Chapitre 2

Some Stylized Facts about Global Imbalances and the Direction of Capital Flows

2.1 Introduction

In this section, we review several simple concepts that shall be useful later and we highlight some important stylized facts characterizing past and recent developments in international capital markets. This chapter takes the first step in our study of international macroeconomics by explaining the accounting concepts economists use to describe the goods and capital market equilibrium and how international transactions modify these accounting identities. To get a complete picture of the macroeconomic linkages among economies that engage in international trade, we have to master three related and essential tools. The first of these tools, national income accounting, records all the expenditures that contribute to a country's income and output.

- the concept GDP which corresponds to the revenue produced on the territory, GNP which measures the income received by the residents of the home country, and the national income which corresponds to GNP less net unilateral transfers (difference between gifts, that is, payments that do not correspond to purchases of any good, service, or asset received from the rest of the world and gifts made by the United States to foreign countries : aid, private remittances, retreat payments, transfer to international organizations)
- the accounting identities relating output and demand components which allows us to link the current account balance to the trade balance, net savings, disposable national income less absorption, and the change in the net foreign asset position.

The second tool relates to balance of payments (BoP) accounting :

- A country's balance of payments has two main components : the current account and the financial account. The current account records exports and imports of goods and services and international receipts or payments of income. The financial account keeps record of sales of assets to foreigners and purchases of assets located abroad. When the current account is negative, it means that the country is a net importer of goods. When the financial account is positive, it reflects the fact that the country is a net capital

importer. The current account plus the financial account balance without reserve assets gives the official settlements balance. Under a fixed exchange rate regime, a country which runs recurring and large BoP deficits also runs down its international reserve assets and thus may be subject to a sudden stop, leading to a severe economic crisis (the country must cut consumption expenditure while interest rates rise sharply).

– While the BoP keeps tracks of trade and financial flows, the net international investment position (NIIP) is an accounting document provides information about the stock of assets and liabilities. If assets are lower than liabilities, it means that the country is net debtor vis à vis the rest of the world : a large external net indebtedness may signal a crisis since it may give rise to a capital reversal if the creditors believe that the country becomes insolvent, often preceded by an increase in the risk premium that raises the interest rate on foreign borrowing (and thus reduces economic activity due to financial frictions that reduce external finance due to lower profits). Examples : Mexico 1994, Argentina 2001, Iceland 2008, Cyprus, Greece, Portugal, Spain 2008-2011.[1] By cutting capital inflows, a sudden stop may trigger different types of crisis : currency crisis (first generation, second generation), currency and banking crisis (third generation).

Equipped with these accounting identities, we will analyze the movements in the current account in France and the US graphically which allows us to discuss the determinants of a current account deficit. We will see that productivity shocks and expansionary budget policies are the main drivers of current account deficits. The fact that expansionary fiscal policies trigger public deficits that may lead to current account deficits is in line with the twin-deficit hypothesis. While the twin-deficit assumption seems to be at odds with stylized facts for the US, except for the eighties, we have to keep in mind that that the current account is the result of both saving and investment changes and may be subject to productivity shocks as well (if public savings rise, the country may run a current account deficit due to an investment boom triggered by a productivity shock). Then, we will address the twin-deficit hypothesis by using first the Keynesian approach which allows us to give a quick refresher of the effects of an expansionary budget policy in the Mundell-Fleming Model (Keynesian model in open economy), differentiating between the fixed and the floating exchange rate regime. We will also develop a simple two-period model of small open economy in order to state the Ricardian equivalence. According to the Ricardian equivalence, agents have rational expectations and thus perfectly understand that tax cuts today will be followed by tax rates increase in the future for the government budget constraint to be fulfilled. As a result, agents save additional disposable income induces by the fall in the tax rates. Consequently, the rise in private savings offset the fall in public savings, thus leaving unaffected the current account. While VAR evidence lend credence to the twin-deficit hypothesis, adjustments in private savings in the US and the euro area tend to confirm the Ricardian equivalence.

We will pursue this chapter by reviewing several empirical facts related to the origins and the destination of capital flows which aim at financing current account deficits. To do so, we will consider the cumulative current account balances of major oil exports, other developing countries such Asia and Latin American countries, and advanced economies over the period 1973-2009. One major empirical fact that emerges is that the origin and the destination of capital flows varies dramatically over the four sub-periods. i) Over the period 1973-1981, capital flows from the South to the South which leads to the . ii) Over the period 1982-1989, capital flows from the North to the North. iii) Over the period 1990-1998, capital flows from

[1] A sudden stop is a fall in capital inflows occurring in conjunction with a sharp rise in credit spreads.

the North to the South (this discussion will provide us the opportunity to discuss the causes of the Asian crisis in a simple manner, by using empirical facts). iv) And over the period 1999-2009, capital flows from the South to the North.

We will close this chapter by mentioning the five major empirical facts that characterize the capital flows over last twenty years :

1. Global imbalances which reflect the large US current account deficit which has been increasingly financed by fast growing emerging economies, in particular Asian countries. The emergence of these global imbalances coincides with a general decline in world real interest rates. We will provide an explanation of this fact in chapter 3.
2. Allocation Puzzle : While the neoclassical model predicts that capital inflows are positively related to productivity growth, empirical facts show that aggregate net capital inflows tend to be negatively correlated with productivity growth across developing countries.
3. Cross border gross asset and liability positions have massively increased since the 1980s and especially in the 1990s and 2000s. This increase has been particularly pronounced for advanced economies which can be explained by the removal of capital and exchange rate controls and increased openness of capital account in the emerging economies.
4. Heterogeneity in Gross Flows and Positions. The asset composition of the external balance sheet of countries is heterogeneous with advanced economies tending to be long in risky assets and emerging markets short in risky assets.

   One line of explanation is that emerging countries are looking build up safe assets for precautionary savings due to poorly developed social security systems and in response to the Asian currency crisis in 1997 ; moreover several emerging countries pursue undervaluation policies by accumulating foreign bonds. As shown by Obstfeld (1994), financial integration has the advantage to diversify risk and to encourage a country to purchase risky foreign assets in order to reduce aggregate risk. Because the growth rate (of consumption) depends on expect returns and since expected return of risk asset is larger than that of safe asset, financial integration boosts growth by allowing risk diversification and thus by encouraging the home country to hold a larger share of risky assets. This line of reasoning may explain the reason why advanced countries have increased the share of risky assets in their portfolios.
5. The growing importance of valuation effects : Valuation effects, which are capital gains and losses on gross external assets and liabilities, account for an important and increasing part of the dynamics of the net foreign asset positions of countries. For the U.S., valuation effects have tended to be positive and economically large. Intuitively, a debtor country will experience an exchange rate depreciation which triggers traded surpluses allowing the country to reduce its external indebtedness ; the net international investment position also improves through a valuation channel because an exchange rate depreciation raises the domestic currency value of foreign assets (when they are denominated in foreign currencies).

2.2 Accounting Identities in Open Economy

In a first step, we relate the trade balance to capital flows which requires to start with the accounting identity stating that final output must be equal to total expenditure.

2.2.1 From GDP to Net National Income : Quick Refresher

GDP is the i) market value of all final goods and services produced within an economy in a given period of time. The value of all final goods and services is the ii) sum of the value added at each stage of production. The value added of a firm equals the value of the firm's output less the value of the intermediate goods that the firm purchases. iii) GDP also corresponds to the total income in the economy (labor income, capital income, profits).

GDP is a measure of the income flow that an economy produces in a given period of time (usually the year). This measure of income does not take into account the revenue paid to residents by foreigner and the revenue paid to foreigners by residents.

The national income accounts include other measures of income that differ slightly in definition from GDP. GDP is supposed to measure the volume of production within a country's borders. GNP equals GDP plus net receipts of factor income from the rest of the world. These net receipts are primarily the income domestic residents earn on wealth they hold in other countries less the payments domestic residents make to foreign owners of wealth that is located in the domestic country. GDP does not correct, as GNP does, for the portion of countries' production carried out using services provided by foreign-owned capital :

$$\begin{aligned} \text{GNP} &= \text{GDP} + \text{Factor Payments From Abroad} \\ &\quad - \text{Factor Payments to Abroad.} \end{aligned} \tag{2.1}$$

Consider an example : The earnings of a Spanish factory with British owners are counted in Spain's GDP but are part of Britain's GNP. The services British capital provides in Spain are a service export from Britain, therefore they are added to British GDP in calculating British GNP. At the same time, to figure Spain's GNP we must subtract from its GDP the corresponding service import from Britain.

Whereas GDP measures the total income produced domestically, GNP measures the total income earned by nationals (residents of a nation). For instance, if a Japanese resident owns an apartment building in New York, the rental income he earns is part of U.S. GDP because it is earned in the United States. But because this rental income is a factor payment to abroad, it is not part of U.S. GNP. In the United States, factor payments from abroad and factor payments to abroad are similar in size - each representing about 3 percent of GDP - so GDP and GNP are quite close ($\pm 1\%$ for France et $\pm 0.3\%$ for the U.S., 30% for the Koweit since it owns a large amount of foreign assets).

To obtain national income (NI), we subtract net unilateral transfers (transferts courants nets) :

$$\text{NI} = \text{GNP} + \text{net unilateral transfers.} \tag{2.2}$$

Examples of unilateral transfers of income are pension payments to retired citizens living abroad and foreign aid.

To obtain net national income (NNI), we subtract the depreciation of capital - the amount of the economy's stock of plants, equipment, and residential structures that wears out during the year :

$$\text{NNI} = \text{NI} - \text{Depreciation}. \tag{2.3}$$

In the national income accounts, depreciation is called the consumption of fixed capital. It equals about 10 percent of GNP. Because the depreciation of capital is a cost of producing the output of the economy and thus reduces the income of capital owners, subtracting depreciation shows the net result of economic activity.

Net National income equals GNP less depreciation plus net unilateral transfers.

2.2.2 Accounting Identity in Closed Economy : Quick Refresher

In a closed economy any final good or service that is not purchased by households or the government must be used by firms to produce new plant, equipment, and inventories (output not sold immediately to consumers or the government and added to involuntary investment). This equality between output and expenditure leads to a fundamental identity for closed economies. Let Y stand for GDP, C for consumption, I for investment, and G for government purchases. Since all of a closed economy's output must be consumed, invested, or bought by the government, we can write :

$$Y = C + I + G. \tag{2.4}$$

Subtracting C and I from both sides and adding $-T + T$ in the LHS of eq. (2.4), one obtains an accounting identity which says that savings are equal to investment.

$$(Y - C - T) + (T - G) = I, \quad \Leftrightarrow \quad S = I. \tag{2.5}$$

The goods market equilibrium leads to the capital market equilibrium. The firms pay wages and profit to the households who save a fraction of this revenue. Savings finance investment expenditure. In a closed economy, when firms sell their whole production, then savings must be equal to investment. Put otherwise, the income paid by firms $Y^S = C + S$ is entirely consumed or invested $Y^D = C + I$ so that $Y^S = Y^D = Y$ and $S = I$.

While in a closed economy saving and investment must always be equal, in an open economy they can differ. More precisely, an excess of investment over savings can be financed by borrowing abroad or an excess of savings over investment can be invested in foreign assets.

2.2.3 Moving from the Closed to the Open Economy

The GDP identity for open economies shows how output is divided between sales to domestic residents and sales to foreign residents. Since residents of an open economy may spend some of their income on imports, that is, goods and services purchased from abroad, only the portion of their spending that is not devoted to imports is part of domestic GDP. The value of imports, denoted by IM, must be subtracted from total domestic spending, $C+I+G$, to find the portion of domestic spending that generates domestic income. Similarly, the goods and services sold to foreigners make up a country's exports. Exports, denoted by EX, are the

amount foreign residents' purchases add to the national income of the domestic economy. The national income of an open economy is therefore the sum of domestic and foreign expenditure on the goods and services produced by domestic factors of production. Thus, the national income identity for an open economy is

$$Y = C + I + G + EX - IM. \tag{2.6}$$

Imports must be subtracted from expenditure $C + I + G + EX$ because the counterpart of the production by the home country is a demand for this output. Denoting by C^F, I^F, G^F, imports by households, firms and the government, we have to subtract imports in order to isolate the residents' demand for home goods and services : $C + I + G + EX - IM$. Hence, the accounting identity in an open economy can be rewritten as follows :

$$Y = C^D + I^D + G^D + EX, \tag{2.7}$$

where $C^D + I^D + G^D$ corresponds to the domestic component of final expenditure while EX represents the foreign component of final expenditure. Using the fact that the import content of consumption is 20%, 35% for investment, 10% public spending, the share of government expenditure, investment and consumption on domestic goods are : $G^D/Y = 20\%$, $I^D/Y = 13\%$, consumption $C^D/Y = 42\%$, and exports $EX/Y = 25\%$ du PIB.

2.2.4 Capital Flows and the Trade Balance

As in a closed economy, we can manipulate the GDP accounting identity in order to show that the capital market is linked to the goods market. To establish the relationship between net exports (or the trade balance) $TB \equiv EX - IM$ and net savings $S - I$, we subtract all demand component $C + G + EX - IM$ from GDP, i.e., from the LHS of (2.6), and subtract and add taxes T. One obtains an accounting identity which can be interpreted in two ways :

$$\begin{aligned} I &= (Y - C - T) + (T - G) + (IM - EX), \\ \text{or} \quad I - S &= (IM - EX). \end{aligned} \tag{2.8}$$

The RHS term, $(Y - C - T)$ corresponds to private savings, $T - G$ to the primary balance, and $(IM - EX)$ to external indebtedness. According to this accounting identity, if national savings which is equal to the sum of private and public savings, is not large enough to finance investment, the excess of investment over savings $I - S$ can be financed by borrowing abroad an amount equal to $IM - EX$. In this case, the country experiences a capital inflow. As a result, a country which experiences a capital inflow from the rest of the world (RW hereafter) also experiences a trade balance deficit.

$$I - S = \text{capital inflows} = \text{trade deficit}, \tag{2.9a}$$

$$S - I = \text{capital outflows} = \text{trade surplus}. \tag{2.9b}$$

The RHS of (2.9b) shows that $S - I > 0$ corresponds to a trade surplus $EX - IM > 0$. Intuitively, when the home country's expenditure are low relative to output, the country exports a large fraction of its output and imports a small output. Because consumption is relatively low compared with national income, the excess of savings over investment can be invested abroad. In this case, the country is a **net lender**. If the country borrows abroad to finance investment, the country is a **net borrower**.

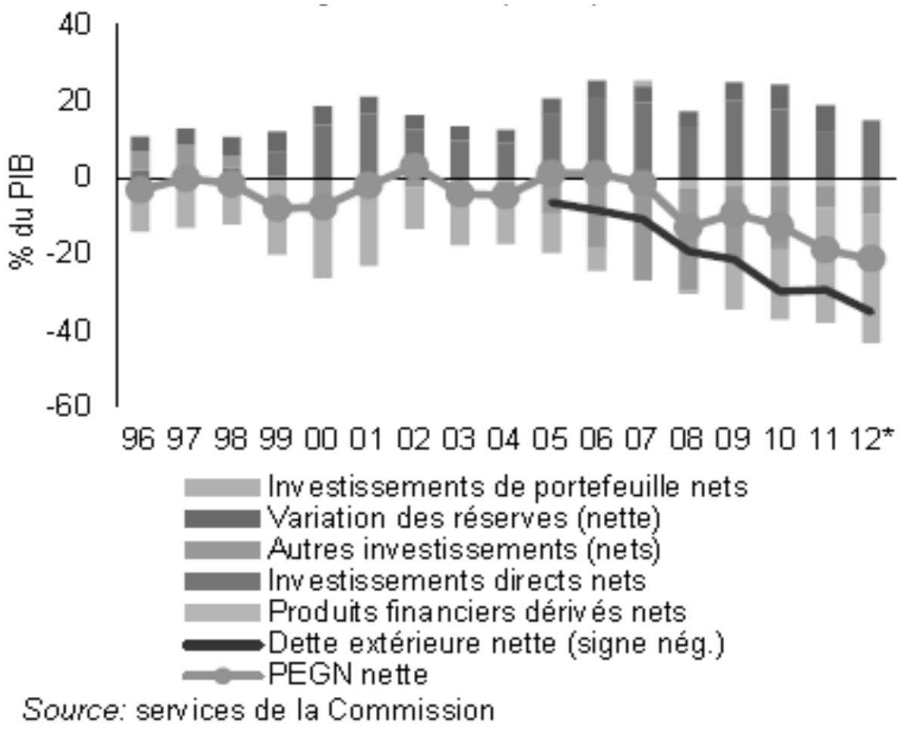


FIG. 2.1 – Net external asset position (% of GDP) in France - Source : Commission Européenne (2014) France 2014, Déséquilibres macroéconomiques

2.2.4.1 Savings, Investment and Trade Balance in France

France has accumulated trade balance deficits since 2004 and became a **net debtor** (foreign liabilities are larger than foreign assets owned by France) in 2007 (amounts to 10% of GDP approximately in 2010), as illustrated in Figure 2.1.[2] The fact that a country becomes a net debtor can be worrying ? By running a deficit in its current account, a country can obtain resources from abroad to invest even if its domestic saving level is low. If the country borrows to undertake productive investments that they would not otherwise carry out, both they and lenders reap gains from trade. If borrowing is devoted to private or government expenditure, the current account deficit may be worrying : in return for being able to import more foreign goods today than its current exports can pay for, the country must promise to repay in the future, either the interest and principal on loans or the dividends on shares in firms sold to foreigners.

Let us take a look at the data about the trade balance, savings, and investment in France. As shown in Table 2.1, in 2007, exports amount to 26.5% of GDP and imports to 28.4% of GDP. Because exports are lower than imports, France experienced a trade balance deficit equal to 1.9% of GDP. As discussed above, a trade balance deficit leads to capital inflows. Have these capital inflows been invested or alternatively been devoted to private or public consumption ? Panel B of Table 2.1 decomposes the accounting identity into two components : a private sector component ($S^P - I$), a public sector component ($S^G = T - G$ which corresponds to the primary deficit), and the trade balance ($TB = EX - IM$). Data summarized in panel B suggest that private savings is large enough to finance investment by firm.

[2]Position extérieure globale nette (PEGN) corresponds to the net international investment position : assets located abroad owned by France less French assets owned by foreigners.

Agregates	% of GDP, 2007
A.Variables	
Exports	26.5
Imports	28.4
Public expenditure	23.1
Tax revenues	20.4
Investment	21.5
Savings	22.90
B.Balances	
Net exports	-1.9
Public sector	-2.7
Private sector	1.4

TAB. 2.1 – Trade Balance, Private and Public Saving, Investment (in percentage of GDP)

Instead, the public sector experiences a deficit. Hence, the excess of investment over savings is due to a public deficit. In conclusion, the data suggest that government expenditure are too large compared with tax revenues and this excess of public spending is financed by borrowing abroad. While it would be tempted to say that these funds are wasted, we have to take into account that public spending which is taken into account into the calculus of GDP includes education, health expenditure and public investment which promote growth. The question is rather the following : is the capital return on public investment large enough to guarantee interest rate payments ?

2.2.4.2 Current Account and the Accounting Identity

What is the difference between the current account and net exports ? The discrepancy between these two aggregates is related to the difference between GDP and the national income which is equal to net factor income plus net unilateral transfers denoted by NII (NII corresponds to net international income). Adding NII in both sides of the accounting identity, on obtains :

$$Y + NII - T = C + I + (G - T) + (NII + EX - IM)\,. \tag{2.10}$$

The LHS term of (2.10) corresponds to the residents' national income $NI = T + NII$. Remembering that private savings is the share of national income which is not consumed, i.e., $S^P \equiv Y + NII - T - C$, one obtains an accounting identity which allows us to defined the current account balance :

$$CA \equiv NII + EX - IM \equiv \left(S^P + S^G - I\right) \equiv S - I = \Delta B. \tag{2.11}$$

This relationship shows that the current account is close to the definition of net exports. Assuming that the net foreign asset position is initially nil so that $NII = 0$ (abstracting from net income payments from labor services), when imports are larger than exports, the country experiences a current account deficit. Conversely, we say that the country experiences a current account surplus if the country runs a positive trade balance. Following a current account surplus, the country raises its net foreign asset position (by purchasing foreign assets

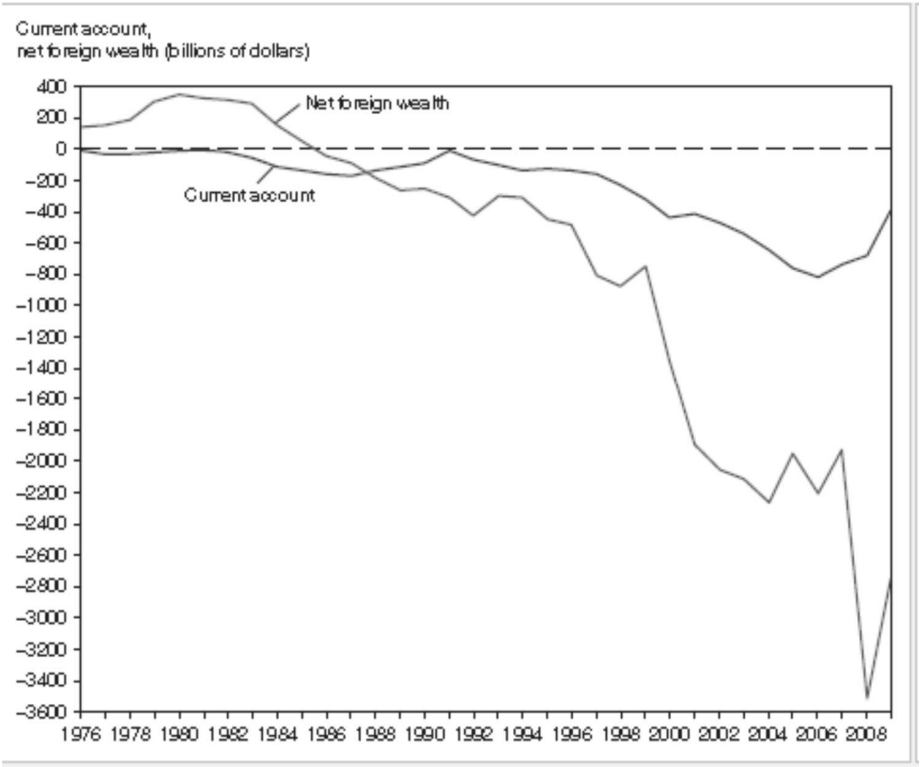


FIG. 2.2 – The U.S. Current Account and Net Foreign Wealth Position, 1976-2008 - Source : Krugman, Obstfeld, Melitz (2012) International Economics : Theory and Policy, 9th Edition, Pearson

or reducing its external debt). Hence, the **current account can be defined as the change in the net foreign asset position**, denoted by ΔB. If a country consumes more than it produces, it must borrow abroad to the difference. A country with a current account deficit must increase its net foreign debts by the amount of the deficit. When foreign assets held by residents are lower than domestic liabilities owned by non residents, then the country experiences a negative net foreign asset position and is said to be a net debtor.

Figure 2.2 gives a vivid illustration of how a string of current account deficits can add up to a large foreign debt. The figure plots the U.S. current account balance since the late 1970s along with a measure of the nation's stock of net foreign wealth. As you can see, the United States had accumulated substantial foreign wealth by the early 1980s, when a sustained current account deficits of proportions unprecedented in the 20th century opened up. In 1987, the country became a net debtor to foreigners for the first time since World War I. That foreign debt has continued to grow, and now stands at about 20 percent of GNP. However, as will be discussed later, this relatively negative picture should be qualified, as the US benefits from large valuation effects. One would expect that the U.S. pay more interest and dividends to the rest of the world than it receives. In other words, we would expect that the net investment income component of the current account be negative ($NII < 0$). In other words, by running recurring current account deficits, the country raises its gross foreign-owned liabilities so that we would expect a negative income balance and thus a larger current account deficit in the next period. While the current account deficit rises over the 1990s and the 2000s until 2008, a negative income balance is not observed in the data. In particular, in 2007, the US have received 815 billions of dollars of interest payments on their foreign assets while they paid 726 billions of dollars of interests on their liabilities.

2.2.5 Four Alternative Ways of Viewing the Current Account

We review four alternative definitions of the current account balance by using accounting identities discussed above.

2.2.5.1 Current Account Deficits As Reflections of Trade Deficits

Recall first the basic concept, introduced earlier, that in the absence of valuation changes, the current account measures the change in the net international investment position (NIIP) of a country :

$$CA_t = B_t - B_{t-1}. \tag{2.12}$$

where CA_t denotes the country's current account in period t and $B_t = A_t - L_t$ (where A_t are assets and L_t are liabilities) the country's net international investment position at the end of period t. If the current account is in deficit, $CA_t < 0$, then the net international investment position falls, $B_t - B_{t-1} < 0$. Similarly, if the current account displays a surplus, $CA_t > 0$, then the net international investment position improves, $B_t - B_{t-1} > 0$. Intuitively, a country with a negative current account balance has low savings and/or high investment. To finance the excess of investment over savings, the country must borrow abroad (domestic shares are purchased by foreigners,

2.2.5.2 Current Account Deficits As Reflections of Trade Deficits

In line with the definition given by BoP accounting document (see eq. (2.11)), the current account is equal to the sum of the trade balance and net investment income (we are ignoring net international compensation to employees and net unilateral transfers) :

$$CA_t = TB_t + r^\star \, .B_{t-1}, \tag{2.13}$$

where TB_t denotes the trade balance in period t, and $r^\star$ denotes the interest rate. All other things equal, larger trade imbalances, or a larger gap between imports and exports, are reflected in larger current account deficits. This follows from the definition of the current account given by (2.13). As will be shown later, the trade balance and the current account move closely together.

2.2.5.3 The Current Account As the Gap Between National Income and Domestic Absorption

Let Y_t denote the amount of final goods and services produced domestically in period t. This measure of output is typically referred to as gross domestic product, or GDP. Let C_t denote the amount of goods and services consumed domestically by the private sector in period t, G_t denote government consumption in period t, and I_t denote the amount of goods and services used for domestic investment (in plants, infrastructure, etc.) in period t. We will refer to C_t, G_t, and I_t simply as consumption, government spending, and investment in period t, respectively. Then we have that

$$Y_t = C_t + I_t + G_t + EX_t - IM_t, \tag{2.14}$$

where EX_t and IM_t stand for exports and imports. Using the definition of the trade balance as the difference between exports and imports of goods and services,

$$TB_t = EX_t - IM_t,$$

eliminating TB_t from (2.13) by using (2.14)

$$TB_t = Y_t - (C_t + I_t + G_t), \tag{2.15}$$

and plugging this relation (2.15) into equation (2.13), we get

$$CA_t = r^\star .B_{t-1} + Y_t - C_t - I_t - G_t. \tag{2.16}$$

The sum of GDP and net investment income ($r^\star .B_{t-1}$), is called national income, or gross national product (GNP) since we abstract from net unilateral transfers. Denoting national income in period t, NI_t, that is,

$$NI_t = Y_t + r^\star .B_{t-1}, \tag{2.17}$$

and absorption

$$A_t = C_t + I_t + G_t, \tag{2.18}$$

the current account can be defined as the difference between GNP and absorption :

$$CA_t = NI_t - A_t. \tag{2.19}$$

A current account deficit may signal that absorption is too high, either due to large government spending, increased private consumption, or a high investment rate (triggered by high global productivity or excessive credit expansion)

2.2.5.4 The Current Account As The Gap Between Savings and Investment

A fourth alternative way to define the current account balance is to use the definitions of savings and investment. Private savings, which we will denote by S_t^P, is defined as the difference between national disposable income and private consumption, that is,

$$\begin{aligned} S_t^P &= Y_t + r^\star .B_{t-1} - T_t - C_t, \\ &= NI_t - T_t - C_t, \end{aligned} \tag{2.20}$$

where we denote by T_t the taxes. We denote by S_t^G the primary balance with $S_t^G = T_t - G_t$; public savings is equal to tax revenues T_t less public spending :

$$S_t^G = T_t - G_t. \tag{2.21}$$

National savings is equal to the sum of private and public savings :

$$S_t = S_t^P + S_t^G = NI_t - C_t - G_t. \tag{2.22}$$

Using the fact that $CA_t = NI_t - C_t - G_t - I_t$, the current account is equal to savings less investment (see (2.18)-(2.19)) :

$$CA_t = S_t - I_t. \tag{2.23}$$

In conclusion, in terms of absorption (eq. (2.19)), of net savings (eq. (2.23)), and of net exports (eq. (2.13)), a current account deficit can be interpreted as the result of high spending, excess of investment over savings, or competitiveness deterioration leading to low exports. Eq. (2.12) shows that a current account deficit materializes into a rise into liabilities and/or a fall in assets (i.e., a NIIP deterioration).

2.2.6 Current Account Changes in OECD countries as a Result of Saving and Investment Behavior

Une façon simple d'étudier l'évolution des modifications des avoirs extérieurs nets d'un pays (c'est-à-dire son solde courant) est d'analyser l'évolution du taux d'épargne et du taux d'investissement.

Le solde courant est le reflet de trois flux : l'épargne nationale pouvant être scindée en deux composantes, l'épargne privée des ménages et l'épargne publique d'une part, et l'investissement d'autre part. Pour le voir plus facilement, il suffit de réécrire l'identité comptable :

$$CA = S^P + (T - G) - I. \tag{2.24}$$

Ces trois flux peuvent se modifier en fonction des comportements des ménages et des firmes, et des politiques menées par le gouvernement (expansion ou restriction budgétaire). Nous allons analyser la relation entre épargne nette de l'investissement et solde courant en nous intéressant d'abord au cas des pays industrialisés en prenant l'exemple de deux pays : les Etats-Unis et la France.

2.2.6.1 Current Account Movements in the United States

Pendant les années 1970, la Figure 2.3 montre que le taux d'investissement et le taux d'épargne aux Etats-Unis restent élevés et proches. La Figure 2.4 indique que le solde courant américain reste équilibré pendant cette période. Puis à partir de 1982, on observe une diminution importante du taux d'épargne nationale aux Etats-Unis. L'explication se trouve dans la politique fiscale menée par Ronald Reagan qui baisse fortement les impôts à partir de cette date. Le solde budgétaire qui était négatif dans les années 1970 mais ne dépassait pas 2% en moyenne se creuse très fortement à partir de 1982 pour atteindre -4.1% puis -5.5% en 1983. Entre 1981 et 1989, le déficit budgétaire s'établit en moyenne à 4% du PIB ce qui aboutit à une diminution du taux d'épargne qui passe de 24% à 20%. Bien que le taux d'investissement diminue au cours de cette période, en particulier sous l'effet de la politique monétaire restrictive menée au début des années 1980 et des taux d'intérêt réels qui en a résulté, la chute du taux d'épargne est plus importante. De manière consécutive, il apparaît un déficit courant à partir de 1982 qui ne cesse de s'accentuer pour atteindre un maximum en 1987 (-3.4%).

Puis le solde courant s'améliore de 1987 à 1991 sous l'effet de la forte baisse du taux d'investissement entraînée par la crise des Caisses d'Epargne et le Krach boursier de 1987 (annonce du déficit commercial américain concomittant à un déficit public et début de la crise bancaire) et en raison de la réduction du déficit budgétaire (de l'ordre de 3%).

Après la mini-récession 1990-1992, sous l'effet de l'amélioration de la situation financière du secteur bancaire, de la politique monétaire plus accomodante, et de l'essor des nouvelles technologies, le taux d'investissement remonte fortement et passe de 20% à 23% en 8 ans (1992-2000). Parallèlement, le taux d'épargne des ménages diminue de manière marquée pendant cette période. L'effet combiné de la hausse du taux d'investissement et de la baisse du taux d'épargne des ménages conduit à une forte dégradation du solde courant de 1992 à 2000. Toutefois, l'accroissement du déficit courant est modéré par la réduction du déficit primaire

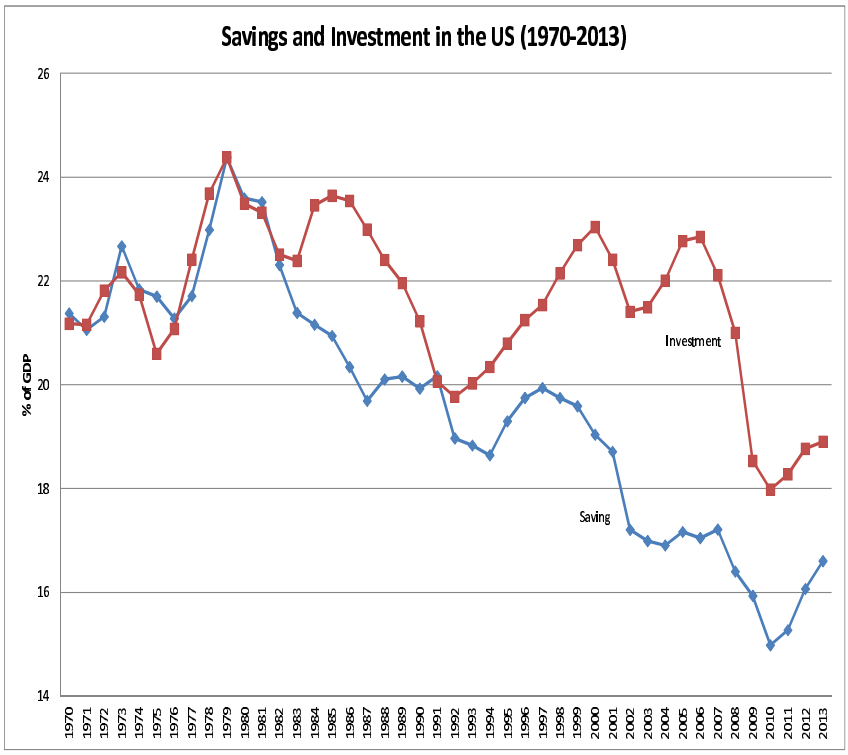


FIG. 2.3 – Saving and Investment Movements in the US (1970-2013)

et l'apparition d'un surplus entre 1998 et 2001. A partir de 1993, le président Bill Clinton réduit les déficits en augmentant les impôts et en diminuant les dépenses publiques ce qui fait augmenter le taux d'épargne nationale jusqu'en 1997.

La poursuite de la forte dégradation du déficit courant américain de 2000 à 2006 est liée à la chute du taux d'épargne : d'abord sous l'effet de la baisse du taux d'épargne des ménages (le solde budgétaire est positif de 1998 à 2001) et ensuite sous l'impact de la politique de baisse des impôts menée par le président George Bush. Pour être plus précis, les Etats-Unis ont un excédent primaire sur la période 1998-2001 puis la chute des recettes fiscales jusqu'en 2004 conduit à un déficit primaire important (-4.6% en 2003 et -4.1% en 2004). Le solde courant continue de se dégrader jusqu'en 2006 sous l'effet de la hausse du taux d'investissement (de 23% à 18%).

De 2006 à 2013, le déficit courant se réduit, passant de -5.8% du PIB à -2.3% du PIB. Cette réduction du déficit s'explique par la faiblesse du taux d'investissement. Bien qu'il apparaît un déficit primaire important, il est compensé en grande partie par la hausse du taux d'épargne des ménages.

2.2.6.2 Current Account Movements in France

Maintenant, nous allons regarder ce qui s'est passé en France au cours des 35 dernières années. Le premier fait marquant est la très forte dégradation du solde courant français de 1978 à 1982 comme le montre la Figure 2.7. Cette dégradation s'explique en étudiant l'évolution du taux d'épargne et du taux d'investissement sur la Figure 2.6. Le taux d'épargne chute de 1978 à 1982 puis continue de baisser jusqu'en 1985. Cette chute du taux d'épargne nationale a deux causes : (1) la dégradation du déficit primaire à partir de 1980 qui s'accentue

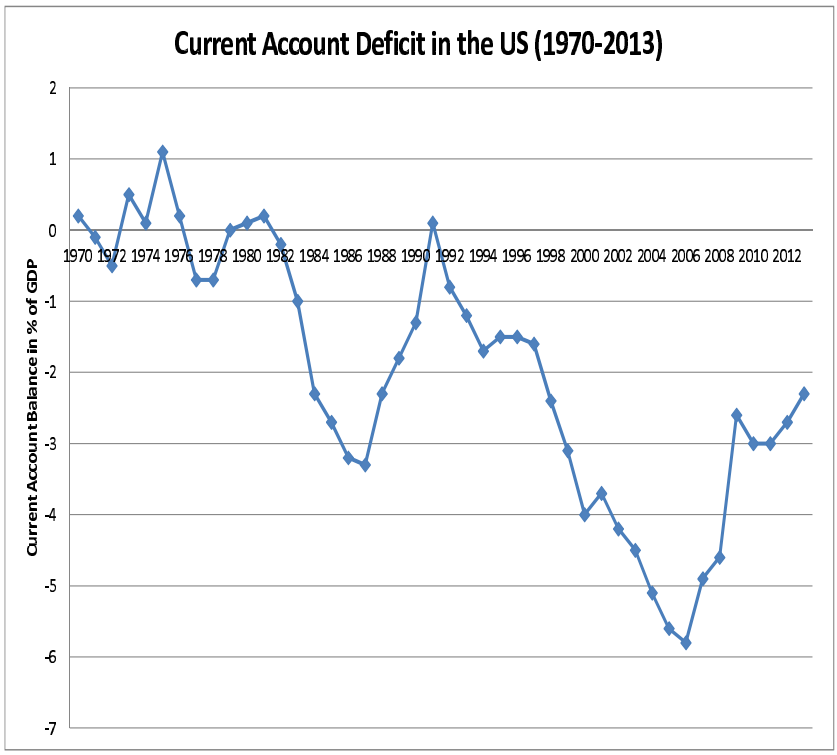


FIG. 2.4 – Current Account Movements in the US (1970-2013)

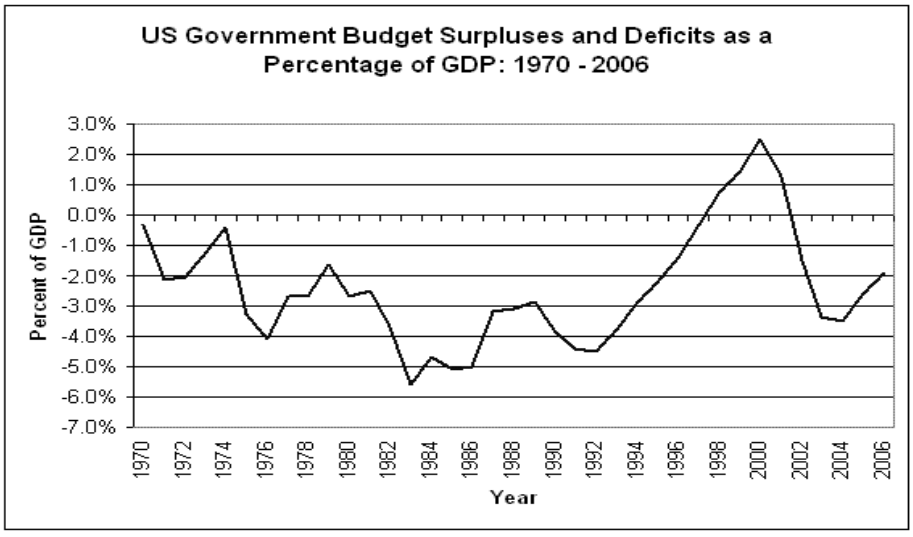


FIG. 2.5 – Primary Fiscal Deficit in the U.S. (1970-2013)

en 1981 et 1982 sous l'effet de la politique de relance du gouvernement en mai 1981, (2) la très forte diminution du taux d'épargne des ménages, comme l'illustre la Figure 2.9, qui peut s'expliquer par le fort ralentissement de la progression du salaire réel (plan Barre en 1978 puis blocage de la progression des salaires à partir de 1983, et ralentissement de la productivité du travail) qui connaît une baisse entre 1983 et 1985 ($g_{W/P} = 8\%$ en 1974 puis 0.5% en 1981 et -0.5% entre 1983 et 1985). Pour éviter une chute trop importante de leurs dépenses, les ménages ont puisé dans leur épargne. L'abandon de la politique de relance par le gouvernement en 1983 permet de stabiliser le taux d'épargne nationale. Combiné au niveau faible du taux d'investissement, il apparaît un excédent du compte courant en 1986.

Après l'accroissement du déficit courant français entraîné par la baisse de l'épargne qui diminue davantage que l'investissement, le deuxième fait marquant est le déficit courant de la France de 1987 à 1991. Alors que le taux d'épargne des ménages remonte fortement de 1987 à 1993 sous l'effet de l'expansion économique et de la hausse du chômage, la très forte remontée du taux d'investissement (1985-1990) stimulé par l'accroissement de la productivité du capital aboutit à un déficit courant qui se réduit à mesure que le taux d'épargne des ménages s'élève. La hausse du taux d'investissement français s'explique par la politique de désinflation menée par la France dont l'un des volets était de restaurer les profits des firmes qui avaient chuté de 1978 à 1982. Bien que la politique de désinflation conduit à des taux d'intérêts réels très élevés, le blocage de la progression des salaires permet d'élever les profits des firmes et d'augmenter fortement la rentabilité du capital. Sur cette période, le taux d'épargne des ménages double mais la hausse du taux d'investissement est telle qu'il apparaît un déficit courant.

Un troisième fait marquant est l'excédent courant que connaît la France à partir de 1992. Ce surplus de la balance courante ne cesse d'augmenter jusqu'en 1999 et restera positif jusqu'en 2004. Que s'est-il passé ? Cette période correspond très exactement à la période au cours de laquelle, le taux d'épargne national augmente fortement et passe de 18.4% à 21.4%. Cet accroissement du taux d'épargne nationale ne s'explique pas par la remontée du taux d'épargne des ménages qui avait déjà augmenté sur la période. Il s'explique par la diminution du déficit budgétaire au cours de cette période de façon à satisfaire les conditions d'entrée dans la zone euro spécifiées par le Traité de Maastricht entré en vigueur en 1993. Cette réduction du déficit apparaît sur la Figure 2.10.

Après avoir atteint un maximum en 1999, le solde courant français se dégrade de manière continue jusqu'en 2011 en passant de 3.15% du PIB à -3.6% en 2011. La baisse du surplus courant sur la période 2000-2003 s'explique d'abord par le déficit budgétaire. Le déficit de la balance courante qui a débuté en 2005 et se poursuit de nos jours repose d'abord sur la hausse du taux d'investissement de 2003 à 2008. La hausse du taux d'investissement qui débute une remontée à partir de 1997 et qui se poursuit en 2003 jusqu'en 2008 s'explique principalement par le niveau faible des taux d'intérêt réels. Sur la période 2000, on assiste à une diminution du taux d'épargne français qui passe de 24% du PIB à 19% du PIB environ. La réduction du taux d'épargne s'explique par les déficits publics (qui passe de -1.8% en 1999 à -5.2% en 2011 ; en moyenne, le déficit budgéraire est de 4.2%).

En résumé, la dégradation du solde courant de 1999 à 2008 s'explique à la fois par la baisse de l'épargne publique et la forte hausse de l'investissement. Le déficit courant s'aggrave de 2008 à nos jours sous l'effet d'un déficit public important.

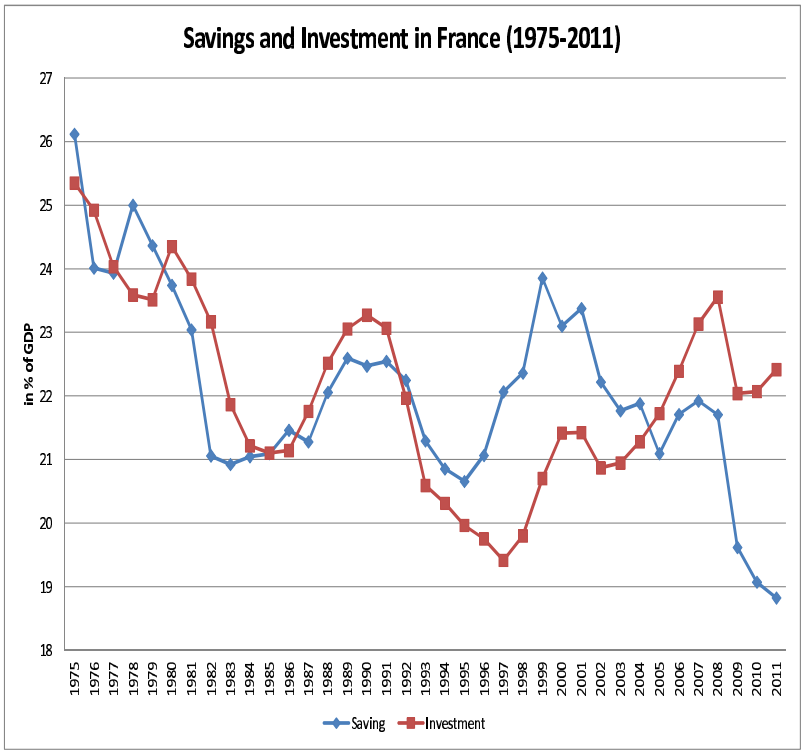


FIG. 2.6 – Saving and Investment in France (1975-2011)

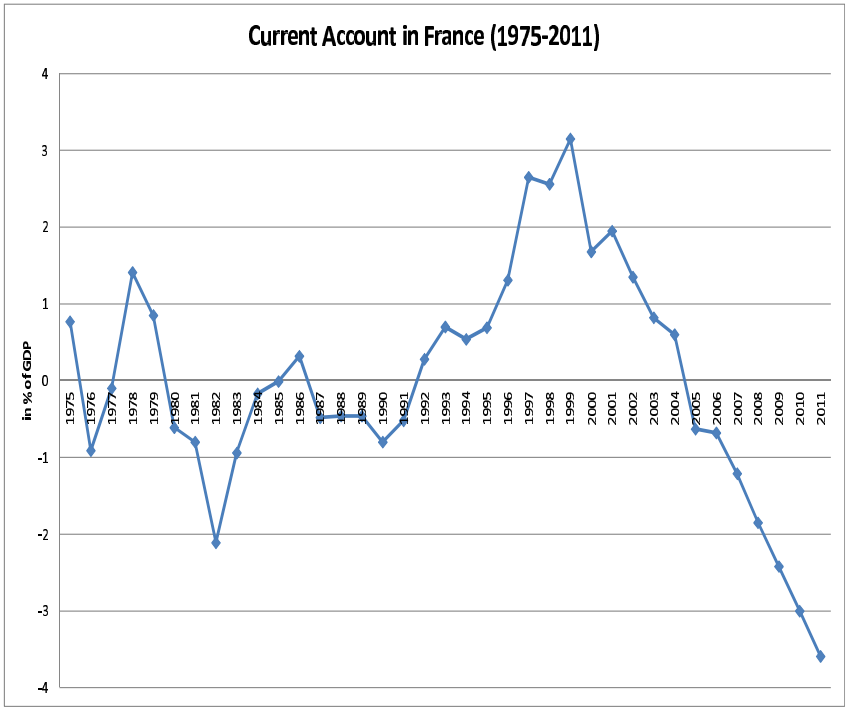


FIG. 2.7 – Current Account Movements in France (1975-2011)

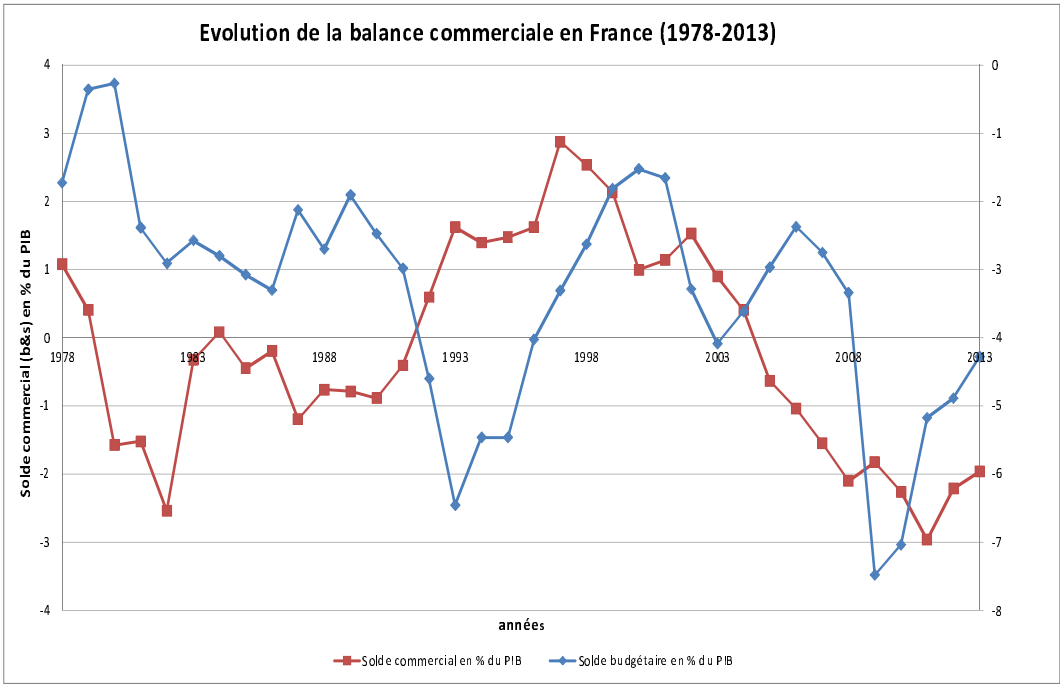


FIG. 2.8 – Trade balance and public deficit in France (1978-2013)

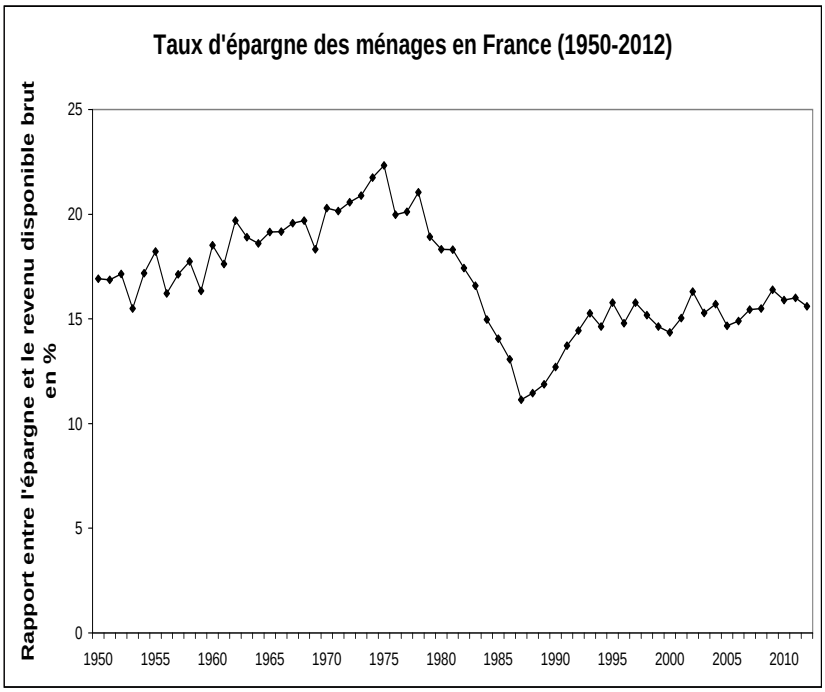


FIG. 2.9 – Households' Savings Rate in France (1950-2012)

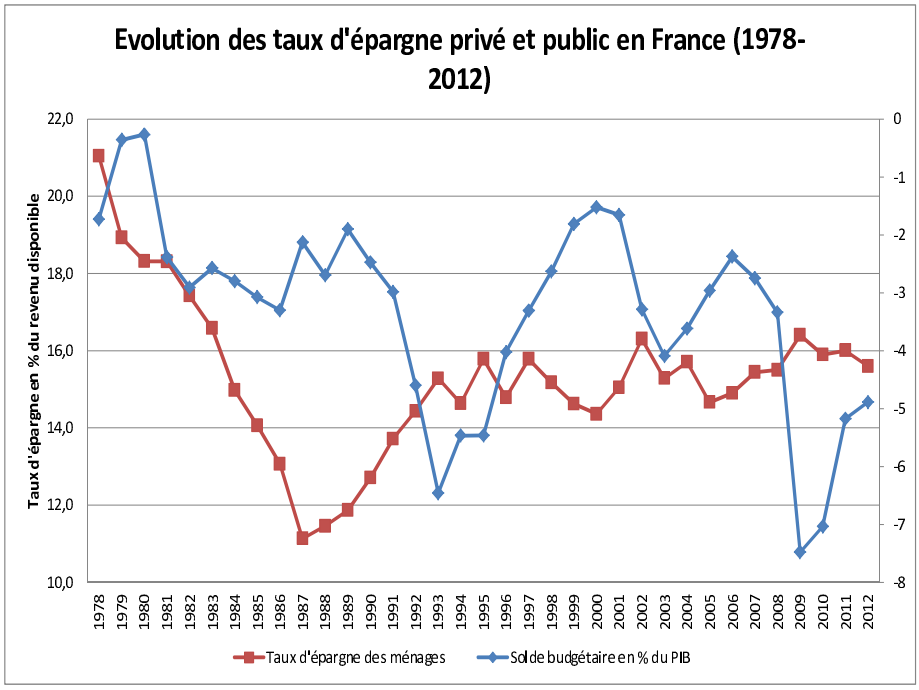


FIG. 2.10 – Private and Public Savings Rate in France (1978-2012)

2.3 Twin Deficits

Our analysis of the current account adjustments in France and in the U.S. allows us to draw two major conclusions :

1. A productivity improvement worsens the current account by stimulating investment ; for example, the current account deficit episodes experienced by France or the U.S. over the period 1985-1990 and 1992-2000 coincide with episodes of investment boom.
2. By reducing public savings and thus national savings, an expansionary budget policy may produce a current account deficit if the crowding out of investment is not too large ; the current account deficit episodes between 1980 and 1982, 2000 and 2003, and between 2006 and 2009 have coincided with a rise in the public deficit in France, as illustrated in Figure 2.8 ; moreover, current account deficits episodes in the U.S. over the periods 1982-1987 and 2001-2003 have also coincided with expansionary budget policies episodes. Between 1981 and 1986, the Reagan administration has lowered tax rates and increased public spending, thus leading to a rise in the public deficit from -2.5% of GDP to -5% of GDP. The current account deteriorates markedly and becomes negative (the current account deficit reaches 3% in 1987). This episode suggests that the current account and public savings are positively correlated. In the following, we analyze this relationship.

2.3.1 Ricardian Equivalence vs. the Twin Deficit Hypothesis

So far, we have discussed the current account adjustment by using a simple accounting identity according to which savings less investment is equal to the current account. A productivity shock triggers a current account deterioration by reducing private savings (because labor supply falls while consumption increases) and by boosting investment. While it is commonly accepted that productivity shocks lead to a current account deficit, the so-called

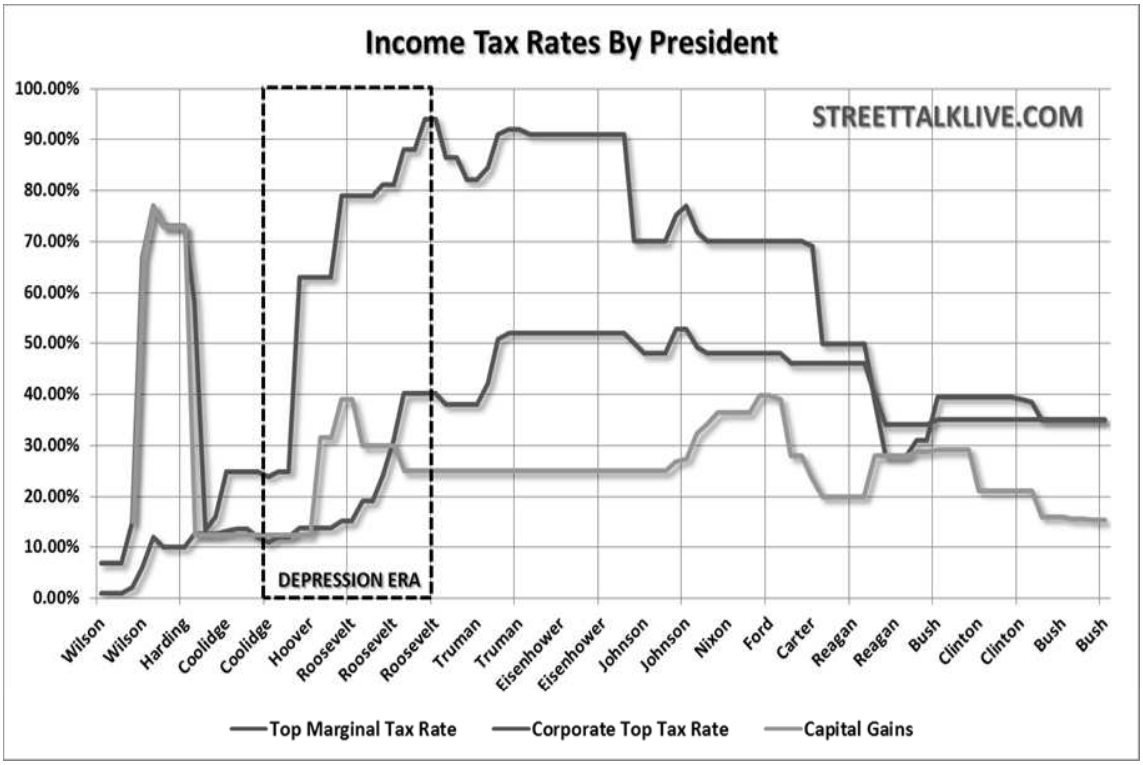


Fig. 2.11 – Marginal Tax Rates in the US Source : www.taxfoundation.org

twin-deficit hypothesis which states that fiscal deficits lead to current account deficits is more debatable.

The idea behind the twin deficit hypothesis is as follows. Start with the definition of the current account as the difference between national savings and aggregate investment. In turn, national savings is the sum of private savings and government savings (or fiscal surpluses). Suppose now that expansionary government spending lowers government savings. If private savings and investment are unaffected by the expansionary fiscal policy, then the current account must deteriorate by the same amount as the decline in government savings.

2.3.1.1 The Twin Deficit Hypothesis : Facts

The current account is equal to the difference between national savings and investment. National savings is equal to the sum of public savings and private savings. All things being equal, the decline in public savings lowers the current account. As documented above, until 1982, the U.S. had run current account surpluses but thereafter a string of large current account deficits opened up. The emergence of large current account deficits coincided with large fiscal deficits shown in Figure 2.5 that were the result of the Reagan administration's policy of tax cuts as illustrated in Figure 2.11 and increases in military spending. The joint deterioration of the current account and the fiscal balance that took place in the early 1980s is documented in the top left panel of 2.12.

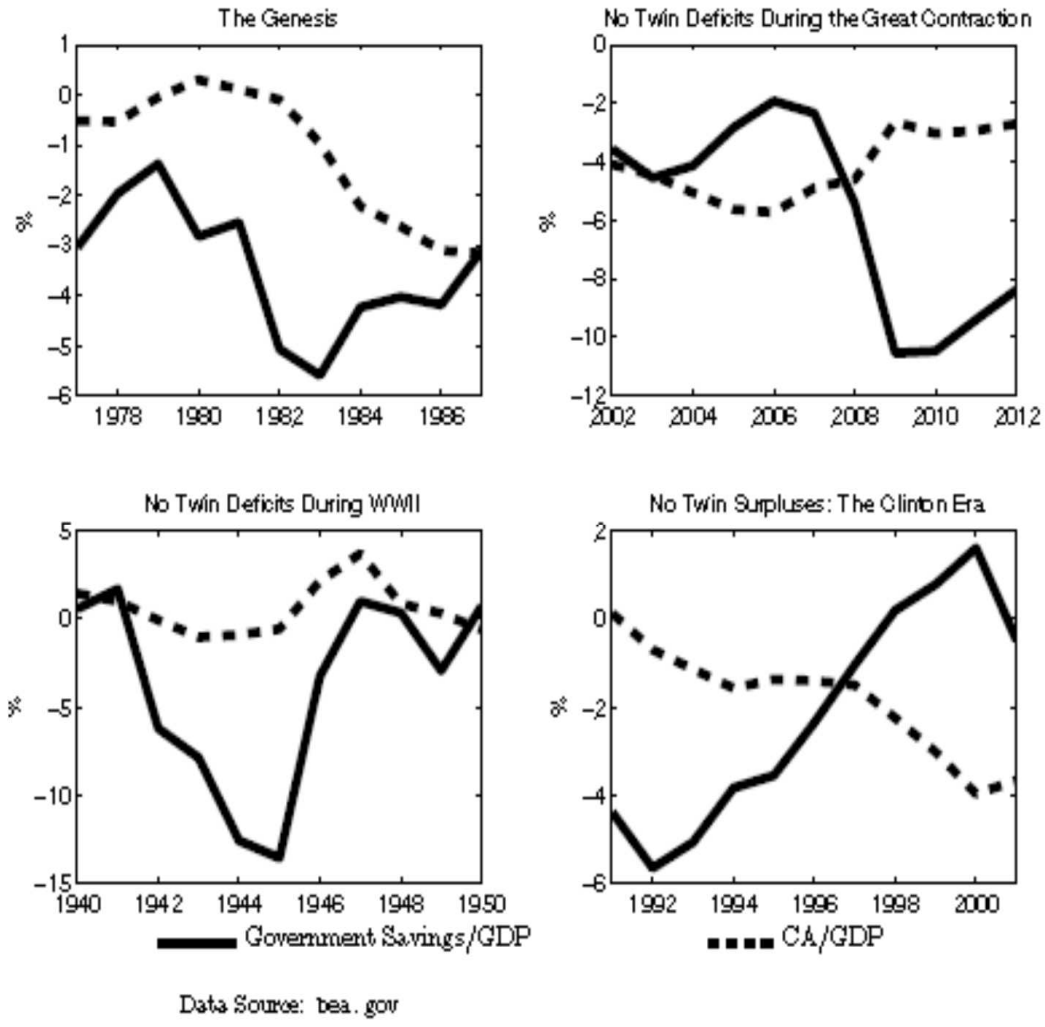


FIG. 2.12 – Twin Deficit Hypothesis : The US example - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 7

Are twin deficits a recurrent phenomenon ? To answer this question, it is of interest to look at other episodes of large changes in government savings. The most recent episode of this type is the fiscal stimulus plan implemented by the Obama administration in the wake of the Great contraction of 2007. The Obama fiscal stimulus plan resulted in the largest fiscal deficits (as a fraction of GDP) in the postwar United States. The top right panel of Figure 2.12 shows that between 2007 and 2009, the fiscal deficit of the United States increased by 8 percentage points of GDP. During the same period, however, contrary to the predictions of the twin-deficit hypothesis, the current account improved by about 2.5 percent of GDP.

In addition to the Reagan and Obama fiscal expansions, two other episodes stand out. One is the enormous albeit short-lived fiscal deficit during the second world war of about 12 percent of GDP, caused primarily by military spending (see the bottom left panel of Figure 2.12). During this period, the current account did deteriorate from about 1 percent to -1 percent of GDP. This movement in the external account is in the direction of the twin-deficit hypothesis. However, the observed decline in the current account balance was so small relative to the deterioration in government savings, that the episode can hardly be considered one of twin deficits. Another noticeable change in the fiscal balance took place in the 1990s during the Clinton administration. Between 1990 and 2000, government savings increased by about 7 percentage points of GDP. At the same time, contrary to the twin-deficit hypothesis, the current account deteriorated by about 4 percent of GDP. In summary, over the past century large changes in government savings have not always been accompanied by equal adjustments in the current account.

In conclusion, it appears that at first sight that the positive correlation between the current account deficit and the public deficit is not a pretty well established empirical fact. However, we have to remember that i) the current account can be affected by both investment and savings, and ii) the current account movements is the result of both productivity shocks (i.e., supply shocks) and fiscal (and monetary) shocks (i.e., demand shocks). The most prominent example is the period running from 1992 to 2000. While over this period, the rise in publics savings influences positively the current account, the combined effect of productivity improvement and of the fall in interest rates led to an investment boom which deteriorated the current account. Hence, when addressing the twin-deficit hypothesis empirically, we have to keep investment fixed.

2.3.1.2 Keynesian Theory and the Effect of an Expansionary Budget Policy

Moreover, the size of the effects of a rise in public spending on net exports should depend on the exchange rate regime. Traditional analysis based on the Mundell-Fleming model suggests that the exchange rate regime has a first-order effect on the multiplier and net exports. Before discussing the effect of a rise in government spending, let us write out the macroeconomic equilibrium combining the goods market equilibrium, the money market equilibrium and the interest rate parity condition :

$$Y = C\left(Y - \bar{T}\right) + I\left(r\right) + \bar{G} + NX\left(Y, e\right), \qquad \text{IS} \tag{2.25a}$$

$$\frac{\bar{M}}{\bar{P}} = Y \times L\left(r\right), \qquad \text{LM} \tag{2.25b}$$

$$r = r^{\star} + \frac{e^{a}}{e} - 1, \qquad \text{Interest Parity Condition} \tag{2.25c}$$

– As shown in Figure 2.13, under fixed exchange rates, monetary policy accommodates the increased demand for domestic currency to prevent the currency from appreciating. As a result, private demand rises along with public demand, while net exports remain unchanged (assuming that imports do not depend on revenue). The multiplier $\frac{1}{1-C_{Y-T}}$ exceeds unity (the crowing-out of investment is absent because the interest rate does not change). A rise in government spending is predicted to be large in economies which maintain an exchange rate peg or which are part of a currency union. Because the exchange rate remains unchanged, net exports should be unaffected by a rise in government spending.
– As shown in Figure 2.14, under a freely floating exchange rate, the increased activity due to higher government spending puts upward pressure on interest rates, triggering capital inflows and an appreciation of the currency. This, in turn, crowds out net exports and eventually offsets the effect of increased public spending on the demand for domestic goods. The real exchange rate appreciation lowers net exports. The multiplier in a floating exchange rate regime is given by :

$$\frac{dY}{Y}=\frac{dG}{Y}\times\frac{1}{\eta_{NX,E}\frac{NX}{Y}\frac{r}{1+r-r^{\star}}\eta_{L,r}+(1-C_{Y-T}-NX_{Y-T})+\frac{\eta_{I,r}}{\eta_{L,r}}\frac{I}{Y}}>0. \tag{2.26}$$

Bjorn, Juessen and Müller (2013) conduct an empirical analysis of the effects of a rise in public spending, depending on whether the exchange rate is floating or fixed. In Figure 2.15, the authors report results for the baseline VAR model. It displays the dynamic effects of an exogenous and unanticipated increase in government spending by 1% of GDP. The solid line displays the point estimate, shaded areas indicate 90% confidence bounds. On the vertical axes government consumption, net exports, and output are measured in percentage points of output relative to trend. The real exchange rate is measured in percentage deviations from trend, while the real interest rate is measured in semiannual percentage points. The horizontal axes measure time in half-year units.

The left column shows results for our sample of countries which we classify as countries with a fixed exchange rate regime. The right column shows results for the floaters. First, the fiscal multiplier is considerably larger under fixed exchange rate regimes, in line with the predictions of the Mundell-Fleming model. Second, government spending tends to appreciate the real exchange rate and to crowd out net exports under floating exchange rates. Note that net exports also deteriorate under a fixed exchange rate regime which can be explained by assuming that imports increase with output.

2.3.2 Ricardian Equivalence : Theory

The Keynesian approach has been criticized on the ground that agents are myopic and thus are not forward-looking. In the following, we investigate the effect of an expansionary budget policy by developing a simple two-period model.

Consider the two-period endowment economy with a government that purchases goods G_1 and G_2 in periods 1 and 2, respectively, and levies taxes t_1 and t_2 on households' revenues. In addition, assume that the government starts with an initial public debt of D_0. The small open economy also comprises households who are endowed with with Y_1 units of goods in

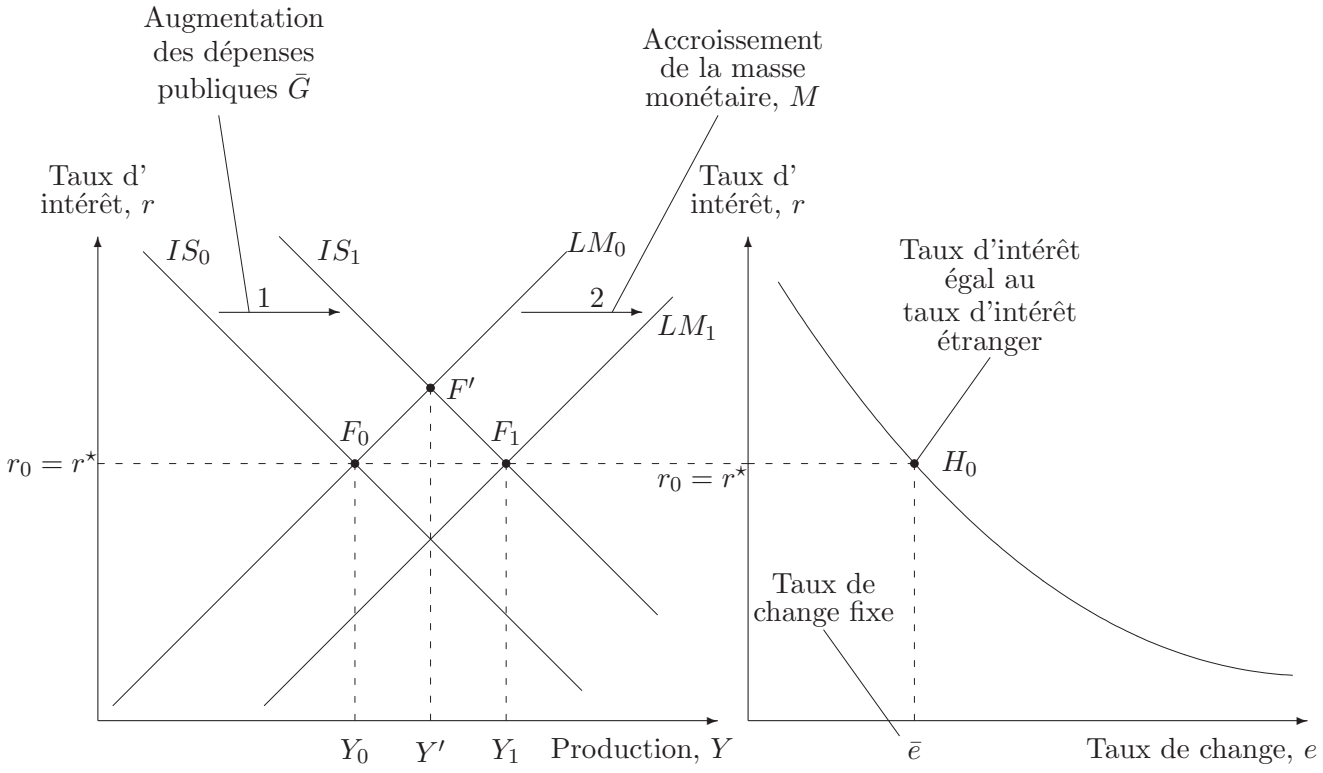


FIG. 2.13 – A rise in government spending under a fixed exchange rate regime

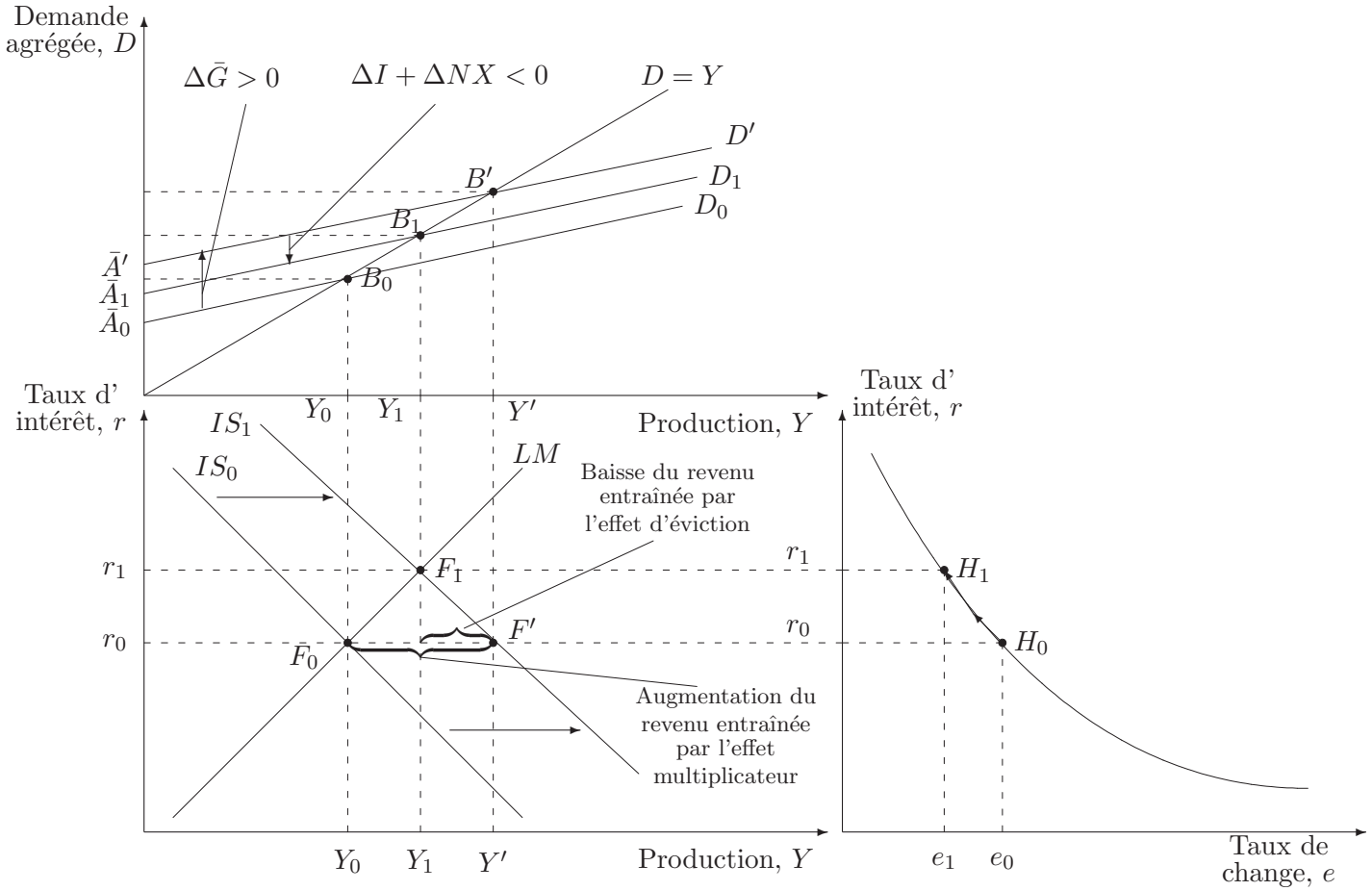


FIG. 2.14 – A rise in government spending under a freely floating exchange rate regime

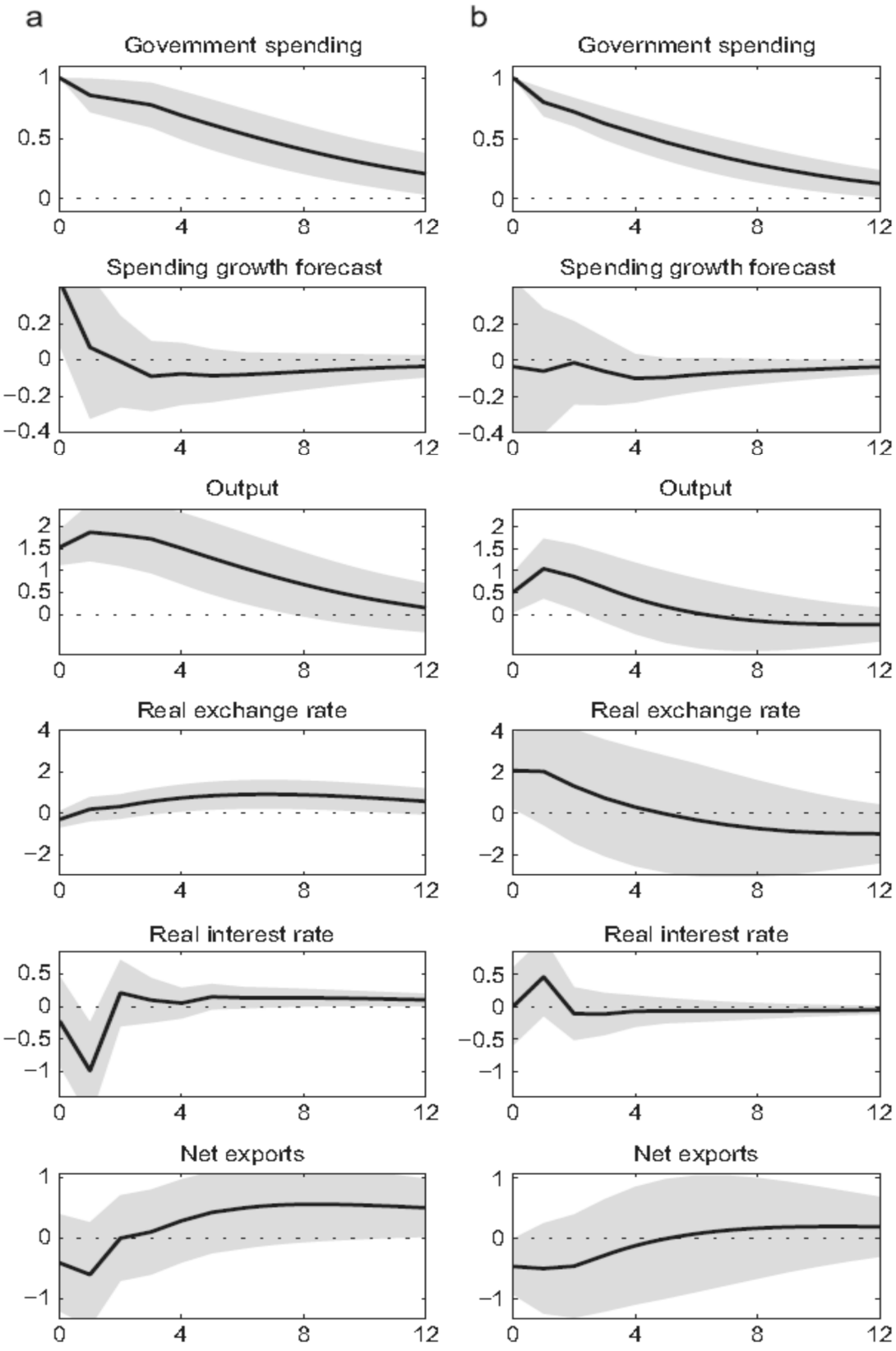


FIG. 2.15 – Impulse responses to unanticipated government spending shock. Notes : exogenous increase of government spending by 1% of GDP. Solid lines : point estimates ; shaded areas : bootstrapped 90% confidence intervals. Horizontal axes indicate half years. Vertical axes measure percentage deviation from trend in output units (government spending, GDP, and net exports), percentage deviations from trend (real exchange rate), and semiannual percentage points (real interest rate and spending growth forecast). (a) Peg. (b) Float. - Source : Bjorn, Juessen, Müller (2013) Exchange rate regimes and fiscal multipliers. 37, pp. 446-465

period 1 and Y_2 units in period 2 and consume in both periods. Households start with an initial stock of financial wealth of A_0. We denote by $r^\star$ the world interest rate.

2.3.2.1 The Government Sector

We denote by D_i the public debt in period $i = 0, 1, 2$. Like households, the government is assumed to be subject to a no-Ponzi game constraint that prevents it from having debt outstanding at the end of period 2. This means that public debt $D_2 \leq 0$ must be less than or equal to zero. At the same time, a benevolent government - that is, a government that cares about the welfare of its citizens - would not find it in its interest to end period 2 with positive asset holdings. This is because the government will not be around in period 3 to spend the accumulated assets in ways that would benefit its constituents. This means that the government will always choose $D_2 \geq 0$ to be larger than or equal to zero. The above two arguments imply that

$$D_2 = 0. \tag{2.27}$$

Because the government can borrow an amount $D_1 - D_0$ to finance the excess of expenditure in period 1, a public deficit denoted by Def_1 leads to a rise in public debt :

$$\text{Def}_1 \equiv r\,.D_0 + G_1 - t_1\,.Y_1 = D_1 - D_0, \tag{2.28a}$$

$$\text{Def}_2 \equiv r\,.D_1 + G_2 - t_2\,.Y_2 = D_2 - D_1 = -D_1. \tag{2.28b}$$

The two constraints can be reduced to one intertemporal budget constraint by eliminating the stock of public debt in period 1, D_1, from (2.28a) by using the period 2 budget constraint (2.28b) :

$$D_1 = \frac{t_2\,.Y_2 - G_2}{1+r} = (1+r)\;.D_0 + G_1 - t_1 Y_1.$$

By isolating expenditure in the LHS, including public spending and interest payments on public debt, the intertemporal budget constraint reads as :

$$(1+r)\;.D_0 + G_1 + \frac{G_2}{1+r} = t_1\,.Y_1 + \frac{t_2\,.Y_2}{1+r}. \tag{2.29}$$

This constraint says that the present discounted value of government consumption plus the initial public debt including interest (the left-hand side) must be equal to the present discounted value of tax revenues and (the right-hand side). All other things equal, given taxes in one period, the above intertemporal constraint uniquely pins down taxes in the other period. In particular, a tax cut in period 1 must be offset by a tax increase in period 2. Similarly, an expected tax cut in period 2 must be accompanied by a tax increase in period 1.

2.3.2.2 Households

Households receive a revenue of Y_1 in period 1 and Y_2 in period 2. In addition, they are assumed to be endowed with an initial stock of financial wealth A_0. In period 1, these bond holdings generate interest income in the amount of $r\,.A_0$. In period 1, the household's income is given by the sum of interest on its bond holdings and its endowment of goods net of taxes, $r\,.A_0 + (1-t_1)\;.Y_1$. The household can allocate its income to two alternative uses : purchases

of consumption goods, which we denote by C_1, and purchases of bonds, $A_1 - A_0$, where A_1 denotes bond holdings in period 1.

$$C_1 + A_1 - A_0 = r\ .A_0 + (1 - t_1)\ .Y_1. \tag{2.30}$$

Similarly, in period 2 the representative household faces a constraint stating that consumption expenditure plus bond purchases must equal income :

$$C_2 + A_2 - A_1 = r\ .A_1 + (1 - t_2)\ .Y_2. \tag{2.31}$$

where C_2 denotes consumption in period 2, r denotes the interest rate on assets, and A_2 denotes bond holdings at the end of period 2. By the no-Ponzi-game constraint households are not allowed to leave any debt at the end of period 2, that is, A_2 must be greater than or equal to zero. Also, because the world is assumed to last for only 2 periods, agents will choose not to hold any positive amount assets at the end of period 2, as they will not be around in period 3 to spend those savings in consumption. Thus, asset holdings at the end of period 2 must be exactly equal to 0 :

$$A_2 = 0. \tag{2.32}$$

Combining the budget constraints (2.30) and (2.31) and the terminal condition (2.32) to eliminate A_1 and A_2,

$$A_1 = \frac{C_2 - (1 - t_2)\, Y_2}{1 + r} = (1 + r)\, A_0 + (1 - t_1)\, Y_1 - C_1,$$

gives rise to the following lifetime budget constraint of the household :

$$C_1 + \frac{C_2}{1 + r} = (1 + r)\ .A_0 + H \equiv \Omega. \tag{2.33}$$

where human wealth H is defined as the present discounted value of after-tax revenue flows :

$$H \equiv (1 - t_1)\ .Y_1 + \frac{(1 - t_2)\ .Y_2}{1 + r}. \tag{2.34}$$

The intertemporal budget constraint (2.33) requires that the present discounted value of consumption (the left-hand side) be equal to the initial stock of wealth including interest payments plus the present discounted value of the endowment stream (the right-hand side). The household chooses consumption in periods 1 and 2, C_1 and C_2, taking as given all other variables appearing in (2.33), namely, r, Y_1, Y_2, A_0.

Figure 2.16 displays the pairs (C_1, C_2) that satisfy the household's intertemporal budget constraint (2.33). For simplicity, we assume for the remainder of this section that the household's initial asset position is zero, that is, we assume that $A_0 = 0$. Then, clearly, the basket $C_1 = Y_1\ .(1 - t_1)$ and $C_2 = Y_2\ .(1 - t_2)$ (point A in Figure 2.16 is feasible in the sense that it satisfies the intertemporal budget constraint (2.33). In words, the household can eat his endowment in each period. In Figure 2.17, we denote by Q_i after tax endowment, that is $Q_1 = Y_1\ .(1 - t_1)$ in period 1, and $Q_2 = Y_2\ .(1 - t_2)$ in period 2. **Point A is the point where** $A_1 = 0$, i.e., $C_1 = Q_1$ and $C_2 = Q_2$.

But the household's choices are not limited to this particular basket. In period 1 the household can consume more or less than Y_1 by borrowing or saving the amount $A_1 = Y_1\ .(1 - t_1) - C_1$ (which is negative if $C_1 > Q_1$). If the household wants to increase consumption in one period, it must sacrifice some consumption in the other period. In particular, for

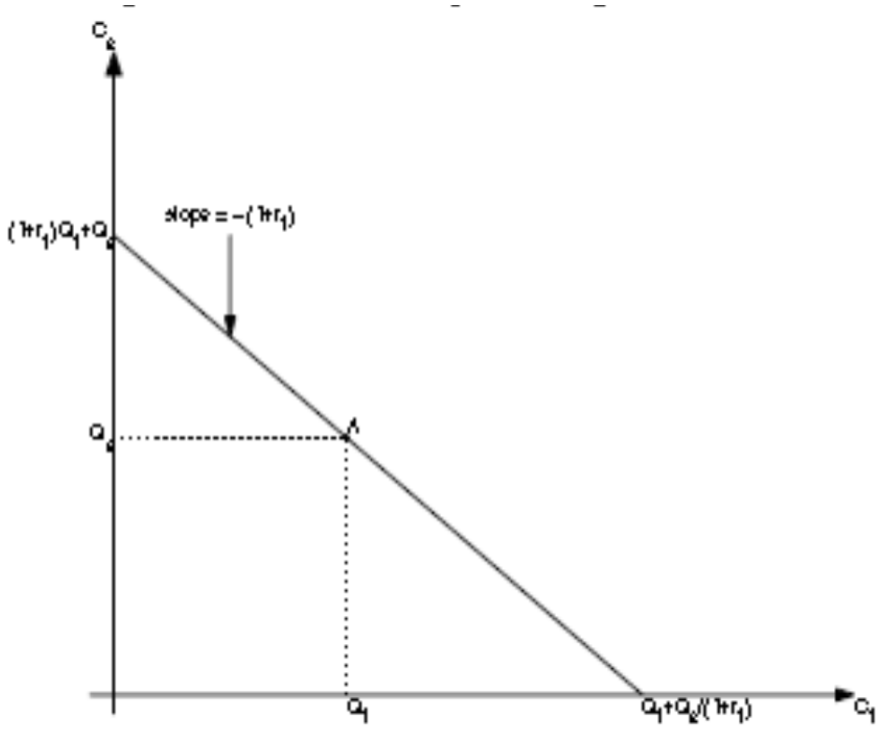


FIG. 2.16 – The intertemporal budget constraint - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 3

each additional unit of consumption in period 1, the household has to give up $1+r$ units of consumption in period 2 (i.e., $\Delta C_2 = (1+r)\ .\Delta A_1$). This means that the slope of the budget constraint is $-(1+r)$. Note that points on the budget constraint located southeast of point A correspond to borrowing (or dissaving) in period 1. Letting S_1 denote savings in period 1, we have that $S_1 = r\ .A_0 + Y_1\ .(1-t_1) - C_1 = Y_1\ .(1-t_1) - C_1 < 0$ (recall that we are assuming that $A_0 = 0$). At the same time, the fact that $S_1 < 0$ implies, by the relation $S_1 = A_1 - A_0$, that the household's asset position at the end of period 1, A_1, is negative. This in turn implies that a point on the budget constraint located southeast of the endowment point A is also associated with positive saving in period 2 because $S_2 = A_2 - A_1 = -A_1 > 0$ (recall that $A_2 = 0$). On the other hand, points on the budget constraint located northwest of A are associated with positive saving in period 1 and dissaving in period 2.

To draw the budget constraint, we need the slope (equal to $-(1+r)$) and both the horizonal and vertical intercepts. If the household chooses to allocate its entire lifetime income to consumption in period 1, then C_1 would equal $(1+r)\ .A_0 + H = H$ and C_2 would be nil. This point corresponds to the intersection of the budget constraint with the horizontal axis. If the household chooses to allocate all its lifetime income to consumption in period 2, then C_2 would equal $(1+r)\ .H$ and C_1 would be nil. This basket is located at the intersection of the budget constraint with the vertical axis.

While the intertemporal budget constraint indicates the consumption locus which can be reached given revenues, households must choose a point along the constraint. More precisely, they must decide to locate consumption in the southeast or the northeast of point A in Figure 2.16. They decide on consumption in order to obtain the highest value of intertemporal utility :

$$\Lambda = U(C_1) + \frac{1}{1+\delta}\ .U(C_2)\,, \tag{2.35}$$

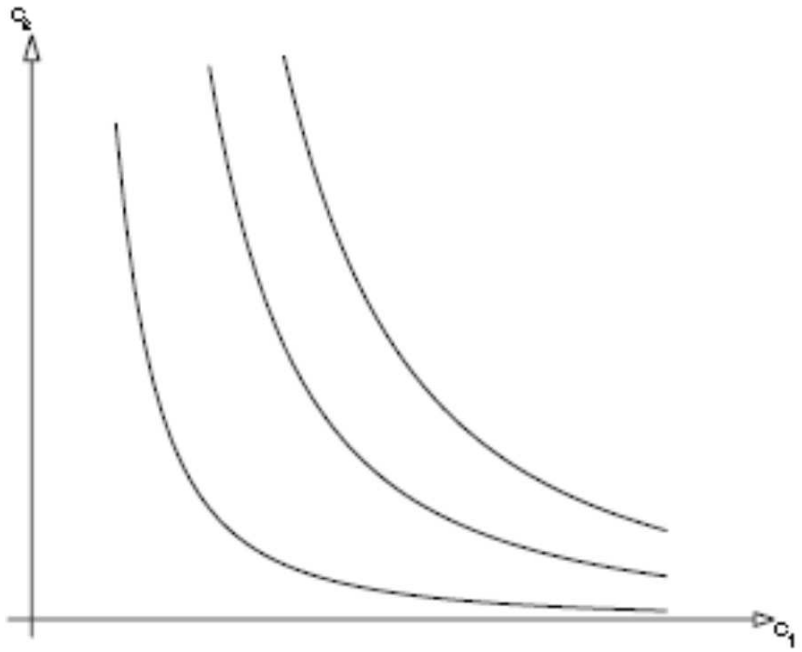


FIG. 2.17 – Indifference curve in a two-period model - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 3

where period 2 units are expressed in terms of period 1 units by using the discount factor defined as $0 < \frac{1}{1+\delta} < 1$, with δ is the subjective time discount rate ; this parameter measures the degree of impatience : when agents are impatient, δ takes higher values which in turn lowers the present discounted value of period-2 utility flows.

Indifference curves defined by eq. (2.35) are shown in Figure 2.17. All consumption baskets on a given indifference curve provide the same level of utility. Because consumption in both periods are goods, that is, items for which more is preferred to less, as one moves northeast in Figure 2.17, utility increases. Note that the indifference curves drawn in Figure 2.17 are convex toward the origin, so that at low levels of C_1 relative to C_2 the indifference curves are steeper than at relatively high levels of C_1. Intuitively, the convexity of the indifference curves means that at low levels of consumption in period 1 relative to consumption in period 2, the household is willing to give up relatively many units of period-2 consumption for an additional unit of period-1 consumption. On the other hand, if period-1 consumption is high relative to period-2 consumption, then the household will not be willing to sacrifice much period-2 consumption for an additional unit of period-1 consumption. The negative of the slope of an indifference curve is known as the marginal rate of substitution (MRS hereafter) of C_2 for C_1. Therefore, the assumption of convexity means that along a given indifference curve, the marginal rate of substitution decreases with C_1. Put otherwise, the slope of the indifference curve represents the price that agents are willing to pays to consumer one additional unit in period 1 ($\frac{\Delta C_2}{\Delta C_1}$). If the indifference curve is steep, it reflects the fact that agents are willing to pay a high price to consume more in period 1.

2.3.2.3 Equilibrium

We assume that all households are identical. Thus, by studying the behavior of an individual household, we are also learning about the behavior of the country as a whole. For this

reason, we will not distinguish between the behavior of an individual household and that of the country as a whole. To keep things simple, we further assume that there is no investment in physical capital. We assume that the country has free access to international financial markets. This means that in equilibrium the domestic interest rate, r, must be equal to the world interest rate, which we will denote by $r^\star$, that is,

$$r = r^\star. \tag{2.36}$$

Aggregating the private and the public sector gives the current account. To determine the current account, we can alternatively proceed as follows. The current account is the change in the net foreign asset position : $B_1 - B_0 = (A_1 - A_0) - (D_1 - D_0)$ with $D_1 - D_0 = r^\star \,.D_0 + G_1 - t_1 \,.Y_1$ and $A_1 - A_0 = r^\star \,.A_0 + (1 - t_1) \;.Y_1 - C_1$. Substituting the change in the stock of financial wealth held by households $A_1 - A_0$ and the change in the stock of public debt $D_1 - D_0$:

$$\begin{aligned} CA_1 &= B_1 - B_0 = (A_1 - A_0) - (D_1 - D_0)\,, \\ &= r^\star \,.A_0 + (1 - t_1) \;.Y_1 - C_1 - (r^\star \,.D_0 + G_1 - t_1 \,.Y_1)\,, \\ &= r^\star \,.B_0 + Y_1 - C_1 - G_1. \end{aligned} \tag{2.37}$$

The same logic applies for period 2 :

$$\begin{aligned} CA_2 &= B_2 - B_1 = (A_2 - A_1) - (D_2 - D_1)\,, \\ &= r^\star \,.A_1 + (1 - t_2) \;.Y_2 - C_2 - (r^\star \,.D_1 + G_2 - t_2 \,.Y_2)\,, \\ &= r^\star \,.B_1 + Y_2 - C_2 - G_2. \end{aligned} \tag{2.38}$$

Because we consider the whole economy (private and public sector), the nation's budget constraint differs from that of households.

For simplicity purpose, we assume that the country's initial public debt and net foreign asset position is zero, i.e. $D_0 = B_0 = 0$, so that the initial stock of financial wealth is nil :

$$A_0 = 0. \tag{2.39}$$

Setting $B_0 = 0$ into (2.37), we have : $Y_1 - C_1 - G_1 = B_1 = CA_1$. Using (2.38) to eliminate $B_1 = \frac{C_2 + G_2 - Y_2}{1 + r^\star}$, the nation's budget constraint is :

$$C_1 + G_1 + \frac{C_2 + G_2}{1 + r^\star} = Y_1 + \frac{Y_2}{1 + r^\star}. \tag{2.40}$$

This intertemporal resource constraint represents the consumption possibility frontier of the economy. It has a clear economic interpretation. The left-hand side is the present discounted value of domestic absorption, which consists of private and government consumption in each period. The RHS of the consumption possibility frontier is the present discounted value of domestic output. Thus, the consumption possibility frontier states that the present discounted value of domestic absorption must equal the present discounted value of domestic output. Solving for C_2 and using the fact that $\Omega' = (Y_1 - G_1) + \frac{(Y_2 - G_2)}{1 + r^\star}$, the consumption possibility frontier can be written as

$$\begin{aligned} C_2 &= (1 + r^\star) \;.\left(\Omega' - C_1\right), \\ &= (1 + r^\star) \;.(Y_1 - G_1 - C_1) + Y_2 - G_2. \end{aligned} \tag{2.41}$$

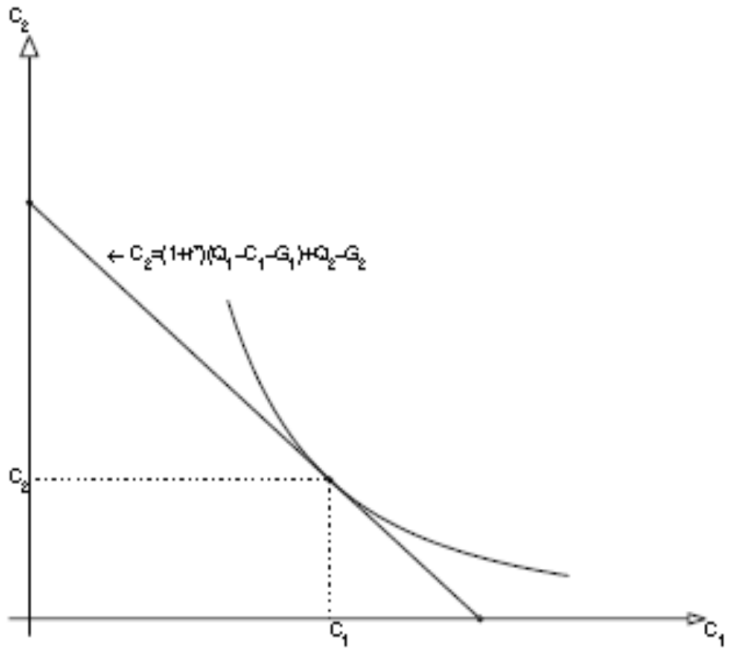


FIG. 2.18 – Optimal consummption decision in a two-period model - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 3

Figure 2.18 depicts the relationship between C_1 and C_2 implied by the consumption possibility frontier. It is a downward sloping line with slope equal to $-(1+r^\star)$. The endowment point is now a point where $C_1 = Y_1 - G_1$ and $C_2 = Y_2 - G_2$. We assume initially that the public budget is initially balanced, i.e., $t_1 \,.Y_1 = G_1$ so that $D_1 = 0$; in this case, the endowment point in Figure 2.18 corresponds to point A in Figure 2.16. The points located on the nation's budget constraint (2.41) located southeast of point A (see Figure 2.16) correspond to a current account deficit : private savings is negative while public savings is zero.

Consumption in each period is determined by the tangency of the consumption possibility frontier with an indifference curve. Note that neither t_1 nor t_2 appear in the consumption possibility frontier. This means that if public spending, G_1 and G_2, are unchanged, tax rates t_1 and t_2 must be set so as to satisfy the government's budget constraint (2.29). If t_1 is reduced, t_2 must be increased for the government's budget constraint (2.29) to hold. Put otherwise, as long as public spending is fixed, a change in the tax rate will not affect households' budget constraint because it is the level of public spending that determines the level of tax rates.

2.3.2.4 Optimal Consumption Decision

Before showing the Ricardian equivalence principle, it is useful to determine the optimal consumption decision both analytically and graphically. To do so, we assume that instantaneous utility takes a logarithmic form :

$$U(C_i) = \ln(C_i), \quad i = 1, 2. \tag{2.42}$$

Households determine consumption basket in order to obtain the highest intertemporal utility Λ given by (2.35) while the intertemporal budget constraint must be fulfilled. The simplest method to determine optimal consumption is to eliminate C_2 from (2.35) by using (2.41)

$$U(C_2) = \ln\left[(1+r^\star)\left(\Omega' - C_1\right)\right]. \tag{2.43}$$

The maximization problem is now reduced to the choice of one variable, C_1, other variables being exogenously given. We differentiate intertemporal utility $\Lambda = \ln(C_1) + \frac{\ln(C_2)}{1+\delta}$ with respect to C_1 , substituting first (2.43) :

$$\frac{1}{C_1} - \frac{1+r}{1+\delta} . \frac{1}{C_2} = 0.$$

The first term on the LHS represents additional utility when households consume one additional unit of C_1. When consuming one more unit in period 1, agents reduce savings by one unit which in turn lowers revenues from bonds holding by $1+r$ units. Because C_2 is reduced by $1+r$ units, consuming one additional unit today lowers period-2 utility by $\frac{1+r}{1+\delta} . \frac{1}{C_2}$ expressed in present value terms (i.e., in period-1 units). The above equality can be rewritten as an equality between the slope of the indifference curve and the slope of the intertemporal budget constraint :

$$\frac{C_2}{C_1} . (1+\delta) = 1 + r^\star. \tag{2.44}$$

The LHS of (2.44) is the MRS which measures the price that agents are willing to pay to consume one additional unit of C_1 : as agents consume more units of C_1, the price (measured by the MRS) that agents are willing to pays decline. The RHS of (2.44) gives the relative price of present consumption that agents must pay : agents consume C_1 until MRS equalizes with the relative price $1 + r^\star$.

Eq. (2.44) gives the optimal ratio of consumption. To solve for both $C_1^\star$ and $C_2^\star$, we need to specify the system that defines the equilibrium. An equilibrium is a consumption bundle (C_1,C_2) that satisfies the household's first-order condition for utility maximization and the country's intertemporal resource constraint, that is,

$$\frac{C_2}{C_1} . (1+\delta) = 1 + r^\star, \tag{2.45a}$$

$$C_1 + \frac{C_2}{1+r^\star} = \Omega'. \tag{2.45b}$$

Eliminating C_2 from the intertemporal budget constraint (2.45b) by using (2.45a) leads to period-1 consumption :

$$C_1 = \left(\frac{1+\delta}{2+\delta}\right) .\Omega'. \tag{2.46}$$

Combining (2.45a) and (2.46) allows us to solve for period-2 consumption :

$$C_2 = \left(\frac{1+r^\star}{2+\delta}\right) .\Omega'. \tag{2.47}$$

Because $\Omega' \equiv Y_1 - G_1 + \frac{(Y_2 - G_2)}{1+r^\star}$ depends on outputs Y_i and government spending G_i, as shown by eqs. (2.46)-(2.47), optimal consumption basket (C_1, C_2) does not depend on tax rates.

Figure 2.18 displays the lifetime budget constraint together with the household's indifference curves. At the feasible basket that maximizes the household's utility, the indifference curve is tangent to the budget constraint.

2.3.3 Ricardian Equivalence

In order to understand the merits of the view that attributes the large current account deficits of the 1980s to fiscal deficits generated in part by the tax cuts implemented by

the Reagan administration, we must determine how a reduction in taxes affects the current account in our model economy. Because the current account is the difference between national savings and investment, and because investment is by assumption nil in our endowment economy, it is sufficient to characterize the effect of tax cuts on national savings. As mentioned earlier, national savings equals the sum of government savings and private savings.

2.3.3.1 Households' Response to a Change in Tax Rates

Private savings in period 1, which we denote by S^P, is defined as the difference between disposable income, given by domestic output minus taxes, and private consumption :

$$S_1^P = Y_1 \,.\,(1 - t_1) - C_1. \tag{2.48}$$

Because, as we just showed, for a given time path of government purchases, private consumption is unaffected by changes in the timing of taxes, it follows that a change in the tax rate in period 1 by Δt_1 modifies tax revenues by $Y_1 \,.\Delta t_1$, and induces a change in private savings of equal size and opposite sign :

$$\Delta S_1^P = -Y_1 \,.\Delta t_1. \tag{2.49}$$

The intuition behind this result is the following. Suppose, for example, that the government cuts tax rates in period 1, keeping government purchases unchanged in both periods. This policy obliges the government to increase public debt in period 1 by

$$\Delta D_1 = -Y_1 \,.\Delta t_1 > 0.$$

In order to service and retire this additional debt, in period 2 the government must raise taxes by

$$(1 + r^\star) \,.\Delta D_1 = Y_2 \,.\Delta t_2,$$

or alternatively by substituting $\Delta D_1 = -Y_1 \,.\Delta t_1$:

$$\Delta t_2 = -\,(1 + r^\star) \,.\frac{Y_1}{Y_2} \,.\Delta t_1 > 0, \tag{2.50}$$

where $\Delta t_1 < 0$. Rational households anticipate this future increase in taxes and therefore choose to save the current tax cut (rather than spend it in consumption goods) so as to be able to pay the higher taxes in period 2 without having to sacrifice consumption in that period. Put differently, a change in the timing of tax rates does no alter the household's lifetime wealth. To see it formally, substitute the expected change in the period 2 tax rate (2.50) into the period-2 budget constraint :

$$\begin{aligned} \Delta C_2 &= -Y_2 \Delta t_2 + (1 + r^\star) \,.\Delta S_1^P, \\ &= Y_2 \,.\,(1 + r^\star) \,.\frac{Y_1}{Y_2} \,.\Delta t_1 - (1 + r^\star) \,.Y_1 \,.\Delta t_1 = 0. \end{aligned} \tag{2.51}$$

By saving the additional disposable income, households are able to offset the fall in the disposable income in period 2.

Government savings, also known as the secondary fiscal surplus, is defined as the difference between revenues (taxes plus interest on asset holdings) and government purchases. Formally,

$$S_1^G = t_1 \,.Y_1 - G_1 - r^\star \,.D_0. \tag{2.52}$$

When the secondary fiscal surplus is negative we say that the government is running a secondary fiscal deficit. The secondary fiscal surplus has two components : interest payments on public debt ($-r^\star \,.D_0$) and the primary fiscal surplus ($t_1 \,.Y_1 - G_1$). The primary fiscal surplus measures the difference between tax revenues and government expenditures. When the primary fiscal surplus is negative, that is, when government expenditures exceed tax revenues, we say that the government is running a primary deficit.

Graphically, in Figure 2.18, the nation's endowment point $Y_1 - G_1$ and $Y_2 - G_2$ is unaffected. Since consumption does not change, it implies that the current account is unchanged. Hence, the fall in private savings is offset by a rise in public savings. In Figure 2.16, point A shifts to southeast along the household's budget constraint because period 1 after tax income rises from $Q_1 = (1 - t_1) \,.Y_1$ to $Q_1' = (1 - t_1') \,.Y_1'$ while period 2 after tax income falls from $Q_2 = (1 - t_2) \,.Y_2$ to $Q_2' = (1 - t_2') \,.Y_2'$. While the optimal consumption basket is unchanged, the rise in period 1 after tax income (equal to $Q_1' - Q_1$) is saved by the household which in turn raises the period 2 income by : $(1 + r^\star) \,.(Q_1' - Q_1)$. As shown above, additional savings compensate for the fall in the period 2 after tax income from Q_2 to Q_2'.

2.3.3.2 Current Account Response following a Change in Tax Rates

Given an exogenous path for government purchases and given the initial condition $r^\star \,.D_0$, any change in taxes in period 1 must be reflected one-for-one in a change in government saving, that is,

$$\Delta S_1^G = Y_1 \,.\Delta t_1. \tag{2.53}$$

As we mentioned before, national saving, which we denote by S, is given by the sum of private and government saving, that is, $S_1 = S_1^P + S_1^G$. Changes in national savings are thus equal to the sum of changes in private savings and changes in government savings :

$$\Delta S_1 = \Delta S_1^P + \Delta S_1^G. \tag{2.54}$$

Combining this expression with equations (2.49) and (2.52), we have that

$$\Delta S_1 = -Y_1 \,.\Delta t_1 + Y_1 \,.\Delta t_1 = 0. \tag{2.55}$$

This expression states that national savings is unaffected by the timing of tax rates. This is an important result in Macroeconomics. For this reason it has been given a special name : Ricardian Equivalence.

Recalling that the current account is the difference between national saving and investment, it follows that the change in the current account in response to a change in taxes, holding constant government expenditure, is given by

$$\Delta CA_1 = \Delta S_1 - \Delta I_1 \tag{2.56}$$

Therefore, an increase in the fiscal deficit due to a decline in current tax taxes (leaving current and expected future government spending unchanged) has no effect on the current account, that is,

$$\Delta CA_1 = 0. \tag{2.57}$$

Graphically, the current account $CA_1 = B_1$ (recall that $B_0 = 0$) is unchanged ; only the composition is affected :

$$B_1' = B_1 = A_1' + D_1'. \tag{2.58}$$

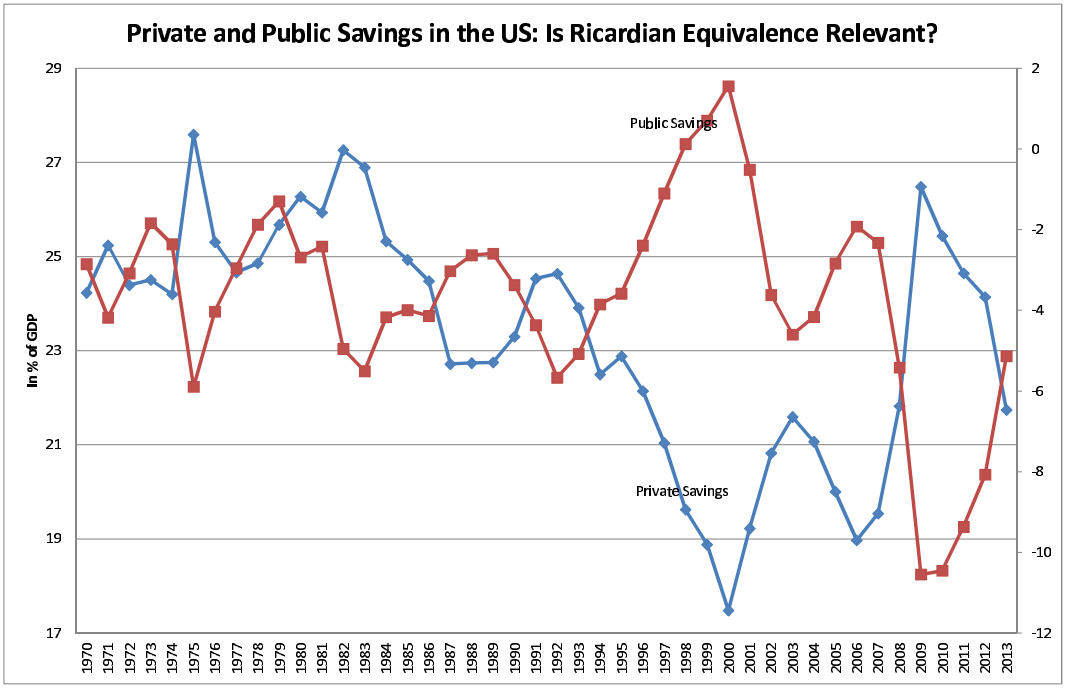


FIG. 2.19 – Private and Public Savings in the US : Is Ricardian Equivalence Relevant ? - Source : OECD database. Authors' calculus.

Let us assume that $D_1 = 0$ so that $B_1 = A_1$. We suppose initially that the country is initially a net debtor, i.e., $B_1 = A_1 < 0$. The government lowers tax rates which is financed by issuing public debt : $D_1' - D_1 = D_1' = -Y_1 \Delta t_1 > 0$. The current account is unchanged so that :

$$\begin{aligned} B_1' - B_1 &= \left(A_1' - A_1\right) - \left(D_1' - D_1\right), \\ &= -Y_1 \Delta t_1 + Y_1 \Delta t_1 = 0. \end{aligned} \tag{2.59}$$

Let us take stock of what we have learned from our model. If the model of Ricardian Equivalence represents an adequate description of how the economy works and if the main cause of the fiscal deficits of the 1980s was the Reagan tax cuts, then what we should have observed is a decline in public savings, an offsetting increase in private savings, and no change either in national savings or the current account. What does the data show ? In the 1980s there was a significant cut in taxes. As predicted by theory, the tax cuts were accompanied by a significant decline in public savings (see Figure 2.19). However, contrary to the predictions of Ricardian Equivalence, private savings did not increase by the same amount as the decline in public savings : as a result, both national savings and the current account have plummeted. We therefore conclude that either the fiscal deficits of the 1980s were caused by factors other than the tax cuts, such as increases in government spending, or Ricardian Equivalence does not hold, or both. We explore these possibilities further in the next section. Note that over 1992-2013, the Ricardian Equivalence holds : the private saving rate is almost a mirror image of the public saving rate, as illustrated in Figure 2.19.

2.3.3.3 Government Spending and Current Account Deficits

What are other possible interpretations of the view according to which the large current account deficits of the 1980s were due to a decline in desired savings and/or an increase in desired U.S. spending ? One possible interpretation is that the increase in the U.S. fiscal deficit of the 1980s was not solely a deferral of taxes, but instead government purchases were

increased temporarily, particularly military spending. In our model, an increase in government purchases in period 1 of ΔG_1, with government purchases in period 2 unchanged, is equivalent to a temporary decline in output. In response to the increase in government spending, households will smooth consumption by reducing consumption spending in period 2 by less than the increase in government purchases :

$$\Delta C_1 = \left(\frac{1+\delta}{2+\delta}\right)\Delta\Omega = -\left(\frac{1+\delta}{2+\delta}\right)\Delta G_1 < 0. \tag{2.60}$$

Intuitively, households perfectly understand that the rise in government spending will lead to an increase in the tax rate in period 2 for the government's budget constraint to hold. Differentiating (2.29) with respect to G_1 and t_2 gives the expected increase in the tax rate in period 2 : $\Delta G_1 = \frac{Y_2}{1+r^\star}\ .\Delta t_2$. Consequently, the agent raises his saving in order to avoid a fall in period 2 consumption. Yet, according to the permanent income hypothesis, a temporary fall in income leads to less than proportional decline in consumption in the current period as households smooth consumption intertemporally. More precisely, the propensity $\left(\frac{1+\delta}{2+\delta}\right)$ is smaller than one. Because consumption C_1 falls by a smaller amount than the decline in disposable income $Y_1 - G_1$, savings rise but by less than ΔG_1, i.e.

$$\Delta S_1^P = -\Delta C_1 = \left(\frac{1+\delta}{2+\delta}\right)\ .\Delta G_1,$$

Because the disposable income in period 2 falls by $-Y_2\ .\Delta t_2 = -\left(1+r^\star\right)\Delta G_1$, consumption in period 2, $C_2 = \left(1+r^\star\right)\ .A_1 + Y_2\ .(1-t_2)$ declines because additional savings and the resulting increased interest receipts are not large enough to compensate for the decrease in the disposable income $Y_2 - G_2$:

$$\Delta C_2 = \left(1+r^\star\right)\Delta A_1 - Y_2\Delta t_2 = \left(1+r^\star\right)\left[\left(\frac{1+\delta}{2+\delta}\right) - 1\right]\ .\Delta G_1 < 0, \tag{2.61}$$

since $0 < \left(\frac{1+\delta}{2+\delta}\right) < 1$. In conclusion, following a temporary increase in public spending, the agent cuts consumption but less than proportionately ; hence, while private savings increases, the fall in public savings more than offsets ΔS_1^P which in turn leads to a current account deterioration.

The current account deterioration can be seen alternatively by using the goods market equilibrium in period 1 :

$$Y_1 = C_1 + I_1 + G_1 + TB_1. \tag{2.62}$$

Because neither output in period 1 nor investment in period 1 are affected by the increase in government purchases, the trade balance in period 1, which is given by $Y_1 - C_1 - G_1 - I_1$, deteriorates ($\Delta TB_1 = -\Delta C_1 - \Delta G_1 < 0$). The current account, given by $r^\star\ .B_0 + TB_1$, declines by the same amount as the trade balance : $\Delta CA_1 = \Delta TB_1$ (recall that net investment income is predetermined in period 1) :

$$\begin{aligned}
\Delta CA_1 &= \Delta TB_1 = -\Delta C_1 - \Delta G_1, \\
&= \left(\frac{1+\delta}{2+\delta}\right)\Delta G_1 - \Delta G_1, \\
&= -\left(\frac{1}{2+\delta}\right)\Delta G_1.
\end{aligned} \tag{2.63}$$

The key behind this result is that consumption falls by less than the increase in government purchases. The effect of the increase in government purchases on consumption is illustrated

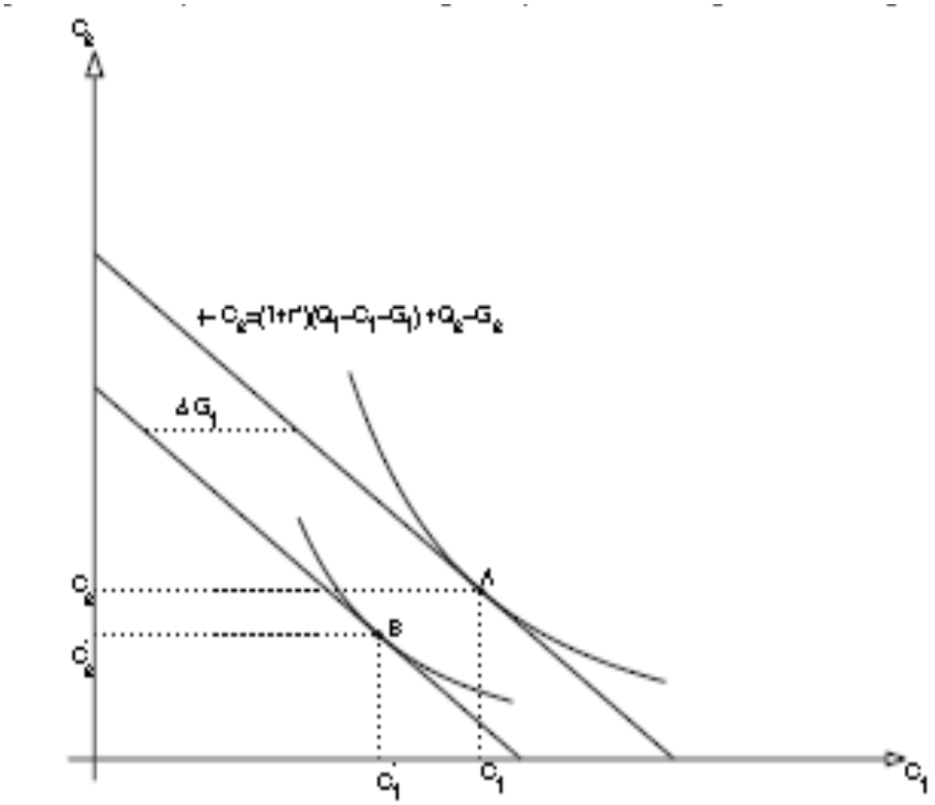


Fig. 2.20 – The Effect of a Temporary Rise in Government Spending in a Two-Period Economy - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 7

Year	Military Spending (% of GNP)
1978-79	5.1-5.2
1980-81	5.4-5.5
1982-84	6.1-6.3
1985-87	6.7-6.9

Fig. 2.21 – The Rise in Military Expenditure in the US - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 7

in Figure 2.20. The initial consumption allocation is point A. The increase in G_1 produces a parallel shift in the economy's resource constraint to the left by ΔG_1. If consumption in both periods is normal, then both C_1 and C_2 decline. Therefore, the new optimal allocation, point B, is located southwest of point A. Clearly, the decline in C_1 is less in absolute value than ΔG_1.

Is this explanation empirically plausible ? There exists evidence that government spending went up in the early 1980s due to an increase in national defense spending as a percentage of GNP. Table 2.21 indicates that military purchases increased by about 1.5% of GNP from 1978 to 1985. But according to our model, this increase in government purchases (if temporary) must be associated with a decline in consumption. Assuming that $\delta = 0$, eq. (2.63) implies that the current account deteriorates by an amount equal to $\frac{\Delta G_1}{2}$. Thus, the decline in national savings triggered by the Reagan military build up of 1.5% of GNP is at most $\frac{1.5}{2} = 0.75\%$ of GNP, which is too small to explain all of the observed decline in national savings of 3% of GNP that occurred during that period (see Figure 3.42). In conclusion, the US current account deficit in the 80s is in line with the twin-deficit assumption while data from 1992 suggest that the consequences of changes in public savings on the current account are in line with the predictions of the Ricardian theory. As discussed in the next subsection, data for the euro area in the 90s also corroborate the Ricardian Equivalence.

2.3.4 Twin Deficit in the Euro Area ?

Ricardian equivalence argues that when the government cuts taxes and raises its deficit, consumers anticipate that they will face higher taxes later to pay off the resulting government debt. In anticipation, they raise their own (private) saving to offset the fall in government saving. Conversely, governments that lower their deficits through higher taxes (thereby increasing government saving) will induce the private sector to lower its own saving. Qualitatively, this is the kind of behavior we saw in Europe in the late 1990s.

To fulfill Maastricht Treaty criteria, the (twelve) candidates to euro area membership have made significant efforts to reduce publics deficits by lowering public spending and rising taxes.[3] In 1995, government spending as a share of GDP was 53.1% while five years later, in 2000, the share G/Y amounts to 46.3%. At the same time, tax revenues increase from 45.6% to 46.3%. As shown in Table 2.22, the primary deficit shrinks considerably ; in 2000, the euro area has a positive primary balance. Over the period 1995-2000, the last column of Table 2.22 shows that the current account remains almost stable.

Under the twin deficits theory, we would have expected the EU's current account surplus to increase sharply as a result of the fiscal change. As the Table below shows, however, nothing of the sort actually happened. For the EU as a whole, government deficits fell by about 4.5 percent of output, yet the current account surplus remained about the same. The table reveals the main reason the current account didn't change much : a sharp fall in the private saving rate, which declined by about 4 percent of output, almost as much as the increase in government saving. (Investment rose slightly at the same time.) In this case, the behavior of private savers just about neutralized governments' efforts to raise national saving. It is difficult to know why this offset occurred, but there are a number of possible

[3] Public deficit cannot exceed 3% while public debt must not be larger than 60% of GDP.

European Union (percentage of GNP)				
Year	CA	S^P	I	$G-T$
1995	0.6	25.9	19.9	−5.4
1996	1.0	24.6	19.3	−4.3
1997	1.5	23.4	19.4	−2.5
1998	1.0	22.6	20.0	−1.6
1999	0.2	21.8	20.8	−0.8

Source: Organization for Economic Cooperation and Development, *OECD Economic Outlook* 68 (December 2000), annex tables 27, 30, and 52 (with investment calculated as the residual).

FIG. 2.22 – Government Deficit Reduction May Not Increase the Current Account Surplus : Euro Area Example (1995-2000) - Source : Krugman, Obstfeld, Melitz (2012) International Economics : Theory and Policy, 9th Edition, Pearson

explanations. One is based on an economic theory known as the Ricardian equivalence of taxes and government deficits : when governments lower their deficits through higher taxes (thereby increasing government saving), the private sector is induced to lower its own saving. Qualitatively, this is the kind of behavior we saw in Europe in the late 1990s.

2.4 The Balance-of-Payments (BoP) Accounts

As shown previously, a trade balance deficit is associated with a capital inflow. These two flows which work in opposite direction exactly offset so that the BoP is in equilibrium. BoP accounts records a country's international transactions. A country's balance of payments accounts keep track of goods and services transactions, capital flows, and currency transactions, between the residents of the home country and the rest of the world. Any transaction resulting in a receipt from foreigners is entered in the balance of payments accounts as a credit (+). Any transaction resulting in a payment to foreigners is entered as a debit (−) : hence, when a country experiences an outflow of money and an asset (real, financial) inflow, the transaction is registered with a −.

Any change in the current account must be reflected in an equivalent change in the country's financial account, that is, the current account equals the difference between a country's purchases of assets from foreigners and its sales of assets to them, which is the financial account preceded by a minus sign. This relationship is known as the fundamental balance-of-payments identity. Formally, we have :

$$\begin{aligned} \text{Current Account Balance} &= -\text{Financial Account Balance}, \\ CA &= -KA. \end{aligned} \tag{2.64}$$

The financial account KA can be broken down into the financial account without international reserves KA' and net reserve assets (NRA)

$$BoP = CA + KA' + NRA = 0. \tag{2.65}$$

The BoP must be balanced ; hence, if the sum of the current account and the financial account without reserves, i.e., $CA + KA'$, is negative, there will be changes in international reserves.

More precisely, if $CA + KA' < 0$, it means that the country bought more foreign (real and financial) assets than the rest of the world bough domestic (real and financial) assets. There is a net demand for foreign currency from residents of the home country. As a result, the central bank must supply foreign currency and the counterpart is a domestic money inflow. Consequently, a fall in international reserves is registered with a + in the BoP document. Put otherwise, the net reserve assets is equal to foreign currency outflow (the counterpart is a domestic currency inflow) − foreign currency inflow (the counterpart is a domestic currency outflow). In other words, denoting by ΔRES the change in international reserves, one must have :

$$CA + KA' = \Delta \text{RES}. \tag{2.66}$$

Three types of international transaction are recorded in the balance of payments (current account transaction, fixed capital transactions, financial transactions) :

1. **Current Account : net exports (i.e., difference between exports and imports) of goods and services and net international income receipts**
   (a) Trade Balance (or Balance on Goods and Services) : difference between exports and imports of goods and services. It divides exports and imports into two finer categories. The first is goods trade, that is, exports (1391 billions €) or imports of merchandise (1371 billions €). The euro area runs a trade balance surplus of 19.8 billions €. The second category, services, includes items such as payments for tourists' expenditures.
   (b) Income Balance. It divides net income into two finer categories.
      i. Net investment income : Difference between income receipts on foreign assets owned by the residents of the Euro Area and income payments on assets in the euro area owned by foreigners. It includes international interest and dividend payments and earnings of domestically owned firms operating abroad. If you own a share of a US firm's stock and receive a dividend payment of 5€, that payment shows up in the accounts as a European investment income receipt of 5€. The euro area receives more investment income than it pays interest ; net investment income is 17 billions €.
      ii. Net international compensation to employees. Wages that workers earn abroad can also enter the income account. This account measures euro area compensation receipts from (1) earnings of European residents employed temporarily abroad, (2) earnings of European residents employed by foreign governments in the euro area, and (3) earnings of European residents employed by international organizations in the Euro Area. European workers receive 16 billions € while the euro area pays 9.9 billions €.
   (c) Net Unilateral Transfers : difference between gifts (that is, payments that do not correspond to purchases of any good, service, or asset) received from the rest of the world and gifts made by the euro area to foreign countries : aid to developing countries, funds paid to international organizations. Net unilateral transfers are negative which mean that the payments by the euro area are larger than the receipts.

2. The **capital account** registers transactions of capital assets such as debt forgiveness, purchases and sells of patents, of copyright (droit d'auteur), of land. These capital flows are low : 23.7 billions € in credit and 14.5 billions € in debit.[4]

3. The sum of the current account CA and the capital account is positive : the euro area has a financing capacity of 17.9 billions €. This amount correspond to the excess of savings over investment and thus can be invested abroad by purchasing foreign assets.

4. The **financial account** is the difference between sales of assets to foreigners and purchases of assets from foreigners. Hence, the financial account registers in credit the purchases of assets denominated in euro by foreigners and registers in debit the purchases of foreign assets by the euro area. In credit, the financial account registers foreign purchases of European securities (shares, bonds, money market securities), European bank borrowing from foreigners, and foreign direct investment in the euro area. In debit, the financial account registers European purchases of foreign securities, bank lending to foreigners, and European foreign direct investment abroad. Hence, the financial account records these three types of sub-categories of investment : FDI (foreign direct investment) which correspond to capital investment abroad when the investor owns more than 10% of the total assets of the foreign firm, purchases and sales of securities, bank lending and borrowing (crédits commerciaux), financial derivative products (produits financiers dérivés : contrats à terme pour se couvrir contre les variations de taux, options pour se couvrir contre les risques de variations des prix des titres).

5. At this stage, we can calculate the **intermediate balance** (balance de base) which represents the sum of the current account, the capital account and net financial flows restricted to the following categories of investment : FDI, securities and financial derivatives. Intermediate balance amounts to 154.6 €.

6. The last financial account transaction merits separate discussion : it is the **Net Reserve Assets** (avoirs nets de réserves). This type of transaction is the sale or the purchase of official reserve assets by central banks. An economy's central bank is the institution responsible for managing the supply of money. In the euro area, the central bank is the ECB. Official international reserves are foreign assets held by central banks. At one time, official reserves consisted largely of gold, but today, central banks' reserves include substantial foreign financial assets, particularly public bonds. According to Table 2.2, international reserves increase by 0.9 billions €.

   A rise in international reserves, without any intervention by the ECB, may lead to undesirable effect such a rise in the money supply which in turn can lower the interest rate below the target interest rate ('refi' : taux de refinancement régulier ou taux des opérations principales de financement). To nullify the impact of their foreign exchange operations on the domestic money supply resulting from an inflow of foreign currencies, central banks sometimes carry out transactions in opposite directions. This type of policy is called sterilized foreign exchange intervention. for example, if international reserves rise, the central bank may sell assets on the private or the public sector ; in

[4] Le poste *transferts en capital* correspond aux transferts de propriété d'un actif fixe (transferts pouvant être identifiés comme relevant de l'aide à l'investissement) ou comme la remise sans contrepartie d'une dette. Par exemple, si la France abandonne 1 milliard d'euros de dette à un pays en développement, cette transaction sera inscrite en débit dans le compte de capital. Le poste *acquisitions et cessions d'actifs non financiers* correspond aux achats et ventes de brevets.

the euro area, the central bank offers the possibility to deposit their surplus liquidity ('facilité de dépôt').

When a central bank purchases or sells a foreign asset, the transaction appears in its country's financial account just as if the same transaction had been carried out by a private citizen. A transaction in which the central bank of Japan (the Bank of Japan) acquires euro assets might occur as follows : A European auto dealer imports a Nissan from Japan and pays the auto company with a check for 20.000 €. Nissan does not want to invest the money in euro assets, but it so happens that the Bank of Japan is willing to give Nissan Japanese money in exchange for the 20.000 € check. The Bank of Japan's international reserves rise by 20.000€ as a result of the deal. Because the Bank of Japan's euro reserves are part of total Japanese assets held in the Euro Area, the latter rise by 20.000 €. This transaction therefore results in a 20.000 € credit in the euro area (BoP) financial account, the other side of the 20.000 € debit in the euro area current account due to the import of the car.

7. The last item is **Net Errors and Omissions** (erreurs et omissions nettes) which amounts to -155.9 billions € is the opposite of the sum of the current account, the capital account and the financial account, i.e., $17.9 + 137.8 = 155.6$. The role of this item is to guarantee that the BoP is in equilibrium. However, there is a discrepancy between the current account and the financial account. The reason is that information about the offsetting debit and credit items associated with a given transaction may be collected from different sources. For example, the import debit that a shipment of DVD players from Japan generates may come from a European customs inspector's report and the corresponding financial account credit from a report by the European bank in which the check paying for the DVD players is deposited. Because data from different sources may differ in coverage, accuracy, and timing, the balance of payments accounts seldom balance in practice as they must in theory.

When calculating the sum of the current account, capital account and the financial account, one obtains 155.6 billions of euros. Since the sum should be nil, we have to subtract -155.6. The euro area has a financing capacity of 17.9 billions € which means that the euro are has sold more goods, services and capital than it has purchased goods, services, and capital abroad. This financing capacity can be used to acquire foreign assets, or can be accumulated as international reserves. Because international reserves have increased by 0.9 billion €, it implies that the euro area experienced a net capital outflow of 17 billions €. To summarize, for the BoP to be balanced, we must have :

$$\text{CA} + \text{Capital account} + \text{KA} = 0. \tag{2.67}$$

Abstracting from the capital account for simplicity and considering the financial account without international reserves denoted by CK', we must have :

$$\underbrace{\text{CA}}_{17.9} + \underbrace{\text{KA}'}_{-17} = \text{official settlements balance} = 0.9. \tag{2.68}$$

The official settlements balance (balance des règlements officiels) is the opposite of the Official Reserve Assets. In the case of the euro, the official settlements balance is positive in 2006 and amounts to 0.9 billion €. The level of net central bank financial flows is thus called the official settlements balance or (in less formal usage) the balance of payments. This balance is the sum of the current account and capital account balances, less the non reserve portion of the

financial account balance, and it indicates the payments gap that official reserve transactions need to cover. Thus the euro area balance of payments in 2006 was positive, at 0.9 billion €.

The balance of payments played an important historical role as a measure of disequilibrium in international payments, and for many countries it still plays this role. A negative balance of payments (a deficit) may signal a crisis, for it means that a country is running down its international reserve assets. If a country faces the risk of being suddenly cut off from foreign loans, it will want to maintain a sufficient amount of international reserves as a precaution. Developing countries, in particular Asian economies following the 1997 crisis, are in this position.

What does the U.S. current account look like ? Take a look at Table 2.24. It displays the U.S. current account for 2012. In that year, the United States experienced large deficits in both the current account and the trade balance of about half a trillion dollars, or about 3 percent of GDP. Current account and trade balance deficits are frequently observed. In fact, as shown in Figure 2.23 the U.S. trade and current account balances have been in deficit for more than 30 years. Moreover, during this period the observed current account and trade balance deficits have been roughly equal to each other.

In 2012, the United States was a net importer of goods, with a merchandise trade deficit of 4.7% of GDP and at the same time a net exporter of services, with a service balance surplus of 1.2% of GDP. The U.S. has a comparative advantage in the production of human capital intensive services, such as professional consulting such as legal and financial services, transport and communication, computer services, research and development. At the same time, the U.S. imports basic goods, such as primary commodities, textiles, and consumer durables. The fact that in the United States the trade balance and the current account have been broadly equal to each other in magnitude over the past thirty years means that the sum of the other two components of the current account, the income balance and net unilateral transfers, were close to zero in most years.

According to Blanchard, Giavazzi and Sa (2005), the US current account deficit has two main causes :

- The first is an increase in U.S. demand for foreign goods, partly due to relatively faster U.S. growth and partly to shifts in demand away from U.S. goods toward foreign goods. Because imports rise, the trade balance enters in deficit which in turn depreciates the dollar and triggers a valuation effect : the dollar depreciation increases the dollar value of U.S. holdings of foreign assets, decreasing the U.S. net debt position.
- The second is an increase in foreign demand for U.S. assets, starting with high foreign private demand for U.S. equities in the second half of the 1990s, and later shifting to foreign private and then central bank demand for U.S. bonds in the 2000s. An increase in the demand for U.S. assets appreciates the dollar and thus triggers an increase in the trade deficit and a deterioration in the net debt position (due to a higher share of domestic assets held by foreigners and a negative valuation effect).

2.4.1 Current Account against Trade Balance

The current account CA is defined as the sum of the trade balance TB, plus net income balance, plus net unilateral transfers (transferts nets courants), NII. Hence, the current

Flux (en milliards d'euros)	Crédit	Débit	Solde
A. Compte des transactions courantes			**8.5**
A.1 Biens			19.8
Exportations de biens	1391		
Importations de biens		1371	
A.2 Services			44.1
Exportations de services	438.8		
Importations de services		394.7	
Balance commerciale			63.9
A.3 Revenus			23.8
dont Revenus des salariés	16.8	10.0	6.8
et Revenus des investissements	487.1	470.2	17.0
A.4 Transferts courants	88.7	167.8	-79.2
B. Compte de capital	23.9	14.5	**9.3**
CF/BF vis-à-vis du RDM			17.9
C. Compte financier			**137.8**
C.1 Investissements directs nets			**−156.7**
de la zone euro dans le RDM		415.6	
du RDM dans la zone euro	258.9		
C.2 Investissements de portefeuille nets			290.4
C.3 Produits financiers dérivés			3.0
C.4 Autres investissements			1.9
C.5 Avoirs de réserve nets			-0.9
Balance de base (A+B+C1+C3+C3)			154.6
Erreurs et omissions nettes			**−155.6**

Tab. 2.2 – Balance of Payments in the Euro Area, 2006 - Source : Eurostat

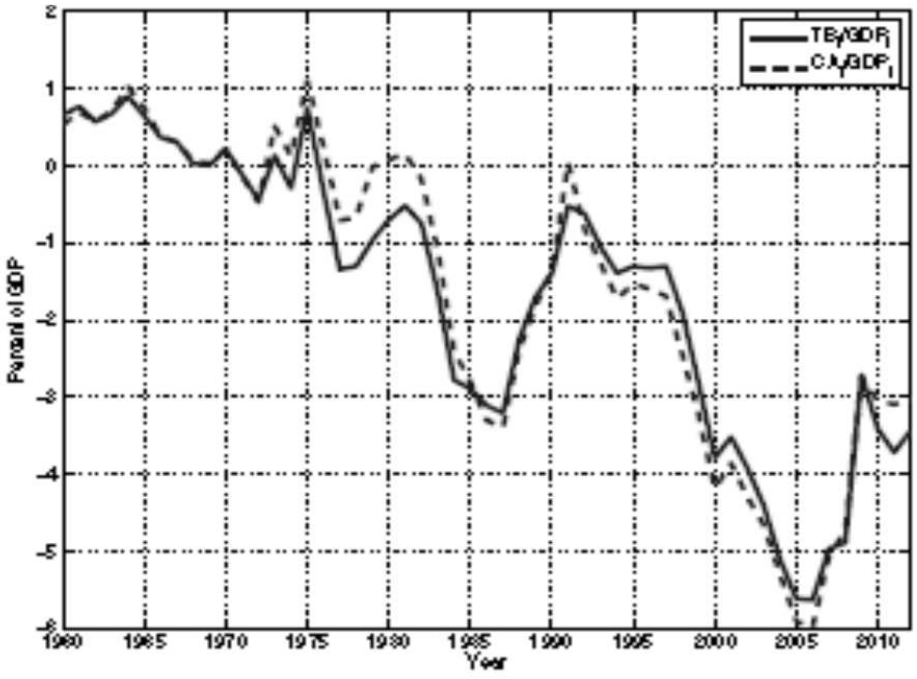


Fig. 2.23 – The U.S. Trade Balance and Current Account (as % of GDP) Source : BEA, taken from Schmitt-Grohé and Uribe (2014) International Macroeconomics

Item	Billions of dollars	Percentage of GDP
Current Account	-475.0	-3.0
Trade Balance	-539.5	-3.4
Merchandise Trade Balance	-735.3	-4.7
Services Balance	195.8	1.2
Income Balance	198.6	1.3
Net Investment Income	206.2	1.3
Net International Compensation to Employees	-7.6	-0.0
Net Unilateral Transfers	-134.1	-0.9
Private Remittances	-77.6	-0.5
U.S. Government Transfers	-56.5	-0.4

Source: Bureau of Economic Analysis, U.S. Department of Commerce, http://www.bea.gov.

FIG. 2.24 – The U.S. Current Account, 2012. Source : BEA, taken from Schmitt-Grohé and Uribe (2014) International Macroeconomics

account need not coincide with the trade balance. The balance on the current account may be larger or smaller than the balance on the trade account. Also, both the trade balance and the current account may be positive or negative and they need not have the same sign.

Figure 2.25 illustrates this point. It displays the trade balance and the current account as percentages of GDP in 2005 (TB/GDP and CA/GDP, respectively) for 102 countries. The space (TB/GDP,CA/GDP) is divided into six regions, depending on the signs of the current account and the trade balance and on their relative magnitudes. Table 2.26 extracts six countries from this group with CA/GDP and TB/GDP pairs located in different regions.

Argentina is an example of a country that in 2005 ran trade balance and current account surpluses, with the trade balance exceeding the current account. The current account surplus was smaller than the trade balance surplus because of interest payments that the country made on its external debt, which caused the income balance to be negative. Historically, Argentina's foreign interest obligations have been larger than the trade balance resulting in negative current account balances. However, in 2001, Argentina defaulted on much of its external debt thereby reducing its net interest payments on foreign debt.

Like Argentina, China displays both a current account and a trade balance surplus. However, unlike Argentina, the Chinese current account surplus is larger than its trade balance surplus. This difference can be explained by the fact that China, unlike Argentina, is a net creditor to the rest of the world, and thus receives positive net investment income.

The Philippines provides an example of a country with a current account surplus in spite of a sizable trade balance deficit. The positive current account balance is the consequence of large personal remittances (envois de fonds) received (amounting to 13 percent of GDP in 2005) from overseas Filipino workers.

Mexico, the United States, and Ireland all experienced current account deficits in 2005. In the case of Mexico and the United States, the current account deficits were associated

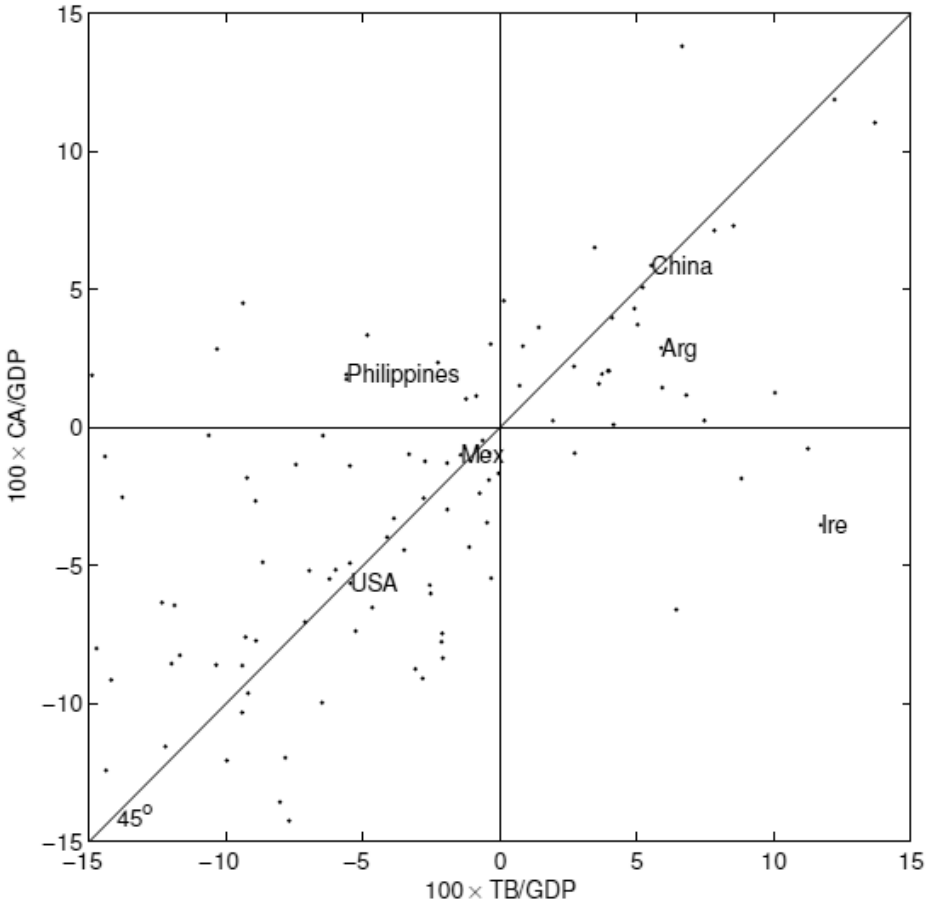


FIG. 2.25 – Trade Balances and Current Account Balances Across Countries in 2005. Notes : Note : TB denotes the trade balance in goods and services and CA denotes the current account balance. There are 102 countries included in the sample. Source : World Development Indicators, taken from Schmitt-Grohé and Uribe (2014) International Macroeconomics

with trade deficits of about equal sizes. In the case of Mexico, the current account deficit was slightly smaller than the trade deficit because of remittances received from Mexicans working in the United States. These very same remittances explain to some extent why the United States current account deficit exceeded its trade deficit.

Finally, the current account deficit in Ireland was accompanied by a large trade surplus of about 11.7 percent of GDP. In the 1980s, Ireland embarked on a remarkable growth path that earned it the nickname 'Celtic Tiger'. This growth experience was financed largely through foreign capital inflows. Gross foreign liabilities in 2005 were about 10 times as large as one annual GDP. Foreign assets were also very large so that the net international investment position of Ireland in 2005 was 'only' -20 percent of GDP. The positive trade balance surplus of 2005 reflects mainly Ireland's effort to pay income on its large external obligations.

It is evident from Figure 2.25 that most $(TB/GDP, CA/GDP)$ pairs fall around the 45-degree line. This means that for many countries the trade balance and the current account are of the same sign and of roughly the same magnitude. This clustering around the 45-degree line suggests that for many countries, including the United States, the trade balance is the main determinant of the current account.

Country	TB/GDP	CA/GDP
Argentina	5.9	2.9
China	5.5	5.9
Ireland	11.7	-3.5
Mexico	-1.4	-1.0
Philippines	-5.6	1.9
United States	-5.5	-5.6

FIG. 2.26 – Trade Balance and Current Account as Percentages of GDP in 2005 for Selected Countries. Notes : Note : TB denotes the trade balance in goods and services and CA denotes the current account balance. Source : World Development Indicators. Taken from Schmitt-Grohé and Uribe (2014) International Macroeconomics

2.5 Net International Investment Position

One reason why the concept of Current Account Balance is economically important is that it reflects a country's net borrowing needs. For example, as we saw earlier, in 2012 the United States ran a current account deficit of 475 billion dollars. To pay for this deficit, the country must have either reduced part of its international asset position or increased its international liability position or both :

$$CA_t = B_t - B_{t-1} = (A_t - A_{t-1}) - (L_t - L_{t-1}) .$$

In this way, the current account is related to changes in a country's net international investment position. The term Net International Investment Position (NIIP) is used to refer to a country's net foreign wealth, that is, the difference between the value of foreign assets owned by the country's residents and the value of the country's assets owned by foreigners. NIIP is a stock while the current account (CA) is a flow.

The accounting document labelled 'Net International Investment Position' provides information about i) reserves in foreign currencies, ii) the size of external indebtedness, iii) the share of domestic physical capital owned by foreigners.

2.5.1 Net International Investment Position (NIIP) of the Euro Area

This accounting document is divided in two parts : the figures on the left hand side give the foreign assets that the home country own, and the figures on the right hand side give the domestic assets owned by the foreigners. The last column shows the difference between assets ('actifs') and liabilities ('engagements') : Net International Investment Position is negative if liabilities are higher than assets. The LHS of the accounting document which gives the

Items/Amount	Assets	Liabilities	Balance
Total	-	-	-1455.4
Direct investment	5633.2	4339.5	1293.7
Portfolio investment	4750.9	7721.5	-2970.7
Financial derivatives	-	-	-29.7
Other investment	4871.2	5287.0	-415.8
Reserve assets	-	-	667.1

TAB. 2.3 – The Net International Investment Position (in euro billions), 2011 - Source : Eurostat

stock of foreign assets held by the euro area can be viewed as the cumulative amount of the purchases of foreign assets registered in debit in the BoP accounting document.

The RHS of the accounting document which gives the stock of domestic assets held by foreigners, i.e., the euro area's liabilities, can be viewed as the cumulative amount of the purchases of domestic assets denominated in euro registered in credit in the BoP accounting document (when abstracting from valuation effects).

Table 2.3 presents the net international investment position (NIIP) of the euro area in 2011. The residents in the euro area acquire 5633.2 billions € of direct investment abroad (for example they set up an affiliate in a foreign country) and foreigners acquire 4339.5 billions € of direct investment in the euro area. While net direct investment in the euro area is positive at 1293.7 billions €, net portfolio investment is negative at -2970.7 billions *euro* which means that foreigners acquire more assets denominated in euro than the euro area acquired foreign securities. Finally, the net reserve assets item is positive which means that the eurosystem holds a net amount of foreign assets of 667.1. The NIIP of the euro area is negative and establishes at -1455.4 billions €. Because the GDP of the euro area in 2011 is 9108, the net external debt held by the euro area represents about 16% of GDP which is approximately 10 percentage points (in% of GDP) smaller than that of the US.

2.5.2 Net External Asset Position in the U.S.

Figure 2.29 shows the U.S. current account balance and net international investment position since 1976. Notice that the U.S. NIIP was positive at the beginning of the sample. In the early 1980s a long sequence of current account deficits emerged that eroded the net foreign wealth of the United States. And in 1987, the nation became a net debtor to foreigners for the first time since World War I. The U.S. current account deficits did not stop in the 1990s however. By the end of that decade, the United States had become the world's largest foreign debtor. Current account deficits continued to expand for twenty five years. Only shortly before the onset of the Great Recession of 2008, did this trend stop and current account deficits became smaller in magnitude. By the end of 2012, the net international investment position of the United States stood at -3.9 trillion dollars or 25 percent of GDP. This is a big number, and many economist wonder whether the observed downward trend in the net foreign investment position is sustainable over time. This concern stems from the fact that countries that accumulated large external debt to GDP ratios in the past, such as many Latin American countries in the 1980s, Southeast Asian countries in the 1990s, and more recently

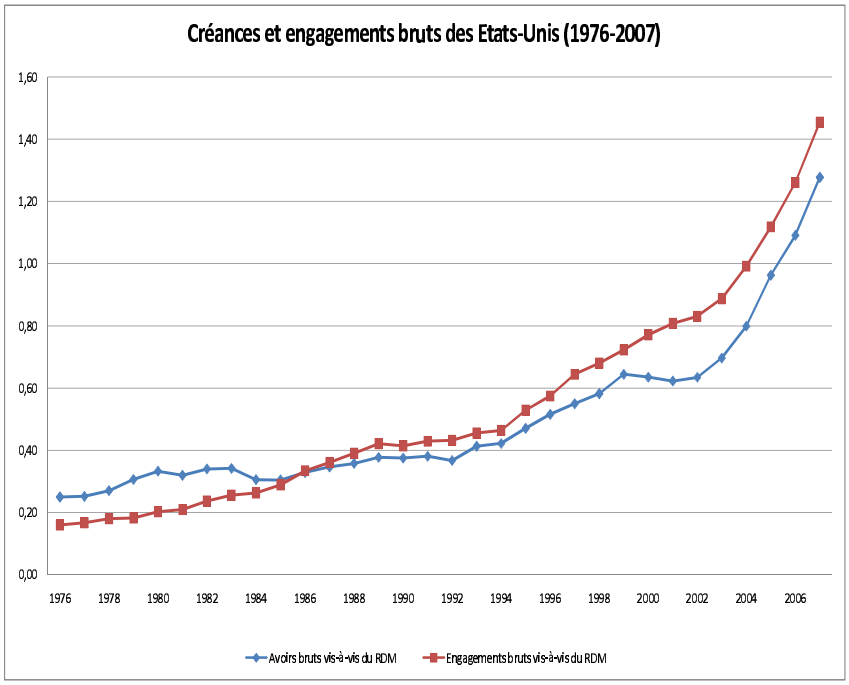


FIG. 2.27 – Foreign assets and liabilities in the US (1976-2007) - Source : BEA

peripheral European countries, have experienced sudden reversals in international capital flows that were followed by costly financial and economic crises. Indeed the 2008 financial meltdown (crise financière) in the United States has brought this issue to the fore (a porté cette question à l'avant-plan).

2.5.3 The Composition of Net External Asset Position in Iceland

The case of Iceland is interesting since it shows that both the level and the composition of external debt have played a major role in triggering the current currency crisis in 2008. First, a large external debt is worrying since it may lead to a sudden stop when investors have doubt about the reimbursement capacity of . Second, a large fraction of the short-run external debt owned by the banking sector raises the probability of a bank run since bank's commitments now include cash withdrawals and short-run debt repayment. Third, if international reserves are insufficient to cover short-run commitments, it is most likely that the country will face a sudden stop. Figure 2.30 shows that the rise in the external debt accelerates in Iceland and amounts to almost ten times the GDP in 2007. Figure 2.31 displays the short-run debt (in % of total external debt) and the short-run debt held by the banking sector (in % of short-run external debt). By and large, the short-term external debt amounts to 25% of total external debt while almost 2/3 of the short-run debt is held by the banking sector. The marked rise in the external debt (192% of GDP in 2008) is caused by the investment boom which led to a huge current account deficit. As a result, international reserves plummeted : they represent less than 10% of the short-term debt at the end of 2007. At the beginning of the 2008, the Icelandic Krona depreciates and following the Lehman Brothers bankruptcy, the country experiences a sudden stop. Between January and October 2008, the Icelandic Krona depreciates by 50% (see Figure 2.32) while the three icelandic banks are nationalized.

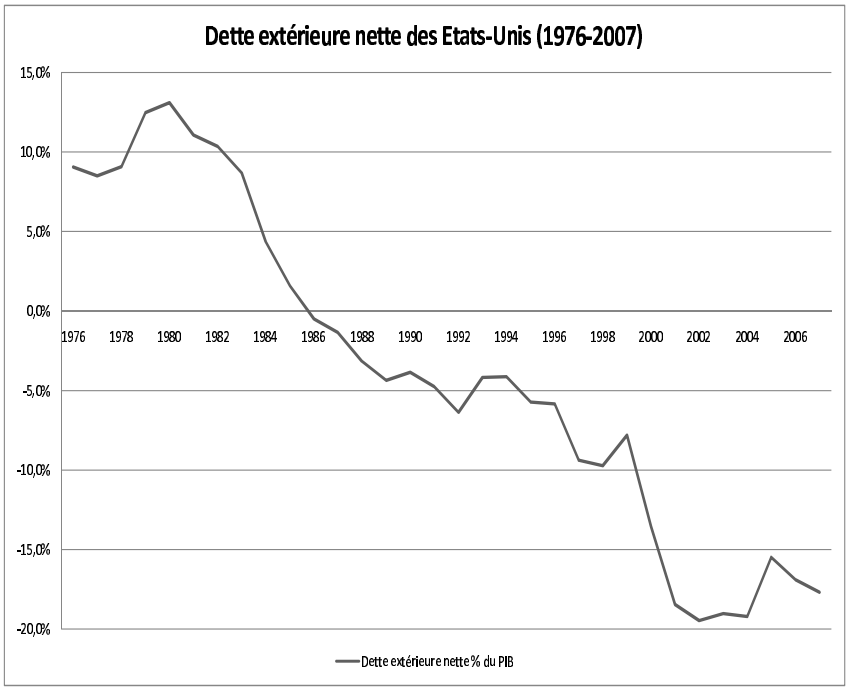
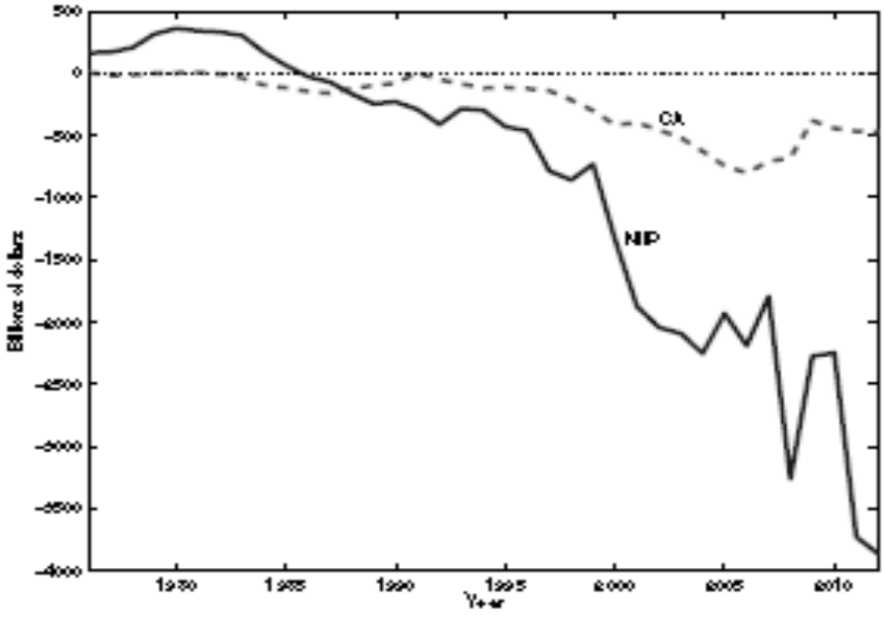


FIG. 2.28 – Net External Debt in the U.S. (1976-2007) - Source : BEA



Source: http://www.bea.gov

FIG. 2.29 – The U.S. Current Account (CA) and Net International Investment Position (NIIP). Source : BEA, taken from Schmitt-Grohé and Uribe (2014) International Macroeconomics

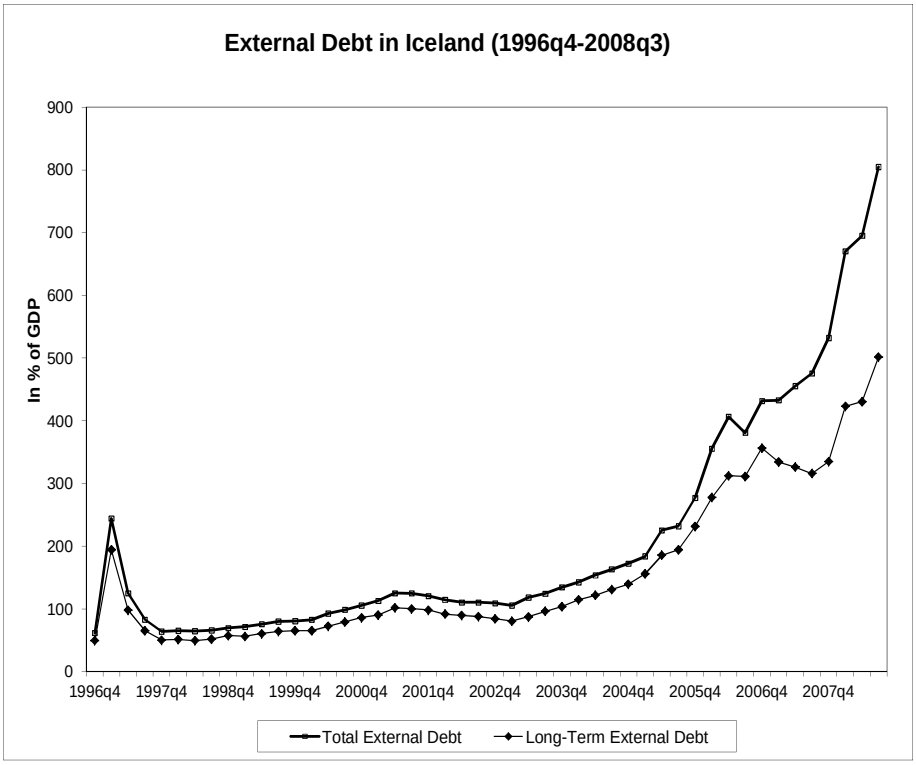


FIG. 2.30 – External Debt in Iceland (1996q4-2008q3)

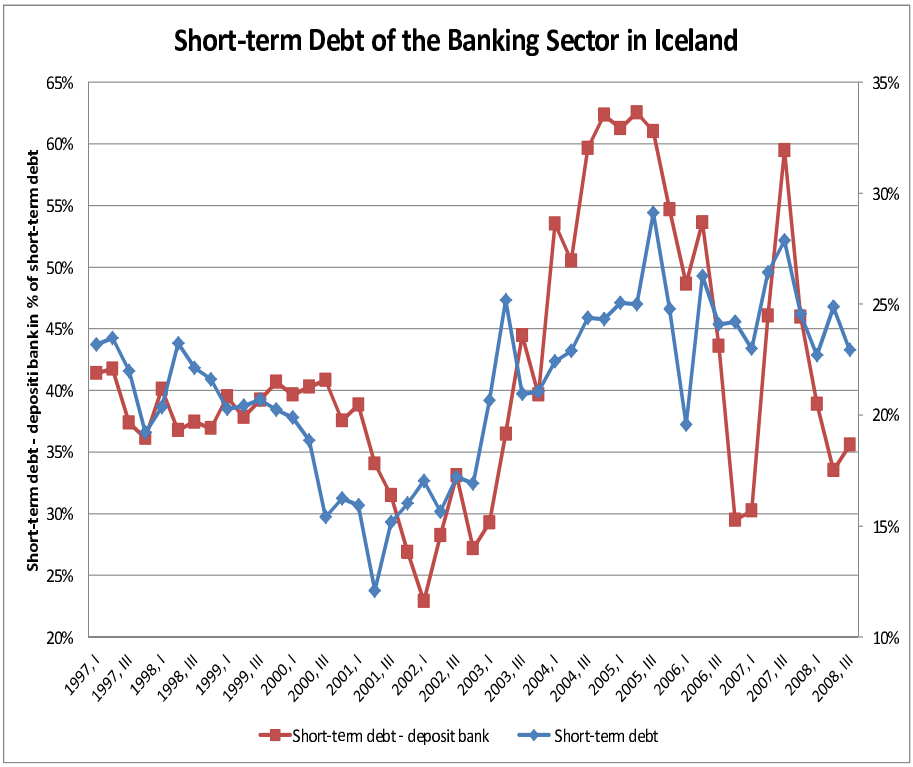


FIG. 2.31 – Short-term Debt of the Banking Sector in Iceland

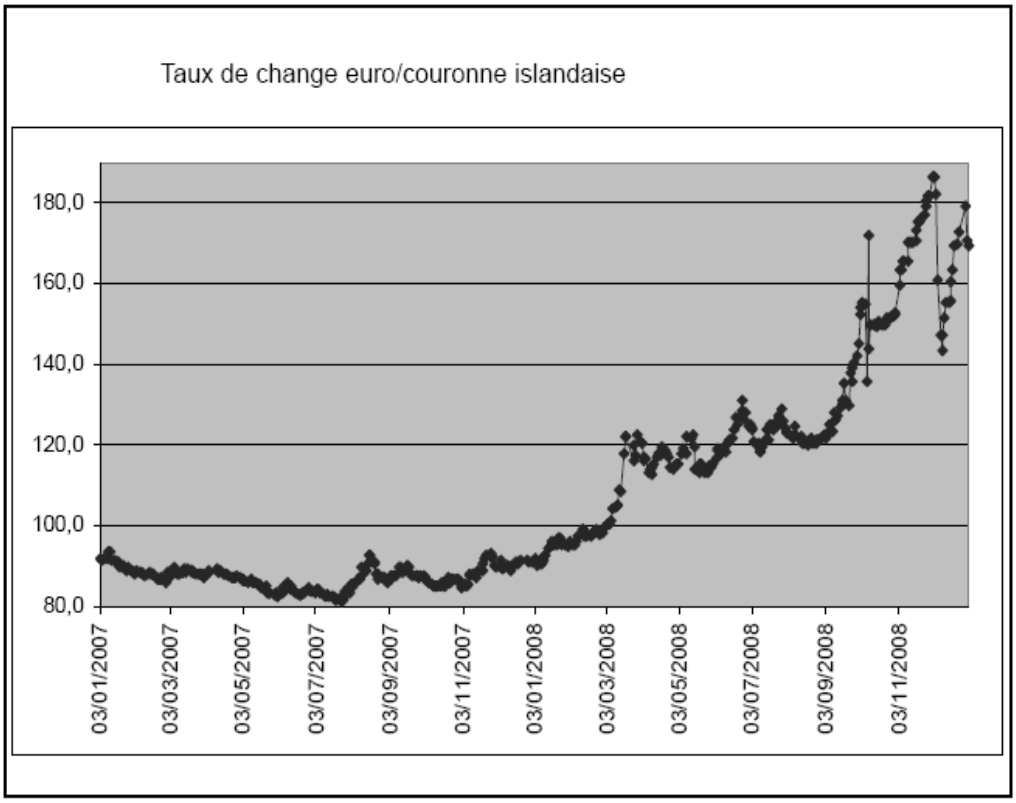


FIG. 2.32 – Exchange rate euro/icelandic Krona, 2007-2008

Periods/Regions	Major Oil Exporters	Other Developing countries	Advanced Economies
1973-1981	363.8	-410.0	7.3
1982-1989	-135.3	-159.2	-361.1
1990-1998	-106.1	-684.2	51.1
1999-2009	2647.9	984.7	-3134.7

TAB. 2.4 – Cumulative Current Account Balances of Major Oil Exporters, Other Developing Countries, and Advanced Countries, 1973-2009 (billions of dollars) - Source : Krugman, Obstfeld, Melitz (2012) International Economics : Theory and Policy, 9th Edition, Pearson

2.6 Capital Movements over the Last Forty Years

In this section, we review the origins and the destination of capital flows which aim at financing current account deficits. To do so, Table 2.4 show the cumulative current account balances of major oil exports, other developing countries (Asia and Latin American countries) and advanced economies over the period 1973-2009. One major empirical fact that emerges is that the origin and the destination of capital flows varies dramatically over the four sub-periods. i) Over the period 1973-1981, capital flows from the South to the South. ii) Over the period 1982-1989, capital flows from the North to the North. iii) Over the period 1990-1998, capital flows from the North to the South. iv) And over the period 1999-2009, capital flows from the South to the North.

2.6.1 South-South Capital Flows in the 70s and the Debt Crisis of Developing Countries of the 1980s

We start with developments in emerging economies, such as Latin American countries. As shown in the first line of Table 2.4, capital flows from the South to the South. More precisely, following the sharp oil price increase in 1973-74, major oil exporters have accumulated huge current account surpluses which led to huge deposits by middle eastern countries in international banks. These funds have been directed toward the Latin American countries via (U.S.) international banks. The first column of Table 2.4 shows that the cumulative current account surpluses which amount to 363.8 billions of dollars almost perfectly coincide with the large cumulative current account deficits (i.e., -410.0) by other developing economies, in particular the Latin American countries. Note that at the same time, as shown in the last column, industrialized countries experience balanced external asset position over the 1970's. While during this period, advanced economies face a major economic slump, governments wish to contain inflationary pressures in the middle of the 1970's and thus conduct restrictive policies. By lowering aggregate demand, these restrictive policies led to current account surpluses.

A number of external factors led to a large accumulation of debt by developing countries in the second half of the 1970s. First, bankers in industrialized countries strongly felt that developing countries could never go bankrupt. Two other external factors were important in explaining the unusual amount of capital that flowed to Latin America and other developing countries in the late 1970s : low real interest rates and large growth in exports.

There were also domestic government policies in Latin America that encouraged borrowing in the late 1970s. First, financial liberalization, led to large expansions in lending, as credit controls in the banking sector were removed. In some countries, such as Argentina and Chile, the government provided loan guarantees. Thus, domestic banks had incentives to borrow at very high rates and invested in risky projects. In fact, it was as if the government was subsidizing foreign borrowing by domestic banks.

Are these capital flows a symptom of bad policies ? Not necessarily. Recall the identity that links national saving, S, domestic investment, I, and the current account balance, $CA = S - I$. If national saving falls short of domestic investment, the difference equals the current account deficit. Because of poverty and poor financial institutions, national saving often is low in developing countries. Because these same countries are relatively poor in capital, however, the opportunities for profitably introducing or expanding plant and equipment can be abundant. Such opportunities justify a high level of investment. By running a deficit in its current account, a country can obtain resources from abroad to invest even if its domestic saving level is low.

However, a deficit in the current account implies that the country is borrowing abroad. In return for being able to invest more today today which implies that the country imports more goods than its current exports can pay for, the country must promise to repay in the future either the interest and principal on loans or the dividends on shares in firms sold to foreigners. Thus, much developing-country borrowing could potentially be explained by the incentives for intertemporal trade examined in chapters 3 and 5. Low-income countries generate too little saving of their own to take advantage of all their profitable investment

opportunities, so they must borrow abroad. In capital-rich countries, on the other hand, many productive investment opportunities have been exploited already but saving levels are relatively high. Savers in developed countries can earn higher rates of return, however, by lending to finance investments in the developing world. It does not imply that all loans from developed to developing countries are justified. Loans that finance unprofitable investments - for example to excessive public deficits - or imports of consumption goods may result in debts that borrowers cannot repay. In several Latin America countries, it was indeed the case such as in Bolivia where publics deficits reach 30% of GDP in the early 80s or Brazil in 1989 (18% of GDP). Moreover, a few countries pegged their currencies to the U.S. dollar (as a way to fight inflation). Due to credit expansion and excessive spending, the real exchange rate appreciated and current account deficits showed up as a result of goods imports (which are cheaper) and high public spending.

In the early 1980s, there was a dramatic change in the economic environment. World interest rates increased sharply due to the anti-inflationary policy in the U.S. led by Federal Reserve chairman Paul Volker (see Table 2.33). In addition, the terms of trade deteriorated for the debtor countries as raw material prices fell. As a result, the real interest rate faced by developing countries rose dramatically (see Figure 2.34).

Debtor countries were highly vulnerable to the rise in world interest rates because much of the debt carried a floating rate. Until the end of the seventies, Latin American countries borrow to US international banks and accumulate short term debts (i.e., the debt must be reimbursed in the short-run), adjustable-rate debts (if the interest rise, interest payments increase), dollar-denominated debts (if the dollar appreciates, the domestic currency vis à vis du dollar depreciates, interest payments denominated in dollars increase). In 1979, the U.S. Federal Reserve adopted a tough anti-inflation policy that raised dollar interest rates. At the same time, European countries face a severe crisis due to increased unit labor cost and experience a dramatic decline in investment. The resulting recession and the consecutive fall in industrial countries' aggregate demand had a direct negative impact on the developing countries, of course, but three other mechanisms were also important :

- Because the developing world had extensive adjustable-rate dollar-denominated debts, there was an immediate and spectacular rise in the interest burden that debtor countries had to carry. More precisely, in Latin America, 65% of the foreign debt had a floating rate (see 1st column of Table 2.35).
- The situation worsened due to the dollar's sharp appreciation in the foreign exchange market, which raised the real value of the dollar debt burden substantially.
- Primary commodity prices collapsed due to the fall in aggregate demand, depressing the terms of trade of many poor economies. The combination of higher interest rates and lower export prices resulted in sharp increases in interest payments relative to export earnings in highly indebted developing countries (see second column of Table 2.35).

External lending to developing countries and inflows of foreign investment abruptly stopped in 1982 :[5]

[5]The results were a widespread inability of developing countries to meet prior debt obligations and a rapid move to the edge of a generalized default. Latin America was perhaps hardest hit, but also hit were Soviet bloc countries like Poland that had borrowed from European banks. African countries, most of whose debts were to official agencies such as the IMF and World Bank, also fell behind on their debts. Most countries in East Asia were able to maintain economic growth and avoid rescheduling their debt (that is, stretching out repayments by promising to pay additional interest in the future). Nonetheless, by the end of 1986 more than

Year	Nominal LIBOR
1978	8.3
1979	12.0
1980	14.2
1981	16.5

FIG. 2.33 – Interest rates in the late 1970s and early 1980s - Source : Andres Bianchi et al., "Adjustment in Latin America, 1981-86", in V. Corbo, M. Goldstein, and M. Khan, ed., Growth Oriented Adjustment Programs, Washington, D.C. : International Monetary Fund and The World Bank, 1987.

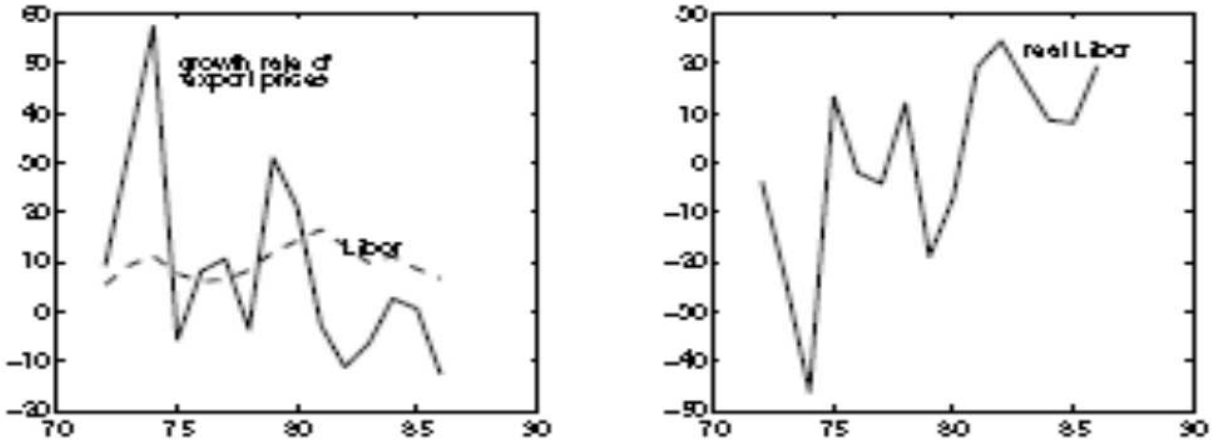


FIG. 2.34 – Interest Rates and Export Prices in Latin America (1972-1986) Note : The real Libor rate is constructed by subtracting the rate of change in export prices from the nominal Libor rate - Source : Andres Bianchi et al., "Adjustment in Latin America, 1981-86", in V. Corbo, M. Goldstein, and M. Khan, ed., Growth Oriented Adjustment Programs, Washington, D.C. : International Monetary Fund and The World Bank, 1987.

Country	Percent of Debt at floating rate	Interest Payment to Exports ratio (%)
Argentina	58	15
Brazil	64	28
Colombia	39	16
Chile	58	28
Mexico	73	19
All Latin America	65	28

FIG. 2.35 – Interest Payments in Selected Latin American Countries. Average 1980-81 - Source : Andres Bianchi et al., "Adjustment in Latin America, 1981-86", in V. Corbo, M. Goldstein, and M. Khan, ed., Growth Oriented Adjustment Programs, Washington, D.C. : International Monetary Fund and The World Bank, 1987.

- The crisis began in August 1982 when Mexico announced that its central bank had run out of foreign reserves and that it could no longer meet payments on its foreign debt. Seeing potential similarities between Mexico and other large Latin American debtors such as Argentina, Brazil, and Chile, banks in the industrial countries - the largest private lenders to Latin America at the time - scrambled to reduce their risks by cutting off new credits and demanding repayment on earlier loans.
- For all developing countries, new lending was 38 billion in 1981, 20 billion in 1982, and only 3 billion in 1983.
- Domestic factors also contributed to the slowdown in capital inflows. The exchange rate policy of pegging the domestic currency to the U.S. dollar followed by several Latin America countries was believed to be unsustainable, in part because governments did fail to implement the required fiscal reforms. As a result, by the early 1980s expectations of real depreciation of the domestic currency induced domestic residents to invest in foreign assets (capital flight).

As a result of the shutdown of foreign credit, countries were forced to generate large current account surpluses in order to continue to service, at least in part, their external obligations (see Figure 2.37). To see it formally, we use the model set out in section 2.3 which considers logarithmic utility, $\ln(C_i)$, while setting the rate of time preference $\rho = \delta$ to zero and abstracting from the government sector, i.e., setting $G_1 = G_2 = 0$. The model consists of four equations determining C_1, C_2, CA_1 and CA_2 :

$$\frac{C_2}{C_1} = (1 + r^\star)\,, \tag{2.69a}$$

$$C_1 + \frac{C_2}{1 + r^\star} = (1 + r^\star)\ .B_0 + Y_1 + \frac{Y_2}{1 + r^\star} \equiv \Omega, \tag{2.69b}$$

$$CA_1 = B_1 - B_0 = r^\star\ .B_0 + (Y_1 - C_1)\,, \tag{2.69c}$$

$$CA_2 = B_2 - B_1 = r^\star B_1 + (Y_2 - C_2)\,, \tag{2.69d}$$

where we have to impose $B_2 = 0$ for the intertemporal solvency condition to hold. Assuming that the initial net foreign asset position is nil, i.e., $B_0 = 0$, one obtains the following optimal conditions :

$$C_1 = \frac{1}{2}\ .\left(Y_1 + \frac{Y_2}{1 + r^\star}\right), \tag{2.70a}$$

$$CA_1 = Y_1 - C_1 = \frac{1}{2}\ .\left(Y_1 - \frac{Y_2}{1 + r^\star}\right), \tag{2.70b}$$

$$C_2 = \frac{1}{2}\ .\left[(1 + r^\star)\ .Y_1 + Y_2\right], \tag{2.70c}$$

$$CA_2 = -B_1 = -CA_1 = \frac{1}{2}\ .\left(\frac{Y_2}{1 + r^\star} - Y_1\right) \tag{2.70d}$$

Figure 2.36 depicts an endowment economy that starts with a zero initial net foreign asset position ($B_0 = 0$) in line with our assumption mentioned above. The endowment point, (Y_1, Y_2), is given by point A in the Figure. The initial equilibrium is at point B, where the economy is running a current account deficit $CA_1 < 0$ (or borrowing from abroad an amount) equal to $Y_1 - C_1$ in period 1. This situation is the result of low output in period 1 relative to consumption. The situation in period 1 resembles the behavior of most Latin American

40 countries had encountered severe external financing problems. The crisis ends only in 1989 when the United States, fearing political instability to its south, insisted that American banks give some form of debt relief to indebted developing countries.

countries in the late 1970s, which, taking advantage of soft international credit conditions borrowed heavily in international capital markets. According to (2.70b), a current account deficit in period 1 ($CA_1 < 0$) is more likely the lower Y_1, the larger the future income Y_2, and the smaller the interest rate $r^\star$.

Consider now an increase in the world interest rate like the one that took place in the early 1980s. The interest rate hike entailed an increase in the amount of resources needed to service not only newly assumed obligations but also existing debts. This is because most of the developing country debt was stipulated at floating rates. If the households re-optimize, they choose B' : a rise in $r^\star$ lowers C_1 and raises C_2, as show by eqs. (2.70a) and (2.70c). The cut in period 1 consumption can be explained by the result of the substitution effect and the rise in interest payments in period 2.[6] Graphically, the increase in the interest rate from $r^\star$ to $r^{\star,\prime}$ causes a clockwise rotation of the budget constraint around endowment point A. However, the interest rate hike is assumed to take place once agents have decided on consumption in period 1 ; hence, they are stuck with $TB_1 = Y_1 - C_1 < 0$.

This means that the new position of the economy is point C on the new budget constraint and vertically aligned with point B. The increase in the world interest rate forces the country to generate a large trade balance in period 2, given by $Y_2 - C_2''$ in order to service the debt contracted in period 1 :

$$C_2'' = Y_2 + \left(1 + r^{\star,\prime}\right) \ .B_1, \tag{2.71}$$

while optimal consumption if households had re-optimized is much larger (i.e., $C_2'' < C_2 < C_2'$) :

$$C_2' = \frac{1}{2} \cdot \left[\left(1 + r^{\star,\prime}\right) \ .Y_1 + Y_2\right] > C_2. \tag{2.72}$$

As a result, the trade surplus ($Y_2 - C_2'' > 0$) in period 2 is much larger than it would have been had the country been able to re-optimize its borrowing in period 1 ($Y_2 - C_2'$). In a model with tradables and non tradables (see chapter 4), the improvement in the trade balance would have been associated with a real exchange rate depreciation as the contraction in aggregate spending lowers consumption in non tradables and thus triggers an excess supply of non tradables. The large cut in spending in period 2 and the consecutive trade surplus shown in Figure 2.36 captures pretty well the adjustment that took place in most Latin American countries in the wake of the Debt Crisis. Figure 2.37 documents the spectacular trade balance reversal that took place in Latin America in 1982.

2.6.2 North-North Capital Flows in the 1980s and the US Current Account Deficit

In the eighties, capital flows from advanced economies to the US. The reason is that at the beginning of the eighties, Japan and the European countries, including Germany, the U.K, France, conduct restrictive monetary policies in order to reduce the inflation rate, as illustrated in Figure 2.38. At the same time, During the administration of President Ronald Reagan in the early 1980s, the United States slashed taxes (the top marginal tax rate has been cut by 23% between 1981 and 1983) and raised some government expenditures, which

[6] Intuitively, a rise in $r^\star$ produces a substitution and an income effect which offset each other. Because the rise in the world interest rate also lowers the period 2 income $\frac{Y_2}{1+r^\star}$ in present value terms, households have to cut consumption expenditure in period 1.

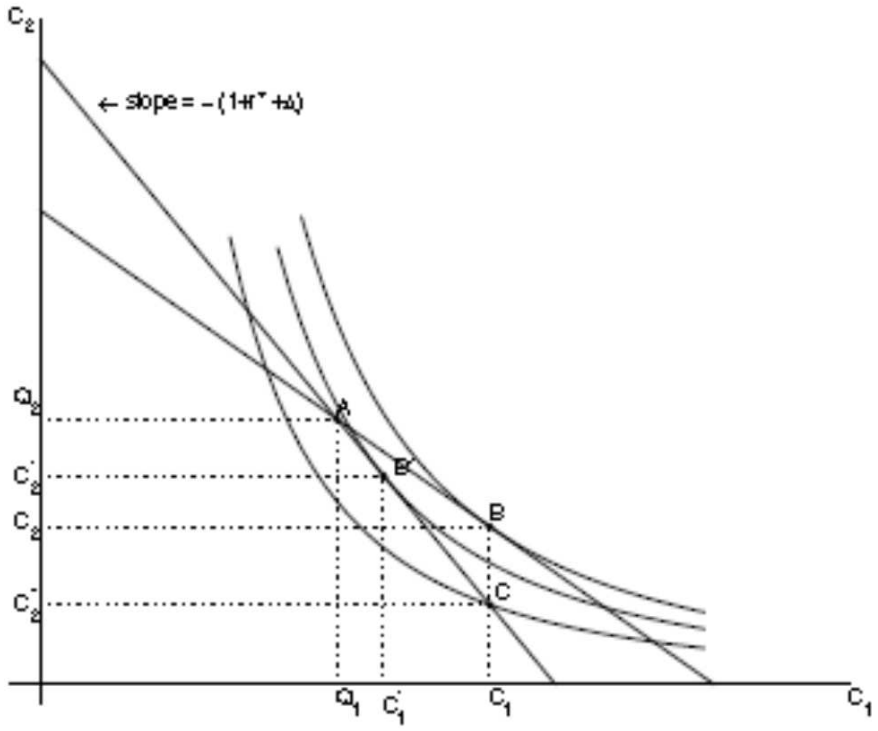


FIG. 2.36 – Floating Interest Rates and Current Account Adjustment - Source : Schmitt-Grohé, Stephanie et Martin, Uribe (2014) International Macroeconomics, Chapter 11

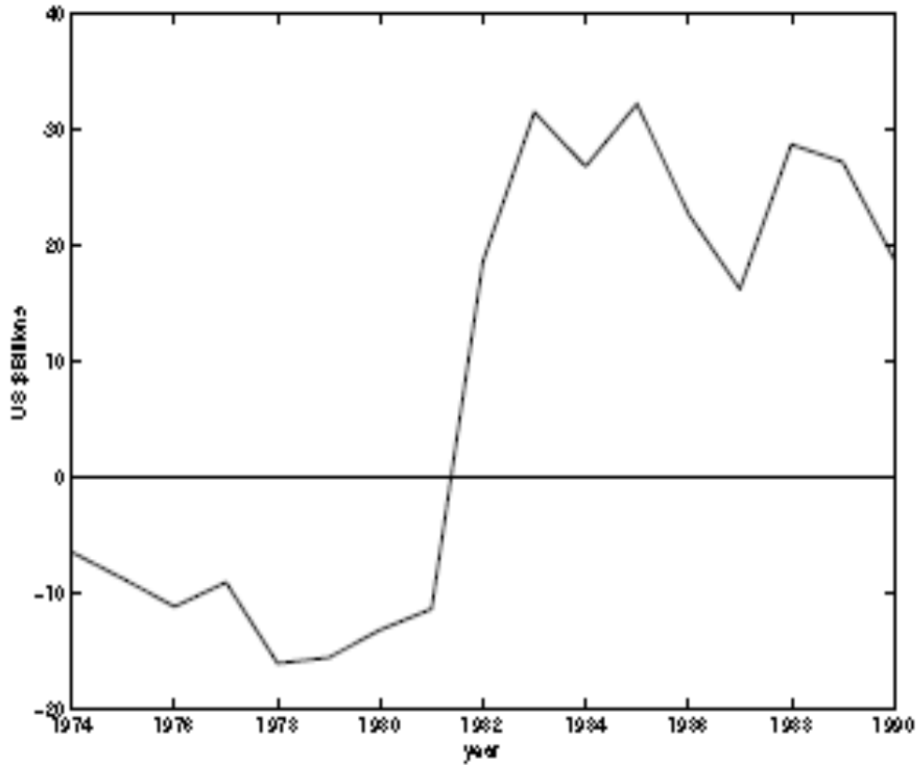


FIG. 2.37 – The Trade Balance in Latin America (1974-1990) - Source : Economic Commission for Latin America and the Caribbean (ECLAC), Preliminary Overview of the Economy of Latin America and the Caribbean, Santiago, Chile, December 1990.

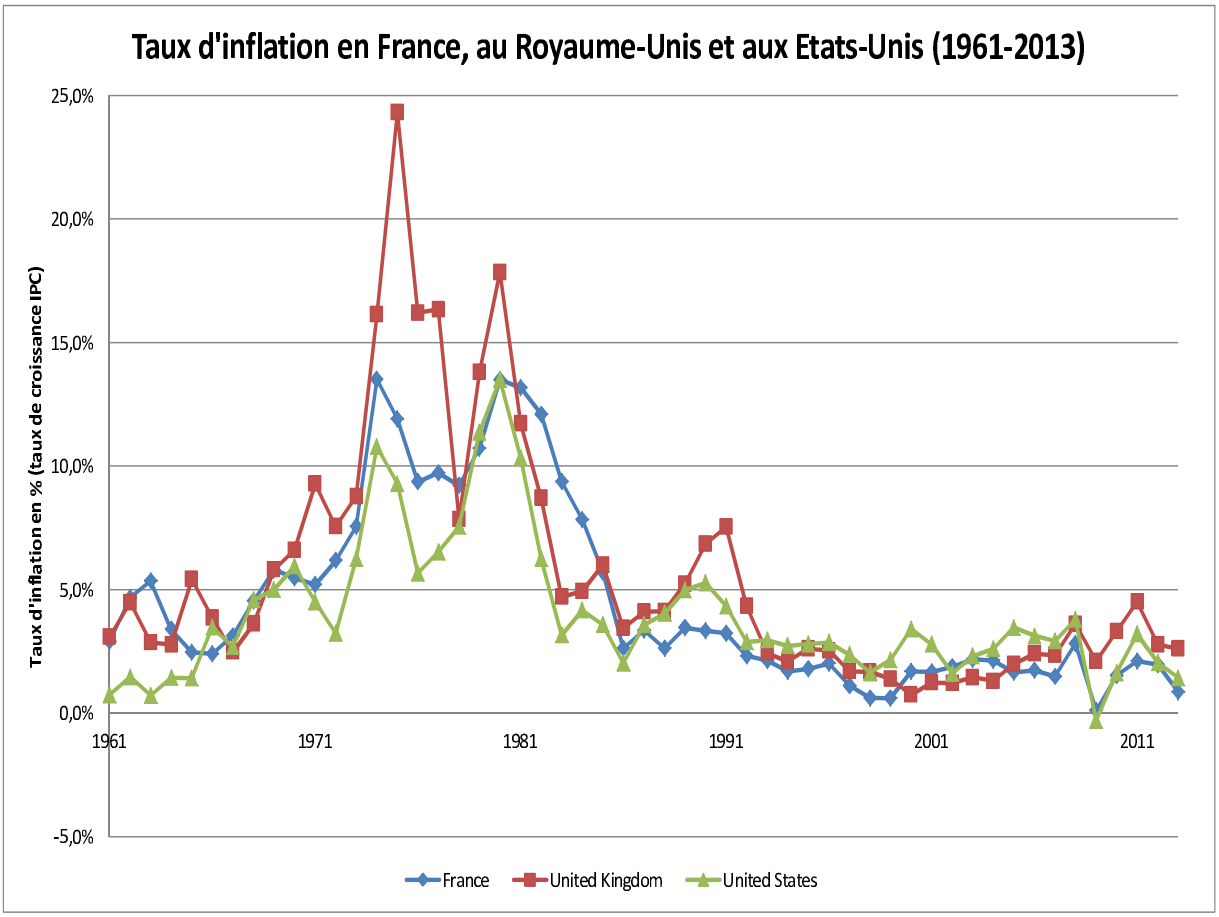


FIG. 2.38 – Inflation rates in France, the U.K. and the U.S. (1961-2013) - Source : OCDE (IPC), calculs de l'auteur

generated both a big government deficit and a sharply increased current account deficit. Those events gave rise to the argument that the government and the current account deficits were 'twin deficits' both generated primarily by expansionary fiscal policies. During the Reagan administration, the U.S. experiences large current accounts deficits which are notably financed by current account surplus in Japan and European Countries, as shown in Figure 2.66 (see the period running from 1983 to 1988).

2.6.3 North-South Capital Flows : The Resurgence of Capital Inflows to Developing Countries in the 1990s

In the 1990s, developing countries in Asia and Latin America experienced a resurgence of capital inflows. About $670 billion of foreign capital flowed to these countries in the 5 years from 1990 to 1994, as measured by the total balance on the financial account. This is 5 times larger than the $133 billion of total inflows during the previous 5 years.

An article by Guillermo Calvo, Leonardo Leiderman, and Carmen Reinhart (1996) analyzes the causes of the resurgence of capital inflows to developing countries in the 1990s and argues that a number of factors were at work. The widespread nature of the phenomenon suggests that global factors were especially important :

– First, interest rates in international financial markets in the 1990s were relatively low. As illustrated in Figure 2.40, after peaking in 1989, interest rates in the U.S. declined steadily in the early 1990s. In 1992 interest rates reached their lowest level since the

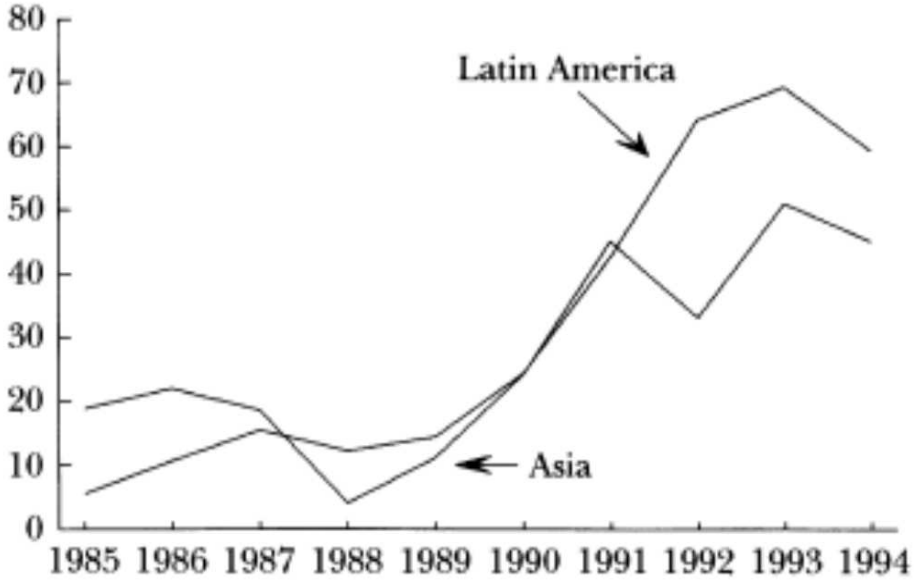


FIG. 2.39 – Asia and Latin America : Balance on the Capital Account, 1985-1994 (Billions of US dollars) - Source : Calvo, Leiderman, and Reinhart (1996) Inflows of Capital to Developing Countries in the 1990s. *Journal of Economic Perspectives*, 10(2), pp. 123-139

FIG. 2.40 – Secondary Market Prices for Loans and U.S. Interest Rate - Source : Calvo, Leiderman, and Reinhart (1996) Inflows of Capital to Developing Countries in the 1990s. *Journal of Economic Perspectives*, 10(2), pp. 123-139

Country	Year Capital Inflow began	Cumulative RER appreciation	Average CA/GDP
Asia			
Indonesia	1990	-6.2	-2.5
Malaysia	1989	-3.9	-4.8
Philippines	1992	20.9	-4.2
Thailand	1988	1.9	-6.0
Latin America			
Argentina	1991	20.1	-3.1
Brazil	1992	57.9	-.2
Chile	1990	13.5	-1.8
Colombia	1991	37.1	-4.2
Mexico	1989	23.4	-6.8

FIG. 2.41 – Selected recipients of large capital inflows : macroeconomic performance 1988-1994 - Source : Calvo, Leiderman, and Reinhart (1996) Inflows of Capital to Developing Countries in the 1990s. *Journal of Economic Perspectives*, 10(2), pp. 123-139

	1990	1991	1992	1993	1994	1995	1996	1997	1997f
Korea	707.76	733.35	780.65	802.67	803.45	771.27	804.45	951.29	1695.00
Indonesia	1842.80	1950.30	2029.90	2087.10	2160.80	2248.60	2342.30	2909.40	4650.00
Malaysia	2.70	2.75	2.55	2.57	2.62	2.50	2.52	2.81	3.89
Philippines	24.31	27.48	25.51	27.12	26.42	25.71	26.22	29.47	39.98
Singapore	1.81	1.73	1.63	1.62	1.53	1.42	1.41	1.48	1.68
Thailand	25.59	25.52	25.40	25.32	25.15	24.91	25.34	31.36	47.25
Hong Kong	7.79	7.77	7.74	7.74	7.73	7.74	7.73	7.74	7.75
China	4.78	5.32	5.51	5.76	8.62	8.35	8.31	8.29	8.28
Taiwan	26.89	26.82	25.16	26.39	26.46	26.49	27.46	28.70	32.64

FIG. 2.42 – Nominal Exchange Rate (to the US dollar). Period average - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

1960s. This attracted capital to high-yield investments in Asia and Latin America. The improved creditworthiness and reduced default risk is reflected by the marked rise in secondary market prices of bank claims on most of the heavily indebted countries in 1994.

- Second, in the early 1990s, the U.S., Japan, and several countries in Western Europe were in recession, which implied that they offered fewer investment opportunities while they experience current account surpluses during this period.
- Third, rapid growth in international capital market integration, facilitated in part by financial deregulation in the U.S. and Europe, allowed mutual funds and life insurance companies to diversify their portfolios to include emerging market assets.
- Fourth, many developing countries adopted sound fiscal and monetary policies and market-oriented reforms such as trade and capital liberalization (Chile, Bolivia, and Mexico in the 1980s, Argentina, Brazil, Ecuador, and Peru in the 1990s). Asian countries took the decision to maintain a stable currency which in turn produces favorable interest rate differentials and expectations of low exchange rate risk.

As shown in Figure 2.41, the capital inflows of the 1990s produced a number of important macroeconomic consequences, which are strikingly similar to those that paved the way for the debt crisis in the late 1970s :

- As illustrated in Figure 2.41, the counterpart of the surge in capital inflows (l'afflux de capitaux) was a large increase in current account deficits, which materialized via investment booms and declines in savings.
- The decline in savings was associated with increases in consumption of (mostly imported) durable goods.

As shown in the third line of Table 2.4, the foreign borrowing of non-oil-developing countries as a group expanded sharply. Excessive external borrowing by Asian countries leads to a severe crisis in 1997.

The novelty of the Asian Crisis with respect to the 1980's Latin America debt crisis is that it involves the private sector :

- Two-third of capital inflows are bank loans and most of these funds originate from advanced economies, in particular European countries as certain European economies experience current account surpluses such as France.
- The pre-crisis years were a period of excessive credit growth in the banking system.
- Moreover, the data indicate excessive external borrowing by local banks denominated in foreign currency, the short-term capital inflows, and importantly points out the low return of investment financed by this external borrowing.
- The bad allocation of capital led to a large stock of non-performing loans and the eventual collapse of several financial institutions.
- Large capital inflows produce a demand boom, notably an investment boom. While in Korea (and Taiwan), the funds were invested in the manufacturing sector, in other Asian countries, they were invested in the non traded sector (housing).
- As a result, the demand boom in the non traded sector has produced a real exchange rate appreciation that contributed to the region's large and growing current account imbalances because the size of the traded sector has shrunk. The exception was, Korea, which displayed current account deficits together with a currency that depreciated in real terms over the 1990s. Yet, it appeared that the return of capital invested was especially low in its manufacturing sector.

Domestic banks borrowed heavily from foreign banks but lent mostly to domestic investors. In normal times a high ratio of foreign liabilities to foreign assets may not cause concern, as short-term foreign debts are easily rolled-ever. In the presence of a rapid currency depreciation, however, this imbalance may cause serious financial problems (especially if the foreign borrowing is in foreign currency while the domestic lending is in domestic currency). Foreign lenders may suddenly refuse to roll over short-term lines of credit to domestic banks, precipitating a credit crisis. To a large extent, this is what happened in 1997.

We start with an overview of economic fundamentals in Asia on the eve of the crisis :

- Data on nominal exchange rates in the 1990s are presented in Table 2.42. The exchange rate depreciated in Korea, Indonesia, Malaysia, Philippines, Singapore, Thailand, and Taiwan, while in Hong-Kong and China, the currency has been relatively stable.
- As shown in Table 2.43, several Asian countries whose currencies collapsed in 1997 had experienced somewhat sizable current account deficits in the 1990s. The two countries with the largest and most persistent current account imbalances in the sample were Thailand and Malaysia, both of which experienced deficits for over a decade. Based on NIA data, the current account in Thailand was over 6 percent of GDP virtually in each year in the 1990s, and approached 9 percent of GDP in 1995 and 1996. Similarly large numbers were observed in Malaysia, where the deficit was above 10 percent of GDP in 1993, while slowly falling to 3.7 percent of GDP in 1996. Other Asian countries such as Philippines and Korea also experienced long-term imbalances. During the Latin American Debt crisis, the current account deficit reached 6% in 1981 and in 1993-1995.
- As can be seen from Table 2.43, these current account imbalances stemmed primarily from large trade deficits, with a relatively small role played by net factor payments to the rest of the world.
- Are these current account imbalances sustainable ? The standard theoretical criterion for assessing current account imbalances is the notion of solvency : a country is solvent to the extent that the discounted value of the expected stock of its foreign debt in the infinitely distant future is non-positive. In other words, a country that is accumulating foreign debt at a rate g that is faster than the real cost of borrowing, r, cannot expect to be able to do so forever. To be solvent, the country must run a trade surplus that pays a fraction α of interest rate payments $r^\star \ .D_{t-1}$ so that the debt D_t grows at a rate $r^\star \ .(1-\alpha) < r^\star$ (the debt rises to roll over the debt and to pay a share of interest payments). Because the debt increases over time, the trade surplus TB_t must rise as well at the same rate as the net foreign debt D_t. For the trade surplus to grow at rate $r^\star \ .(1-\alpha)$, the GDP must increase at a rate $g_Y = r^\star \ .(1-\alpha)$. As a result, GDP increases at the same rate as the net foreign debt so that economic growth stabilizes the debt. In brief, for the economy to be intertemporally solvent, it must run a trade surplus consistent with a constant net foreign debt as a share of GDP.

  A popular 'test' of solvency in practical terms is a non-increasing foreign debt to GDP ratio (this test consists in calculating the size of the trade surplus to stabilize the debt). Formally, we start from the current account identity $D_{t+1} = (1+r) \ .D_t - T_t$ where D is the net debt position of the country and T is the trade balance ; dividing both sides by current GDP, denoted Y_t, assuming that GDP grows at the constant rate g, so that $\frac{Y_{t+1}}{Y_t} = 1+g$, the previous expression can be rewritten $d_{t+1} \ .(1+g) = (1+r) \ .d_t - t_t$ with $d_t = d_t/Y_t$ and $t_t = T_t/Y_t$. For the debt to GDP ratio to be constant in the long run at some level d, i.e., $d_t = d_{t+1} = d$, the trade balance surplus (as a fraction of GDP)

must be equal to $d\,.\,(1+g-1-r) = -t$ or alternatively :

$$t = d\,.\,(r-g)\,. \tag{2.73}$$

The resource balance gap is the difference between the above trade surplus and the currently observed trade balance (both as percentages of GDP). If the gap is positive, it means that the solvency criteria is not fulfilled. Assuming a 1 percent differential between the real interest rate and output growth, the trade balance adjustment required to stabilize the foreign debt to GDP ratio at the 1996 value are shown in Table 2.45. The figures reveal that resource gaps were quite large already in 1996.

– Other criteria of current account sustainability focus on the intertemporal decisions underlying a current account deficit. Since the current account is equal to the difference between national saving and investment, a deficit can emerge from either a fall in saving or an increase in investment. Conventional wisdom holds that borrowing from abroad is less 'dangerous' for sustainability if it finances new investment (leading to increased productive capacity and to higher future export receipts) rather than consumption (which implies lower saving). For these reasons, a current account deficit that is accompanied by a fall in saving rates is regarded as more problematic than a deficit accompanied by rising investment rates. Underlying such 'conventional' conclusions, however, is the implicit assumption that the return on investment is at least as high as the cost of the borrowed funds, i.e., $R^K = r^\star + \delta$ while $Y = R^K\,.K + W\,.L$. Also implicit is the assumption that high investment rates contribute to the enhancement of productive capacity in the traded sector. The size of the traded sector must rise in order to make interest payments on debt :

$$\dot{D} = r^\star\,.D + C^T + I^T - Y^T,$$

where D is the net foreign debt, C^T, I^T, are consumption and investment on tradables, while Y^T is trade output. In the long run, net exports $Y^T - C^T - I^T$ are necessary to pay interest $r^\star\,.D$. If the investment boom is confined to the non-traded sector (commercial and residential construction, as well as inward-oriented services), debt sustainability is compromised because economic growth is driven by productivity gains by traded firms which depends on the amount of resources invested in this sector.

Evidence on investment rates in Asian countries is shown in Table 2.46 (corresponding data on saving ratios are presented below). Unlike the Latin American countries that experienced currency and financial crises in the recent past, the Asian countries were characterized by very high rates of investment throughout the 1990s . In most countries these rates were well above 30 percent of GDP (and in some cases above 40 percent of GDP), with the exceptions of the Philippines and Taiwan, that show rates in the 20-25 percent range. A standard measure of investment efficiency, the ICOR or 'incremental capital output ratio' defined as the ratio between the investment rate and the rate of output growth :

$$\frac{\Delta K}{\Delta Y} = \frac{\frac{\Delta K}{Y}}{\frac{\Delta Y}{Y}} = \frac{\frac{I}{Y}}{g}.$$

It appears that the measure of productivity of capital (ratio of the investment rate to the growth rate) increases sharply in the four years before the crisis. In Thailand, ICOR rises from 3.4 (1987-1992) to 5.1 (1992-1996) which suggests that the productivity of capital is not large enough (see Figure 2.47). In the case of Korea, evidence of low profitability is also available at the firm level, as discussed below.

- The extent of the financial problems of the chaebols is presented in Table 2.48 outlining the assets, liabilities, sales, net profits and debt-equity ratios for 30 chaebols at the end of 1996. The Table shows that the average debt-equity ratio for the 30 chaebols was 333 percent (the comparable figure for the US is close to 100 percent). The table also shows that profitability, as measured by net profits (résultat net), was very low (or outright negative in the case of 13 out of 30 companies).
- Table 2.49 shows the return on invested capital (ROIC, calculated as the ratio of the net profit to assets) in the 1992-1996 period for five of the bankrupt firms. With a prime rate in local currency that before the crisis was as high as 12 percent, the ROIC for these firms was well below the cost of the capital in the 1992-1996 period.[7] For example, in France, the ROA is 12% in average for large firms.

  Evidence on the low profitability of investment was also provided by the Interest Coverage Rate (ICR) which compares cash flow earned with interest payments due over a particular period : 11 out of the 30 top chaebols had an ICR below 1, meaning that earnings were below interest payments
- In Korea, most investment projects by the chaebols were concentrated in the manufacturing sector. However, in other countries over-investment and overcapacity problems were concentrated instead in the non-traded sector. The low profitability of these investment projects can be assessed by looking at the data on Central Business District vacancy rates and rental yields presented in Table 2.50. As the table shows, before the onset of the crisis, rental yields on office buildings were already quite low, reflecting the very high prices of real estate (a normal rental yield is 8%). In mid 1997, they were as low as 3.5 percent in Hong Kong and 3.9 percent in Singapore. From a different viewpoint, evidence consistent with speculative over-investment in land and real estate is provided by data on stock market prices (see Figure 2.51), which in many countries rose more rapidly in the property sector than in the other sectors over the 1990-1996 period.
- In parallel with the assessment of investment rates, the analysis of the dynamics of private and public savings can shed light on the sustainability of the underlying current account imbalances. A fall in national savings caused by lower public savings (a higher budget deficit) is seen typically as more disruptive than a fall in private savings. The conventional underpinning of this view is that a fall in private savings is more likely to be a transitory phenomenon (as a result of intertemporal smoothing behavior), while an increase in public sector deficits often represents a persistent change which results in an irreversible build-up of foreign debt.

  Data on saving rates in Asia are reported in Table 2.52, and somewhat represent the mirror of the investment rates in Table 2.46. Asian countries were characterized by very high savings rates throughout the 1990s - in many cases above 30 percent of GDP and in some cases above 40 percent. Looking at the data before the crisis, there is little evidence of public dissaving so that the current account imbalances do not appear to

[7] Rendement de l'actif investi calculé comme le rapport du résultat net au montant des actifs de l'entreprise évalués à leur valeur comptable ; en anglais : return on assets (ROA) ou return on invested capital. Le résultat net est l'excédent net d'exploitation moins les frais financiers (paiement d'intérêts) et après paiement des impôts. Le flux de trésorerie est le résultat net auquel il faut retrancher le montant des dividendes distribués. Le rendement du capital investi mesure la capacité de l'entreprise à générer un profit à partir de ses capitaux propres et de ses dettes (résultant du financement externe).

be the result of increased public sector deficits. Table 2.53 shows that in most countries the fiscal balance of the central government was either in surplus or a small deficit.

– Inflation is also important since high inflation rates may signal poor macroeconomic policy and/or sizable fiscal imbalances, generating the need for seigniorage revenue. Hence, high inflation signals that the fixed exchange rate regime is potentially exposed to speculative attacks. Table 2.54 presents the data on inflation in our sample of Asian countries in the 1990s. The overall picture is quite clear : in all the countries, inflation rates were relatively low in the 1990s. However, as will be shown in chapter 5 when presenting the model by Aghion, Bacchetta and Banerjee (2001), expectations play a key role in driving exchange rate crisis. The banking and financial sector problems experienced by several Asian countries over the 1990s raised considerable doubts about their ability to keep inflation low in the near future. Specifically, these doubts were related to the possibility that the consequences of the banking sector bail-outs might prompt an increasing use of seigniorage, and would require infusions of liquidity to prevent systemic runs. For these reasons, the nominal depreciations of Asian currencies in 1997 were consistent with the expected inflationary consequences of banking and financial bail-outs.[8]

– Virtually all the analyses of crisis episodes emphasize that a significant real exchange rate appreciation may be associated with a loss of competitiveness and a structural worsening of the trade balance, thus jeopardizing the sustainability of the current account. Table 2.55 presents the data on the real exchange rate of the Asian countries. Taking 1990 as the base year, we observe that by the spring of 1997 the real exchange rate had appreciated by 19 percent in Malaysia, 23 percent in the Philippines, 12 percent in Thailand, 8 percent in Indonesia, 18 percent in Singapore, and 30 percent in Hong Kong. In Korea and Taiwan, the currency depreciated in real terms (respectively by 14 percent and 10 percent). This suggests that with the important exception of Korea, all the currencies that crashed in 1997 had experienced a real appreciation. It should be stressed that in several countries, a large part of the real appreciation occurred after 1995, in parallel with the strengthening of the US dollar (After the spring of 1995, the dollar started to appreciate very rapidly : the yen/dollar rate appreciated 56 percent between the spring of 1995 and the summer of 1997).

  Because most of the Asian countries with appreciating currencies generally experienced a larger deterioration of the current account, while countries such as China and Taiwan that had experienced a real depreciation exhibited current account surpluses, the data suggest that a RER appreciation was correlated with a worsening of the current account.

The previous facts has highlighted a number of country-specific and global factors that determined the current account imbalances observed in Asia on the eve of the crisis, and undermined their sustainability. We now investigate the composition of capital flows toward Asian economies. More specifically, while the analysis of the current account imbalances point out the existence of over-investment (which correspond to bank assets), we now investigate shed light on bank liabilities. The key to a comprehensive interpretation of the events leading to the Asian meltdown of 1997 is the analysis of the banking and financial sectors in the region.

[8] Ex-post data seem to confirm this view : injections of liquidity into the banking system have occurred in several countries, such as Indonesia and Malaysia, and inflationary pressures have emerged in Asia, either explicitly (Indonesia) or masked by tight price controls (Malaysia).

- As illustrated in Table 2.56, the ratio of private sector lending to GDP shows an upward trend in all the countries in our sample. Between 1990 and 1996, the magnitude of the lending boom was largest in the Philippines (151 percent), Thailand (58 percent) and Malaysia (31 percent). It is also large but more modest in Korea, Singapore, Hong Kong and Indonesia. And the measure was the smallest in China (7 percent).
- The growth rate of the lending to GDP ratio gives an indication of the quantity of loans. But one of the main problems faced by the countries in our sample is that many loans made by banks and non-banks were of low quality, financing investment of dubious profitability of existing financial assets. We have already shown evidence suggesting over-investment in risky and poorly performing projects. We can now add to the picture evidence on the quality of pre-crisis lending, by looking at the proportion of non-performing loans to total loans. As reported in Table 2.57, the pre-crisis share of non-performing loans as a proportion of total lending can be estimated at 13 percent for Thailand, 13 percent for Indonesia, 8 percent for Korea, 10 percent for Malaysia, 14 percent for the Philippines and 4 percent for Singapore.
- In the Asian region, with bond and equity markets relatively underdeveloped, most financial intermediation occurred through the banking system. This meant that the capital inflows financing the region's large current account deficits were largely intermediated by local banks. Specifically, domestic banks borrowed from foreign banks and then, in turn, lent on to domestic firms, so that when the domestic firms experienced financial difficulties, domestic banks were faced with non-performing domestic assets and short-term foreign currency liabilities.
- Such 'overborrowing' and 'overlending' syndromes within the undercapitalized banking systems were the outcome of severe institutional and policy deficiencies : in Thailand, financial liberalization in the 1990s led to the emergence of other largely unregulated nonbank intermediaries that could circumvent credit limits, in Korea the financial system was in a severe crisis because of excessive lending to large traded-sector conglomerates, a number of which went bankrupt before the currency crisis hit in late 1997 (in several cases, private banks in Korea were effectively controlled by chaebols), in Indonesia, several banks (15/240) did not meet the required 8 percent capital adequacy ratio
- Table 2.60 reports the ratio of foreign liabilities to assets relative to BIS reporting banks. This ratio is above unity for all crisis countries, and deteriorates severely in the 1990s. In an extreme case, Thailand, it reaches 1103 percent in 1996. In Korea, it is 297 percent in 1993, and reaches 375 percent in 1996 - the same patterns emerge if we focus on foreign liabilities and assets of domestic banks only. In 1996, equally worrisome ratios are observed in Indonesia (424 percent), the Philippines (172 percent), Hong Kong (165 percent), Singapore (162 percent) and Malaysia (148 percent). Conversely, the ratio is lower in China (120 percent). The case of Taiwan is interesting as it is the only country in our sample that has a net positive assets position (the ratio is lower than unity). Net assets are equal to US $12.2 billion in 1997, 7.5 billion for the Taiwan banking system alone. The above figures suggest a serious mismatch between foreign liabilities and foreign assets of Asian banks and non-bank firms. Domestic banks borrowed heavily from foreign banks but lent mostly to domestic investors.
- An otherwise solvent country may suffer a short-run liquidity problem when the available stock of reserves is low relative to the overall burden of external debt service

(interest payments plus the renewal of loans coming to maturity). Liquidity problems emerge when panicking external creditors (in response to expected or current devaluation) become unwilling to roll over existing short-term credits. So, if a large fraction of a country's external liabilities are short-term, a crisis may take the form of a pure liquidity shortfall (inability by a country to roll-over its short-term liabilities). The experience of Mexico with its short-term public debt (Tesobonos) in 1994-1995, and of several Asian countries with private external liabilities in 1997 provides striking examples of liquidity problems.

As can be seen from Table 2.58, the debt-to-GDP ratio for many of these countries was relatively low and growing only modestly, or else high but actually falling during the 1990s. Figures in Table 2.59 also suggest that the share of short-term debt was relatively modest, albeit growing. If a liquidity crisis occurs, foreign reserves must be large enough to cover a country's debt service obligations (including the roll-over of short-term debt).[9] Tables 2.61 and 2.62 present the ratio of short-term debt to foreign reserves, and the ratio of debt-service plus short-term debt to foreign reserves. The overall conclusion that can be drawn is that foreign reserves are not large enough compared with the amounts of interest payments on long-run debt and the short-term debt that must be repaid.

– The existence of large foreign exchange reserves facilitates the financing of a current account deficit, and enhances the credibility of a fixed exchange rate policy. Foreign exchange reserves and a small external debt burden reduce the risk of external crises, and enable a country to finance a current account deficit at lower costs. A relevant indicator is the ratio of money assets to foreign reserves, since in the event of an exchange rate crisis or panic, all liquid money assets can potentially be converted into foreign exchange. Calvo (1998) suggests the ratio of a broad measure of liquid monetary assets to foreign reserves, for instance the ratio of M2 to foreign reserves. The ratio is shown in Table 2.64. For the purpose of comparison, it is worth recalling that, just before the Mexican peso crisis (November 1994), M2/FX was equal to 9.1 in Mexico, and equal to 3.6 in both Brazil and Argentina - the two countries that were most affected by the 'tequila effect'.

  In most Asian countries the ratio between M2 and foreign reserves was dangerously high in 1996-1997. For instance, in Korea, this ratio was equal to 6.5 by the end of 1996, and rose to almost 7 in the first quarter of 1997. In Indonesia M2/FX constantly rose throughout the 1990s and reached a peak as high as 7.09 in 1995.

– To provide another indicator of financial fragility, Table 2.63 reports the ratio of total short-term external liabilities (towards BIS banks) to foreign reserves at the end of 1996. This ratio was 213 percent in Korea, 181 percent in Indonesia, 169 percent in Thailand, 77 percent in the Philippines, 47 percent in Malaysia and 36 percent in China. These figures mean that, by the end of 1996, in the event of a liquidity crisis with BIS banks no longer willing to roll-over short-term loans, foreign reserves in Korea, Indonesia and Thailand were insufficient to cover short term liabilities, let alone to service interest payments and to repay the principal on long-term debt coming to maturity in the period. When we add interest and long-term principal repayment, the Philippines and Malaysia would have also found it impossible to meet their external obligations.

[9] The debt service ratio is defined as the interest on all debt plus the principal to be repaid on long-term debt as a share of total exports or foreign reserves.

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	−1.2	−3.2	−1.7	−0.2	−1.5	−1.9	−4.8	−1.9
Indonesia	−4.4	−4.4	−2.5	−0.8	−1.5	−4.3	−3.3	−3.6
Malaysia	−2.3	−14.0	−3.4	−10.1	−6.6	−8.9	−3.7	−3.5
Philippines	−6.3	−2.5	−3.2	−6.7	−3.7	−5.1	−4.7	−6.1
Singapore	9.5	12.4	12.4	8.5	18.1	18.0	16.3	13.9
Thailand	−8.7	−8.0	−6.2	−5.7	−6.4	−8.4	−8.5	−2.4
Hong Kong	8.4	6.6	5.3	8.1	2.0	−3.0	−2.4	−3.8
China	3.0	3.1	1.1	−2.2	1.2	0.0	0.5	3.6
Taiwan	7.4	6.9	4.0	3.5	3.1	3.1	4.7	3.2

[a] Note: The source of all the data in these tables is the international financial statistics of the International Monetary Fund (unless otherwise noted). The data for Taiwan are from various sources (Economist Intelligence unit reports, IMF's december 1997 world economic outlook and asian development bank). The data for Singapore for 1997 are from the economist intelligence unit country report, 2nd quarter 1998.

FIG. 2.43 – Current account, NIA definition (% of GDP)) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	−0.8	−3.0	−1.4	0.1	−1.2	−1.6	−4.4	−1.4
Indonesia	1.7	0.9	1.8	1.5	0.7	−0.8	−1.1	0.2
Malaysia	2.1	−3.7	1.4	−0.1	−1.6	−3.8	0.6	
Philippines	−5.7	−3.0	−4.3	−8.5	−9.0	−8.8	−9.4	−12.3
Singapore	6.8	10.6	9.3	8.1	14.9	15.4	13.6	12.6
Thailand	−7.8	−6.9	−4.7	−4.6	−5.2	−7.1	−6.7	0.1
China	2.8	2.9	1.0	−1.9	1.4	1.7	2.1	4.4
Taiwan	4.7	4.4	1.7	1.6	1.7	1.6	3.5	2.4

FIG. 2.44 – Trade balance, BOP definition (% of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

In conclusion, Asian economies were exposed to a currency crisis due to :

- over lending with low profitability ;
- a large fraction of the short-run foreign debt owned by the banking system while the stock of reserves was low relative to liabilities.

In 1997, some financial institutions go bankrupt, in particular in Thailand.[10] Most of these economies (Korea, Indonesia, Thailand, Malaysia, Philippines, Taiwan) experience strong speculative attack and forced Thailand, and then Korea, Malaysia, the Philippines, Indonesia to let their currencies float.[11]

[10] Reportedly, on 25 June (the same day when information was leaked that the government would stop supporting Finance One) the new finance minister 'discovered' that the stock of international reserves effectively available was a tiny fraction of that officially stated.

[11] It should be noted that the collapse of the real estate bubble was an important factor in the weakening of the financial conditions of the finance companies, except in Korea where several chaebols went bankrupt.

Korea	4.4 percent
Thailand	6.9 percent
Indonesia	3.3 percent
Philippines	6.5 percent
Malaysia	2.3 percent

FIG. 2.45 – The trade balance adjustment required to stabilize the foreign debt to GDP ratio at the 1996 value - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	36.9	38.9	36.6	35.1	36.1	37.1	38.4	35.0
Indonesia	36.2	35.5	35.9	29.5	31.1	31.9	30.8	31.6
Malaysia	31.3	37.6	33.5	37.8	40.4	43.5	41.5	42.8
Philippines	24.2	20.2	21.3	24.0	24.1	22.2	24.0	24.8
Singapore	35.9	34.2	36.0	37.7	32.7	33.1	35.1	37.4
Thailand	41.1	42.8	40.0	39.9	40.3	41.6	41.7	35.0
Hong Kong	27.4	27.2	28.5	27.5	31.9	34.9	32.4	35.1
China	34.7	34.8	36.2	43.5	40.9	40.2	38.7	37.6
Taiwan	23.1	23.3	24.9	25.2	23.9	23.7	21.2	22.2

FIG. 2.46 – Investment rates (% of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Incremental capital output ratio (ICOR)[a]

	1987–1992	1993–1996
Korea	3.8	4.9
Indonesia	4.0	3.8
Malaysia	3.7	4.8
Philippines	6.0	5.5
Singapore	3.6	4.0
Thailand	3.4	5.1
Hong Kong	3.7	6.1
China	3.1	2.9
Taiwan	2.4	3.9

[a] Source: J.P. Morgan and authors' calculation.

FIG. 2.47 – Incremental capital output ratio (ICOR) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Financial conditions of top 30 Korean chaebol at the end of 1996 (in hundred million won and %)[a]

Chaebol	Total assets	Debt	Sales	Net profit	Debt/equity ratio
Samsung	508.6	370.4	601.1	1.8	268.2
Hyundai	531.8	433.2	680.1	1.8	439.1
Daewoo	342.1	263.8	382.5	3.6	337.3
LG	370.7	287.7	466.7	3.6	346.5
Hanjin	139.0	117.9	87.0	−1.9	556.9
Kia	141.6	118.9	121.0	−1.3	523.6
Ssangyong	158.1	127.0	194.5	−1.0	409.0
Sunkyong	227.3	180.4	266.1	2.9	385.0
Hanhwa	109.7	97.2	96.9	−1.8	778.2
Daelim	57.9	45.9	48.3	0.1	380.1
Kumho	74.0	61.2	44.4	−0.2	477.9
Doosan	64.0	55.9	40.5	−1.1	692.3
Halla	66.3	63.2	52.9	0.2	2067.6
Sammi	25.2	25.9	14.9	−2.5	3245.0
Hyosung	41.2	32.5	54.8	0.4	373.2
Hanil	26.3	22.3	13.0	−1.2	563.2
Donga Construction	62.9	49.1	38.9	0.4	355.0
Kohap	36.5	31.2	25.2	0.3	589.5
Jinro	39.4	39.0	14.8	−1.6	8598.7
Dongguk Jaekank	37.0	25.4	30.7	0.9	210.4
Lotte	77.5	51.0	71.9	0.5	191.2
Kolon	38.0	28.9	41.3	0.2	316.5
Haitai	34.0	29.5	27.2	0.4	658.3
Sinho Jaeji	21.3	17.7	12.2	−0.1	489.5
Anam Industrial	26.4	21.8	19.8	0.1	478.1
Dongguk Muyok	16.2	13.6	10.7	−0.2	587.9
New Core	28.0	25.9	18.3	0.2	1224.0
Bongil	20.3	18.3	8.7	−0.9	920.5
Hansol	47.9	37.1	25.5	−0.1	343.2
Hansin Kongyong	13.3	11.5	10.6	0.0	648.8

[a] Source: Chosun Ilbo, 29 November, 1997.

FIG. 2.48 – Financial conditions of top 30 Korean chaebol at the end of 1996 (in hundred million won and %)- Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Profitability of Korean chaebols. ROIC in 1992–1996[a]

Chaebol	1992–1996 (%)	1996 (%)
Hanbo	3.0	1.7
Sammi	2.9	3.2
Jinro	2.7	1.9
Kia	18.9	8.7
Dainong	6.8	5.5

[a] Source: LG Economic Research Institute.

FIG. 2.49 – Profitability of Korean chaebols. ROIC in 1992-1996 - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Central business district office vacancy rates and rental yields[a]

	Vacancy rates		Rental yield June–1997 (%)
	1997 (%)	1998–1999 (%)	
Seoul			9.50
Jakarta	10.0	20.0	7.20
Kuala Lumpur	3.0	20.0	5.80
Manila	1.0	3.0	9.30
Singapore	8.0	12.0	3.90
Bangkok	15.0	20.0	6.80
Hong Kong	6.0	10.0	3.50
Shanghai	30.0	40.0	8.00
Taipei			4.80

[a] Source: J.P. Morgan 'Asian Financial Markets', January 1998. 1997 figures for vacancy rates are estimates; 1998–1999 figures are forecasts.

FIG. 2.50 – Central business district office vacancy rates and rental yields - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Stock market prices indexes (property sector)

	1990	1991	1992	1993	1994	1995	1996	1997
Indonesia		119	66	214	140	112	143	40
Malaysia	113	113	126	369	240	199	294	64
Philippines	32	34	39	81	80	87	119	59
Singapore	230	280	250	541	548	614	648	357
Thailand	74	82	168	367	232	192	99	7
Hong Kong	312	453	554	1392	862	1070	1682	941
Taiwan	61	71	57	137	109	59	55	55

FIG. 2.51 – Stock market prices indexes (property sector) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	35.69	35.74	34.88	34.91	34.60	35.14	33.60	33.06
Indonesia	31.75	31.10	33.41	28.66	29.52	27.65	27.50	27.98
Malaysia	29.07	23.24	30.06	27.70	33.81	34.65	37.81	39.34
Philippines	17.85	17.76	18.16	17.29	20.32	17.16	19.35	18.77
Singapore	45.32	46.56	48.35	46.17	50.82	51.05	51.33	51.30
Thailand	32.33	34.83	33.73	34.26	33.89	33.25	33.22	32.64
Hong Kong	35.85	33.78	33.76	35.67	33.83	31.94	29.95	31.33
China	37.77	37.84	37.26	41.29	42.04	40.22	39.25	41.15
Taiwan	30.50	30.26	28.93	28.68	26.99	26.70	25.92	25.43

FIG. 2.52 – Saving rates (% of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	−0.68	−1.63	−0.50	0.64	0.32	0.30	0.46	0.25
Indonesia	0.43	0.45	−0.44	0.64	1.03	2.44	1.26	0.00
Malaysia	−3.10	−2.10	−0.89	0.23	2.44	0.89	0.76	2.52
Philippines	−3.47	−2.10	−1.16	−1.46	1.04	0.57	0.28	0.06
Singapore	10.53	8.58	12.35	15.67	11.93	13.07	14.10	9.52
Thailand	4.59	4.79	2.90	2.13	1.89	2.94	0.97	−0.32
China	−0.79	−1.09	−0.97	−0.85	−1.22	−1.00	−0.82	−0.75
Taiwan	1.85	−2.18	−5.34	−3.88	−1.73	−1.09	−1.34	−1.68

FIG. 2.53 – Government fiscal balances (% of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1991	1992	1993	1994	1995	1996	1997
Korea	9.30	6.22	4.82	6.24	4.41	4.96	4.45
Indonesia	9.40	7.59	9.60	12.56	8.95	6.64	11.62
Malaysia	4.40	4.69	3.57	3.71	5.28	3.56	2.66
Philippines	18.70	8.93	7.58	9.06	8.11	8.41	5.01
Singapore	3.40	2.32	2.27	3.05	1.79	1.32	2.00
Thailand	5.70	4.07	3.36	5.19	5.69	5.85	5.61
Hong Kong	11.60	9.32	8.52	8.16	8.59	6.30	5.83
China	3.50	6.30	14.60	24.20	16.90	8.30	2.80
Taiwan	3.63	4.50	2.87	4.09	3.75	3.01	0.90

FIG. 2.54 – Inflation rate (in %) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	96.00	91.50	87.70	85.20	84.70	87.70	87.20	58.60
Indonesia	97.40	99.60	100.80	103.80	101.00	100.50	105.40	62.40
Malaysia	97.00	96.90	109.70	111.00	107.10	106.90	112.10	84.90
Philippines	92.40	103.10	107.10	97.40	111.70	109.60	116.40	90.90
Singapore	101.20	105.70	106.00	108.60	111.90	112.70	118.20	114.40
Thailand	102.20	99.00	99.70	101.90	98.30	101.70	107.60	72.40
Hong Kong	99.70	103.90	108.50	116.00	114.50	116.00	125.80	138.40
Taiwan	96.50	95.70	95.70	91.40	92.60	90.40	89.60	89.20

[a] Data Source: J.P. Morgan. The base figure (100) is the average for the year 1990.

FIG. 2.55 – Real Exchange Rate (Ratio of Domestic Prices to Foreign Prices). End of year data - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	52.54	52.81	53.34	54.21	56.84	57.04	61.81	69.79
Indonesia	49.67	50.32	49.45	48.90	51.88	53.48	55.42	69.23
Malaysia	71.36	75.29	74.72	74.06	74.61	84.80	93.39	106.91
Philippines	19.17	17.76	20.44	26.37	29.06	37.52	48.98	56.53
Singapore	82.20	83.34	85.06	84.14	84.21	90.75	95.96	100.29
Thailand	64.30	67.70	72.24	80.01	91.00	97.62	101.94	116.33
Hong Kong		141.84	134.20	140.02	149.00	155.24	162.36	174.24
China	85.51	87.87	86.17	95.49	87.12	85.83	91.65	101.07
Taiwan	100.41	108.99	126.43	137.23	146.89	149.49	146.05	146.23

Table 20
Lending boom measure (rate of growth between 1990 and 1996 of the ratio between the claims on the private sector of the deposit money banks and nominal GDP)

Korea	11%	Singapore	17%
Indonesia	10%	Thailand	58%
Malaysia	31%	Hong Kong	26%
Philippines	151%	China	7%

FIG. 2.56 – Bank lending to private sector (% of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Korea	8%	Thailand	13%
Indonesia	13%	Hong Kong	3%
Malaysia	10%	China	14%
Philippines	14%	Taiwan	4%
Singapore	4%		

[a] Source: 1997 BIS annual report; Jardine Fleming

FIG. 2.57 – Non-performing loans (as proportion of total lending in 1996) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996
Korea	13.79	13.51	14.34	14.18	14.32	23.80	28.40
Indonesia	65.89	68.21	68.74	56.44	60.96	61.54	56.74
Malaysia	35.80	35.48	34.51	40.74	40.40	39.31	40.06
Philippines	69.02	71.45	62.29	66.09	62.42	53.21	49.75
Singapore	11.23	11.07	9.47	9.45	10.79	9.84	10.74
Thailand	32.80	38.38	37.51	34.10	33.31	33.78	50.05
Hong Kong	16.80	14.84	14.99	14.35	18.38	16.60	15.44
China	14.26	14.84	14.99	14.35	18.38	16.60	15.44
Taiwan	11.04	10.73	9.37	10.44	10.87	10.40	10.07

[a] Note: The source for Tables 23–27 is the Global Development Finance (GDF) report of the World Bank and IMF-IFS. The data for Hong Kong, Singapore, Taiwan in Tables 23, 24 and 26, 27 are from the Asian development bank. The data for Korea in 1995 and 1996 (in italics) are from OECD, external debt statistics.

FIG. 2.58 – Foreign debt, world bank data (as a % of GDP) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996
Korea	30.87	28.19	26.99	25.85	25.47	51.60	50.20
Indonesia	15.92	18.00	20.52	20.17	18.05	20.87	24.98
Malaysia	12.43	12.14	18.18	26.58	21.13	21.19	27.83
Philippines	14.48	15.24	15.93	14.01	14.29	13.38	19.34
Singapore	17.51	18.92	19.91	17.87	13.28	14.56	19.81
Thailand	29.63	33.13	35.22	53.01	60.67	72.36	41.41
Hong Kong	45.97	46.63	45.89	41.19	30.04	28.36	43.57
China	16.85	17.89	19.01	17.80	17.40	18.91	19.72
Taiwan	88.31	86.49	86.93	84.99	76.75	72.18	68.44

FIG. 2.59 – Short-term debt, world bank data - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Ratio of liabilities to assets (towards BIS Banks)

	1993	1994	1995	1996	1997
Korea	2.97	2.97	3.32	3.75	2.51
Indonesia	2.96	4.01	4.26	4.24	5.43
Malaysia	0.83	1.40	1.44	1.48	2.23
Philippines	1.14	0.97	1.10	1.72	1.71
Singapore	1.51	1.62	1.66	1.62	1.38
Thailand	6.93	7.73	7.81	11.03	8.12
Hong Kong	1.42	1.43	1.56	1.65	1.59
China	0.99	0.94	1.17	1.20	1.36
Taiwan	0.64	0.59	0.61	0.61	0.62

FIG. 2.60 – Ratio of liabilities to assets (towards BIS Banks) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996
Korea	72.13	81.75	69.62	60.31	54.06	171.45	203.23
Indonesia	149.28	154.62	172.81	159.70	160.36	189.42	176.59
Malaysia	19.54	19.05	21.12	25.51	24.34	30.60	40.98
Philippines	479.11	152.31	119.37	107.68	95.00	82.85	79.45
Singapore	2.65	2.67	2.35	2.04	1.75	1.78	2.60
Thailand	62.55	71.31	72.34	92.49	99.48	114.21	99.69
Hong Kong	23.52	21.78	18.38	17.09	16.49	14.16	22.35
China	31.49	24.68	66.76	68.33	33.04	29.62	23.74
Taiwan	21.56	20.21	21.00	23.64	21.76	21.64	21.31

FIG. 2.61 – Short-term debt, world bank data (% of foreign reserves) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996
Korea	127.43	125.90	110.35	105.66	84.90	204.93	243.31
Indonesia	282.92	278.75	292.03	284.79	277.95	309.18	294.17
Malaysia	63.96	45.87	45.55	42.37	48.73	55.92	69.33
Philippines	867.64	256.99	217.08	212.60	171.98	166.60	137.06
Thailand	102.35	99.34	101.34	120.28	126.54	138.13	122.62
Hong Kong	30.51	26.87	22.82	20.64	22.02	16.82	
China	55.34	43.70	108.55	113.74	54.08	49.61	38.46
Taiwan	23.92	22.29	23.08	25.21	23.69	24.20	

FIG. 2.62 – Debt service plus short-term debt, world bank data (% of foreign reserves) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

Short-term liabilities towards BIS banks (% of foreign reserves, end of 1996)

Korea	213%	Philippines	77%
Indonesia	181%	Thailand	169%
Malaysia	47%	China	36%

FIG. 2.63 – Short-term liabilities towards BIS banks (% of foreign reserves, end of 1996) - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	1990	1991	1992	1993	1994	1995	1996	1997
Korea	6.48	8.33	7.20	6.91	6.45	6.11	6.51	10.50
Indonesia	6.16	5.51	5.61	6.09	6.55	7.09	6.50	7.37
Malaysia	2.91	2.99	2.64	2.09	2.47	3.33	3.66	4.99
Philippines	16.33	4.82	4.35	4.90	4.86	5.86	4.50	6.97
Singapore	1.23	1.18	1.17	1.05	1.06	1.05	1.03	1.17
Thailand	4.49	4.10	4.10	4.05	3.84	3.69	3.90	5.29
Hong Kong		5.43	4.84	4.54	4.43	4.35	4.25	3.18
China	10.37	8.00	21.39	26.93	10.29	9.65	8.55	7.76
Taiwan	3.20	3.36	4.28	4.61	4.78	5.35	5.78	6.30

FIG. 2.64 – M2 to foreign reserves ratio - Source : Corsetti, Pesenti, Roubini (1999) What caused the Asian currency and financial crisis. *Japan and the World Economy*, 11(3), pp. 305-373

	Period		
Region	1980-1996	1997-2006	2007-2012
United States	-0.44	-1.17	-0.86
Japan	0.32	0.36	0.26
European Union	-0.10	0.04	-0.07
Oil producers	-0.06	0.28	0.57
China	0.01	0.15	0.49
Emerging Asia ex-China	-0.01	0.19	0.26
Latin American and Caribbean	-0.13	-0.10	-0.07
Rest of the World	-0.08	-0.02	-0.14

FIG. 2.65 – Current Account Balances, fraction of world GDP. Notes : Oil producers consists of Canada, Norway, Mexico, Russia, Venezuela, Saudi Arabia, Iran, Kuweit, Libya, Oman and Bahrein. Emerging Asia ex-China consists of Taiwan, Korea, Malaysia, Indonesia, Philippines, Singapore and Thailand. Source : Gourinchas and Rey (2014) External Adjustment, Global Imbalances, Valuation Effects. Handbook of International Economics, vol IV.

2.6.4 US Current Account Deficit over 1997-2006 and Global Imbalances

After the Asian crisis, capital flows move in the opposite direction. Over the last twenty years capital has flown from South to North, and especially towards the United States, arguably among the most advanced economies in the world. The large current account deficits of the United States have started to expand after the Asian Crisis to reach 5.3% of US GDP in 2004, 5.8% in 2005 and about 6% in 2006. Figure 2.66 illustrates this pattern by reporting the current account balances of various groups of countries, as a fraction of world output between 1980 and 2012. Table 2.65 reports average ratios of current accounts to world output for three periods : between 1980 and 1996 (before the Asian financial crisis) ; from 1997 to 2006 (between the Asian and global financial crises) ; and since 2007. U.S. current account deficits have been financed by a broad array of creditors, mostly Japan in the 1980s and early 1990s, oil producing economies and emerging Asia since 1996, and especially China over the recent period. These massive net capital flows into the world's dominant capital market have been referred to as global imbalances.

Figure 2.67 reports the world real interest rate over the same period. We observe a dramatic decline in the world real interest rate, from 5-6% at the beginning of the 1980s, to -2% by the end of 2011. As Bernanke (2005) observed in his early and influential piece on the 'savings glut', any account for the pattern of global imbalances needs also to be consistent with the evidence on real interest rates.

Stylized Fact 1 (Global Imbalances) : The largest and arguably most advanced world economy, the United States, has been a net capital importer since 1982 and has been increasingly financed by fast growing emerging economies. The absolute value of world current account balances scaled by world GDP, the 'global imbalances', have been increasing starting in 1996 with a short dip at the time of the 2001-02 recession and a more sustained one since 2008. The emergence of these global imbalances coincides with a general decline in world real interest rates.