TIGHT MONEY PARADOX ON THE LOOSE:
A FISCALIST HYPERINFLATION

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ABSTRACT: Hyperinflation is usually interpreted as a result of the monetary financing of serious fiscal imbalances. Here, a fiscalist alternative is explored, in which inflation explodes because of the fiscal effects of monetary policy. Higher interest rates cause the outside financial wealth of private agents to grow faster in nominal terms, which in fiscalist models calls for higher inflation. If the monetary authority responds to higher inflation with sufficiently higher nominal interest rates, a vicious circle is formed. The model is particularly advantageous for hyperinflations in which most of the fiscal action concentrates in the interest bill on public debt and debt rollover, rather than seigniorage or primary budget deficits. Brazil in the late 1970s and early 1980s serves as a motivating case. (*JEL* E31, E5)

Inflation – so goes the monetarist dictum – is always and everywhere a monetary phenomenon. Of course, there is no conflict between that claim and monetary expansion ultimately originating in the need to finance fiscal deficits. Nowhere is that as distinct as in studies of hyperinflation in the tradition of Phillip Cagan (1956).

Adopting the fiscalist approach to price determination advocated by Eric M. Leeper (1991), Christopher A. Sims (1994) and Michael Woodford (1994, 1995), one can turn that monetarist story right on its head. In a fiscalist world, prices are driven not by liquidity, but by the outside wealth of private agents. Budget deficits, under a fiscal policy regime that causes a

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breakdown of Ricardian equivalence, add to that wealth stock. Inflation is none other than a symptom of ‘too much nominal wealth chasing too few goods’: it serves to corrode the real value of financial wealth, thus bringing demand back in line with supply. Inflation becomes essentially a fiscal phenomenon.

Just as inflation may have deep fiscal roots even in a monetarist account, so can monetary factors be blamed for inflation in a fiscalist account. That is because monetary policy, changing both the share of government liabilities that bears interest and the interest rate itself, affects the nominal growth of private net worth. But then a ‘tight money paradox’ arises: given the primary budget deficits, tighter money leads to faster growth of outside wealth, and to more rather than less inflation.

The reversion comes full circle with regard to explosive inflation, the subject of this paper. A foothold on monetary policy may be especially important in explaining certain hyperinflations along fiscalist lines – as much as fiscal pressures for monetary expansion are particularly prominent in Cagan models. Under a monetary policy regime that controls nominal interest rates, sustained acceleration of inflation can only be generated by persistent monetary tightening. Meanwhile, the trajectory of primary government budgets can have no systematic effect on inflation rates. Such hyperinflations can be well modeled as a vicious circle of ever higher interest rates and ever higher inflation.

Empirical motivation for such theoretical exercise can be found in the Brazilian experience in the late 1970s and early 1980s. Brazil boasted a thriving market for domestically denominated government debt, an ingredient that enhances the fiscalist departure from conventional results. In 1980, the country underwent a notorious change in monetary policy regime, upon which a fiscalist model would have predicted exactly what came to pass: a switch from stability of inflation rates to persistent inflation acceleration. Conventional explanations for the episode are unsatisfactory, and signs of a tight money paradox have not been lost on a number of observers.[2]

Section I briefly reviews the Brazilian evidence. In section II, the central results of the paper are derived from a general equilibrium model built on microfoundations. Section III addresses a few recurrent questions, extending the baseline model as needed. Section IV concludes.

I. BRAZIL, 1975-1985

After a period of reasonable stability between the oil shocks of the 1970s, inflation in Brazil switched to a trajectory of persistent acceleration (figure 1). The most conventional explanation for such an episode, along the lines of a Cagan model, would rely on movements in real seigniorage targets. Persistent increases in seigniorage would cause inflation to accelerate commensurately. Under certain assumptions, even a discrete upward step in seigniorage requirements can set off an explosive trajectory along which seigniorage need not increase any further. But there is a nagging (and well known) piece of evidence in the case of Brazil: real seigniorage collection remained remarkably stable all along (figure 2).[3]

Long and steady inflationary trends as seen in Brazil clamor for rational expectations rather than backward looking mechanisms implying that economic agents are systematically

[2] Thomas J. Sargent (1986) hinted at the possibility of a tight money paradox explained by the 'unpleasant monetarist arithmetic' of Sargent and Neil Wallace (1981). High interest rates were most frequently mentioned as a cost-push inflationary factor, counting interest on working capital among the costs of production (as in Albert Fishlow, 1971, or in Domingo Felipe Cavallo, 1977). As far as physical inventories are concerned, only movements in the real interest rate should matter; but the nominal interest rate remains the relevant opportunity cost of transactions balances held by firms. Variants of the cost-push argument based on credit rationing, either due to direct government intervention or to market imperfections (as in Alan S. Blinder, 1987) were also very frequent in the structuralist literature (see Samuel A. Morley, 1971). Others still echoed Fishlow (1971) with the claim that tight money fueled inflation because it depressed output and increased unit costs of production. Finally, the liquidity services of government debt soon became a prominent theme: if the relevant monetary aggregate is as broad as to include public debt, 'money' grows faster with higher interest rates. That channel was explored by Carlos Ivan Simonsen Leal and Sérgio Ribeiro da Costa Werlang (1990, 1995), and reviewed in Deepak Lal (1990).

[3] Inflation is the CPI computed by FIPE, Universidade de São Paulo. Interest is the average overnight rate from the ARIES database compiled by Fundação Getúlio Vargas, Rio de Janeiro. Interest and inflation are gross monthly rates (1+net rate/100), as in the text. Raw data on the monetary base and government debt

fooled. Then, both stable and exploding inflation might be equally consistent with the same constant seigniorage target, in a manifestation of the equilibrium indeterminacy problems plaguing rational expectations models of monetary economies. Typically, equilibrium is selected by discarding 'speculative' inflationary explosions – namely, those unjustified by seigniorage movements. That strategy produces a good explanation for the early stability seen in Brazil, but turns a blind eye to the later explosion. It also begs the question of why explosive trajectories could legitimately be ruled out before but not later. In the absence of additional criteria to select a particular *explosive* trajectory, the observed explosion can only be interpreted as a self-fulfilling prophecy. If the conventional selection criterion is jettisoned, even the period of stability reduces to a chance event.

Given such shortcomings, it is no surprise that a popular explanation for the Brazilian episode focuses instead on a certain pattern of monetary accommodation that made permanent the otherwise temporary effects of adverse supply shocks on inflation rates. Favorable supply shocks are seldom mentioned, which may be fair enough if policy did not make their disinflationary effect persistent. Such asymmetry in policy responses could account for the upward drift in the rate of inflation without any particularly bad luck in the draw of supply shocks. Unlike in Cagan models, however, no intrinsic trait of the macroeconomic policy regime would be pulling inflation up in the absence of exogenous shocks. The economy might well have switched from stability to inflationary explosion simply because the adverse shocks intensified, even without any change in policy regime.

But there *was* a major change in macroeconomic policy regime in 1980, virtually contemporaneous with the trend break in the inflation series. It was *the* salient macroeconomic policy turnaround in Brazil between the late 1960s and the Cruzado Plan of February 1986.[4]

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used to generate the monthly fiscal series in figure 2 are from *Boletim do Banco Central do Brasil*, several issues. The fiscal series are deflated by the price index. All plots show three-month moving averages.

[4] That seems to be a fairly consensual opinion: for instance, see Fishlow (1989), and Paulo Rabello de Castro and Marcio Ronci (1991).

Nominal interest rates had been kept fairly stable until then, displaying for several months no response to the inflationary impact of the second oil shock. By mid-year, the switch to a new regime was clearly under way (figure 1). High officials eventually went on record to announce their intent to raise interest rates so that ‘those with money had better think twice before spending it’.[5] The change in regime is attributed to foreign creditors having finally prevailed upon domestic policymakers to mend their heterodox ways – which had been often rationalized, with regard to monetary policy and inflation, with allusions to the cost-push effects of tight money.[6]

In spite of all the lip service officially paid to quantitative targets, monetary aggregates were not truly exogenous under either policy regime. Most frequently, monetary policy is described as ‘passive’ for failing to exercise direct control over monetary aggregates and for accommodating completely the inflationary impulse from adverse supply shocks. However, the intensity of monetary policy reaction to bursts of inflation and the choice of policy instrument are two potentially separate questions. It is well known that monetary policy can be very ‘active’ in spite of controlling interest rates rather than monetary aggregates, as long as feedback from inflation into nominal interest rates is strong enough. A nominal interest rule with feedback from inflation can be described by:

(1) $$R_t = \theta_0 + \theta_1 \pi_t$$

where R_t denotes the gross nominal interest rate on assets carried from t to t+1, while π_t denotes the gross rate of inflation between dates t-1 and t (variables are dated according to when they are determined).

Abundant evidence on the conduct of monetary policy in Brazil bears witness to interest rates being the actual policy instrument, with monetary aggregates turned endogenous as a consequence (see, for instance, Armínio Fraga Neto, 1988). However, the evidence is not in the least supportive of the idea that monetary policy remained impervious to inflation all along.

[5] Minister Antonio Delfim Netto, quoted by *O Estado de São Paulo*, 11/5/1980, p. 1.

Monetary policy was indeed 'passive' or 'accommodative' until 1980, when real interest rates were allowed to drop whenever inflation happened to pick up. In terms of equation 1, that would be captured by a very low value of θ_1, which is confirmed by the scatter plot and the linear regression line of figure 3, panel (a). The new regime, on the other hand, strove to raise real interest rates in reaction to higher observed inflation, by making nominal interest rates increase even more than inflation already had. In terms of equation 1, that would require a relatively high value of θ_1, as revealed by panel (b) of figure 3.[7]

The only problem is that such a change in regime is normally supposed to curb inflation – as it presumably did in the US since the early 1980s – and not to make the problem worse. The vicious inflation acceleration that followed the policy switch sounds even more bizarre when contrasted with the Brazilian experience after the *first* oil shock: monetary policy was much more accommodative then, and yet inflation merely climbed to a permanently higher plateau instead of exploding. In the following section, I present a simple fiscalist model that reconciles the stability of inflation in the late 1970s with the explosion in the early 1980s, and each outcome with the monetary policy regime in place at the time.

II. INFLATION WITHOUT MONEY

I consider here a closed economy inhabited by an infinitely-lived representative household. The household subsists on a single good supplied exogenously. There is a government whose only business is to collect taxes and make transfers, all lumpsum. The only financial assets are one-period, riskless nominal bonds. I abstract from the existence of an asset with superior liquidity services and potentially dominated in rate of return – thereby stressing that inflation

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[6] Political circumstances surrounding economic policymaking, the personalities involved and their economic thinking are described in detail by Fishlow (1971, 1989) and Thomas E. Skidmore (1971, 1989).

[7] These simple estimates do not purport to serve as the basis for formal statistical inference about a change in monetary policy regime, especially given the non-stationarity of the latter half of the sample. The data alone cannot determine whether the regressions are truly structural, or if they are instead reduced form relations capturing a structural break that occurred elsewhere in the economy, creating the spurious appearance of a change in monetary policy regime. But the identification of the estimated parameters as

arises independently of liquidity effects of any kind. But the economy is still monetary, for prices and financial contracts are denominated in a conventional unit of account. Monetary policy can be described in terms of direct control of the nominal interest rate.[8]

The representative household maximizes lifetime utility:

$$\sum_{t=0}^{\infty} \beta^t u(c_t) \tag{2}$$

where $0 < \beta < 1$. Its financial wealth evolves according to the series of flow budget constraints:

$$b_t + c_t = y_t + g_t + b_{t-1} \frac{R_{t-1}}{\pi_t}$$

Here, c and y respectively denote consumption and the exogenous endowments, while g denotes the primary fiscal deficit in real terms. By b_{t-1} I denote the real value at t-1 of bonds carried from t-1 to t. Those bonds promise to pay the gross nominal interest rate R_{t-1}, determined at t-1, and the gross rate of inflation during the same period is π_t.

A well posed intertemporal maximization problem requires some limitation on borrowing by the representative household. Prohibiting the household from ever borrowing more than the present discounted value of future disposable income, its flow budget constraints can be turned into the following series of intertemporal budget constraints ($\forall\ t \geq 0$):

$$\frac{b_{t-1} R_{t-1}}{\pi_t} \geq \sum_{s=0}^{\infty} \frac{c_{t+s} - y_{t+s} - g_{t+s}}{\prod_{k=1}^{s} \frac{R_{t+k-1}}{\pi_{t+k}}} \tag{3}$$

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structural is corroborated by the narrative evidence on the conduct of monetary policy, which lends credence to the hypothesis of a deliberate regime change.

[8] Monetary models without explicit mention of money balances have been used outside the fiscalist literature, as in Julio J. Rotemberg and Woodford (1997), Richard Clarida, Jordi Galí and Mark Gertler (1999), and Woodford (1999). A standard liquidity demand may exist in the background, but certain interest rate rules for monetary policy reduce the model to a set of equations that fully determine inflation and output and make no reference to monetary aggregates. In a fiscalist model, that operation is complicated by what the government saves in interest by issuing money rather than bonds. That contribution to the budgets can be safely disregarded if it is largely unresponsive to endogenous variables (as in part D of section III below). For the sake of expositional clarity and in order to avoid discussing particular assumptions about the money demand function, much of the fiscalist literature opts for eliminating money from the model outright, as I do here. Good examples are John H. Cochrane (1996,

Maximization of objective function 2 subject to constraints 3, with b_{-1} and R_{-1} given as initial conditions, results in the following perfect foresight equilibrium conditions (∀ $t \geq 0$):

(4) $$u'(y_t) = \beta \frac{R_t}{\pi_{t+1}} u'(y_{t+1})$$

(5) $$\frac{b_{t-1} R_{t-1}}{\pi_t} = -\sum_{s=0}^{\infty} \frac{g_{t+s}}{\prod_{k=1}^{s} \frac{R_{t+k-1}}{\pi_{t+k}}}$$

Equation 4 is the consumption Euler equation combined with the market clearing condition $c = y$. Equation 5 is the household's intertemporal budget constraint (HIBC) holding with equality, as necessary for lifetime utility maximization, also combined with market clearing. The latter is readily recognized as the government's intertemporal budget constraint (GIBC).

The model is closed by specification of fiscal and monetary policies. Given the motivating Brazilian evidence, monetary policy is assumed to set nominal interest rates with feedback from inflation, as described by equation 1. As for fiscal policy, I assume throughout that primary deficits are set exogenously. That is just the simplest example of a fiscal regime with the property that a unique initial inflation rate is consistent with equation 5 at each date – the central tenet of a fiscalist approach to price level determination.[9] It departs from the implicit conventional assumption that, because primary deficits adjust endogenously to macroeconomic conditions so as to uphold the GIBC, equation 5 is identically satisfied for *every* initial inflation rate. If that were the case, the household would not regard public debt as net worth, since it would be simply *identical* to the present discounted value of future net taxes – which accounts for Woodford (1995) terming that type of fiscal regime 'Ricardian'.

Under the assumed fiscal regime, a perfect foresight equilibrium starting from $t = 0$ is fully determined by equations 1, 4 and 5. From equation 4 one obtains at each date the entire path

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1998) and Sims (1997). But the absence of monetary frictions is not an inherent feature of the fiscal theory of price determination, a point carefully argued by Woodford (1998c).

[9] The only restriction on the exogenous choice of primary budgets is that the right-hand side of equation 5 must have the same *sign* as the numerator on the left-hand side.

of *future* real interest rates. Given that, and exogenous and predetermined variables, at each date equation 5 determines the current inflation rate (the one appearing on the left-hand side). Given the past inflation rate, next period's nominal interest rate is set at each date according to equation 1. The semi-differenced form of 5:

$$(6) \qquad b_t = g_t + b_{t-1}\frac{R_{t-1}}{\pi_t}$$

finally determines the path of government debt. A trajectory computed in that fashion is indeed a perfect foresight equilibrium starting at $t = 0$: it is easy to verify that the resulting real interest rates R_t/π_{t+1} satisfy the Euler equation 4 for all $t \geq 0$.

Inflation driven by equation 5 can be attributed to wealth effects. After all, the equilibrium inflation rate is determined by the joint requirements of exhaustion of HIBCs (given the nominal financial wealth the household brings from the past and the expected future path of fiscal policy) and market clearing. Faster growth of nominal financial wealth, as implied by higher nominal interest rates, or higher expected fiscal transfers, both require higher inflation or otherwise the HIBCs would expand in real terms, and the household would want to consume more relatively to endowments.

The *same* perfect foresight equilibrium path of inflation can be more directly computed by combining equation 4 with equation 1 ($\forall\ t \geq 0$):

$$(7) \qquad \frac{u'(y_t)}{\beta u'(y_{t+1})} = \frac{\theta_0 + \theta_1 \pi_t}{\pi_{t+1}}$$

Given an exogenous sequence of endowments, this equation reduces to a first-order difference equation for the inflation rate. Complete determination of the inflationary trajectory still requires an initial condition for π_0, which can be obtained from equation 5 for $t = 0$.

A graphical description of the resulting dynamics is easiest in the particular case of constant equilibrium real interest rates $\bar{r}$. Two possible cases of interest are depicted in figure 4. In panel (a), where $\theta_1 < \bar{r}$, the inflationary dynamics is stable. Wherever the economy starts, as dictated by the initial GIBC, it must converge to the steady state. If monetary policy tightens, in the sense of responding to each given rate of inflation with a higher interest rate (that is, θ_0 or θ_1 increase, but still keeping $\theta_1 < \bar{r}$), then steady state inflation goes up, and that is where the economy must converge to. The monetary policy estimated for pre-1980 Brazil is consistent with this case.

In panel (b), on the other hand, where $\theta_1 > \bar{r}$, the dynamics is unstable. If the economy happens to start at the steady state, it will remain there. But only by coincidence will the starting point determined by the GIBC be exactly the steady state. Otherwise, the inflationary dynamics will be explosive. In particular, if the initial inflation rate is higher than the steady state, the result will be ever accelerating inflation. The post-1980 evidence about the Brazilian monetary policy regime is consistent with this case. With the estimated regression coefficients, and assuming an equilibrium real interest rate of 6% per year, steady state inflation would be 2.4% per month – lower than the inflation rates at the time of the change in regime.

Thus inflationary explosion is traced back to an explosion of nominal interest rates. The interest bill on public debt is the fiscal variable pinpointed as responsible for the explosion of the nominal growth rate of government liabilities. In fact, nothing was specified about the *temporal* trajectory of primary budget deficits in order to obtain the hyperinflationary equilibrium. Focusing on payments of interest by the government rather than on movements in primary deficits may seem warranted in the case of Brazil, in the light of the evidence in figure 2. Yet, it is natural to ask what importance primary deficits could ever have in producing that kind of dynamics.

The mere realization that one can fully describe the perfect foresight equilibrium path of inflation without much information on the temporal trajectory of primary budgets indicates that the latter must play a rather limited role. In the perfect foresight equilibrium computed above, π_0 depended on future primary budgets only through their discounted sum (as in the GIBC for $t = 0$).

Since all later inflation rates had to turn out as predicted, and at the same time had to satisfy equation 4, they were fully determined by the nominal interest rate at each date. Initial inflation had an impact on later inflation rates, but only through the difference equation 7 – i.e., thanks to its impact on the later path of nominal interest. Whether the discounted sums on the right-hand side of equations 5 increased or decreased over time – provided that they did so exactly as foreseen – would have no further bearing on subsequent inflation rates. Satisfaction of equation 5 at every date would be guaranteed by the implied evolution of government debt (the numerator on the left-hand side).

That stark distinction between π_0 and later inflation rates along the equilibrium path is just an idiosyncrasy of perfect foresight. It can be properly interpreted as attesting that, under nominal interest rate control, only *surprises* about the future path of primary budgets matter for inflation: the arrival of news calls for a recomputation of the perfect foresight equilibrium, with the initial inflation rate again restricted only by the initial GIBC. Surprises regarding fiscal deficits and inflation, however, should not be systematic, or agents would learn to expect them. Once they learn what inflation to expect, equilibrium cannot keep violating the Euler equations 4. Therefore, in the absence of justification from monetary policy, repeated fiscal expansion is not a good reason for persistently accelerating inflation if expectations are rational. On the other hand, unsystematic fiscal surprises would cause inflation to deviate from the previously foreseen path also in an unsystematic manner, except insofar as justified by persistent changes in the path of interest rates.

Barring changes in interest rates, a large one-time fiscal surprise (about the whole sequence of future primary deficits) could still be blamed for a large blip in inflation. Such blip could even turn into a more protracted inflationary burst in the presence of nominal rigidities (as shown in Woodford, 1998a). But inflation would eventually run out of steam as the pressure of real wealth on demand was alleviated. That is hardly a good description of inflation that keeps accelerating for years without any sign of tapering off. Therefore, under monetary regimes that control the nominal interest rate, the fiscalist diagnostic regarding persistent inflation acceleration must point the finger at the fiscal consequences of monetary policy tightening.

It is also easy to verify that the explosive inflationary path just described is perfectly consistent with the *real* value of government debt remaining bounded in equilibrium – perhaps not even increasing at all. In the case of Brazil, real government debt did increase considerably, which can be accommodated by movements in real interest rates or in primary deficits. But what inflation follows is the *nominal* rate of growth of government debt, exactly in order to prevent debt from growing excessively in real terms. In this sense the fiscalist approach differs from arguments like the 'unpleasant monetarist arithmetic' of Sargent and Wallace (1981), which attribute a similar tight money paradox to anticipation of higher monetary financing of budget deficits as real debt approaches some hard ceiling.

That observation bears directly upon an issue of fiscal policy that has been debated in connection with episodes of high inflation: whether one should worry about the total budget deficit or only about the narrower concept of 'operational deficit' (primary deficit plus *real* interest on public debt). A case was frequently made for tracking the latter, downplaying the importance of 'price level adjustments' of the nominal value of government debt. One argument was that such price level adjustments would not put pressure on current or future seigniorage needs, since they would not contribute to increasing the *real* value of government debt. That is consistent with the Sargent-Wallace but not with the fiscalist view of the tight money paradox. According to the latter, the price level adjustment of government debt does matter, exactly because it calls for inflation in order to prevent the real value of government debt from growing too much and causing demand for goods to exceed supply.[10]

[10] Another popular argument for tracking operational deficits does focus on the evolution of outside financial wealth: the price level adjustments of government debt should presumably have no effect on real aggregate demand, since they do not expand real outside wealth, but only prevent it from shrinking. Not having any impact on *real* aggregate demand, the argument goes, they should have no impact on inflation. But that reasoning is analogous to looking at a simple quantity equation $M/P = Y$ and making the absurd claim that monetary expansion only causes inflation if it increases *real* money balances.

The explosion of inflation results from the monetary authority repeatedly setting nominal interest rates such that, if inflation remained the same as in the period before, the real interest rate would be too high for equilibrium. It may sound naive of policymakers to insist on setting nominal interest rates higher and higher if that simply calls for higher and higher inflation. But there are many sources of inflationary shocks in the real world, and the tight money paradox may not be so easy to detect – especially with conventional wisdom pointing in the opposite direction. Sticky prices would blur the whole picture even more: as shown in Loyo (1998), in spite of the tight money paradox, monetary tightening would still raise real interest rates and depress output in the short run, just as conventionally expected.

Even if real rates fail to respond to the extent desired, and inflation is repeatedly observed to accelerate in response to tighter money, all that may be rationalized without ever admitting that monetary tightening is self-defeating for some fundamental reason. In Brazil, the monetary authority often expressed its frustration at the fact that increases in nominal interest rates were perceived not as an attempt to raise real rates, but as incorporating an upward revision in inflation forecasts. But those were not identified as the only rational expectations agents could hold in a world where higher nominal interest calls for higher inflation. Instead, the problem was explained much like the 'price puzzle' in the US: inflation accelerated because price setters revised their forecasts according to what they saw as a signal revealing the monetary authority's superior information about inflation.[11] Disabusing private agents of such information asymmetry would presumably cure the problem.

The nature of the monetary policy regime is actually not particular to my story. Indeed, monetary regimes yielding a unique unstable steady state inflation rate are exactly what conventional accounts rely on to determine inflation period by period, in models with the same

[11] That interpretation became less persuasive as a massive private effort of inflation forecasting (and even price sampling) developed. Results by Márcio G.P. Garcia (1995) for a later period indicate that nominal interest rates on government bonds did not contain superior information about inflation.

basic structure as the one presented here.[12] What distinguishes those models from a fiscalist approach is only the role assigned to the GIBCs in equilibrium determination. Implicitly assuming that the GIBC is identically satisfied, their strategy to pin inflation down is to rule out perfect foresight paths in which inflation is expected to explode or implode. This naturally requires inflation to remain always at the steady state. Among monetary policy rules described by equation 1 and yielding a unique unstable steady state, increases in intercept or slope reduce the *steady state* inflation rate. Inflation then displays the standard response to monetary policy tightening, but only because it is tied to the steady state by assumption. Along any explosive path, it would still be true that higher nominal interest rates call for higher inflation to satisfy the Euler equation – that is exactly what makes these paths explosive in the first place. But that becomes irrelevant once one assumes that these paths are never followed.

One might contend that monetary policy regimes with a unique unstable steady state sound more reasonable in combination with the conventional approach to equilibrium selection: an obdurate behavior is prescribed to the monetary authority only out of equilibrium, a situation that is actually never supposed to arise. But equilibrium selection based on the unsavory off-equilibrium consequences of a policy regime is hardly persuasive if the regime is only deemed credible as long as the monetary authority is never called upon to deliver on its off-equilibrium obduracy. Quite to the contrary, it might even be argued that conventional equilibrium selection requires worse monetary obduracy than the fiscalist approach suggested here. Conventional equilibrium selection relies on it being believable that the monetary regime would be maintained *forever* if the economy ever hitched on the explosive path, producing equilibria that are ruled out on the grounds of inflation growing *without bound*. In the fiscalist approach, the current inflation rate depends only on the contemporaneous and not on future nominal interest rates. In particular,

[12] That argument was applied to interest rate feedback rules by Bennett T. McCallum (1981). See caveats in Jess Benhabib, Stephanie Schmitt-Grohé and Martín Uribe (1998).

it is never assumed that the explosive monetary regime will remain in force forever; while it does, however, inflation accelerates.

The rightful bone of contention with regard to the fiscalist hyperinflation suggested here is really whether the *fiscal* regime I assume is reasonable or not. It is not essential that the fiscal regime be exactly the one I use for clarity's sake, with exogenous primary budgets. Similar results obtain even if primary budgets do respond to endogenous variables, as long as it remains true that a unique initial inflation rate solves the GIBC, given the quasi-exogenous path of future equilibrium real interest rates and the predetermined financial wealth.

The diametrically opposite assumption of a Ricardian fiscal regime seems to proceed from the notion that governments ought to be subject to borrowing constraints just like households. However, while the household's borrowing constraints are necessary for the existence of a solution to its utility maximization problem, and thus for the existence of equilibrium, the same is not true of government's borrowing constraints. That does not preclude the government from being a maximizer in its own right. Unlike the price-taking representative household, it should only recognize that its actions have an impact on the aggregate equilibrium conditions. The policy problem would then amount to choosing among the aggregate equilibria that different policy regimes implement. Restricting the choice space by imposing borrowing constraints on the government is not at all necessary to make that a well posed problem, and optimal choices might in fact be found outside those bounds.[13]

Ricardian fiscal regimes, once the logical possibility of alternative assumptions is seriously contemplated, start to look like quite special cases. There are in fact reasonable enough feedback rules for primary budgets that make the fiscal regime Ricardian (Woodford, 1995), and one should not make the exaggerated claim that Ricardian regimes are non-generic exceptional cases. There is also evidence that fiscal regimes in certain situations must be Ricardian, or else

[13] Woodford (1998b), for instance, shows that a regime yielding a fiscalist determination of the price level may be the solution to a Ramsey problem of optimal taxation.

the monetary policy rules estimated in these cases would result in inflationary explosion just like in Brazil – and they do not.[14] Yet, Ricardian regimes do require a degree of fiscal rectitude that is hard to square with Brazil's historical record.

III. FAQ

In this section I address some of the most frequently asked questions about the above results. Variations of the baseline model are made as required in each case.

A. Indexed bonds

High inflation economies tend to develop an extensive system of indexed contracts – and there is hardly a better example of that than Brazil. If public debt is indexed, the model's assumption that all bonds are nominal could be challenged on two counts. First, a feedback rule for controlling the yield on nominal bonds might be a poor description of monetary policy. Second, inflation is determined by the GIBCs assuming that the real value of government debt can be corroded by inflation.

Those objections lose much of their force once it is recalled that bonds linked to price indices are not tantamount to 'real' bonds. Because of the time involved in sampling and computing price indices, the nominal value of indexed bonds is typically adjusted according to lagged inflation rates. If the price index is made public with a one-period lag, then the nominal yield on one-period indexed bonds will depend only on their contractual 'real' yield and on an inflation rate already realized at the date of *issue* (although not yet officially computed). That is not far from Brazilian reality, for instance, if a 'period' represents a month. Government debt appearing in the GIBCs would have a predetermined nominal value, and inflation determination would work just as described above.

Despite Brazil's already established fame as a highly indexed economy, it is not hard to make the case for a nominal interest rate rule to describe pre-1980 monetary policy. First of all,

[14] The US since Volcker is a case in point, according to the estimates of Clarida, Galí and Gertler (1997). See nonetheless Cochrane's (1998) fiscalist interpretation of US inflation.

the proportion of indexed bonds in total public debt was still relatively low: around 40% between 1977 and 1980 (Dionísio Dias Carneiro Netto, 1987). On top of that, an attempt to break inflationary inertia without dismantling the legal indexation structure gave rise to as blatant an oxymoron as ‘pre-fixed indexation’ (announced months in advance). Under such circumstances, government bonds were nominal for all intents and purposes, and monetary policy could be described as targeting their nominal yield.

As inflation exploded after 1980, honestly indexed bonds did become more prevalent in the stock of government debt: upwards of 80% between 1982-83, and even more afterwards (Carneiro Netto, 1987). The nominal yields on indexed bonds can be written as $R_t = \hat{r}_t \hat{\pi}_{t+1}$, where $\hat{r}_t$ denotes the contractual ‘real’ yield on a bond carried from *t* to *t*+1 and earning $\hat{\pi}_{t+1}$ from its indexation clause. The best description of monetary policy might then be as targeting $\hat{r}_t$ instead of the nominal interest rate, but still doing so according to a feedback rule from inflation: it would tighten in response to higher inflation by raising the contractual ‘real’ yield. That might be represented by:

$$\hat{r}_t = \theta_1 + \frac{\theta_0}{\pi_t}$$

With the coefficients (θ_0, θ_1) estimated in panel (b) of figure 3, $\hat{r}_t$ would react positively to a good forecast of the next inflation release, converging to a value that exceeds the equilibrium real interest rate as inflation explodes. If the index applied to financial contracts is inflation lagged once ($\hat{\pi}_{t+1} = \pi_t$), that particular rule leads right back to equation 1. The more general message is that, if indexation is itself lagged, then a feedback rule for the nominal interest rate may properly represent a regime based on a feedback rule for contractual ‘real’ yields on indexed bonds.

But even if true real bonds were added to the model, their presence side by side with nominal bonds would *not* affect the above predictions about the effects of monetary tightening.

The equilibrium path of inflation would still be determined by equation 7, except that now the initial condition would be provided by the modified GIBC:

$$(8) \qquad \frac{b_{-1}R_{-1}}{\pi_0} + \tilde{b}_{-1}\tilde{r}_{-1} = -\sum_{t=0}^{\infty} \frac{g_t}{\prod_{s=1}^{t} \tilde{r}_{s-1}}$$

where $\tilde{b}_t$ is the stock of real bonds carried from t to t+1, which earn a predetermined real rate of interest $\tilde{r}_t$.

Suppose that $t = 0$ brings news of a change in the parameters of the monetary policy rule, equation 1. That cannot affect the predetermined R_{-1} or $\tilde{r}_{-1}$, nor does it affect future real interest rates, which must still conform with exogenous endowments according to equation 4. So, equation 8 determines the same π_0 as in the absence of news, regardless of the proportion of real bonds in the initial financial portfolios. Starting from that unchanged initial condition, later inflation rates will be determined by equation 7 with the new policy parameters, but that is again independent from the initial portfolio composition or from its subsequent evolution.[15]

Intuitively, the existence of true inflation-protected bonds is irrelevant for the inflationary effects of monetary policy because these effects were never intended to cause a *surprise* corrosion of the real value of accumulated financial assets.[16] In fact, they do not cause that sort of surprise since they affect inflation only with at least one period's notice, and one period is exactly the maturity of all bonds in this model. Inflation that is fully anticipated must be reflected in an equality between the *ex post* yields of nominal and real bonds, and so the portfolio composition does not affect the rate at which the nominal value of the total portfolio grows, or the subsequent rates of inflation required to keep demand in line with supply.

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[15] Nominal rigidities would complicate the picture, because monetary tightening would then cause a temporary increase in real interest rates, and call for some surprise inflationary corrosion of initial nominal wealth in order to compensate for more intense discounting of future primary surpluses.

[16] This is unlike the consequences of news about future primary deficits, which must be compensated by the effects of an inflationary surprise on real initial wealth. A higher proportion of indexed debt would magnify the inflationary impact of fiscal shocks: a larger surprise jump in inflation is necessary to bring lifetime wealth back to equilibrium when a larger proportion of financial wealth is inflation-proof.

B. Open economy

The main reason for curiosity about an open economy extension seems to be the possibility of foreign shocks to the household's lifetime wealth. If inflation is driven by outside wealth, that might be important. Also, the effects of monetary or fiscal policy might be different with the extra degrees of freedom afforded by the open economy. As it turns out, opening the economy does not significantly alter the results already obtained.

This claim can be verified in a simple model of a small open economy, still with a single good and subject to PPP. The real interest rate is no longer determined by the domestic endowments, but imported from the rest of the world through interest rate parity. Even so, the consumption Euler equations must still be satisfied: consumption will differ from domestic endowments as needed, which can happen now thanks to international trade. I assume that there are one-period bonds denominated in domestic currency, and also real bonds (the latter may stand for bonds denominated in foreign currency, since foreign inflation is exogenous). The HIBCs will read:

(9) $$\frac{a_{t-1}R_{t-1}}{\pi_t} + \tilde{a}_{t-1}\tilde{r}_{t-1} = \sum_{s=0}^{\infty} \frac{c_{t+s} - y_{t+s} - g_{t+s} + x_{t+s}}{\prod_{k=1}^{s} \tilde{r}_{k-1}}$$

Here, *a* denotes the household's holding of bonds, while *b* will be reserved for the government's liabilities – the two need not coincide once foreign debt is allowed. Now, *g* denotes the net transfers made by the government, both to the domestic households and abroad. The term *x* denotes net transfers made abroad, both by the government and by the household. Assumed to be lumpsum and exogenous, the latter are meant as a very stylized representation of foreign shocks to lifetime wealth that do *not* simultaneously affect the real interest rate (for instance, war reparations, foreign debt forgiveness, or terms of trade shocks).

Now that autarkic market clearing is no longer required, the model must be closed by some limitation on how much real resources the economy can absorb. A fairly standard closure is to impose foreign borrowing constraints on the country as a whole – the consolidation of government and household. That results in ‘national’ intertemporal budget constraints (NIBCs):

$$(10)\qquad \frac{(a_{t-1}-b_{t-1})R_{t-1}}{\pi_t}+\left(\tilde{a}_{t-1}-\tilde{b}_{t-1}\right)\tilde{r}_{t-1}=\sum_{s=0}^{\infty}\frac{c_{t+s}-y_{t+s}+x_{t+s}}{\prod_{k=1}^{s}\tilde{r}_{k-1}}$$

Just as autarkic market clearing reduced the HIBCs to GIBCs, so does the sequence of NIBCs (subtract equation 10 from equation 9). As a result, the equilibrium trajectory of inflation is still determined by the difference equation:

$$(11)\qquad \tilde{r}_t=\frac{\theta_0+\theta_1\pi_t}{\pi_{t+1}}$$

with initial condition given by equation 8 above. Except for the source of determination of equilibrium real interest rates, opening the economy makes no difference for how the equilibrium path of inflation is computed.

Indeed, changes in monetary policy regime affect the path of inflation just as in a closed economy with the same equilibrium real interest rates. The pure foreign wealth shocks *x*, with primary deficits *g* unchanged, have no bearing on inflation. The household becomes poorer if *x* increases given *g*, but that requires no compensating increase in the real value of initial wealth because what the country can absorb – which here plays the role of ‘supply’ – decreases by exactly the same amount. Realistically, foreign shocks might simultaneously affect *x* and *g*, but that would have the same impact on inflation as an equal change in *g* in a closed economy. Larger government transfers abroad would call for as much inflation as if they were transfers to the domestic household – unlike domestic transfers, they do not make households feel any richer, but instead consumption must be made to conform with the tightened external constraint.[17]

Shocks to equilibrium real interest rates also have exactly the same impact on inflation as they would if the economy were closed. In particular, that impact depends on the liability position of the government, but not on whether the country is a net borrower or a net lender abroad. If the monetary policy regime were that of panel (a) of figure 4, a permanent increase in international real interest rates would even be helpful on the inflation front: the immediate impact would be inflationary, as dictated by equation 8 (with positive government debt), but in the long run the economy would settle at a lower steady state inflation. This should be contrasted with the lasting inflationary impact predicted according to conventional equilibrium selection, based on a Ricardian fiscal regime and on a monetary policy as in panel (b).

C. Quasi-money

An alternative rationale for inflation fueled by the nominal growth of government debt relies on government bonds being very liquid, thus qualifying as 'near money'. The inflationary explosion happens not because of the wealth effects stressed by the fiscalist approach, but to satisfy some liquidity preference relation where government debt appears as part of a broad monetary aggregate. Expositions of this view for the case of Brazil can be found in Lal (1995) and in Leal and Werlang (1990, 1995).

Since government debt is often believed to provide important liquidity services in chronic inflation economies, specifying the model accordingly emerges as a key element even in a *fiscalist* story aspiring to realism. That ingredient may be added by replacing the household's objective function (equation 2) with:

$$\sum_{t=0}^{\infty} \beta^t \left[u(c_t) + v(b_t)\right]$$

for some increasing, concave utility function v. The resulting equilibrium conditions would then be equation 5 together with ($\forall\ t \geq 0$):

(12) $$u'(y_t) - v'(b_t) = \beta \frac{R_t}{\pi_{t+1}} u'(y_{t+1})$$

[17] An extension with nontradeable goods would indicate that fiscal and foreign shocks may have an effect on the equilibrium real exchange rate, which is determined jointly with domestic inflation. But it would remain true that changes in monetary policy only affect domestic inflation, and just as predicted here.

One recognizes in equation 12 a well defined equilibrium demand for government debt at each point along the perfect foresight equilibrium path.[18] But that is not analogous to a conventional liquidity preference relation, whereby the transactions demand for real liquidity is associated with *current* income and the *nominal* interest rate. Here, the decision about how much liquidity to hold is indiscernible from the intertemporal allocation of consumption, since all wealth is in liquid but interest bearing form. That is different from the conventional problem of balancing the convenience of holding cash with its opportunity cost in terms of foregone nominal interest, when there is also an illiquid but higher yielding store of value.

The computation of the perfect foresight equilibrium is rendered more complicated, because the equilibrium real interest rates are no longer 'quasi-exogenous'. In fact, it is interesting to note that, if v is strictly concave, equilibrium real interest rates naturally increase as the real value of government debt explodes, for any given path of output – a phenomenon distinct from real interest fluctuations associated with fluctuations in output. Each passing day the government finds it harder to refinance its growing debt, facing a market that demands higher and higher real yields. That happens simply because the marginal utility of the additional real debt is falling, and not for the often suggested reason of growing fears of repudiation of a snowballing debt.

But the fundamental logic of the model remains the same in terms of the fiscalist determination of the price level. Equations 6 and 12 form a difference system in $(b_t, R_t/\pi_{t+1})$, with the property that, as long as debt remains positive, all future equilibrium real interest rates are continuous, decreasing functions of initial inflation π_0. Intuitively, the higher initial inflation the lower the initial debt, allowing later debt and thus also later real interest rates to be uniformly lower. With exogenous, positive primary surpluses, the right-hand side of equation 5 (for $t = 0$) is a continuous, positive, and increasing function of π_0. Since the left-hand side is a continuous,

[18] Existence of equilibrium requires the left-hand side of 12 to remain positive at all times. With positive debt and concave utility functions, it is enough to have $v'(0) < u'(y_{max})$, where y_{max} is some upper bound on

decreasing function of π_0 spanning $\boldsymbol{R}_{++}$, there must be exactly one π_0 solving that equation. That unique π_0 and initial conditions determine b_0. Then the difference system in (b_t, R_t/π_{t+1}) determines the entire perfect foresight equilibrium path of real debt and real interest rates. As before, all later inflation rates are determined by the sequence of nominal interest rates generated according to equation 1, given the equilibrium real interest rates.

Government debt displaying inordinate liquidity often invites proposals of institutional reforms meant to reinstate the 'salutary' distinction between money and interest-bearing assets. The motivation for such reforms is to entitle the government to 'non-inflationary' (i.e., non-monetary) means of deficit finance. One may wonder if they would still be warranted in a fiscalist world – where at least their avowed purpose makes little sense, since debt is inflationary even without liquidity effects.

Equation 12 indicates that the verdict hinges on how the institutional reforms would affect the first derivative v'. That would determine the effect on equilibrium real interest rates, and by consequence the effect on inflation rates resulting from a given policy for nominal interest. If v' is not a constant function, real interest rates are determined jointly with the path of real government debt, and this general equilibrium effect must also be taken into account.

The verdict also hinges on the monetary policy regime. For a simple illustration, I assume that v' is a constant function and that endowments are also constant over time. Reform is assumed to raise the constant:

$$\eta \equiv \frac{u'(y) - v'}{\beta u'(y)}$$

by reducing v'. Figure 5 depicts that change under the same assumptions about the parameters of equation 1 as explored in figure 4.

Institutional reform raising η makes good sense in the case of panel (a): steady state inflation, at which the economy will settle no matter where it starts, is indeed reduced. But the

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the exogenous sequence of y.

very same result could be obtained by changing the monetary policy rule parameters (θ_0, θ_1) and leaving η alone.

In the unstable case of panel (b), reform would instead raise the steady state inflation rate. Unless squarely hit by the initial inflation rate determined by the GIBC, the position of that unstable steady state would be of limited importance.[19] Even if the objective were to make the steady state coincide with the initial inflation, to avoid setting off the inflationary explosion without abandoning the active monetary policy, that would again be more easily achieved by manipulating the policy parameters (θ_0, θ_1). But it is hard to believe that policy or institutional parameters could be fine tuned to that extent even once, let alone to keep rectifying repeated perturbation to the unstable equilibrium. In a fiscalist interpretation of the inflationary explosion, elimination of liquid government debt would be of no avail.

D. A classic hyperinflation

Hyperinflation has so far been blamed on the nominal growth of public debt as caused by the accrual of ever higher nominal interest, with primary budget deficits relegated to a lesser role. That story, motivated by the Brazilian evidence, makes the most out of the fiscalist tight money paradox. In contrast, 'classic' episodes of hyperinflation are associated with the explosion of primary deficits financed by seigniorage, and public debt is seldom mentioned. Fiscalist models can easily account for classic hyperinflations as well, though not making as big a splash in such cases. How they can do so is described here as an elucidative counterpoint to the diagnostic offered above.

In order to discuss seigniorage finance, the model needs money balances. Without elaborating on its microfoundations, I directly posit the liquidity preference relation:

(13) $$\left(1-R_t^{-1}\right)m_t=\psi\left(y_t\right)$$

[19] Interestingly, conventional equilibrium selection under Ricardian fiscal regimes – ruling out explosive paths, hence tying inflation to the unstable steady state – would justify *opposing* such reduction in debt liquidity.

where ψ is a positive function and m_t denotes the real money balances carried from t to t+1. The left-hand side is the rent on money paid by the household (the interest foregone by holding money rather than bonds). The liquidity preference relation is chosen to have a unit interest elasticity, so that total rent on money depends only on exogenous endowments. That is convenient because rent on money will now appear in the intertemporal budget constraints. The GIBCs become:

$$(14) \qquad \frac{m_{t-1} + b_{t-1}R_{t-1}}{\pi_t} = \sum_{s=0}^{\infty} \frac{\left(1 - R_{t+s}^{-1}\right)m_{t+s} - g_{t+s}}{\prod_{k=1}^{s} \frac{R_{t+k-1}}{\pi_{t+k}}}$$

As for the monetary policy regime, instead of control of nominal interest rates, I assume now that the government controls the composition of its liability portfolio so as to keep money and maturing debt in a constant proportion: $R_t b_t = \gamma m_t$. As a result, real seigniorage will be:

$$(15) \qquad m_t - \frac{m_{t-1}}{\pi_t} = \frac{g_t + \gamma\psi(y_t)}{1+\gamma}$$

The case most often associated with a classic hyperinflation is that of $\gamma = 0$, when total deficits coincide with primary deficits and are entirely financed by seigniorage. There is little monetary policy to speak of apart from the mechanical financing of government budgets.

To simplify the exposition, let endowments be constant. In this case, for all $t \geq 1$, the Euler equations 4 imply $R_{t-1}/\pi_t = 1/\beta$, and the GIBCs 14 simplify to:

$$(16) \qquad \frac{1+\gamma}{\pi_t - \beta} = \sum_{s=0}^{\infty} \beta^s \left[1 - \frac{g_{t+s}}{\psi(y)}\right]$$

If g is increasing along the perfect foresight path, equation 16 makes clear that inflation must be accelerating too. According to equation 15, increasing primary deficits must be accompanied by increasing seigniorage.

There could hardly be a more 'classic' hyperinflation – especially if $\gamma = 0$. But at each date the price level is fully determined according to fiscalist principles, and inflation is driven by wealth effects just as in section II. There is no conflict with the assertion that fiscalist price level determination generates a tight money paradox: a higher proportion of bond financing γ would make inflation uniformly higher along the perfect foresight path. There is also no conflict with the conclusion that, under interest rate targeting and rational expectations, the time variation of primary budgets must cease to have systematic effects on inflation. Here, that result does not hold because the nominal interest rate is determined endogenously and must keep up with inflation: different paths of primary budgets, even if perfectly foreseen and coinciding in present discounted value, will result in different paths of inflation and nominal interest rates.

It should be clear that the inclusion of money balances in the model is not itself responsible for the changed results. Simply appending the demand for money 13 to the model of section II, for instance, would not have altered the conclusions reached there. What makes the difference is the monetary policy regime assumed in each case. If a modern open market in public debt is absent, it is hard to argue against the regime traditionally associated with explosive inflation – a mechanic monetization of the government's liabilities. But interest rate feedback rules are perfectly plausible in high inflation countries with more sophisticated monetary institutions, as the case of Brazil illustrates.

IV. CONCLUSION

The explosive combination of non-Ricardian fiscal policy and monetary policies with strong feedback from inflation has received scant attention from the fiscalist literature. That is a natural consequence of the firmly established tradition of relying on locality arguments to pin down the solution to rational expectations models, as in the standard method of Olivier Jean Blanchard and Charles M. Kahn (1980). Leeper (1991), for instance, precludes from the outset any consideration of explosive paths by restricting attention to equilibria that remain in a neighborhood of a steady state.

Explosive trajectories are clearly counterfactual as far as stable economies are concerned, but dismissing them outright may give the unintended and erroneous impression that the fiscal theory of price determination necessarily presumes that the monetary authority blinks in a game of chicken played against the fiscal authority. If the fiscal authority moves first, and away from Ricardian policies, then the monetary authority would need to conform by picking a ‘passive’ policy rule. That combination of preemptive fiscal hawk and compliant monetary dove would characterize a fiscalist world – to be contrasted with the conventional world of fiscal doves where equilibrium will be determinate or indeterminate depending on whether a hawk or a dove stands at the monetary helm.

There is no logical inconsistency in both fiscal and monetary policies being simultaneously ‘active’. Confronted with that case, a local formulation would simply detect an overdetermination, because there would be a unique price level consistent with stable inflation, and another unique price level consistent with stable government debt. But the situation does not remain ‘unresolved’ until one player blinks. Rather, it is resolved in favor of the government remaining intertemporally solvent *in equilibrium* – as it must be if private consumption plans are to be optimal and markets are to clear – and inflation is the variable that explodes.

Of course, someone must eventually blink, since it is not reasonable to expect inflation rates to be tolerated no matter how high they become. If it is *known* that the fiscal authority will blink and turn Ricardian, then by definition it has blinked already (since it is the entire future path of fiscal budgets that matters), and all bets are off for fiscalist price determination. But, as seen in section II, the fiscalist approach abstains from any backward induction with respect to the consequences of monetary policy. The monetary authority may be the one expected to blink in the future, and in the meantime inflation explodes all the same.

A long history of repeated monetary reforms lacking satisfactory fiscal retrenchment in Brazil and other chronic inflation countries may indicate that, more often than not, it is monetary policy that caves in first. Fiscal reform is likely to come as a surprise, if it comes at all. From a fiscalist perspective, in the introduction of a new ‘sound’ currency, along with a price freeze or a pledge to peg the currency value of key real assets, the crucial point is that nominal interest rates can be drastically reduced. They can be brought down to levels fundamentally consistent with low inflation at the prevailing equilibrium real interest rates, in a move that would seem reckless without the attendant incomes policies, coaching of expectations, and purging of financial contracts from prior inflation expectations that will no longer materialize. Monetary policymakers tend to relent and embrace shock treatments of this sort as frustration mounts towards monetary policy instruments that seem impotent against inflation, even if those in charge are not persuaded that tight money is actually counterproductive.

That so many such plans have ultimately failed and let inflation return with a vengeance might betray the fondness of monetary authorities often accused of laxity for policies conventionally deemed sound and responsible – but very offensive under non-Ricardian fiscal regimes. Perhaps sudden disinflation is simply a one-time break from a policy rule that remains active, thus condemning the economy from the start to a new bout of inflation. Perhaps the monetary authority reverts to its old ways once confronted with inflation rekindled by fiscal or other shocks. Either way, the fiscalist model easily accommodates a sawtooth pattern of gradual inflation acceleration and sudden disinflation (be it anticipated or not), as driven by a similar pattern for nominal interest rates.

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Figure 1
Interest Rates and Inflation

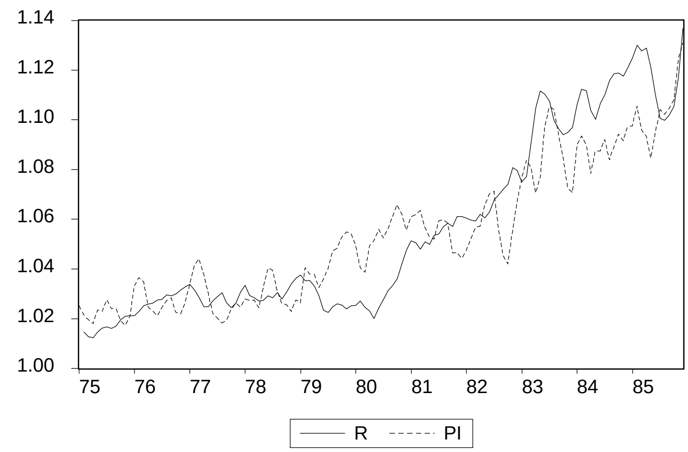

Figure 2(a)
Seigniorage and Total Deficits

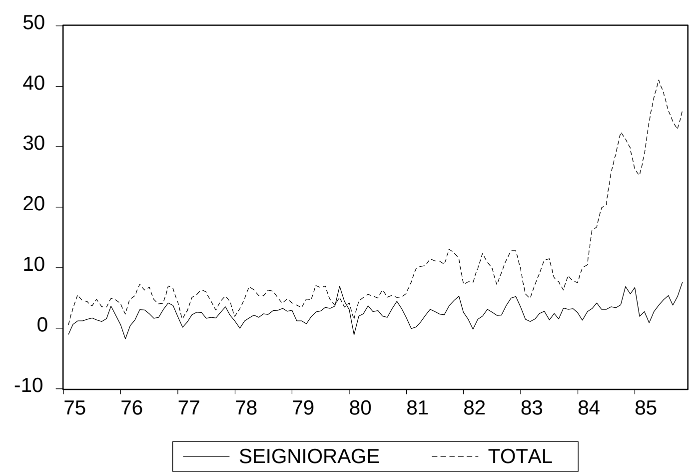

Figure 2(b)
Primary Deficits and Interest Payments

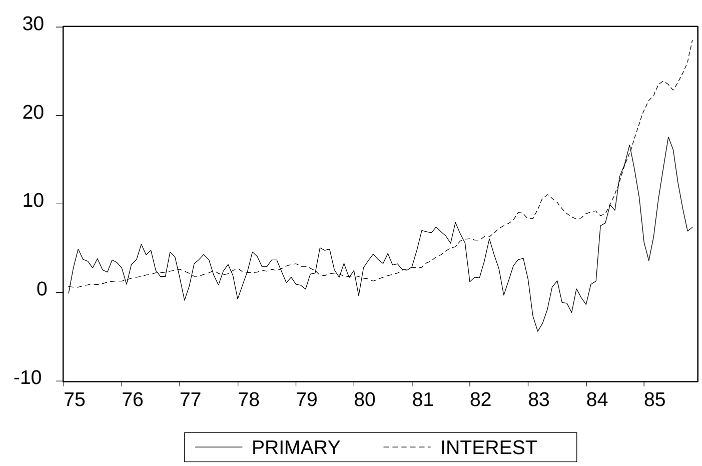

Figure 3(a)

$R_t = 0.98 + 0.04\pi_t$

(1975:01 – 1980:06)

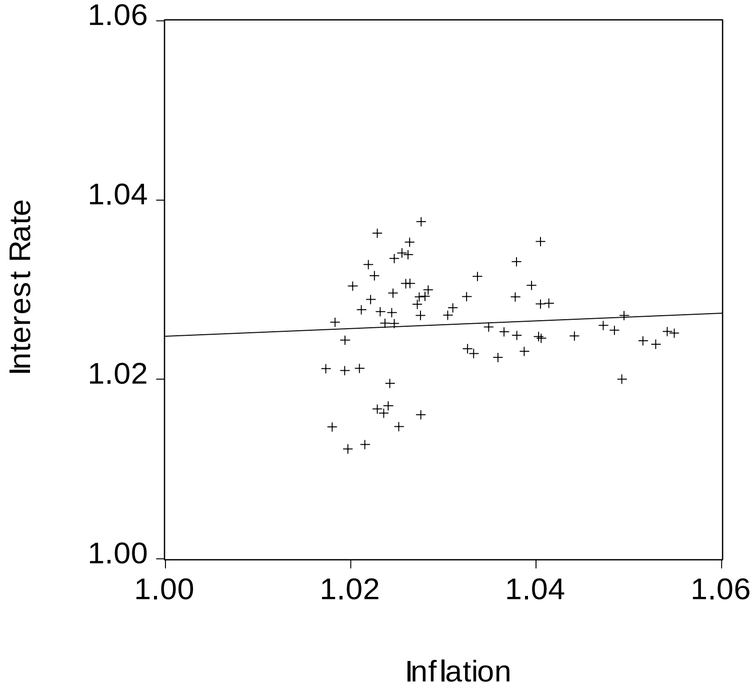

Figure 3(b)

$R_t = -0.21 + 1.21\pi_t$

(1980:07 – 1985:12)

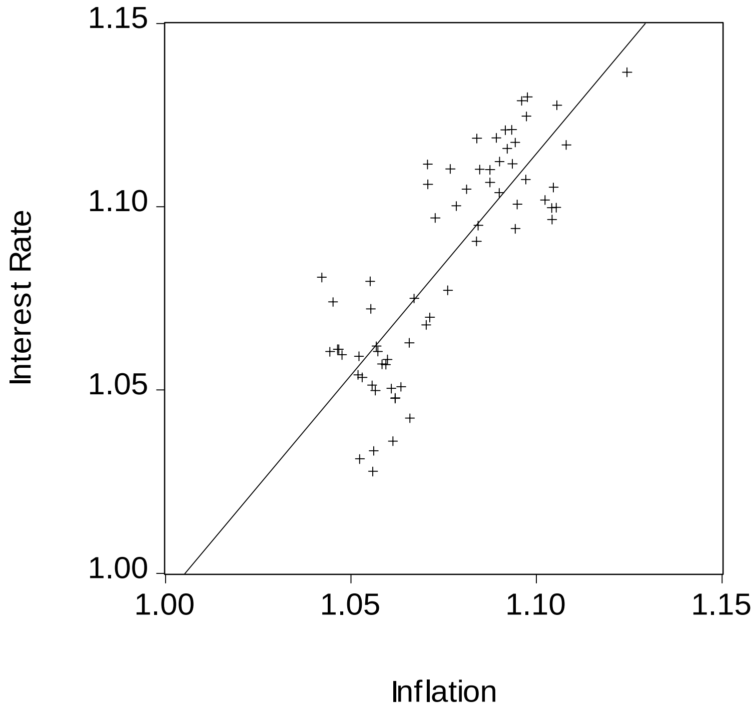

Figure 4

(a) **(b)**

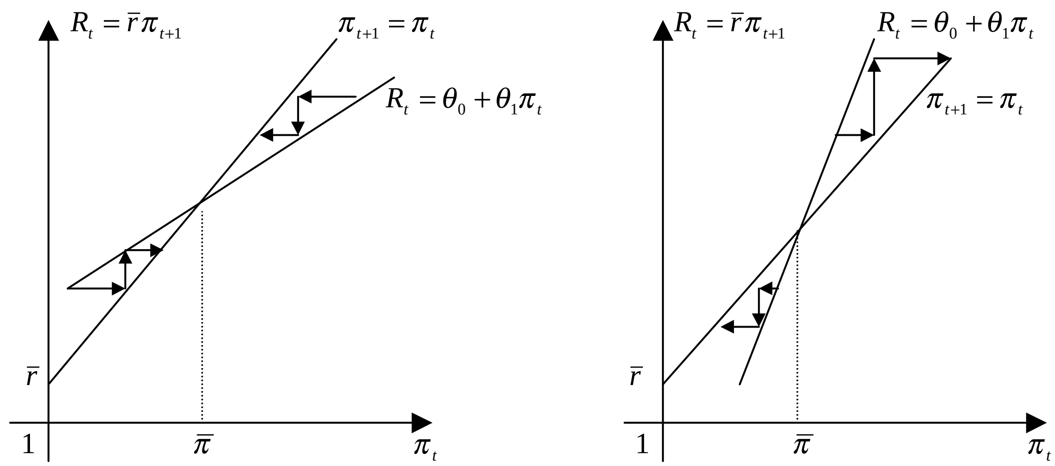

Figure 5

(a) **(b)**