Mundell-Fleming without the LM curve: the exogenous interest rate in an open economy [*]

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Abstract

In this paper we evaluate critically the popular Mundell-Fleming model from the standpoint the exogenous interest rate heterodox approach. We criticize the assumptions of exogenous money supply, "perfect" international capital markets and inelastic exchange rate expectations. We show that in a more realistic framework none of the main results of the Mundell-Fleming model on the relative effectiveness of fiscal and monetary policies are valid, either in floating and fixed exchange rate regimes. We conclude that ,within certain very asymmetric bounds, the central bank has the power to determine the domestic interest rate exogenously even in open economy with free capital mobility and that there is no automatic market mechanism to ensure the automatic adjustment of the interest rate and exchange rate to sustainable levels.
Key words: Mundell-Fleming, Exogenous interest rate, Economic Policy.

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I.Introduction

Fortunately, there has been a growing number of orthodox and heterodox economists that accept that the basic nominal interest rate is determined exogenously by the central bank of a country and not by an adjustment between the "demand for money" and an “exogenous” money supply.[1]. However, at the same time many economists still think in terms of the Mundell-Fleming model (IS-LM-BP short-term external perfect capital mobility) when discussing specific problems of open economy.[2] As it is well known, the Mundell-Fleming model is based on the idea that the interest rate is determined by supply and demand for money and that money supply is exogenous, at least in the first instance, because depending on the exchange rate regime it can be made to vary endogenously. Moreover, in the Mundell-Fleming model the interest rate is no longer controlled by the monetary authority of the country, and is defined by the interest rate prevailing in the international markets. Thus, the central bank of each country would lose its ability to fix the nominal interest rate in an open economy context, regardless of its ability to control or not the money supply. On the other hand, the relative effectiveness of monetary and fiscal policy would depend crucially on the exchange rate regime adopted (fixed or floating).

In this paper we critically evaluate the Mundell-Fleming model[3] and some of its (short run) extensions from the perspective of the heterodox approach of the exogenous interest rate. We will try to show that this model has some unrealistic assumptions, such as "perfect" international capital markets and inelastic exchange rate expectations, whetehr the latter inelasticity is relative to the financial fragility of the balance of payments (as in the case of the fixed exchange rate regime) or relative to the exchange rate actually observed in recent past (in the case of the floating exchange rate regime). In the light of this critical assessment, we will show that none of the main qualitative results of the Mundell-Fleming model on the relative effectiveness of fiscal and monetary policies is valid and that under more realistic assumptions the central bank has the power to set exogenously the interest rates even in an open economy with free (but not "perfect") capital mobility. We will also see that this power to determine the interest rate is in practice limited and can become very asymmetric, because depending on the exchange rate regime and the conditions of

1 In the Heterodox side we have Sraffians like Pivetti (1991, 2001) and post-Keynesians like Lavoie (2000,2001). On the Orthodox side we have John Taylor (1997, 2000), Romer (2000) among many others.

2 Some of the few undergraduate textbooks that already include the model without the LM curve generally do so in the context of closed economy.The open economy analysis is discussed in terms of the Mundell-Fleming model (see Mankiw (2010) and Jones (2011)). An exception would be that of Romer (2006). Most of the essays on pedagogy from the macroeconomic model of the new consensus without the LM curve in Fontana & Setterfield (2009) both orthodox and unorthodox also show only the formalization of the closed economy model.

[3]For the history of the Mundell-Fleming model and its relation to the original works of Mundell and Fleming see Darity & Young (2004).

the external balance of payment constraint , a given interest rate set by the central bank can lead to various problems and may eventually become in practice unsustainable. But, as we shall see, even in these cases the point is that in a monetary economy there is no automatic market mechanism available to determine the interest rate that would be appropriate to a given economic situation and/or a given set of policy objectives of the monetary authority.
Besides this introduction, this paper will be divided into three more sections. In Section II, we briefly present the Mundell-Fleming model. In section III we show the results of the model when we relax the "perfect" international capital mobility assumption. In section IV, we present the main criticisms of the Mundell Fleming model both in the case of fixed exchange rate and floating exchange rate regime. Concluding remarks are made in the last section (V).

II.The Mundell-Fleming Model

II.1 IS-LM-BP with perfect capital mobility

The short-term Mundell Fleming Model is nothing more than the IS-LM model adapted to an open economy with free capital mobility. It is assumed that nominal wages (or alternatively the nominal price level) is exogenously given and that the level of output can differ from the "full employment"(more generally, potential) level. The IS curve, that show the balance in the goods market is elastic with respect to real interest rate due to the assumption that investment is an inverse function of the interest rate and consumption is largely induced by disposable income. In the open economy the curve also includes net exports (exports minus imports), and these depend positively on the real exchange rate, since a depreciation of the real exchange rate increases exports and decreases imports. The LM curve continues to show the money market equilibria that arise from the matching between the demand and supply of money (the latter equal to a exogenous high powered monetary base times the given "money multiplier").
In addition to the IS and the LM, another curve is introduced to show the conditions of balance of payments equilibrium. The balance of payments depends both on the trade and financial accounts. The trade account depends on exports and imports (including nonfactor services), while the financial account depends on the nominal interest rate differential between domestic and international bonds. A positive interest rate differential leads to capital inflows, while a negative differential leads to an outflow of capital. If the equality is not verified, capital flows will quickly move in the direction of the assets with higher yields, and this will continue until the equality is somehow restored. It is assumed that the short run mobility of international capital is both free and "perfect" and therefore that the economy faces an infinitely elastic supply of foreign exchange at any interest rate slightly higher than international rate. Note that in this curve is also implicitly assumed that the market's expectation of the changes in the nominal exchange rate change is always zero.

II. 2 The fixed Exchange rate regime

In the case of the fixed exchange rate regime , the central bank sells (and buys) foreign exchange whenever there is a tendency to a deficit (or surplus) in the overall

balance of payments, losing (or accumulating) reserves , in order to maintain the nominal exchange rate fixed. In the model, this decrease (increase) of the country's international reserves in turn has the effect of decreasing (increasing) the monetary base, which according to the model leads to a decrease (increase) in the money supply. Thus, in the case of fixed exchange rate, an expansionary monetary policy produces the following results. The increase in (exogenous) money supply decreases the domestic interest rate below the international interest rate (plus the country's sovereign spread), leading to an outflow of capital and reduced net imports (since exports are autonomous, but imports are a function of the output level). Then, the domestic monetary authority, in order to avoid a nominal exchange rate devaluation, sells international reserves at a fixed price. This leads to a decrease in international reserves, and also in the monetary base and the money supply. When the money supply contracts, the interest rate rises again. Note that the new equilibrium is achieved only when the interest rate again equals the external interest rate again and, therefore, the net effect on output is zero.

In the case of expansionary fiscal policy results are quite different. In the fixed exchange rate regime a expansionary fiscal policy, given an exogenous money supply, initially leads to an increase in output and domestic interest rate through the usual the effect of the higher demand for money associated with a higher level of activity, given an unchanged money supply. The higher domestic interest rate rises above the external interest rate and leads to a rapid and large inflow of foreign capital. The central bank, in order to prevent a revaluation of the nominal exchange rate is forced to buy all of the excess of foreign exchange and to accumulate reserves. But in doing so the monetary base and money supply expand and the domestic interest rate falls. This process ends only when the monetary base expands enough, expanding the money supply sufficiently to meet the increased demand generated by the fiscal expansion at a domestic interest rate is equal to the international rate. Therefore, monetary policy in the fixed exchange rate regime is totally ineffective in expanding the output because the government loses control over the money supply as a consequence of its commitment to buying and selling foreign currency. And fiscal policy is fully effective in expanding the output because this same commitment ultimately ensures that the traditional partial crowding out effect of private investment that occurs in the IS-LM model of the closed economy (where the money supply remains fixed) will not happen.

II.3 The floating exchange rate regime

In the Mundell-Fleming model with floating exchange rates, it is assumed that the exchange rate appreciates when the domestic interest rate is above the international level and depreciates when it is below it. If, for example, the government decides to undertake an expansionary monetary policy by increasing the exogenous supply of money, the interest rate decreases, thereby increasing investment and output. But now the interest rate has fallen s below the international rate and this leads to a devaluation. This nominal exchange rate depreciation, with fixed nominal wages and/or prices, also leads to a real exchange rate devaluation and increased net exports, shifting the IS curve to the right, increasing output. The increase in output, through its effect on the demand for money, causes an increase in the interest rate.

But while the interest rate remains below the international rate there will be other nominal and real exchange rate devaluations and further increases in net exports and output. Thus output will continue to increase until the domestic interest rate rises again to the level of the international rate. Monetary policy in the floating exchange rate regime is thus very effective in expanding the output because it causes exchange rate devaluations that shift the IS curve to the right.
On the other hand, in this exchange rate regime, fiscal policy loses its effectiveness completely. An increase in government spending in principle shifts the IS curve to the right and increases output. However, given the exogenous supply of money, the output expansion leads to an increase in interest rates and a reduction in investment, reducing the expansionary effect of fiscal policy. In addition to this known effect of partial crowding out, in the Mundell-Fleming model under floating exchange rates, domestic interest rates above the international level lead to an exchange rate appreciation, which then reduces net exports and output. This reduction of output in turn reduces the domestic interest rate. While domestic interest rates have not returned to the international level, there will be other real exchange rate appreciations and further reduction in net exports. The equilibrium will be achieved only when the interest rate goes back to its initial level, but this will only occur when the contraction in net exports exactly offsets the initial expansion of public spending and the level of output also return to its initial level. Thus, fiscal policy is totally ineffective and unable to change the level of output in the floating exchange rate regime.

III. The IS-LM-BP with "imperfect capital mobility"

III.1 Imperfect mobility?

Let us now relax the first strong assumption of "perfect capital mobility" and see what happens to the results of the Mudell-Fleming model.
According to the extreme hypothesis of "perfect" international markets in which any country is supposed to be a price taker in relation to the international interest rate (plus some fixed country risk spread) and so can attract a potentially infinite amount of foreign capital, simply by fixing an interest rate slightly higher than the international rate.
First of all, it may be the case that the country concerned is relatively large and, therefore, it would be unrealistic to think that the international interest rate itself is independent of the size of its external financing operations. Secondly, even for "small" countries - relative to the size of the global market - it could be the case that the assets of a country are not perfect substitutes for assets of other countries and agents require a growing interest premium to retain them in larger quantities in their portfolios. In addition, there may be market imperfections and asymmetric information that make the risks of loans increase when a country increases its foreign currency liabilities. One or more of these reasons is enough to make the BP curve slope upward in the interest-output quadrant because the international interest rate (foreign rate plus spread) increases when the level of output increases, since higher output brings with it higher imports and eventually growing current account deficits.
Note that the name used for this variant of the model is quite inadequate. There is nothing "imperfect" with international capital mobility as such , which moves freely in the short run. It is the world capital market that is not "perfect", in the sense of

absence of "atomism" (i.e., there are large economies) or existence of real or perceived heterogeneous risks ("capital market imperfections").
Anyway, what interests us here is that the IS-LM-BP results with this "imperfect mobility" of foreign capital may be quite different from the standard Mundell-Fleming model.
In this IS-LM-BP version the crucial element is whether and when the BP is more or less vertical than the LM, i.e., if an output expansion leads to a faster increase of the international interest rate (which equilibrates the Balance of Payments BP) or of the domestic interest rate (which equals the supply and demand for money LM). In the first case, when the external interest rate rises faster than the internal rate is often considered to be a case of “low mobility of capital and low financial integration”, while the opposite case, when the international rate increases more slowly than the internal rate is rationalized as a case of "high mobility of capital" or "strong financial integration".

III.2 The fixed exchange rate regime under "imperfect mobility"

Let's see what happens with the IS-LM-BP model with "imperfect mobility", initially in the fixed exchange rate regime. Suppose first that the BP curve is less vertical than the LM curve. Let's start with monetary policy. An increase in money supply reduces the domestic interest rate in relation to international and causes a capital outflow. This reserve loss forces the central bank to buy the domestic currency and sell foreign exchange to keep the nominal exchange rate fixed. Money supply contracts, counteracting the expansionist policy. In this case, the result is identical to the Mundell-Fleming model.
If now we change the hypothesis and assume that BP is more vertical than the LM and ask again what the effect of monetary policy, the answer is the same. The initial fall in interest rates creates a BP imbalance leading to a loss of reserves, contracting the monetary base (and money supply). In the fixed exchange rate regime in all three cases of perfect, high or low mobility the result is the same because in the three cases an initial shock results in a domestic interest rates below the international rate and a reserve loss. The conclusion that monetary policy is ineffective in the fixed exchange rate regime is thus quite robust.
Let’s turn to the case of fiscal policy, still in the fixed exchange rate regime. Recall that in the version with perfect capital mobility (Mundell-Fleming) fiscal policy was fully effective and the output increased in proportion to the fiscal stimulus (i.e., the autonomous increase in public expenditure times the traditional Keynesian multiplier in an open economy with government). There was a partial crowding out, because the initial rise of domestic interest rates, given the initial money supply, makes the domestic interest rate higher than the international rate, which caused a surplus in balance of payments, attracting foreign capital and the government was then forced to buy foreign currencies and sell to local currency, expanding the money supply until the domestic rate reached the international rate.
In the case of “high" but not perfect mobility the results are something close but not identical. The fiscal expansion increases output and pushes up the domestic interest rate, attracting international capital and the government, in order to maintain a fixed exchange rate, buys foreign currency, which expands the money supply. This occurs

until the domestic interest rate is equal again to the international interest rate. But now the international interest rate increases with the level of activity, which means that fiscal policy will expand the economy less than in the case of perfect mobility, because the money supply will not increase in proportion to the increase in public spending amplified by the multiplier effect. Thus, with high capital mobility (BP less vertical than the LM), fiscal policy is still effective but less than in the Mundell-Fleming model.

However, in the case of "low capital mobility" the process is quite different but the result is similar. A fiscal expansion in fixed exchange rate regime has the following effects. The increase in government spending increases aggregate demand and output, but now, due to "low mobility", the domestic interest rate increases less than the international rate. This leads to a deficit in the balance of payments and a capital outflow that forces the central bank to maintain the fixed exchange rate by buying local currency and selling foreign currency, reducing the monetary base and the money supply, until the equality between domestic interest rates and international rate is restored. Again, in a slightly different way, the final equilibrium will be such that fiscal policy will continue to have expansionary effects, but there will be a partial crowding out effects that dampens this effect and this negative effect will be stronger the less horizontal is the BP curve, and so, the less "perfect" is the capital mobility. At the end, a monetary policy in the fixed exchange rate regime is still not effective and the fiscal policy will be less effective than before, but the changes are not drastic compared to the Mundell-Fleming model with "perfect mobility".

III.3 The floating exchange rate regime under "imperfect mobility"

It is in the case of flexible exchange rates, however, that the results change more drastically. Suppose initially that there is "high capital mobility" and the domestic interest rate increases faster than the international rate . A monetary expansion causes a tendency to a balance of payments deficit that is corrected by currency devaluations and lead to a subsequent expansion of net exports. This increase in net exports has two effects. On the one hand it increases the level of output and the demand for money, so that the domestic interest starts to increase. On the other hand, the increase in net exports improves the current account balance and shifts the BP curve itself by reducing the interest rate necessary to equilibrate the balance of payments. In the new equilibrium, monetary policy will be expansionary although less so than in the Mundell Fleming case, as the final effect will always be higher levels of domestic and international interest rate , the higher is the economy's level of activity. On the other hand, monetary expansion in the "low capital mobility" case, when the domestic rate increases less than the international rate, generates even more expansionary results. An increase in money supply now generates a devaluation and increase in net exports, which again has the dual effect of increasing aggregate demand and output and improve the current account balance. The IS and BP curves shift to the right until a new equilibrium level of output is reached, with an equilibrium level of output greater than the initial level after the monetary expansion.[4] With the

[4] Note that the increase in output given an increase in exports is $\Delta X / ((1-c(1-t)) + m)$ and an increase in output that equilibrates the trade account would be $\Delta X / m$. Thus the shift of BP curve is larger than the IS curve, ensuring the stability of the Mundell Fleming model, for all cases, since the simple Keynesian

increased level of activity, the domestic interest rate begins to rise again, and eventually equals the external interest rate. In this case the result is that with "low mobility of capital," monetary policy is powerful.

Let us now see what happens in the case of fiscal expansion, even in the regime of flexible exchange rates with "imperfect mobility." Initially we assume "high capital mobility", i.e., the domestic interest rate increases more than international rate. An increase in government spending will lead to an increase in aggregate demand and money demand, which raises the domestic interest rate. This leads to a strong appreciation of local currency that decreases net exports, offsetting the impact of expansionary fiscal policy. However, the decline of net exports worsens the current account balance and also shifts the BP curve to the left, increasing the international interest rate for a given level of activity. When the fall in economic activity caused by the continued appreciation of the exchange reduces the domestic interest rate to the point that equals the international rate, the exchange rate appreciation will stop and output will cease to shrink. In the end, the crowding out effect will be less than complete and fiscal policy will have had some expansive effect, even with flexible exchange rates.

Finally, we come to the case where there would be "low-mobility" of capital and the domestic interest rate increases more slowly than international rate when the level of output increases. In this case, fiscal policy with flexible exchange rates would have the following effects. An initial increase in output increases the domestic interest rate, given the money supply. Given the assumption that the domestic interest rate increases more than the international rate, the economy is now below (not above) the BP curve. Devaluations occur and increase net exports. Thus, not only the fiscal expansion is not neutralized, but it still indirectly causes an expansion of net exports and therefore a further increase in the levels of output. In addition, the increase in net exports causes a shift of the BP curve to the right, because the current account balance improves. This process ends only when the domestic interest rate rises so much that equals the international interest rate. The model is stable because the expansion of the IS increases the domestic interest rate (given the money supply) and shifts the BP curve to the right, reducing the international interest rate. In the end, fiscal policy in the flexible exchange rate regime may be more expansionary than in the fixed exchange rate regime, even more than the fixed exchange rate with perfect mobility, end this result depends only on the assumption that capital mobility is sufficiently "imperfect."

What could we conclude in this section through this complicated sequence of arguments about the IS-LM-BP with "imperfect mobility" and the Mundell-Fleming model? Some authors such as Dunn jr. & Mutti (2005, p.489) conclude that fiscal policy is very effective with fixed exchange rates and high or perfect capital mobility and under flexible exchange rates and **low** capital mobility. Monetary policy in turn never works in the fixed exchange rate regime, but in the floating exchange rate regime it works well with perfect mobility, and less well with both high and low mobility of capital.[5]

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models the usual stability condition (c (1-t) <1) is met. For an analysis of the formal conditions for stability of the IS-LM-BP, see Gandolfo (2002).

[5] Most textbooks omit the case of monetary and fiscal policy under low capital mobility. Some examples of books that explore some of these effects are Dunn jr. & Mutti (2005, p.482-3), Cysne Simonsen (1989,

Let's see what we can conclude taking a more critical view of these models. As noted above, the idea of an upward sloping BP curve is reasonable, although in fact it has nothing to do with "low capital mobility". However, the notion that appears in the IS-LM-BP using **the BP curve slope in relation to the LM curve slope as a measure of the degree of international mobility of capital is basically meaningless**, because the slope of the LM curve reflects only parameters such as the interest and income elasticity of demand for domestic currency. Using these slopes as a measure of relative mobility of foreign capital implies absurd results. In fact , everything else being constant, if there is a country A where by law capital is as free to move abroad as a country B but the parameter of the demand for money for the transaction motive of country A happens to be greater than that of country B for some reason, then we must conclude that country A will have necessarily a "lower degree of international capital mobility" than country B.

But in fact, we should not worry much about the different results of the IS-LM-BP models regarding the appropriate of economic policy mix in each exchange rate regime and "degree of capital mobility", simply because both the position and the slope of the LM are irrelevant, because in practice central banks set directly the basic domestic interest rates thus the "demand for money" has no direct effect on these rates. As the LM curve has been in practice abandoned (or to be more precise, made redundant) even in the New Consensus Macroeconomics, we should think of discarding it also in the open economy analysis and thus forget the IS-LM-BP model with its unnecessary complications.

IV. Critical evaluation to the Mundell-Fleming model

IV.1 Introduction

In the previous section we saw that the policy mix conclusions of the Mundell-Fleming model conclusions are not completely robust when we relax the extreme hypothesis of perfect foreign capital mobility (horizontal BP curve). However, this could turn out not to be such a big problem in practice, to the extent that one could argue that the MF model with its s extreme assumptions and sharp results could still be admittedly a highly simplified but still the most relevant model for a first approximation to the analysis of the problems of many economies in the modern world that are characterized by a very high degree of financial openness. In this section we will try to argue that this is not the case and that the model is not a good characterization of the simplified short-term behavior of a financially open economy, and we will make some simple suggestions on how to treat these issues with a bit of realism.[6]

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p.351) and Froyen (2003). The reason for the lack of concern about the results of BP curve more steeper than the LM curve, as Froyen said is that "Although the result in Figure 7.21 [BP steeper than LM] is possible in theory, most economists believe that the result of Figure 6.21 [BP flatter than LM] is more likely. They find that an expansionary fiscal policy will reduce the exchange rate (increase the value of domestic currency in relation to other countries). This belief stems from the idea that there is a relatively high degree of international capital mobility, which means that BP is relatively flat, and therefore likely to be flatter than the LM curve (...) [emphasis added] " (Froyen, p. 591)..

[6] Godley and Lavoie (2004) introduce the exogenous interest rate in a model that they consider "small", with "only 32 equations" and all the international spillover effects on flows and stocks, which do not

IV.2 The fixed exchange rate regime

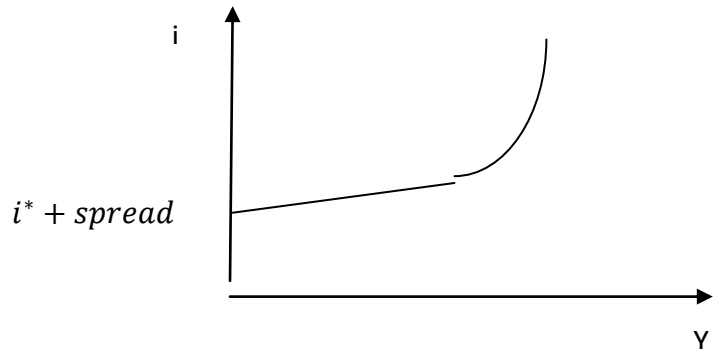
a) Increasing Spreads and Credit Rationing

The first issue to be criticized is the idea of an unlimited supply of foreign capital at a domestic rate of interest slightly higher than the international interest rate. Even if the international rate includes a spread that reflects the risk and / or illiquid liabilities in foreign currency of a country, it seems clear that even with free capital mobility (in the sense that there are no obstacles to entry and exit of capital flows from abroad in the economy) and even in the short term, it is not realistic to think that any current account deficit of any magnitude can always be financed at a constant interest rate.[7]
In addition to increasing risk, which seems inevitable beyond the point at which the expansion of the economy leads to rising current account deficits, it is possible to state that beyond a certain limit begins foreign credit rationing is bound to occur and the country will not be able to obtain more foreign currency, regardless how high is the domestic interest rate. In other words, the BP curve, in addition to being positively sloped, becomes vertical at a certain point. This relationship is shown in Figure 1 below, where i is the domestic nominal interest rate, i* the international interest rate, and Y the output level.

help to separate the effect of this hypothesis from all the others that become necessary to make the model tractable. Recently, Lavoie and Daigle (2011) introduced also the possibility of currency speculation and endogenous expectations in a simulation model and seem to confirm its destabilizing role in a flexible exchange rate regime. Ferrari-Filho (1994) criticizes the Mundell-Fleming model from the post-Keynesian perspective of "fundamental uncertainty", quite different from that adopted here.

[7] An important point emphasized by Smithin (2002-03) and Lavoie (2002-03) is that what is most important is not the assumption of perfect capital mobility, but that of perfect substitutability between assets in the world. Without the latter, there would be an infinite input of capital when a country raises its interest rate above the international (plus the effect of risk and the expectation of devaluation), even if it was fixed for a long period of time. Thus, the hypothesis of imperfect substitutability between assets globally is enough to ensure that there will be no endless flow of capital into the country who fix an interest rate higher than the world. This means that if there is a hierarchy of international currencies according, for example, how deep and liquid are international assets markets denominated in that currency, at least part of the spreads charged by international investors do not merely reflect the default risk assessment in the external accounts of these countries but also the relative degrees of international liquidity of the currency of those countries.

Figure 1 –BP curve with increasing spreads and credit rationing



a) Expectations of Devaluation

Besides the increased risk and the possibility of international credit rationing, in the specific case of the fixed exchange rate regime it is also necessary to take into account that, as the economy expands and incur in increasing current account deficits with potential losses of reserves, it is likely that, despite the fact that the exchange rate regime is fixed, in financial markets inside and outside the country's growing doubts about the sustainability of exchange rate parity chosen by the government may arise. These doubts tend to turn quickly into expectations of a arge exchange rate devaluation. These expectations of a change in the nominal exchange rate will move the whole BP curve upwards and may generate a process of continuous loss of reserves. Such a process tends to be offset by the central bank directly increasing domestic interest rates to a level that compensates the expectations of devaluation (or what is less common these days, imposing capital controls or by the taxation of capital outflow).[8]

So one of the most problematic assumptions of the Mundell-Fleming model is an implicit assumption of full credibility of the fixed exchange rate regime, because only then the expected depreciation would be zero and uncorrelated with the loss of reserves and the size of the current account deficits and external debt of the country.[9]

b) Exogenous interest rate and non-sterilized interventions

[8] Santos (2005) makes similar criticisms to the Mundell-Fleming model but unfortunately related the notion of limits to the attraction of foreign capital to the orthodox argument for the portfolio distribution between different assets by Tsiang (1975), which depends on an implicit and totally unrealistic assumption a of world exogenous money supply. On the other hand Santos(2005) assumes that the BP curve becomes vertical at a critical level of the external interest rate equal to the rate of growth of exports because beyond that foreign debts become unsustainable. But in reality the curve may become vertical before that because of the problem of external liquidity, i.e., if the level of short term external debt (not total external debt) becomes very high relative to foreign exchange reserves (on that see Medeiros & Serrano(2006).

[9] For an analysis about the collapse of the Brazilian managed exchange rate regime in 1999 as a process of accumulation of current account deficits, growing risk and endogenous expectations of devaluation see Medeiros & Serrano (2006).

Another crucial and totally unrealistic point in the Mundell-Fleming fixed exchange rate regime model was noted by Lavoie (2002, 2005) and concerns the transmission channel from foreign exchange reserves to domestic interest rate. In the Mundell-Fleming model a balance of payments surplus increases the monetary base, and this in turn increases the money supply, shifts the LM curve, reducing the economy's domestic interest rate. In this case we say that foreign exchange interventions are non-sterilized.

The problem is that if we assume, with a minimum of realism, that in practice the central bank operates by setting the basic nominal interest rate, this mechanism no longer makes sense. In this context, in many cases, the entry of foreign capital that caused the increase in reserves will go straight to the purchase of government bonds in the country (or be invested in local private banks and funds that buy and hold these bonds) which has set the domestic interest rate at an attractive level , above the international rate. In this case the "sterilization" of the increase in reserves will be voluntary, full and automatic as the whole of the increase in foreign reserves is offset directly by an equal increase in domestic public debt and there is no increase in the monetary base (and of course also no increase in the money supply M1), and the domestic interest rate remains unchanged.

In other cases, the increase in reserves may have been the result of an increase in exports or other financial flows or remittances to the country. In these cases, in fact the monetary base increases when the first foreign currency are exchanged for domestic currency at the fixed exchange rate. However, there is no reason to suppose that it affects the domestic interest rate previously set the central bank. In the first moment, the private bank reserves actually increase, but there is no reason to suppose that the banks are forced to lend these additional resources if nothing occurred to increase the number of customers considered creditworthy by banks at the current level domestic interest rates (plus banking spread). As in a modern capitalist economy banks are not forced to lend, the only direct impact of the initial monetary base increase is a drop of the money “multiplier" (monetary base - money supply ratio). On the other hand, the basic domestic interest rate, fixed by central bank also has no reason to be altered and will remain constant. In fact, sooner or later what is most likely to occur is that banks do not want to retain these extra idle and unpaid reserves, and in the end will invest these excess bank reserves in government securities. As the central bank, when setting the basic interest rate, has of course agreed to sell bonds at the exact amount that is demanded, this leads to an increase in public debt and sterilization of the total increase in foreign exchange reserves, because the increase in public debt reduces again the monetary base to its previous level.

It could be also be the case that those who sold foreign currency and bought domestic currency in fact wish to keep in domestic cash a part or all of the initial increase in foreign reserves increase. In this case, which would include, for example, foreign tourists in need of local bills and coins for small expenses or a foreign owner of a supermarket chain that has sent money from abroad to its subsidiary in Brazil and needs cash and coins to give small change in their stores. In this case the increased the newly issued domestic money will not be deposited in banks and will not be applied in government bonds. There will be no sterilization and the monetary base will increase. However, even here there is no reason for a change in this economy's domestic interest rate, because the increased local currency held by the “public” was

entirely desired by the public and there were no unwanted excess local currency that could affect the interest rate (the “money multiplier” falls). Note that if the tourists later, the manager of the supermarket or any member of the public who receive the notes and coins corresponding to the base increase resolve to get rid of these, they will directly, or through funds, to invest these funds in government bonds, which will be issued to maintain the basic interest rate and so finally these resources will also be "sterilized." Note that nothing needs to be done by the central bank specifically for the purpose of sterilization. If we just assume that the central bank wants to maintain the fixed exchange rate and the benchmark interest rate unchanged , the sterilization will necessarily occur in the exact amount that is required to achieve these two objectives simultaneously.

As Lavoie said “*Neutralization arose either automatically, at the initiative of the private sector, or naturally, as a result of the normal behaviour of the central bank to sustain the payment system*” (Lavoie, 2005 p.29).

So he correctly concludes that “*fixed exchange rates did not prevent central Banks from setting interest rates, while money creation was still demand-led*” (2005, p. 29), that is, no matter what may happen to the monetary base, the amount of money created in a system of fixed exchange rate is determined not by the balance of payments but for the demand for bank loans of creditworthy clients given the current basic interest and bank spreads, just as in closed economy. The sterilized intervention is almost always the rule and not the exception to the rules of the game.

c) Capital inflows, changes in reserves e and credit expansion in fixed Exchange rate regimes

Note that in a fixed exchange rate regime, unlike the automatic adjustment assumed in Mundell Fleming model, neither the interest rate or the amount of domestic credit is directly affected by a surplus or deficit in the balance of payments. So capital inflows do not by themselves directly generate credit booms even in a currency board regime where the printing money has supposedly to be fully backed for foreign currency. What actually happens in countries that adopted this extreme system is that domestic banks do lend the amount of local currency to customers whom the banks consider solvent, given the basic interest rate and banking spreads. In this case, an increase in bank loans within the country tends to create the usual need to increase bank reserves, a need that is fulfilled to the system as a whole, either through increased central bank lending to the private banking sector, or by the sale of government securities from banks to the central bank. In both cases the monetary base expands endogenously as a consequence of endogenous expansion of credit and the “money supply”.

Of course this increase in the monetary base decreases the degree of coverage of the exchange system, i.e., the monetary base becomes greater than the level of foreign reserves. This forces the government of the country to try to attract more foreign funds to increase foreign reserves and restore the reserve coverage of the currency board. The end result of all this will be a strong increase in external public debt (in foreign currency) with the international private sector (and / or the metropolitan government in the case of colonies that have used this scheme) which becomes necessary even if the domestic banking system lend to activities that use very few

imports and thus require little or no foreign currency such as construction, for example. Currency board schemes, especially those that depend on private external credit tend to be short lived due to a combined effect of strong appreciation of the real exchange rate due to domestic inflation remaining above international levels and due to the effects described in items a) and b) above. But the point is that even in this kind of regime the domestic interest rate is exogenous and the money supply endogenous, because local banks are not forced to lend to those who they do not want to and the central bank does not lose the power to determine the basic interest rate in domestic currency.[10]

This does not mean that we do not often observe an empirical relationship between capital inflows, reserve accumulation and the expansion of credit and effective demand of the local economy. But the correct chain of causality comes from more favorable external interest rates and credit terms in relation to domestic credit and interest rate conditions, inducing local banks or businesses and workers to take more credit to finance their decisions to increase spending on productive investment, residential investment and durable consumption and / or buying existing assets. The accumulation of reserves is only the inevitable consequence of the exchange rate has been kept fixed[11] in this process if the foreign capital net inflows is higher than the expansion of imports induced by this increase in credit and spending. And a possible change in monetary base is a mere consequence of, as we saw above, the public and the banks needs of holding more money in liquid form and by no means impacts the domestic interest rate or the actual expansion of domestic credit.

d) **Asymmetries**

Since the basic endogenous mechanism of Mundell-Fleming model with fixed exchange rate - the foreign reserves – domestic base nominal interest rate connection - does not work, it is clear that in the fixed exchange rate regime there is no good reason to think that fiscal policy would be more or less effective as compared to what would occur in a closed economy in terms of expanding or contracting aggregate demand and output.

What is relevant in the fixed exchange rate regime with free capital mobility are two strong asymmetries. The first is between conditions where the economy is above or below the BP curve , i.e., accumulating or losing reserves. In practice there is no limit to how much a country can accumulate international reserves. In fact, the only cost of this process is the expansion of public debt that comes from the partial or complete sterilization of the foreign reserves that is required to maintain the basic interest rate set by the Central Bank. This cost, which is the difference between the domestic interest rate and foreign interest rate paid in the country's reserves can lead to extensive government transfers of income to holders of public debt. However, it is unlikely that such transfers, even when large, should have a significant impact on aggregate demand , because it is highly unlikely that the banks and rich agents who

[10] Even the excellent work and Manoelito and Calcagno (2003) on the period of convertibility in Argentina incurs in this misinterpretation. For a brief analysis of the operation of schemes currency board approach the light of the exogenous interest rate see Serrano (2003).

[11] In fact it is sufficient that the exchange is not fully flexible ("dirty floating") to generate some increase in reserves under these conditions.

hold these resources would greatly increase their spending as a result of this increase in domestic public debt and its service.

On the other hand, the popular belief that an increase in domestic debt affects the risk spread to the country's external loans in foreign currency and, thus, the BP curve, also seems incorrect. As a matter of logic, governments that issue their own currency cannot be forced by the market or anyone else to default on its domestic debt denominated and paid in its own currency, so it is impossible that the government faces a lack of money to pay its internal public debt.[12] Moreover, the idea that, collectively, the international investors who are creditors of the country in international currency (usually U.S. dollars) would be concerned with any kind of indicators of the local economy that do not affect either the country´s nor the government´s cash flow and ability to pay its commitments in foreign currencies also simply makes no sense.

The correlation sometimes observed between basic interest rates and public debt, therefore, has the causality coming from the interest rate fixed by the Central Bank to domestic public debt, and not the opposite. And as the central bank tends to fix its domestic interest rate above the foreign rate (the rate plus the external spread outside the country), the sequence of causality that makes sense begins in the country's sovereign spread, which depend on international market conditions and the overall credit and market assessment of the liquidity and sustainability of the external accounts of the particular country. These external changes in the spread tend to affect the domestic interest rate required to maintain the fixed exchange rate, and subsequently this increase in interest rates impacts the domestic country's debt.

The above discussion shows that there is no element that forces the central bank to stop accumulating reserves at a fixed exchange rate regime, contrary to the Mundell-Fleming model. On the other hand, no matter how large is the initial stock of reserves and the initial access to credit in foreign currency of a country, usually the reserves are finite and can, in a context of free international capital mobility, fall very rapidly, a process which tends to be magnified with the emergence of expectations of an eventual devaluation of the exchange rate, which leads to further outflows of speculative capital. These movements can rapidly make the fixed exchange rate regime impossible to maintain. Thus, although in principle the domestic interest rate may be fixed by the monetary authorities both above and below the levels specified by the BP curve, there is a strong asymmetry between positions above and below this curve. Domestic interest rates fixed below the curve can lead to unsustainable situations, and to an upward shift in the BP curve for two complementary reasons. The first would be to increase the external spread for a given level of activity and current account deficit, due to the strong loss of reserves. And second, the emergence and subsequent

[12] About this Tcherneva (2011) transcribes a long quote from Orthodox Michael Woodford: "A subtler question is whether it makes sense to suppose that actual market institutions do not actually impose a constraint … upon governments (whether logically necessary or not), given that we believe that they impose such borrowing limits upon households and firms. *The best answer to this question, I believe, is to note that a government that issues debt denominated in its own currency is in a different situation than from that of private borrowers, in that its debt is a promise only to deliver more of its own liabilities*. (A Treasury bond is simply a promise to pay dollars at various future dates, but these dollars are simply additional government liabilities, that happen to be non-interest-earning.) *There is thus no possible doubt about the government's technical ability to deliver what it has promised*…" (Woodford 2000, p. 32)

increase in the expected devaluation of exchange rate by the market. Asymmetrically, domestic interest rates above the curve indicated by initial BP, despite their fiscal costs can be kept for long periods of time without creating situations that require its rapid reversal.

The other important asymmetry in fixed exchange rate regimes with free capital mobility would be between contractionary and expansionary policies. In situations where the economy is still in the region above the curve BP any expansion, be it a fiscal or monetary (i.e., the shift to a lower interest rate but still above the international rate) leads to an increase in imports and the loss of reserves that ,from some point on, will increase both the current account deficit and the ratio of short-term external debt over reserves and thus begin to worsen both indicators of external debt sustainability and of the economy's external liquidity. On the other hand, asymmetrically contractionary monetary and fiscal policies (even assuming that the economy is initially at a point above the curve BP) have the opposite effect of reducing the current account deficit and increasing the stock of reserves.

These are the problems and asymmetries that affect the fixed exchange rate regimes in the exogenous interest rate approach. The supposed greater effectiveness of fiscal policy in relation to monetary policy in the Mundell-Fleming model does not occur, even less the supposed impossibility of implementing a monetary policy, which comes from a presumed "trilemma" between free capital mobility, fixed exchange rate and monetary policy autonomy that appears in literature inspired by this model. At least for contracting effective demand, a monetary policy of raising domestic interest works without any problems in a fixed exchange rate regime and free capital mobility (even in a currency board system).

IV.3 Floating Exchange Rates

Many of the criticisms we made to the Mundell Fleming model with fixed exchange rates will also apply to the floating exchange rate version, particularly with regard to the possibility of increasing risk spreads and credit rationing beyond a certain point. However, some of the problems of the model appear in modified form in the context of a floating exchange rate regime.

a) Exchange rate and general price level

Even assuming that initially nominal wages and general price level is constant, a devaluation of the exchange rate will increase the general price level by increasing domestic prices of all tradable goods that are priced in foreign currency outside the country in certain market internationally. On the other hand, an appreciation of the exchange will have the opposite effect of generating a reduction in the general price level by decreasing the level of prices of tradable goods in local currency. Weeks (2009) draws attention to the fact that the Mundell-Fleming model in the case of flexible exchange rate incoherently ignores these effects on the general price level in the economy. Suppose that there is no wage resistance, i.e., subsequent increases in nominal wages in an attempt to restore the purchasing power of wages and also there is no other kind of reaction from other groups of agents or any type of formal or informal inflation indexed contracts in the economy, so that a process of permanent

inflation (or deflation) does not happen. Yet, the inevitable initial increase in the general level of prices after a nominal devaluation (or reduction after the nominal exchange rate appreciation) will have impacts on the model results. As Weeks (2009) shown, taking into account this effect, the expansive monetary policy would lose its power, and fiscal policy becomes more effective. In the case of monetary policy, an expansion of money supply leads to a nominal devaluation that, by causing an increase in general price level, reduces in part the actual increase in the real money supply which is what determines the domestic interest rate of the economy. Thus, the higher the proportion of tradable goods, the lower the expansionary impact of a nominal increase in the money supply. On the other hand, an expansionary fiscal policy with constant nominal money supply leads initially to increased output and a higher nominal interest rate, which causes an exchange rate appreciation which reduces net exports. The nominal exchange rate appreciation, however, will reduce the general level of prices and thus cause an increase in real money supply and an increase in investment. Thus, following Weeks (2009), monetary policy loses its effectiveness and fiscal policy will gain some effectiveness, the greater the proportion of tradable goods in output and the higher is their impact on the general price level. And we may add that if a devaluation triggers a process of permanent inflation, monetary policy lose completely their effectiveness and the fiscal policy gain overall effectiveness in the longer run, if we still maintain the questionable hypothesis of an exogenous money.

b) Exogenous Interest Rate

As we saw in Section II above, the endogenous mechanism of automatic adjustment of the Mundell-Fleming flexible exchange rate regime is based on the idea that a domestic interest rate below the international (plus sovereign spread) rate will lead to a tendency of capital outflows that will cause a real devaluation, large enough so that this outflow is offset by an increase in net exports. The domestic interest rate then will again rise to the international level because the devaluation, as it expands net exports, also expands aggregate demand and output, and with it the demand for money, which increases domestic interest rates, if the money supply is exogenous. Faced with an initial situation in which domestic interest rates are below the international rate, capital outflows, currency devaluation and the increase in net exports will continue to occur until the output is increased just enough to increase the domestic interest rate back to international level. The same kind of automatic process to occur symmetrically if, for some reason, the domestic interest rate is above the international rate. In this case there would be capital inflows, exchange rate appreciation that continues until the net exports and the output fall enough so that the demand for money is reduced to the point that the interest rate fell back to the international level. That is this very peculiar mechanism of automatic adjustment of domestic interest rate to the international rate which upholds the idea that monetary policy would have expansionary effects in flexible exchange rate regime, as increases in money supply increase permanently net exports and output. This is also the mechanism behind the idea that fiscal policy is impotent, as a fiscal expansion, given the exogenous supply of money, would cause exchange rate appreciation and reduction of net exports until output, the demand for money and interest rate return to its initial level.

If we assume more realistically the domestic basic rate of interest is exogenous and the money supply is endogenous it is evident that this automatic mechanism stops working. With the exogenous interest rate below the international rate, continuous devaluations occur and even if the economy expands, the interest rate will not increase because the amount of money expands in line with the increasing activity levels (and even prices) of the economy. Thus, a fiscal expansion, with the domestic interest initially equal to the international level will not be offset by a fall in net exports, since there is no reason to suppose a tendency towards currency appreciation. On the other hand, a monetary expansion (fixed interest rate below the international level) would lead to endless and continuous devaluations, because the exogenous domestic interest rates will not return to the level of the international rate. The same process would occur, also without limit, in the case of a restrictive monetary policy. There would be a process of continuous exchange rate appreciation, a cumulative process that could not be stopped endogenously but only by an autonomous decision of the Central Bank to change the domestic interest rate again. This shows that none of the basic results of the Mundell Fleming model with flexible exchange rate survives in a more realistic context of exogenous interest rates.

c)Are Exchange rate devaluations always expansionist?

Another limitation of the Mundell-Fleming model with flexible exchange rates is that it assumes that exchange rate devaluations are always expansionary and currency appreciation are always contractionary. A real devaluation usually reduces real wages, given nominal wages, because increases in tradable goods prices (and / or inputs), transfer real income from the workers to the business and the “rest of the world” sectors. If we consider that the workers’ propensity to consume is higher than that of capitalists, this redistribution reduces aggregate consumption. Accordingly, a a real exchange rate appreciation will generally have the opposite effect of increasing the aggregate consumption.

In addition, in certain situations, private companies and/or banks of a country can have a lot of debt in foreign currency. In this case a large real depreciation of local currency can lead to a financial crisis for companies that will have to cut spending and/or banks that may be forced to contract credit. Again the effect of a devaluation on real consumption and investment can be quite negative, while an appreciation would have the opposite effect of reducing the weight of private external debt in local currency. Obviously this last financial effect will occur in reverse if the economy in question has a private sector that is a net creditor in foreign currency. In this case, it is the real appreciation that creates financial difficulties by reducing the value of foreign assets of banks and local businesses.

The Mundell-Fleming model ignores all these possible effects, but nothing guarantees that the positive effect of a real depreciation on net exports will predominate. There is also the possibility that a devaluation is partly eroded by a possible increase in inflation from further increases in nominal wages in response to actual initial losses, the "real wage resistance". The stronger this effect will lower the real exchange rate depreciation associated with a nominal devaluation, and thus lower will be the expansion of net exports. On the other hand, the s contractionary effect on

consumption of workers and the adverse financial effects, in the case that companies and banks are net borrowers in foreign currencies would also be lower. All these possibilities show that, contrary to the postulates the Mundell-Fleming model, not all real devaluations expand the output[13], even if and when net exports expand. [14]

d) Endogenous expectations of change in Exchange rates

Last, but not least, we must criticize the flexible exchange rate regime Mundell Fleming model in what the striking lack of realism of the assumption of expected level of the exchange rate in subsequent periods is exogenous[15] and identical to the initial exchange rate in the more relevant short run version of the model. As noted above, this hypothesis in the case of fixed exchange rate regime is totally unrealistic and assumes a priori and implicitly that the fixed exchange rate regime has full credibility even though there may be huge losses of reserves and / or the current account deficits may be growing without limit. In the case of a flexible exchange rate regime the static expectations hypothesis is even less plausible because in the model the current exchange rate is now an endogenous variable that will necessarily change vary over time.

Such hypothesis could only make sense if the adjustment of net exports and current account was faster than the adjustment of the capital account. In this case, even with a big shock, only a once for all depreciation or appreciation would be necessary to restore the balance of payments equilibrium of the economy. Only in this case, there would be no time, nor need to revise the expectations of change in the exchange rate after a shock that altered the current exchange rate that equilibrates the BP, because the imbalance would already have been eliminated.

Perhaps (with a lot of good will) this hypothesis about the relative speed of adjustment of the capital account and current account could even make some sense for developed countries at the time that the Mundell-Fleming model was formulated, in the days when people discussed if it would be better to replace the Bretton Woods system with fixed or flexible exchange rate (i.e., in the 1960s). At that time there were strong short-run capital controls in many countries and it was still plausible to

[13] Although Kalecki already referred to these problems in the 1930s the literature on the possibility of contractionary exchange rate devaluations has grown since Krugman and Taylor (1976). See the recent survey by J. Frenkel (2011). Many empirical studies on the subject find a contractionary effect of devaluation in the short run, followed by an expansionary effect later. Most likely what happens is that the direct effect of devaluation on the effective demand and output are most often contractionary but on the other hand, by often loosening the external constraints on growth, make possible, though not determine, the pursuit of more expansionary macroeconomic policies later.

[14] Note that we are not talking here about the known issue that the actual net exports will only increase with a real devaluation if the so-called Marshall-Lerner conditions are met, i.e., the sum of absolute values of the real exchange rate elasticity of imports and exports is greater than one, which also may not always occur in practice.

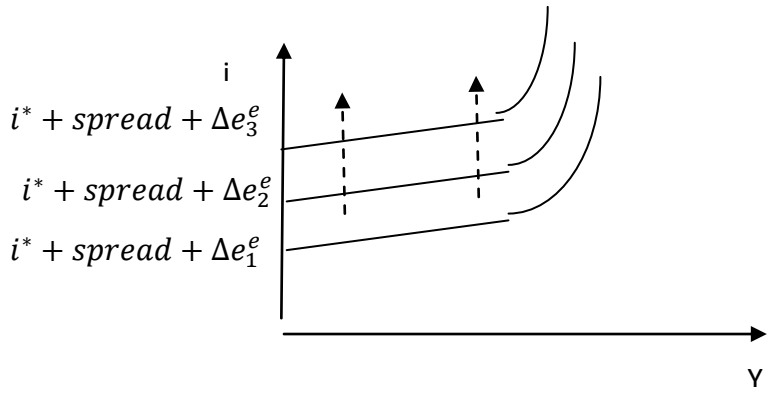
[15] In the long-run versions of the IS-LM-BP, this case it is even more unrealistic since the expected change in exchange rate evolve according to the expected differential between domestic inflation and international inflation, in order to ensure the validity of purchasing power parity in the long run. We are not concerned here of the critique of this extreme view , as we focus here on the most relevant model, which is the Keynesian or "short run" version,where the only relevant hypothesis is that the expected future exchange rate is exogenous. For the critical conditions of long-run parity of purchasing power parity and real interest rates, see Lavoie (2000).

imagine a world where capital account movements were dominated by long-run capital in terms of both loans (official and to a lesser extent private) and foreign direct investment . However, in current times of high mobility of short-run capital flows this idea makes no sense at all.

But if , in reality, capital flows are fast and changes in net exports subsequent to an change in the exchange rate are slow, then it is clear that any imbalance in the model will not be corrected by a single exchange rate appreciation or depreciation but, at best, by a sequence of appreciations or depreciations over time.

But this makes it impossible to sustain the idea that the expected exchange rate in a future period is not affected at all by the exchange rate that actually occurred in the recent period. But if we suppose, with a little realism, that expectations are minimally elastic with respect to the exchange rate actually observed, the short-run Mundell Fleming model can become quite unstable. Recalling that the equilibrium position of the balance of payments curve (either perfect or imperfect mobility, large or small) depends on the equivalence between the domestic interest rate and international (including the spread of external risk) plus the expected change in exchange rate, each time, for example, that domestic interest rates fall below the international and the current exchange rate begins to depreciate, the spot exchange rate expected for a subsequent period will also change in the same direction, increasing the rate of change of expected exchange rate and therefore shifting the BP curve upwards, which increases the initial divergence between the domestic interest rate and international rate and causes an acceleration in devaluation that will turn the switch back expectations of change exchange, and so on. The same effects occur symmetrically in the case of domestic interest rates above the rate outside: there will be a tendency to a continuous appreciation of the exchange rate and the BP curve will shift down continuously as expectations of currency appreciation increase[16]. This problem can be seen in Figure 2 below:

Figure 2 – Exchange rate devaluation and an expectation cumulative process of devaluation



[16]Note that our argument here depends only on the assumption that the "elasticity of exchange rate expectations" in the sense of Hicks (i.e., the expected change in the exchange rate from a change in the actual exchange rate) is positive, even if it is lower than one.

e) There is no such thing as a free floating regime

If we combine the more realistic assumptions of exogenous interest rate and elastic expectations of exchange rate the result is that a floating exchange rate regime becomes violently unstable subject to a cumulative process of exchange rate appreciation or devaluations.

From this we can draw two conclusions. First, the Mundell-Fleming flexible exchange rate with its implausible idea that any deficit in capital account will be automatically and quickly eliminated by the instant effect of changes of exchange rates on net exports and the current account is not an useful tool of economic policy analysis even as a first approximation in a high level of abstraction.

And secondly, from this critique of the Mundell-Fleming model we can better understand why in the real world with high international capital mobility there is simply no free floating exchange rate regime in the short-run without intervention by the central bank, whether acting directly in foreign exchange market to try to stabilize the current and expected exchange rate, or a little more discretely varying the domestic interest rate in order to control minimally the direction and speed of evolution of the nominal exchange rate at each time according to its main policy objectives.

Note that this is not just the well-known and important case of "fear of floating" whereby central banks of net foreign debtor countries (public and / or private) and with high inflation try to moderate the trends of currency devaluation and central banks of net foreign creditor nations try to moderate trends of exchange rate appreciation so as not to lose market share in world trade and avoid major losses in the local value of assets of the domestic financial sector. It is something much more general serious, in that, with free capital mobility, markets could go either toward cumulative appreciations or depreciations. This would be the "fear that the fluctuations of exchange rate will never stop" by themselves if the central bank does not do something to stabilize exchange rate expectations.

V. Final remarks

This critical view of the Mundell-Fleming model allows us to draw three main conclusions. The first is that from the analytical point of view, the hypothesis of interest rate as determined by an exogenous supply of money is unrealistic in the closed economy and as inadequate or perhaps even more in an open economy, implying that non-sterilized interventions in practice are the exception rather than the "rule of the game."

The second is that the central problem with regard to economic policy is not the exchange rate regime as such, nor the choice between monetary or fiscal policy as the most effective tool. The central problem is the issue of free short run capital mobility. It is this free mobility that makes it difficult to maintain a parity in the fixed exchange rate regime, because once we have widespread expectations of devaluation it is difficult to avoid an endogenous worsening in the BP curve, and the consequent need

to increase domestic interest rates and/or cut government spending to lower imports. It is free capital mobility which also makes a truly “clean” floating regime impossible, because the endogeneity of exchange rate expectations can lead to a continued process of appreciation or depreciation of the nominal exchange rate, forcing the government to intervene either directly buying or selling foreign currency directly or indirectly through the manipulation of interest rates. So is the free mobility of capital that takes away degrees of freedom of expansionist policies, whether fiscal or monetary. On the other hand, because the asymmetry of the balance of payments constraint, unfortunately there is no automatic mechanism to prevent or correct an interest rate that is too high in comparison with international rates or excessively contractionary fiscal policies.

Finally, the above analysis confirms the idea that even in the open economy with free short run capital mobility, the short-term basic interest rate is exogenous in the sense of being operationally an economic policy variable, directly controlled by the central bank. This, due to the problems and asymmetries discussed above, does mean that in principle the central bank may fix the interest rate at any desired level. In practice, this power is limited by the different consequences on the balance of payments situation and the evolution of the exchange rate of a particular level of interest rate chosen by the monetary authorities. The fact that the central bank sets the interest rate, but on the other hand the interest rate fixed under free capital mobility are not always sustainable for a long period makes it clear that we are not saying that the central bank has absolute power but that, realistically, there is simply no automatic endogenous mechanism of adjustment in the interest- exchange rates and balance of payments system, which makes it inevitable that the exchange rate regime is always partially administered with both buying and selling of currencies by central bank or via manipulation of the domestic interest rate, and makes useful some measures of capital controls (particularly short-run foreign capital inflows taxation), so that they expand the degrees of freedom for macroeconomic policy, both monetary and fiscal.

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