THE REFLUX MECHANISM IN THE OPEN ECONOMY

by

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1. Introduction

While the post-Keynesian approach to endogenous credit and money is well developed within the setting of a closed economy, few contributions have been made within the framework of an open economy. The objective of this paper is to underline some elements that must be present, and also those that should not be present, in a genuine post-Keynesian analysis of an open monetary production economy. The paper does not offer a fully-contained formal model of such an economy. At this preliminary stage, I will only offer hints about the issues that are involved.

Essentially, the horizontalist approach to endogenous credit and money is no different in an open economy. The logic of horizontalism remains the same, whether the economy is open or closed. Horizontalists believe that, in a closed economy, monetary authorities have the ability to set short-term rates of interest at the level of their choice, given their policy objectives regarding price inflation, labour unemployment, output gaps or other key economic variables. In the open economy, central banks still can set short-term interest rates, but while doing so they have to consider the impact of an additional variable, that of the exchange rate, and they have to take into account the amount of foreign reserves they have left.

Another crucial feature of the horizontalist approach to money and credit is the reflux principle. The reflux principle says that when agents dispose of money balances that they do not wish to hold, these excess money balances can be extinguished by the reimbursement of previously accumulated debt. The reflux principle applies first and foremost to firms, which are systematically in debt vis-à-vis the banks or other financial institutions, but it also applies to households and to the banking institutions themselves. We shall see that the reflux principle

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1 See however the recent book edited by Deprez and Harvey (1999). While some contributors tackle money and credit issues, none deal with the questions discussed here. It should also be mentioned that Basil Moore (1988: 271-276), in his classic book on endogenous money, devotes a few pages to open-economy considerations, but he does not differ very much from the orthodox position with respect to the issues dealt with here.

2 See Godley (1999) for such a two-country model based on endogenous money and a
plays a crucial role within the framework of an open economy, a role which has been underlined in most detail by Ragnar Nurkse (1944) and Pierre Berger (1972a, 1972b). The reflux principle, as it applies to open economies, has been called the compensation principle by Berger, because the movements in some elements of the balance sheet of a central bank are automatically compensated by opposite movements in other elements. An obvious consequence of the compensation principle is that, with fixed exchange rates, no mechanism will spontaneously bring back the economy to a balance of payments equilibrium.

An interesting classification, underlined by several authors in the horizontalist tradition, is the distinction between overdraft economies and auto-economies, a distinction first made by John Hicks (1974: 51). In the auto-economy, agents sell their liquid assets to finance new ventures, or they issue new bonds or new shares. For this reason, these economies are now called financial-markets economies (Renversez 1996: 465), but we shall call them asset-based economies, to underline the fact that firms in such economies are said to own the financial resources required to make their investment expenditures, whereas banks sell their liquid assets (mainly Treasury bills) to make new loans.

In the overdraft economy, by contrast, firms or households pull on their lines of credit with private banks when they require new financing means. The same distinction applies to the financial sector. When they need more high powered money, banks borrow it from the central bank instead of purchasing it by selling government securities. As a result, when the focus of the analysis is on the balance sheet of the central bank, the distinction between an overdraft economy and an asset-based economy relies on whether the central bank has claims over the domestic financial sector. “The overdraft economy is thus defined by a double level of indebtedness: that of the firms to the banks and that of the banks to the central bank” (Renversez 1996: 475). This distinction will be useful when discussing the limits inherent to a pegged exchange rate policy.

The outline of the paper is the following. In the next section, some of the essential watertight stock and flow system of accounts.

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elements of the neoclassical approach to monetary analysis, in the open economy, are briefly recalled. These include Mundell’s assertion that money is endogenous and supply-determined in the fixed exchange regime, as it is said to be under the specie-flow mechanism of the gold standard. In the third section, I present the institutional elements that justify the compensation thesis, based on the reflux principle, which puts in jeopardy the implications of the Mundell-Fleming model in the case of the fixed exchange rate regime. In the fourth section, I display the theoretical framework that applies to an overdraft economy, while the fifth section is devoted to asset-based economies. The sixth section shows that the compensation thesis applied even during the heyday of the gold standard, and the seventh section deals with the limits to the compensation principle. I conclude with some implications of the reflux mechanism for the economic theory of open economies.

2. The neoclassical analysis in a nutshell

Neoclassical analysis in the open economy is not as neat and as well-organized as neoclassical analysis of the closed economy. There are several competing approaches to the analysis of the open economy. First there is the issue of whether the analysis is concerned with the short run or the long run. In long run analysis, full employment of labour and capacity is assumed. In short run analysis, prices are assumed to be given, while employment and output are the endogenous variables. In all cases, the money supply is a supply-determined variable, while the domestic interest rate is an endogenous variable, unless the economy under study is a small open economy, with high financial capital mobility, in which case the domestic interest rates is determined by world interest rates.

The Mundell-Fleming model

The short-run neoclassical model is essentially the Mundell-Fleming model (the IS/LM/BP model). Being based on the neoclassical synthesis, it contains many Keynesian features. Its main assertion, as is well-known, is that an economy operating with fixed exchange rates would lose control of the money supply, and hence that monetary policy is ineffective. By contrast, with
flexible exchange rates, an expansionary monetary policy could achieve higher levels of output and employment.

The reason for which monetary policy is said to be ineffective is straightforward. Expansionary monetary policy drives interest rates below their world levels, and it increases output and imports. Both of these effects drive the balance of payments into a deficit situation, thus leading to a reduction of the central bank foreign reserves, as the central bank attempts to sustain the value of its domestic currency on exchange markets. The reduction in the foreign reserves diminishes the assets of the central bank, thus inducing a reduction in the monetary base and hence in the money supply of the economy (provided the so-called multiplier is sufficiently stable). The autonomous expansionary policy of the central bank is thus counter-balanced by this endogenous reduction in the monetary base and money supply. With a perfectly mobile financial capital, with no risk aversion, such an endogenous reduction will perdure until domestic interest rates are back to their world levels, at which point the balance of payments deficit will be wiped out and the economy will be back to its initial position – the case where monetary policy is totally ineffective. In a sense, this is the old specie-flow mechanism based on gold, about which more will be said latter, in a world without commodity money. Only flexible exchange rates allow monetary growth targets to be immune from being contaminated from abroad.

Students are sometimes told that such a situation need not occurred, however, if the impact of the deficit on official foreign reserves is being neutralized or sterilized. In the case of the balance of payments deficit, this would imply that monetary authorities retain control over the monetary base by engaging into counter-balancing open market operations, by purchasing government securities from the market. These sterilization operations allow central banks to keep their assets at a constant level, thus halting any endogenous decrease in the money supply.

Similar mechanisms operate when a country finds itself into a balance of payments surplus position. In this case, the central bank is said to accumulate foreign reserves, thus leading to an increase in its assets. As a result, the monetary base expands, and so does the money supply. Once again, students are sometimes told that the central bank may then engage into operations of sterilization, selling government bonds, and thus reducing its domestic assets in line with its increase in foreign assets, and thus retaining control over the monetary base and the money supply.
With regards to the post-Keynesian theory that will be presented later, it is important to note that, in the neoclassical model, the changes in government bonds inventories are done at the initiative of the central bank. The monetary authorities must act on their own to retain control over the money supply. In the next section, it will be argued that sterilization is itself, to a large extent, the result of an endogenous process, which is taken, in many countries, at the initiative of agents operating in the domestic financial markets.

Neoclassical economists are usually keen to say that, whereas otherwise it is exogenous, the money supply process is endogenous in the case of an open economy with fixed exchange rates. It should be clear that such an instance of endogeneity of the money supply has nothing to do with the endogenous money supply process that is usually underlined by post-Keynesian authors. In this neoclassical instance of the endogenous money supply, the endogeneity process is supply-led, whereas in the post-Keynesian approach, the money supply is endogenous because it is demand-led. In the post-Keynesian case, the money supply grows because more of it is being demanded by the various agents of the economy. For instance, as more loans are being demanded by firms, new banking deposits are being created. Similarly, when agents desire more banknotes, the central bank provides these banknotes to the users of the monetary system. In the open economy case underlined by neoclassical authors, the money supply increases endogenously, but independently of the demand for money expressed by the economic agents. Changes in interest rates then adapt the endogenous, but autonomous, increase in the money supply to the unchanging money demand schedule. This sort of endogeneity of the money supply is thus totally at odds with the type of endogeneity underlined by post-Keynesian authors (Lavoie 1992: 189).

**Long run analysis**

The long-run neoclassical monetary analysis of the open economy is essentially based on four relations. The first of these relations is the famous purchasing power parity (PPP). In its relative version, PPP says that exchange rates move in line with inflation rate differentials. Empirical evidence seems to show that while PPP is not a successful explanation of exchange rate variations in the short or even in the medium run, it does a much better job over the long run, and
hence can be considered a relevant fundamental of exchange rates evolution.

There is also here an issue of causality. It has been argued by researchers of various persuasions that exchange rate variations can cause inflation acceleration or slowdown. In particular, with a depreciation of the domestic currency, foreign products, both final and intermediary ones, become more expensive, thus inducing countervailing increases in wages as workers attempt to maintain their real wages. As a consequence, there may be circular effects, virtuous circles of low inflation rates and currency appreciation, or vicious circles of high inflation rates and currency depreciation, that may operate for long periods of time (Kholdy and Sohrabian 1990).

On the other hand, there is a lot of empirical evidence about the lack of a pass-through effect. When there is a relative appreciation of their own currency, foreign producers lower markups and absorb losses to make sure that their prices are in line with those of the producers on local markets. Thus, depreciation of the domestic currency need not lead to higher inflation rates, and this may help to explain why PPP, even with reversed causality, does not hold in the medium or even in the long run.

The purchasing power parity theorem is often associated with the classical Quantity theory of money, or the contemporary monetarist theory. In that framework, while differential rates of inflation explain the evolution of exchange rates, the differential rates of inflation are themselves explained by differential rates of money supply growth (having taken into account growth in normal real output). But of course, such an association is not required. One could believe in the long-run validity of purchasing power parity while rejecting the monetarist explanation of inflation (which is also that of mainstream textbooks).

The Quantity theory of money, which holds that the level of the money supply determines the price level, is also a key feature of Hume’s specie-flow mechanism, which may be looked at as the second element of the long-run neoclassical monetary analysis of the open economy. This mechanism also happens to be a crucial element of the theory of comparative advantage in international trade, as first posited by Ricardo. A country with some absolute disadvantage will be facing a balance of payments deficit. Once the gold points have been reached, so that the exchange rates are no longer flexible, such a country will suffer from an outflow of gold, which will induce a fall in its money supply, and this in turn will lead to a
general fall in prices. The general absolute disadvantage will be turned into a comparative advantage for some products. Similarly, the country with an absolute competitive advantage will show a balance of payments surplus, which will generate an inflow of gold and a continuous increase in the stock of money and in prices, until the dearer prices bring back to equilibrium the balance of payments.

A similar mechanism is provided by the modern “monetary approach to the balance of payments” of the monetarists, where full employment is explicitly assumed. Indeed, neoclassical economists claim that the Rules of the Game must be such that “a balance of payments deficit should be fully reflected in a reduction in the supply of money, and a surplus should be fully reflected in an increased money supply” (Ethier 1988: 341). Hidden behind this rule is the assumption that the increase (reduction) in the money supply leads to an increase (reduction) in the price level. Thus, whether exchange rates are fixed or flexible, through a change in domestic prices relative to foreign prices, an equilibrium tendency remains: the balance of payments is self-adjusting.

Finally, the last two crucial relations are the covered interest parity relation (CIP) and the uncovered interest parity relation (UIP). These two relations can be found in all (or at least most) formal models of open economies. The UIP relation asserts that nominal interest rates (in a riskless environment) are determined by world interest rates plus the expected change in exchange rates. Thus the interest rate differentials for one-month assets are determined by expectations regarding the change in the exchange rate at the end of a month. The question then arises as to what determines the expectations about future exchange rates. In the neoclassical framework, the answer is straightforward: inflation rate differentials, as determined by money supply growth differentials net of output growth, should provide the correct expectations, if PPP holds. Thus, uncovered interest parity implies the equalization of real interest rates between countries – the real interest parity theorem (RIP).

The uncovered interest parity relation must also be made consistent with covered interest parity. Covered interest parity asserts that the interest rate differentials must be equal to the forward exchange premium (or discount) with respect to the spot exchange rate, a relationship which indeed yields a perfect match in empirical observation. Putting together the CIP and UIP relations implies that the forward exchange rate and the expected future spot exchange rate must
be equal. Thus the forward exchange rate, within this standard neoclassical theoretical framework, should reflect the expectations of the financial markets with respect to future spot exchange rates.

The trouble with the neoclassical model, however, is that there is hardly any correlation between the forward exchange rate and its corresponding realized future spot exchange rate. It must thus be concluded either that the expectations of the agents operating in the financial markets are consistently wrong, or that the forward exchange rate has nothing to do with expectations of future values of the spot exchange rate, in contrast to what is asserted in the neoclassical model.

Thus, two of the main relations of the open economy neoclassical model appear to be built on dubious foundations. The uncovered interest parity theorem does not withstand empirical scrutiny, while the so-called Rules of the Game (as followed also in Mundell’s model) do not withstand an adequate analysis of the banking process. We shall now examine the latter of those two flaws, and show how post-Keynesian analysis can shed some light on this issue.

3. **The balance sheet of central banks**

Neoclassical textbooks usually make the claim that central banks have only four significant items in their balance sheets, two on each side, as indicated below:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign reserves</td>
<td>Currency in circulation</td>
</tr>
<tr>
<td>Domestic Government bonds</td>
<td>Bank reserves</td>
</tr>
</tbody>
</table>

Under this representation, since bank reserves plus currency in circulation equate the monetary base, there is a one-to-one relation between the size of the assets of the central bank

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5 The issue of the uncovered interest parity is discussed by John Smithin in another chapter of the present book.
and the monetary base. This representation is biased. It reflects, to some extent, the characteristics of Anglo-Saxon monetary systems, but not those of the majority of the monetary systems that can be found in the world. It thus yields a misleading comprehension of the functioning of most monetary systems. The correct balance sheet of most central banks looks more like the following one:

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreign reserves</td>
<td>Currency in circulation</td>
</tr>
<tr>
<td>Claims on domestic government</td>
<td>Bank reserves</td>
</tr>
<tr>
<td>Claims on domestic banks</td>
<td>Government deposits</td>
</tr>
</tbody>
</table>

On the asset side, claims on domestic private banks are the crucial addition. In most monetary systems, central banks lend to private banks. These commercial banks are structurally in debt vis-à-vis the central bank, and will thus attempt to reduce this debt whenever they can. These monetary systems are often called *overdraft* systems, because private banks can make use of a kind of overdraft, by pulling on a line of credit at the central bank, provided they show the appropriate collateral requirements. This overdraft system is symmetric to the one in use between non-financial economic agents, such as firms, and their private bankers.

On the liability side of the central bank balance sheet, an additional item has been included, that of government deposits. This entry illustrates the fact that the central bank can move government deposits around, at its choice, between its own central bank account and the accounts that government agencies hold at the various private banks. The additional entry on the liability side disrupts the straightforward relation between the size of the assets of the central bank and the monetary base. In the mainstream view, as reflected by the 2x2 balance sheet first shown, any increase in the assets of the central bank must be associated with an increase in the monetary base. Adding a third component to the liabilities of the central bank destroys this necessary association, because government deposits at the central bank are not part of the monetary base. Indeed, when the central bank moves government deposits from private banks to its own balance sheet, private banks lose reserves. It is as if customers of private banks suddenly decided to dispose of their bank deposits, acquiring instead banknotes issued by the central bank.
Here the customer is the (federal) government, which switches from deposits held at private banks to deposits held at the central bank.

In reality, central bank balance sheets can be even more complicated. Some central banks have large foreign liabilities. Some have large holdings of gold, which are officially undervalued. A correction for the market evaluation is then included in a capital account entry. The following tables illustrate how different the various monetary systems can be, both from the asset and the liability sides.
<table>
<thead>
<tr>
<th></th>
<th>Australia billions of A$</th>
<th>Canada billions of C$</th>
<th>United Kingdom billions of £</th>
<th>United States billions of US$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign assets</td>
<td>28.3</td>
<td>25.7</td>
<td>22.9</td>
<td>70</td>
</tr>
<tr>
<td>Claims on Govt</td>
<td>18.3</td>
<td>31.8</td>
<td>27.6</td>
<td>447.5</td>
</tr>
<tr>
<td>Claims on banks</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Liabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td>Currency</td>
<td>17.9</td>
<td>30.1</td>
<td>23.4</td>
<td>437.7</td>
</tr>
<tr>
<td>Bank reserves</td>
<td>5.2</td>
<td>4.4</td>
<td>8</td>
<td>75.5</td>
</tr>
<tr>
<td>Govt deposits</td>
<td>2.8</td>
<td>22.1</td>
<td>--</td>
<td>22.6</td>
</tr>
<tr>
<td>Foreign liabilities</td>
<td></td>
<td></td>
<td>23.6</td>
<td></td>
</tr>
</tbody>
</table>

### Table 2
Allemanic central banks, 1997 balance sheet

<table>
<thead>
<tr>
<th></th>
<th>Austria billions of Schillings</th>
<th>Germany billions of Marks</th>
<th>Switzerland billions of SF</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign assets</td>
<td>263.4</td>
<td>129.7</td>
<td>69</td>
</tr>
<tr>
<td>Claims on Govt</td>
<td>9.8</td>
<td>24.2</td>
<td>7.1</td>
</tr>
<tr>
<td>Claims on banks</td>
<td>74.2</td>
<td>235.2</td>
<td>1.1</td>
</tr>
<tr>
<td>Liabilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Currency</td>
<td>146.7</td>
<td>246.9</td>
<td>34.3</td>
</tr>
<tr>
<td>Bank reserves</td>
<td>80.1</td>
<td>79.2</td>
<td>5.1</td>
</tr>
<tr>
<td>Govt deposits</td>
<td>0.2</td>
<td>0.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Foreign liabilities</td>
<td>--</td>
<td>16.9</td>
<td>--</td>
</tr>
<tr>
<td>Capital accounts</td>
<td>145.7</td>
<td>--</td>
<td>35.1 (other items)</td>
</tr>
</tbody>
</table>

Table 3
Continental Europe central banks, 1997 balance sheet

<table>
<thead>
<tr>
<th></th>
<th>Belgium billions of BF</th>
<th>Denmark billions of crowns</th>
<th>France billions of FF</th>
<th>Italy trillions of Lire</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign assets</td>
<td>793</td>
<td>129.5</td>
<td>335</td>
<td>135.6</td>
</tr>
<tr>
<td>Claims on Govt</td>
<td>94</td>
<td>15.2</td>
<td>52</td>
<td>174.1</td>
</tr>
<tr>
<td>Claims on banks</td>
<td>150</td>
<td>52</td>
<td>125</td>
<td>32.3</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Currency</td>
<td>272</td>
<td>33.2</td>
<td>263</td>
<td>92.5</td>
</tr>
<tr>
<td>Bank reserves</td>
<td>229</td>
<td>98</td>
<td>60</td>
<td>91.4</td>
</tr>
<tr>
<td>Govt deposits</td>
<td>0.1</td>
<td>30.7</td>
<td>43</td>
<td>57.8</td>
</tr>
<tr>
<td>Capital accounts and other items</td>
<td>532</td>
<td>40.3</td>
<td>162</td>
<td>85.8</td>
</tr>
</tbody>
</table>

Table 4
South American and Asiatic central banks, 1997 balance sheet

<table>
<thead>
<tr>
<th></th>
<th>Brazil millions of reals</th>
<th>Mexico trillions of new pesos</th>
<th>China billions of renminbis</th>
<th>Korea billions of won</th>
<th>Japan trillions of yens</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign assets</td>
<td>66</td>
<td>225</td>
<td>1345</td>
<td>14.7</td>
<td>16.8</td>
</tr>
<tr>
<td>Claims on Govt</td>
<td>36</td>
<td>-34</td>
<td>158</td>
<td>5.3</td>
<td>32.8</td>
</tr>
<tr>
<td>Claims on banks</td>
<td>68</td>
<td>81</td>
<td>1642</td>
<td>62.4</td>
<td>13.8</td>
</tr>
<tr>
<td>Liabilities</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Currency</td>
<td>18</td>
<td>94</td>
<td>1017</td>
<td>15.5</td>
<td>52.7</td>
</tr>
<tr>
<td>Bank reserves</td>
<td>48</td>
<td>54</td>
<td>2122</td>
<td>7</td>
<td>9.3</td>
</tr>
<tr>
<td>Govt deposits</td>
<td>41</td>
<td>46</td>
<td>66</td>
<td>5.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Foreign liabilities</td>
<td></td>
<td>74</td>
<td>22</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Capital accounts and other items</td>
<td>-5</td>
<td>4</td>
<td>80</td>
<td>28.2</td>
<td>-2.3</td>
</tr>
</tbody>
</table>

Table 1 shows that Anglo-Saxon central bank share commonalities with respect to their assets: they do not have assets arising from loans to private banks (although the Bank of England used to have a small amount of claims on private banks). In their case, the standard textbook representation of central banks seems faithful: only foreign reserves and government securities appear on the asset side of the balance sheet of these central banks. On the liability side, however, three of these countries have substantial amounts of government deposits, the exception being the United Kingdom. For these countries, there is a wedge between the monetary base and the overall liabilities of the central bank. Table 2 shows that the Swiss central bank has a structure of assets which is similar to that of the Anglo-Saxon central banks. By contrast, the German and the Austrian central banks have large assets arising from loans to private banks. Their asset structure is in line with that of overdraft economies, and does not conform to that shown by the standard textbook.

Looking now at the balance sheets of the central banks from Continental Europe, in Table 3, the same conclusion can be made. Loans to private banks represent a substantial proportion of the assets of these four central banks, those from Belgium, Denmark, France and Italy, and for the first three of them, these loans made to banks are larger than the loans made to central governments (the stock of government securities held by central banks). Similar observations can be made about the central banks of Brazil, Mexico, China, Korea, and Japan, as shown in Table 4. These five central banks have a large proportion of their assets under the form of loans made to domestic private banks. With the exception of Japan, these loans to private banks are larger than the loans made to government. On the liability side, it can be verified that several central banks from Europe and Latin America, and even Asia, also hold substantial amounts of government deposits.

In the next section, it will be shown that overdraft financial systems obviously do not follow the Rules of the Game assumed by classical and neoclassical authors. This analysis will help us to understand why asset-based financial systems do not follow these rules either.

4. The compensation principle in the overdraft economy
The institutional characteristics identified in the tables above have important repercussions for theory. In the standard neoclassical account, when operating with fixed exchange rates, central banks must engage into open market operations if they wish to neutralize the effects of their exchange market operations. In the post-Keynesian approach, this is not necessary. The neutralization will occur at the initiative of the private agents of the financial markets. This is most obvious in the case of the overdraft economy, but it will also occur in the so-called asset-based economy, where private banks are not in debt vis-à-vis the central bank. This automatic neutralizing of the effects arising from exchange market operations is called the compensation effect.

Suppose the economy is on a fixed or a pegged exchange rate, and that the domestic economy is running a balance of payment surplus. Some agents wind up with foreign currency and give an order to their banks, asking them to transform this foreign currency into domestic banking deposits. The banks sell the foreign monies to the central bank, who is the residual buyer when it attempts to keep the exchange rate fixed. The central bank thus acquires the foreign currency, which it adds to its foreign reserves, and it credits the domestic banks with some deposits. The increase in the foreign reserves on the asset side of the balance sheet of the central bank is thus balanced by the increase in the reserve deposits of the private banks on the liability side of the balance sheet of the central bank. This situation arises, whether the economy is of the overdraft type or of the asset-based type.

Let us now consider the case of the overdraft economy. Banks have now been credited with additional reserves, beyond those required by law or by prudent behaviour. Because we are in a world of endogenous credit and money, banks make loans and search for reserves later. Therefore, banks have already made loans to all the firms and agents that they consider to be credit-worthy and who have requested such loans. The fact that the banks suddenly have additional reserves at their disposal does not make existing firms more credit-worthy. In fact, in the case of the overdraft economy, it is crystal-clear that private banks are not constrained by reserves in their lending behaviour since banks continuously borrow high powered money from the central bank, in order to fulfill their reserve requirements and to plug the leaks arising from the demand for banknotes by the general public.

So what are the private banks going to do with their newly found reserve deposits at the
central bank? These reserve deposits will be used to reduce their debt vis-à-vis the central bank. As soon as these reserve deposits are created, as a result of the domestic balance of payment surplus, they are destroyed as private banks reimburse their debt to the central bank. There will be no increase in the size of the balance sheet of the central bank. On the contrary, two compensating movements will occur on the asset side of the balance sheet of the central bank. While foreign reserves will increase (decrease), the claims on domestic private banks will decrease (increase) by the same amount.

This is the *compensation* effect, and it is clearly an extension of the reflux mechanism brought up by Thomas Tooke, and more recently underlined by Nicholas Kaldor and James Trevithick (1981) and by Joan Robinson (1956, ch. 23). If agents wind up with money that they do not want to spend, they will use it to reduce their debts. The same occurs in the context of an open economy in the case of private banks. The reduction in the claims on the domestic economy, when there is a brisk increase in the claims on the foreign economy, will be done automatically and at the initiative of the commercial banks. With fixed exchange rates, sterilization occurs automatically. Despite the huge increase in foreign reserves, there will be no change in the overall size of the assets of the central bank, and hence no change in the monetary base or in the supply of money.

Emil-Maria Claassen (1996) gives an interesting example of a foreign exchange crisis and its lack of an impact on the balance sheet of the central bank. This is the case of the German Bundesbank, when the European Monetary System was under attack, in September 1992 and in August 1993. The financial markets and their speculators were expecting major realignments of the European currencies, and believed that the Deutschmark would be reevaluated upwards compared to the other main European currencies. Although there were substantial changes in the composition of the balance sheet of the Bundesbank before and after each of the two crises, its overall size hardly changed.

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6 On the similitude of the contributions of Kaldor and Robinson over the reflux mechanism, see Lavoie (1999) and Rochon (2000).
In the view of Claassen, the compensation that occurs between reserves and domestic credit is the result of the sterilization efforts undertaken by the German central bank to keep constant the monetary base and the money supply, despite the huge balance of payments surplus created by the foreign exchange crisis in Europe. Claassen (1996: 56) says that the Bundesbank “did not renew” many domestic credits, for otherwise it would have lost all control over the monetary base. An alternative explanation, which seems more natural and correct, is that the private banks were now loaded up with excess reserves which they did not wish to hold, and as a result did not renew the loans which they had previously contracted to fulfill their compulsory reserve requirements and to acquire the banknotes (issued by the central bank) which were demanded by their customers.

Now, there is some ambiguity regarding the identity of the “domestic credit” in Table 5. It could consist of claims on government or of claims on private banks. We know however from Table 2 that more than 90% of the domestic claims of the Bundesbank arise from loans to the private banks. It is thus clear that the private banks winded up with excess reserve deposits during the exchange crisis, and that they unloaded these excess reserves by reimbursing their debts vis-à-vis the central bank, as one would expect that they would do in the context of an overdraft economy. By doing so, banks reduce their interest costs.

5. The compensation principle and the asset-based economy

Up to now, most of the discussion has been in terms of the overdraft economy. The same sort of
endogenous sterilization could also occur, however, in the asset-based economy. Suppose again that an economy is faced with large balance of payment surpluses, and that banks wind up with large amounts of foreign currency which they exchange at the central bank, acquiring excess reserve deposits in the process. What will private banks do with these excess reserves?

The conventional answer is that banks would use these excess reserves to grant new loans and to start off a multiple deposit expansion. But within the endogenous money approach, banks do not wait until they acquire new reserves to make such loans. They have already granted all the loans that they could make to credit-worthy borrowers. Unless there is a fall in interest rates, which would induce the appearance of new customers, or which would transform unworthy potential borrowers into worthy ones, no additional loan should result from these new reserves. Rational banks will not hold on to reserves that provide no interest revenue.

One obvious possibility is for banks to purchase foreign assets with their foreign currency balances: in this case the surplus in the balance of payments is eliminated on its own (Lutz 1971: 146). The other obvious possibility is for banks to purchase government securities, which provide income and have no risk. Private banks will thus initiate purchases of government bonds, and in all likelihood, the seller of these bonds will be the central bank. From the mainstream point of view, the sale of government bonds by the central bank looks like an attempt at neutralizing the inflow of foreign funds. In this case, however, sterilization occurs automatically, and at the initiative of the commercial banks. What we really have at work is the compensation principle, a variant of the reflux principle.

Some central bankers prefer nonetheless to perform immediate sterilization, at their own initiative making use in particular of government deposits. This is the case of the Bank of Canada, for which government deposits constitute the main tool to neutralize undesired fluctuations in the monetary base. Table 6 below illustrates the use of this tool. Between 1995 and 1996, there has been a large increase in the foreign reserves held by the Bank of Canada. In the mainstream story, this should have led to a large increase in the monetary base, unless the

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7 This possibility is also noted by Sheila Dow (1999: 160): “If there is an addition to domestic bank reserves there may be no direct effect on domestic credit provision. If confidence in domestic assets is low, the banks may prefer not to be lent to, or to lend outside the domestic economy, canceling out the capital inflow”.
central bank pursued an active sterilization policy, by selling government securities in the open market.

The figures of Table 6 show however that there has not been any decrease in the claims on government. The Bank of Canada did not sell any of the government bonds that it held. Instead, what the Bank did, was to move a large amount of government deposits held at chartered banks, shifting them to its own account at the central bank. As a result, the amount of high powered money (the monetary base) hardly increased (it did so by one billion), despite the large change in official reserves and in the size of the central bank balance sheet (about 8 billion dollars extra).
Table 6
Sterilization through government deposits, by the Bank of Canada.

<table>
<thead>
<tr>
<th></th>
<th>1995</th>
<th>1996</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foreign assets</td>
<td>50.9</td>
<td>59.2</td>
</tr>
<tr>
<td>Claims on central government</td>
<td>20.8</td>
<td>28.2</td>
</tr>
<tr>
<td><strong>Liabilities</strong></td>
<td>50.9</td>
<td>59.2</td>
</tr>
<tr>
<td>Monetary base</td>
<td>32.1</td>
<td>33.4</td>
</tr>
<tr>
<td>------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Government deposits</td>
<td>17.8</td>
<td>25</td>
</tr>
<tr>
<td>Other items</td>
<td>1</td>
<td>0.8</td>
</tr>
</tbody>
</table>


6. Historical and empirical evidence of the compensation principle

In the previous two sections, various examples of the operation of the compensation principle were offered. It could be argued however that the validity of the compensation principle is limited to the current functioning of the international economy, and that in particular, a return to a gold standard would bring back into operation the Rules of the Game. This is not the opinion however of the main modern proponent of the compensation principle. Pierre Berger (1972a: 94, 1972b:171), who was the general director of research at the Banque de France, points out that the compensation phenomenon that can be observed in modern economies could already be observed in the 19th century. Statistics show that when France had large external surpluses, and hence was accumulating gold reserves, the peaks in the gold reserves of the Banque de France were accompanied by throughs in credits to the domestic economy. As a result, despite the wide fluctuations in gold reserves, the variations in the monetary base and the money supply were
quite limited.\textsuperscript{8}

This analysis is confirmed by studies on the gold standard period, between 1880-1913 and 1922-1938. Bloomfield (1959: 49) shows that when looking at year-to-year changes in the period before the First World War – the heyday of the gold standard – the foreign assets and the domestic assets of central banks moved in opposite directions 60% of the time. Foreign assets and domestic assets moved in the same direction only 34% of the time for the eleven central banks under consideration. The prevalence of a negative correlation thus shows that the so-called Rules of the Game were violated more often than not, even during the heyday of the gold standard. Indeed, “in the case of every central bank the year-to-year changes in international and domestic assets were more often in the opposite than in the same direction” (Bloomfield 1959: 49-50).

Almost identical results were obtained in the case of the 1922-1938 period. Ragnar Nurkse (1944: 69) shows that the foreign assets and the domestic assets of twenty-six central banks moved in opposite direction in 60% of the years under consideration, and that they moved in the same direction only 32% of the time. Studying the various episodes of inflows or outflows of gold and exchange reserves, Nurkse (1944: 88) concludes that “neutralization was the rule rather than the exception”. Without saying so, Nurkse adopts the compensation principle as the phenomenon ruling central banks in an open economy. The rules of the game as they were to be endorsed in the modern IS/LM/BP models of Mundell are an erroneous depiction of reality.

There is nothing automatic about the mechanism envisaged in the «rules of the game». We have seen that automatic forces, on the contrary, may make for neutralization. Accordingly, if central banks were to intensify the effect of changes in their international assets instead of offsetting them or allowing them to be offset by inverse changes in their domestic assets, this would require not only

\textsuperscript{8} Denizet (1969: 203-204) notes a specific instance of the lack of a relationship between the flows of gold and the money supply. When France had to transfer one billion francs worth of gold to Germany in 1870, as a form of war reparation, everyone expected France to fall into a recession as a result of the diminished liquidity, but the reverse occurred. France entered a period of prosperity, while the Banque de France compensated the outflow of gold with a substantial
deliberate management but possibly even management in opposition to automatic
tendencies. (Nurkse 1944: 88)

Nurkse’s account of the negative correlation between foreign and domestic assets of
central banks in various dramatic instances is particularly interesting because he rejects the
standard interpretation in terms of a “sterilization” operation initiated by the central bank. Nurkse
considers that it would be “quite wrong to interpret [the inverse correlation] as a deliberate act of
neutralization” on the part of the central bank. On the opposite, Nurkse considers that the
neutralization of shifts in foreign reserves is caused by “normal” or “automatic” factors, and that
the compensation principle operates both in the overdraft financial systems and in the asset-
based ones. In the overdraft system, Nurkse (1944: 70) notes that “an inflow of gold, for
instance, tends to result in increased liquidity on the domestic money market, which in turn may
naturally lead the market to repay some of its indebtedness to the central bank”.

But Nurkse also observed compensating phenomena that were consistent with the
operation of an asset-based financial system. In the case of an inflow of gold and foreign
exchange, foreign investors (or the banks where their deposits would be held) would purchase
new government securities. This would allow Government to reduce its debt to the central bank,
as would be the case in an open-market operation. However, as Nurkse (1944: 77) points out, in
contrast to the usual open-market operation, the manoeuvre “did not come about at the Bank’s
initiative”. Alternatively, Nurkse (1944: 76) points out, gold inflows could also be neutralized by
an increase in government deposits held at the central bank, as the Bank of Canada does
nowadays.

Nurkse’s analysis can easily be extended to the current context, with central banks setting
high interest rates to attract foreign capital and achieve a balance of payment surplus. Suppose
foreigners have sold foreign currency to acquire Brazilian money deposits. They now need to
purchase Brazilian Treasury bills to take advantage of the high interest rates. If they acquire
these bills directly from the Brazilian central bank, the increase in the foreign reserves of the
central bank are fully compensated by the decline in the credits granted to government, i.e.,

amount of advances to banks.
sterilization is automatic and at the initiative of the foreign investors. The Brazilian government may also decide to issue new bonds and sell them directly to the foreign investors, in which case the money deposits of the latter would now be held by Government. Once again compensation is complete provided the newly held bank deposits are shifted to the Government’s account at the Brazilian central bank.

The above results thus clearly show that the compensation principle applies both to the old and the current international monetary systems. While Berger (1972a) offered graphic illustrations of the compensation thesis, Jacques David (1971: 51), Éric Arnoult (1977) and Nicholas Kaldor (1980: 309) have provided some econometric evidence in support of the principle. An interesting recent empirical result is that of Marselli (1993). He shows that changes in foreign reserves are not cointegrated with additional bank loans. This supports the claim that banks do not need to await free reserves to grant new loans. Marselli also shows that changes in foreign reserves and changes in the bonds held by private banks are cointegrated, with a positive sign. This is consistent with the claim that when private banks wind up with free reserves, they usually do not use them to grant new loans. Rather, they will use these excess reserves to acquire risk-free government securities. The latter, of course, is also consistent with systematic sterilization operations made at the initiative of the central bank.

Some well-known specialists of central banks have also recently endorsed the compensation principle. When speaking of the various determinants of the monetary base, Charles Goodhart (1984: 192) points out that there is “some tendency towards negative covariation in these flows, i.e., they seem to interact in a way that produces some partial compensation, which alleviates some of the difficulties facing the authorities. A large foreign exchange inflow usually encourages sales of gilts and also reduces company demand for bank credit”.

7. **Limits to the compensation principle**

It is often argued that sterilization cannot occur on a long term basis. In other words there would be limits to sterilization. This would imply that there are limits to the compensation principle, or so it would seem. The cases of capital inflows and capital outflows must be distinguish. Suppose
there is a balance of payment deficit. Then clearly, whether the endogenous compensation principle or the sterilization process is at work makes no difference: at some point, the central bank will run out of official reserves, and will need to borrow them. Clearly this process cannot go on forever. But as long as the central bank under attack has foreign reserves left or the credit-worthiness to borrow them, it is able to compensate for the loss in foreign reserves.

Now, what about the decreasing reserves of the private banks? In the case of the overdraft economy, private banks will borrow at the discount window the reserves which they just lost on the exchange market, and this could go on forever. In the case of the asset-based economy, private banks can sell their government securities to the central bank. It should be noted that even if central banks were to refuse to purchase these securities, reserves would eventually be forthcoming. Commercial banks need only wait until Treasury bills must be redeemed, without taking any renewals. The banks would acquire government deposits, thus securing the missing reserves in the process. In general, when banks run out of government securities, the central bank can shift away its government deposits to the private banks. Under these circumstances, a balance of payment deficit need not have any impact on the monetary base.

When a currency is under attack, the domestic central bank may in fact take measures that run counter to the endogenous compensation principle. The central bank may then pursue a deliberate restrictive monetary policy, pushing up overnight rates of interest, not so much to induce incoming capital flows, but rather to increase the cost of outgoing capital transfers (Coulbois 1982: 200). The increase in the rate of interest is not the endogenous result of the capital outflow. Rather, it is an economic and political decision of the central bankers. The central bank does have a choice. By hiking up rates of interest, the central bank wishes to increase the opportunity cost of sending domestic funds abroad, and it increases the cost of speculation. Borrowing domestic funds to exchange them into foreign currencies becomes a more costly operation. Speculation may become unrewarding. It is clear however that such an interest rate policy needs to be drastic: a 1% change in the exchange rate within a month will be sufficient to cover a 12% interest rate differential. Clearly, capital controls or penal taxes on short-term capital flows are a better alternative.

What happens when there is a balance of payment surplus? This situation can arise for at least four reasons. There may be a financial crisis abroad, and the domestic currency is
considered to be safe, thus inducing substantial capital inflows. Secondly, exports may be strong,
and exporters receive large amounts of foreign currencies compared to the amounts required by
importers. Thirdly, foreign investors may find domestic interest rates high and attractive, as was
discussed in the previous section. Finally, it may be that domestic firms consider domestic
interest rates to be too high, as would be the case when domestic monetary policy is highly
restrictive; these domestic firms would then borrow funds from foreign markets, at lower interest
rates, while accepting to take the risk that the domestic currency could depreciate in the future,
before the debt can be reimbursed.

This fourth case is somewhat different from the first three, because the compensation
principle does not play its role. The capital balance surplus is induced by the attempt of the
central bank to slow down the economy. What we have here is a typical instance of endogenous
money. The central bank sets high interest rates in an attempt to slow down the growth rates of
credit, money, output and prices. Banks try to evade the restrictions by inducing their customers
to borrow abroad, from their correspondents, at the lower world rates. Whether the exchange rate
is fixed or not is irrelevant. The same would occur in a world of flexible exchange rates. Banks
and their customers would still attempt to avoid the constraining monetary policy. In any case,
even if there exists this endogenous inflow of foreign capital, it is not certain that it will lead to
an increase in the monetary base and the money supply. Firms may prefer to borrow in other
currencies on the euro-markets to take advantage of the low rates of interest. But they may use
the proceeds to repay their indebtedness vis-à-vis domestic banks, “so that neither money supply
nor effective demand for goods and services increase” (Coulbois and Prissert 1974: 303).

The situation is different in the other three cases. Clearly the increase in official reserves
can last forever, as long as there is some automatic compensation or deliberate sterilization
mechanism. The compensation over the increasing official reserves can occur as long as the
central bank of an overdraft system still hold some claims over the private banks. The latter will
keep on wiping out their excess reserves by reimbursing their previous debts vis-à-vis the central
bank. In the case of the asset-based sector, the banks will get rid of their excess reserves by
purchasing government securities, and hence compensation can proceed as long as the central

9 This is pointed out by Moore (1988: 274).
bank still holds some government securities. When this source is extinguished, the central bank can remove government deposits from the private banks. Compensation can thus proceed for a long time, and it is dubious that any central bank could lose its control over monetary policy.

It has been argued by some critics of the compensation approach that as soon as exporters receive their foreign currency, the money supply increases, even though banks wipe out their excess reserves, since the currency from abroad will be transformed immediately into deposits in local currency. But such a claim is misleading. The reflux principle applies equally well to foreign and domestic receipts. Exporters, who now get paid for their exports, previously incurred expenditures when producing these export goods, and probably had to borrow to do so. As a result, when they transform their foreign receipts into domestic deposits, these deposits are utilized to pay back their debt vis-à-vis the banks. This was underlined by Le Bourva (1992: 462-3): “Moreover, notice that an initial compensation occurs in the accounts of productive businesses before doing so in those of financial establishments. If the businesses obtain the funds needed for the payments of their means of production by foreign and not domestic sales, they present foreign currencies instead of regular bills of exchange to their bankers”.

As a result, one can say that the compensation principle occurs at two levels, “at the junction between the public and the banks, and at the junction between the banks and the central bank” (Lavoie 1992: 190). Thus, as rightly noted by Arestis and Eichner (1988: 1004), “any money creation emanating from fiscal or debt management operations initiated by the authorities or from a favourable balance of payments, can be neutralized through an equivalent reduction in commercial bank credit brought about by the actions of private economic agents”.

In any case, most economies are operating with growing figures. In general, a balance of payment surplus, through the compensation principle, will diminish the rate of growth of the debt owed by the banks to the central bank, or it will diminish the needs of banks to sell government securities to acquire their growing requirements in high powered money. Thus, while a negative correlation between foreign and domestic assets of central banks disproves the operation of the Rules of the Game, a positive correlation does not disprove the operation of a compensation mechanism.10

10 Thus, in the studies of Bloomfield (1959 and Nurkse (1944), the 30% or so of positive
8. **Conclusion: consequences for theory**

The essential features of the horizontalist approach to monetary economics are that credit and money are demand-led endogenous variables, and that central banks have the ability to set interest rates (even real interest rates), at a level of their choice. This choice, of course, is constrained by the objectives pursued by the central bank and the economic conjuncture. In a modern monetary production economy, there is no such thing as a natural rate of interest, towards which the central bank would necessarily have to align its Bank rate.

The same features still characterize an open economy operating in a world where capital is mobile. Through the compensation principle, which is a variant of the reflux principle, balance of payments disequilibria have no effect on the overall monetary base or money supply, even with fixed exchange rates. Money aggregates are still determined by demand-led factors. The only difference is that these foreign-induced disequilibria will change the composition of the balance sheet of the central bank.

Balance of payments disequilibria have no endogenous effect on the level of interest rates. For instance, external deficits do not lead to reduced internal liquidity and higher interest rates. This conclusion is confirmed by Wynne Godley’s (1999) modelling of a two-country economy with mobile capital. The central bank, however, may decide to hike interest rates up when it feels uncomfortable with its falling foreign reserves. But there is nothing automatic about such a change in interest rates: it does not result from market supply and demand forces; it is a discretionary decision of the central bank.

We may thus conclude, as do Arestis and Eichner (1988: 1015), that “so long as it is recognized that money supply is credit-driven and demand-determined, the exchange rate regime is of absolutely no consequence in the determination of money and credit”. It also follows that countries running trade surpluses or benefiting from net capital inflows are not prone to inflationary forces since there is no supply-led endogenous creation of money. As Prissert (1972: 302) notes, there is no such thing as imported inflation in a fixed exchange regime. In a world correlation over-estimate the proportion of cases consistent with the Rules of the Game.
where growth is demand-led, countries with external surpluses should have no hesitation in pursuing expansionary policies, to help out countries which experience slowdowns because their growth has been constrained by balance of payments difficulties. The compensation principle is thus fully consistent with Paul Davidson’s (1994: 265) insistence, following Keynes, that the burden of adjustment to international disequilibria should fall on creditor countries rather than debtor ones.

The compensation thesis also has some repercussion on the neoclassical theory of international trade, as embedded in the theory of comparative advantage. While there have been various attacks on the classical or the neoclassical theories of comparative advantage, Anwar Shaikh (1980) has long argued that balance of payments disequilibria do not necessarily lead to changes in prices, and hence that absolute advantages and balance of payments disequilibria do not necessarily transform themselves into comparative advantage and balance of payments equilibria. Based on arguments offered by Marx, Shaikh (1980: 223) points out that, at the time of the gold standard, the incoming gold flows could have been absorbed by hoards or transformed into articles of luxury. In addition, the incoming gold and its accompanying growing money supply could have been absorbed by higher production levels, rather than by higher prices, since full employment need not be assumed.

The analysis of the compensation thesis reinforces the arguments offered by Shaikh, since the first stage of the automatic adjustment mechanism – the increase in the money supply – does not arise in the post-Keynesian model with reflux. We also saw that the reflux mechanism, applied to international payments, already existed even at the time of the gold standard, and hence that a return to such an international monetary system would probably not help to enforce the so-called Rules of the Game. The compensation thesis, based on the reflux mechanism and on the other features of Horizontalism, thus puts in jeopardy both the theory of comparative advantage and the self-adjusting mechanisms that are taken for granted in neoclassical theories of open economies.

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Indeed, Nurkse (1944: 71-72) points out that when compensation did not occur at the level of the central bank, it would occur at the level of the commercial banks. They would hoard useless reserves for lack of creditworthy borrowers and for fear of future capital losses on government securities.
It is interesting to note that IMF researchers are starting to recognize the importance of the compensation principle. In a paper devoted to central banking without high powered money – an institutional framework which could arise in a not too distant future – Henckel et al. (1999: 35) claim that the foreign exchange interventions made by central banks to keep exchange rates fixed would necessarily entail an equivalent amount of sterilization. The compensation principle would thus operate fully. Henckel et al. (1999: 38) conclude from this that the relevance of the monetarist approach to the balance of payments would fade away, not realizing that spontaneous sterilization is already widespread.
References


