Endogenous dollarization

by

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Abstract

This paper analyses the interaction between the spontaneous use of dollars by the private sector and the government's incentive to dollarize officially. Under normal conditions this interaction results in an equilibrium with low level of effective dollarization in the economy and a low probability of official dollarization. However, developments that increase the government's perceived benefit from giving up the local currency or the private sector's actual use of dollars can set in motion a dynamic process which will eventually bring about the complete phasing out of the domestic currency.

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1. Introduction.

Interest in dollarization taken in the generic sense to mean the replacement of the domestic currency by a foreign currency has increased in recent years. Ecuador and El Salvador have made the US dollar legal tender replacing the Sucre and the Colon respectively. Kosovo and Macedonia have likewise adopted the Euro. The creation of the European Monetary Union has already lead to the elimination of twelve national currencies, and if the so-called accession countries in Eastern and Central European join in the medium-term this number will almost double. In addition to these concrete examples, it has been suggested that countries in Central America would do well in following the example of El Salvador. Even in Canada there is considerable debate about the merits of maintaining the Canadian dollar.

The academic debate reflects this increased interest in dollarization. The theoretical optimum currency area literature has seen a revival (e.g. Frankel and Rose (1998) and Corsetti and Pesenti (2002)) and empirical work has been conducted to evaluate the likely impact of membership in a currency union or unilateral dollarization (e.g. Rose (2002)).

Most of the literature treats the decision to dollarize as exogenous depending on structural characteristics of the economy. Yet it is likely that private sector's use of dollars in transactions depends on the probability of the government dollarizing officially, which in turn is a function of the extent of market dollarization. In this paper I study the implications of this mutual dependence, showing that under some circumstances it can lead to endogenous complete dollarization.

The next section contains a brief review of search-theoretic models of international money. A stylized model of the interaction between the incentives of the government to dollarize and the incentives of the private sector to engage in currency substitution is presented and analyzed in Section 3. Some consequences of increased dollarization for the conduct of monetary policy are taken up in Section 4, and Section 5 discusses some aspects of the resource costs associated with dollarization. Section 6 concludes.

2. Search-theoretic models of currency use.

Theoretical models where the choice of currency for transactions is determined endogenously by the private sector typically imply multiple equilibria. Applied to an international context, this means that it is possible to generate equilibria where no, one or several currencies become accepted for transactions, and are therefore held, in a country.[1] Factors such as the openness of the economy and its integration with other economies will play a role in determining which outcomes are possible. But these models also predict that the equilibria may not be unique. For a given set of characteristics an equilibrium with no foreign currency holdings and another equilibrium with positive foreign currency holdings are both possible. Which of the two possibilities prevails will depend on the expectations of economic agents as to the outcome. The one that is expected to prevail will actually emerge as the self-fulfilling equilibrium.

The reason for the multiplicity of equilibria is that the choice of currency is basically viewed as a coordination problem in the presence of externalities. The externality emerges because the more frequently a currency is used and accepted by others, the more useful will it be for any given individual. The coordination problem is due to the fact that any one of several currencies could potentially serve as a transactions vehicle provided that a sufficiently large number of economic agents happen to decide on it. The importance of expectations is now easily understood. If a sufficiently large number of agents expect currency A to be adopted as the transactions currency, then they will hold that currency and use it. By doing so they provide the incentives for others to use it as well, and the currency emerges as money. If expectations instead had focused on currency B, it would have been chosen as the currency in the region.

The incumbent money will have a natural advantage in this situation. It will be resilient to challenges from potential alternatives because many agents already use it for their transactions. A coordinated switch by many economic agents to another currency would normally come about if the costs of maintaining the incumbent became very high. However, if some factor would lead to a significant change in expectations, it may be possible that a shift in currency use will take place even if the direct costs of keeping the incumbent money are not large. An official announcement that a country is on schedule to join a monetary union or to adopt a foreign currency unilaterally could generate such expectations. In the next section I will analyze a stylized model in which the

[1] See Trejos and Wright (1996) for an accessible illustration of how these search-theoretic models are constructed, and what kinds of conclusions they yield.

extent to which the private sector uses a foreign currency depends on the probability that the government will eventually give it legal tender status.

3. Interaction between market and official dollarization.

In contrast with the search-theoretic models referred to in the previous section, here I will consider a situation where the government gives legal tender status to one currency. Initially a domestic currency enjoys this status and is therefore the main store of value, unit of account and medium of exchange. The government faces some incentives to transfer legal tender status onto a foreign currency (the dollar) due to the usual arguments related to optimum currency area criteria. The degree to which the private sector already uses the dollar also influences these incentives.

While the legal tender status of the domestic currency gives it a special status, the private sector is assumed to use the dollar in some transactions. The extent of this spontaneous dollarization is usually modeled as a function of the relative costs of using the domestic and the foreign currency. Here I will argue that it depends also on the probability that the government will dollarize officially, i.e. that it will give legal tender status to the dollar instead of the domestic currency. I study the interaction between the spontaneous private sector dollarization and the probability that this will become official policy.

Consider first the incentives for the government to dollarize the economy. These can be evaluated for example in terms of criteria that have been developed in the optimum currency area literature. Here I want to concentrate only on how the degree of market dollarization influences the government's incentives. Specifically I will argue that the higher the share of dollars (D) in the domestic monetary base (MB), the greater will be the incentives for the government to dollarize officially. Clearly if dollars have completely driven out the domestic currency from circulation (D/MB = 1) there is no point for the government to insist on maintaining the domestic currency, so the incentives are such that the probability that the government will dollarize approaches 1.[2] At the other extreme, if there is no dollarization in the private sector, the official incentives to introduce the dollar as the domestic monetary unit are smaller. They are not zero, however, but they depend on openness, trade patterns, the degree of diversification of the economy, the degree of wage flexibility, etc.

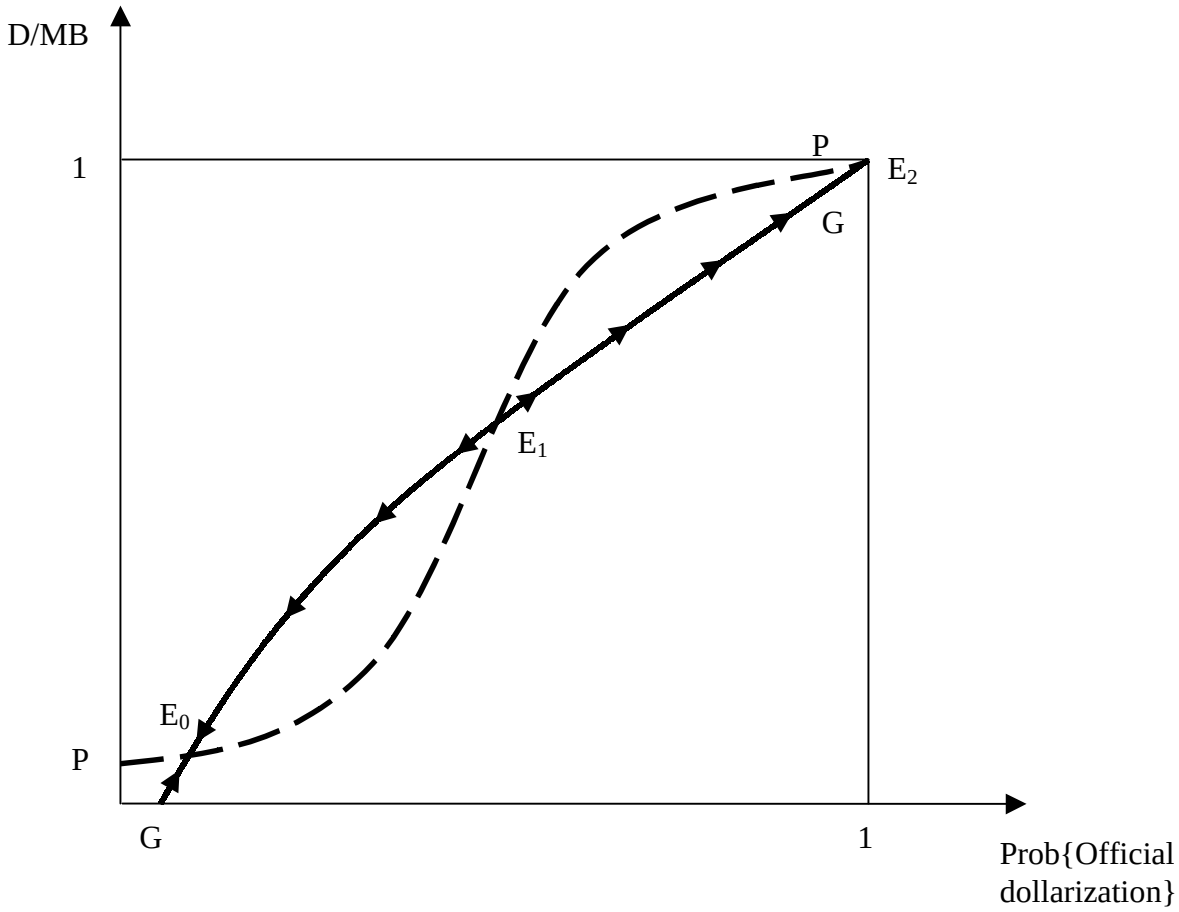
[2] If the government insists that certain types of payments (e.g. taxes) be made using the domestic currency, it is unlikely that the private sector will ever completely replace the domestic currency by dollars. For simplicity I will ignore this complication, since it does not affect the gist of my argument.

If we now imagine increasing the degree of market dollarization from zero to one, the incentive of the government to dollarize increases as well. I will assume that the relationship is smooth and continuous. In Figure 1 I have drawn this as the solid GG line starting at some positive probability of dollarization and ending at a probability of unity.

Let me now turn to the incentives facing the private sector. The arguments in the previous section suggests that in an economy which is initially not very dollarized, network externalities associated with the incumbent currency are such that a small increase in the probability of official dollarization will not change currency use by a large amount. In Figure 1 this is shown by the relatively flat relationship (the dashed PP line) between the amount of market dollarization and the probability of official dollarization at low initial levels of D/MB. A symmetric argument applies if the initial level of dollarization is very high. Then the dollar in the incumbent currency, and small variations in the probability of official dollarization will not have much of an effect on actual currency use. Assuming continuity we get a PP line that is initially relatively flat, has an intermediate portion that is steep, and a final segment that again is flat.

I interpret the PP line in Figure 1 as representing the degree of market dollarization that will prevail in the long run for any given probability of official dollarization. If I make the additional assumption that the actual degree of market dollarization adjusts slowly to this long run level, then the arrows on the GG line represent dynamics of the two variables in the figure. It is immediately clear that there is one unstable equilibrium (E_1) and two stable ones (E_0 and E_2). If the economy starts somewhere to the left of E_1 it will converge on a low level of dollarization at E_0, and if it starts to the right of E_1 it will converge on E_2.

Figure 1.



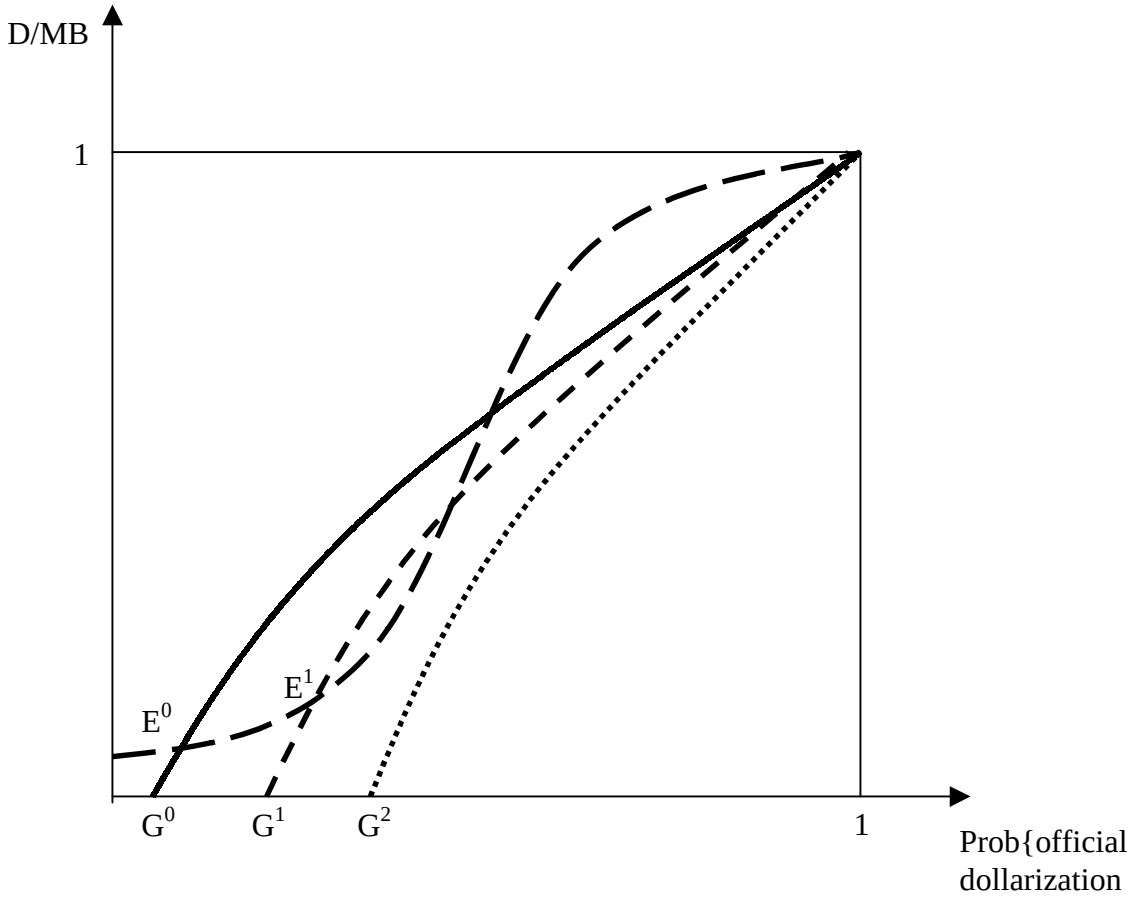
PP represents the degree of market dollarization as a function of the probability that the government will dollarize officially

GG represents the probability of official dollarization derived from the relationship between the incentive of the government to dollarize and the degree to which the dollar is already used in the economy.

Consider now what could happen in an economy that is initially in a state of low dollarization at E^0, and the incentives for the government to dollarize started to increase (see Figure 2). The reason for this could for example be an increase in the openness of the economy. The intercept of the GG line would shift from G^0 to G^1 to G^2. At first the effect on the actual degree of dollarization in the market would be relatively minor, as the equilibrium would move from E^0 to E^1. At some point however, the dynamics would change significantly and a process would be set in motion that would eventually lead to full dollarization.

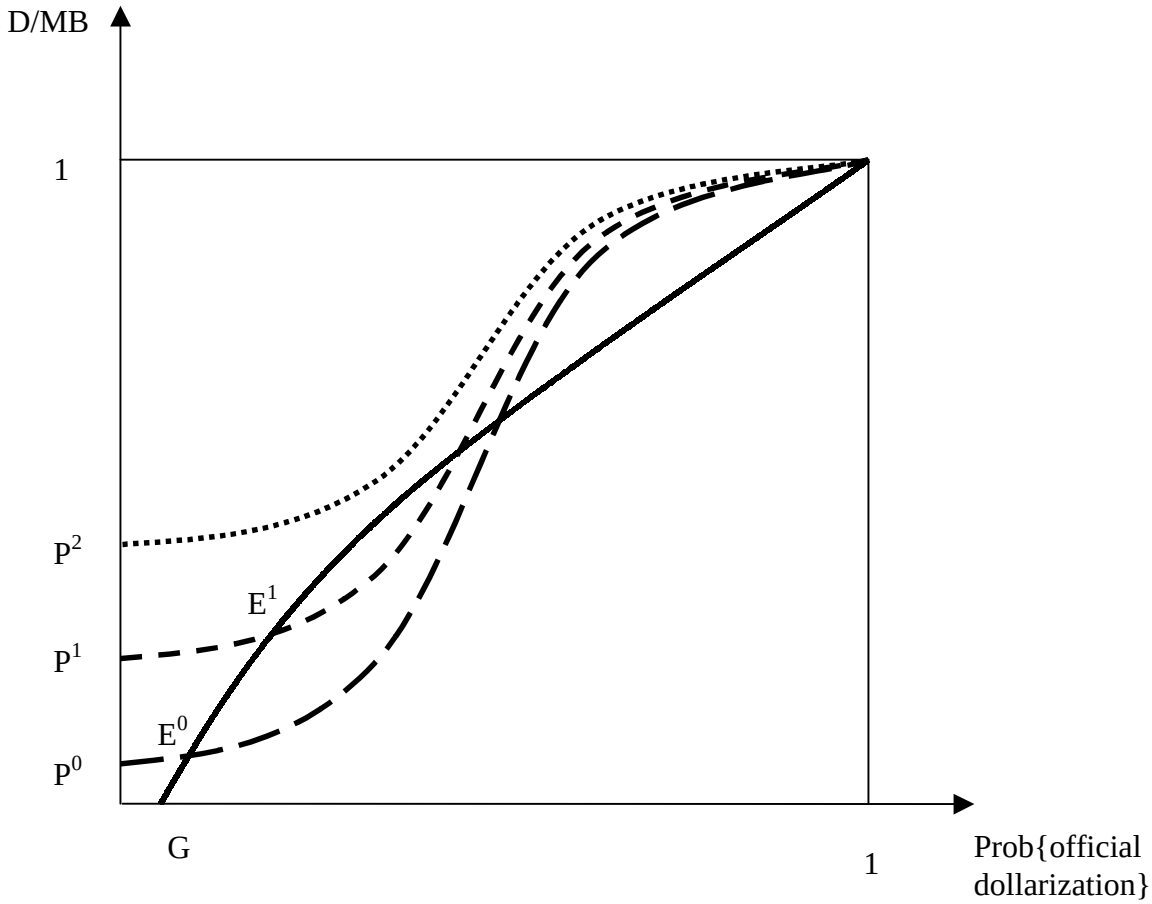
Figure 2.

Consequence of developments that increase the incentives for the government to dollarize.



A similar reasoning would apply if the degree of dollarization in the private sector would increase exogenously, perhaps because of a loss of confidence in the ability of the domestic central bank to ensure monetary stability. In Figure 3 this is shown as an upward displacement in the vertical intercept of the PP line from P^0 to P^1 to P^2. The economy would first experience a moderate increase in dollarization as the equilibrium would move from E^0 to E^1. If the exogenous change in the private sector's currency use were large enough however, the economy would again converge on the full dollarization equilibrium.

Figure 3.
Consequences of an exogenous increase in market dollarization



Although the analysis presented here is very simple, it suggests the possibility that official dollarization could come about endogenously under certain circumstances. The process leading up to the decision of the government of Ecuador to replace the Sucre with the US dollar is perhaps a concrete example where the incentives of both the government and the private sector contributed to the final outcome. As monetary instability increased in the late 1990ies the private sector reacted by substituting US dollars for Sucres (the PP line shifted upwards). Faced with a rising inflation rate the incentive of the government to use dollarization as a stabilization device increased (shifting the GG line to the right). The end result was the official dollarization announced in the beginning of 2000.

The future membership of a number of Central European countries in the European Union, and therefore eventually also in the EMU, could provide another example of a similar process. As the probability of a country officially joining the EMU increases (the GG line shifts to the right), the private sector will surely increase its use of the Euro ahead of the anticipated changeover. How far this process will go will depend in part on the length of the transition period after the country has obtained EU membership but before it has been admitted to the Eurozone. In principle it could lead to full spontaneous euroization before the official changeover.

Clearly more work would be needed to determine how applicable the model is in general. The crucial elements are the slopes of the GG and PP lines. More detailed analysis would be desirable to evaluate whether the shapes I have conjectured can be justified by formal models.

4. Consequences for monetary policy.

Suppose a central bank is faced with a situation where dollarization in the private sector has reached a significant stage. What effect does this have on the way in which it conducts its monetary policy? Let us look specifically at a central bank that aims to achieve domestic price stability.

In countries that make the objective of controlling inflation explicit, the price index used to measure the inflation rate is usually a consumer price index. Sometimes it is adjusted to remove temporary, non-monetary sources of price changes such as sales taxes. When all transactions are denominated in the local currency, the relevant price quotes are obviously also in local currency. The resulting index then also provides a convenient measure of the evolution of the purchasing power of domestic money holdings and wages, provided that the latter are also denominated in domestic currency. But what if a significant portion of domestic purchases is

denominated in a foreign currency, would the same price index still be as appropriate? And what if wage and salary contracts were stated in terms of the foreign money, would domestic price inflation still be an appropriate target for monetary policy.

To be specific, suppose incomes are fixed in the home currency but that a significant proportion of expenditures is denominated in dollars. The latter may come about because consumers actually buy some items directly abroad or because firms find it useful to quote prices in dollars. In this case, the measured consumer price index would presumably incorporate the dollar-based prices converted into the local exchange rate using the market exchange rate, in principle at the time of the transaction. A consequence for goods whose prices are denominated in dollars is that fluctuations in the exchange rate will have an immediate and one-for-one effect on local-currency prices, just as if purchasing power parity was maintained continuously. Stabilizing the domestic price index would under these circumstances be considerably facilitated if the exchange rate did not fluctuate substantially. To the extent that disturbances in asset markets did lead to pressures on the currency, it would be appropriate to offset these to maintain domestic price stability.

Suppose next that wages and salaries were denominated in dollars. In this case, would stabilizing a local-currency based price index necessarily be appropriate? We would have to understand the real purpose of a stable and predictable domestic-currency based price index in order to answer this question. If it is to make it easier for firms or households to evaluate expected real wages, for example, then with nominal wages fixed in dollars, the usefulness of a stable local-currency price level (and hence one that would fluctuate one-for-one with the exchange rate) could be called into question. A policy to stabilize a dollar-denominated domestic price level might be preferable in the limit where all domestic wages and salaries were denominated in this currency. In the intermediate case where some fraction of wages is denominated in dollars, the relevant price index may have to include the exchange rate explicitly. The issue seems to be entirely dependent on exactly why a stable price level is desirable in an economy. As far as I am aware, analysis of this issue always assumes that domestic wages and salaries as well as prices of goods purchased and sold on the domestic market are denominated in the local currency. If this is not the case, the choice of the appropriate price index is more intricate, and needs to be analyzed further.

If finally incomes, expenditures as well as all nominal assets of domestic residents became denominated in dollars, then to focus on a domestic-currency based inflation measure starts to lose its usefulness. What would matter for consumers would be the evolution of dollar-denominated prices and wages. Converting prices into the local currency using a floating market exchange rate, and having this index be a target for policy would not serve any real purpose in the limiting case there the economy has become completely dollarized. It would be better to ignore the exchange rate altogether. When dollarization is only partial, on the other hand, the formulation of monetary policy would have to deal with the consequences of fluctuations in the dollar exchange rate for the stability of the price index converted into the local currency.

5. Resource costs of dollarization.

Dollarization has important consequences for seignorage. Unless there is some compensation from the issuer of the new currency, a once-and-for all resource cost corresponding to the stock of domestic currency in circulation will be incurred at the time of dollarization, and a continuous cost equal to the increase in demand for the new currency will have to be borne thereafter. The likelihood of compensation depends on the form the dollarization takes, particularly if it is the result of joining an existing monetary union or a unilateral decision.

5.1 The case of EU accession countries.

According to the current rules new EU members that want to join the European Monetary Union will have to fulfill a certain number of convergence criteria before they can become members. One of these criteria requires fixing the exchange rate to the Euro and staying in an ERM2 arrangement for two years. I have argued elsewhere that this relatively long transition period combined with the quasi-certain outcome involving the replacement of the domestic currency with the Euro could induce a certain amount of spontaneous euroization in the private sector.[3] Such euroization would reduce the size of the monetary base denominated in domestic currency and consequently the amount of Euros the new member will be allowed to print upon entry. Compared to the current EMU members, potential accession countries will incur a significant resource costs as a result of euroization in the private sector.

[3] See Genberg (2002).

An indication of the size of these costs is given in Table 1, which shows that they range from 5.6% of GDP in Slovenia to 37.3% in Malta.[4] To be sure, these figures represent an upper limit of the potential loss because they would be realized only if spontaneous euroization before the official changeover was complete in the sense that the entire monetary base was transformed into Euros.[5] However, even if only a fraction of this transformation were to take place, the loss to the country could be substantial.

Table 1: Reserve money as a percentage of GDP in potential EMU countries

	Set to join on May 1, 2004	Have accepted membership	Reserve money/GDP (average 1997-2001)*
Bulgaria	Hopes to join in 2007		13.1%
Cyprus	x	x	19.2%
Czech Republic	x	x	23.4%
Estonia	x	Will vote on 14/9	13.7%
Hungary	x	x	10.8%
Latvia	x	Will vote on 20/9	13.3%
Lithuania	x	x	9.2%
Malta	x	x	37.3%
Poland	x	x	8.7%
Romania	Hopes to join in 2007		9.5%
Slovak Republic	x	x	12.6%
Slovenia	x	x	5.6%
Sweden	Member since 1997	Will vote on EMU membership on 14/9	4.8%

*Avg. for Cyprus is 1997-2000. Source: IFS and own calculations.

[4] For Sweden, which is already member of the EU but which will vote on EMU membership on September 14 this year, the figure is 4.7%.

[5] Note that some additional loss of seignorage has already occurred since Euros are already held in the accession countries.

A solution to this problem would be to allow the new members to print an amount of Euros that corresponds to the domestic-currency monetary base at the beginning of the transition process towards membership. Alternatively, the extent of private sector euroization, and hence the extent of the resource cost, could be reduced by making the transition process shorter.[6]

5.2 Countries that dollarize unilaterally.

While equity considerations can be evoked to argue that new EMU members should be compensated for the loss of seignorage due to private sector euroization in the transition period, it is less clear that this argument applies to countries that dollarize unilaterally. After all, since they do so completely voluntarily, their citizens are presumably better off compared to a situation where the old currency is maintained. However, this does not change the fact that such dollarization involves resource costs and transfers from the (generally poor) dollarizing country to the United States (in the case 'dollarizing' refers literally to the adoption of the US dollar). In addition, since it is almost costless for the United States to provide the dollars in exchange for the local currency, the equity motive for doing so does have some merit.

It may also be in the longer-term interest of the United States to provide a country with the initial stock of dollars in order to give some incentives to adopt this currency. On purely commercial grounds, such an 'investment' does have a return in terms of the continuous flow of seignorage thereafter.[7] In addition, if dollarization in a number of countries increases the role of the dollar more generally as an international currency, additional gains for the US may materialize.

6. Concluding remarks.

The main novelty of this paper concerns the interaction between the spontaneous use of dollars by the private sector and the government's incentive to dollarize officially. Under normal conditions this interaction results in an equilibrium with low level of effective dollarization in the

[6] See Genberg (2002) for a more detailed discussion.

[7] This abstracts from the possibility that the 'dollarizing' country would 'shop around' among alternative suppliers of an international money and be able to extract a portion or even all the present and future seignorage gains by searching for the best terms.

economy and a low probability of official dollarization. However, developments that increase the government's perceived benefit from giving up the local currency or the private sector's actual use of dollars can set in motion a dynamic process which will eventually bring about the complete facing out of the domestic currency.

In future work it would be interesting to investigate whether the processes that led to the dollarization in Ecuador and El Salvador can be described by the interactive process emphasized here, and whether it is possible to identify the critical parameters that can set in motion the cumulative process of endogenous dollarization. The evolution of the use of the Euro in the EU accession countries could be a test of the model's predictions.

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