FD	NFA
1960	71.4	44.7	26.7						
	13.9	8.7	5.2						
1965	106.3	58.7	47.6						
	15.1	8.3	6.8						
1970	166.8	97.7	69.1	20.2	15.5	4.7			
	16.4	9.6	6.8	9.7	7.4	2.3			
1975	295.6	221.0	75.0	58.3	51.3	7.0	131.7	75.5	561
	18.5	13.8	4.7	11.5	10.1	1.4	31.5	18.0	13.5
1980	606.9	500.8	106.0	159.6	148.0	11.5	249.1	216.0	33.1
	22.2	18.3	3.9	14.1	13.1	1.0	32.9	28.5	4.4
1981	719.7	579.0	140.7	209.3	198.3	10.9	241.3	215.1	26.2
	23.6	19.0	4.6	18.3	17.4	0.9	35.2	31.4	3.8
1982	824.9	688.7	136.2	227.7	203.0	24.7	251.0	218.0	32.9
	26.1	21.8	4.3	20.9	18.6	2.3	37.3	32.4	4.9
1983	874.1	785.6	88.5	272.0	234.7	37.3	234.3	201.9	32.5
	25.7	23.1	2.6	22.6	19.5	3.1	37.9	32.7	5.2
1984	898.2	893.8	4.4	341.4	266.9	74.3	231.5	193.1	38.5
	23.9	23.7	0.2	27.5	21.5	6.0	41.2	34.3	6.8
1985	949.4	1061.3	-111.9	437.7	307.9	129.8	330.2	266.0	64.2
	23.7	26.5	-2.8	29.7	20.9	8.8	44.0	35.5	8.6
1986	1067.8	1331.5	-263.6	727.3	547.0	180.4			
	25.4	31.6	-6.3	34.7	26.1	8.6			
1987	1167.8	1536.0	-368.2	1071.6	830.9	240.7			
	26.0	34.2	-8.2	44.9	34.8	10.1			

Note: FA: Foreign Asset
FD: Foreign Liability
NFA: Net Foreign Asset

Lower figures indicate the ratios to nominal GNP in percent.

Table 2. Average Net Saving Rate

	1960-1986	1970-1986
U.S.	8.2%	7.3%
Japan	23.8%	23.4%
Germany	14.5%	13.2%
Average	12.4%	11.8%

Table 3. Rate of Return and Capital Accumulation Rate

Country	Rate of Return/K		Saving/K		Difference	
	1960-1986	1970-1986	1960-1986	1970-1986	1960-1986	1970-1986
U.S.	14.6	11.7	5.8	4.7	8.8	7.0
Japan	22.8	15.7	20.3	16.6	2.5	-0.9
Germany	9.6	10.8	6.9	6.8	2.7	3.9

Figure 2A. Net National Saving Rate in the U.S., Japan and Germany

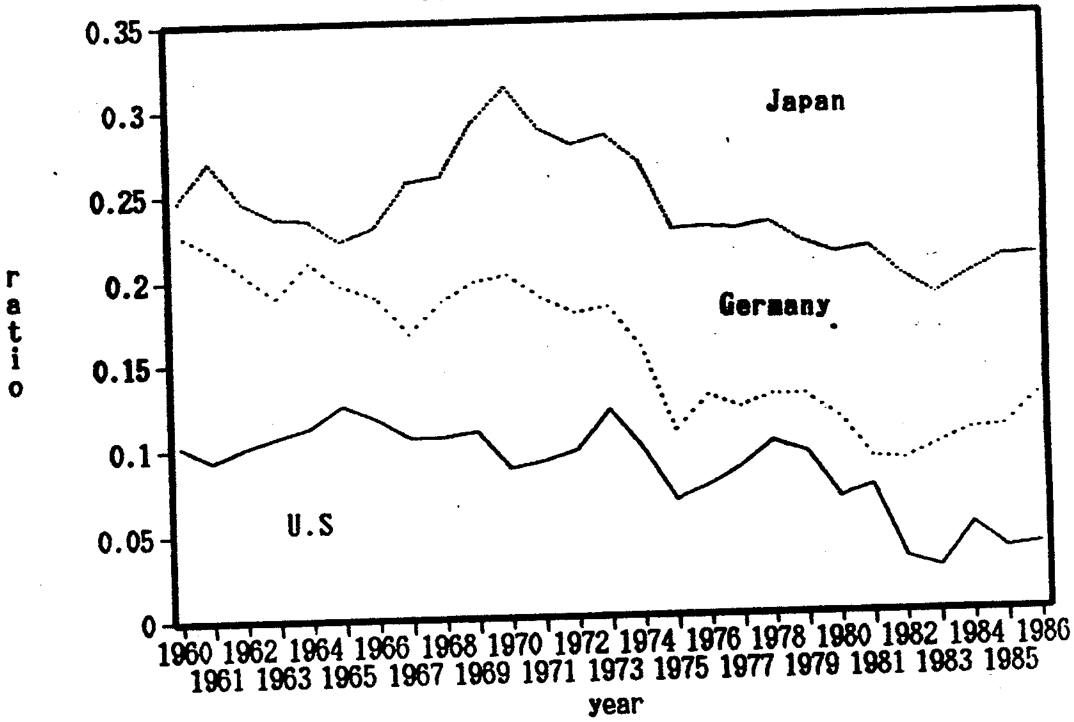

Figure 2B. Net National Investment Rate in the U.S., Japan and Germany

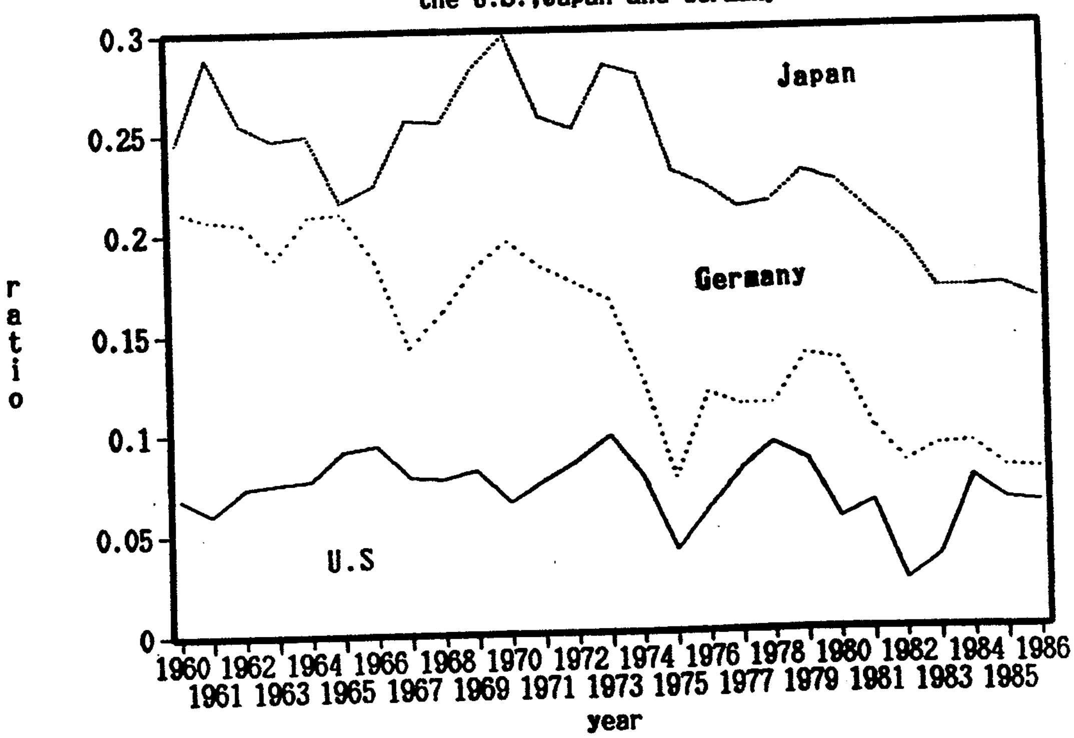

Figure 3A U.S. Current Account Balance with Japan and Germany

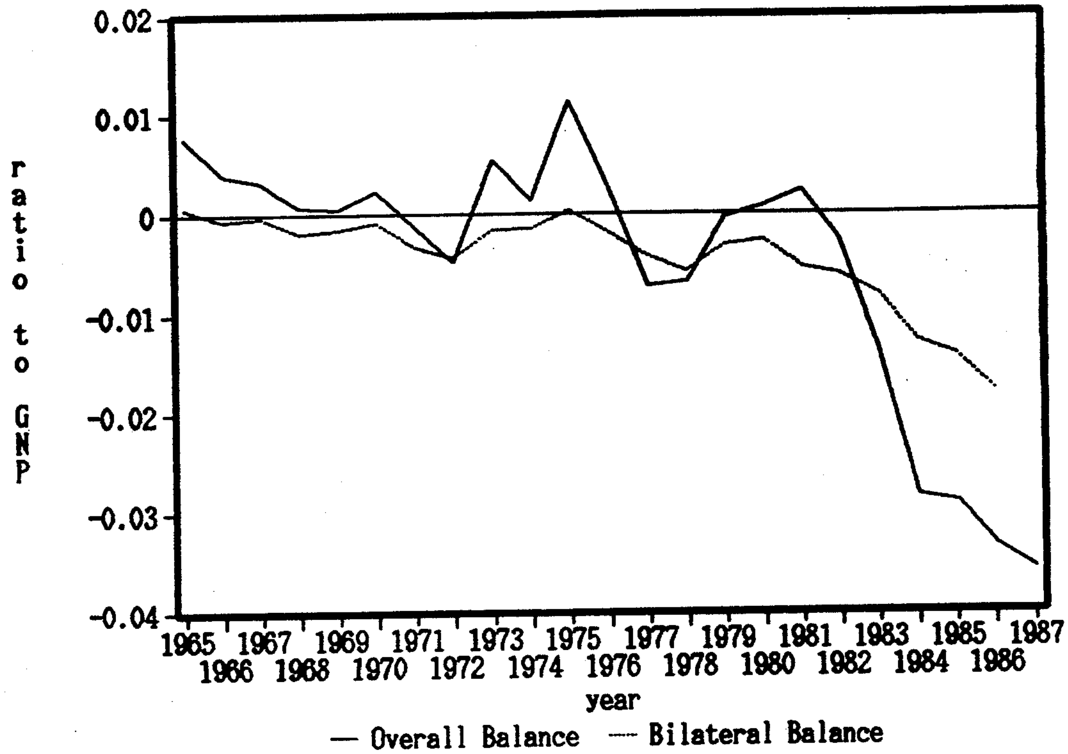

Figure 3B Current Account Balance of Japan with U.S.