

THE BENEFITS OF CURRENCY SUBSTITUTION DURING HIGH INFLATION AND STABILIZATION¹

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Abstract:

Allowing currency substitution in a very high inflation helps to maintain the level of output, as the distortion of the information carried by prices is mitigated. The total (primary plus secondary) money supply may increase if currency substitution is permitted. Currency substitution does not even necessarily reduce the real primary money stock. Moreover, the demand for the primary money fragments at very high rates of inflation, which means that the authorities may lose little when they give up the attempt to obtain inflation tax revenue. Currency substitution need be no more expensive, in terms of the real resources it consumes, than is indexation. Finally, the availability of a second stable currency may reduce the severity of post-stabilization recessions.

Introduction

A multiple monies approach to the analysis of hyperinflation takes as its starting point that in a hyperinflation the usual single money system breaks down into a multiple monies economy (Auerbach, 1979). As a result, the hyperinflating primary money need not be the most important money—neither in terms of the real value of its total stock relative to that of other monies nor in terms of the functions it performs. In such a multiple monies economy, in which there may be one or more secondary currencies in use as well as several commodity monies², the hyperinflation affecting one, possibly rather minor, money should not necessarily be thought of as the only significant monetary event taking place. Without denying that the hyperinflation of the primary money is the original cause of the emergence of the multiple monies system, it seems that the traditional approach to analysing hyperinflationary episodes almost exclusively in terms of the primary currency (its depreciation, velocity, real mass, devaluation) is subject to

severe shortcomings. Such an analysis may well leave the bulk of monetary phenomena, and in particular their real effects, outside its purview. It is my belief that these shortcomings result not only in theoretical errors (see Auerbach, Davison and Rostowski, 1992) but also in mistaken policy advice.

In the paper I draw extensively on earlier work on the Russian hyperinflation and stabilization of 1922-24 (Rostowski and Shapiro, 1992). Three key points emerge from an analysis of the Russian episode. First, the introduction of the second currency significantly increased the monetization of the economy (total real money supply doubled in 1923), which allowed output to attain a higher level. Second, the introduction of the stable Chevrons (as the second currency was called in Russia), did not initially cause a decrease in the real value of the mass of the hyperinflating primary currency, the Sovznak. This casts doubt on the orthodox view that the introduction of a secondary currency must necessarily reduce the demand for the primary currency (a number of explanations are advanced in the paper). Third, the authorities took advantage of the non-homogeneity of money under hyperinflationary conditions to introduce the stable currency first in those segments of the market for money in which inflation tax revenue was smallest³. As a result the economy could benefit from a stable currency before the budget could be balanced and at a time when a large proportion of the deficit still had to be covered by note issue (i.e. by inflation tax on those kinds of money for which demand was relatively inelastic). I argue that this is also usually likely to be the case when dollarization is permitted.

Section 1 of the paper examines the real effects of permitting currency substitution during high inflation. Section 2 considers the relative merits of currency substitution and indexation as ways for an economy to adjust to high inflation. Section 3 shows that demonetization can be smaller in the presence of currency substitution, and examines the indirect effects on the demand for the primary currency of currency substitution via changes in output and the budget deficit. In Section 4, I argue that the fragmentation of the demand for money which occurs during high inflation means that the loss of seignorage resulting from permitting currency substitution may be quite limited. Section 5 examines the implications of the fragmentation of the demand for money for the desirability of indexation or foreign currency denomination of bank deposits, while Section 6 examines the case for a dollarization of the budget during a high inflation. In Section 7 it is argued that post-stabilization recessions will be less severe if currency substitution has been permitted during the preceding inflation and continues to be permitted during the stabilization.

1. High Inflation, Output and Currency Substitution

In very high inflations the amount of "noise" affecting the information carried by relative prices is large. Actors do not know whether given price changes are a result of changes in underlying supply and demand relationships for particular goods, or merely the result of changes in the average price level (Lucas, 1977). The result is that the elasticities of supply and demand with respect to relative price changes fall, the whole economy becomes more rigid, spending more time away from the optimal allocation of resources and thus at a lower level of output.

Moreover, high inflation is usually highly variable (Ball and Cecchetti, 1990). This damages the intertemporal allocation of resources. In the absence of a complete set of futures markets, in which case the need for any kind of money is problematic, the

primary currency loses its ability to perform both its store of value and unit of account functions. The reduction in the ability of money to perform its store of value function, as a result of the inflation tax, reduces savings and consequently investment. A reduction in money's ability to perform its unit of account function (because of inflation variability) makes investment more risky, and reduces investment directly. The reduction of the information carried by relative prices also makes investment more risky. The overall effect will be to reduce the level of output in the medium term.

If the use of a secondary currency is permitted these effects are initially mitigated, and then ultimately eliminated altogether as the share of the primary currency in total real money approaches zero (see section 3). Thus, during high inflation, in the presence of a secondary currency output will first decline and then increase, until it reaches a level similar to that which obtained before the disruption caused by high inflation began. In the case when the secondary currency is successfully banned, output will fall until it reaches the level sustainable in an economy in which the real stock of currency is arbitrarily small, and barter or inconvenient commodity monies are used to effect transactions. For any given high rate of inflation in the primary currency the level of output should be higher when the secondary currency is also used (Figure 1b).

Currency substitution does, of course, have a cost in terms of the seignorage paid to the country emitting the secondary currency. However, this is a gross, not a net cost. In the absence of currency substitution a number of commodities are likely to perform some of the functions of money, displacing the primary currency. There is thus a loss of consumption, either of the commodities concerned (if their supply remains unchanged), or of other commodities if the supply of these money-like commodities increases in response to the increased demand for them. This applies not only to commodities used as means of payment (e.g. cigarettes or vodka), but also to those which become stores of value. Thus investment projects may not be undertaken because the fungibility of land held as a store of value is reduced when it is built upon.

The Russian hyperinflation of the early 1920s provides evidence in support of these theoretical conclusions (Rostowski and Shapiro, 1992). In Russia the authorities introduced a second stable domestic currency 15 months before full stabilization. Industrial production rose by some 30% in the last year of the hyperinflation, whereas in both Germany and Poland the last period of the hyperinflation in 1923 led to a sharp disruption of production⁴. Contemporary observers had no doubt that the rapid continued growth in spite of the hyperinflation was made possible by the availability of the stable "chevrons" currency⁵.

2. Currency Substitution vs. Indexation

Economies adjust to high inflation in one of two ways: the first is indexation, the second is currency substitution. Both are commonly viewed as causing an acceleration of inflation, although it is sometimes admitted that they also mitigate the disruptive real effects of high inflation (Dornbusch, Sturzenegger and Wolf, 1991). Like indexation, secondary currencies facilitate inter-temporal contracts. In very high inflations contracts which are to extend over significant periods must either be indexed or expressed in a stable second currency. However, using a secondary currency for this purpose is more efficient since much indexation can only take place discretely and the time between valorizations cannot be the same for all goods, so that relative prices vary sharply between valorizations. This is the well known Taylor effect (Taylor, 1983)⁶. However, this

price variability is not due to changes in underlying conditions in various markets. Thus, the ensuing price variations do not carry useful information to economic actors. On the contrary, actors taking decisions have to try to "clean" the price signals they receive of this noise. The income effects of the Taylor price variability are also inconvenient to many economic actors.

Also, unlike indexation secondary currencies make it easier for relative prices at a point in time to vary in response to underlying market conditions, and for variations in relative prices to act as signals to economic actors. Indeed indexation, far from helping to solve this problem, actually, makes it worse. If we abstract from the Taylor effect, the greater the number of individual prices which are linked to an average price index the less scope there is for changes in relative prices, because the prices of all indexed goods are fixed relative to each other. At the limit, an economy in which all prices were indexed would be one in which all relative prices would be absolutely rigid. Thus indexation reduces useful, information conveying, price variations and increases useless accidental price variability resulting from the Taylor effect. Secondary currencies allow the economy to avoid these costs while still facilitating inter-temporal contracts. They are therefore likely to lead to the maintenance of a higher level of output during high inflation than will result from indexation.

Furthermore, the rigidity induced by indexation makes highly indexed economies highly susceptible to an acceleration of inflation whenever such economies are subjected to supply shocks (Dornbusch, Sturzenegger and Wolf, 1990). An increase in the relative price of certain goods, either foreign or domestic (for instance because of a failed harvest), increases the price level and, through the indexation mechanism, the prices of all other goods, which in turn feeds back into the prices of the original goods'. The economy thus ends up at a high rate of inflation. If there is currency substitution rather than indexation, this effect will not be present⁸.

Finally, it may appear that indexation has the advantage over currency substitution of saving on the seignorage which has to be paid to the country emitting the secondary currency. However, it is not clear that this results in any net saving. Although currency substitution requires the payment of seignorage, indexation requires devoting of considerable real resources to the financial services sector. Thus, in Poland in the 1980s hard currency transfers, which were the source of the economy's dollarization, accounted for about 3% of GNP per annum⁹. These transfers were the proceeds of illegal work by Poles in the West, and were effectively the result of the country's export of labour. These costs can be compared with the case of Brazil, where widespread indexation and high inflation caused a huge expansion of the financial sector from 6% to 12% of GNP between 1970 and 1985 (Lees, Bouts and Penha Cysne, 1990)¹⁰. Thus quite apart from the better effect on output, currency substitution need be no more expensive, in terms of the real resources it consumes, than indexation.

3. Currency Substitution and De-monetization

A simple monetary model of hyperinflation in a single currency economy is presented by Dornbusch (1987). Rational expectations are assumed, as is the full monetization of the budget deficit:

$$m_t = 1y \quad (1)$$

where

n = the growth rate of nominal primary money

m_t = M_t/P_t = real primary money balances

1 = the budget deficit as a share of output

y = real output

There is also a linear velocity equation:

$$y/m_t = a + bp_t \quad (2)$$

where

p_t = the rate of inflation of prices denominated in the primary money

Assuming a steady state in which $n = p_t$, gives:

$$m_t = y/(a + bn) \quad (3)$$

The real money supply thus depends on the growth rate of nominal money and the two parameters of the velocity equation. An increase in a , brought about by a flight from the primary money due to an increase in the use made of secondary monies will thus reduce m_t , the real primary money supply. This in turn increases the growth rate of nominal primary money required to finance the budget deficit, leading to an increase in inflation.

However, it is only part of the total real money stock which declines. What happens to total real money, i.e. whether there really is a demonetization of the economy or not, depends on whether the increase in the real stock of the secondary currency, m_t , is less than the fall in the real stock of the primary currency m_t^{11} .

In a single money economy the real money supply declines continuously as inflation increases, until it reaches trace levels and only commodity monies (vodka, cigarettes) are used¹². In the presence of a secondary currency the path taken by the total real supply of currency (the primary plus the secondary currency) is more complex. In the initial stages of the inflation, when the inflation tax on currency holdings is relatively small, the use of the secondary currency is limited. However, given the public good aspect of a currency, the more the secondary currency is used the lower the costs of switching into it become. Thus as the inflation accelerates the use of the secondary currency will spread ever faster¹³. Like output, the total real money supply will, therefore, follow a U-shaped path, falling in the early stages of the inflation when the primary currency is dominant, and rising again as the increase in the use of the secondary currency begins to outstrip the fall in the primary currency (see Figure 1a). At the end of this process none of the primary currency will be used, the entire money stock will consist of the secondary currency¹⁴, and the total real money stock will be close to its level of before the inflationary episode.

Thus, at any given rate of inflation the total real money supply may be higher in the absence of a secondary money than in its presence. Nevertheless, the higher the inflation and the longer it has lasted, the less likely is this to be the case.

Earlier in this section the case against the use of secondary currencies was outlined: their presence acts (directly) to shift the demand curve for the primary currency inward. However, when the indirect effects of a secondary currency via output and the budget

FIGURE 1a

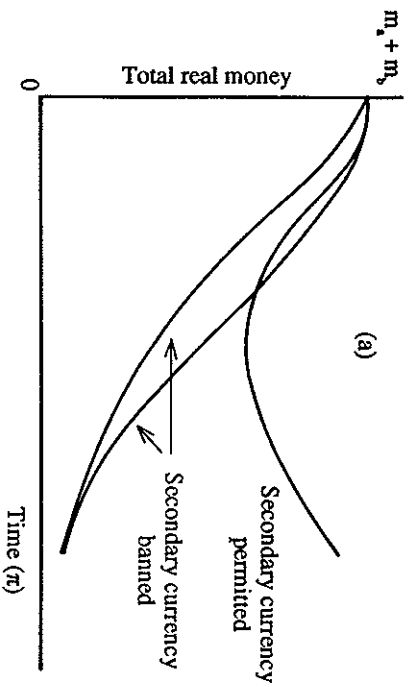
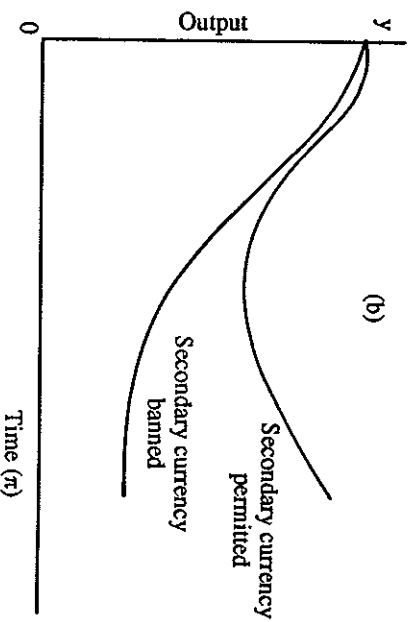


FIGURE 1b



deficit are taken into account, the presence of a secondary currency may possibly even increase the demand for real primary currency balances, rather than reduce it.

In the simple Dornbusch framework outlined at the beginning of the section it is explicitly assumed that the budget deficit is fully monetized, as is likely during a high inflation. Dornbusch, however, assumes that the deficit is exogenously given. In fact, for a given path for real government spending, the deficit will rise as real output falls, since tax collections decline. In a single currency economy the decline in output is likely to be larger than in one in which a secondary currency is permitted, requiring greater increases in money growth which will generate even higher inflation. Moreover, with lags in tax collection, inflation erodes the real value of tax revenues via the Tanzi

effect and thereby exacerbates the inflation even further. If taxes on economic activities using the secondary currency are raised at the time of payment, then the Tanzi effect on currency at the spot rate of exchange at the time of payment, then the Tanzi effect on these activities is eliminated, which reduces the budget deficit.¹⁵ Furthermore, legalization of currency substitution means that transactions in which the secondary currency is used are legal. Such activities are therefore less likely to go unreported to the tax authorities, helping to reduce the budget deficit.¹⁶

What is decisive here is whether the overall budget, including inflation tax revenue, is affected more strongly by the Tanzi and legalization effects or by the reduction in the inflation tax base caused by currency substitution. Thus a country may be on the upward sloping part of its inflation tax Laffer curve as regards gross inflation tax revenues, and yet be on the backward sloping part of the curve when inflation tax revenues net of the legalization and Tanzi effects on other revenues are taken into account. In such a case currency substitution will result in a lower inflation tax rate being needed to balance the budget, which will in turn lead to an increase in the demand for real primary currency balances. If a country is on the upward sloping part of its "Tanzi and legalization effects-adjusted net inflation tax Laffer curve" then indeed the overall budget imbalance will be worse in the presence of currency substitution, a higher inflation tax rate will be required to finance expenditures, and the ensuing higher rate of inflation will result in declining output of those economic activities which involve the use of the primary currency in transactions.¹⁷ However, it is important to note that as regards the overall output of the economy such a reduction will be transitory, as the higher inflation will cause an acceleration of the shift in activities to the secondary currency using sector of the economy, in which output is protected from the disruption caused by higher inflation. The negative effect of currency substitution on the budget will therefore also be transitory. At the limit, if the secondary currency is foreign, and if almost all activities use the secondary currency, then the government will be forced to balance the budget without recourse to the inflation tax.

In much of the above we have assumed that the use of secondary currencies can be banned successfully. In fact in most high inflations in which secondary currencies have been banned, they have been used extensively in spite of their illegality. The advice to ban, is thus advice to render the use of such currencies less widespread, rather than to eliminate it altogether. In such cases the impact of lifting the ban will be smaller, both as regards the undesirable direct effect on the demand for the primary currency and the desirable effect on output. However, the desirable effects on the budget deficit, inflation and the demand for the primary currency which result from the retention of secondary currency financed activities within the tax base and from the elimination of the Tanzi effect on part of the tax base through the dollarization of tax revenues are not reduced.

In Russia in 1923 the introduction of the second relatively stable "chevrons" currency resulted in an acceleration in total real domestic currency growth¹⁸ (see Tables 1a and 1b). Most significant, however, is that it was not only the total stock of real money which increased. While the real stock of the secondary currency increased rapidly to 28% of the real primary currency stock in the five months after the introduction of the chevrons, the Sovznak primary currency far from declining, as the orthodox view of currency substitution would indicate, also increased by some 23% (compared to the fall of 56% in the same period of 1922) (see Figure 2). These developments are certainly difficult to square with the orthodox view that the introduction of a secondary currency necessarily reduces the real stock of the primary currency.

TABLE 1a

CIRCULATION, 1921-1923, IN MILLIONS OF PRE-WAR (1913) RUBLES

	Sovznaki		Chervonetsy		Transport Certificates		Total
	1921	1922	1923	1923	1923	1923	
January	69.6	60.9	93.9	2.9			96.8
February	60.1	54.6	94.9	6.4			101.3
March	53.9	42.1	104.0	12.3			116.4
April	47.2	32.2	114.2	19.7			133.9
May	44.9	31.1	111.0	31.3			142.3
June	34.2	42.0	90.9	34.9			125.8
July	29.1	55.2	76.8	45.2			122.0
August	35.0	85.0	63.9	63.9			127.8
September	46.0	116.1	50.3	97.7			148.0
October	55.3	116.0	45.1	125.7		0.2	171.0
November	67.9	94.8	62.6	143.2		2.7	208.4
December	71.3	90.0	50.0	133.7		3.0	186.7

Source: Calculated from Yurovsky (1926), pages 153 and 248.

Note: Small differences between totals and constituent parts due to rounding.

TABLE 1b

CIRCULATION, 1924, IN MILLIONS OF PRE-WAR (1913) RUBLES

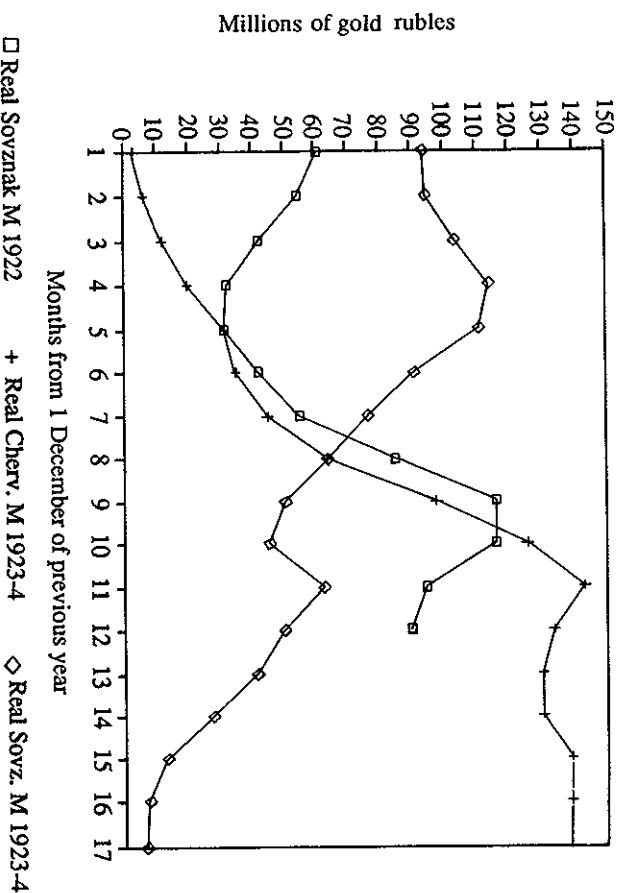
	Sovznaki	Chervonetsy	Transport Certificates	Treasury Notes	Total
January	41.3	130.3	5.3		176.9
February	27.5	130.2	6.2		164.0
March	13.1	139.3	9.3		173.1
April	7.3	139.2	10.0		189.1
May	7.0	139.1	10.0		207.3
June		139.9	10.2		231.6
July		142.0	1.6		234.1
August		136.2			240.4
September		154.9			279.9
October		180.7			327.0
November		190.1			348.5
December		201.7			365.2

Source: As Table 1a, also see Arnold (1937), page 191.

Note: Small differences between totals and constituent parts due to rounding.

FIGURE 2

SOVZNAK AND CHERVONETS REAL MONEY, 1922-24



4. The Fragmentation of the Demand for Money under High Inflation

Under normal conditions the various functions of money are thought of as all being fulfilled by a homogeneous primary money for which there is a single homogeneous demand function. Under the impact of hyperinflation the demand for money fragments into demands for different forms of money which fulfil the various functions of money to differing degrees. The usual approach of treating the primary money as a single homogeneous commodity thus becomes and over-simplification.

Any particular sum of money held by an individual is both a store of value and can be used as a means of payment. Nevertheless, because of convenience in use and transactions costs, money held primarily as a store of value will tend to be held in the form of bank deposits and large denomination notes, as will money held mainly for the purpose of effecting large transactions, whereas money held for the purpose of effecting small transactions will be held in small denomination notes and coins. Under conditions of very high inflation the demand for these different forms of money will fragment, so that there will be separate demand functions for bank deposits, large denomination cash and small denomination cash.

Let the demand for real balances under conditions of low inflation be:

$$(M/P)^d = h(Y, r, p) \quad (4)$$

where

r = nominal interest rate
 $e_p < 0$ is the elasticity of $(M/P)^d$ with respect to inflation.

The demands for various forms of money (bank deposits and high and low denomination cash) are determined by their relative convenience for various uses, which changes only slowly over time.

Under very high inflation we may have:

$$\begin{aligned} (M/P)^d_1 &= h_1(Y, r, p) & (4') \\ (M/P)^d_2 &= h_2(Y, r, p) & (4'') \\ (M/P)^d_3 &= h_3(Y, r, p) & (4''') \end{aligned}$$

where
 $h_1(Y, r, p)$ is the demand function for non-interest bearing non-indexed bank deposits

$h_2(Y, r, p)$ is the demand function for large denominations of cash
 $h_3(Y, r, p)$ is the demand function for small denominations of cash

and

$$0 > e^3 > e^2 > e^1$$

This is because it is easiest to find substitutes for a hyperinflating currency to fulfill those functions of money which are performed by the high denominations of a currency and by bank deposits — i.e. its store of value and means of payment for large transactions functions. Many goods, including land, as well as secondary currencies can perform the store of value function, as can commodity monies such as vodka or gold. Moreover, the costs of using a depreciating currency as a store of value are obviously very high because, ex definitione, the money is held for a considerable time, so that with a high unit inflation tax rate and high elasticity of the demand for these kinds of money with respect to the rate of inflation, very little of the primary money will be held as a store of value in a hyperinflation. Thus the loss in inflation tax revenue in this segment of the market for money resulting from permitting currency substitution will be very small.

The same applies to money used to finance large transactions. Although the inflation tax per money unit is smaller than in the store of value case, because the money is held for a shorter period of time, the total amount of inflation tax paid on the money used to finance one large transaction is large. The whole of this tax can be avoided by executing the transaction in some means of payment other than the depreciating primary money. With inter-firm transactions the use of illegal means of payment may be difficult, but larger firms will find it easier to engage in pseudo-barter, in which some widely used industrial commodity such as crude oil comes to be used extensively as a commodity money (crude oil and tankers of vodka were said to be used by state enterprises as commodity monies in the ex-Soviet Union during 1990-1). Larger firms will also find that, because of their highly organized nature, specialized knowledge of their market and often very specific needs, they can engage relatively easily in true barter among

themselves. Smaller traders on the other hand can take the risk of using illegal means of payment (foreign currency and gold) for their larger transactions. With small change, however, the sums involved are not large, the amount of time they are held is likely to be short, and the transactions costs of converting them into other means of payment could be relatively high. Thus it is not surprising that the demand for primary currency as small change holds up best in a high inflation¹⁹.

To summarize, in a hyperinflationary economy the fall in the real primary money supply is a process by which all of money's functions except the facilitation of small transactions are successively abandoned and the primary money collapses into small change.

The fragmentation of the demand for money has an important implication for the desirability of currency substitution. To the extent that the secondary currency is a substitute for the primary currency mainly as regards those forms of money (bank deposits and high denomination notes) for which the elasticity of demand with respect to the inflation tax is high, then the direct effect on the demand for the primary currency of allowing currency substitution will be small. At the same time the secondary currency will help to maintain output, sustaining budget revenues and possibly even limiting primary currency inflation. Thus, it is not necessarily the case that there is a symmetry of costs and benefits, whereby the introduction of a secondary currency can have positive supply side (efficiency and output) effects only to the extent that it is a better substitute for the primary currency than are the potentially available commodity monies, and therefore in the degree to which the it has harmful direct demand side effects (i.e. reduces the demand for the primary money).

In Russia, after the introduction of the "chervonets" in late 1922, the hyperinflating Sovznak currency was limited to servicing first medium and then small scale transactions. This helps to explain why the chervonets initially did not compete with the Sovznak and failed to cause a fall in the real Sovznak money stock. Instead it fulfilled a need which the Sovznak had long since ceased satisfying.

5. The Desirability of Financial Sector Adaptation to High Inflation

The fragmentation of the demand for money at high rates of inflation implies that financial sector adaptation to high inflation need not be as damaging as is sometimes implied (e.g. Dornbusch, Sturzenegger and Wolf, 1990). With the demand for non-indexed deposits and large denomination notes exhibiting higher elasticities with respect to the inflation tax rate than does the demand for small change the authorities may lose little in terms of inflation tax revenue when they give up the attempt to tax primary currency held mainly as a store of value, and allow the establishment of index-linked or foreign currency denominated savings accounts and time deposits.

What they gain is the protection of the financial system of the economy, and in particular the role of the banks in that system. In the absence of the indexation of loans, high inflation leads to very negative real interest rates (e.g. in the presence of interest rate ceilings) or to very high nominal rates. The first leads to disintermediation, the second to the disappearance of all but very short term lending as high nominal rates imply very rapid amortization of the real value of loans. Whether time deposits are indexed or merely benefit from very high nominal interest rates is in principle immaterial. The advantage of indexing or exchange rate linking such deposits is that it guarantees than the authorities will not try to impose negative real rates on deposit holders as a

way of earning seignorage. This means that the real rate on longer term deposits need not incorporate a risk premium reflecting this danger, and can therefore be lower.

Furthermore, to the extent to which sight deposits are used mainly to finance large transactions, the refusal to index or pay market based interest rates on sight deposits at very high rates of inflation could also cause severe disruption of the payments system via the banks, without helping to maintain inflation tax revenue. Actors will simply switch to illegal use of secondary currency, to commodity monies or barter²⁰.

The question is whether financial sector adaptation to high inflation, via indexation of loans and market based interest rates for both time and sight deposits is better or worse than the use of a secondary currency. The effects on government's ability to earn seignorage are likely to be similar under both sets of institutions, as are the real resource costs (see Section 3). However, in the absence of a secondary currency the establishment of intertemporal comparability of prices will require widespread indexation, with all the disadvantages described in section 3. If prices are set in a foreign currency and transposed into the domestic currency at the time of sale according to the spot exchange rate, relative prices should be as undistorted as when a secondary currency is used²¹.

6. Dollarization of the Budget

The *Tanzi effect*, by which accelerating inflation leads to declining real budget revenues and consequently increasing real budget deficits, is a process by which the budget itself suffers as a result of inflation. In Russia in the 1920s observers spoke of the inflation tax being "thrown back onto the budget" to describe this (Arnold, 1937). The dollarization of taxes eliminates the *Tanzi effect*, but these benefits can only be obtained at the cost of reducing the demand for the primary currency²². A government contemplating such a change must therefore consider whether the benefits in terms increased real tax revenues will more than offset the loss of inflation tax revenue or not. If stabilization were sufficient on its own to increase taxes through the reversal of the *Tanzi effect* to such an extent that the budget became balanced, and no longer needed to rely on the inflation tax²³, then the dollarization of taxes would also lead to the balancing of the budget, even if this required that expenditures also be dollarized²⁴.

7. Currency Substitution and Stabilization

In single currency economies post-stabilization recessions stem from the high real interest rates which accompany stabilization. These result either from the sharp increase in the demand for money after the elimination of the inflation tax, or from the lack of credibility of the stabilization (exchange and default risk) (Dornbusch and Simonsen, 1988). Since policymakers do not know which is the true cause of the high real rates, it is often the case that in successful stabilizations they err on the side of caution, that is on the side of liquidity shortages²⁵.

If actors have access to a secondary stable currency the economy will be less demonetized so that the increase in the demand for the primary currency relative to the value of total transactions will be smaller, and the post-stabilization recession may be smaller. For this to be the case it is necessary that there be hysteresis in the spread of the use of the secondary currency, which will happen if there are fixed costs of switching to the use of the secondary currency. An example of such fixed costs is the need to

switch over to accounting systems denominated in the secondary currency. Actors will switch to the use of the secondary currency only when the expected net present value of the inflation tax exceeds the net present value of the costs of using the secondary currency. The existence of fixed costs of switching means that upon stabilization (which of its nature must be unexpected) only a proportion of actors will switch back to using the primary money. In other words, the pre-stabilization elasticity of substitution between the two currencies will be higher than post-stabilization. If the post-stabilization elasticity of substitution is sufficiently low, and if the share of transactions financed by the primary currency is sufficiently low, then the recession resulting from stabilization of the primary currency will be smaller than in the absence of currency substitution²⁶.

Calvo and Végh (1990) show that if the stabilization is exchange rate based, credible and there is perfect capital mobility, then there will be an expansion of economic activity. This is because with perfect international capital mobility increased demand for the primary currency can be fully satisfied without the domestic inflation rate having to fall below the rate of primary money creation²⁷. However, many countries may be capable of enjoying only perfect internal capital mobility without perfect international capital mobility, as foreigners may not consider that they are sufficiently well informed to assess the credibility of the stabilization in the medium term. In such a situation only currency substitution before stabilization would provide the domestically held foreign currency needed to make the post-stabilization expansion possible in the case of a domestically credible (but internationally non-credible) stabilization.

Furthermore, if the exchange rate based stabilization is not credible the situation is less advantageous if currency substitution was not permitted before the stabilization. Exchange rate based stabilization entails the possibility of converting domestic currency into foreign currency. This will lead to capital flight if the maintenance of the right to hold and use foreign currency domestically after the expected failure of the stabilization is itself not credible. Such a lack of credibility is more likely if currency substitution was not permitted before the stabilization. Thus, if the maintenance of legal currency substitution after the expected failure of the stabilization is credible, then with a non-credible exchange rate-based stabilization there will merely be a continuation of the pre-stabilization situation with a significant amount of foreign currency held domestically — i.e. capital flight will not occur. Of course, if both lenders and borrowers agree on high interest rates on primary currency loans because the stabilization is not credible, there may still be a recession when (if) these expectations are falsified, as many borrowers may go bankrupt.

Finally, in single money economies, stabilization leads to a "relative price shock" as the price distortions caused by the high inflation are suddenly unwound. In the absence of currency substitution the flight from money does not take the form of an indiscriminating flight into all goods uniformly as is usually assumed. Instead the flight will be mainly into those goods which are good substitutes for money (Auerbach, Davison and Rostowski, 1992). Thus, during high inflation the relative price of land or dry goods may rise because these are good stores of value, while the relative price of crude oil may rise because it is a good means of exchange for large transactions between enterprises. The relative price of cabbages (or labour) may, on the other hand, fall. When stabilization occurs, relative prices return to their previous levels. Production which was profitable ceases to be so, production which was not profitable becomes so. The reallocation of resources will not, however, be either instantaneous or smooth. This source of post-stabilization recession will be absent in a country in which currency substitution is permitted both before and after stabilization²⁸.

It is significant that in Russia, where a second stable currency was widely available, growth continued unabated after the monetary reform and stabilization. The economic year 1923-4 was a very good one, with industrial output increasing some 30%, with the growth concentrated in the period after the reform. The year 1924-5 was even better, with growth of industrial output exceeding 45%. The contrast with the other post-hyperinflation stabilizations of the 1920s is notable.²⁰

The relevance of the existence of the bi-paper standard to the Russian experience of stabilization is underlined by the fact that total real money grew by 40% in Russia in the last year of the hyperinflation, whereas it fell in the other four episodes of the 1920s²¹, and also by the fact that the post-stabilization re-monetization was smallest in Russia, indicating that the shortage of liquidity after the stabilization was less than in the other cases. The real currency stock grew 108% from the monetary reform until the end of 1924 in Russia. This compares with over 300% in the ten months following stabilization in Austria, about 200% in Poland and 14 times in Germany²¹.

Conclusion

Currency substitution mitigates the disruption caused by very high inflation, without necessarily accelerating the inflation. It does so in ways which seem more efficient than indexation. It is also likely to reduce the costs of stabilization. Finally, to the extent to which inflation tax is regressive, as is claimed for example by Dornbusch, Sturzenegger and Wolf (1990), then widespread legal currency substitution will act to equalize incomes.

Dollarization is the economy's natural way of protecting itself from high inflation. This can be seen by the way in which economies denied the use of adequate secondary currencies will spontaneously create them. Thus in Germany in 1923 large concerns paid their workers in "emergency money" (Notgeld), which enabled these to buy (often imported) goods at the firms' factory shops (Webb, 1989). In Russia transportation certificates (bills issued by the Commissariat of Transport) were "pressed into service" as currency by the population (Arnold, 1937). It is puzzling that whereas no one doubts that the spontaneous appearance of money as a result of the acceptance of certain commodities as a means of exchange leads to an improvement in economic efficiency (Goodhart, 1989), a similar process by which the economy adopts or creates secondary currencies when the primary fiat currency ceases to perform the functions of money efficiently, has met with so much resistance.²²

Notes:

- 1 This paper is based on Auerbach, Davison and Rostowski (1992) and Rostowski and Shapiro (1992). Any mistakes in the summary of our joint work presented here are, however, my own. I am also grateful for comments to Carlos Végh and a referee.
- 2 We distinguish between:
 - a) currencies, primary and secondary, which are "fiat" monies, with the primary currency being the deprecating domestic one and the secondary currency being the stable, usually foreign, one.
 - b) commodity monies, which are commodities, such as cigarettes or crude oil, used as money.
- 3 Gold and silver coinage can thus be considered a superior form of commodity money.
- 4 This is somewhat like applying higher tax rates to the goods with lower price elasticities, which is a property of an optimal tax system.
- 5 Young (1925) vol. 1, p. 121, reports that in Hungary production fell during the hyperinflation. Steiny unemployment data tells a similar tale (Whitaker, 1986, p. 356), and the same is true of Austria

(Sargent, 1982, Table 7). For Austria the available output data is uninformative as it is annual, and the stabilization took place in the summer of 1922.

2 Thus Yurovsky (1924), page 24), considered the strengthening of the economy in 1923 to have been "unthinkable" without the chevrons.

3 Taylor wrote about the effect of suggested indexation on the real wages (i.e. the relative price of labour) of different groups of workers. We extend the use of the concept to all indexed prices.

4 The prices of these goods are assumed to be free (i.e. undistorted), as is likely to be the case for goods sold discretely, such as agricultural produce or oil. In the case of goods sold on long term indexed contracts, such as electricity, the terms will have to be renegotiated.

5 If widespread indexation, free international trade and currency substitution are present, it will become impossible to buy certain goods with the domestic currency until inflation has reached the level at which relative prices clear the relevant markets given the new underlying supply and demand conditions.

6 At the fixed 1990 exchange rate at which Poland moved to convertibility. Since this rate was highly undervalued, these transfers in fact represented considerably less than 3% of GNP.

7 This should be compared with the 9% share of this sector in the USA, which is a far more developed economy (Tobin, 1984). Hypertrophy of the financial sector in Brazil due to very high inflation can therefore be guessed to be at least 3% of GDP.

8 Much of what follows is based on Auerbach, Davison and Rostowski, 1991.

9 An economy relying on the use of commodities as money will be less inefficient than one based on pure barter. Nevertheless, it will be less efficient than one in which there is a currency (or currencies) (see Auerbach, Davison and Rostowski, 1991, for a discussion of the costs of commodity monies).

10 However, the use of the secondary currency will not decline symmetrically with reductions in the rate of inflation as there are fixed costs of switching to the secondary currency (see section 7).

11 We abstract here from actions by government to force actors to use the primary currency (e.g. by demanding payment of taxes in it). Such policies, in any case have serious disadvantages, such as the reduction in the real value of tax revenues (the Tarzi-Oliveira effect), so that governments are sometimes forced to require payment of taxes in foreign currency.

12 If the latter mechanism is chosen, we do not even have a fall in the demand for the primary currency as a result of the elimination of the demand for it for the purpose of paying taxes.

13 I am grateful to Paul Auerbach for this point.

14 As a result, we would not necessarily have even the "direct" positive effect of currency substitution on the budget via increased output. It would depend on whether reduced output of primary currency using activities was greater or less than increased output of secondary currency using activities (on the assumption that both kinds of activities were subject to the same conventional tax rates).

15 We can see this when we look at what happened between the two eleven month periods of 1 January-1 December 1922 and 1923 respectively. In 1922 the real value of total paper money in circulation rose 55.6% in an uneven course over the eleven months. In 1923 the growth for the same period was more than double this, 115.2%.

16 If the supply of the various denominations of a currency is at any point in time fixed, there is either a varying exchange rate between the different denominations of currency (i.e. a single one million note can be bought for less than one million singles), or the lower denominations of the currency are in short supply. Alternatively, the authorities may respond to the lower demand for high denomination notes by printing less of them. This may help to account for the paradox of "cash crises" (Germany) which sometimes take place in the midst of hyperinflations. The explanation would go as follows: people are unwilling to hold deposits dominated in the primary money for the reasons described and because payment by cheque takes a long time and therefore bears a high inflation tax. People switch from deposits into cash to avoid inflation tax, thus causing the cash crisis. Furthermore the authorities print high and low denomination notes in the wrong proportions (roughly those of pre-hyperinflationary times), so that the real value of the stock of low denomination notes is insufficient to fulfil the function of small change because of hyperinflation. It may not be that there is not enough money (as Dornbusch (1987) suggests, but that there is not enough of the right kind of money (notes and small change).

17 In countries with very highly developed banking systems, such as Brazil, interest bearing overnight sight deposits can be used to finance even very small transactions (Lees, Boiss and Perth Cygne, 1990), which may reduce seigniorage as much as the use of foreign currency small change.

18 This is so as long as actors are free to actually use the secondary currency in any given transaction should they so wish. If they are not, a wedge is driven between the "dollar price" and the price in physical dollars of a given good, since the recipient of the domestic currency is forced to pay inflation tax during the time he holds it. This helps account for the "premium on goods" or undervaluation of the real exchange rate which can occur in a hyperinflation (Dornbusch, Sturzenegger and Wolf, 1990).

19 Unless the mechanism suggests in footnote 15 is followed.

- 23 Dornbusch (1987) comes close to implying that this was the case in Germany in 1924.
- 24 Such a policy would require the country to obtain additional foreign currency to serve as money within the economy, i.e. it would have to increase its payments surplus.
- 25 In those cases in which they err on the side of looser policy the stabilization fails. Given the high degree of uncertainty after stabilization, it may be possible for an economy to move from a situation in which real rates are high due to a lack of liquidity to one in which they are high due to the stabilization's lack of credibility as a result of excessive monetary expansion, without policymakers being aware of the change.
- 26 See Calvo and Végh (1990). The authors show that with a fully credible stabilization based on a reduction in the growth rate of the money supply (with perfect international capital mobility) the nominal interest rate in the primary currency falls, inducing substitution away from the secondary currency towards the primary currency. Since the growth rate of the primary currency is fixed, real primary currency balances can grow only as a result of primary currency inflation falling below the rate of primary currency growth. As price fixing is staggered this causes a recession, and the greater the elasticity of substitution between the two currencies the greater the recession. However, Calvo and Végh do not allow the possibility that the pre- and post-stabilization elasticities of substitution between the two currencies may be different.
- 27 Also, the reduction in foreign currency held by the population means an increase in holdings of interest bearing foreign bonds, a reduction in net seigniorage payments abroad, and therefore an increase in society's net wealth.
- 28 Nevertheless, a different kind of shock may be present. Upon credible stabilization smaller quantities of foreign currency will be demanded. As a result the real exchange rate of the domestic primary currency will rise, causing a fall in the competitiveness of exports and import substitutes. However, the same effect may be present in the absence of currency substitution; if there is a stock of foreign assets held by domestic residents, these will attempt (unsuccessfully) to increase holdings of the primary currency, causing a real appreciation (I am grateful to Carlos Végh for this point).
- 29 Poland suffered a marked stabilization crisis (Lardas and Tomaszewski, p. 61) as did Hungary (Whicker, 1986, p. 356). Germany first went through the "stabilization boom" (November 1923-April 1924) as the extreme disruption caused by the last phase of hyperinflation was removed. But this was followed by a more profound readjustment (the "stabilization slump") during the rest of 1924 and, according to Bressant-Turroni (p. 405-6), again from the summer of 1925. In Austria unemployment figures are sharply higher post-stabilization, but output does not seem to have suffered much (on the very imprecise data we have (Whicker, p. 355)).
- 30 In the year preceding stabilization real note circulation fell by 79% in Austria (over 13 months), 23% in Poland and 59% in Germany (Young, 1925). The data for Hungary could not be calculated exactly as the source does not specify for what day of the month note circulation is reported. Stabilization in Hungary took place about March 1924, and if the data on note circulation refers to the end of the month, then real circulation fell 35% in the preceding year. If on the other hand it refers to the beginning of the month, real circulation fell 30%.
- 31 No price index is made available for the post stabilization period by Young for Poland. As regards Hungary, real note circulation increased either by 150% or by 90% in the ten months following stabilization (depending on whether the data on note circulation applies to end or beginning of month). This relatively low remonetization in Hungary was, however, due to the much less rapid rate of inflation in that country in the last year of the hyperinflation (33% per month as compared to 45% in Austria, 66% in Poland, 70% in Russia and 212% in Germany). Also stabilization was a process and not an event in Hungary, taking some three months to be completed.
- 32 It is possible that this is partly due to a tendency by many macro-economists to concentrate on the problems faced by governments — whose seigniorage revenue appears threatened by currency substitution — rather than on those of other actors in the economy.

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