

Hyperinflation and the re-integration of monetary functions :
Argentina and Brazil, 1990-2002

Jérôme SGARD
CEPII (Paris) - Université de Paris-Dauphine

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CEPII - 9 rue Georges-Pitard 75015 Paris – France
Tel : 33 1 – 53 68 55 35
sgard@cepii.fr

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ABSTRACT

High inflation is generally associated with a fragmentation of monetary functions : the unit of account and unit of payments are split and transferred onto alternate institutional supports. This paper compares the Argentine experience, dominated by dollarisation, to the the backward-looking indexation of prices on domestic indices which was the rule in Brazil. This contrast is reflected in different inflation patterns as in the difficulties of stabilisation. After failed orthodox and heterodox attempts in the 1980s', both countries adopted a comparable 'third generation' strategy, which is the core of the paper : respectively, the bimonetary Currency Board regime and the Real plan, which wholly reconstructed a single national monetary unit. However, while the latter resisted the 1999 sharp devaluation and allowed for an orderly adjustment of relative prices, the un-pegging of the Argentine peso led to a unique experience where the payment system, the unit of account and unit of payment have been separately destroyed.

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1- Introduction

Episodes of high or hyperinflation in Latin America during the 1980s, or in Eastern Europe in the early 1990s¹, have raised a new interest in these forms of extreme monetary instability. After earlier post-World Wars experiences had seen a first series of contributions¹, this newer literature has concentrated mostly on three main topics : the causes of hyperinflation, which generally brings back to fiscal and public debt issues, the short term dynamics of high inflation and the different possible strategies for stabilisation².

The basic analytical framework remains, to a large extent, the model proposed by Cagan (1956), where inflation accelerates exponentially as money supply becomes endogenous to the agents' expectations and requires, in order to be stopped, a simultaneous corrections of both expected and actual inflation. Beyond this very short-term process, a series of factors may then be integrated. The closer to Cagan's approach is the standard Laffer curve on seigniorage revenue which increases the elasticity of prices to excess money supply, as the respective tax base shrinks. This may in turn respond i.a. to increased public deficits linked to the real term devaluation of fiscal revenues and further reliance upon seigniorage (Oliveira-Tanzi effect). A more structural framework proposed by Sargent and Wallace (1981) then explicitly links excess budget deficits over the medium term with an unsustainable accumulation of debt and its eventual monetisation. Here, hyperinflation is not anymore modelled as a pure flow problem (excess money supply), but as the resolution of a stock problem : namely the insolvency of either the State or, the experience tells, the banking sector; inflation should then be opposed to alternate methods for reducing over-indebtedness, such as a cut in the foreign debt or any other formal capital levy.

One issue however has attracted much less interest than the actual mechanics high inflation : its long-term consequences on monetary adjustments and on the real economy. In an early series of case-studies, Bruno et alli (1991) for instance have analysed the immediate impact of stabilisation : they identify first a tendency for a demand-led recovery, when inflation tax and the overall uncertainty caused by inflation fall; it is then followed by a slow-down which reflects supply-side adjustment constraints linked to the changing competitive environment in which firms operate³. Otherwise, the enduring impact of high inflation tends to be interpreted exclusively as an extended loss of credibility by the monetary authority : this would typically call for a strong rule-based regime, implemented by an independent Central bank which would exclusively target a low level of inflation.

¹ The usual reference for the 1920s' is Bresciani-Turoni (1937), but one may also consult Fischer (1922), Hayek (1923), Keynes (1923) or Cassel (1932).

² Cagan (1956) conventionally defines hyperinflation as a period of at least two consecutive months during which the rate of inflation is above 50% per month ; conversely, hyperinflation finishes when inflation is brought under this threshold for two consecutive months. Empirically this criteria proves rather demanding and is rarely observed : many inflationary episodes have presented patterns close to those observed in a Caganian hyperinflation, while not falling under its exact definition.

³ See for instance the contribution by Bruno and Meridor on Israel, in Bruno et al. (1991); Dornbusch (1991) and Bruno (1993).

Remarkably, the point was already at the core of the policy debate in the 1980s, which opposed standard monetarist approaches to the so-called theory of 'inertial inflation'. While the former rest with various qualifications on the quantitative theory of inflation, the latter relied upon an explicit institutional framework. Its main emphasis was on the individual and collective mechanisms whereby agents defend themselves against the redistributive impact of inflation on revenue and wealth. Typically, the argument says, in countries with a long experience of inflation, price mechanism will tend to include *ad hoc* clauses which automatically adjust payments due to nominal depreciation; this can be typically the case for labour and debt contracts.

This has a key consequence : nominal prices, which determine actual payments due, become differentiated from real prices which reflect the initial competitive adjustment of market forces, i.e. the terms of trade. Inflation thus leads to monetary dis-integration : the unit of payment and the unit of account, which in principle should be strongly articulated within a single national money, tend to be split and then transferred separately onto alternate supports. The standard case in developing countries is dollarisation, where both units are fractured : people would use rubbles only for daily payments, while counting, saving and investing in foreign currencies - euros accounts in local banks, hoarding, or capital flight. An alternate option is indexation on domestic price indices, as had often been the case in OECD countries in the 1970s' and early 1980s' : here nominal wages and prices tend to automatically incorporate the past drift in the consumer prices, so that they become increasingly backward-looking. Where Argentina was already in the 1970s a typical case of a dollarised economy, Brazil developed on a large scale indexation methods.

Once inflation is considered a process of monetary dis-integration, stabilisation should as well include the reverse process whereby monetary functions are re-integrated within a national money. Here in particular analytical knowledge is very limited. While for instance monetary substitution, however defined, are rather well-researched (Calvo and Vegh, 1992), de-dollarisation has attracted much less interest : few is known, beyond the usual but problematic statement that such process is more an exception than a rule, even after prolonged periods of low inflation⁴.

From this viewpoint a low rate of price increase or even the absence of inflationary taxation are however insufficient criteria of institutional stabilisation. As well, the underlying tendency for nominal shocks to produce permanently higher levels of inflation –inertial inflation – is more a symptom of key monetary weakness. The key issue is indeed the link between the national unit of payment and the unit of account, on which the capacity to adjust relative prices depends. In principle, they should permanently modified after a one-off price correction in a specific sector, such as agriculture, or more commonly after a shock on the exchange rate. If dollarisation or indexation is pervasive, such specific shocks on prices will be followed by a general increase in all prices, which is inflation. Hence, terms of trade and the relative competitiveness or profitability of sectors will not be much affected, and the real economy will adjust poorly, whether internally or externally. While dollarisation and indexation accommodate monetary shocks and protect the real economy against them, the reverse movement aims at recovering the capacity for monetary adjustments to affect real term decisions on production, expenditures and investments.

This article compares the respective Argentinean and Brazilian experiences with inflation stabilisation and the further re-integration of monetary functions, up to the two respective crises : the un-pegging and sharp depreciation of the Brazilian Real, in 1999, and the catastrophic exit from the Argentinean Currency Board, in January 2002. In the first instance a reconstructed national money resisted the initial inflationary impact and then supported a permanent adjustment in the terms of trade. In the second case, a comprehensive brake-down of monetary order was observed which, from a structural point of view, went further than had been the case during the great hyperinflation of 1989. The key

⁴ A standard example is Bolivia where, more than 15 years after hyperinflation has been stopped (1985), the dollarisation of the broader monetary aggregates was still close to 85 %. On the other hand, Israël (after 1986) and Poland (after 1990) are two classical examples of de-dollarisation, which has been obtained mainly thanks to a strong appreciation of the real exchange rate, over the medium term.

argument is that these contrasted outcomes reflect the different stabilisation strategies adopted in the early 1990s' in order to put an end to high inflation and re-integrate monetary functions; and in turn, these were heavily influenced by the respective accommodation methods developed in the decades before, in order to limit the redistributive impact of inflation. In this sense, the pattern of short-term, violent monetary crisis is directly linked to the long term evolution of monetary functions and institutions.

Part 2 sums up the respective experiences with accommodation to high inflation and attempts at stabilisation till the late 1980s'. Part 3 analyses the conditions under which the Argentinean Currency Board was adopted while Part 4 shows that this strategy share common theoretical premises with the Brazilian 1994 Plano Real and analyses its relative success till 1999. The next section centres on the monetary collapse in Argentina which started in fall 2001 and the part 6 concludes.

2- The protection against high inflation

Steadily accelerating rates of inflation since the 1960s, in Argentina and Brazil, showed early on contrasted national patterns. The former case was marked by the bad overall quality of macroeconomic management and a rapid weakening of the financial system, especially after radical liberalisation reforms were attempted in the late 1970s. This was reflected in a regime of highly unstable inflation and extensive reliance upon seignorage, marked by three successive crisis episodes between 1973 and 1985 : each saw a violent acceleration in prices, a steep fall in the exchange rate and a one-off jump in the overall degree of dollarisation of the economy (Sturzenegger 1991, Balinõ 1991).

<<< GRAPH 1.a & b >>>>

In Brazil, by contrast, the acceleration in inflation has been more progressive, due i.a. to lower budget deficits, a smaller reliance upon seigniorage, with less monetary shocks along the road and much larger overall real growth. The main characteristic of this experience however was the early development, already in the 1960s', of comprehensive mechanisms of domestic indexation for goods and services, wages, financial assets or fiscal liabilities (Fishlow 1974, Lara Resende 1990, Simonsen 1995). At least in the short term, the benefits are uncontested : indexation better protects the real economy from the destabilising impact of inflation. Whereas for instance the Argentinean economy contracted by 6,2% during the 1989 hyperinflation, Brazil grew by 5,3% in 1993, the last full-year of high and accelerating inflation – a rare example which partly explains why the eventual stabilisation was exceptionally late. The counterpart is that all shocks on prices, most notably on the foreign exchange, tended to be systematically absorbed into the going rate of inflation : already in the 1970s', monetary policy explicitly targeted real interest rate, which helped smoothening the impact of inflation but also implied a *de facto* loss of control on inflation (Garcia 1996).

<<< Graph 2 >>>

The alternative between dollarisation of the Argentinean type and the Brazilian methods of domestic indexation has a key microeconomic, supply-side dimension. On the one hand, anchoring prices and possibly a share of actual payments on a foreign currency does not require a very sophisticated financial system : as witnessed in Eastern Europe before the reforms, the most basic forms of market exchanges can do. Moreover, in a standard emerging economy, sharp devaluations and large waves of capital outflows can have a destructive impact on local banks - contrary to those in Miami or Cyprus. On the other hand, domestic indexation requires a competitive supply of a diversified set of financial assets which are denominated in the national currency and should offer a secure real term remuneration as well as an efficient liquidity service – i.e. an indexed quasi-money.

One example is the interbank payment system, which has to be extremely efficient. If settlements are long or unpredictable, or if they can be suspended due to liquidity or counterparty problems, high inflation can rapidly destroy the enterprises' working capital and have a sharp, adverse impact real activity : since by definition these funds are largely invested in the interbank float, they are directly exposed to inflation – hence its high efficiency in Brazil⁵. Another case is the inception of Brazilian indexed Treasury bills, in 1987, which created the basis for a strong growth in the supply of tradable, protected assets. These new class of assets were then issued as well by private firms and bought on a large scale by institutional investors and households. Despite accelerating rates of inflation, the following years witnessed a rapid real-term growth of private balance-sheets, at a time when the Argentinean banks were being almost destroyed by hyperinflation.

3. Heterodox stabilisation policies and the Currency Board in Argentina, 1985-1991

The main underlying problem raised by both dollarisation and indexation is the increasing difficulty to control inflation : the larger the accommodation, the more difficult disinflation will be – just as in OECD countries with intermediate inflation rates. Standard macroeconomic strategies, which rest only on budgetary and monetary control variables, will tend to deliver slow or partial results, generally at a high cost in terms of output and job losses. Such has indeed been the case of an early series of purely monetarist plans, in Latin America in the late 1970s and early 1980s' - for instance with the Manuel de Hoz programme, in Argentina (Calvo 1986).

These difficulties led to the emergence of a second generation of programmes which have dominated, at least intellectually, the latter half of the 1980s'. On top of standard macroeconomic measures and a temporarily fixed exchange rate, they typically relied upon a comprehensive freeze of prices and wages, as well as on dis-indexation measures, either legal or incentive-based (Dornbusch and Simonsen, 1987, Heymann 1987). Dis-inflation was thus not obtained via a single nominal anchor - money supply or the exchange rate - which, once under strong control, would force a slowing down in expected and observed price increases. Reliance upon multiple anchors and public intervention into private commercial contracts were the defining elements of these programmes – hence the heterodoxy. The Israeli 1985 plan remains the classical example of this approach (Bruno 1986), while the Mexican 1987 plan, which started from a less distressed situation, succeeded in articulating macro-stabilisation with an explicitly negotiated social pact. On the other hand, Argentina and Brazil launched very comparable plans at about the same time, but they experienced a rapid failure in the former case and an almost immediate one in the latter, due first of all to insufficient real adjustment (Bruno et alii 1988).

<<< TABLE 1 >>>

The following years saw a series of less consistent heterodox attempts, by increasingly discredited governments, which regularly lead to new bouts of ever higher inflation (see i.a. Giorgio 1989, Kiguel and Liviathan 1991, Modiano 1990). The most spectacular outcome was the Argentinean 1989 hyperinflation, one of the larger in historical record, which was controlled only gradually over the two following years thanks (Cavallo and Cottani 1997, Canavese 1992). One instrument was a large, forced exchange of almost a half of remaining bank deposits against long-term dollar T-bills, bearing capitalised interests – the so-called Bonex programme. This remarkable operation almost brought to its end the process of demonetisation, as it sanctioned the incapacity of monetary authority to support the most limited residual monetary aggregate left over from hyperinflation : by December 1989, the M3 aggregate was *de facto* equalled to M1, which represented only 3,2% of GDP, before falling further down to 2,1% in the following weeks.

Durable stabilisation was however the result of a third generation of programmes : the Argentinean *Convertibility Law* of April 1991, which established a Currency Board regime, was followed by a

⁵ On the remarkable Brazilian case, see Listfield and Montes-Negret, 1996.

corresponding experience in Brazil with the 1994 *Plano Real*. Contrary to both orthodox and heterodox approaches, which aimed primarily at a destruction or substantial weakening of the link between the national money and its exogenous substitutes, these new programmes were formally much *less* ambitious : they opted for a complete anchoring of the economy on its alternate unit of account, on which the unit of payment function was then legally transferred. While in the 1980s' the aim was to re-anchor the payment and account functions on the existing national money, this new brand of programmes relied upon the alternate unit of account in order to stabilise monetary functions.

Hence the logic beyond the *Currency Board* : the national money should be fully anchored at par on the dollar so that both units of accounts would not only be aligned, but almost identified : the closer the identification the better, since the root of the crisis was the past instability of the national unit of account. Inflation in pesos would thus be automatically aligned on dollar inflation, at least for traded goods. The main consequence however was that adjustment of individual relative prices to domestic shocks (wage costs, bank solvency, etc) or to external ones (market contagion, international prices, etc.), was directly transferred on the agents. Money was not anymore an instrument for adjusting terms of trade : only individual prices could do.

In order for this commitment to be as strong as possible, the Central Bank was subjected to well-known, extremely tight rules of emission : reserve money was to be fully backed by dollar-assets, in stock as in flow terms⁶. Any increase in the M0 aggregate should thus correspond to an equivalent inflow of reserves, and vice-versa : capital outflows would contract money supply and credit distribution, via a negative multiplier, without any possibility of sterilisation. Consequently, domestic interest rates were the result of the Fed's policy, plus the country risk premium imposed by international capital markets. Finally the impossibility of a discretionary creation of money implied that there were no lender of last resort, so that banks were more exposed than usual to self-fulfilling liquidity crisis à la Diamond and Dybvig (1983)⁷.

One further point made this institutional arrangement much more constraining than in the main alternate case of the Hongkong Currency Board (Beecham, 1996). While in this latter case only local currency circulates, in cash or between reserve accounts held at the Monetary Authority, Argentina opted for a full, bi-monetary regime : all *domestic* monetary functions, including the legal tender, were endowed to the US dollar. Hence, institutionally, pesos and dollars were *de facto* perfect substitutes, with low conversion cost from one into the other. This was considered and defended as a key commitment device : confidence in the new regime, as reflected i.a. in the country risk premium, would be higher, the more difficult any return to a national, discretionary monetary regime would be. But at the same time a change of rule remained possible, although it could prove highly destabilising, as substitution was made extremely easy.

4- The Brazilian experience

The last period of high inflation in Brazil started after the failure of the 1990 orthodox *Plano Collor* (Bresser-Pereira and Nakano 1991, Modiano 1991) and was ended in June 1994 by Plano Real, at a time when inflation was almost reaching the symbolic 50% monthly threshold. Stabilisation was then engaged in a context which shows a series of *ex ante* common points with the Argentinean experience. First, the reduction in inflationary resources available to finance budget expenditures had de facto imposed a substantial fiscal stabilisation: the budget deficit represented 1,5% and 1,2% of GDP in Argentina and Brazil, in 1990 and 1993 respectively. The same situation was observed as regard the balance of payments, which did not call for a macroeconomic adjustment : Argentina posted a 3,2% surplus in the current account in 1990 and Brazil was in equilibrium in 1993. In both cases as well, the

⁶ 20/30% of foreign reserves in the Central Bank could actually take the form of dollar-denominated, Tbills issued by the Argentinean government.

⁷ See Caprio and all (1996) on how a full collapse of the banking sector was averted *in extremis*, at the time of the 1995 Tequila crisis.

expectation of a coming reduction in the foreign debt, within the Brady framework, would have a favourable impact on the perceived solvency of the State and on its capacity to support a sound monetary policy⁸. Moreover, the success of the *Plano Real*⁹, just as of the *Convertibility Law*, did not rely upon any policy surprise or any shock on expectations : both programme were widely discussed and voted by the Parliament weeks before their inception, so that agents virtually had the complete knowledge of the “true model” of stabilisation, before it was implemented.

Finally, and most important, the *Plano Real* was based on theoretical premises closely comparable to those embedded in the *Currency Board*, as regard the re-integration of monetary function - or the re-institution of money. In the Argentinean case, stabilisation had been obtained by a powerful institutional anchor of the peso on the the dollar. Brazil followed with a comparable approach : in order to put an end to inertial inflation it opted as well for a *complete and voluntary* indexation of the whole price structure on its alternate unit of account. In accordance with the country’ historic experience, this did not require that it embraces the American currency but a domestic price index.

The first step, which developed between February and June 1994, had one main aim : the recoordination of agents on a single price index. Until then, indexation had been mostly a non-co-ordinated, decentralised process whereby contracts and prices were anchored on wide variety of supports : the pace of adjustments could differ (monthly, weekly, etc), some classes of agents relied on a consumer index and others on a producer or a sectoral index, and regional indices were also widely used. In other words, the unit of account had not only been lost by the national money, it had also been fragmented. The Central Bank thus started to publish on a daily basis a new index - the *Unidade Real de Valor* (URV) – which was linked *de facto* though not officially to the dollar. At the same time, it was imposed by law that all new contracts and all wages should be anchored solely on the new URV and strong incentives were established in order to induce agents to convert old contracts into the new unit. The consequences were twofold : the on-going process of indexation at work since the mid-1960s’ was almost fully completed and the fragmented unit of account was re-unified or “re-nationalised”, so that it became again a public good. It could then work again as a co-ordinating mechanism, whereas high inflation implied till then an extreme volatility of relative prices, in the very short term, due to disynchronised adjustments (Sgard 1998).

The result is that after four months, the two monetary functions were wholly separated. Virtually, in June 1994, the 48% inflation rate in the old monetary unit corresponded to an homothetic shift of all prices, while any adjustment in URV terms reflected only a change in relative prices. Inflation would take place only in *cruzeiro* and relative price adjustments only in URV¹⁰, which also means that the economy had no monetary anchor. Once this was achieved, a standard monetary reform could be implemented : on July 1st, the unit of payment function, i.e. the legal tender, was transferred on the URV and the old money was abandoned. All payment obligations inscribed into contracts and financial assets were converted into the new Real, the old fiduciary money was withdrawn and the Central Bank started to conduct a monetary policy in Real as well as a foreign exchange policy. In other words, a single monetary unit was reconstructed which formally was as perfectly dis-indexed as the *cruzeiro*, the day before, was fully indexed on the URV : only the persistence of an alternate support for indexation, such as the dollar or gold, could have survived the monetary reform. From 48% in June, monthly inflation in the going unit of payment fell to 7,8% in July and 1,9% in August, and it remained below 2% during the two following years. This sudden end of inflation, comparable to that witnessed in Germany in 1923 or in Israël in 1986, thus fully validated the original intellectual premises on which this programme was based.

As opposed to their Argentinean counterparts, Brazilian authorities took remarkably few commitments as regard future policy making. Not only Brazilian Central Bank remained one of the least independent

⁸ Argentina signed a Brady agreement in april 1993 and Brazil in april 1994.

⁹ Arida et Lara-Resende (1985) have been the first to expose the logic of this programme. For a full description of its implementation see Franco (1995).

¹⁰ Inflation in UVR was estimated at 3,7% between February and June, after Sachs and Zini (1995).

among emerging economies, but few was said in 1994 of the principle which would govern the daily management of the new Real. Take the foreign exchange policy. Instead of writing into the Constitution the exchange rate of the national currency, a rapid succession of different policy rules was observed (Bogdanski et al. 2001, Franco 2000). Starting in February 1994, the UVR had been anchored at par on the dollar but, with due regard to the positive developments in the real economy and to future inflation risks, the government eventually floated the Real when it was launched : the exchange rate appreciated up to 0,83 Real per dollar, despite some interventions, before a (non-crawling) band system was established in March 1995. Although it was adjusted about on a yearly basis, large intra-bands interventions around the central parity allowed for a very regulated nominal depreciation during the following years, with fluctuations of some +/- 2%. Finally, in January 1999, after a long fight against capital flight since the Russian default of August 1998, this regime was also abandoned : the Real was allowed to float and the Central Bank adopted a strategy of inflation targeting.

This last episode was arguable the decisive test of the capacity of the *Real* to adjust relative prices, instead of transforming nominal shocks into aggregate inflation. Before that time, an extreme uncertainty surrounded the answer to one key question : did the *Plano Real* cure the economy only of its going rate of inflation, or did it also succeed in changing the mechanism of price formation? A possibility was for instance that, on the day the URV had received the unit of payment function, the unit of account had been immediately though invisibly transferred again on alternative indices – the dollar or domestic price indices. In that case, ratchetting-up inflation may re-emerge after devaluation and again translate external terms of trade into permanent inflation.

By the second quarter of 1999, the good news in Brazil was that the initial 35% depreciation in the exchange rate had only produced a 8% annualised inflation (Baig and Goldfajn 2000, Bogdanski et al. 2001). For sure, the overall policy mix was very restrictive and world inflation low (IMF, 1999), while the banking sector proved quite resilient contrary to what had been the in Asia the year before (Bevilacqua and Garcia 1999, Puga 1999). This was however the best indication possible that after decades of high inflation, the reconstructed national money had indeed recovered a capacity to adjust relative prices so as to affect durably the relative profitability of the traded and non-traded sectors. In the following years, the relative success of an inflation-targetting monetary regime, with a floating exchange rate, came as a further confirmation of this recovery of the national money. This of course does not imply that Brazilian price mechanisms are immune to distortions, due i.a. to poor domestic competition (OECD, 2001). Neither is the country protected against self-fulfilling financial crisis or international contagion, which could certainly impose destructive shocks to the financial system, first of all via the public finances. But at least, the adjustment capacities of the Real as a unit of account were not anymore a specific source of macroeconomic tensions, durable price misalignments and resource misallocation.

5- The 2002 Argentinean disaster

Argentina was the one country on which the Real crisis had the most negative impact : the consequences of a substantial trade integration, in the Mercosur framework, plus the appreciation of the US dollars signalled the beginning of the end of the Currency Board. The later refusal by the successive governments to exit the Currency Board, before the country was in the most extreme monetary and economic crises, has produced a protracted domestic crisis which severely hurt the real economy. Part of the crisis was also the liquidity crunch, as a consequence of massive capital outflows : between December 1998, two weeks before the Brazilian devaluation, and December 2001, total credit to the private sector contracted by 23%, or 27% when taking into account price deflation.

But the crisis was to centre on money as a public institution. First, in August 2001, parallel units started to be issued by the City of Buenos Aires and some provinces. Although these insolvent and illiquid agents were excluded from capital markets and unable to call for the Central Bank's cash, they did not adjust their level of expenditures and their debt was not restructured. Hence, they started

settling an increasing share of their payments obligations with this new type of debt securities - first of all their wage bill. These were actually no more than acknowledgements of payments arrears and, of course, they were not offered on an open market : civil servants had no other choice than accepting them as wage payment. But in order to increase their value of usage, these securities also received some monetary capacities, as partial legal tender : they could be used in order to pay taxes and a number of enterprises, especially in the retail trade sector, have started to accept them, generally at the local level¹¹. After the country had been operating with two official monies since 1991, the unit of payment function was thus further fragmented, while braking loose from the State's authority.

In the last quarter of 2001, in a context where access to international private capital markets had been lost (March 2001) and capital outflows accelerated, the expectation of a coming exit from the Broad triggered a full-size run on the banks : agents did not expect them to resist the impact of devaluation on their liabilities. In the absence of a lender of last resort, the authorities were soon left with only one option : on December 3^d, tight controls on the conversion of deposits into cash and on capital outflows were enacted. The second victim of the monetary crisis was thus the payment system, through which agents settle their transactions and firms trade. Ensuing mass demonstrations by deposit-holders forced the resignation of two Presidents of the Republic in less than a month. At the economic level, the main consequence was a profound disruption of domestic and foreign transactions, which translated into an accelerated fall in output and employment and a further impoverishment of the population. In the first quarter of 2002, GDP contracted by 16%, vis-à-vis the year before, investment by 28% and imports by 34%.

At that time however, the Board had already been abandoned (January 7th) and the peso had been officially floated on February 11th. It lost 72% of its value until late June in spite of a large freeze on domestic liquidity and comprehensive capital controls. In other words, this did not correspond to a market-based exchange rate : each time the depositors' access to the banks' liquidity was increased, the exchange rate immediately fell. This suggests that the resilience of the banks and more generally of private balance sheets was not the core problem in the post-Board environment : the on-going process of monetary dis-integration now raised the question of whether the floating peso had any chance to survive on an open market, once liquidity would be freed. Floating supposed that a market exchange rate would be formed, just as for cars or securities, while in fact agents now had to opt between two competing public institutions, which till then had been perfect substitutes.

This raises a coordination problem. A key factor in the adoption and resilience of a monetary unit is the network externalities it carries, within a given economic and institutional space ; in other words, a monetary unit is typically a good which utility for individuals increases with the number of agents who rely upon it¹² – which supposes inter alia that they do not consider to be exposed to excessive transaction or inflation risks. Then, the element of irreversibility borne by these network externalities, may then be strengthened by the development of public and private institutions, first of all in the financial system. In the Brazilian regime of high inflation, example reached from the quality of domestic price indices, to the efficiency of the interbank payments system or the market for indexed bonds.

In such a context, unlinking the dollar and the Argentine peso implied a sudden brake-up of part of these externalities and the emergence of a highly unstable, two-equilibria institutional situation : within a very short period of time, agents could fully re-coordinate around one currency, while the value of the other would violently converge towards zero – guess which one. Hence, the main risk was not so much a return to hyperinflation, as was generally mentioned, although redistributive risks were possibly higher due to the growth of balance sheets since the late 1980s'. It was the destruction of the

¹¹ This monetary phenomenon has been recurrent in Argentina during the XIX^e century (see Bordo and Vegh 1998, Irigoin 2000, della Paolera et Taylor 2000), as well as during the 1980s, although on a very local scale. It also presents a number of common points with the experience of local and private monies in Russia, during the 1990s; see Ivanova and Wyplosz (1999), Woodruff (1999).

¹² See Katz and Shapiro (1994) as well as, for payments issues, Nakamura and Parigi (1992) Angelini (1998).

peso on the foreign exchange market, with domestic price explosion as a consequence of it – whether there would be or not a loss of control on money supply.

One rare historical experience sheds some light on this exceptional situation : the Hungarian hyperinflation after World War II. As analysed by Bomberger and Makinen (1983), in January 1946, at a time when current inflation was already very high, the government had decided to index fiscal liabilities and the Treasury's own bank accounts on domestic inflation, in order to protect the real term value of its revenues. Shortly afterwards, the population was also granted the benefit of this institutional innovation and, latter on, an increasing share of public expenditures and services started to be priced and settled in the new unit. In May, specific bank notes were issued so that what was initially a pure unit of account became also a mean of payment. The economy was thus *de facto* bi-monetary, with a strong unit in competition with an inflationary one. The result was striking : in July 1946 inflation in the un-protected money reached $4,2.10^{16}$, which was probably a historical record; and at the end of the month, when that unit was withdrawn, the total corresponding monetary aggregate, for the whole country, could be converted on the black market against 2300 US dollars (ibid).

This “Hungarian hypothesis” highlights the strategy adopted by the new Duhalde government after it took power in January 2002. First, it refused to fully dollarise the economy and opted for its “pesification”, that is the conversion of prices, wage contracts, financial assets, interbank payments etc into pesos. The immediate aim was to limit the exposure of banks to the foreign exchange risk so as to allow for a progressive re-opening of domestic and foreign payments. Beyond that, in more general terms, the objective was to re-transfer on the sole peso the monetary functions which had largely been lost since the 1970s', before being officially shared with the dollar after 1991. In other words, both monies were not to be substitutes anymore : demand for the national money would be supported by the government's policies so that it would survive on the market and, hopefully, coalesce around it new monetary network externalities.

Then came a second turn : after pesification had been envisaged as a voluntary process, which would rely only upon incentives, from February on it was imposed upon agents at a given exchange rate. In other words, monetary institutions were not anymore an issue of private choice but one of public monopoly, which the State now tried to re-establish. What could be done by institutional instruments has been done : dollar deposits for instance fell from 46,8 billions at the beginning of January 2002, down to 2,7 billions at the end of April. The Argentine government was thus trying to achieve by law and the infringement into contracts, what the Brazilian *Plano Real* had obtained with much less interventionists instruments. In this case, only the recoordination of agents on a single unit of account, before July 1994, included some legal interference in work contracts, although they did not incur clear redistributive risks. Beyond that, re-coordination was the result of ex post decentralised reactions to institutional reforms.

The problem of course, at the beginning of 2002, was that monetary destruction was considerably more severe in Argentina than in Brazil in 1994. In a wholly original way, monetary disintegration had developed in three parallel directions. The *unit of payment* had been fragmented by the rapid emission of parallel monies; then a large-scale segmentation of the *payment system* had to be decided and finally, the un-pegging of the peso, in the context of a full bimonetary regime, raised the “Hungarian risk” of a brutal self-destruction of the national *unit of account*. There may not be further steps in the complete destruction of monetary institutions. No doubt that under these conditions, the forced repatriation of monetary functions on the waning peso was probably doomed to a rapid failure : that is, a final turn-around towards complete dollarisation, either after an explicit political decision or as a result of a market-based destruction of the peso. Beyond that, the most probable outcome would be a deflationary monetary environment, with dollar payments on the one hand, for the solvent and emerged part of the economy, and a large circulation of parallel, local monies on the other hand. The unit of account would be (at last) entirely carried by the dollar and the unit of payment fragmented, with different terms of trade between them.

6- Conclusion

The parallel experiences of Argentina and Brazil since the early 1990s shed some light on the long-term impact of hyperinflation, as on the conditions under which monetary functions can be re-integrated into a self-sustained national money. At first sight, both countries had experienced comparable inflationary experiences : the only tangible difference was the dominant mechanism of protection against inflation – dollarisation vs. indexation. However, this bore heavily on the respective stabilisation strategies : Argentina established a bimonetary regime based upon most constraining monetary regime, while Brazil reconstructed a single national money and endowed its policy makers with considerable lee-way.

Later on, the forced devaluation of both monies had opposite effects : while Argentina sink into economic and monetary chaos, the devaluation of the Brazilian Real was not followed by a tangible acceleration in inflation but by a textbook J-curve adjustment pattern. The foreign exchange was again an instrument for adjusting relative prices and for real term, external adjustment. In Argentina, on the contrary, the Currency Board was given some credit for its successful defence against the 1995 Tequilla crisis, but this was rapidly lost after the Brazilian 1999 devaluation. And when the Board was finally abandoned, the potential for survival of the peso was not very different from what it was when the country had entered this mechanism.

These highly divergent courses cannot be accounted for by the simple references to a “psychologic shock” à la Sargent, the “confidence” of agents or a previously accumulated capital of credibility, which the respective Central banks could have reinvested in a new policy framework. Political decisions have certainly borne at some critical moments, such as the *Plano Real* or the decision in Brazil to develop indexed Tbills. As well, some responsibilities are borne by the political “discourse” which accompanied the Argentinean experience and structured its perception by agents : for ten years, authorities have repeated almost on a daily basis that the Board was no more than the rationalisation of the *de facto* loss of the monetary instrument, which could not be re-instituted in the foreseeable future.

But there is more than that : almost all arguments put forwards to legitimate this regime, whether positive or discursive, could as well have warranted full-dollarisation. This is probably why this option kept haunting the Argentinean policy debate for ten years. And indeed, compared to the *Real* strategy, the Board was a half-way solution, which rational was never wholly established. Where in Brazil the transfer of all monetary functions on a new, non-inflationary single unit had been validated by private agents and markets, the Argentine bi-monetary regime included all constituents of a possibly violent brake-up : the reco-ordination of agents created the *ex ante* risk of a catastrophic adjustment if the institutional anchor on the dollar was abandoned.

In order to explain these divergent experiences, it is necessary to take into account the conditions under which monetary functions has been transferred to alternate supports during the decades of high inflation, and then re-integrated after nominal stabilisation. Monetary rules of usage on which agents co-ordinate are the result of informal, decentralised reactions to changing conditions – e.g. redistributive risks of inflation – as well as to policy innovations. But all institutional equilibria which emerge do not produce a monetary public good of the same value : private services to agents, the capacity to adjust relative prices and use the national money as a policy instrument vary considerably among countries, or monetary zones. Only when these functions and uses are strongly integrated within a single national money does it become useful to call for a trusted and well-advised central banker to manage it.

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1- Argentina (in percentage)

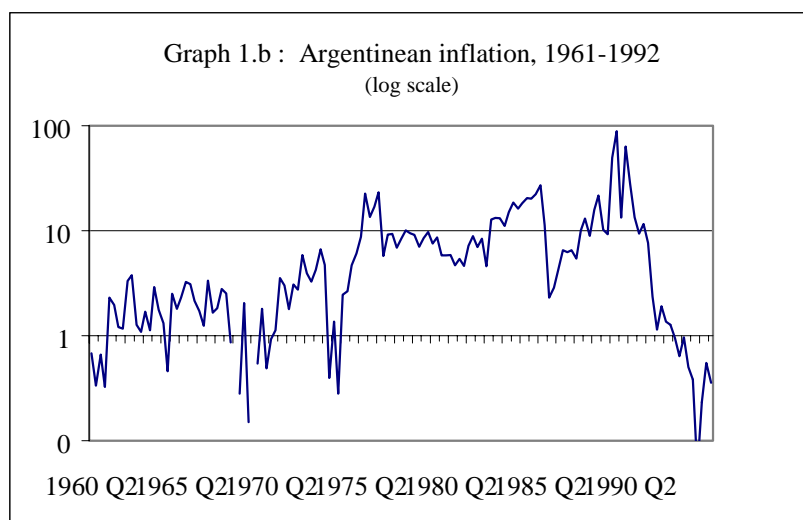
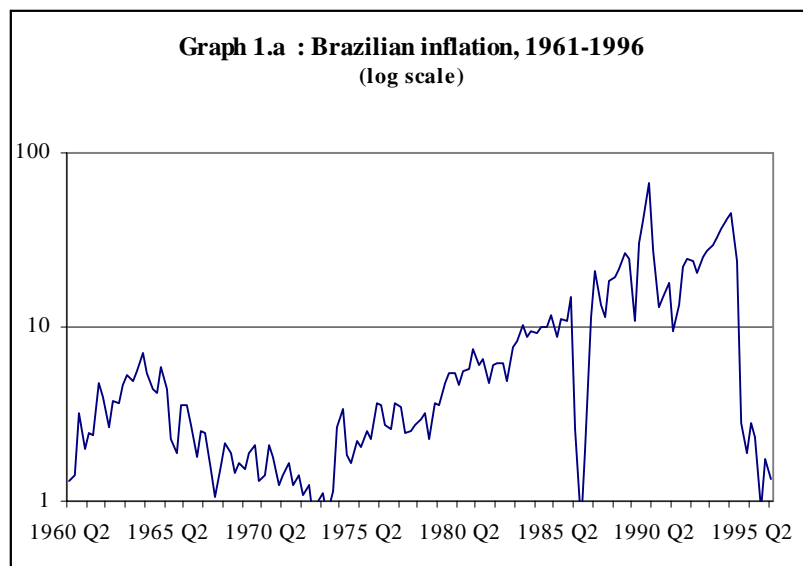
	GDP Growth	Public deficit	Inflation	Seignorage	Inflation tax on M1	M0/ gdp	M2/ gdp	Dom. Private Cdt/ gdp
1970-1979	3,2	5,5	132	8,9	5,1	14,9	16,4	11,4
1980-1985	-1,7	4,9	335	9,4	4,5	8,5	13,2	15,0
1986-1991	1,6	1,3	1021	5,4	3,9	6,1	10,4	11,0
1992-1996	4,8	0,8	35	0,5	0,3	8,6	17,3	17,1
1997-2001	0,7	1,6	-0,3	0,3	0,0	9,5	29,0	22,5

Sources : IMF, National Bank, author's calculations

2- Brazil (in percentage)

	GDP Growth	Public deficit	Inflation (% of gdp)	Seignorage (% of gdp)	Inflation tax on M1	M0/ gdp	M2/ gdp	Dom. Cdt to enterp. / gdp
1970-1979	8,0	-0,4	32	2,4	2,1	8,4	14,0	21,9
1980-1985	2,8	-4,7	150	2,9	2,7	4,1	7,3	17,3
1986-1991	2,6	-10,9	903	6,1	4,5	4,6	13,9	22,6
1992-1996	3,4	-6,4	1067	4,0	2,0	5,5	24,5	27,4
1997-2001	1,3	-6,8	5,9	1,1	0,2	8,3	28,1	28,7

Sources : IMF, National Bank, author's calculations



Graph 2 : Seigniorage, 1961-2001
(in gdp %)

