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THE TWIN RISKS IN THE DOLLARIZATION DEBATE: COUNTRY AND DEVALUATION RISKS

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ABSTRACT

This paper discusses dollarization from the perspective of the relation between country and devaluation risk. In the absence of balance sheet effects, we find that a full dollarization of an economy increases its country risk. On the other hand, when balance sheet effects are present, the full dollarization could reduce country risk.

The link between these two risks is based on the government's financial needs. In this paper government devalue the currency for fiscal purposes. Consequently, a full dollarization closes this avenue transferring the whole cost to bond holders. This paper stresses the idea that dollarization is at the very end a fiscal issue.

Empirically, using the ratio of foreign currency deposit on total deposits as a proxy to the balance sheet effect, the paper tests the importance of this variable on country risk. We find that the balance sheet has a positive effect on country risk, in other words, country with higher balance sheet effect should have higher country risk.

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I. MOTIVATION

One of the many criticisms that the dollarization proposals have received is that there are no observations in the sample to infer what will happen if an economy adopts a fully dollarized monetary system. The announcement of former President Mahuad to attempt a dollarization of Ecuador has heated up the debate and will also provide another observation to a very narrow sample.[1] Instead of waiting for more events we present a very simple framework in which the basic issues can be analyzed.

In the context of the dollarization debate, Fernandez-Arias and Talvi (1999) discuss the different policies that governments could implement to minimize the impact of a real exchange rate shock. Calvo (1999b) and Hausmann, Gavin, Pagés-Serra and Stein (1999) address the question of which is the optimal currency arrangement for emergent economies. In addition, Hausmann, Panizza and Stein (1999) and Levy-Yeyati and Sturzenegger (1999) discuss the characteristics of these currency regimes. In this context, we discuss the rather unexplored relationship between country risk and devaluation risk. Powell and Sturzenegger (2000) focus on the empirical question on how much interest rate reduction an emergent country should expect from the elimination of the currency risk.[2] In this respect we agree with these authors that this reduction of the interest rate could be for some countries the most substantial (but potential) benefit from dollarization.

The bottom line of the paper is to stress the idea that dollarization is at the very end a fiscal issue and it has costs as the country risk may go up while the devaluation risk disappears. A successfully dollarized economy will be one in which there are no obstacles to finance contingent fiscal deficits. In this respect, the recent decision of Ecuador might prove that dollarizing is not enough in itself. It has to come with a comprehensive program aimed to satisfy the current and future fiscal constraints. If the government cannot finance this unexpected deficit it could choose to satisfy these constraints by confiscating the domestic agents by devaluing its currency or defaulting on its external obligations. Institutional investors will have a perception of the real intention of the government and this will drive the country risk up or the devaluation risk up depending on their priors on who is more likely to get confiscated by the government.

One of the main issues on this debate is whether the dollarization option implies lower interest rates.[3] This is due to the fact that they are giving up an instrument (the exchange rate) that enables an economy to face an external shock. A dollarized economy ties his hands and therefore it is seen as less able to react to different shocks. In this paper we put special emphasis to the fact that most of the emergent countries face the potentially disruptive balance sheet effects as they share the characteristic of being liability dollarized.

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[1] Since that announcement, El Salvador has moved towards full dollarization, and Guatemala announces its intention toward a full dollarization.

[2] See Neumeyer and Nicolini (2000) for a related paper but using a different approach.

[3] Powell and Sturzenegger (2000) point out arguments that might explain either an increase or a decrease in country risk suggesting that both results are feasible.

We also find theoretical support to the idea of implementing a dollarization strategy with a contingent credit facility. We put special emphasis on the fact that this insurance scheme should be at a not-distorted price. If there is some implicit subsidy, it will reproduce the same credibility issues that alternative stabilization policies face.

In addition, this paper supports the stylized fact presented by Hausmann, Panizza and Stein (1999) where they show that emerging countries float differently from the way developed countries do. The reason of this difference is that floating emergent countries need a substantial amount of foreign reserves as collateral to avoid a higher country risk. Floaters are forced –by the market- to float with lots of reserves compared to M2 or debt obligations. On the other hand, developed economies can endure huge fluctuations in the exchange rate (domestic confiscation) because nobody questions the possibility of an external default.

The paper proceeds as follows. In Section II we present a simple model of confiscation risks. In Section III we simulate the model to see what might happen with the currency and country risks under two different scenarios, one in which balance sheet effects are absent and another in which they are important. In Section IV we discuss the role of contingent credit lines as a policy recommendation that might go along with dollarization. Finally, in Section V we present preliminary results of the country risk model for 10 emerging countries and we close the paper with some final remarks and directions for further research on this topic.

II. A SIMPLE MODEL OF CONFISCATION RISKS

In order to think about the relevant issues in the decision of dollarizing an economy we consider the following simple setup. We assume a one-good, two-period open economy with the following agents.[4]

The Government

The government's basic decision is how to face the uncertainty of having good and bad times. When bad times arrives, we assume that the government does not have other alternatives to finance the adverse shock but confiscating. In this case, the government will be forced to decide between confiscate the domestic agents through devaluation or confiscate the institutional investor defaulting on its external obligations. We impose the uncertainty in such a way that when bad times hit the economy the government will not have other choice but to confiscate one of the two or both.

The expected budget constraint of the government is:

$$E(r) - \frac{g}{E_0} - (1 + i^L)b = 0 \qquad (1.)$$

[4] The model is quite similar to the one presented in chapter 6 of Obstfeld and Rogoff (1996).

The government revenue is stochastic and follows a simple rule. The realized revenue in good times is $\mathbf{r_0}$ and that happens with probability **(1-p)**. The realized revenue in bad times is $\mathbf{r_1}$ and that happens with probability **p**. Obviously, $\mathbf{r_0} > \mathbf{r_1}$. The fiscal revenues available contingent on the state of the world are represented by **r.**[5]

With those resources the government has to meet both its domestic outlays ($\mathbf{g/E_0}$) and its external obligations $\mathbf{(1+i^L)b}$. $\mathbf{E_0}$ is the current exchange rate and **g** is the nominal expenditure of the government measured in domestic currency. The government issues external bonds (**b**) in dollars that pay $\mathbf{i^L}$ interest. When good times hit the economy the realized government budget surplus is:

$$r_0 - \frac{g}{E_0} - (1+i^L)b > 0 \qquad (2.)$$

In that case, the government has no problem to satisfy its internal and external obligations and life goes on. However, in bad times the realized government budget surplus is:

$$r_1 - \frac{g}{E_0} - (1+i^L)b < 0 \qquad (3.)$$

Therefore, the government will have to either devalue or default. The amount that the government needs to obtain from these alternatives is:

$$r_1 - \frac{g}{E_0} - (1+i^L)b = (a+i^L)b \qquad (4.)$$

The government of that emergent country might default on the interests due plus a share (**a**) of the principal. For the sake of simplicity we assume that the government will always start a default with the interest payment and it will not compromise a default on the principal. The government will confiscate a fraction α of this amount to the foreign investors by means of an external debt default, and a fraction $\mathbf{(1-\alpha)}$ to the domestic agents using a devaluation.

The model assumes that the economy does not have other way to finance but to confiscate in case the bad shock arrives. We do not believe that this is the only way countries face an adverse shock, governments could reduce its expenditure, lost reserves among other alternatives. The goal of the confiscation assumption is to simplify the exposition of the problems. We will discuss this issue in section V.

[5] Emerging economies tend to be subject to large swings of their terms of trade and/or fluctuations in the cost of borrowing funds from abroad. As suggested by Fernandez-Arias and Talvi (1999) these changes may require large real exchange rate depreciations.

If the government has other choices to cover the contingent liability, as for example reducing g (its expenditures), the possibility of confiscation should never exist, and consequently, the country risk should disappear. In other words, if there is no confiscation risk, country and devaluation risk should disappear in the context of this paper.

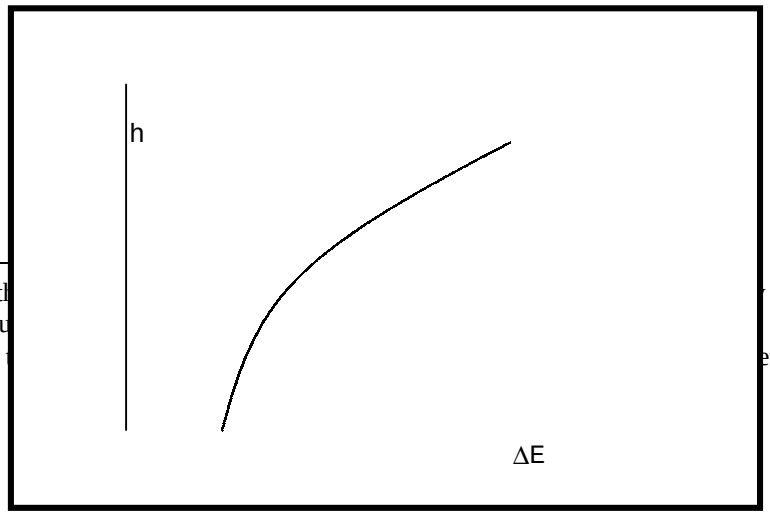
The Role of Balance Sheet Effects

However, the depreciation in itself potentially creates another cost. Once the government chooses to devalue the households and/or the firms with dollar liabilities may have to endure a negative wealth effect. This negative wealth effect in known in the literature as balance sheet effect. In this paper, the balance sheet effect is represented by the function **h(ΔE)**[6], where ΔE represents the expected real devaluation[7]. Fernandez-Arias and Talvi (1999) showed that the devaluation should be in real terms to play a role in the balance sheet effect.

As Calvo and Reinhart (2000) showed, there are economies with floating regimes that do not allow the exchange rate to move further away from a narrow band. One reason behind this fear of floating is that a sizeable depreciation could bring havoc in a banking system that is partially dollarized as firms are not fully hedged. The evidence of Calvo and Reinhart (2000) suggest that a reasonable way to model this characteristic is using a function such as:

$$h(\Delta E) = \begin{cases} 0 & \text{if } \Delta E < \varepsilon \\ (\gamma^2 \sqrt{1 + \Delta E - \varepsilon})^{\frac{D}{2}} - 1 & \text{if } \Delta E > \varepsilon \end{cases} \qquad \textbf{(5.)}$$

Where the balance sheet cost appears when the devaluation is higher that a certain threshold ε. In the above balance sheet function there are three key parameters: i) **γ** is a scale variable (assuming **γ>1**). A higher **γ** will impose a higher cost of devaluations. ii) the parameter **ε** allows for a non-linear relationship between the size of devaluations and its associated cost, and iii) the dummy variable D shows if the country is fully dollarized or not, where D=0 the economy is fully dollarized. An economy with no balance sheet effects will be one in which **h(ΔE) = 0**. Figure 1 depicts a general **h(ΔE)** function where ε>0, γ>0 and D=1.



[6] The importance of th… Calvo (1998), Calvo (1999) and Kru…

[7] The model suppose … evaluation.

Fig.1 The h(ΔE) function with ε>0, γ>0, η>0

If there were a possibility that the government decides to devalue next period in order to collect resources, the scheme for the next period exchange rate would be:[8]

$$\frac{g}{E_0} - \frac{g}{E_1} = \left[h(\Delta E) + a + i^L \right] b (1-\alpha) \qquad \begin{matrix} p \\ E_0 \end{matrix} \qquad \begin{matrix} \\ 1-p \end{matrix} \tag{6}$$

Therefore, the expected exchange rate will be $E^e=(1-p)E_0+pE_1$. From this we can derive the following expression for the currency risk:

$$\Delta E = \frac{(1-\alpha) p E_0 \left[i^L + a + h(\Delta E) \right] b}{g - (1-\alpha) E_0 \left[i^L + a + h(\Delta E) \right] b} \tag{7.}$$

From this formula one can infer the relationship between country and devaluation risk as $\mathbf{i^L}$ shows up. However, we need to explain what is behind the interest rate $\mathbf{i^L}$. In order to do so we need to introduce an institutional investor and derive an expression for the country risk.

Before going to the institutional investor section, let us discuss a further equation (6.). This equation provides an insight about how much does the government should devalue, in case it needs. The left hand side of the equation (6.) shows the government revenue of a devaluation, measure by $(\frac{g}{E_0} - \frac{g}{E_1})$, because a given g and E_0 an increase in E_1 means that the government needs less real resources to pay its debts. On the other side of the equation, h represents the additional cost of a devaluation, as creates a new liability for the

[8] This equation should not be interpreted as the balance sheet depending on amount of bond issued by the government. As it would be seen in the Institutional Investor section, the reason of having the balance sheet effect in this equation is because the balance sheet effect is specified in terms of per unit of bond issued.

government. Depending how these two equations behave the government will decide the rate of devaluation for fiscal purposes.[9]

Going further with this idea, figure 2 shows a simple simulation on the fiscal cost and benefit of a devaluation. First, the benefit is measured as the saved real resources due to the devaluation. For example suppose that the government expenditure is 1000 pesos and the exchange rate is equal to 1. So, a 10 percent devaluation means that the government will save almost 92 dollars, and this profit function is represented by R in figure 2; whereas the cost function is defined by the balance sheet effect, which is the function h explained above. This cost function is represented by H_i in figure 2, where **i** represent different balance sheet effects. Then, the trade off between these two functions determines the size of a devaluation for fiscal purposes.

Suppose that a country has a large balance sheet effect, in the sense that a small devaluation generates huge fiscal cost (shown in figure 2 as function H_1). If the government of this country wants to use the devaluation as a way of collecting resources, this government would have to devalue at least ε_1. On the other hand, if the shape of the cost function is as H_2, this country could collect resources with a smaller devaluation.

[9] This paper assumes that the government devalue only for fiscal proposes and there are no others reason to do that.

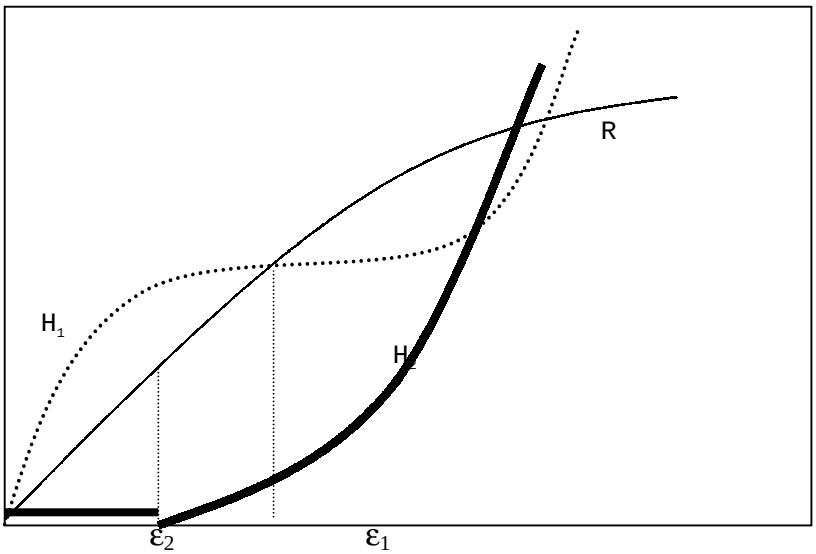


Fig2. Fiscal cost (H) and benefit (R) of a devaluation

Although the main issue of this paper is not measuring the optimal devaluation rate for fiscal purposes, the issue of the effect of the balance sheet at the time the government decides the rate of devaluation arises. Table 1 shows selected information for some of the financial crises of the last decade. The information is selected taking into account the paper by Fernandez-Arias and Talvi (2000), where they show that the balance sheet effect arises when countries have real exchange rate devaluations.

The nominal and real devaluation are self-explained, the variable Stock Exchange is the ratio of the stock index on the spot exchange rate, and the fiscal cost is how much the government paid in order to avoid a generalized bankruptcy due to the financial crisis. We use a broad definition of financial crisis, this could be a banking crisis, the devaluation itself, etc. So, this fiscal cost should not be interpreted as the balance sheet effect due just to the devaluation.

To construct the table, we took as the base month the month of the devaluation, from there we consider the highest nominal devaluation during the next six months. Taking these two months we complete the information shown on the table. This table shows that emerging markets have a higher real devaluation than developed countries, and higher fiscal cost.

According to the assumptions made in the paper, if H_1 represents an emerging market and H_2 a developed country, the results would be: (i) emerging markets have higher nominal devaluations than developed countries (the optimal devaluation rate for developed countries is ε_2; (ii) the balance sheet effects should be higher in developing countries; and (iii) emerging markets should show higher fiscal costs due to the devaluation.

Table 1 shows the above characteristics. The goal of the table is to emphasize the role could have been played by the balance sheet effect at the time government decided its policies. The table does not intent to be the empirical test of the above proposition.

Table 1
Fiscal Cost of Devaluations

Date of Crisis	Nominal Devaluation	Real Devaluation	Stock Exchange Index	Fiscal Cost % of GDP
Mexico 94	97%	72%	-64%	19%
Indonesia 97	184%	162%	-57%	50%
Malaysia 97	73%	70%	-68%	16%
Thailand 97	83%	75%	-61%	33%
France 92	17%	17%	14%	n.a.
Sweden 92	34%	32%	4%	4.5
UK 92	24%	27%	-10%	n.a.

Sources: IFS for exchange rate, Bloomberg for stock exchange, and Honohan and Klingebiel (2000) bail out cost. n.a.-not avalilable

An Institutional Investor

An institutional investor may take position on safe bonds (t-bills) with no default risk (**B**) that pays an interest rate of **i**. The other asset is a risky bond from an emergent market (a Brady bond), which we denote by (**b)**, and pays $\mathbf{i^L}$. As expected the benefits from this operations might be less due to the possibility of default from the emergent economy. The probability attached to that event is denoted by **p**.

The amount of default is $\boldsymbol{\alpha[a+i^L+h(\Delta E)]b}$. We should understand α as the *perceived* willingness to pay of the government on its external obligations. As the 1980s debt default showed, governments instead of raising more taxes to repay their external obligations preferred to default. Eaton and Gersovitz (1981) make this point. Clearly $\alpha \in [0,1]$. The institutional investors bear the cost of a potential bailout.[10] The total cost of the potential bailout is given by **h(ΔE)b**.

Therefore, the expected profits of the institutional investor is:[11]

[10] As the model does not include banks or private firms there are no more options for the government than imposing that extra cost to the institutional investor. This is just a simplifying assumption.
[11] When the good shock hit the economy the institutional investor is not subject to the possibility of a confiscation.

$$\Pi = (1+i^L)b + (1+i)B - p\alpha\left[a + i^L + h(\Delta E)\right]b \qquad (8.)$$

This investor has a total net worth of:

$$NW = b + B \qquad (9.)$$

Plugging (9) in (8) and deriving the expected profits with respect to **b**, we obtain the optimal decision on how much to invest in emerging market bonds. From the FOC we can obtain the following expression:

$$i^L = \frac{i + p\alpha\left[a + h(\Delta E)\right]}{1 - p\alpha} \qquad (10.)$$

A first result so far is that when there is no probability of default (**p=0**), the $\mathbf{i^L=i}$ and when there is no potential bailout cost (**h(.) = 0**), $i^L = \frac{i + ap\alpha}{1 - p\alpha}$

In addition, we define country risk in this model (from equation 10) as:

$$i^L - i = \frac{p\alpha\left[i + a + h(\Delta E)\right]}{1 - p\alpha} \qquad (11.)$$

From this, the rate of return in domestic currency terms is:

$$i^L_{DC} = i + \frac{p\alpha\left[i + a + h(\Delta E)\right]}{1 - p\alpha} + \Delta E \qquad (12.)$$

Where the exchange rate risk could be expressed in terms of the fundamental parameters of the model as:

$$\Delta E = \frac{p(1-\alpha)\left[i + a + h(\Delta E)\right]bE_0}{g(1 - p\alpha) - (1-\alpha)\left[i + a + h(\Delta E)\right]bE_0} \qquad (13.)$$

III. SIMULATIONS FROM THE MODEL

In this section we consider two possible scenarios. In the first one, the economy does not have balance sheet effects. Depreciations are neutral to wealth for all agents. In a second case, we discuss the scenario in which the monetary authorities have a bias against allowing large depreciations of their domestic currency.

Case I: No Balance Sheet Effects

First we explore the option to dollarize an economy that does not suffer from balance sheet effects. Therefore, $\mathbf{h(\Delta E) = 0}$ as all agents in the economy are able to hedge against the risk of a devaluation. Simulating the model we obtained the following propositions:

Proposition 1: The country risk and the devaluation risk are negatively correlated.

Graph 1 shows the negative relationship between country risk and devaluation risk for different values of α. It shows that the cost of reducing one type of risk is the increase of the other type of risk. Graph 2 shows this result explicitly, recall that the value of α represents the degree of confiscation from international investors; a higher α means a higher country risk and a lower devaluation risk. Then, α**=1** means that the devaluation risk is zero and the country risk reaches its highest value. In other words, α equal to one can be interpret as the economy being totally dollarized. In this case, the country will have a zero devaluation risk but the highest country risk. The model suggests that when a non-dollarized economy decides for full dollarization will face a higher country risk.

Proposition 2: For low (high) values of α an increase in the foreign interest rate has a stronger effect on the devaluation risk (country risk) compared to the effect on the country risk (devaluation risk).

Graphs 3 to 5 show the behavior of both devaluation risk and country risk when the free risk interest rate increases after controlling for different α's. We use three values of α to illustrate the differences (0.05, 0.5 and 0.95).

These graphs show that both risks increase when the free risk interest rate increases, but its effect on both risks will depend on the value of α. For low values of α, for example in Graph 3 when α takes the value 0.05, not only the devaluation risk is more important than the country risk, but also the effect of an increase of the free risk interest rate is stronger in this devaluation risk. On the other hand, for high values of α, as an example you can see Graph 5 (α=0.95), this result is reversed where the stronger effect is on the country risk.

Proposition 3: An economy that faces foreign interest rate shocks will present a high correlation between the country risk and the devaluation risk.

Graph 6 shows the scatter diagram for country risk and devaluation risk when the free risk interest rate increases given that α is equal to 0.95. This graph shows that although the effect of an increase in the free risk interest rate affect both risks, these two risks are highly correlated. This high correlation hold for different values of α.

Note that while in Proposition 1 we allow α to change, in this case we allow the foreign interest rate to change holding α constant.

Proposition 4: A contagion effect (an increase in the probability of a bad shock) will drive up both the country risk and the devaluation risk.

Graph 9 and 10 show that an increase in the probability of default increases both devaluation risk and country risk. The intuition of this statement is that a contagion effect will increase the probability of a bad shock.

Proposition 5: An economy that suffers a dollarization process will have higher interest rates in domestic currency and in dollars if has a high contingent fiscal liability. While an economy with low contingent fiscal liability will show a lower interest rate in domestic currency but a higher interest rate in dollars.

Contrary to the current belief that a dollarization will decrease the interest rate, Graphs 11 and 12 show that this result depends on how much the country risk goes up after a dollarization. Depending on the level of the contingent fiscal liability the interest rates will go up or down.

Case II: Dollarizing under Balance Sheet Effects

A more interesting case is when **h(ΔE)** reflects the cost of allowing the exchange rate to depreciate in a partially dollarized economy. We perform a simulation study and the following propositions arise:

Proposition 6: The presence of a significant bailout cost will generate a non-linear relationship between the currency risk and the default risk

In Graph 13 we can see that once we assume that balance sheet effects matter, the trade-off between the currency and the exchange risk will show a non-linearity. The upward part of

the curve will be almost non-existent if the **h(.)** function approaches zero. Therefore, financially vulnerable economies will find optimal to avoid currency depreciations as a way to reduce the country risk, more specifically these countries will try to reduce currency risk exposure through high levels of international reserves (See Calvo and Reinhart, 2000). For values of the devaluation risk higher than a certain threshold a higher α, i.e. a greater commitment with the exchange rate, will decrease the exchange rate risk while the country risk increases.

Proposition 7: A fully dollarized economy might obtain -under some conditions- a lower country risk.

In Graph 15 we present the case for adopting a full dollarized economy. An economy could either choose to be in point B with a low exchange rate commitment ($\alpha<1$) and with a given level of country risk or in point A with the same level of country risk but as the economy is fully dollarized with zero devaluation risk. The bottom line is: if you live with fear, why don't you fix it for your life? The same can be analyzed in Graph 16, in which staying at a high level of partial dollarization ($\alpha>0.8$) is the worst possible situation as the potential bailout cost due to currency mismatches increases the country and the devaluation risk as well.

Proposition 8: A banking system with a higher degree of liability dollarization will make the economy more vulnerable.

In Graph 14 we plot one economy with a higher bailout cost than other, represented as a higher value of the parameter γ. We can say that an economy with a higher degree of liability dollarization will be more vulnerable to external shocks and therefore will face a higher potential bailout cost. Basically, an economy in which balance sheet effects are sizeable will face a higher combination of exchange rate risk and country risk compared to another economy with potentially lower balance sheet effects.

Proposition 9: Under the presence of balance sheet effects, a full dollarization of the economy might reduce the local interest rate in dollars.

If our starting point is an $\alpha_{MIN}<\alpha<1$ (see Graph 17) the option to fully dollarize the economy will reduce the local interest rate on dollars. This should not be a surprise as a higher α reduces the devaluation risk and the spread between the interest rate on dollars and the interest rate on domestic currency. Clearly, for economies that are not sufficiently dollarized ($\alpha<\alpha_{MIN} \approx 0.2$) adopting the full dollarization proposal will not make sense as there is no gain in lower interest rates.

IV. THE ROLE OF A CREDIT LINE (NOW CALLED "BLINDAJE")

Using equation (1), the theoretical model claims that if a country is willing to lend and borrow whatever it wants, this country will never face a fiscal financing problem because it can lend the resources left over after a good shock and can borrow in case of a bad shock. This result means that the government will not need to confiscate anybody, as result, this country will have neither devaluation nor country risk. In other words, the domestic rate on domestic currency and foreign currency are equal to the free risk interest rate.

On the other hand, if the country has limited access to the capital market, the consequences explained early in the paper arises, where the possibility of having an unexpected deficit can not be financed. The existence of this credit constraint generates both devaluation and country risk, where the magnitude of each risk depends on the government's decision of which sector would be confiscated in case the bad shock materializes. Note that, first, the paper assumes that the government does not have other alternatives but to confiscate so far, and second, the problem emerges when the government is not allowed to finance a deficit, although this government could have an intertemporal sustainable budget. Under this context, the completeness of the market can be achieved if the economy could get a credit line to finance the bad shock scenario. The introduction of this financial tool would eliminate both risks.

Being more realistic, when an adverse shock hit the economy, government do have others alternative to collect resources, for example this government could increase taxes, reduce expenditure. Sometimes the authority is not able to meet its entire obligation once the financial crisis emerged. In this case, although the government's fiscal position could be sustainable intertemporally, investors are afraid that the government can not honor its obligation. The existence of this possibility should create the country and devaluation risk. As was mention earlier, if the government were able to obtain a credit line to finance its deficit, both, devaluation and country risk should disappear. An example of this financial tool is the Stand-By credit line granted by the International Monetary Fund. As a result, to overcome a financial crisis the government could combine a sound economic plan plus a credit line.

Therefore, although a dollarization can eliminate the balance sheet effect, it will not eliminate the possibility of the bad shock scenario. In this case, if the government decides to full dollarize the economy without the option of using the capital market, this economy would benefit of hiring a credit line. This benefit is a reduction of the both domestic interest rates, in term of foreign and domestic currency, to the risk free interest rate.

V. EMPIRICAL RESULTS

The model calls for an estimation of a country risk equation and a currency risk equation. Both should be treated as endogenous. Due to lack of data we could not complete enough series of currency risk to perform the whole exercise. We estimate the country risk equation (11.) from the model and delay for further research the estimation of a currency risk equation.

The model suggests that four types of variables should explain country risk: (i) those that reflect the safe asset return, (ii) those that are idiosyncratic to each particular economy, (iii) those affecting the probability of an adverse shock, and the government's decision to whom should be confiscated in case the bad shock arises, and iv) those variables measuring the balance sheet effect.

In the first category we include the yield of 30-year US Treasury bills. In the second category we include the return of the stock exchange measured in dollar terms lagged one period. In the third category, we also include an indicator of international liquidity (the ratio M2 to foreign reserves) as a measure of the ability to pay the external debt; and a proxy for the terms of trade shocks (the variation of FOREX reserves) a proxy for the probability of bad shocks affecting each country.[12] Additionally we should include the fiscal stance and the output growth to capture the potential repayment problems that might arise. These last two variables are not included in the results shown below. These variables are somewhat captured in the regressions as we include the lagged endogenous variable as an explanatory variable.

With respect to the last variable, due to data availability we chose to include the dollarization ratio as a measurement of the balance sheet effect. This variable is calculated using the International Financial Statistics, published by the IMF, as the ratio of Foreign Liabilities (26c) over the sum of Demand Deposits (24), Time, Savings and Foreign Currency Deposits (25). In the case of Argentina and Peru, the data used come from their respective Central Banks.

Finally, we include a dummy variable to account for the Russian crises, but we might include political factors that have affected the country risk of some countries (for example Indonesia or Peru) and an interaction variable between the effect of a change in the U.S. interest rate and money supply.

The monthly database covers 1997.01 to 2000.10. The countries in our sample include 5 Latin American economies (Argentina, Brazil, Mexico, Peru and Venezuela), 4 Asian countries (Indonesia, Korea, Malaysia, and Thailand) and 1 Transition economy (Poland). The sample of countries was chosen on data availability considerations. We exclude several countries, as the data was insufficient.

The model is estimated within a SUR framework as we expect that idiosyncratic shocks will affect the behavior or other countries due to real or financial contagion. The results are

[12] Calvo and Reinhart (2000) suggested that terms of trade shocks will affect foreign reserves and therefore the variation of foreign reserves is a good proxy.

shown in Table 2. We find the following empirical facts: (i) a positive and significant relationship between country risk and the dollarization ratio; (ii) external factors as the Russian crisis are important; (iii) the lagged endogenous variable was significant, and (iv) no clear effect of changing the US interest rate.

Although this is an incomplete test due to data availability, we still can observe an indication of the potential consequences of the so-called "balance sheet effect".

VI. CONCLUSION

We learned once the relevance of the intertemporal fiscal sustainability with hyperinflation episodes. This paper teaches us the same lesson of fiscal sustainability in the context of the dollarization debate.

Under the assumption that there is a deficit that needs to be financed, investors will expect some reaction from the government: either lose reserves, increase its debt or print money. Another way to accomplish the objective when all these avenues are banned is to confiscate somebody devaluating the domestic currency or defaulting on its external obligations. In this sense, a full dollarization closes one of the last two sources of confiscation, the devaluation; as result, the dollarization transfers the cost of confiscation from one sector to another.

Concerning the effects over the interest rate, the paper present two cases, with and without balance sheet effects. These results are: i) when the economy does not face a balance sheet effect, as the devaluation risk disappears, the country risk goes up, and ii) when the economy face a balance sheet effect, a dollarization could reduce country risk. A caveat of the second result is that, the higher the balance sheet effect, the higher the reduction in the country risk.

Empirically, using the ratio of foreign currency deposit on total deposits as a proxy to the balance sheet effect, the paper tests the importance of this variable on country risk. We find that the balance sheet has a positive effect on country risk.

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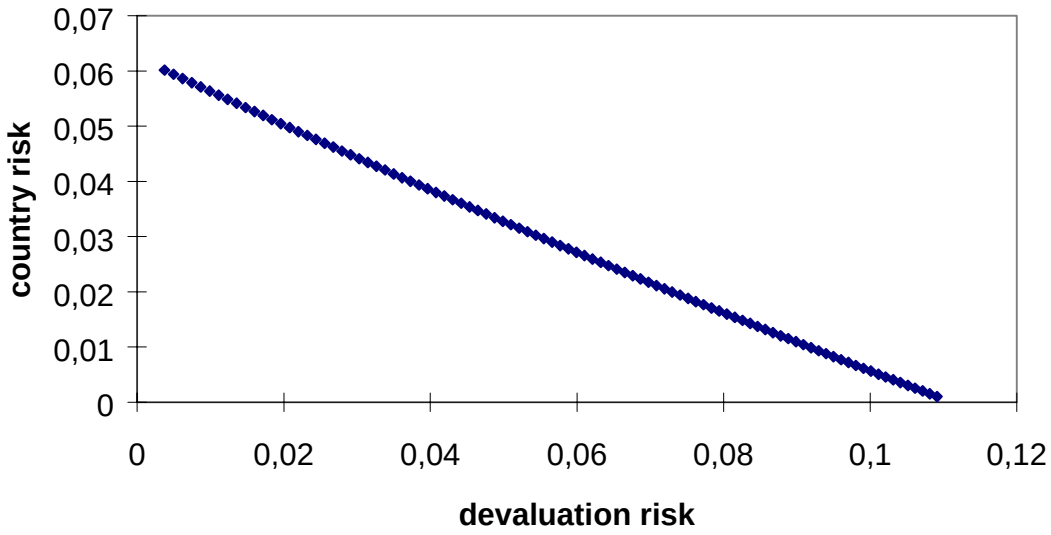
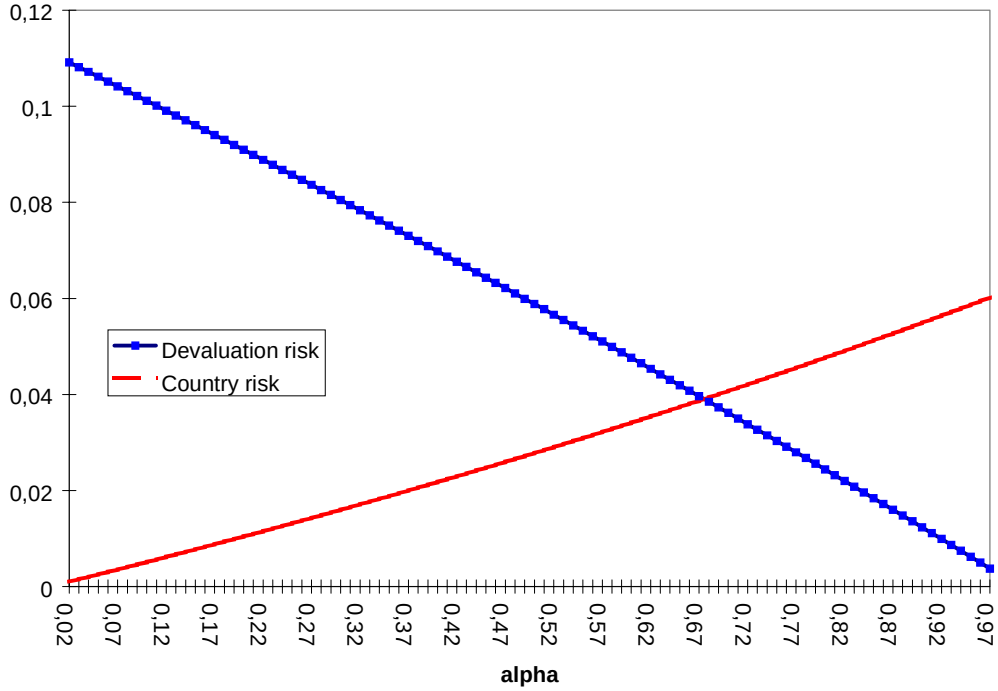
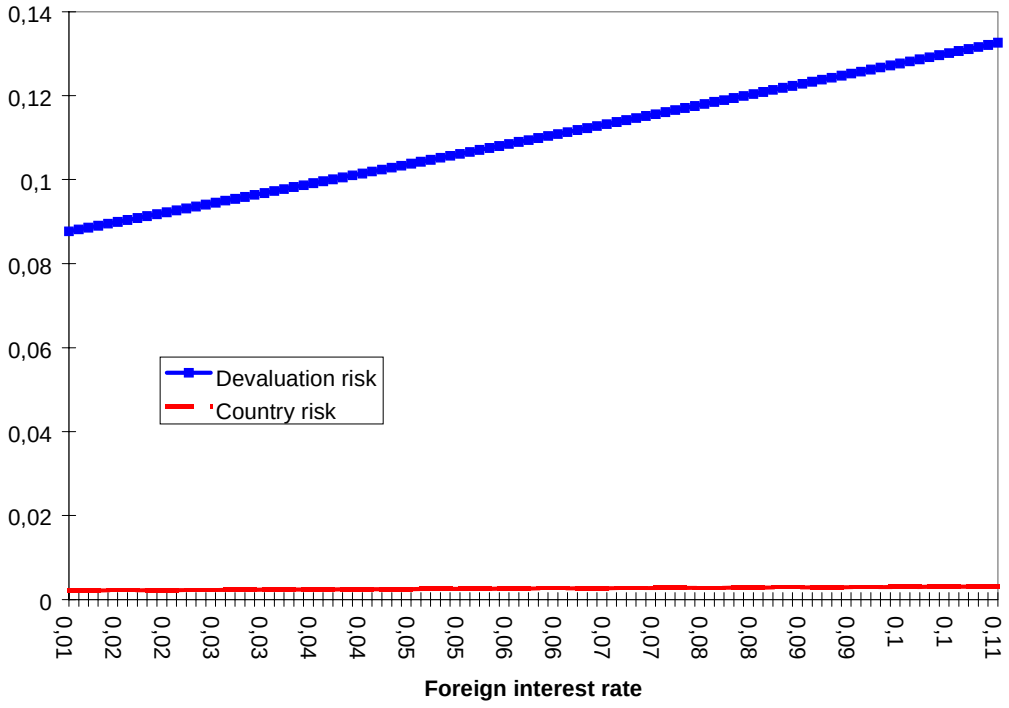
Graph 1: Trade-off between Country Risk and Devaluation Risk



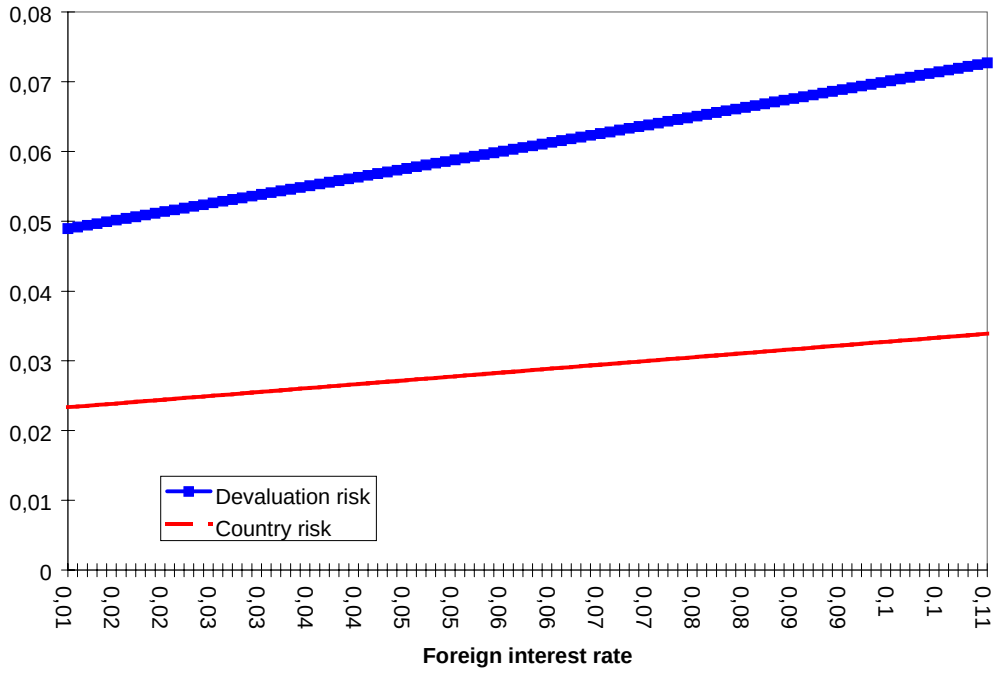
Graph 2: Country and devaluation risks for different values of alpha



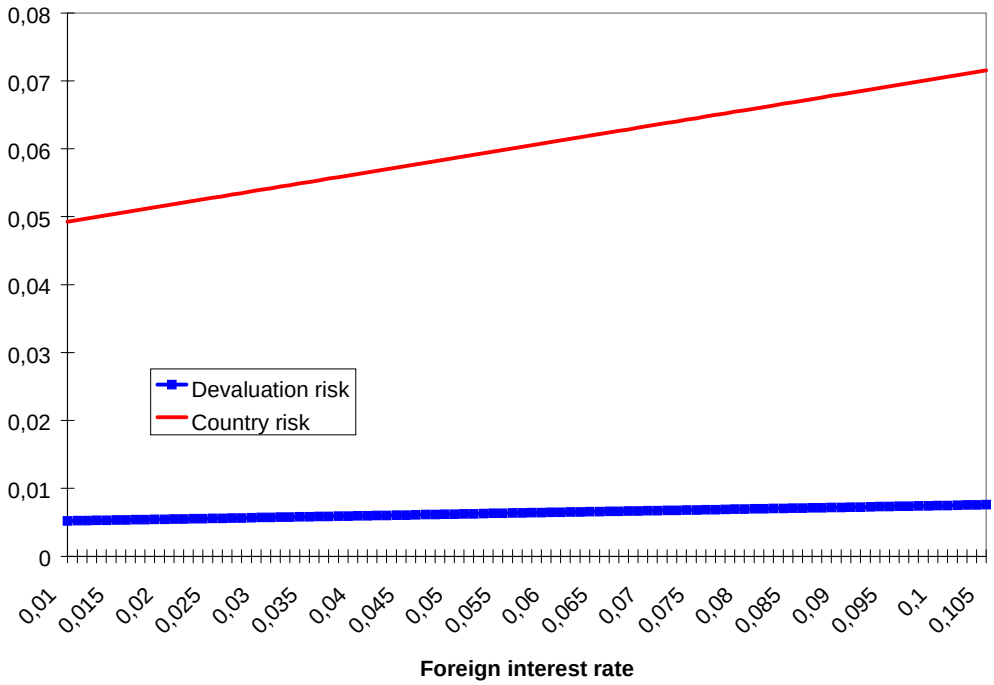
Graph 3: Country and devaluation risks with small alpha=0.05



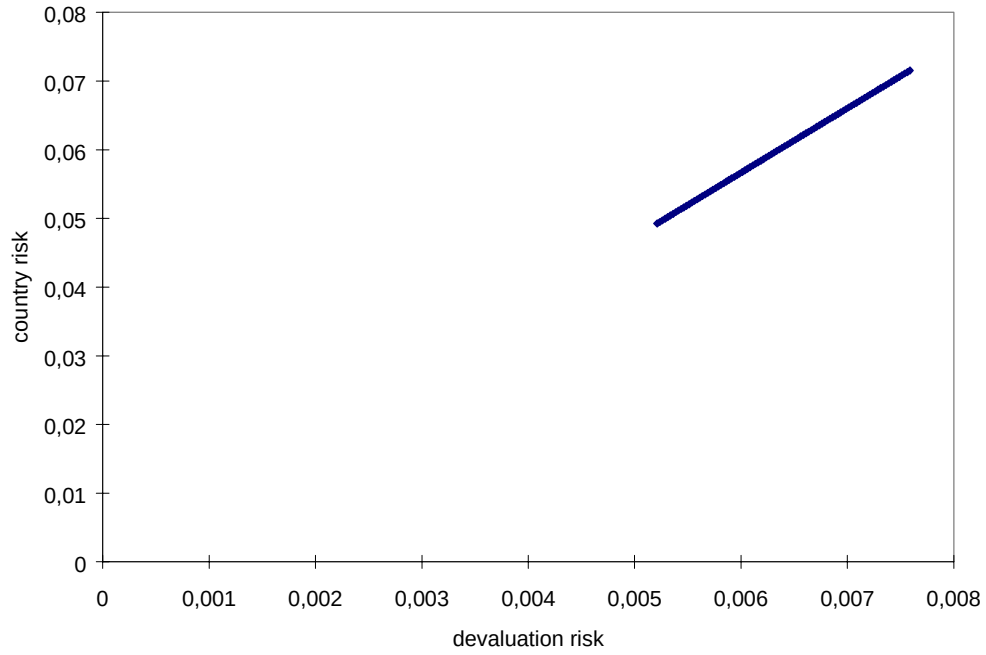
Graph 4: Country and Devaluation risks for alpha=0.5



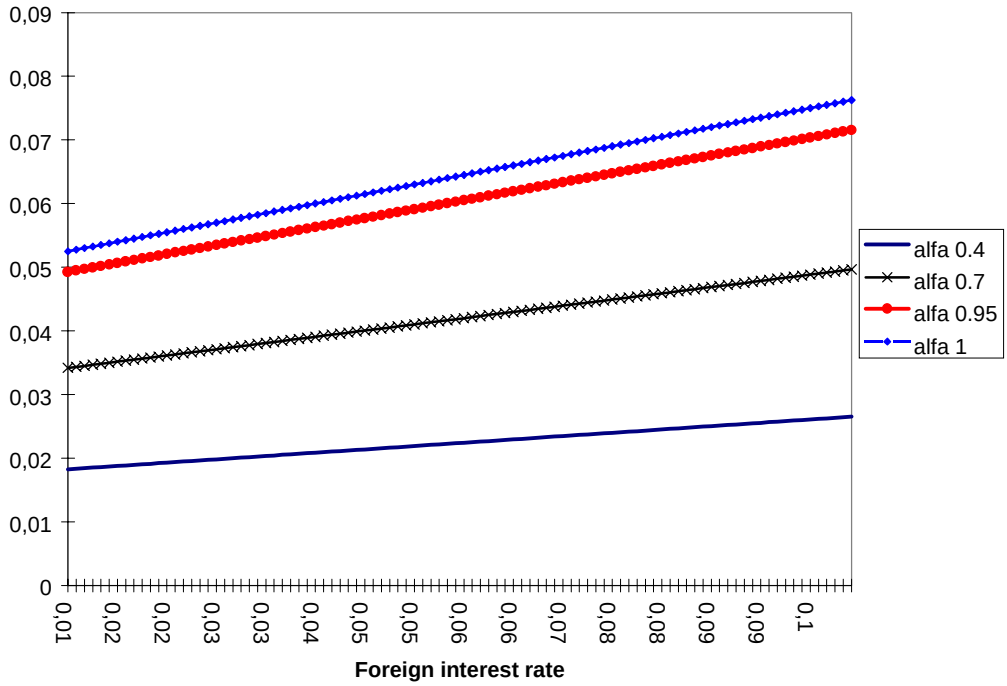
Graph 5: Country and Devaluation risks with high alpha=0.95



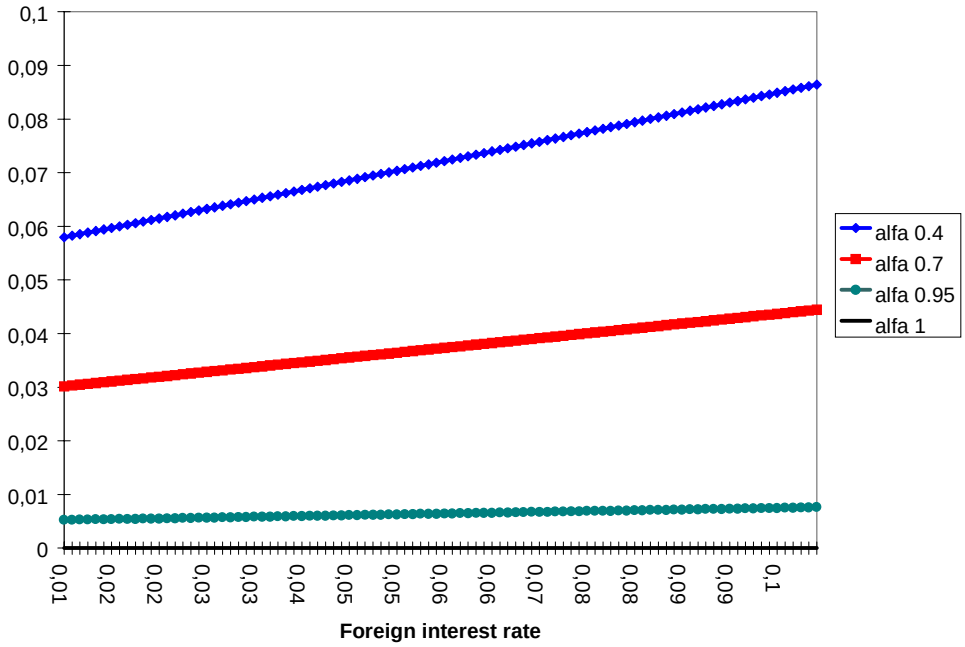
Graph 6: Correlation between Country and Devaluation Risk high alpha=0.95



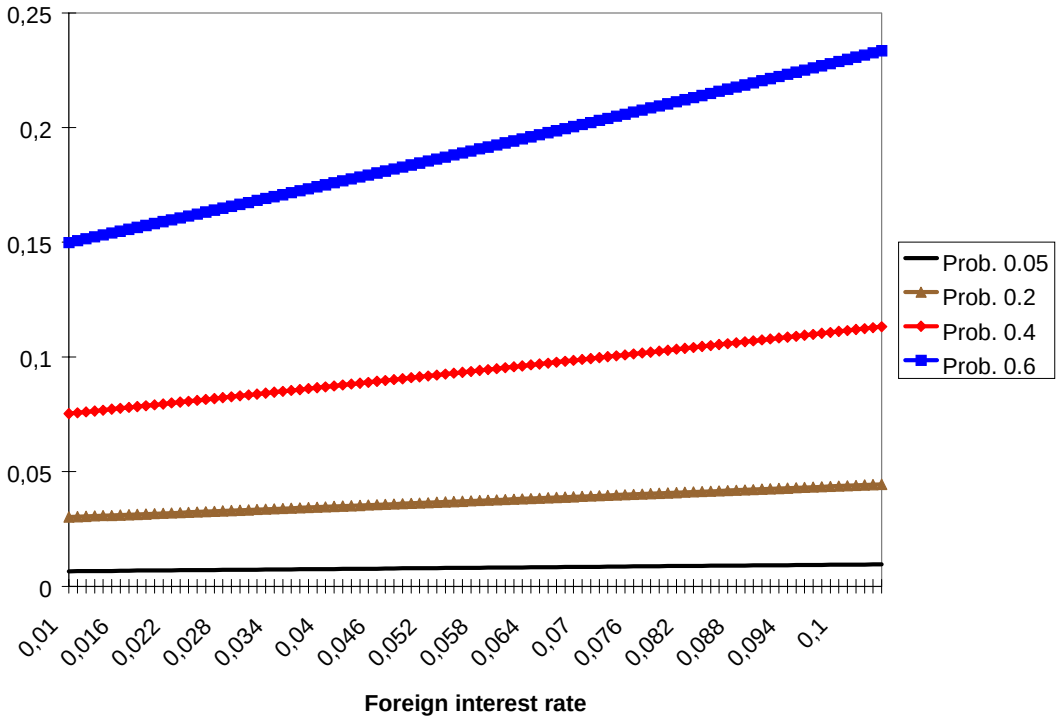
Graph 7: Country risk for different values of alpha
(dollarized economy alpha=1)



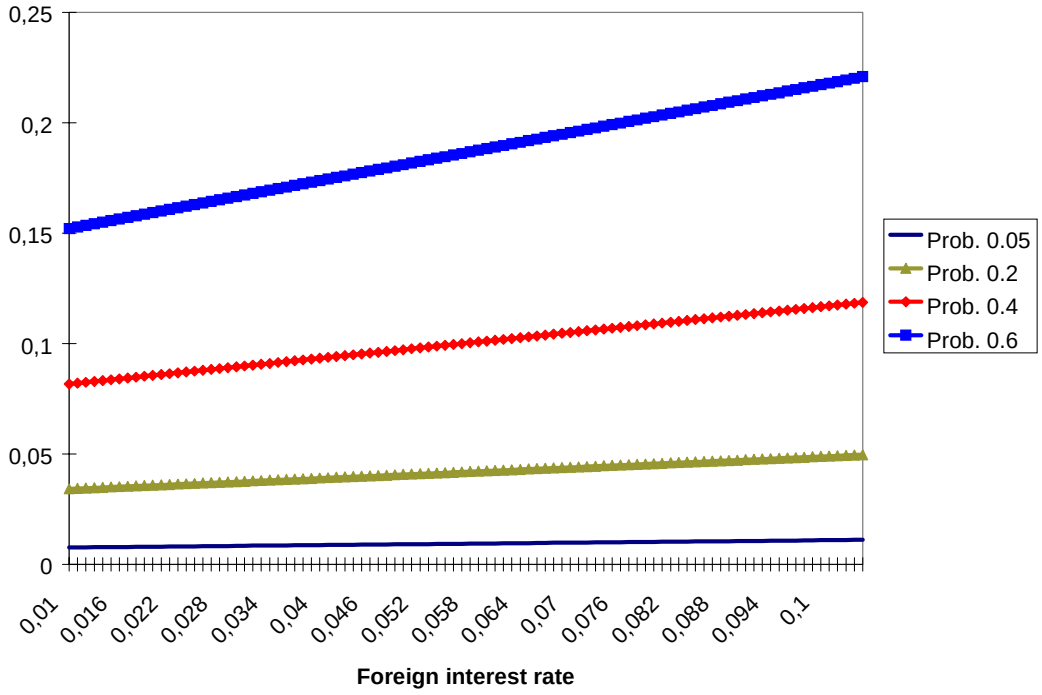
Graph 8: Devaluation Risk for different values of alpha
(dollarized economy alpha=1)



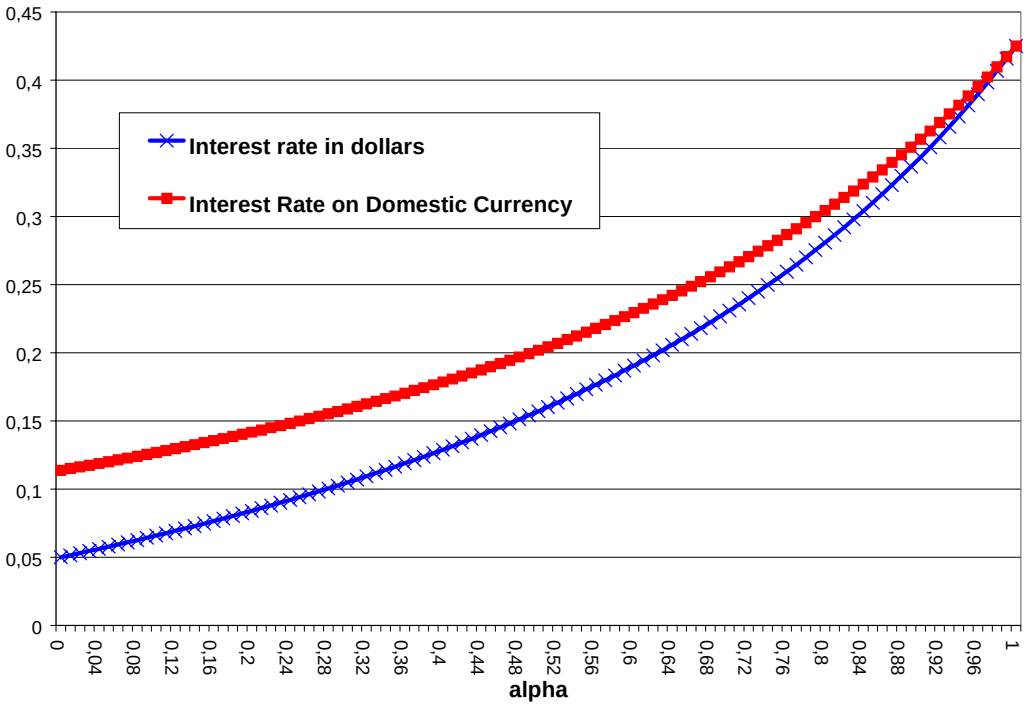
Graph 9: Devaluation Risk under Contagion Effects
Sudden increase in the probability of adverse shock



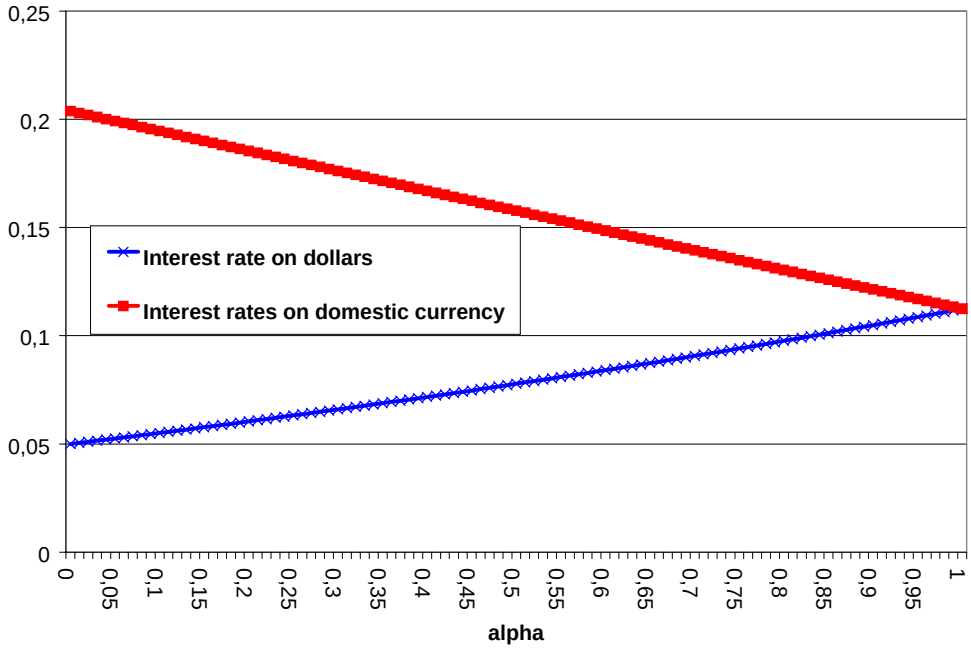
Graph 10: Country Risk with Contagion Effects
Sudden increase in the probability of an adverse shock



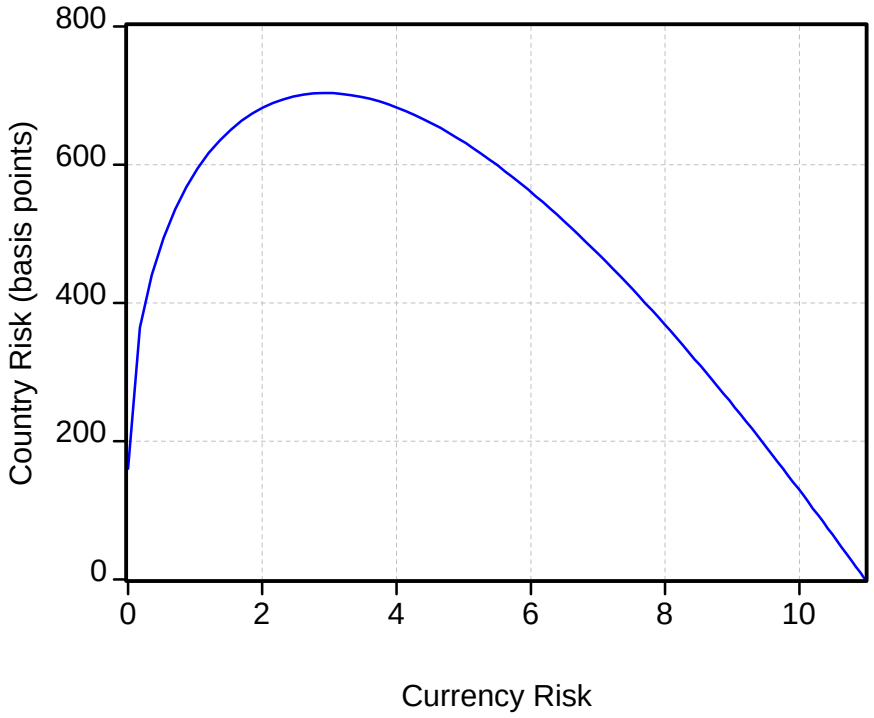
Graph 11: Dollarization under High Contingent Fiscal Liability
(g=100)



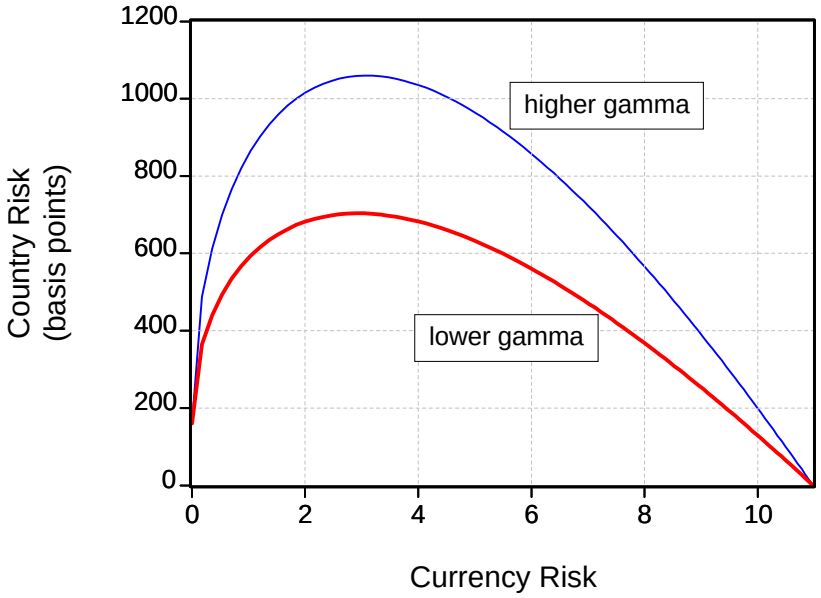
Graph 12: Dollarization under Low Contingent Fiscal Liability (g=15)



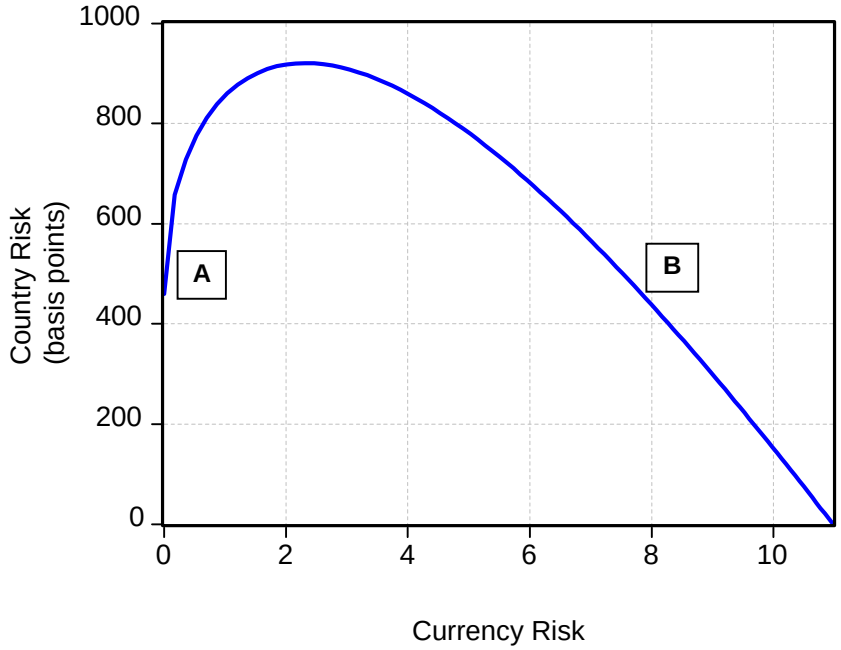
Graph 13: Nonlinear Trade-off with Balance Sheet Effects



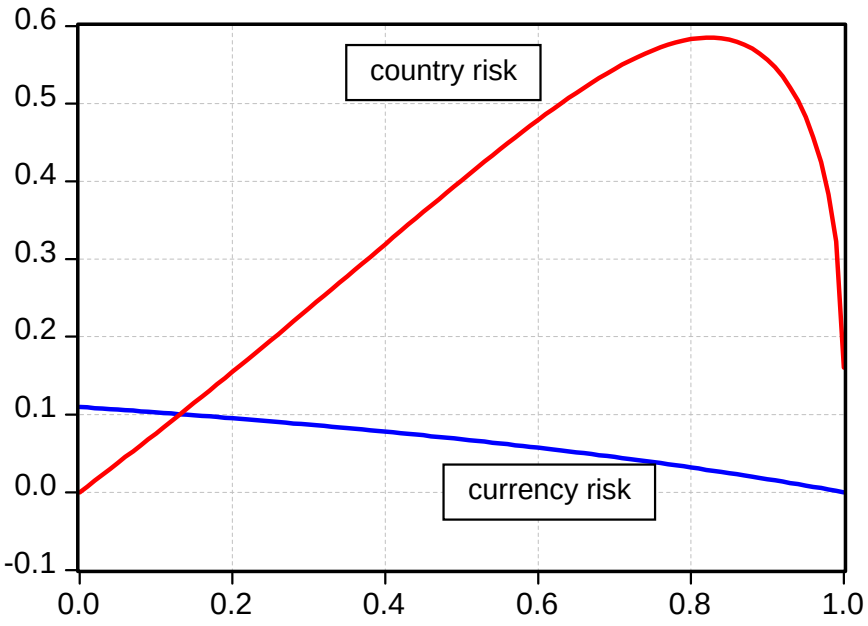
Graph 14: More Financially Vulnerable Economies
(higher gamma)



Graph 15: Fixing for your Life or Living with Fear?



Graph 16: Country and Currency Risks
for different values of alpha with balance sheet effects



Graph 17: The effect on interest rates

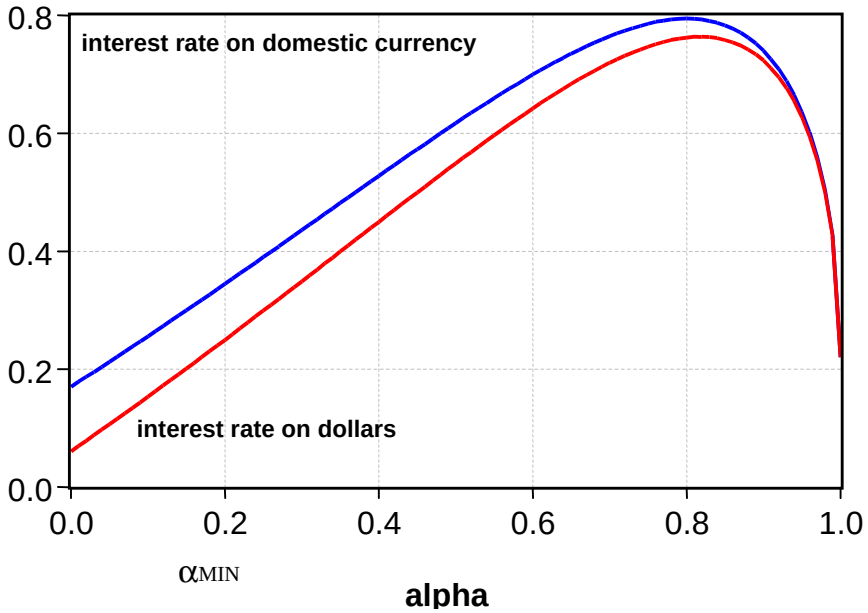


TABLE 2
SUR ESTIMATES OF THE COUNTRY RISK REGRESSION
All countries. 1997.01-2000.10

Country	Dollarization Ratio	M2 / Reserves	Terms of Trade	Stock Exchange	US T-bills	Lagged Endogenous	Russian Crisis	Interaction variable
Argentina	1479.65*	-1671.57	-1.64	-125.23**	2.70	0.43*	292.24*	2.69
Brazil	1627.51	-29.07	-1.21	11.04	-1.80	0.67*	334.05*	0.06
Indonesia	5.91	-461.34**	0.42	-4.09	-4.45*	0.52*	138.91	0.66**
Korea	1074.20*	-185.84	0.85*	-19.43**	-1.70	0.56*	196.20*	0.25
Malaysia	-776.29	3854.71 *	0.77	-1.27	17.65*	0.61*	n.i.	-6.57*
Mexico	2009.11**	-187.25	-1.51**	-16.74	-0.89	0.69*	234.87*	0.21
Peru	984.12***	118.52	0.13	-61.30***	-0.14	0.49*	255.04*	-0.23
Poland	1764.30*	324.36	-0.98*	-29.52**	0.38	0.24*	59.37*	-0.50
Thailand	548.60*	-458.31	1.55***	-48.71**	-3.73***	0.55*	315.00*	0.69
Venezuela	11143.63***	193.91	-1.02	-83.24	-0.02	0.70*	617.74*	0.25

Notes: * significance at 1%, ** significance at 5%, *** significance at 10%, n.i. not included.