The U.S. Current Account Deficit is supported by the International Capital Inflows?*

Takeshi Kudo† and Eiji Ogawa‡

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† Graduate School of Economics at Hitotsubashi University, e-mail: ged2403@srv.cc.hit-u.ac.jp

‡ Graduate School of Commerce and Management at Hitotsubashi University, e-mail: ogawa.eiji@srv.cc.hit-u.ac.jp

1 Introduction

In the mid of 1980s, the United States economy faced the so-called twin deficits, fiscal and current account deficits, which was one of the hottest policy issues in the world economy. The fiscal deficit was cut down by the long-term boom and political efforts during the 1990s. As a result, the federal government budget turned to surplus in 2000. On one hand, the current account deficit was decreasing till 1990. However, it was increasing and approached the level that was higher than in the mid of 1980s. In addition, the United States became a net external debtor and has been increasing its external debts till now. (See Figures 1 and 2.)

One may doubt whether the United States can repay its external debt because the current account deficit is unsustainable under the circumstance that its external debt has been increasing. The current account deficit has been supported by the capital inflows although it was kept at its high level. However, if the international capital flows made significant changes, we might not expect capital inflows that support the current account deficit. If the capital inflows to the United States ceased, the U.S. economy would have to pay huge costs because of its rapid adjustment to the current account deficit[1].

Mann (2002) investigated whether the U.S. current account deficit was sustainable based on three perspectives in terms of the domestic investment-saving balance, the international trade and the international capital flows. From the three perspectives, she used some related data to conclude that the present level of the U.S. current account deficit was unsustainable in the long-run. They are closely related with solvency of the external debts through the current account deficit. Accordingly, we

[1] Some doubt whether the adjustment should be accompanied by a serious financial crisis like developing countries. McKinnon (2001) insisted that a rapid adjustment like a "dollar crisis" might not occur because the dollar plays a role of international nominal anchor and the dollar assets are very liquid and useful as the reserve. Mann (2002) regarded that a various financial instruments in the U.S. market relieve the economy from the influence of financial fragility unlike developing countries. These effects might prevent the United States from financial crises. However, the "dollar system" may not continue indefinitely, and the substitution among dollar assets may not solve the problem on the economy's external balance sustainability. Thus, we can analyze the U.S. current account sustainability by using the method that is often applied to the developing countries.

explain the three perspectives on the current account deficit sustainability to investigate the current account deficit and the change in the external debts.

First, we look at the investment-saving relationships for both the private and public sectors in the United States. Figure 3 shows the investment-saving balances in the private and public sectors from 1960 to 2002. We found that the private savings exceeded the private investments and the government budget was turned into deficit in the end of the 1990s. Especially, the fiscal deficit exceeded net savings in the private sector. The so-called “twin deficits” became the most important problem in the mid of 1980s (Figure 2).

The current account deficit gradually decreased as the fiscal deficit was cut down. After 1992, the amount of reduction was exceeded by the decrease in net saving in the private sector though the fiscal deficit was reduced. In 2000, excess investments over savings in the private sector exceeded the fiscal surplus because the international capital was attracted by the higher rates of return in the U.S. market. Thus, the excess investments of the private sector brought about the current account deficit during the period.

Second, we look at movements of imports and exports in goods and services in Figure 4.[2] The trade account had been almost balanced till the beginning of 1980s. The trade account deficit/GDP ratio became about 2.8%. Both the trade and current account deficits were almost the same during the period (Figure 2).

Though the trade account deficit decreased till the beginning of 1990s, it began to increase and approached to 4% of GDP in 2000. This coincided with the level of the current account deficit during the period. Thus, the international trade flows were closely related with the current account deficit. The United States economy was turned into a net external debtor.

Third, we shall roughly look at the international capital flows. Figure 5 shows the ratio of the net capital inflows to GDP. The international capital flows balanced till

[2] Mann (2002) investigates more closely international trade balance. She classifies the trade balance into consumers’ goods, capital goods and services. And she analyzes the relationship between the U.S. international trade and the relative GDP of the U.S. and the rest of world. She concludes that the income elasticity of imports and exports is asymmetry in the United States.

the beginning of 1980s. Then, the capital inflows have been exceeding the capital outflows since 1983. Figure 6 shows the movements in the direct investment, the portfolio investment and the other investment balances. We found that all the capital flows were more volatile in 1990s than before 1990.

One may regard that the U.S. current account deficit has been financed by the capital inflows in the 1990s. This mean that the United States have been the "Oasis of prosperity" (Mann, 2002) in the sense of provider of the return for the international investors. In this case, the volatility in the portfolio investments might affect the finance of the U.S. current account deficit through the boom and slump in the asset market.

Therefore, we should investigate the movements in the current account deficit from the three perspectives. Thus, we will investigate the U.S. current account deficit as follows. First, we will investigate the current account deficit sustainability from the three perspectives. We use an econometric method to analyze whether the U.S. current account deficit is sustainable from the viewpoint of the solvency of the external debts.[3]

Second, we will analyze which items in the international capital flows have supported the finance of the current account deficit. Especially, some insist that the current account deficit has been financed by the international capital inflows under the boom in the U.S. stock market. We investigate whether it was true or not.

The time series analysis method that is used to test the current account sustainability was based on one that Hamilton and Flavin (1986) analyzed the sustainability of the fiscal deficit. Trehan and Walsh (1991) and Husted (1992) applied the method to the analysis of current account deficit sustainability.

Husted (1992) regarded a necessary condition for the current account sustainability as the cointegration among the items in the trade balance by assuming that the interest rates to the external debt were constant. Trehan and Walsh (1991) showed that a sufficient condition of the sustainability was the level of the external

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[3] Milesi-Ferretti and Razin (1996) define the sustainability of the current account as the case that the intertemporal budget constraint of the economy is satisfied and the external debt is solvent even if the present policy stance will not be altered in the future. That is, testing the solvency to the external debt is necessary to investigate the current account sustainability.

debts that followed a first-order integration process. They investigated the necessary and sufficient conditions by using items in the trade balance. On the other hand, Matsubayashi (2002) analyzed the necessary and sufficient conditions based on the recent U.S. data by paying attention to the relationship between the current account deficit and the domestic investment-saving balance.[4]

These researches assumed constant interest rates in order to derive the necessary condition. Unfortunately, the assumption may not be satisfied in the case of using a long-term time series. Bohn (1995) and Ahmed and Rogers (1995) showed that the necessary and sufficient conditions of the current account sustainability were that the relevant variables were cointegrated and the cointegration vectors satisfied a linear constraint in the case of variant market discount rates. In our analysis on the current account sustainability, we employ their method which allows the interest rates to be variable.

The above researches analyze the current account sustainability from the viewpoints of the international trade and the domestic investment-saving relationship. However, some insist that the boom in the asset market attracted the international capital inflows into the United States in 1990s and the capital outflows financed the current account deficit.

We analyze the U.S. current account deficit sustainability from the perspective based on international capital flows in addition to the domestic investment-saving balance and the international trade flows. More concretely, we analyze whether the current account deficit was related with each item in the financial accounts in balance of payment to investigate how the international capital flows financed the U.S. current account deficit.

This paper is composed of the following five sections. In section 2, we explain the econometric methods which are used in our analysis and summarize the three perspectives that Mann (2002) pointed out. In section 3, we explain data and an empirical analysis methodology we use in this paper. In section 4, we investigate how

[4] By using the same method, Matsubayashi (2002) also analyzes whether the budget constraints in the private and public sectors are satisfied.

the international capital flows finance the current account deficit from the viewpoints of long-term equilibrium relationship between the current account and each item in the financial account. In the last section, we conclude our investigation and mention its policy implication, based on the analytical results.

2 Three Perspectives on the Current Account Sustainability

In this section, we explain the econometric methods that we use in our analysis and summarize the three perspectives that Mann (2002) pointed out.

Hamilton and Flavin (1986) analyzed the sustainability of the fiscal deficit. T rehan and Walsh (1991) and Husted (1992) applied the method to the analysis of current account deficit sustainability. Husted (1992) derived a necessary condition for the current account sustainability as the cointegration among the items in the trade balance by assuming that the interest rates of the external debts were constant.

Trehan and Walsh (1991) developed it to make it applicable to the case of the variable interest rates. They showed that a sufficient condition of the current account deficit sustainability was that the level of the external debts followed a first-order integration process. They investigated both the necessary and the sufficient conditions. Thus, they concluded that external debts of the United States were solvent according to the results of the unit-root tests.

Ahmed and Rogers (1995) applied the method, which Bohn (1995) used for the analysis of the government debt, to an analysis of the current account sustainability. They showed that the necessary and sufficient conditions of the current account sustainability were that the relevant variables were cointegrated and that the cointegration vectors satisfied a linear constraint in the case of variable market discount rates. They used this method with the long-term annual data to find that external debts of the United Sates and the United Kingdom were solvent.

Matsubayashi (2002) analyzed the investment-saving relationships of both the private and public sectors to investigate the current account sustainability. He derived a necessary condition of the current account sustainability under the assumption of the constant market discount rate. In addition, he employed the method of Trehan and Walsh (1991) as the sufficient condition, which is applicable to the variable interest rates, in order to investigate the sufficient condition. He used the data during a period from the first quarter of 1975 to the second quarter of 1998 to find that the U.S. current account deficit was sustainable.

In this section, we employ the method of Bohn (1995) and Ahmed and Rogers (1995), which is applicable to the case of the stochastic market discount rates, in order to derive the necessary and sufficient conditions.

We also analyze the current account deficit from the perspective based on the international capital flows in addition to the perspectives of the domestic investment-saving relationship and international trade flows. Thus, we investigate whether the current account deficit in the United States was financed by the international capital inflows.

2.1 A Perspective Based on the Domestic Investment-Saving Balance

As the first perspective, we investigate the relationship among the domestic investment-saving balance, the current account deficit, and the external debts. As we described above, we investigate the investment-saving balance for each of the sectors (private and public sectors). First, the relationship between the change in the external debts in the end of the period D_t and the current account deficit CAD_t is represented by

(1) $$D_t - D_{t-1} = CAD_t \, .$$

The current account deficit increases the external debts as the current account deficit is financed the international capital inflows. This can be interpreted as a "budget constraint" of the whole economy in period t.

Next, we consider both the domestic investment and saving behavior of each of the sectors.[5] The budget constraint of the private sector in period t is represented by

5 Matsubayashi (2002) analyzes that each sector's budget constraint is satisfied from the view of the

$$(2) \qquad A_t - A_{t-1} = r_t A_{t-1} + S_t - I_t ,$$

where r_t is the interest rate, A_t is the asset holdings by the private sector, which include the claims on the public sectors and foreigners, S_t is the savings of the private sector, and I_t is the investments of the private sector.

The budget constraint of the public sector (government) is represented by

$$(3) \qquad B_t - B_{t-1} = r_t B_{t-1} + G_t - T_t ,$$

where B_t is the government debts, G_t is the government expenditures, and T_t is the tax revenues. The government bonds are held by the private sector and foreigners.

We obtain $B_t - A_t = D_t$ since the government bond holdings by the private sector equal to the liabilities of the public sector to the private sector. From equations (2) and (3), we derive the relationship between the current account deficit and the domestic investment-saving balance as

$$(4) \qquad CAD_t = r_t D_{t-1} + I_t + G_t - S_t - T_t .$$

We define the stochastic discount factor of the private sector as $Q_{t,t+k} = [\beta^k u'(C_{t+k}) / u'(C_t)]$, where C_t is consumption, $u(\cdot)$ is utility function and $u'(\cdot) > 0, u''(\cdot) < 0$ are satisfied, and $Q_{t,t} = 1$. The Euler equation of intertemporal consumption is

$$(5) \qquad E_t \left[Q_{t,t+k} \left(\prod_{j=0}^{k} (1 + r_{t+j}) \right) \right] = 1 .$$

Substituting equation (4) into equation (1), we obtain a difference equation of D_t. We solve forward the equation and use equation (5) to derive the whole economy's intertemporal budget constraint based on the domestic investment-saving balance:

$$(6) \qquad \begin{aligned} & E_t \sum_{k=0}^{\infty} (Q_{t,t+k} I_{t+k}) + E_t \sum_{k=0}^{\infty} (Q_{t,t+k} G_{t+k}) - E_t \sum_{k=0}^{\infty} (Q_{t,t+k} S_{t+k}) \\ & \qquad - E_t \sum_{k=0}^{\infty} (Q_{t,t+k} T_{t+k}) + (1 + r_t) D_{t-1} = \lim_{K \to \infty} E_t (Q_{t,t+K} D_{t+K}). \end{aligned}$$

Now, we consider solvency of the external debts based on the equation (6). We suppose that the transversarity condition $\lim_{K \to \infty} E_t (Q_{t,t+K} D_{t+K}) = 0$ to obtain

necessary condition and sufficient condition. But, we will not consider each sector's budget constraint for focusing on the current account sustainability.

$$(1+r_t)D_{t-1} = E_t \sum_{k=0}^{\infty} Q_{t,t+k}(S_{t+k} + T_{t+k} - I_{t+k} - G_{t+k})\,.$$

This means that the external debts at the present time should be equal to the present value of the net savings in the present and the future because the present value of the external debts in the terminal period to converge to zero in order to satisfy the transversarity condition. Thus, the current account sustainability condition of the economy is that the external debts at the present time have to be repaid by the net savings in the present and the future.

Ahmed and Rogers (1995) derived the necessary and sufficient conditions of the current account sustainability by transforming the equation (6) to an applicable econometric method. According to them, we difference the both sides of equation (6) to obtain:

$$\begin{aligned} &\Delta E_t \sum_{k=0}^{\infty}(Q_{t,t+k} I_{t+k}) + \Delta E_t \sum_{k=0}^{\infty}(Q_{t,t+k} G_{t+k}) - \Delta E_t \sum_{k=0}^{\infty}(Q_{t,t+k} S_{t+k}) \\ &\quad - \Delta E_t \sum_{k=0}^{\infty}(Q_{t,t+k} T_{t+k}) + (r_t D_{t-1} + I_t + G_t - S_t - T_t) \\ &\quad = \lim_{K\to\infty} E_t(Q_{t,t+K} D_{t+K}) - \lim_{K\to\infty} E_{t-1}(Q_{t-1,t+K-1} D_{t+K-1}), \end{aligned} \tag{7}$$

where Δ is the difference operator.

From this equation, Ahmed and Rogers (1995) show that the necessary and sufficient conditions of the current account sustainability or the transversarity condition is that $r_t D_{t-1}, I_t, G_t, S_t, T_t$ are cointegrated and have the cointegration vector $(1, 1, 1, -1, -1)$ under some assumptions.[6] We analyze the cointegration among these variables to investigate whether the current account sustainability condition is satisfied.

2.2 A Perspective on the International Trade Flows

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6 The following conditions should be satisfied. (i) I_t, G_t, S_t, T_t follow I(1) processes, (ii) the utility function is separable for time, the marginal utility of consumption $u'(C_t)$ follows a random-walk process, and the subjective discount factor satisfies $\beta \in (0,1)$, (iii) all risks are invariant for any time period i.e. the covariance between the stochastic discount factor and each variable is constant, (iv) the series of the external debt follows I(1) process, and (v) the expectation operator E_t represents the rational expectation. Under these assumptions, Ahmed and Rogers (1995) show that the stationarity of the right hand side of equation (7) is identical to cointegrate the relevant variables.

Next, we consider the solvency of the external debts from the international trade flows as the second perspective of the current account sustainability. By abstracting the net receipts of labor income and the current transfers in the balance of payments, we can represent the current account deficit as

(8) $$CAD_t = r_t D_{t-1} - X_t + M_t,$$

where X_t is exports of goods and services and M_t is imports of goods and services.

We substitute equation (8) into equation (1) to obtain a difference equation of D_t. We solve forward the difference equations and use equation (5) to derive the economy's intertemporal budget constraint based on the international trade flows:

(9) $$E_t \sum_{k=0}^{\infty} (Q_{t,t+k} M_{t+k}) - E_t \sum_{k=0}^{\infty} (Q_{t,t+k} X_{t+k}) + (1+r_t) D_{t-1} = \lim_{K \to \infty} E_t (Q_{t,t+K} D_{t+K}).$$

The transversarity condition in equation (9) means that the initial external debts are repaid by the net exports in the present and the future. We difference the both sides of equation (9) to obtain:

(10) $$\Delta E_t \sum_{k=0}^{\infty} (Q_{t,t+k} M_{t+k}) - \Delta E_t \sum_{k=0}^{\infty} (Q_{t,t+k} X_{t+k}) + (r_t D_{t-1} - X_t + M_t) = \lim_{K \to \infty} E_t (Q_{t,t+K} D_{t+K}) - \lim_{K \to \infty} E_{t-1} (Q_{t-1,t+K-1} D_{t+K-1}).$$

According to equation (10), the necessary and sufficient conditions of the current account deficit sustainability should be that $r_t D_{t-1}, X_t, M_t$ are cointegrated and have the cointegration vector $(1, -1, 1)$. Thus, from the perspective on the international trade flows, we analyze this cointegration relationship to investigate the current account sustainability.

2.3 A Perspective on the International Capital Flows

Finally, we consider the condition of the current account sustainability from the perspective on the international capital flows. The definition of the balance of payments tells us that the relationship between the current account deficit and the international capital flows should be represented by the following eqution:

(11) $$CAD_t = Fin_t - Fout_t - \Delta R_t ,$$

where Fin_t is the capital inflows, $Fout_t$ is the capital outflows, and R_t is the foreign reserves.

The definition of the balance of payments tells us that equation (11) always holds. Accordingly, we should analyze whether the private capital flows finance the current account deficit. We analyze the cointegration relationship by omitting the change in foreign reserves in equation (11).

If we find the cointegration between the current account deficit and the capital flows in equation (11), then we will consider which items in the financial account finance the current account deficit. Focusing on each of the international capital flows in equation (11), we can rewrite equation (11) as

(12) $$CAD_t = DIB_t + PIB_t + OIB_t - \Delta R_t ,$$

where DIB_t is direct investment in the financial account, PIB_t is portfolio investment in the financial account, and OIB_t is other investment in the financial account. If variables in the sub-system including the current account deficit and some of the times in equation (12) are cointegrated, then the items would support the current account deficit in the long run. Thus, we also test the cointegration relationship in the sub-system of the equation (12).

3 An Empirical Analysis on the U.S. Current Account Sustainability

In this section, we investigate whether the U.S. current account is sustainable in the sense of the external debt solvency. We use the above-mentioned methodology to analyze the cointegration relationship among the relevant variables.

3.1 Data and Methodology

We explain the data used in our analysis here. The original variables and the standardized variables by GDP are prepared for all data. Most of the data in the analysis based on the domestic investment-saving balance are referred to the Table 5.1 from the "National Income and Production Account Tables" by the Bureau of Economic Analysis, and the balance of payments data are referred to the Table 1 from the "International Transactions Accounts". All the data are seasonally adjusted. Table 1 shows the data sources. The sample period of the data covers from the first quarter of 1960 to the fourth quarter of 2002. The number of observations is 172.

In our empirical analysis based on investment-saving balance, we represent the repayment for the external debts $r_t D_{t-1}$ as RD, the private savings S_t as PS, the private investments I_t as PI. We use data on the private gross savings and investments as PS and PI, respectively. We replace the government expenditure G_t by the government gross investment GE and the tax revenue T_t by the government gross saving GS. In addition, we make data series of the national gross saving NS and the national gross investment NI. We also make data series of the investment-saving balances of the private sector PIS and the public sector GIS as well as the national investment-saving balance NIS.

In our empirical analysis based on international trade flows, we represent the exports of goods and services X_t as EX and the imports of good and services M_t as IM. In addition, we make data series of a sum the repayment for external debt $r_t D_{t-1}$ and the imports M_t, which is represented as MM. We also use the trade balance TB. We also test directly whether the current account deficit CAD is stationary.

In our empirical analysis based on international capital flows, we represent the change in foreign reserve ΔR_t as RES, the capital inflows Fin_t as FIN, and the capital outflows $Fout_t$ as FOUT. In the analysis on the items in financial account, we use the direct investment inflow DIIN, the portfolio investment inflow PIIN, and the other investment inflow OIIN, and the direct investment outflow DIOUT, the portfolio investment outflow PIOUT, and the other investment outflow OIOUT. In addition, we make data series on the direct investment balance DIB, the portfolio investment balance PIB, and the other investment balance OIB.

We use the Johansen's method to investigate whether the relevant variables are cointegrated.[7] We use the unit-root tests on the relevant variables in the systems to investigate whether all the variables are the elements of the cointegration in advance. If the variables are relevant to the cointegration system, they are expected to follow the same order integration processes. As the result, we can find that the system is cointegrated.

We test whether the condtions of the cointegration vector are satisfied, for the systems in which all variables are cointegrated.[8] If the system passes all tests, we can conclude that the condition of the current account sustainability is satisfied. Based on the analysis in the preceding section, we analyze the sustainability of the current account.

3.2 Empirical Results from the Perspective on the Domestic Investment-Saving Balance

In this subsection, we investigate the current account sustainability from the perspective based on the domestic investment-saving balance. We consider the following pattern as

(13) RD+PI+GE-PS-GS,

(14) RD+NI-NS,

(15) RD+PIS+GIS,

(16) RD+NIS.

Equation (13) is the same as the system in equation (7). In equation (14), we define the national investments NI as a sum of private investments PI plus government investments GE and the national savings NS as a sum of private savings PS plus government savings GS. This means we analyze the whole economy's investment-saving relationship. In equation (15), we use investment-saving balance of both the private and

[7] We use the table 1 in Osterwald-Lenum (1992) as the critical value here.

[8] Noticing that the linear restriction which is described in previous section is imposed on the cointegration vector, Miyao (2001) tests the cointegration by using the framework of the Engle-Granger test. Though he carries out unit-root test on the series of RD+IM-EX, this is similar to carry out the Engle-Granger test on the system of RD, IM, EX by imposing the restriction (1,1,-1) on the cointegration vector.

public sectors. We analyze the national investment-saving balance in equation (16).

The Results of Equation (13)

In the case of using the non-standardized data, the ADF test rejected a unit-root for the government savings GS (Table 2.1). In the case of using the data standardized by GDP, a unit-root is rejected in the private investments PI and the government savings GS. Therefore, this system is not cointegrated in terms of both the non-standardized and standardized data.

The Results of Equation (14)

In the case of using the non-standardized data, the ADF test did not reject any unit-root for all variables (Tables 2.1 and 2.2). The cointegration test showed that this system has full rank in the cointegration relationship but that this is contradiction to the assumption of this test (Table 2.3). In the case of using the standardized data, a unit-root is rejected for the national savings NS. Therefore, this system is not cointegrated in terms of both the non-standardized and standardized data.

The Results of Equation (15)

In the case of using the non-standardized data, the ADF test rejected a unit-root for the private and public sectors' investment-saving balances, PIS and GIS (Table 2.1). In the case of using the data standardized by GDP, a unit-root is rejected for the private and public sectors' investment-saving balances, PIS and GIS (Table 2.1). Therefore this system is not cointegrated in terms of both the non-standardized and standardized data.

The Results of Equation (16)

In the case of using the non-standardized data, every variable follows a first-order integrated process (Tables 2.1 and 2.2). We conducted the cointegration test for this system. The cointegration test cannot reject that the system has no cointegration vector in terms of both the non-standardized data. In the case of using the standardized data, a unit-root is rejected for the national investment-saving balance NIS. Therefore this system is not cointegrated in terms of the standardized data.

3.3 Empirical Results from the Perspective on the International Trade Flows

We investigate the current account sustainability from the perspective based on the international trade flows. For the cointegration relationship in equation (10), we consider the following pattern as

(17) RD+IM-EX,

(18) MM-EX,

(19) RD-TB,

(20) CAD.

Equation (17) follows directly the definition in equation (10). Next, we use MM rather than RD and IM in equation (18). In equation (19), we use the trade balance TB rather than the imports and the exports. In addition, we conduct a unit-root test for the current account deficit CAD itself in equation (20).

The Results of Equation (17)

In the case of using the non-standardized data, the ADF tests shows that a unit-root is rejected for the imports IM (Table 3.1). Therefore, this system has no cointegration relationship in terms of the non-standardized data. In the case of using the standardized data, we cannot reject the repayment for the external debt RD and imports IM following an I(2) process while the exports EX follows a first-order integrated process (Tables 3.1 and 3.2). We regard that the power of the ADF test is very weak and conduct the cointegration test for this system. The result is that this system has no cointegration relationship (Table 3.3).

The Results of Equation (18)

In the case of using the non-standardized data, we can find that the sum of the imports and repayment for the external debts MM follows a first-order integrated process and that the exports EX follows a second-order integrated process. Since the power of the ADF test is weak, we conduct the cointegration test for this system. We obtain a result that the system has a cointegration vector. We also test whether a linear restriction on the cointegration vector is satisfied. As a result, the test rejected the null hypothesis of a linear restriction on the cointegration vector. One hand, in the case of using the standardized data, a unit-root is rejected for the exports EX. Therefore, this system is not cointegrated.

The Results of Equation (19)

In the case of using the non-standardized data, all variables in this system follow first-order integrated processes (Tables 3.1 and 3.2). The cointegration test found that this system has no cointegration vector (Table 3.3). In the case of using the standardized data, a unit-root is rejected for the trade balance TB. Therefore, this system is not cointegrated.

The Results of Equation (20)

In this formulation, the stationarity of the current account deficit CAD is the condition of the current account sustainability. We investigate whether this condition is satisfied. Table 3.1 shows that we cannot reject any unit-root for the current account deficit.

Thus, these results show that the U.S. current account deficit is unsustainable from the perspective based on the international trade flows.

4 An Analysis on the Finance for Current Account Deficits

We investigated the U.S. current account sustainability from the perspectives based on the domestic investment-saving relationships and on the international trade flows. These analytical results show that the U.S. current account deficit is not sustainable. Next, we investigate which items in the international capital inflows finance the current account deficit in the long run.

First, we analyze the cointegration relationship among the current account deficit, the international capital flows, and the change in the foreign reserves. We conduct unit-root tests for relevant variables in advance. The results are shown in Table 4.1. The results is that the unit-root is rejected for the change in the foreign reserves ΔR_t. The empirical results in the previous section showed that the current account deficit CAD_t is non-stationary. Therefore, the current account deficit CAD_t and the international capital flows FB_t should be cointegrated in equation (11) in order to be consistent with the fact that the change in the foreign reserves ΔR_t is stationary.

The results of unit-root and cointegration tests on the current account deficit and the international capital flows are shown in Tables 4.1, 4.2, and 4.3. The results of unit-root tests in the case of using the non-standardized data is that a second-order integration is not rejected for the financial balance FB while the current account deficit CAD follows a first-order integration process. In the case of using the standardized data, the financial balance FB and the current account deficit CAD follow a first-order integration process.

We also conduct cointegration tests between the current account deficit and the financial balance.[9] The results are shown in table 4.3. In the case of using the non-standardized data, the rank of cointegration is full-rank and it contradicts with the assumptions. In the case of using the standardized data, we can find a cointegration vector in the system that includes the current account deficit CAD and the financial balance FB.

Next, we conduct the analysis by decomposing the financial balance FB into the direct investment balance DIB, the portfolio investment balance PIB and the other investment balance OIB. Because the change in foreign reserves ΔR_t is stationary, some of the other variables (DIB, PIB, and OIB) in equation (12) should be cointegrated. The unit-root tests show that the current account deficit and the portfolio investment balance follow first-order integrated processes.

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[9] Though it is not rejected for FB to follow the second-order integrated process, we carried out the cointegration test on the system since it is said that the power of ADF test is weak.

Table 4.3 shows that the cointegration rank is 2 among the variables in the case of using the non-standardized data. The cointegration rank is 1 among the variables in the case of using the standardized data. Thus, the cointegration has full-rank and it contradicts with the assumptions of the analysis in the case of using the non-standardized data. On one hand, there is a cointegration vector in the system which includes the current account deficit and the portfolio investment balance in the case of using the standardized data. Accordingly, we can conclude that the huge current account deficit in the United States has been financed by the portfolio investment from other countries in the long run in terms of the stationary relationship.

5 Conclusion

In this paper, we investigated whether the U.S. current account deficit was sustainable from the perspectives based on both the domestic investment-saving relationships and the international trade flows. In addition, we investigated the current account deficit was financed by the international capital inflows in order that the balance of payment as a whole should be sustainable in the long run.

The analyses in section 3 showed that the U.S. current account deficit was not sustainable from the perspectives based on both the domestic investment-saving relationships and the international trade flows. This means that the rapid growth in the current account deficit from the mid of 1990s together with the worsening international investment position has not satisfied the external "budget constraint" of the United States. However, the U.S. current account deficit has been financed by the international capital inflows in the long run. In this sense, the balance of payments as a whole has been sustainable. In other words, the portfolio investment into the United States finance the current account deficit of the United States.

Based on our analysis, if the pattern of the international capital inflows to the United States made no structural changes, the balance of payments of the United States will not collapse since the current account deficit will be financed by the capital inflows though it may be unsustainable in the long run. Especially, the current account deficit has been financed by the portfolio investment into the United States. If the recent changes in the capital inflows to the United States (the decreases in the capital inflows into the United States from European countries) were structural and persistent, the U.S. current account would not be financed by the capital inflows any longer. The U.S. current account deficit would never be financed by the capital inflows if the United States made structural changes in the capital inflows. The United States' economy would make the current account deficit unsustainable and might face a balance of payment crisis.

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Table 1: Data Sources

No.	Variable	Definition	Sources	Referenced lines	
1	RD	Net Income Payment	ITA, Table1, SA	- line 13 - line 30	
2	NS	National Saving	NIPA, Table5.1	line 1	
3	NI	National Investment	NIPA, Table5.1	line 18	
4	PS	Private Saving	NIPA, Table5.1	line 2	
5	GS	Government Saving	NIPA, Table5.1	line 11	
6	PI	Private Investment	NIPA, Table5.1	line 19	
7	GE	Government Investment	NIPA, Table5.1	line 20	
8	NIS	Investment-Saving Balance			No.3 - No.2
9	PIS	IS Balance in the Private Sector			No.6 - No.4
10	GIS	IS Balance in the Public Sector			No.7 - No.5
11	EX	Exports	ITA, Table1, SA	line 2	
12	IM	Imports	ITA, Table1, SA	- line 19	
13	MM	Imports and			No.11 + No.12 + No.1
14	TB	Trade Balance			No.11 + No.12
15	CAD	Current Account Deficit	ITA, Table1, SA	- line 76	
16	FOUT	Financial Account (Asset)	ITA, Table1, SA	- line 40	
17	FIN	Financial Account (Debit)	ITA, Table1, SA	line 55	
18	RES	Official Reserve Assets	ITA, Table1, SA	line 41	
19	DIOUT	Foreign Direct Investment	ITA, Table1, SA	- line 51	
20	PIOUT	Portfolio Investment	ITA, Table1, SA	- line 52	
21	OIOUT	Other Investment	ITA, Table1, SA	- line 53 - line 54	
22	DIIN	Direct Investment In	ITA, Table1, SA	line 64	
23	PIIN	Portfolio Investment In	ITA, Table1, SA	line 65 + line 66	
24	OIIN	Other Investment In	ITA, Table1, SA	line 67 + line 68 + line 69	
25	FB	Financial Account Balance			No.16 + No.17
26	DIB	Direct Investment Balance			No.19 + No.22
27	PIB	Portfolio Investment Balance			No.20 + No.23
28	OIB	Other Investment Balance			No.21 + No.24

Data
ITA：International Transactions Accounts (Bereau of Economic Analysis)
NIPA：National Income and Production Account Tables (Bereau of Economic Analysis)

Table 2: Current Account Sustainability from the view of Domestic Investment-Saving Balance

Table 2.1: Results of Unit-Root Tests (Level of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (13)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
PI	5	166	158	Yes	Yes	t(rho-1)/tao	-1.75	-3.41	Trend=0 under the UR	3.15	0.05	6.25	Series contains a unit root with drift
		166	159	Yes	No	t(rho-1)/mu	1.19	-2.86	Constant=0 under the UR	5.86	0.00	4.59	
		166	160			Constant=0	3.21	*	using normal distribution	*	0.00		
						Testing UR	1.19	*	using normal distribution	*	0.23		
GE	5	166	158	Yes	Yes	t(rho-1)/tao	-1.14	-3.41	Trend=0 under the UR	4.27	0.02	6.25	Series stationary around a non-zero mean
		166	159	Yes	No	t(rho-1)/mu	2.15	-2.86	Constant=0 under the UR	5.77	0.00	4.59	
		166	160			Constant=0	2.60	*	using normal distribution	*	0.01		
						Testing UR	2.15	*	using normal distribution	*	0.03		
PS	11	160	146	Yes	Yes	t(rho-1)/tao	-2.69	-3.41	Trend=0 under the UR	6.95	0.00	6.25	Series stationary around a linear trend
									Constant,Trend=0 under the UI	10.73	0.00	4.68	
		160	147			Trend=0	2.53	*	using normal distribution	*	0.01		
						Testing UR	-2.69	*	using normal distribution	*	0.01		
GS	11	160	146	Yes	Yes	t(rho-1)/tao	-3.98	-3.41					Series has no unit root
System 2: Equation (14)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
NI	9	162	150	Yes	Yes	t(rho-1)/tao	-2.62	-3.41	Trend=0 under the UR	3.43	0.03	6.25	Series contains a unit root with zero drift
		162	151	Yes	No	t(rho-1)/mu	-0.73	-2.86	Constant=0 under the UR	1.40	0.25	4.59	
		162	152	No	No	t(rho-1)	0.49	-1.95					
NS	3	168	162	Yes	Yes	t(rho-1)/tao	-2.43	-3.41	Trend=0 under the UR	3.13	0.05	6.25	Series contains a unit root with zero drift
		168	163	Yes	No	t(rho-1)/mu	-0.07	-2.86	Constant=0 under the UR	2.51	0.08	4.59	
		168	164	No	No	t(rho-1)	1.65	-1.95					
System 3: Equation (15)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
PIS	5	166	158	Yes	Yes	t(rho-1)/tao	-2.38	-3.41	Trend=0 under the UR	2.88	0.06	6.25	Series stationary around a zero mean
		166	159	Yes	No	t(rho-1)/mu	-2.35	-2.86	Constant=0 under the UR	2.77	0.07	4.59	
		166	160	No	No	t(rho-1)	-2.28	-1.95					
GIS	11	160	146	Yes	Yes	t(rho-1)/tao	-3.85	-3.41					Series has no unit root
System 4: Equation (16)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
NIS	10	161	148	Yes	Yes	t(rho-1)/tao	0.00	-3.41	Trend=0 under the UR	1.75	0.18	6.25	Series contains a unit root with zero drift
		161	149	Yes	No	t(rho-1)/mu	-0.12	-2.86	Constant=0 under the UR	0.38	0.68	4.59	
		161	150	No	No	t(rho-1)	-0.48	-1.95					
Standardized by GDP													
System 1: Equation (13)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
PI	3	168	162	Yes	Yes	t(rho-1)/tao	-3.79	-3.41					Series has no unit root
GE	0	170	165	Yes	Yes	t(rho-1)/tao	-1.38	-3.41	Trend=0 under the UR	3.95	0.02	6.25	Series contains a unit root with zero drift
		170	166	Yes	No	t(rho-1)/mu	-1.45	-2.86	Constant=0 under the UR	79.28	0.00	4.59	
		170	167			Constant=0	1.34	*	using normal distribution	*	0.18		
PS	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	3.01	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.77	-2.86	Constant=0 under the UR	1.58	0.21	4.59	
		170	168	No	No	t(rho-1)	-0.27	-1.95					
GS	2	169	164	Yes	Yes	t(rho-1)/tao	-2.73	-3.41	Trend=0 under the UR	3.77	0.03	6.25	Series stationary around a zero mean
		169	165	Yes	No	t(rho-1)/mu	-2.54	-2.86	Constant=0 under the UR	3.37	0.04	4.59	
		169	166	No	No	t(rho-1)	-2.47	-1.95					
System 2: Equation (14)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
NI	3	168	162	Yes	Yes	t(rho-1)/tao	-3.36	-3.41	Trend=0 under the UR	6.67	0.00	6.25	Series contains a unit root with zero drift
									Constant,Trend=0 under the UI	4.65	0.00	4.68	
		168	163			Trend=0	-1.38	*	using normal distribution	*	0.17		
NS	4	167	160	Yes	Yes	t(rho-1)/tao	-3.96	-3.41					Series has no unit root
System 3: Equation (15)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
PIS	2	169	164	Yes	Yes	t(rho-1)/tao	-3.46	-3.41					Series has no unit root
GIS	2	169	164	Yes	Yes	t(rho-1)/tao	-3.03	-3.41	Trend=0 under the UR	4.59	0.01	6.25	Series stationary around a non-zero mean
		169	165	Yes	No	t(rho-1)/mu	-2.98	-2.86					
System 4: Equation (16)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
NIS	5	166	158	Yes	Yes	t(rho-1)/tao	-2.69	-3.41	Trend=0 under the UR	4.15	0.02	6.25	Series stationary around a zero mean
		166	159	Yes	No	t(rho-1)/mu	-2.20	-2.86	Constant=0 under the UR	2.47	0.09	4.59	
		166	160	No	No	t(rho-1)	-1.96	-1.95					

Table 2.2: Results of Unit-Root Tests (Difference of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (13)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
PI	4	166	159	Yes	Yes	t(rho-1)/tao	-6.51	-3.41					Series has no unit root
GE	5	165	157	Yes	Yes	t(rho-1)/tao	-4.10	-3.41					Series has no unit root
PS	2	168	163	Yes	Yes	t(rho-1)/tao	-7.36	-3.41					Series has no unit root
GS	5	165	157	Yes	Yes	t(rho-1)/tao	-4.86	-3.41					Series has no unit root
System 2: Equation (14)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
NI	2	168	163	Yes	Yes	t(rho-1)/tao	-5.23	-3.41					Series has no unit root
NS	2	168	163	Yes	Yes	t(rho-1)/tao	-5.25	-3.41					Series has no unit root
System 3: Equation (15)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
PIS	4	166	159	Yes	Yes	t(rho-1)/mu	-5.57	-3.41					Series has no unit root
GIS	5	165	157	Yes	Yes	t(rho-1)/tao	-5.11	-3.41					Series has no unit root
System 4: Equation (16)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
NIS	9	161	149	Yes	Yes	t(rho-1)/tao	-5.72	-3.41					Series has no unit root
Standardized by GDP													
System 1: Equation (13)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
PI	0	169	164	Yes	Yes	t(rho-1)/tao	2.59	-3.41	Trend=0 under the UR	3.35	0.04	6.25	Series contains a unit root with zero drift
		169	165	Yes	No	t(rho-1)/mu	9.82	-2.86	Constant=0 under the UR	48.21	0.00	4.59	
		169	166			Constant=0	0.02	*	using normal distribution	*	0.98		
GE	0	169	164	Yes	Yes	t(rho-1)/tao	-3.47	-3.41					Series has no unit root
PS	0	169	164	Yes	Yes	t(rho-1)/tao	8.40	-3.41	Trend=0 under the UR	35.40	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	23.60	0.00	4.68	
		169	165			Trend=0	-0.04	*	using normal distribution	*	0.97		
GS	1	169	165	Yes	Yes	t(rho-1)/tao	-7.25	-3.41					Series has no unit root
System 2: Equation (14)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
NI	0	169	164	Yes	Yes	t(rho-1)/tao	-9.47	-3.41					Series has no unit root
NS	3	167	161	Yes	Yes	t(rho-1)/tao	-6.43	-3.41					Series has no unit root
System 3: Equation (15)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
PIS	0	169	164	Yes	Yes	t(rho-1)/tao	-7.06	-3.41					Series has no unit root
GIS	1	169	165	Yes	Yes	t(rho-1)/tao	-7.09	-3.41					Series has no unit root
System 4: Equation (16)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
NIS	10	160	147	Yes	Yes	t(rho-1)/tao	-6.58	-3.41					Series has no unit root

Table 2.3: Results of Cointegration Tests

System	Lags	Rank	Eigen Value	Trace	Trace95	Trace90	L-max	L-max95	L-max90	Cointegration Vectors	LR	p-Value
Eq.(14): RD,NI,NS	11	0	0.121	36.37	29.68	26.79	20.55	20.97	18.60	1.000, 0.210, -0.208		
		1	0.068	15.82	15.41	13.33	11.27	14.07	12.07	1.000, 0.443, -0.403		
		2	0.028	4.55	3.76	2.69	4.55	3.76	2.69	1.000, 0.019, -0.014		
Eq.(16): RD,NIS	11	0	0.072	12.12	15.41	13.33	12.07	14.07	12.07			
		1	0.000	0.05	3.76	2.69	0.05	3.76	2.69			

Notes:
1) Lags means the lag-length of the VARs. They are determined by AIC.
2) Trace means the statistic for Trace tests, and L-max means the statistic for maximum eigen-value test.
3) Trace95 and Trace90 mean the 95% and 90% critical values on trace tests. Similarly, L-max95 and L-max90 mean the critical values.
4) LR means the Likelihood ratio test for the hypothesis of linear restriction on the cointegration vectors.

Table 3: Current Account Sustainability from the view of International Trade

Table 3.1: Results of Unit-Root Tests (Level of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (17)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
IM	10	161	148	Yes	Yes	t(rho-1)/tao	0.38	-3.41	Trend=0 under the UR	4.99	0.01	6.25	Series stationary around a non-zero mean
		161	149	Yes	No	t(rho-1)/mu	2.67	-2.86	Constant=0 under the UR	5.56	0.00	4.59	
		161	150			Constant=0	1.96	*	using normal distribution	*	0.05		
						Testing UR	2.67	*	using normal distribution	*	0.01		
EX	10	161	148	Yes	Yes	t(rho-1)/tao	-2.14	-3.41	Trend=0 under the UR	2.40	0.09	6.25	Series contains a unit root with zero drift
		161	149	Yes	No	t(rho-1)/mu	-0.52	-2.86	Constant=0 under the UR	1.07	0.34	4.59	
		161	150	No	No	t(rho-1)	-0.04	-1.95					
System 2: Equation (18)													
MM	8	163	152	Yes	Yes	t(rho-1)/tao	0.90	-3.41	Trend=0 under the UR	8.96	0.00	6.25	Cannot reject unit root.
									Constant,Trend=0 under the UI	8.36	0.00	4.68	
		163	153			Trend=0	4.14	*	using normal distribution	*	0.00		
						Testing UR	0.90	*	using normal distribution	*	0.37		
EX	10	161	148	Yes	Yes	t(rho-1)/tao	-2.14	-3.41	Trend=0 under the UR	2.40	0.09	6.25	Series contains a unit root with zero drift
		161	149	Yes	No	t(rho-1)/mu	-0.52	-2.86	Constant=0 under the UR	1.07	0.34	4.59	
		161	150	No	No	t(rho-1)	-0.04	-1.95					
System 3: Equation (19)													
RD	4	167	160	Yes	Yes	t(rho-1)/tao	-0.90	-3.41	Trend=0 under the UR	1.58	0.21	6.25	Series contains a unit root with zero drift
		167	161	Yes	No	t(rho-1)/mu	-1.72	-2.86	Constant=0 under the UR	1.51	0.22	4.59	
		167	162	No	No	t(rho-1)	-1.07	-1.95					
TB	2	169	164	Yes	Yes	t(rho-1)/tao	0.39	-3.41	Trend=0 under the UR	2.63	0.08	6.25	Series contains a unit root with zero drift
		169	165	Yes	No	t(rho-1)/mu	1.95	-2.86	Constant=0 under the UR	3.44	0.03	4.59	
		169	166	No	No	t(rho-1)	2.59	-1.95					
System 4: Equation (20)													
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	9.13	-3.41	Trend=0 under the UR	53.41	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	41.43	0.00	4.68	
		170	166			Trend=0	-0.17	*	using normal distribution	*	0.87		
Standardized by GDP													
System 1: Equation (17)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
IM	1	170	166	Yes	Yes	t(rho-1)/tao	-3.33	-3.41	Trend=0 under the UR	5.58	0.00	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-0.56	-2.86	Constant=0 under the UR	1.99	0.14	4.59	
		170	168	No	No	t(rho-1)	1.61	-1.95					
EX	5	166	158	Yes	Yes	t(rho-1)/tao	-2.56	-3.41	Trend=0 under the UR	3.45	0.03	6.25	Series contains a unit root with zero drift
		166	159	Yes	No	t(rho-1)/mu	-1.48	-2.86	Constant=0 under the UR	1.56	0.21	4.59	
		166	160	No	No	t(rho-1)	0.53	-1.95					
System 2: Equation (18)													
MM	1	170	166	Yes	Yes	t(rho-1)/tao	-3.81	-3.41					Series has no unit root
EX	5	166	158	Yes	Yes	t(rho-1)/tao	-2.56	-3.41	Trend=0 under the UR	3.45	0.03	6.25	Series contains a unit root with zero drift
		166	159	Yes	No	t(rho-1)/mu	-1.48	-2.86	Constant=0 under the UR	1.56	0.21	4.59	
		166	160	No	No	t(rho-1)	0.53	-1.95					
System 3: Equation (19)													
RD	1	170	166	Yes	Yes	t(rho-1)/tao	-2.15	-3.41	Trend=0 under the UR	2.95	0.05	6.25	Series contains a unit root with zero drift
		170	167	Yes	No	t(rho-1)/mu	-1.05	-2.86	Constant=0 under the UR	0.75	0.47	4.59	
		170	168	No	No	t(rho-1)	-1.02	-1.95					
TB	0	170	165	Yes	Yes	t(rho-1)/tao	-5.63	-3.41					Series has no unit root
System 4: Equation (20)													
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	2.60	-3.41	Trend=0 under the UR	8.47	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	17.63	0.00	4.68	
		170	166			Trend=0	0.78	*	using normal distribution	*	0.44		

Table 3.2: Results of Unit-Root Tests (Difference of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (17)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
IM	4	166	159	Yes	Yes	t(rho-1)/tao	-7.46	-3.41					Series has no unit root
EX	0	169	164	Yes	Yes	t(rho-1)/tao	7.34	-3.41	Trend=0 under the UR	32.83	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	21.97	0.00	4.68	
		169	165			Trend=0	-0.80	*	using normal distribution	*	0.42		
System 2: Equation (18)													
MM	7	163	153	Yes	Yes	t(rho-1)/tao	-5.64	-3.41					Series has no unit root
EX	0	169	164	Yes	Yes	t(rho-1)/tao	7.34	-3.41	Trend=0 under the UR	32.83	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	21.97	0.00	4.68	
		169	165			Trend=0	-0.80	*	using normal distribution	*	0.42		
System 3: Equation (19)													
RD	2	168	163	Yes	Yes	t(rho-1)/tao	-10.68	-3.41					Series has no unit root
TB	1	169	165	Yes	Yes	t(rho-1)/tao	-6.91	-3.41					Series has no unit root
System 4: Equation (20)													
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	-8.67	-3.41					Series has no unit root
Standardized by GDP													
System 1: Equation (17)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
IM	0	169	164	Yes	Yes	t(rho-1)/tao	-1.46	-3.41	Trend=0 under the UR	1.06	0.35	6.25	Series contains a unit root with zero drift
		169	165	Yes	No	t(rho-1)/mu	12.03	-2.86	Constant=0 under the UR	72.46	0.00	4.59	
		169	166			Constant=0	-0.06	*	using normal distribution	*	0.95		
EX	5	165	157	Yes	Yes	t(rho-1)/tao	-4.64	-3.41					Series has no unit root
System 2: Equation (18)													
MM	0	169	164	Yes	Yes	t(rho-1)/tao	-2.50	-3.41	Trend=0 under the UR	3.57	0.03	6.25	Series contains a unit root with zero drift
		169	165	Yes	No	t(rho-1)/mu	8.99	-2.86	Constant=0 under the UR	41.88	0.00	4.59	
		169	166			Constant=0	-0.03	*	using normal distribution	*	0.98		
EX	5	165	157	Yes	Yes	t(rho-1)/tao	-4.64	-3.41					Series has no unit root
System 3: Equation (19)													
RD	0	169	164	Yes	Yes	t(rho-1)/tao	6.27	-3.41	Trend=0 under the UR	20.26	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	14.66	0.00	4.68	
		169	165			Trend=0	-0.10	*	using normal distribution	*	0.92		
TB	0	169	164	Yes	Yes	t(rho-1)/tao	10.64	-3.41	Trend=0 under the UR	56.58	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	38.00	0.00	4.68	
		169	165			Trend=0	0.02	*	using normal distribution	*	0.98		
System 4: Equation (20)													
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	0.90	-3.41	Trend=0 under the UR	0.44	0.65	6.25	Series stationary around a non-zero mean
		169	165	Yes	No	t(rho-1)/mu	-7.92	-2.86					

Table 3.3: Results of Cointegration Tests

System	Lags	Rank	Eigen Value	Trace	Trace95	Trace90	L-max	L-max95	L-max90	Cointegration Vectors	LR	p-Value
Eq.(18): MM,EX	10	0	0.221	41.81	15.41	13.33	40.41	14.07	12.07	1.000, -1.564	38.11	0.00
		1	0.009	1.40	3.76	2.69	1.40	3.76	2.69			
Eq.(19): RD,TB	3	0	0.048	10.80	15.41	13.33	8.33	14.07	12.07			
		1	0.015	2.47	3.76	2.69	2.47	3.76	2.69			
Standardized by GDP												
Eq.(17): RD,IM,EX	2	0	0.051	11.27	29.68	26.79	8.97	20.97	18.60			
		1	0.013	2.30	15.41	13.33	2.30	14.07	12.07			
		2	0.000	0.00	3.76	2.69	0.00	3.76	2.69			

Notes:
1) Lags means the lag-length of the VARs. They are determined by AIC.
2) Trace means the statistic for Trace tests, and L-max means the statistic for maximum eigen-value test.
3) Trace95 and Trace90 mean the 95% and 90% critical values on trace tests. Similarly, L-max95 and L-max90 mean the critical values.
4) LR means the Likelihood ratio test for the hypothesis of linear restriction on the cointegration vectors.

Table 4: Financing Current Account Deficits from the View of International Capital Flows

Table 4.1: Results of Unit-Root Tests (Level of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (11)													
RES	4	167	160	Yes	Yes	t(rho-1)/tao	-6.45	-3.41					Series has no unit root
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	9.13	-3.41	Trend=0 under the UR	53.41	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	41.43	0.00	4.68	
		170	166			Trend=0	-0.17	*	using normal distribution	*	0.87		
FB	12	159	144	Yes	Yes	t(rho-1)/tao	1.83	-3.41	Trend=0 under the UR	4.69	0.01	6.25	Series contains a unit root with zero drift
		159	145	Yes	No	t(rho-1)/mu	3.07	-2.86	Constant=0 under the UR	6.03	0.00	4.59	
		159	146			Constant=0	1.59	*	using normal distribution	*	0.11		
System 2: Equation (12)													
RES	4	167	160	Yes	Yes	t(rho-1)/tao	-6.45	-3.41					Series has no unit root
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	9.13	-3.41	Trend=0 under the UR	53.41	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	41.43	0.00	4.68	
		170	166			Trend=0	-0.17	*	using normal distribution	*	0.87		
DIB	11	160	146	Yes	Yes	t(rho-1)/tao	-6.17	-3.41					Series has no unit root
PIB	12	159	144	Yes	Yes	t(rho-1)/tao	-0.51	-3.41	Trend=0 under the UR	1.62	0.20	6.25	Series contains a unit root with zero drift
		159	145	Yes	No	t(rho-1)/mu	0.56	-2.86	Constant=0 under the UR	0.82	0.44	4.59	
		159	146	No	No	t(rho-1)	0.97	-1.95					
OIB	2	169	164	Yes	Yes	t(rho-1)/tao	-5.10	-3.41					Series has no unit root
Standardized by GDP													
System 1: Equation (11)													
RES	4	167	160	Yes	Yes	t(rho-1)/tao	-5.38	-3.41					Series has no unit root
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	2.60	-3.41	Trend=0 under the UR	8.47	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	17.63	0.00	4.68	
		170	166			Trend=0	0.78	*	using normal distribution	*	0.44		
FB	2	169	164	Yes	Yes	t(rho-1)/tao	-3.07	-3.41	Trend=0 under the UR	5.11	0.01	6.25	Series contains a unit root with zero drift
		169	165	Yes	No	t(rho-1)/mu	-1.37	-2.86	Constant=0 under the UR	1.27	0.28	4.59	
		169	166	No	No	t(rho-1)	-0.84	-1.95					
System 2: Equation (12)													
RES	4	167	160	Yes	Yes	t(rho-1)/tao	-5.38	-3.41					Series has no unit root
CAD	0	170	165	Yes	Yes	t(rho-1)/tao	2.60	-3.41	Trend=0 under the UR	8.47	0.00	6.25	Series contains a unit root with drift
									Constant,Trend=0 under the UI	17.63	0.00	4.68	
		170	166			Trend=0	0.78	*	using normal distribution	*	0.44		
DIB	11	160	146	Yes	Yes	t(rho-1)/tao	-4.39	-3.41					Series has no unit root
PIB	12	159	144	Yes	Yes	t(rho-1)/tao	-1.71	-3.41	Trend=0 under the UR	2.13	0.12	6.25	Series contains a unit root with zero drift
		159	145	Yes	No	t(rho-1)/mu	-0.52	-2.86	Constant=0 under the UR	0.73	0.48	4.59	
		159	146	No	No	t(rho-1)	0.11	-1.95					
OIB	2	169	164	Yes	Yes	t(rho-1)/tao	-4.63	-3.41					Series has no unit root

Table 4.2: Results of Unit-Root Tests (Difference of the Variables)

Variable	lags	No. of Obs.	D.F.	Drift	Trend	Test Type	t-Value	Critical Value	Test Type	F-Value	Significance Level	Critical Value	Conclusion
System 1: Equation (11)													
RES	9	161	149	Yes	Yes	t(rho-1)/tao	-7.38	-3.41					Series has no unit root
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	-8.67	-3.41					Series has no unit root
FB	12	158	143	Yes	Yes	t(rho-1)/tao	-2.46	-3.41	Trend=0 under the UR	3.47	0.03	6.25	Series contains a unit root with zero drift
		158	144	Yes	No	t(rho-1)/mu	-1.74	-2.86	Constant=0 under the UR	1.75	0.18	4.59	
		158	145	No	No	t(rho-1)	-1.40	-1.95					
System 2: Equation (12)													
RES	9	161	149	Yes	Yes	t(rho-1)/tao	-7.38	-3.41					Series has no unit root
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	-8.67	-3.41					Series has no unit root
DIB	12	158	143	Yes	Yes	t(rho-1)/tao	-3.85	-3.41					Series has no unit root
PIB	12	158	143	Yes	Yes	t(rho-1)/tao	-4.82	-3.41					Series has no unit root
OIB	7	163	153	Yes	Yes	t(rho-1)/tao	-7.32	-3.41					Series has no unit root
Standardized by GDP													
System 1: Equation (11)													
RES	7	163	153	Yes	Yes	t(rho-1)/tao	-6.80	-3.41					Series has no unit root
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	0.90	-3.41	Trend=0 under the UR	0.44	0.65	6.25	Series stationary around a non-zero mean
		169	165	Yes	No	t(rho-1)/mu	-7.92	-2.86					
FB	2	168	163	Yes	Yes	t(rho-1)/tao	-11.25	-3.41					Series has no unit root
System 2: Equation (12)													
RES	7	163	153	Yes	Yes	t(rho-1)/tao	-6.80	-3.41					Series has no unit root
CAD	0	169	164	Yes	Yes	t(rho-1)/tao	0.90	-3.41	Trend=0 under the UR	0.44	0.65	6.25	Series stationary around a non-zero mean
		169	165	Yes	No	t(rho-1)/mu	-7.92	-2.86					
DIB	11	159	145	Yes	Yes	t(rho-1)/tao	-3.23	-3.41	Trend=0 under the UR	5.63	0.00	6.25	Series stationary around a non-zero mean
		159	146	Yes	No	t(rho-1)/mu	-3.30	-2.86					
PIB	11	159	145	Yes	Yes	t(rho-1)/tao	-4.26	-3.41					Series has no unit root
OIB	2	168	163	Yes	Yes	t(rho-1)/tao	-12.30	-3.41					Series has no unit root

Table 4.3: Results of Cointegration Tests

System	Lags	Rank	Eigen Value	Trace	Trace95	Trace90	L-max	L-max95	L-max90	Cointegration Vectors
Eq.(11): CAD,FB	4	0	0.202	43.20	28.00	15.41	38.00	14.07	12.07	1.000, -0.998
		1	0.031	5.20	6.41	3.76	5.20	3.76	2.69	1.000, 1.455
Eq.(12): CAD,PIB	4	0	0.142	33.72	28.00	15.41	25.81	14.07	12.07	1.000, -1.694
		1	0.046	7.91	6.41	3.76	7.91	3.76	2.69	1.000, -0.079
Standardized by GDP										
Eq.(11): CAD,FB	4	0	0.134	24.43	28.00	15.41	24.10	14.07	12.07	1.000, -1.032
		1	0.002	0.33	6.41	3.76	0.33	3.76	2.69	
Eq.(12): CAD,PIB	4	0	0.133	23.95	28.00	15.41	23.95	14.07	12.07	1.000, -1.972
		1	0.000	0.00	6.41	3.76	0.00	3.76	2.69	

Notes:
1) Lags means the lag-length of the VARs. They are determined by AIC.
2) Trace means the statistic for Trace tests, and L-max means the statistic for maximum eigen-value test.
3) Trace95 and Trace90 mean the 95% and 90% critical values on trace tests. Similarly, L-max95 and L-max90 mean the critical values.

Figure 1: International Investment Position

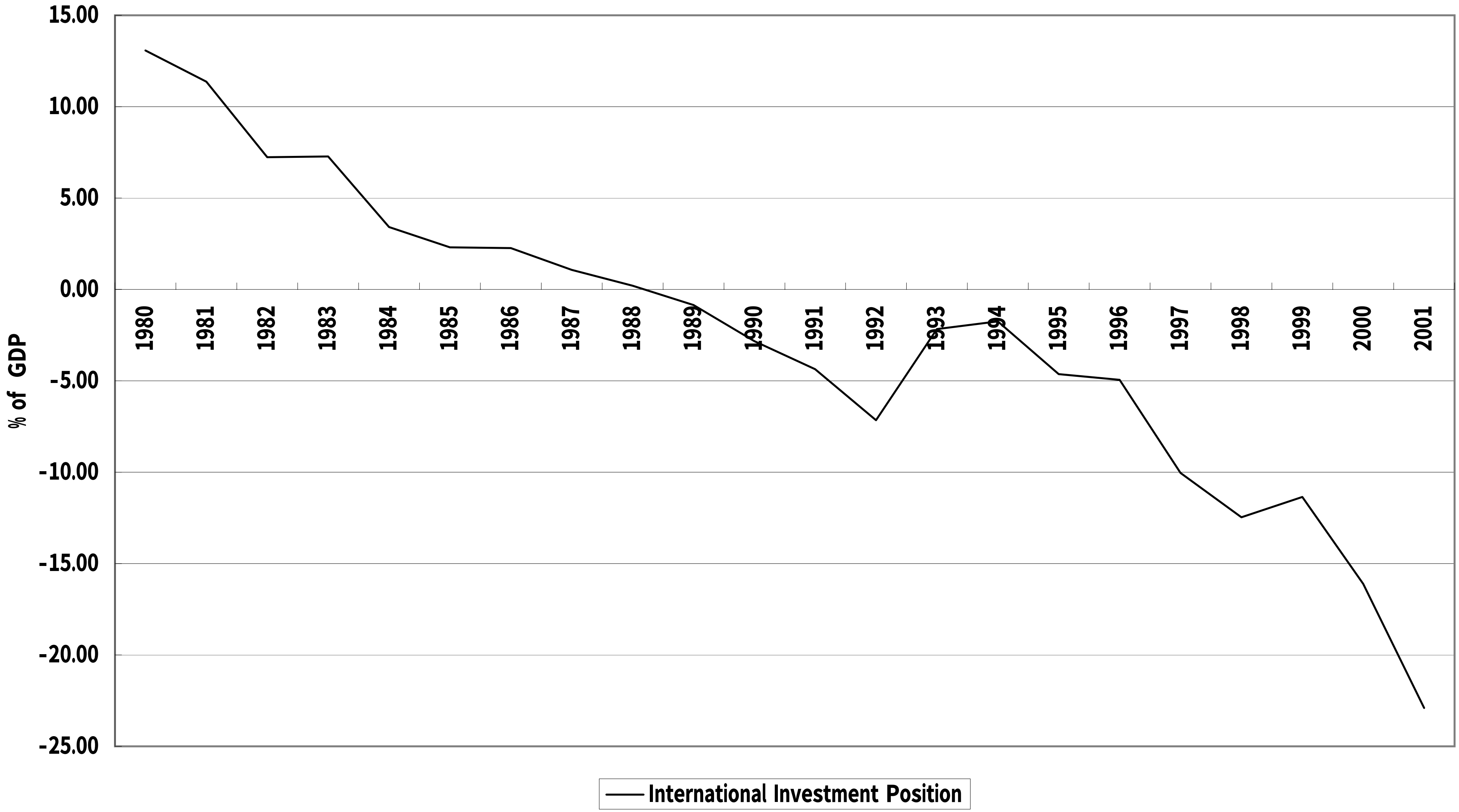

Figure 2: Current Account

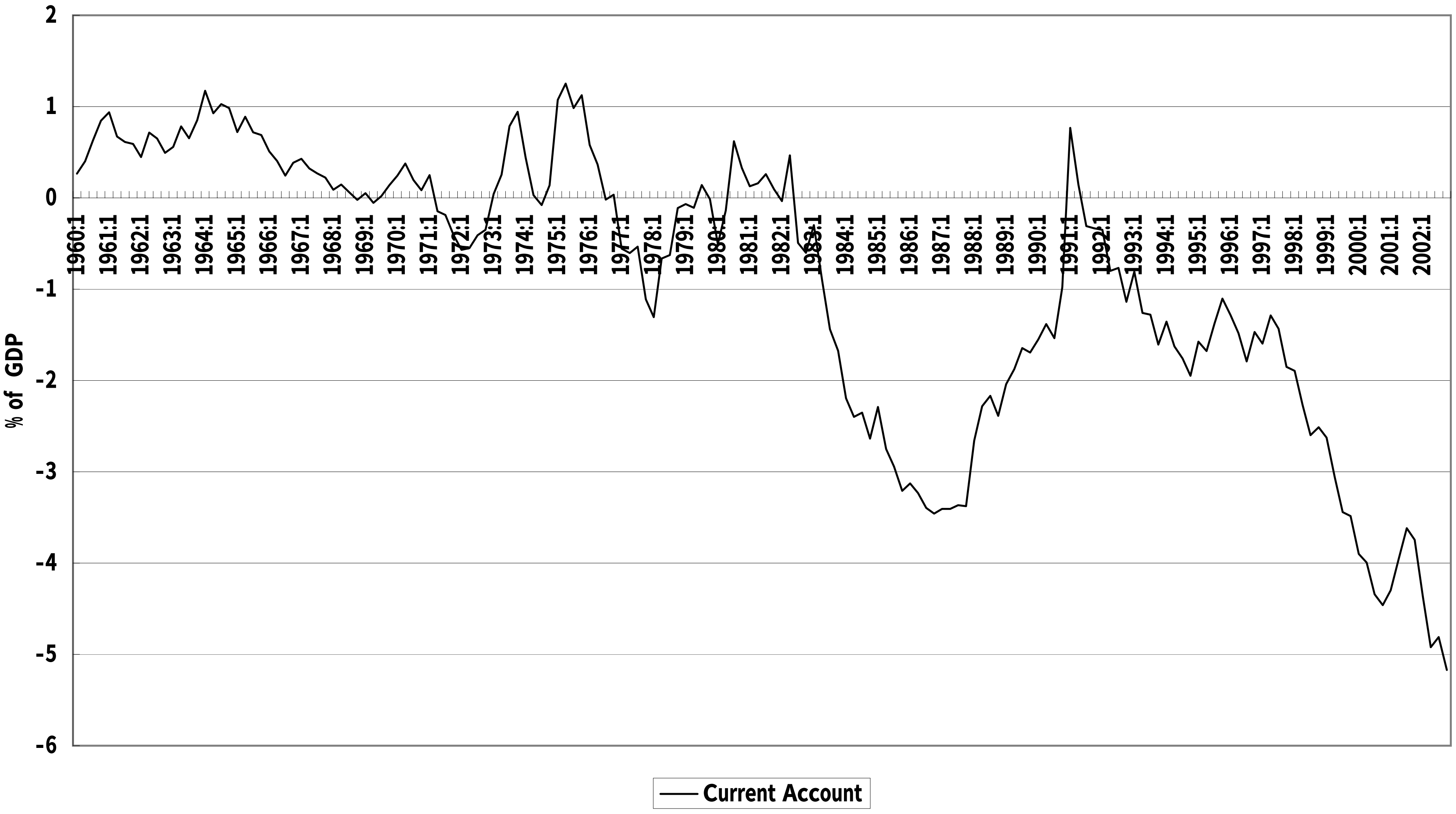

Figure 3: Investment-Saving Balance

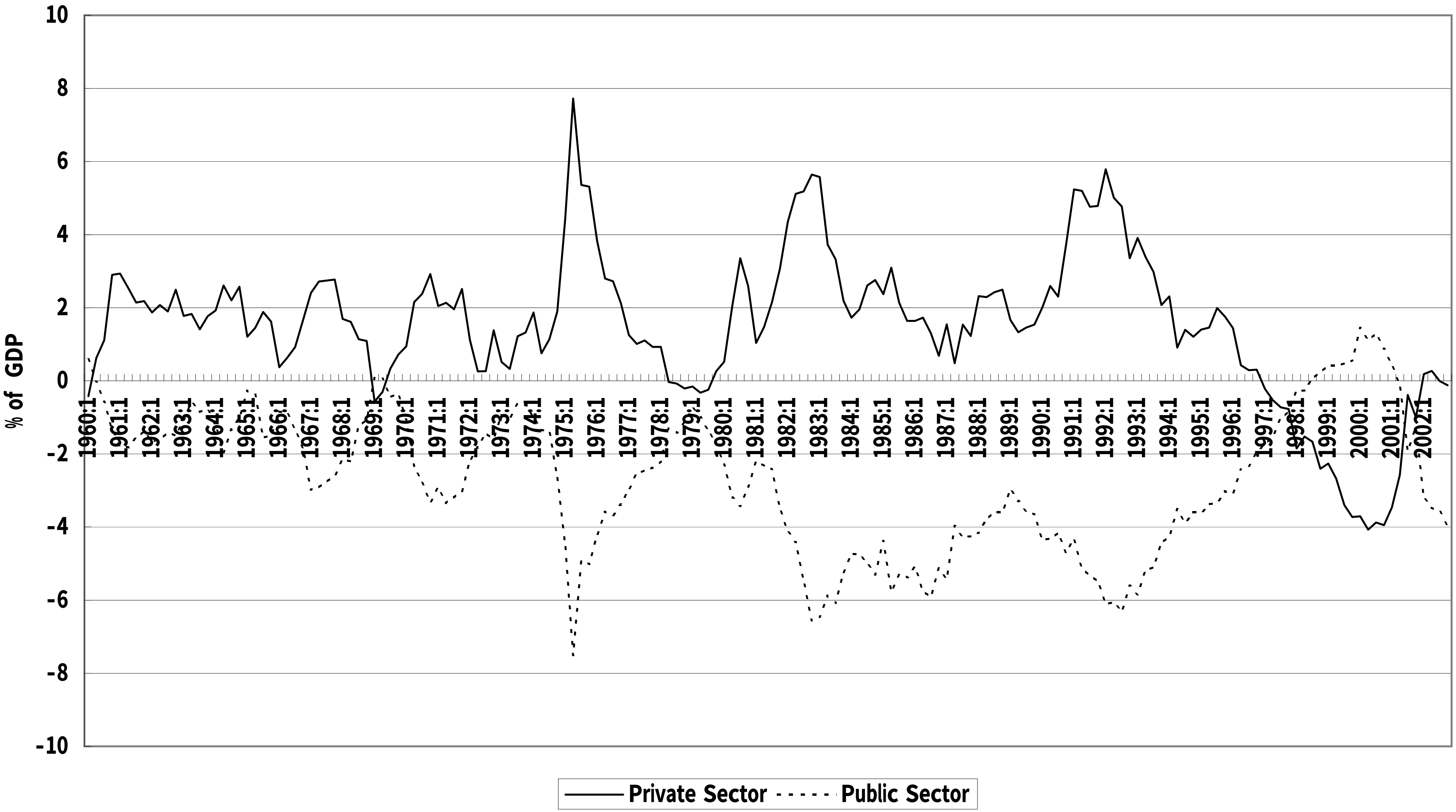

Figure 4: International Trade of Goods and Services

Figure 5: Net Capital Inflow

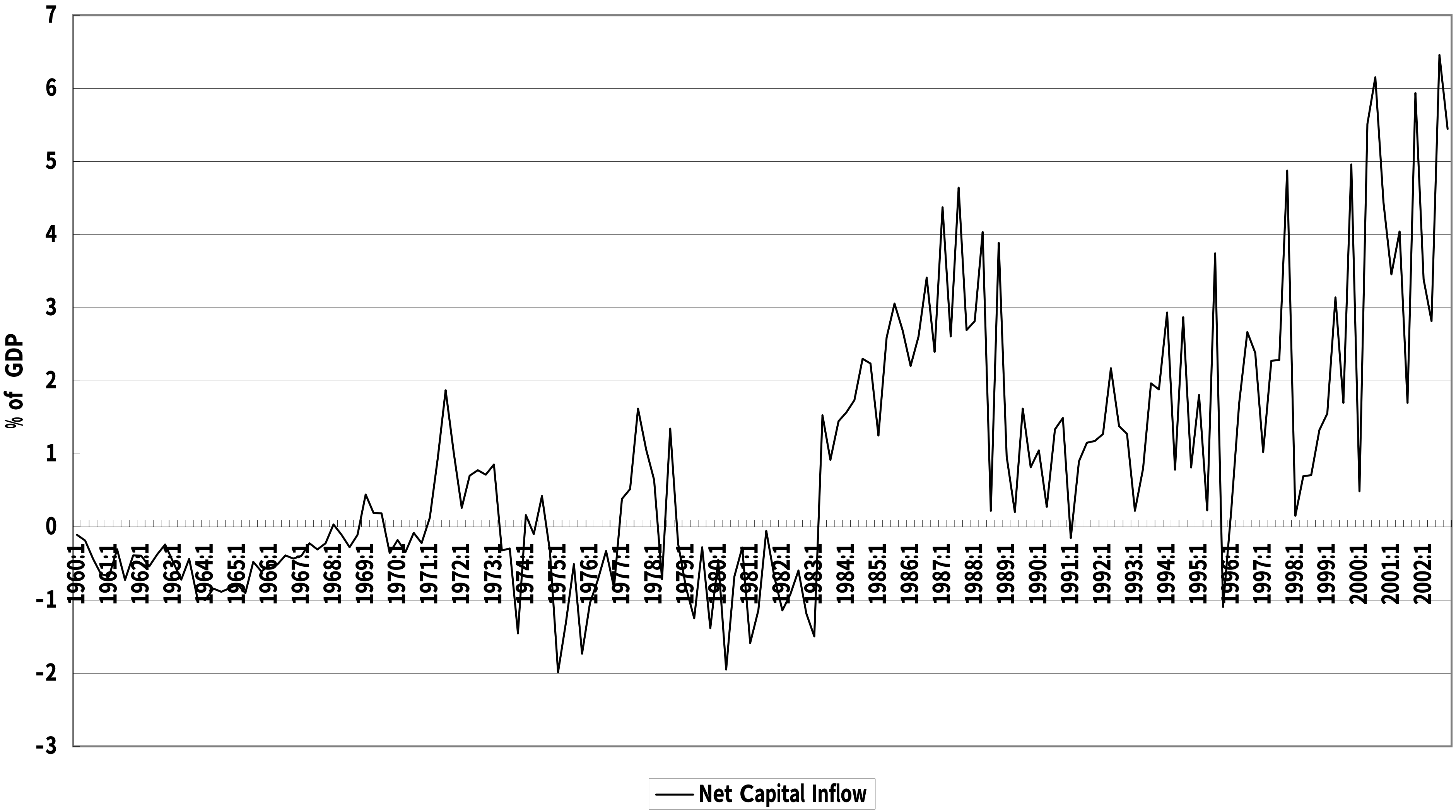

Figure 6: Net Capital Inflow by Items in BOP