Revista Venezolana de Análisis de Coyuntura, 2003, Vol. IX, No. 1 (ene-jun), pp. 11-39

CONJECTURES ON WHY A DEVALUATION DID NOT CURE ARGENTINA

Carlos E. J. M. Zarazaga*
FEDERAL RESERVE BANK OF DALLAS

Abstract:

Many experts, policymakers, and journalists had been enthusiastically advising Argentina to abandon the currency board arrangement that had been in place since 1991, on the grounds that it was choking its economy. They were disappointed when Argentina's attempt to devalue "just a little" ended up in a collapse of its currency and real GDP. We argue that the reason why the devaluation "drug" didn't cure Argentina is because the doctors who recommended it overlooked that the perfect information conditions required for the medication to work properly were not met by that country. We propose an alternative "diagnosis," according to which the attempt to devalue "just a little" ends up in higher depreciation and inflation rates than originally intended. This prediction, consistent with the evidence for Argentina, suggests that non-state contingent ("rigid",) monetary regimes, such as a currency board or outright dollarization, might dominate in a welfare sense, by virtue of a transparency-inducing feature, state-contingent ("flexible") policies in countries like Argentina, where economic agents are unable to satisfactorily monitor the policymakers' actions, as well as the underlying decision process.

Key Words: Argentina, devaluation, currency boards, optimal monetary policy, time inconsistency.

INTRODUCTION

It is not perhaps by chance that someone born in Argentina like me has being honored with an invitation to share his thoughts in Venezuelan soil about monetary policy options in Latin America: both my native country and the one I have the pleasure to visit for this event have a lot in common: they are, in paper, rich countries.

---

* This paper was prepared for the International Seminar "Monetary Options for South America in the Light of the Globalization and Integration Processes," organized by the Economic and Social Research Institute (IIES) and the Master in Economic Theory and Policy of the Universidad Central de Venezuela (UCV), in collaboration with the Central Bank of Venezuela and the Andean Development Corporation (CAF), held in Caracas, Venezuela, on November 27-29, 2002. The author wishes to express his gratitude to Prof. Sary Levy Carciente and Prof. Luis Mata Mollejas for the opportunity to share his thoughts with the participants in the Seminar, making clear, however, that the views expressed herein are exclusively his and do not reflect necessarily the position of the Federal Reserve Bank of Dallas or of the Federal Reserve System.

Venezuela, the fifth oil exporter in the world, should have the same living standards as Saudi Arabia. Yet, not only is the income of its average citizen less than half that of its luckier Saudi counterpart, but it is also currently deteriorating to levels not seen in many decades.

Likewise, Argentina, with its fertile Pampas and sufficient oil and gas to supply cheap energy to its food industry, was supposed to prosper selling abundant calories and proteins to the world. Yet, its population is plagued with lethal infant malnutrition, increasingly looking to outside observers as the unfortunate crew of the Kursk, trapped at the bottom of deep sea, desperately gasping for air while political bickering and mutinies unwisely exhaust the limited supply of oxygen (international reserves, that is) that keeps their hopes breathing.

The gap between the prosperity that Argentina could accomplish and its current sad state of affairs is dramatically captured in Exhibit A. I bet a similar picture would emerge for Venezuela. How come two richly endowed countries manage to be so poor relatively to their potential?

The maintained hypothesis in these comments is that the main responsible for that tragic gap is not the particular monetary arrangement in place in each of those countries, but their bad and reprehensible habit of reneging on past promises, that is, their propensity to fall too often in what is known in the literature as the time inconsistency temptation. As demonstrated in the seminal article by Kydland and Prescott (1977,) the governments of all countries are subject to that temptation. But for reasons not yet fully understood–and which these comments represent an attempt to start thinking about-Argentina, Venezuela, and many other Latin American countries have succumbed to that temptation far more frequently and virulently than other regions of the world, with devastating consequences for their standards of living.

For the sake of intellectual honesty, let me point out that many respected scholars will dispute this diagnosis on the grounds that the "time inconsistency" problem is not important when considering the convenience of devaluations. Heavy weights like Paul Krugman belong to that group. Yet, I'll dare to challenge those views by showing, somewhat paradoxically, why the devaluation advice they offered to Argentina was not completely unreasonable and, in fact, quite sound under a different set of conditions than those that were prevailing in that country when it *de facto* abandoned its currency board some time in 2001.

A preliminary piece of evidence in support of the time inconsistency disease hypothesis is that the predictions that a devaluation would get started in Argentina a virtuous circle of prosperity failed to materialize. The economic havoc that followed the devaluation instead is entirely in line with the predictions inspired by

the time inconsistency literature. The main purpose of these comments will be precisely to present to the consideration of the reader a novel interpretation of the key factors behind those gloomy predictions. The hope is that such understanding will in the future induce countries burdened with heavy debts and anemic growth to request a second opinion before they accept the devaluation prescription from doctors who don't take seriously the potentially lethal time inconsistency side effects of the drug.

I.- THE TIME INCONSISTENCY PROBLEM IN ARGENTINA

The origins of Argentina's economic growth travails in the last four years or so are often traced to the adoption of its quasi-currency board arrangement in 1991. In the opinion of many experts, echoed in policy forums and the press, the problem with that system is that it condemned Argentina's currency, the peso, to persistent periods of "overvaluation." Unable to compete in the world markets, its economy would, sooner or later, grind to a halt. According to this popular interpretation, all Argentines had to do to live happily ever after was to throw away their archaic currency board system. Paul Krugman eloquently captured this view in his New York Times editorial of January 1, 2002:

> "I could explain at length the causes of Argentina's slump: it had more to do with monetary policy than with free markets.... I.M.F. staffers have known for months, perhaps years, that the one-peso-one-dollar policy could not be sustained. And the I.M.F. could have offered Argentina guidance on how to escape from its monetary trap, as well as political cover for Argentina's leaders as they did what had to be done."

Krugman's was certainly not the only call to Argentine government officials to be "brave and do what needed to be done." Many others scholars, policymakers, and journalists shared the same view[1]. It is only fair, however, to point out that other giants in the profession, albeit rather quiet, like Tom Sargent and Neil Wallace, would cough at the notion that the sustainability or unsustainability of a particular exchange rate regime can be confidently established without any reference whatsoever to the fiscal policy simultaneously in place[2].

---

[1] See also Bordo and Chang (2001), Financial Times (2001), Lunhow and Druckerman (2001), and Fernandez and Portes (2002).

[2] It is unfortunate that so many members of the profession overlook too often their celebrated "unpleasant monetarist arithmetic" result (Sargent and Wallace, 1987) which convincingly demonstrated that fiscal and monetary policies are inextricably linked through the government budget constraint, and that it is impossible therefore to make statements

In any case, Argentina did what the doctors had ordered and indeed, left the recession behind... to get full speed into an economic depression that was still unfolding at the time of this writing, almost a year after the devaluation. The contrasts between the results of the devaluation "drug" and the ones that were advertised are so stark that the profession bears the serious responsibility of explaining what went wrong with the medication, lest it wants to induce the general public to believe that uncertified quacks can do much better at curing economic growth ailments.

If the readers are tempted to think that the very different ending that Argentines are experiencing after repudiating its currency board has forced many experts to revise their theories and, accordingly, their policy prescriptions, they are naively wrong. The happy ending predictions were carefully crafted to make them oblivious to evidence: "of course the devaluation in Argentina turned sour... You see, they should have done it earlier... By the time they actually did what the doctors had ordered, the disease was too spread to fight it successfully. And besides... they didn't follow the treatment guidelines with the precision required to guarantee its success."

Never mind, either, that Venezuela is in the same kind of trouble, even it never had a currency board and it has been consistently devaluing its currency. Don't you dare to mention Uruguay. True, that country is mired in a depression as severe as Argentina's, and true, that is the case even if Uruguay, like Venezuela, has been consistently devaluing its currency as well, and way before Argentina did (see Exhibit B.) But you can't ask a flexible exchange rate to protect you against a fire next door, can you?[3]

There is no point in arguing with theories that cannot be falsified because, like the chameleon, change colors with the surroundings to avoid detection. Nor it is my interest, which is to present to the consideration of the readers scientific arguments about the relevance of the time inconsistency problem for predicting the effects of devaluations, rather than engaging in useless and endless polemics with die-hard dogmatics.

It is for that reason that I have to be thankful to Paul Krugman as a source of inspiration in another one of his articles on Argentina, this time an Op-Ed editorial that appeared in the New York Times issue of November 7, 2001. Not for his

---

about one without implicitly or explicitly making at the same time assumptions or statements about the other.

[3] I can't imagine that after all these warnings about annoying questions a reader will risk to ask what a flexible exchange rate regime is then good for.

arguments in favor of a devaluation, which I had heard before with great interest and concern, but for suggesting a question that brings to the forefront the issue of the time inconsistency problem.

Insightful as usual, Professor Krugman pointed out there:

> "I've written before about an apparent double standard for economic policy in the third world, but this is truly bizarre. Advanced countries often devalue their currencies — but Argentina is being told that it can't. On the other hand, advanced countries never default on their debt — but Argentina is being told that it must."

Indeed, several distinguished members of the profession and prominent government officials of the G7 countries, as well as of the IMF, insisted all along 2001 that Argentina's way out of its pile of debt (accumulated in part with the blessing of the IMF) was an "orderly" default[4]. The optimistic view was indeed puzzling from the perspective of a prolific literature on the subject suggesting that "ain't such a thing"[5]. No one less than the Chief Economist of the IMF, author as he is of articles on the topic published in top academic journals in the profession, has recently asserted that on the issue of sovereign debt restructuring "there has been a moving consensus on what constitutes the underlying problem, but not on how to fix it." (Rogoff and Zettelmeyer, 2002.) The conspicuous omission of the potentially lethal side-effects of "orderly" defaults in proposals extolling their virtues is all the more serious when one considers that, just out of common sense, the man in the street would probably be inclined to regard the default recommendation as wise as inciting a lover to cheat on the expectations of a "friendly" split-up from the regular partner[6].

Anyway, hardly anything could offer more conclusive proof of the relevance of the time inconsistency problem than sovereign debt defaults. They clearly identify a practical instance in which a government, committed to make payments according to certain schedule documented in the non-contingent debt instruments issued to that effect, reneges to do so when the time of honoring the

---

[4] See, for example, Lerrick and Meltzer (2001), and Calomiris (2001).

[5] See, for example, Atkeson (1991).

[6] A "default and prosper" approach doesn't certainly sound like the one ambitious and smart entrepreneurs would take to run their businesses. Paul Krugman's second sentence in his comments just quoted confirms that former Argentine Minister of Finance, Domingo Cavallo, was right to chastise the unsolicited advice as an attempt to transform Argentina into a "guinea pig" on which to test "new theories" of default. Unfortunately, the laboratory experiment has ended up in a monster that not even the IMF knows how to tame or "terminate".

commitment comes. It is surprising then that this overwhelming evidence on the severity of the time inconsistency problem is summarily dismissed as irrelevant when it comes to discussions about the most appropriate monetary policy or exchange rate regime for countries like Argentina.

The disregard for the time inconsistency problem is also present in the first sentence of Krugman's comments quoted immediately above, pointing out the apparent double standard of letting developed countries float their currencies and at the same time condemning Argentina for trying to do the same. It is important to alert the readers that in order to deliver his message more strongly, in that first sentence Krugman is appealing to the standard literary trick of setting up a "straw man" that distorts a little bit the facts in his favor.

The "right-wing think tanks" that, in Krugman's words, supported Argentina's currency board arrangement never supported, at the same time, a flexible exchange rate regime for developed countries. In fact, I suspect that they would subscribe as enthusiastically the return of the whole world to the gold standard. No double standard there. Perhaps lack of rigor (although many on the opposite side of the argument could be accused of the same,) but no lack of coherence and, certainly, no disregard for the time inconsistency problem.

No double standard on the part of the IMF either: by the beginning of 2001 that institution, like a good disciple, had finally embraced Krugman's teaching throughout his distinguished career that flexible exchange rates are superior to fixed ones for every country. The IMF was then doing nothing but following Krugman's lead when it started to urge Argentina to abandon its "rigid" currency board regime in 2001, with the implicit assumption that the time inconsistency problem was not severe enough to change the prescription. Much to his chagrin, on the count of prescribing a devaluation drug with devastating economic health effects for Argentina, Krugman will be handed out the same verdict as the IMF he declared guilty as charged on the misguided "orderly" default advice count[7].

Before the jury proceeds with its deliberations, however, the judge must instruct them that, despite the bold accusations, strictly speaking neither Krugman nor the IMF recommended a devaluation for Argentina. They simply favored the

---

[7] Incidentally, Krugman's ironic assessment of orderly default recommendations is itself ironic, because his suggestion, similar to one trumpeted by former champion of dollarization Ricardo Hausmann, that Argentina should compulsively swap assets denominated in dollars for assets denominated in a devalued local currency was indeed a concrete way to implement an "orderly" default... in anticipation of which depositors took their savings out of the banks as fast as they could, thereby precipitating, indeed, a chaotic default.

adoption of more flexible monetary policies, the result of which could be sometimes, though not always, devaluations. But, and this is crucial for a fair trial, if the immediate outcome turned out to be indeed a devaluation, then it would surely be followed later by a corresponding appreciation.

At least that is what Exhibit C suggests it should have been expected from the "flexible" monetary policy prescription that the IMF and Krugman wrote for Argentina. The chart presents a time series of the nominal exchange rate between the now demised Deutsche Mark and the US dollar. Underlying that exchange rate path is a monetary policy certainly much more flexible than the one Argentina started implementing in April 1, 1991 and officially abandoned in January 6, 2002. As the chart makes clear, the flexible monetary policy did not induce a permanent devaluation of the Deutsche Mark. True, as a result of that flexible policy, the Mark suffered a devaluation in the first half of the 1980s. However, it recovered steadily afterwards. Holders of assets denominated in Marks could not have been happier with a flexible monetary policy that isolated their economy from shocks that it could not handle on its own[8], and that at the same time preserved, ups and downs aside, the long term real value of their savings.

The fact that the flexible monetary prescription produced such promising results in Germany should exonerate Krugman and the IMF for prescribing the same drug for Argentina with far less favorable, and in fact, almost lethal, results. After all, and contrary to the "orderly" default recommendation, the prescription had solid and widely accepted theoretical foundations on the well-established result that under perfect information, state-contingent policy rules dominate, in a welfare sense, non-state-contingent rules such as a currency board, and its even more extreme version, dollarization.

As we'll see later, there is more to the perfect information caveat than advocates of flexible monetary policies typically recognize, but for the time being, Exhibit C brings us back to the issue brought up by Krugman in the first sentence of his comments above: Does it make any sense that "advanced countries often devalue their currencies — but Argentina is being told that it can't?".

From the foregoing discussion about the optimality of state-contingent rules, the reader might jump to the conclusion, as Krugman apparently did, that the answer to that question is clearly "no." However, we'll argue below that when all the relevant factors, including the time inconsistency temptation, are properly taken into account, the answer is a resounding "yes," and therefore, that the

---

[8] Presumably due to the presence of market imperfection, such as incomplete markets or nominal rigidities.

"right-wing think tanks" stance against devaluations that Krugman dismissed might indeed be right, although perhaps for the wrong reasons.

In fact, if I dare to encourage the readers not to skip the somewhat more technical section that follows is because they might discover in it that there might be more than just dogma behind predictions that look a lot like the ones that Krugman has identified as coming from "right-wing think tanks." The opposite might be closer to the truth, because a theme that allegedly fascinates "left wing" circles, the overwhelming presence of imperfect information problems in the economy, plays a prominent role in the implication, almost naturally emerging from the analysis of "flexible" monetary policies offered below, that a devaluation may create more problems than it solves.

In any case, the purpose of the fairly heavy technical arguments in the section that follows is not to indict any expert or institution for a particular policy recommendation, but rather to present to the consideration of the readers an "artificial" or "model" economy, that is, an abstract representation of how real economies work, in which the presence of the time inconsistency virus can make the devaluation medicine worse than the disease. As we'll argue later, the evidence seems to validate the empirical relevance of this "toy economy" better than the implicit or explicit models behind the predictions that a devaluation could not bring but good things to an ailing Argentine economy.

II.- A TOY ECONOMY IN WHICH THE DEVALUATION CURE IS WORSE THAN THE DISEASE

As indicated above, in this section we put together the elements of a sort of "toy" or "model" economy meant to capture the relevant features of actual ones for the purpose of analyzing the effects of flexible monetary policies or monetary policies with "judgment calls" of the sort employed in the US and favored by Krugman. Playing with this "toy economy" will enable us to understand why such policies might lead to moderate inflation in countries like the US, but to high inflation and out-of-control devaluations in countries like Argentina.

Concretely, this section will present some heuristic arguments, more formally developed elsewhere (Zarazaga, 1995; 1999), with the purpose of taking some steps to answer a variant of the question inspired by Krugman's comment: "Why is it that Chairman Greenspan could not run in Argentina a flexible monetary policy as successfully as he has in the US?"

Because the simplified economy focuses on what appears to be the critical elements to provide an answer to that question, it will downplay or ignore many

real world details that in principle are less important to understand the main forces behind the effects of alternative monetary policy regimes.

In our toy economy, as in most of the real ones, there is the need to finance goods and services provided by the government, such as maintenance of essential infrastructure (i.e. roads and highways). Typically, the amount of expenditures that the provision of those goods and services requires vary unpredictably for a variety of reasons, ranging from technological changes, shocks to the price of raw materials and intermediate inputs needed in repairing and maintaining the infrastructure, or even bad weather. Following the advice of advocates of "flexible" monetary policies, the policymaker in charge of providing public goods and services in our model economy is convinced that it is a good idea to finance them with expansions of the money supply of between 1 percent and 3 percent. Notice that the resulting monetary policy is flexible in the sense that it is looser in the "states of the world" in which the government needs more financing due to shocks to its revenues or expenditures, but tighter in the "states of the world" in which the opposite is true.

The well-intended policymaker in charge of assuring the provision of intrinsically public goods and services in our model economy coexist, as in most actual ones, with much less altruistic constituencies. These constituencies are meant to capture the influence on monetary and fiscal policies of representatives of important groups of the population linked together by common interests, such as industry or trade associations, unions, particular regions or states, and so forth. Indeed, powerful public or quasi-public entities, or even industrial and financial conglomerates from the private sector, in almost every country try to twist the policymaker's arm in their favor[9].

Imagine, for example, the situation at the Ministry of Energy of our model economy. The request for funds that the Minister receives from the oil company may reflect the cost of replacing hundreds of obsolete pumps and structures, but also particularly generous retirement plans for the oil workers or losses in revenues from a cumbersome structure of subsidized prices for gasoline and other fuels used by different groups of customers.

Likewise, imagine the situation at the Ministry of Defense of our model economy. Part of its expenditures may originate in the need to maintain and repair equipment and to pay military personnel. But other part may originate in subsi-

---

[9] For those tempted to believe that the problem is not present in advanced economies, let me bring up the recent imposition of steel tariffs by the US, or the significant subsidies that that country has always granted to its farmers.

dies to Research and Development by private firms and contractors that have managed to convince government officials that their projects have potential defense applications.

What is important for our purposes is that the budget of these Ministries (or of any government agency or publicly-owned bank or industrial holding for that matter) can be eventually manipulated in their favor by constituencies and vested interests with substantial economic and financial relationships with those agencies.

Thus, in our model economy we can envision constituency A trying to secure subsidies for its members through the Minister of Energy while constituency B is trying to do the same through the Minister of Defense. On top of the money created to finance those subsidies covertly channeled to the private sector through the Ministries is the money created to finance genuine public goods and services, such as the maintenance of infrastructure already mentioned.

There are many other channels through which the basic mechanism described above may operate. Perhaps the relationships between the federal and provincial governments, or between the central bank and commercial banks with access to the discount window provide an even more eloquent image of the kind of institutional reality that we are trying to capture in our very simple model economy. In the case of provinces, suppose that a couple of them in a given country succeed in passing laws exempting businesses located in their jurisdictions from some federal tax, for example, federal income or corporate earning taxes. The tax exemptions would then benefit the taxpayers of those provinces at the expense of the whole population, which will be paying now the higher inflation tax necessary to compensate the resulting shortfall in fiscal revenues. That is, the provinces act *as if* they had the ability to print money.

In the case of banks, they could successfully secure lines of credit from the discount window against collateral composed basically of unrecoverable loans that the central bank cannot readily identified as such. From the point of view of formal accounting, the expansion of the money supply is not necessarily inflationary because it is backed by the commercial paper offered as collateral. But from a practical point of view, the market value of the collateral could be much lower than recognized by the central bank. If the commercial bank fails, the central bank is left with a pile of unrecoverable loans and the bank's shareholders will have received, therefore, a subsidy equal to the difference between the market value and the nominal value of the loans offered as collateral in discount window operations. The whole population will end up paying for this subsidy in the form of a higher inflation.

So far then we have in our model economy two basic ingredients: a flexible or state-contingent monetary policy and constituencies that try to manipulate it in their favor. Since both ingredients appear virtually in every economy (see footnote 9) their presence cannot possibly explain why flexible monetary policies will produce quite reasonable outcomes in some countries, and create havoc in others. The critical ingredient that can potentially make a difference must be something else and is suggested by the answer to a question that, although trivial in appearance, has far-reaching implications: Can constituencies A and B determine exactly which part of government spending went to finance, say, maintenance of infrastructure, and which part went to finance subsidies or goods and services enjoyed only by the other constituency or province? Can bank A tell that a central bank discount window advance to its competitor B was just bridging a genuine short-term liquidity need and not covering losses from bad loans? If each constituency (or bank, or province) can say how the taxpayers' money was used in each and every instance, our model economy is characterized by perfect monitoring. By contrast, if the different constituencies can't determine with certainty how the government revenues from all sources (including the inflation tax) were used, our model economy suffers from imperfect monitoring.

Why is information about the use of the public monies--in particular, of the inflation tax--so important in our model economy? Because the availability (and quality) of that information will have dramatic consequences for the outcomes of flexible monetary policies. Under perfect monitoring, inflation will remain low and devaluations will be typically small.

By contrast, with imperfect monitoring, the attempt to implement a flexible monetary policy, which in our model economy takes the form of financing government goods and services with a rate of money creation that varies with the "state of the world," will set the time inconsistency forces lose and unleash insurmountable political pressures for higher subsidies financed with money creation. As a consequence, the attempt to devalue "just a little" will end up in an out-of-control depreciation of the currency and higher inflation than intended.

II.1 - The time inconsistency high inflation bias

Before attempting to explain why the structure of information makes a difference for the outcomes of a flexible monetary policy, it is important to point out that a high inflation bias is always present in our toy economy, even when the allocation of government spending among different potential uses can be perfectly monitored.

To understand the source of that bias, notice that in the "toy economy" just described the money creation used to finance subsidies to a particular constituency imposes an inflation tax on the money holdings of the whole population (including those of the constituents receiving the subsidy,) even if the proceeds of that tax are captured only by the fraction of the population receiving the subsidy (that is, only by the members of the constituency benefiting from the subsidy). That means that each constituency faces a trade off in setting its desired level of subsidy: utility from the subsidy increases, at a decreasing rate, with the size of the subsidy, but higher subsidies need to be financed with higher inflation, which hurts all consumers, including the members of the constituency receiving the subsidy[10]. However, each constituency takes into account only the costs that a higher inflation imposes on its own members, and not on the members of the other constituencies. Accordingly, each constituency will pick a level of subsidy that is larger than it would have been if it had taken into account the costs of inflation to the whole society. This is precisely the source of the high inflation bias present in our "toy economy:" as each constituency behaves the same way, the outcome will be a higher rate of money creation and, therefore, of inflation, than any of them had individually intended. That higher inflation ends up offsetting the benefits of what were individually perceived as desirable (or "optimal") subsidies and makes all constituencies worse off.

More technically speaking, the failure of each constituency to internalize all the costs of inflation to society gives rise to a "political economy" game in which Nash equilibria are not Pareto Optimal (see Zarazaga, 1999).

Readers familiar with the literature may argue that the inefficiently high inflation bias just described is the result of a "free rider" problem and not of the time inconsistency that we have been claiming all along. However, that perception is created because for purposes of exposition, we have focused the attention on the failure of each constituency to internalize the costs that inflation imposes on other constituencies. But the time inconsistency problem is still present, albeit in a more subtle way, on the side of the benefits, rather than the costs, of the subsidy.

To see that, suppose that each and every constituency promised to contribute to an overall low inflation by not pressing for any subsidies. The prospect of a low inflation will induce a high demand for money balances, which are the natural base of the inflation tax. Now the informed readers will recognize the time inconsistency temptation faced by the constituencies of our toy economy: to promise first to keep subsidies, and therefore, inflation, low, and later renege on that promise to exploit the opportunity to extract additional revenues (subsidies) by

---

[10] For the details, see Zarazaga (1995).

taxing more heavily (with inflation) the higher level of real money balances accumulated under that promise.

To sum up, the high inflation bias in our toy economy comes from two sources: the time inconsistency problem on the side of the benefits from the subsidy, and the "free rider" problem on the side of the costs of the subsidy, represented by the inflation tax required to finance it.

Is there any way to resolve this high inflation bias or, what is the same, of inducing the representatives of each interest group not to press for subsidies that appear to benefit his constituency but whose effect is just to cause higher inflation?

The answer is a resounding yes for our model economy under perfect monitoring, but not under imperfect monitoring. Put differently, in an economy characterized by perfect monitoring in the allocation of government spending it is possible to keep the high inflation bias in latent state. But that bias will manifest itself in full force in an economy where imperfect monitoring of government spending prevails instead.

II.1.1 - Inflation under control when the constituencies know where the money went

The perfect monitoring scenario is ideal for understanding why flexible monetary policies, despite the presence of the high inflation bias mentioned earlier, don't lead to out-of-control devaluations in the presence of political and fiscal institutions that make it possible to perfectly monitor how the government actually spends the money in its potentially numerous areas of influence (remember that even the central bank discount window can be used to funnel subsidies to commercial banks!).

The way to keep the high inflation bias in latent state in this perfect monitoring environment is by exploiting the fact that each constituency can perfectly observe the actions taken by the others. This feature will invite the constituencies almost naturally to reach the implicit arrangement of not granting subsidies to their members in the understanding that a deviation by one constituency will trigger a similar deviation by the others, leading to a "war of subsidies" whose financing will require substantial expansions of the money supply. The resulting inflation will be so high that it will end up hurting everyone, including the constituency that cheated in the first place. The threat of this "high inflation punishment" (and the associated pronounced devaluation of the currency) deters each constituency from falling into the time inconsistency trap and pressing for more sub-

sidies than implicitly "agreed." By virtue of this temptation-deterring mechanism, inflation is kept low all the time. The key to this result is that deviations by any constituency from any given low subsidy policy (strategy,) will be detected with probability one in this perfect information environment.

More technically speaking, in perfect monitoring environments, trigger strategies of the type discussed in Barro and Gordon (1983) can enforce cooperative outcomes in which the inflation rate and the money supply growth driving it remain permanently low.

Indeed, a flexible monetary policy will run as smoothly as its advocates would have predicted in the perfect monitoring environment of our "toy economy:" the money supply will grow just the amount necessary to finance genuine government spending, at annual rates of between 1% and 3 %. As a consequence, inflation will remain within that moderate range.

The situation changes dramatically, however, if deviations by any constituency from a "low subsidy" policy cannot be detected without ambiguity.

II.1.2 - Inflation when the constituencies don't know where the money went

The high inflation bias always present in our toy economy cannot be kept in latent state, however, under conditions of imperfect monitoring, that is, when it is no longer possible to detect with probability one whether a constituency has cheated (received higher subsidies than implicitly agreed) every time the money supply grows at an abnormally high rate.

In particular, assume for a moment that it is no longer possible in our toy economy to distinguish between increases in the money supply originated in the need to finance a higher level of genuine government expenditures (such as maintenance of roads and schools) from those increases originated in the "selfish" actions of the constituencies that successfully pressed for more subsidies. This uncertainty reproduces the imperfect monitoring conditions of the repeated games developed in the industrial organization literature by Porter (1983), Green and Porter (1984), and Abreu, Pearce, and Stachetti (1986, 1990) and suggests therefore our main conjecture: that recurrent high inflations and out-of-control devaluations play the same role as the "price wars" in models of oligopolistic competition with imperfect information.

The problem is that in imperfect information environments, the same flexible monetary policy that so satisfactory results produced under perfect information turns out to "muddy the waters," in the sense that it makes impossible to estab-

lish with certainty whether or not some constituency has obtained higher subsidies than it was supposed to.

To make the point clearer, suppose that there are two constituencies, each of which has "agreed" to restrict to 2% per period the rate of money creation that finances subsidies to its members. On top of the resulting 4% "constituency-induced" expansion of the money supply, assume that the "judgment calls" of the well-intended policymaker can lead to additional money supply growth anywhere between 1% and 3% per period, as it was the case under the flexible monetary policy implemented in the perfect monitoring case.

Suppose now that in some periods the overall money supply expands at the unusually high rate of 6.5%. This may have happened in an infinite number of ways, but the following two will suffice to illustrate the point: 1) each constituency induced a 2% expansion of the money supply, to finance subsidies as agreed, and the well-intended policymaker expanded it by an additional 2.5% to finance "genuine" government spending, or 2) the well-intended policymaker increased the money supply by 1%, one of the constituencies kept its promise of inducing only a 2% money supply growth, but the other one cheated and induced a 3.5% expansion of the money supply, in order to enjoy subsidies above and beyond those financed with the agreed 2% "constituency-induced" expansion of the money supply.

With perfect monitoring, all constituencies will be able to distinguish the first case from the second. The reason is that they can exactly identify the sources of expansion of the money supply. However, if that ability is missing, all they know is that the money supply has expanded at a rate of 6.5%. They cannot tell whether that outcome was the result of some constituency cheating and getting more subsidies (Case No. 2) or simply of the well-intended policymaker expanding the money supply at the rate of 2.5% (Case No. 1). This means that the constituencies lost the ability they had in the perfect monitoring environment to detect unwarranted subsidies with absolute certainty. This poses a problem: should they punish unusually high expansions of the money supply, such as the 6.5% of the example? If they do not, sooner or later some constituency will realize that now it can obtain more subsidies without fearing that the resulting higher increase of the money supply will trigger damaging retaliatory "subsidy wars." On the other hand, if they retaliate with a "subsidy war", they might be punishing deviations that never occurred: after all, the 6.5% increase in the money supply may have been caused, as in case 1, by the well intended "judgment calls" of the benevolent policymaker and not by a "greedy" constituency attempting to grab more than its "fair share" of subsidies.

As intuition may suggest, and as demonstrated by Zarazaga (1999) in an application of the basic result in the paper from Green and Porter already mentioned, the solution to this problem is a compromise between the two extreme strategies: sometimes the constituencies will not react, on the assumption that no one cheated; and sometimes they will retaliate, on the suspicion that some constituency cheated and got more than its "fair" share of subsidies. In particular, in imperfect information environments, retaliations will occur when the rate of growth of the money supply exceeds certain threshold. For instance, take the 6.5% of the numerical example as the threshold. Each constituency will assume that none of the others has cheated while it sees the money supply growing below or at 6.5%. But when the money supply expands beyond that, they will retaliate with "subsidy wars" for some time. During this punishment phase, inflation soars and can account for the recurrent high inflations and out-of-control devaluations observed in countries like Argentina.

Notice that, in contrast with the imperfect information case, the punishment is effectively implemented even if no constituency cheats. The mechanism just described may appear perverse at first sight: why trigger "subsidy wars" if no one has deviated from the prescribed path of subsidies? Because if the punishment would not take place, then the constituencies will start cheating! That is, the "subsidy wars" do not punish cheating: they prevent it[11].

II.2 - A baseball analogy

Luckily, baseball is fairly popular in Venezuela and therefore an analogy with a common situation faced by the players in that sport will help the reader to understand the intricacies (and everyday relevance!) of the mechanism to deal with potential cheating described above. The ability to draw such analogy should not be surprising, as baseball is precisely a game played under imperfect monitoring conditions.

Recall the "old ball game" rule that the batter is awarded a run to first base when hit by a "bean ball" thrown by the pitcher. What's the rationale for such a rule? After all, it's not easy even for well-intended pitchers to keep under perfect control a ball they are throwing at a speed of about 90 miles per hour. It seems too harsh to penalize a pitcher for what may have been an accident. The problem is that the umpire cannot tell. All he sees is the ball hitting the batter, not the pitcher's intentions, very much as the constituents in the imperfect monitoring

[11] For a more in-depth account of the subtleties of this self-enforcing, Pareto constrained mechanism, see the papers by Porter and Green and Porter already mentioned.

scenario of the example above see only the rate of expansion of the money supply, not what brought it about.

Note that the baseball umpire faces a quandary similar to the one the constituencies face when they observe a suspiciously high rate of expansion of the money supply (that the batter is hit, in our analogy): Was the batter hit by accident or on purpose? A good-hearted umpire leaning to the first interpretation would be tempted to suspend the run of the batter to first base on the grounds that it's unfair and unnecessary to punish the pitcher for an accident. But note that this benevolent and naive attitude will give pitchers incentives to start doing the opposite, that is, to start hitting batters (and forced them out of the game) on purpose, anticipating that the gullible umpire will think the batter was hurt by accident and, therefore, that he will not award a run to first base to the batter. It should be clear why the rule must be implemented, even if the batter was hit by accident: it forces the pitchers to be careful. Batters will still be eventually hit from time to time by accident, but at least much less often than they would without the rule.

Likewise, in our model each constituency is careful not to ask for excessive subsidies, because it knows that doing so can push the increase in the money supply more often beyond the threshold that triggers the undesirable "subsidy wars." It is true that occasionally the well-intended policymaker will increase the money supply above the threshold and that this will trigger those wars anyway. But what the mechanism described does, both in baseball and in our model, is to give the players incentives to reduce the frequency of undesired outcomes. And a situation similar to the one in baseball would arise in our model if the punishment (retaliatory subsidies) were not implemented on the ground that the money supply grew beyond a certain threshold as a result of a "judgment call" by the well-intended policymaker and not because some self-serving constituency obtained higher than agreed subsidies. In imperfect information environments, there is no way to avoid such "undeserved" punishments. Putting the punishment on hold would ignore that it is precisely its effective implementation what deters constituencies from requesting higher subsidies all the time and, therefore, from pushing the economy into a permanent state of extremely high inflation.

II.3- Insights from the toy economy

II.3.1 - The advantages of non-contingent policy rules

By now the readers may have started to figure out the advantages of iron-clad, non-contingent rules in our toy economy in imperfect monitoring situations. A currency board, for example, completely eliminates all ambiguity regarding the

evolution of the money supply: it expands or contracts with and only with corresponding expansions and contractions of the international reserves. The attempt by any constituency to get away with subsidies financed with money creation will be immediately detected, because the resulting expansion of the money supply would not have a counterpart in a corresponding increase in the international reserves.

In other words, a currency board, dollarization, and in general any ironclad, non-contingent monetary policy rule restores perfect monitoring conditions in economic environments in which those conditions would otherwise be lacking. This makes it possible to enforce a "zero subsidy" and therefore, a very low inflation outcome with the same "trigger strategy" mechanism described for the perfect information toy economy[12].

II.3.2 - The perils of flexible rules

By the same token, the readers may have started to perceive the perils of replacing non-contingent rules with more "flexible" ones when imperfect monitoring conditions prevail. To reiterate, flexible monetary policies in those environments will not remove the ambiguity about the sources of expansion of the money supply intrinsic to those environments. The suspicion that money growth is prompted by attempts from some constituencies to benefit from the inflation tax at the expense of others will make it impossible to resist the assault of the always present time inconsistent high inflation bias and as result, flexible policies will likely end up in higher inflation and devaluations than intended.

It is based on these insights from the toy economy that I warned already in 1997 that in the case of Argentina.

> "replacing the currency board arrangement with more discretionary policies will be a dangerous move, at least until transparency in the allocation of public spending is achieved. Perhaps the ability to tell first "where the public monies went" should be the focus of attention of those trying to find ways to get off the back of the "currency board tiger" without the risk of being eaten up by furious inflationary forces." (Zarazaga, 1997, p. 66).

---

[12] More rigorously speaking, by virtue of its "transparency equivalence" feature in environments otherwise characterized by imperfect monitoring, non-contingent monetary policy rules may eventually reintroduce in the feasible equilibrium set Pareto efficient outcomes that can be supported as sub-game perfect equilibria under reputational strategies. See Zarazaga (1999).

The evidence briefly reviewed in the Appendix suggests that these predictions turned out to be, unfortunately, closer to the facts than the rosy picture of a quick recovery envisioned by those who confidently advocated a devaluation for Argentina.

Abandoning the currency board seems to have been, indeed, a bad idea, exactly as the "right-wing" think tanks reviled by Krugman had been telling all along. But I'm confident that it will not be easy to trace "right wing" influence in the arguments presented in these comments. Paradoxically, it has been by abandoning the "perfect information" assumption typically prevalent in "right wing thinking" that currency boards come out ahead of more flexible monetary regimes in our toy economy. In fact, I invite anyone tempted to think otherwise to read Joseph Stiglitz's Nobel Laureate lecture (2002.) My toy economy has played the game by the rules he suggested there. Since no one would dare to accuse Stiglitz of right wing thinking, it will be much more difficult from now on to dismiss concerns about abandoning currency boards as "*old-time economic religion, with its narrow-minded insistence on monetary rectitude at the expense of every other consideration*".

In fact, our toy economy, played with the rules of the game suggested "by the left," suggests that it is equally dangerous to extol the virtues of "discretionary policies at the expense of every other consideration." Devaluation doctors may now be looking for all kind of excuses to explain why their predictions failed so miserably in Argentina. But we know now from the insights of our toy economy that they forgot to check whether the societies for which they prescribed their supposedly more "state-of-the-arts" policies could monitor the actions of those in charge of implementing them.

Somewhat paradoxically, the efforts required to follow the tedious technical arguments in this section will have been justified if after going through them the readers end up dismissing the malpractice charges imaginary raised against those who advocated a devaluation for Argentina. After all, according to the tentative interpretation offered in these comments, the flexible monetary policy prescription was not obviously misguided and in fact, it might have worked alright, had not it been for the presence of anomalies in Argentina's economic body that the profession as whole has failed so far to recognize. Placated by the understanding of why devaluation doctors home and abroad erred so miserably, the angry Argentines might be more willing to consider out-of-court settlement offers from the defense. That would certainly be a welcomed development for so many doctors facing the prospect of serving jail time if the case went to trial and the jury found them guilty as charged of the misery and starvation of thousands of Argentine children. They will surely perform the necessary extra tests next time

around, lest they want to kill the patient and face malpractice charges once more, but then without the alibi that the profession as a whole didn't know any better.

III - TOYS AND REALITY

As many doctors had ordered, Argentina devalued, and the cure turned out to be worse than the alleged disease.

In these comments we have tried to rationalize why the doctors prescribed so confidently the devaluation medicine. They were just applying the well-established result that state-contingent, that is, "flexible" monetary policy rules are superior, in terms of welfare, to non-state contingent, that is, "rigid" ones. Since the currency board that Argentina had implemented since 1991 was indeed such a rigid rule, the advice to get rid of it seemed to be grounded on serious scientific thinking.

However, the recommendation forgot to read the fine print in the label of the devaluation drug: "Warning: doses are state-contingent. Use only if patient can perfectly tell apart each and every contingency from the other."

We have heuristically presented a model economy that has demonstrated the paramount importance of that caveat for the effects of monetary policy. As in actual economies, the time inconsistency of optimal state-contingent (or "flexible) plans introduces a high inflation bias in that model economy. As in actual economies, the presence of interest groups that want to exploit that time inconsistency problem in their favor exacerbates that bias. Flexible monetary policies can be successfully implemented without unleashing the high inflation bias only under conditions of perfect transparency regarding the actions of the monetary authority.

We have shown what happens in our toy economy when that transparency is lost: the inability of different constituencies to tell apart one "state of the world" from the other, and in particular, whether or not every constituency has "behaved" as agreed, activates the time inconsistency problem that was dormant in the perfect monitoring case. As a result, the very same flexible monetary policy that may have been successful in the perfect information environment ends up in high inflation and out-of-control devaluations.

We have argued that perfect monitoring conditions were far from being a reality in Argentina and that therefore the replacement of a "rigid" currency board with "flexible" monetary policies was more likely to have the dreadful effects suggested by our toy economy than the balsamic ones predicted by those who con-

fidently recommended the drug to ailing Argentina. Indeed, the predictions that we made in 1997 based on the insights from that economy seem to have largely materialized after Argentina abandoned the very transparent currency board arrangement that had been in place since 1991.

It is not the desire to brag about superior forecasting skills that compel me to bring up once more the observation that "we had told you so" five years ago regarding the disastrous consequences of a devaluation in Argentina. Rather, it is the scientific need to validate the relevance of a working hypothesis for making statements about the real world. To the extent that the predictions from the model economy seem to have been closer to the mark than predictions based on other models, I can now proceed with some confidence to apply the insights obtained with our toy economy to make conjectures about the likely fate and chances of ultimate success of the main monetary policy options open to Latin America in the 21st century.

IV - CONCLUSION

Throughout these comments the maintained hypothesis has been that the reason why the economies of many Latin American countries like Argentina o Venezuela are mired in stagnation is because those countries seem to be prone to fall into the same time inconsistency temptation that more developed countries appear to resist.

We have argued that the reason why some countries may not be able to resist the time inconsistency temptation more than others is because they lack the ability to perfectly monitor the actions of the monetary and fiscal authorities. Without that necessary transparency, "state contingent" (flexible) monetary policies cannot resist, as they do in economies with perfect information, the assault of different constituencies that exacerbate the time inconsistency high inflation bias. As a result, the very same policies that might be optimal in economies characterized by perfect information create havoc in the form of high inflation and seemingly out-of-control devaluations.

If the choice of a monetary policy for Latin America were left to those who recommended a devaluation for Argentina, they would surely like to see all Latin American countries implementing a "flexible" monetary policy resembling the one that Germany seems to have followed between 1980 and 2000, as described in section I. That would seem a priori a sound decision, since it is well known that

optimal monetary policies have the feature of being "state contingent" or, more loosely speaking, "flexible"[13].

However, that recommendation would overlook that most Latin American countries are plagued with the same kind of informational problems present in our model economy. In that context, rigid, non-state contingent monetary policies such as currency boards might do better because, unlike flexible ones, they do not "muddy the waters" even more in an environment in which the lack of transparency is already dismal.

An obvious policy recommendation would be to fix the informational problem, instead of doing away with the flexible policies that eventually exacerbate it. But this sensible course of action raises a host of questions: Which are exactly the sources of the informational problems that prevent the monitoring of the actions of the fiscal and monetary authorities? Is there any way to quantify the severity of the problem? If so, what would be the best way to alleviate it or eliminate it?

These are all questions that do not have yet answers, in part because the importance of finding them has not been fully appreciated. Perhaps this is another case of "theory ahead of measurement" and future research will make progress on that front.

. Existing work, however, suggests that transparency is closely associated with the development of adequate institutions. A study by Alesina, Hausmann, Hommes, and Stein (1996) finds that the Latin American countries with the best budgetary institutions in terms of a transparency index have also the lowest inflation rates. But there is still a lot of work to be done in this relatively unexplored area of research before we can better understand the subtle and surely complex links between institutions and the ability to monitor the implementation of monetary and fiscal policies. And even if it were possible to acquire all the necessary knowledge overnight, institutions take many years, perhaps generations, to change.

No doubt that in the long run Latin America should aim at creating the conditions for implementing state contingent or "flexible" monetary policies. But following the old Keynesian wisdom that "in the long run we are all dead," a relevant question is then what is the best monetary policy during the long transition time that the necessary institutional overhaul will eventually take.

---

[13] In fact, Bordo and Kydland (1995) have argued that even the gold standard could be interpreted as a rule with state-contingent escape clauses.

The toy economy with which we have "played" in these comments suggests that insisting with "state contingent" monetary policies simply because they are optimal under perfect information may be counterproductive. For the reasons we discussed, in the muddy informational conditions prevailing in Latin America those "flexible" policies may lead to periodic financial crises and out-of-control devaluations, unavoidably associated with social unrest. That is hardly the best climate to implement deep institutional reforms. As a result, flexible policies may end up delaying, if not derailing altogether, the reform process meant to create the conditions under which those policies would stop causing trouble and start working properly, as they are supposed to in perfect information environments.

As demonstrated in our model economy, non-contingent rules such as currency boards and dollarization may, by its very nature, restore transparency in environments otherwise lacking of it and, therefore, reintroduce the possibility of articulating strategies that help societies and governments to resist the time inconsistency temptation. Since informational problems in monitoring the activities of the public sector and the policymaking process seem to be common in Latin America, non-contingent monetary regimes such as a currency board or outright dollarization might be the best policy option left to the countries in that region that have gone from one devaluation and financial crisis to the next. Advocates of currency boards and dollarization may see in this policy recommendation a vindication of their sympathy for those regimes. However, they are not exempt of reading the fine print in the instructions of the medication either: "Discontinue use after completing treatment for your imperfect information disease".

To offer one last analogy, the situation is similar to the one a dentist faces during a root canal procedure. He well knows that patients dislike the idea of having to keep their mouth wide open and dry while he performs the procedure. The patients will tolerate the odd situation as long as they see the dentist frantically and competently working to rid them of their pain. But they might lose their temper and even react violently if the dentist disappeared for hours and his assistant attempted to force them to keep the uncomfortable position in the meantime.

Likewise, it may be that dollarization and currency boards are the only stopgap devices that many Latin American countries have left to keep the time inconsistency high inflation bias under control while, and this is crucial, they engage in a coordinated effort to implement the institutional reforms to bring the necessary transparency to the policymaking process. Once that condition is met, those same countries should consider switching to flexible monetary policies in principle optimal in perfect information contexts.

In that understanding, countries that dollarize should not do so on the false perception that such policy will allow them to readily "import" the institutional fra-

framework behind the almighty US dollar and relieve them, therefore, from the hard work of setting up their own transparency-inducing institutions. Even the stoic citizens of Latin America will not endure an open and dry mouth forever. Dollarization and currency boards should be useful stepping-stones, not the end of the road, in the process of creating the conditions for the successful implementation of welfare enhancing, state-contingent policies.

REFERENCES

Atkeson, A. (1991), "International lending with moral hazard and risk of repudiation," Econometrica 59, Number 4 (July).

Abreu, D., D. Pearce, and E. Stachetti (1986), "Optimal cartel equilibria with imperfect information," *Journal of Economic Theory* 39, Number 1 (June).

Alesina, Alberto; R. Hausmann; R. Hommes and E. Stein (1996), "Budget institutions and fiscal performance in Latin America," NBER Working Paper No. 5586.

Barro, R. J. and D. B. Gordon (1983), "A Positive Theory of Monetary Policy in a Natural Rate Model," *Journal of Political Economy* 91, Number 4 (August).

Bordo, Michael and R. Chang (2001), "Throw away the dollar peg," in *Financial Times* newspaper, June 6th edition.

Bordo, Michael and F. E. Kydland (1995), The gold standard as a rule: an essay in exploration," *Explorations in Economic History* 32, Number 4 (October).

Calomiris, Charles (2001), "Argentina can't pay what it owes," *The Wall Street Journal*, The Americas section editorial, April 13th edition.

Fernandez, Raquel, and J. Porter (2002), "Devaluation of the Argentine Peso is now not only inevitable, but also desirable," in *Financial Times* newspaper, January 3rd edition.

Financial Times (2001), "Argentina's hope," editorial in "Leader" Section, October 30th edition.

Kydland, Finn E. and Edward C. Prescott (1977), "Rules rather than discretion: The inconsistency of optimal plans," *Journal of Political Economy* 85, Number 3 (June).

Lerrick, A. and A. H. Meltzer (2001), "Beyond IMF Bailouts: Default without disruption," *Quarterly International Economics Report* (May), Carnegie-Mellon Gailliot Center for Public Policy.

Luhnow, David and P.Druckerman (2001), "Last tango: Long hailed as hero, reformer in

argentina sees his dream sour," in *The W all Street Journal*, December 4th edition.

Green, E. and Robert H. Porter (1984), "Noncooperative collusion under imperfect price information," *Econometrica* 52, Number 1 (January).

Porter, Robert H. (1983), "optimal cartel trigger price strategies," *Journal of Economic Theory* 29, Number 2 (April).

Rogoff, Kenneth and Jeromin Zettelmeyer (2002), "Bankruptcy procedures for sovereigns: a history of ideas, 1976-2001, *IMF Staff Papers* 49 (3).

Sargent, Tom J. and N. Wallace (1987), "Inflation and the government budget constraint," in *Economic Policy in Theory and Practice*, A. Razin and E. Sadka (editors.) Macmillan.

Stiglitz, Joseph E. (2002), "Information and the change in the paradigm in economics," *American Economic Review* 92, Number 3 (June).

Zarazaga, C. E. J. M. (1995), "Hyperinflations and moral hazard in the appropriation of seignorage: An empirical implementation with a calibration approach", *Working Paper 95-17*, Federal Reserve Bank of Dallas, November 1995.

—(1997), "Currency boards and the problem of time inconsistency: The role of fiscal institutions in keeping inflation low," in *"Currency Board System: A Stop-Gap Measure or a Necessity?* Proceedings of the 1997 Currency Board System Symposium, Board of Commissioners of Currency, Singapore.

—(1999), "Building a Case for Currency Boards," *Pacific Economic Review* 4, Number 2 (June).

EXHIBIT A

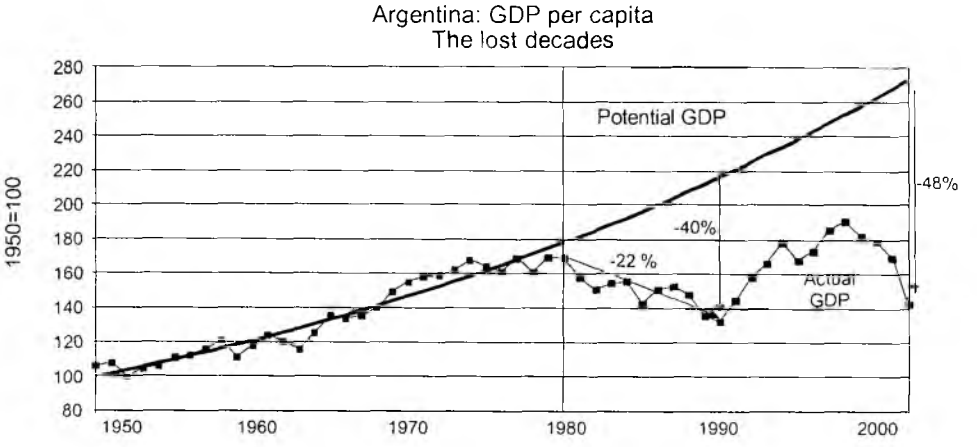

EXHIBIT B

Uruguay: Exchange rate "flexible" yet...
growth performance not better than Argentina's

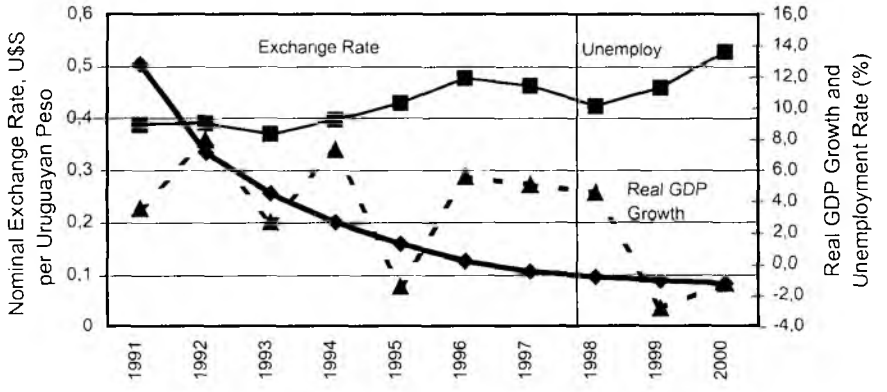

EXHIBIT C

"Normal" Countries Don't Devalue All The Time:
Deutsche Mark- US Dollar Exchange Rate

APPENDIX

In this appendix we briefly examine the evidence for Argentina after it abandoned its currency board. To that effect, it would be misleading to take January 6, 2002, the date in which that system was abandoned *de jure*, as the date in which it was abandoned in practice. That had happened *de facto* much earlier, in April 25, 2001, when then Minister of the Economy Domingo Cavallo, in strange complicity with a left wing legislator, Elisa Carrió, sacked Pedro Pou, the president of the Central Bank, after he refused to lend to the government, as expressly prohibited by the Convertibilily Law.

Having terminated with the independence of the Central Bank, Cavallo was able to complete his plan. The new central bank authorities proceeded to happily accept government bonds at face value as collateral for an equivalent amount of international reserves, which the Treasury "borrowed just for a little while" to honor sovereign debt obligations that were coming due.

As later developments proved the government bonds offered as collateral worthless, the swap just described left the money base unbacked well below the lower limit established by the Convertibility Law. As if mimicking a Greek tragedy, that Law had been sacrificed at the hands of its own father.

Cavallo took two other crucial steps that directly contributed to the collapse of the currency board way before its official demise on January 6, 2002. In April he submitted to Congress legislation that proposed to abandon the Convertibility Law (to "expand" it, in terms of an administration that repeatedly proved its fondness for euphemisms) and replace it with a system in which each unit of the local currency would no longer be backed exactly by one US dollar, but by a basket of currencies, composed in equal parts by the dollar and the newly launched euro.

Notice that this proposal was indeed a move in the direction of the more "flexible" monetary policies demanded by the experts who were urging the Argentina to relax the straitjacket with which the Convertibility Law was, according to them, "choking" its economy. Entirely in line with the predictions from our toy economy, this turned out to be a very unfortunate decision.

To top it all, in October 2002 Cavallo authorized the Treasury to issue a non-interest bearing bond, the LECOP (Letras de Cancelación de Obligaciones Provinciales,) to cancel federal government obligations with the provinces. Since the private sector could use these bonds to pay federal taxes, for all practical purposes they became currency issued by the Treasury that circulated in parallel and at par with the currency issued by the central bank.

Later on, the government allowed the province of Buenos Aires to issue a similar bond, the Patacón, which could also be used to cancel federal taxes. Other provinces followed suit, as the ability of each to print its own currency set in motion the "free rider inflation tax-cum-time-inconsistency" mechanism described in our toy economy. As of the time of this writing, the stock of circulating quasicurrencies is equivalent to about 80% of the stock of money base. That is, in practice the provinces almost doubled the money base. The inflationary pressures generated by that proliferation of quasi-currencies remained uncertain as of the time of this writing, in part because the quasicurrencies issued by smaller provinces traded at considerable discounts and in part because the government simultaneously introduced severe capital controls and froze some prices, particularly of transportation and utilities.

The dismissal of a "rigid" central banker, the relaxation of the monetary policy regime he was trying to enforce according to the law, the looser monetary policy implemented with quasicurrencies, were all manifestations of the attempt to implement the more flexible monetary policies that supposedly would take Argentina out of its economic slump. The results were indeed disappointing.

The attempt to devalue "just a little" (30%, from $1 per US dollar on January 5, 2002, to $1.4 on January 6) ended up, as our model economy would have predicted, in a devaluation more than twice as high (70% as of the time of this writing, when a US dollar sold for $3.5.) Consumer prices, which had declined 1.1 % in 2001, were bound to increase by about 40% in 2002 against the background of a GDP falling at a 10-12% annual rate. Simultaneously, consistent with the outcomes of flexible policies in imperfect information environments captured in our model economy, Argentina witnessed an avalanche of subsidies to all sort of debtors, consumers of public utilities, and provinces desperately trying to grab a larger share of the inflation tax by printing their own currencies. Nothing farther from the virtuous circle of growth and prosperity that the devaluation was supposed to bring about.