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# A Political Economy Model of Monetary Policy: Decentralized Decision Making and Competition For Seigniorage

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A political economy model is developed to provide a rationale of monetary policy in high inflation regimes, such as the Brazilian experience until the advent of the *Plano Real*. Decision making of monetary policy is assumed to be decentralized, where several decision-makers competitively determine the quantity of money. It is shown that equilibrium inflation is higher than under the alternative monetary regime where decision making is centralized at the Central Bank. An important additional feature of this political economy model is that it does not rely on time-inconsistency to generate high and sub-optimal inflation.

## I. INTRODUCTION

Monetary policy is one of the most commonly discussed and least understood aspects of modern economic life. Havrilevsky (1994) points out that the costs and benefits to various interest groups of changes in monetary policy are shrouded in uncertainty, because direct transfers to identifiable interest groups at the expense of other interest groups are politically dangerous. Another key factor impeding a more realistic understanding of the making of monetary policy is the way monetary theorists have been modeling it. Within the Keynesian tradition the Central Bank is seen as an apolitical institution, insulated from political pressures and interest groups activities. Game theoretic models usually do not provide a good description of monetary policy because their authors do not deal with the interactions between interest groups, politicians and the Central Bank[1].

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[1] For a more comprehensive digression on these competing theories, see Havrilevsky (1994, 1993), Hetzel (1990), Toma (1982) and Wagner (1986). See, however, the growing literature on the political economy of macroeconomic policies. A good reference here is Persson & Tabellini (1990).

The political economy perspective of monetary policy can offer some useful insights to understand the making of monetary policy in high inflation regimes, such as the recent Brazilian experience. The political economy perspective has two main variations. The first one focuses on the Central Bank's bureaucratic objectives, while the second one focuses on redistributive considerations. Generating government revenues from inflation — seigniorage — falls under the latter rubric. Considerable political pressure by different decision-makers is put on the Brazilian Central Bank to generate inflationary revenues. Mostly until the advent of the Real Plan, an inflation stabilization plan implemented in 1994, politically powerful state governments had used their official financial institutions — the so called State Banks — to exert pressure on the Central Bank and appropriate part of inflationary revenues. Moreover, this political competition for seigniorage leads to a wasteful rent-seeking behavior by state governments in Brazil.

In fact, there are several ways a state government could use its bank's apparatus to collect inflationary revenues. The mechanisms available to state banks to capture part of the inflation tax are: (i) the states emit low rating debts, and the Central Bank swaps them for higher rating federal paper. The swap reduces the states' costs of their outstanding debts; (ii) state banks get discount loans and do not honor subsequent obligations; and (iii) state banks do not hold the minimum amount of required reserves. The recurrent crises that hit official financial institutions in Brazil since the beginning of the 80's are a clear sign that politicians were using these mechanisms systematically to increase revenues.

Usually, monetary policy models assume that the Central Bank determines itself the quantity of money, that is, the Central Bank is the monopolist in printing money matters[2]. At least since Cheung (1970), it is well known that non-exclusive property of a valuable resource leads to waste and dissipation of rents. By assuming away the hypothesis that the Central Bank is a monopolist in the money supply determination, and giving a role to several decision makers that competitively determine the quantity of money, a political economy model of monetary policy is developed to explain the recent Brazilian experience with high and growing inflation. Waste and dissipation of rents appear because: (i) state governments have to fight a war of attrition against the Central Bank, which is costly; (ii) the economy can be put on the wrong side of the Laffer curve of seigniorage, in the sense that the same amount of inflationary revenues could be collected with a lower rate of inflation. Moreover, inflation typically imposes increasing distortions on the economy, it being the case that its social cost is not only the usual dead-weight loss measures but also a decrease in economic efficiency of society[3].

Besides giving a more realistic explanation for the political process of monetary policy making, the political economy model developed in this article does not rely

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[2] Exceptions are Aizenman (1992) and Werlang & Novaes (1995).

[3] See Tommasi (1992). Welfare losses appear because higher inflation induces higher relative price variability. The main consequences of higher relative price variability in search markets are higher real prices and a lesser ability of the price system to screen out inefficient competitors.

on time-inconsistency to generate a monetary policy time path that leads to high and sub-optimal inflation[4]. The crucial assumption of the model is decentralized decision making of monetary policy. The equilibrium inflation rate is higher than optimal because of an externality: if states can transfer deficits and debt to the central government, or monetize them through a war of attrition against the Central Bank, they may choose to do so. The point is that using higher taxes to finance deficits means that the burden of spending falls over the state's constituents, while the inflation tax is spread over the entire federation.

Presumably the governments that rely extensively on the inflation tax do not have alternative sources of revenue. This suggests that the analysis of the inflation tax should go *pari passu* with the analysis of tax reforms. Accordingly, to explain why some countries collect so much revenue from the inflation tax, one should explain why they do not enact tax reforms that improve the efficiency of the tax system. Two complementary rationalizations have been proposed to explain why some countries fail to enhance Pareto improving tax reforms. One view advocates that the policymaker deliberately chooses not to improve the efficiency of the tax system, because in an unstable environment it does not expect to reap the benefits of a more efficient tax system in the future. The reason for this is that the government in office is uncertain about its future reappointment (Cukierman, Edwards & Tabellini, 1992). The second view argues that inefficient tax systems are maintained because the government cannot change the status quo, in the sense that it cannot find a consensus in favor of any tax reform. According to this second view, the inability to make a collective decision forces the government to rely on residual sources of revenue, such as seigniorage or borrowing.

Still according to this second view, the government prolongs inefficient and unsustainable economic policy because the policy maker is not a single decision maker, but instead several decision makers that behave non-cooperatively and that control some dimensions of policy making, such as different ministries, different public corporations or different states in a federation. Thus policy is a game between different policy makers. This game has been modeled either like a war of attrition (Alesina & Drazen, 1992, Drazen & Grilli, 1990) or like a tax competition between different taxing authorities (Aizenman, 1987). The equilibrium outcome in both cases is inefficient and typically relies on "too much" seigniorage and inflation as source of government revenues. This inefficiency is generally stronger the more conflict and polarization there is among the different decision-makers, and the weaker is the central authority.

The evidence from high inflation countries — such as the Brazilian experience during the period 1987-94 — suggests that the inflation rate exceeded the rate that would maximize revenues from this source[5]. In the next sections some possible

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[4] Typically, Barro-Gordon type of monetary models depends on policy discretion to generate higher than optimal inflation rates and equilibrium inflation on the wrong side of the Laffer curve. See, for instance, Cukierman (1992: chap. IV).

[5] See Edwards & Tabellini (1991).

explanations for this evidence are investigated. In section II I start with the traditional theory of optimal taxation, and then I proceed by developing a model that focus on political incentives and constraints.

## II. THE THEORY OF OPTIMAL TAXATION

The theory of public finance supports the view that the inflation tax can be explained as the optimal response to a politically desired path of public spending. In the presence of tax evasion, or if there are tax collection costs in administering other tax instruments, it is optimal for the government to rely on the inflation tax (Aizenman, 1987; Faig, 1988; Kimbrough, 1986; Phelps, 1971). Suppose that the government can use the inflation tax ($\pi$) and other tax rates on output ($\tau$) to finance its expenditures. Both taxes are distortionary and impose a welfare cost that is increasing on their rates. The cost of the output tax rate is $f(\tau)$ while that of the inflation tax is $h(\pi)$. Mankiw (1987) shows that in these circumstances the optimal tax policy implies:

$$h'(\pi_t) = kf'(\tau_t) \tag{1}$$

Where $k$ is a parameter of the money demand function. Thus at the optimum the marginal cost of each tax has to be equated in every period. This implies that as government expenditure changes, inflation and non-inflation tax rates move together. Mankiw (1987) tested this implication using U.S. data for 1951-82 and found a positive relationship between inflation and the average tax rate. He interpreted this finding as providing support for the theory of optimal taxation as a theory of policy behavior. A number of authors have extended Mankiw's work both empirically and theoretically. Grilli (1989), for instance, has pointed out that Mankiw's tests fail some important applications of the theory, including the fact that seigniorage and income taxes should have a unit root and should be cointegrated. His model also allows for changes in velocity in the specification of the money demand function.

Edwards & Tabellini (1991) test the optimal taxation theory for a sample of LDC (Least Developed Countries) — including Brazil — for the period 1963-87. Although they find that the inflation rate and the tax rate have a unit root for most countries (India appears as an exception) they show that seigniorage does not cointegrate with the rate of the income tax for most countries in the sample. For most countries the results obtained strongly reject the hypothesis that there is a positive relation between the output rate and the inflation rate. This suggests that the theory of optimal taxation does not apply to these countries.

The simplest explanation of why governments do not behave according to the theory of optimal taxation is that they lack credibility. Since the works of Calvo (1978) and Kydland & Prescott (1977), it is well known that the optimal inflation tax is time-inconsistent in the absence of binding policy commitments. In a credible (or a time-consistent) equilibrium with policy discretion, the government relies too much on the inflation tax. Another explanation of why governments do not follow the optimal taxation theory is that the policy maker is not a single decision

maker, but rather a collection of decision makers that behave non-cooperatively and that control some dimensions of policy making, such as different states in a federation. One possible way to model this game is like a tax competition between different taxing authorities (Aizenman, 1987) and another one is like a seigniorage competition between different states, provinces or even countries[6]. In any event, the equilibrium policy is inefficient and typically relies on too much inflation to achieve a certain amount of seigniorage. This inefficiency is generally stronger the more conflict and polarization there is between different policy makers, and the weaker is the central government authority. In the next section a simple game theoretical model that explicitly shows this inefficiency is provided.

## III. A POLITICAL ECONOMY MODEL OF COMPETITION FOR SEIGNIORAGE

State governments in Brazil, at least until the Real Plan, were able to collect seigniorage using their own financial institutions — the state banks. There are several ways a state government can use its bank's apparatus to collect seigniorage: the states emit low rating debts, and the Central Bank swaps them for higher rating federal paper, state banks get discount loans and do not honor subsequent obligations, and state banks do not hold the minimum amount of required reserves. Another critical point is that state banks behave according to the theory of bureaucratic behavior, implying that it is costly for state governments to use these banks to soften their budget constraints, since the banks' objectives are different from those of the state governments. Generally, the banks' budgets are bigger than state governments would want, the banks specialize in activities that are costly but difficult to measure, and slack and inefficiency are present to a degree. Moreover, in order to collect seigniorage, state governments have to fight an attrition war against the Central Bank, which is costly as well.

To model the situation described above, it is considered that state governments will compete to collect seigniorage. There are $n$ states in the Federation with the following objective functions:

$$F_i = B_i \mu_i L(\pi) - A_i \pi^2 \qquad (2)$$

Where:

$0 < B_i < 1$ measure the states' costs to collect seigniorage; the higher $B_i$, the less the resources states have to devote in order to collect this revenue and the weaker is the central authority;

$A_i > 0$ is a measure of conservativeness towards inflation of the $i^{th}$ state government, that is, it measures the perceived cost of inflation for the $i^{th}$ state;

$\mu_i L(\pi)$ are the seigniorage revenues of each state;

[6] The European Monetary Union (EMU) has been analyzed in this context. See, for instance, Cassella (1992).

$\mu_i$ is the rate of monetary expansion appropriated by the $i^{th}$ state;

$L(\pi) = C - \alpha\pi^e$, $\alpha > 0$, is a linear demand for money function, which depends on the expected inflation rate $\pi^e$ and on real income C, which is considered exogenous.

Consider the symmetrical case, where states have the same inflation aversion ($A_i = A_j$, $\forall i,j$) and face the same political restrictions and costs to collect seigniorage ($B_i = B_j$, $\forall i,j$). Rewrite equation (2) as:

$$f_i = \mu_i L(\pi) - a\pi^2 \tag{3}$$

Where:

$$a = \frac{Ai}{Bi} \qquad f_i = \frac{Fi}{Bi}$$

Therefore, the coefficient $a$ reflects both the ability to collect inflationary revenues and the governors' preferences towards inflation.

Private agents behave optimally, and the Central Bank possesses the ability to influence the public's expectations. By giving away its discretion to change policy within the period, the Central Bank — or more generally, the states — generates a sequentially rational, time-consistent inflation rate. Expectations are rational, and are formed according to:

$$\pi^e = \pi = \sum_{i=1}^{n} \mu_i \tag{4}$$

The Nash-Cournot solution of this game implies that each state maximizes its objective function by choosing an appropriate $\mu_i$, and that the states play simultaneously taking the others' actions as given. Accordingly, the problem of the $i^{th}$ state is:

$$\text{Max } f_i = \mu_i L(\pi) - a\pi^2 \tag{5}$$

Substituting (4) into (5), and from the definition of the demand for money function, we have:

$$\text{Max } f_i = \mu_i(C - \alpha(\sum_{i=1}^{n} \mu_i)) - a(\sum_{i=1}^{n} \mu i)^2 \tag{6}$$

The first order condition yields the following solutions for $\pi$ and $\mu$:

$$\pi_C = \frac{nC}{n(2a + \alpha) + \alpha} \tag{7}$$

$$\mu_i = \frac{\pi_C}{n} = \frac{C}{n(2a + \alpha) + \alpha} \tag{7'}$$

Where $\pi_C$ stands for the equilibrium inflation rate of the Nash-Cournot solution. In this symmetric non-cooperative solution, the states collect the same amount of seigniorage by having access to the same monetary expansion revenues. Note that

$$\frac{\delta\mu_i}{\delta a} < 0 \tag{8}$$

This result means that the more conservative are the state governments or the more difficult it is to collect inflationary revenues, the lower is the monetary expansion and inflation. The states' objective function values are calculated by using (3) and (7):

$$f_i = \frac{C^2(-an^2 + 2an + \alpha)}{(n(2a + \alpha) + \alpha)^2} \tag{9}$$

The effect of increasing the number of states with access to seigniorage revenues on their welfare functions can be found differentiating (9) with respect to $n$:

$$\frac{\delta f_i}{\delta n} = \frac{-C^2(4a^2n + 4a\alpha n + 2a\alpha + 2\alpha^2)}{(n(2a + \alpha) + \alpha)^3} < 0 \tag{10}$$

Increasing the number of states with access to seigniorage revenues will reduce each state's welfare. Moreover, as it is immediate from equation (9), the term in parenthesis on the numerator indicates that the states' welfare may even be negative if $n > 2$. In this case, a strict rule of freezing the money supply, that is, impeding any state to collect seigniorage, would make all states better off. Moreover, an increase of the number of states collecting seigniorage increases the equilibrium inflation rate and reduces each states' share:

$$\frac{\delta \pi_C}{\delta n} = \frac{C\alpha}{(n(2a + \alpha) + \alpha)^2} > 0 \tag{11}$$

$$\frac{\delta \mu_i}{\delta n} = \frac{-C(2a + \alpha)}{(n(2a + \alpha) + \alpha)^2} < 0 \tag{12}$$

The effect of the coefficient $a$ — the measure of state governments' conservativeness towards inflation and their costs to collect seigniorage — on the inflation rate is

$$\frac{\delta \pi}{\delta a} = \frac{-2n^2C}{(n(2a + \alpha) + \alpha)^2} < 0 \tag{13}$$

Now consider the effect of changing the number of states collecting seigniorage on the total amount of seigniorage. By definition, seigniorage is:

$$S = \pi(C - \alpha\pi) \tag{14}$$

The maximum amount of seigniorage can be found differentiating $S$ with respect to $\pi$. From the first order condition we have:

$$\pi^* = \frac{C}{2\alpha} \tag{15}$$

Where $\pi^*$ is the inflation rate that generates maximum seigniorage. Being on the wrong side of the Laffer curve means that $\delta S/\delta\pi$ is negative, since there is a lower inflation rate that generates the same amount of seigniorage. Therefore, as it is implied by equation (15), if $\pi_C > C/2\alpha$ then the economy will be on the wrong side of the Laffer curve. The effect of $n$ on the total amount of seigniorage depends on which side of the Laffer curve the economy is:

$$\frac{\delta S}{\delta n} = \underset{(?)}{\frac{\delta S}{\delta \pi}} \underset{(+)}{\frac{\delta \pi}{\delta n}} \tag{16}$$

Thus if the economy is on the wrong side of the Laffer curve, that is, $\pi_C > C/2\alpha$, both $\delta S/\delta \pi$ and $\delta S/\delta n$ will be negative. The equilibrium inflation rate is given by equation (7), so that for $n > 1$,

$$\pi_C = \frac{nC}{n(2a + \alpha) + \alpha} > \frac{C}{2\alpha} \quad => \quad \frac{\delta S}{\delta n} < 0 \tag{17}$$

$$n > \frac{\alpha}{\alpha - 2a} \quad => \quad \frac{\delta S}{\delta n} < 0 \tag{17'}$$

Equation (17') shows that the bigger the parameter $n$ — the number of states collecting seigniorage — the more likely it is for the economy to be on the wrong side of the Laffer curve.

Consider now the centralized decision solution where the Central Bank is the monopolist in printing money matters. There the Central Bank transfers evenly all its inflationary revenues to the states, since they are parametrically equal. Thus the relevant problem now is choosing an inflation rate $\pi$ that maximizes the following objective function:

$$f_{Mon} = \pi(C - \alpha\pi) - a\pi^2 \tag{18}$$

Where $f_{Mon}$ is the objective function of the monopolist, that is, the Central Bank. From the first order condition, the equilibrium inflation and the states' welfare functions under centralization are, respectively:

$$\pi_M = \frac{C}{2\alpha + 2a} \tag{19}$$

$$f_{M,i} = \frac{(\alpha + 2a - an)C^2}{n(2\alpha + 2a)^2} \tag{20}$$

From the equation (20) above it is immediate that if $n > 2 + \alpha/a$, $f_{M,i}$ is negative, that is, the states' welfare function values are negative. Total amount of seigniorage collected under centralization is:

$$S_M = \frac{(2a + \alpha)C^2}{(2a + 2\alpha)^2} \tag{21}$$

Now some useful comparisons can be made. From equations (7) and (19), the equilibrium inflation rate under the Nash-Cournot solution is equal to the equilibrium inflation rate under the centralization for $n = 1$, and bigger for any $n > 1$. From equations (15) and (19), the equilibrium inflation rate under the centralization is always less than the maximum seigniorage inflation rate.

What remains to be shown is the relationship between the states' welfare functions under the Nash-Cournot solution and the centralization one, and total amount

of seigniorage collected under both solution concepts. Two propositions and respective proofs follow.

PROPOSITION I: For every $n > 1$, $f_{Mon,i} > f_{C,i}$, that is, if there are more than one competing states having access to seigniorage, the states' welfare measured by their objective functions is smaller than it would be under centralization, where the Central Bank is the monopolist in printing money matters.

PROOF. Define the following function:

$$G(n) \equiv f_{Mon,i} - f_{C,i} \tag{22}$$

From equations (9) and (20) we have:

$$G(n) = \frac{C^2(\alpha + 2a - an)}{n(2\alpha + 2a)^2} - \frac{C^2(-an^2 + 2an + \alpha)}{(n(2a + \alpha) + \alpha)^2} \tag{23}$$

It is immediate from equation (23) that $G(n) = 0$ for $n = 1$. What is to be shown is that $\delta G(n)/\delta n > 0$ for $n>1$. After introducing the change of notation $\beta = a/\alpha$, it is easy to show that:

$$\frac{\delta G(n)}{\delta n} = n^2(12\beta^2 + 9\beta) + n(-16\beta^2 - 8\beta + 2) + 4\beta^2 - \beta - 2$$

The roots of this quadratic equation for $n$ are:

$$n_1 = \frac{1 - \frac{4}{3 + 4\beta} - \frac{2}{\beta(3 + 4\beta)}}{3}$$

$$n_2 = 1$$

Since $\beta > 0$, $n_1 < 1$. Therefore, *for* $n > n_2 = 1$, $\delta G(n)/\delta n > 0$. This proves that $f_{Mon,i} > f_{C,i}$ for $n>1$. Now, what remains to be shown is the relation between total seigniorage under both solutions. This leads us to the following proposition:

PROPOSITION II: The shape of the Laffer Curve under competition for seigniorage, that is, under the Nash-Cournot solution, depends on the structural parameters of the model. If $\alpha > 3.236a$ (after rounding), then after some $n$ total seigniorage under the Nash-Cournot solution falls below the monopoly (or centralization) level. Otherwise, if $\alpha < 3.236a$, then total seigniorage under Nash-Cournot falls whenever $n > \alpha/(\alpha - 2a)$, but it converges to a point above total seigniorage under the Central Bank's monopoly.

PROOF: From equations (7) and (14), seigniorage under the Nash-Cournot solution is:

$$S_C = \frac{(2an^2 + \alpha n)C^2}{(n(2a + \alpha) + \alpha)^2} \tag{25}$$

and from equation (21), seigniorage under the Central Bank's monopoly is:

$$S_M = \frac{(2a + \alpha)C^2}{(2a + 2\alpha)^2} \tag{26}$$

Now solve $S_C - S_M = 0$ for $n$. The roots are:

$$n_1 = \frac{-2a\alpha - \alpha^2}{4a^2 + 2a\alpha - \alpha^2} \tag{27}$$

$$n_2 = 1 \tag{27'}$$

Consider solution $n_1$. Since the denominator is negative, in order to $n_1$ be positive, the numerator needs to be negative as well. Solving the quadratic equation in the numerator for $a$, the positive solution is $\alpha > 3.236a$ (after rounding), that is, if $\alpha > 3.236a$, after some $n$, total seigniorage under the Nash-Cournot solution falls below the monopoly level. Otherwise, if $\alpha < 3.236a$, total seigniorage falls whenever $n > \alpha/(\alpha - 2a)$, but it converges to a point above total seigniorage under the Central Bank's monopoly.

The implications of the political economy model developed in this section with regard to the Laffer curve for seigniorage can be stated. According to equation (17), the bigger the $n$ and/or the smaller the coefficient $a$ in the Nash-Cournot solution, the more likely the economy will be on the wrong side of the Laffer curve. Note that this result independs from dynamic inconsistency, since the policy maker gives away its discretion to change policy within periods. Furthermore, the non-usual shape of the Laffer curve — in the sense that seigniorage does not fall below the level given by the centralized solution — depends on a combination of parameters $a$ and $\alpha$, according to Proposition II above.

## IV - CONCLUSIONS

The political economy model developed here has structure enough to provide an explanation of why Brazil was put on the wrong side of the Laffer curve from 1987 until the advent of Real Plan, which has been driven inflation down since July 1994. A weak central authority has to concede frequently in the political bargaining process, particularly when state authorities can easily make coalitions and block central government's interests. Some reasons can contribute to weaken politically the central government: (i) multiplicity of parties, which makes more difficult to establish a workable majority coalition that supports the federal government; (ii) the very low independence of the Central Bank, which allows open access to monetary policy and states' competition for seigniorage revenues. The lack of credible commitment of central authorities to control the monetary expansion softens the states' budget constraints, providing them incentives to be financially irresponsible[7]. These features are captured by the parameter $a$ in the model, which reflects both

[7] McKinnon (1994), Montinola, Qian & Weingast (1994) and Weingast (1994) discuss the implications of states' soft budget constraints on market-preserving federalism. Werlang & Novaes (1995) provide a model where states can transfer deficits to the federal government, creating incentives for higher deficits at state and federal levels.

the states' costs (bargaining or rent-seeking costs) for collecting seigniorage revenues and the states' degree of conservativeness toward inflation. Additionally, the central authorities' loose control on the money supply might have induced an increase of $n$, that is, the number of states having access to seigniorage.

## REFERENCES


AIZENMAN, J. (1987) "Inflation, Tariffs and Tax Enforcement Costs", *Journal of International Economic Integration*, 2, pp. 12-28.

_____ (1992) "Competitive Externalities and the Optimal Seigniorage Segmentation", *Journal of Money, Credit and Banking*, 24(1), pp. 61-71.

ALESINA, A. & A. DRAZEN (1991) "Why are Stabilizations Delayed?", *American Economic Review*, 81, pp. 1170-88.

ALESINA, A. & G. TABELLINI (1990) "A Positive Theory of Fiscal Deficit and Government Debt", *Review of Economic Studies*, 57 (July), pp. 403-14.

BARRO, R. & D. GORDON (1983) "Rules, Discretion, and Reputation in a Model of Monetary Policy", *Journal of Monetary Economics*, 12 (July), pp. 101-22.

CALVO, G. (1978) "On the Time Consistency of Optimal Policy in a Monetary Economy", *Econometrica*, 46, pp. 1411-28.

CASSELLA, A. (1992) "Participation in a Currency Union", *American Economic Review*, 82(4), pp. 847-863.

CHEUNG, S. (1970) "The Structure of a Contract and the Theory of a Non-exclusive Resource", *Journal of Law and Economics*, 13, pp. 49-70.

CUKIERMAN, A. (1992) *Central Bank Strategy, Credibility, and Independence.* Cambridge: The M.I.T. Press.

CUKIERMAN, A., EDWARDS, S., & G. TABELLINI (1992) "Seigniorage and Political Instability", *American Economic Review*, 82(3), pp. 537-55.

DRAZEN, A. & V. GRILLI (1992) "The Benefit of Crises for Economic Reform", *American Economic Review*, 83(3), pp. 598-607.

EDWARDS, S. (1993) "The Political Economy of Inflation and Stabilization in Developing Countries", *NBER Working Paper*, n. 4319.

EDWARDS, S. & G TABELLINI (1990) "Political Instability, Political Weakness and Inflation: An Empirical Analysis", *NBER Working Paper*, n. 3721.

_____ (1989) "Explaining Fiscal Deficits and Inflation in Developing Countries", *NBER Working Paper*, n. 3493.

FAIG, M. (1988) "Characterization of Optimal Tax on Money when it Functions as Medium of Exchange", *Journal of Monetary Economics.*

GRILLI, V. (1989) "Seigniorage in Europe". In: DE CECCO, M. & GIOVANNINI, A. (orgs.) *A European Central Bank?* London: Cambridge University Press.

HAVRILEVSKY, T. (1994) "The Political Economy of Monetary Policy", *European Journal of Political Economy 10* 111-134.

_____ (1993) *The Pressures on American Monetary Policy.* Norwell, MA: Kleewer Academic Publishers.

HETZEL, R. (1990) "The Political Economy of Monetary Policy". In: MAYER, Thomas (org.), *The Political Economy of American Monetary Policy.* New York: Cambridge University Press.

KIMBROUGH, K. (1986) "The Optimal Quantity of Money Rule in the Theory of Public Finance", *Journal of Public Finance.*

KYDLAND, F. & PRESCOTT., E. (1977) "Rules rather Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy*, 85(3).

LOYOLA, G. (1993) "Bancos Públicos Estaduais: Situação Atual", *Banco Central do Brasil, CMN 20*, mimeo.

MANKIW, G. (1987) "The Optimal Collection of Seignorage: Theory and Evidence", *NBER Working Papers*, nº 2270.

MCKINNON, R. (1994) "Market-Preserving Fiscal Federalism", Manuscript.

MONTINOLA, G., QIAN, Y. & B. WEINGAST (1994) "Federalism, Chinese Style: The Political Basis for Economic Success in China", Manuscript.

OLIVEIRA, J. (1967) "Money, Prices and Fiscal Lags: A Note on the Dynamics of Inflation", *Banco Nazionale del Lavoro*, 20, pp. 258-67.

PERSSON, T. and G. TABELLINI (1990) *Macroeconomy Policy, Credibility and Politics*. London: Harwood Academic Publishers.

PHELPS, E. (1973) "Inflation in the Theory of Public Finance", *Swedish Journal of Economics*.

ROUBINI, N. (1991) "Economic and Political Determinants of Budget Deficits in Developing Countries", *Journal of International Money and Finance*, 10, S49-S72.

SACHS, J. & A. ZINI (1995) "A Inflação Brasileira e o Plano Real", *Revista de Economia Política*, vol. 15, 2(58), pp. 26-49.

TANZI, V. (1978) "Inflation, Real Tax Revenue, and the Case of Inflationary Finance: Theory with an Application to Argentina", *IMF Staff Papers*, 25, pp. 417-51.

TOMA, M. (1982) "Inflation Bias and the FED: A Bureaucratic Perspective", *Journal of Monetary Economics*, 10, pp. 163-90.

TOMMASI, M. (1992) "The Welfare Effects of Inflation: The Consequences of Price Instability on Search Markets", Manuscript.

WAGNER, R. (1986) "Central Banking and the FED: A Public Choice Perspective." *Cato Journal* 6(2): 519-538.

WEINGAST, B. (1994) "The Economic Role of Political Institutions: Federalism, Markets, and Economic Development", Manuscript.

WERLANG, S., & W. NOVAES (1995) "Inflationary bias and state-owned financial institutions", *Journal of Development Economic*, vol. 47, pp. 135-54.