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Jorge León ‡

Abstract

This document illustrates the inflows of capital to a small and open economy such as Costa Rica using the Metzler Diagram. The simplicity of the Metzler Diagram provides clarity to understand the motivation for the inflows of capital, as well as a framework to analyze the policy options available to the policy-makers.

Key Words: Capital Inflows, Interest Rate, Exchange Rate, Inflation

JEL Classification: E65, F32, F41

Resumen

El presente documento utiliza el Diagrama de Metzler para ilustrar la entrada de capitales extranjeros en una economía pequeña y abierta como es el caso de Costa Rica. La simplicidad del Diagrama de Metzler provee de la claridad necesaria para comprender la motivación de estos ingresos de capitales, asimismo es una herramienta que permite el análisis de las opciones de política disponibles para las autoridades.

Palabras clave: Flujos de Capitales, Tasa de Interés, Tipo de Cambio, Inflación.

Clasificación JEL: E65, F32, F41

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Capital Inflows in a Small Open Economy: Costa Rica

1 Introduction

This document illustrates the inflows of capital to a small and open economy such as Costa Rica using the Metzler Diagram. The simplicity of the Metzler Diagram provide clarity to understand the motivations for the inflows of capital, as well as a framework to analyze the policy options available to the policy-makers.

During the second half of 2012 the economy has absorbed a significant amount of external capital flows.

While Costa Rica liberalized its capital account since the early nineties, this liberalization has allow for a capital account surplus. These capital inflows have helped finance the current account deficits which are characteristic of Costa Rica. But this inflows have been mainly coming from Foreign Direct Investment.

As part of the economic development strategy put forward by the various governments, there has been an encouragement of capital inflows, specially in foreign direct investment (FDI), which has not only enabled an increase in exports, but also an increase in our production frontier based on the introduction of new production technologies.

The country has been very successful in attracting capital for FDI, but capital inflows for portfolio investment have been relatively small until last year.

The sudden increase in portfolio capital inflows is due to the existence of a large interest rate differential.

The purpose of this paper is to create a theoretical and analytical base to discuss policy options to

control de level of capital inflows.

Capital inflows are good for emerging economies such as Costa Rica, nevertheless short term capital inflows could generate risks to the macroeconomic stability, and it could lead to excessive risk taking by the financial sector.

The paper is organized as follows. First, Section 2 presents a Keynesian model with capital flows following Metzler (1960). In Section 3 the resulting Metzler Diagrams are presented. Sections 4 and 5 present the risks and policy recommendations for a small open economy subject to an important level capital inflows. In section 6 a possible extension of the model to include the effect of financial dollarization. Section 7 concludes.

2 Model

The seminal paper by Metzler (1960) was the first to introduce capital flows into a Keynesian trade model. International trade in this model takes place between two countries under a system of fixed exchange rates and full-employment.

An adaptation of the classical diagram invented by Metzler(1960), is updated to include intertemporal maximizing agents, and a small economy that takes the foreign interest rate as given.

The model is a two periods model. The world as a whole is a closed economy, so in equilibrium total savings and investment are equal. And the current account is defined as:

$$CA = A - I \quad (1)$$

Where A is equal to savings and I is equal to investment.

Home and Foreign production functions are:

$$Y = AF(K), Y^* = A^*F^*(K^*) \quad (2)$$

Home's investment curve (labeled I) is the implicit function of equation 3.

$$i = AF'(K + I) \quad (3)$$

Where equation 3 states that the level of investment is determined by equalizing the marginal return of capital i to its marginal productivity given by the derivative of the production function $AF'(K + I)$.

Given that the production function is increasing but strictly concave, the investment curves slope downwards.

Using Home's intertemporal budget constraint and the Euler equation, and assuming for the sake of simplicity that the utility function is isoelastic. The Home's savings curve¹ (labeled S) is obtained using the Euler equation:

$$\frac{dC_1}{di} = \frac{(Y_1 - C_1 - I_1) - \sigma C_2/(1 + i)}{1 + i + (C_2/C_1)} \quad (4)$$

Where σ is the intertemporal elasticity of substitution of the agent's utility function. Equation (4) is upward sloping with respect to i .

The Home's saving curve slope is equal to $\frac{dS_1}{di} = -\frac{dC_1}{di}$

Note that the savings curve can be modified to include the Government. Where G and T are the government expenditures and taxes respectively.

$$\frac{dC_1}{di} = \frac{(Y_1 - C_1 - I_1 - (G_1 - T_1)) - \sigma C_2/(1 + i)}{1 + i + (C_2/C_1)} \quad (5)$$

The addition of the government in the model does not change its characteristics but it give us the possibility to analyze the impact of fiscal policies.

3 Metzler Diagram

In this section the graphic representation of the model derived above is presented. This representation is known in the economic literature as the Metzler Diagram. Given its clarity the Metzler Diagram is one of the first things taught at international macroeconomics courses.

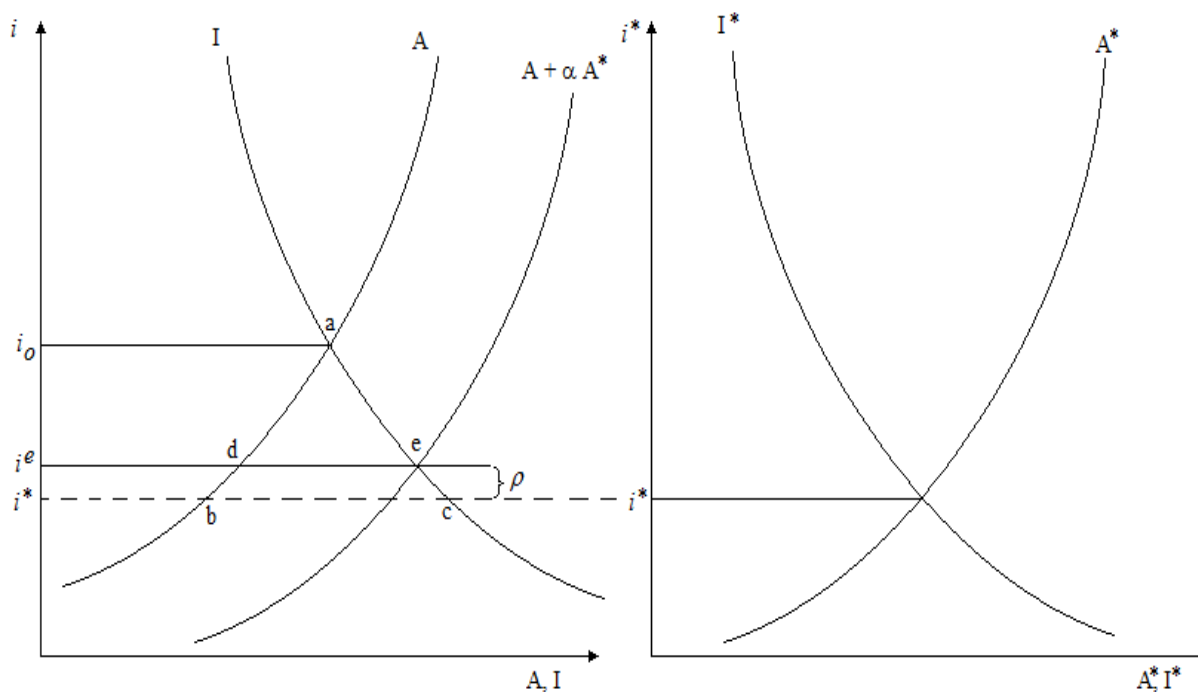
Figure (1) is the Metzler Diagram, where the interest rate differentials given the risk premium ρ between Home and Foreign country creates an inflow of capital equal to \overline{de} .

¹Savings are equal to income minus consumption therefore: $S_1 = Y_1 - C_1$

Note that α represents the desired proportion of the portfolio that Foreign is willing to allocate in Home's financial assets.

Under this scenario the capital inflow is going to create a current account deficit of the same magnitude. The current account deficit is generated by an increase in imports given the increase in consumption by the agents in Home country and by the increase in investment.

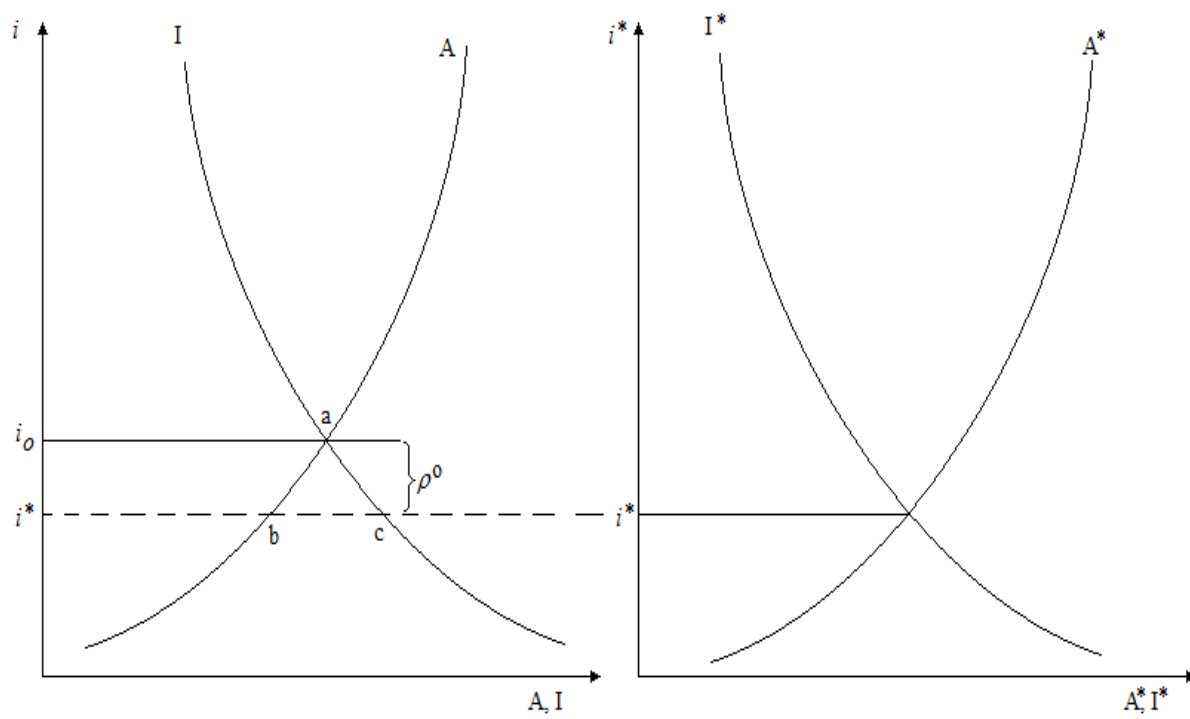
Figure 1: Metzler Diagram: Capital Inflows



Even if the representation of the state of the economy depicted in Figure (1) provides some clarity of the forces and incentives behind the inflows of capitals, and also provides intuition to some possible policy responses available to the policy-maker, the analysis still is incomplete. Therefore let's concentrate first in understand who the interest rate differential was created in the first place.

Figure (2) is the starting point. Lets assume that before the Financial Crisis unfold, the economies where in equilibrium. Where Home's interest rate was i_0 , that is basically the international interest rate i^* plus the risk premium $\rho > 0$.

Figure 2: Metzler Diagram: Equilibrium Previous to the Financial Crisis

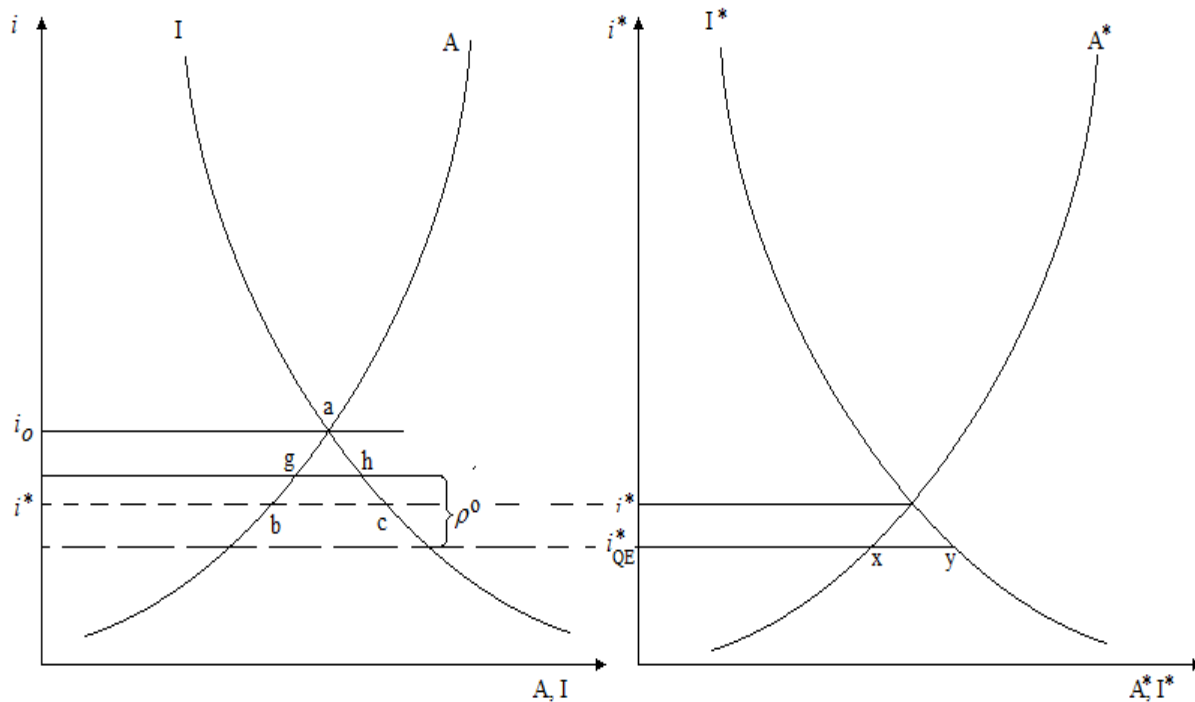


As a response to the Financial Crisis the Federal Reserve has taken some unorthodox monetary policies such as the Quantitative Easing. This policies where intended to reduce in interest rate to boost the economy out of the recession.

It is possible to use the Metzler Diagram to show the implication for a small economy of such policies. As shown in Figure (3), the Quantitative Easing would be equal to \overline{xy} reducing the international interest rate from i^* to i_{QE}^* .

The decrease in the international interest rate, keeping constant the risk premium of Home, generates a capital inflow to Home equal to \overline{gh} . The effect of the Quantitative Easing and a lax monetary policy by the Federal Reserve will by itself provide an incentive for capital inflows into Home country.

Figure 3: Metzler Diagram: Effect of the Quantitative Easing by the Federal Reserve

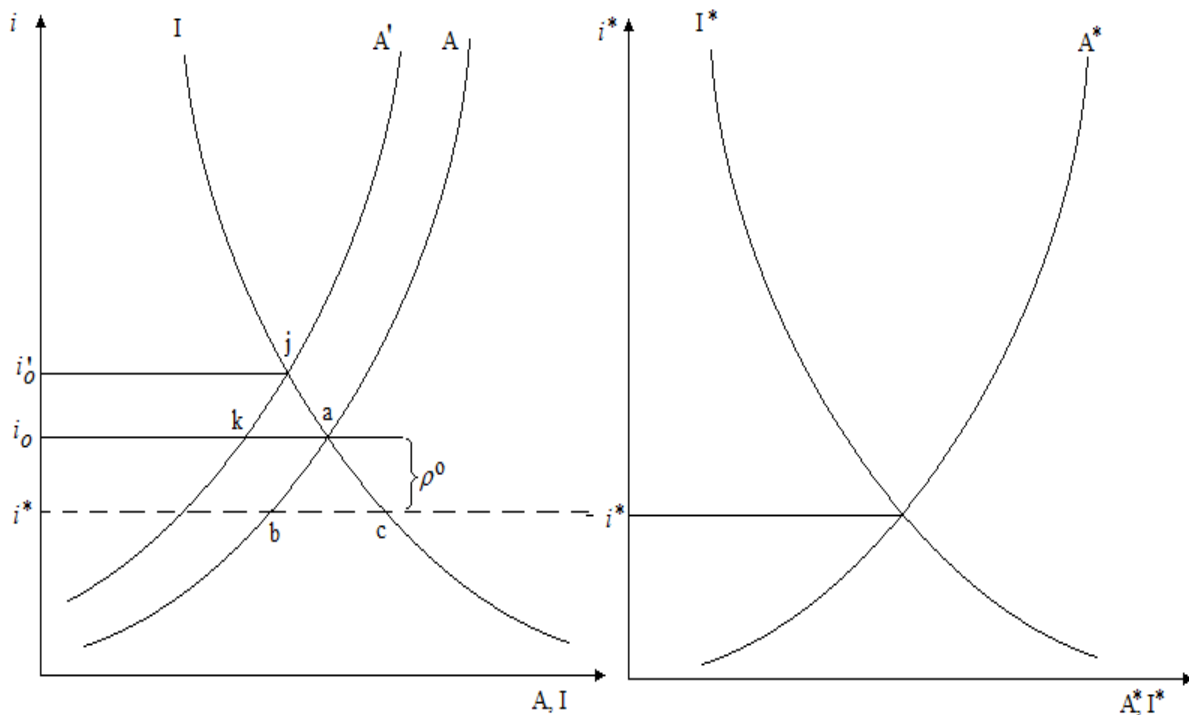


But the reaction of the Home country to the Financial Crisis will also play a part in increasing the interest rate differential. This scenario is presented in the Metzler Diagram of Figure (4).

As a policy response to the contraction in the foreign GDP growth, and the inevitable reduction in demand for export from Home country, the government of Home country implements a countercyclical fiscal policy. The increase of government expenditure and the reduction of tax revenues creates a fiscal deficit as a by product of the countercyclical fiscal policy.

The fiscal deficit in the model works as a decrease of total savings in the economy, pushing the curve A leftwards. This reduction of total savings in the economy will push the local interest rate from i_0 to i'_0 . The increase in interest rate differentials in this case will create an inflow of capital equal to \overline{ka}

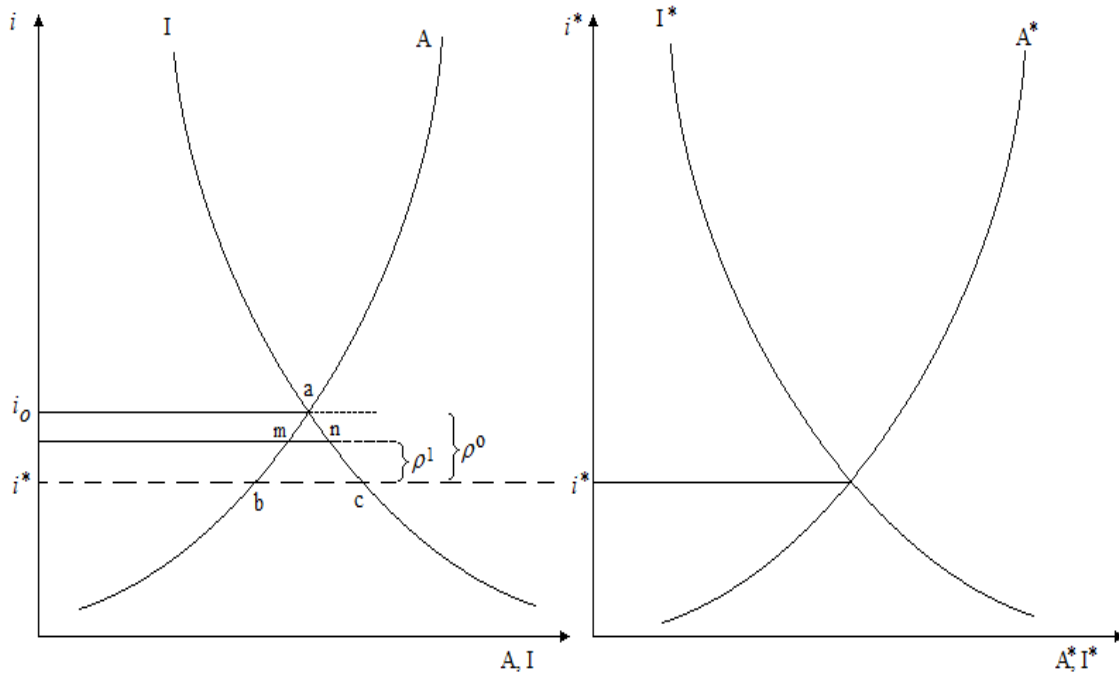
Figure 4: Metzler Diagram: Effect of Countercyclical Fiscal Policy



Until now we have assumed that the Risk Premium is constant, but this could not be the case. If we assume that the Home country has had a more or less strong economic performance, and that the Home's government has followed sound economic policies, in the background of the Financial Crisis, it is possible to assume that Foreign agents will reduce the Risk Premium of the Home country.

The scenario of a reduction of risk premium is presented on Figure (5). The reduction of the risk premium from ρ^0 to ρ^1 , holding everything else constant will create an inflow equal to \overline{mn} as is shown in the graph.

Figure 5: Metzler Diagram: Effect of a Reduction of the Risk Premium



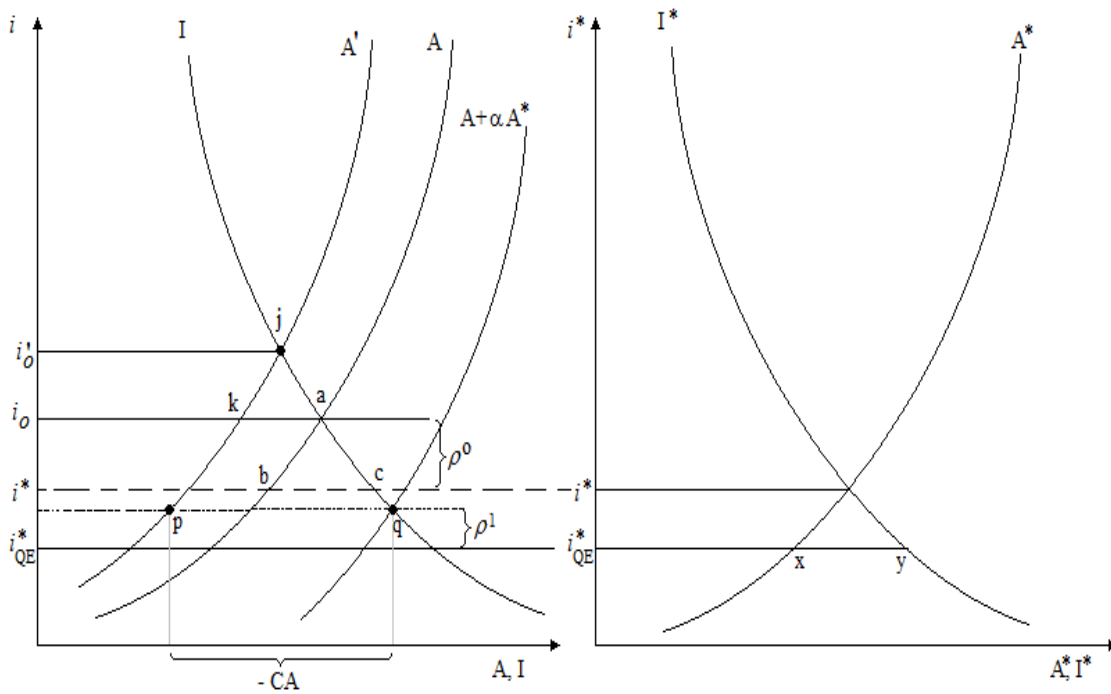
Summing up the interest rate differential that generates the capital inflows could be explain by a combination of factors stated previously:

- The effect of the Quantitative Easing by the Federal Reserve, that has reduced substantially the international interest rates.
- The effect of countercyclical fiscal policy financed by issuing of government debt, that has put an upward pressure to the domestic interest rate.
- The effect of a reduction of the perceived risk premium by foreign agents to the domestic financial assets. This also has to do with an almost fixed exchange rate, that reduces the exchange rate risk of investment in Home country.

If we combine Figures (3), (4) and (5) into one graph as shown in Figure (6), where the different factors (Quantitative Easing, Countercyclical Fiscal Policy and lower Risk premium) play a role. It is possible to observe how the interest rate differential increases from its level of equilibrium previous to the Financial Crisis $i = i^* + \rho^0$ to its new equilibrium $i'_0 > i_{QE}^* + \rho^1$.

This new interest rate differential creates the incentive for capital inflows equal to $\bar{p}q$. This capital inflows will generate a symmetric current account deficit for the Home country.

Figure 6: Metzler Diagram: Combination of the Effects



4 Risks

The main risk associated with the inflows of capital is the possibility of a sudden stop of these inflows. A sudden stop could arise from internal or external factors. If a country suffers from a sudden stop of

capital inflows it will create a strong current account adjustment, a depreciation of the exchange rate, and via the pass-through an increase in inflation, and a contraction of the GDP because of the increase in interest rate.

5 Policy Recommendations

Going back to Figure (6) it is possible to observe some possible policy recommendations in order to reduce the capital inflows in the economy.

(1) Increase the risk premium ρ by allowing a more flexible exchange rate that will transmit the exchange rate risk to the foreign agents.

(2) Reduce the fiscal deficit in order to increase the total savings of the economy, pushing downwards the local interest rate.

(3) Implement some capital controls to reduce the level of desired demand of Home's financial assets for the portfolio of the foreign agents.

Given that the interest rate differential was caused by three different factors, a sensible approach is to reduce the interest rate differential using also a combination of factors to minimize the impact on output and risks in the market.

Provided that the main risk associated to capital inflows is a sudden stop, a possible measure to reduce the probability of large fluctuations in the level of inflows is to discourage short term or speculative inflows by putting in place macro-prudential measurements.

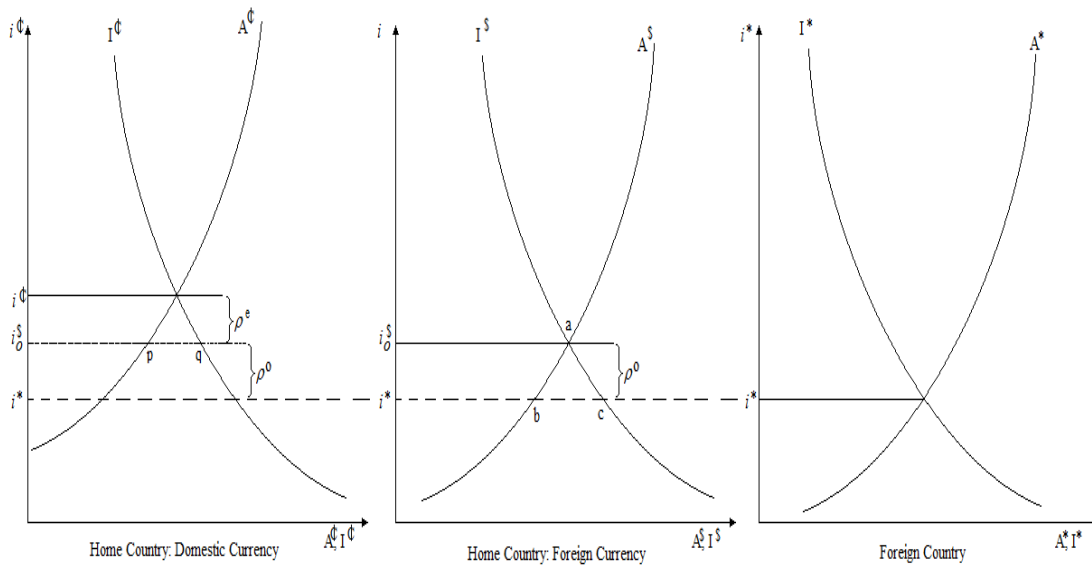
6 Analysis under Dollarization

A possible extension of the analysis using the Metzler Diagram is to divide the Home country into Domestic Currency and Foreign Currency financial markets. This case approximates the situation of an economy in which there is financial dollarization.

The advantage of making this differentiation is that the reason for capital inflows caused by having no exchange rate risk ρ^e could be easily overcome by allowing the exchange rate to fluctuate more freely.

Figure (7) shows the reasoning behind this possible extension. Where the capital inflow to the domestic currency market can come from either the Foreign country or the Home country foreign currency market. If we assume zero exchange rate risk the interest rate differential will create a capital inflow to the domestic currency market equals to \overline{pq}

Figure 7: Metzler Diagram: Effect of Dollarization in the Economy



This extension of differentiating Domestic Currency and Foreign Currency financial markets in the Home country can help in clarifying some of the idiosyncratic characteristics of the current behaviour of capital inflows. Even-thought portfolio capital inflows have been present in the economy since the liberalization of the capital account, never before those these inflows have had the current magnitude and effect on the exchange rate.

Lets assume some degree of friction between the three markets (Foreign country financial market and Domestic Currency and Foreign Currency in Home country). This frictions can arise from asymmetric

and incomplete information, specially between the Foreign country financial market and the Domestic Currency market. Another source of friction can be a legal barrier, such as a prohibition for foreign agents to hold government debt denominated in domestic currency².

If these frictions exist, the Foreign Currency market in the Home country will play a role of intermediary (or arbitrator) between the other two markets. This arbitration will reduce the volatility of capital inflows and exchange rate.

If for some reason some of the frictions disappear³, or the interest rate differential becomes so great that it covers the risk associated with incomplete information. A more direct interaction between the Domestic Currency market and the Foreign country financial market, could lead to a significant increase in capital inflows directly from Foreign to Home country.

This situation is analogous to a process of rapid financial integration between both markets. From the information available, this scenario is very similar to the current situation of foreign capital inflows in Costa Rica.

7 Concluding Remarks

This document illustrates the inflows of capital to a small and open economy such as Costa Rica using the Metzler Diagram. The simplicity of the Metzler Diagram provides clarity to understand the motivations for the inflows of capital, as well as a framework to analyze the policy options available to the policy-makers.

During the second half of 2012 the economy has absorbed a significant amount of external capital flows.

Possible policy recommendations in order to reduce the capital inflows in the economy are: (a) Increase the risk premium by allowing a more flexible exchange rate. (b) Reduce the fiscal deficit in order to push down the local interest rate. (c) Implement some capital controls to reduce the level of foreign desired demand of Home's financial assets.

²Government bonds could represent a big portion of the primary and secondary market of the domestic currency financial market, such is the case for Costa Rica.

³Another possibility is the creation and implementation of financial instruments such as derivatives allowing the foreign agents to buy in the Domestic Currency market.

If the observed capital inflows are part of a financial integration process, the above policy recommendations will help moderate the capital inflows, but is unlikely to succeed in stopping the inflow. In this case more stringent macro-prudential measurements and supervision will be the recommended course of action.

8 Reference

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