# Making a Dishonest Government Credible: The Inflation Tax

By Frank G. Steindl, Stillwater, Oklahoma*

## I. Introduction

It is well known that in a stationary economy a government maximizes revenue from the tax on real balances where the demand is unit elastic (Cagan 1956, 77) (Friedman 1971, 849).[1] This result holds in equilibrium in the stationary state when the inflation rate corresponds to the unit elastic point on the demand for real balances. Auernheimer (1974), following a suggestion by Cagan (1956, 81), points out, however, that "once and for all" increases in the rate of money creation, to reach say the stationary revenue maximizing point, increase revenue.[2] A government thus may value surprise inflation as a lump-sum tax to increase its revenues.

The issue at hand in this note is a variation on the inconsistency of optimal policy problem raised by Kydland and Prescott (1977), where "policy" here can be thought of as actions designed to increase the budget in order to finance greater expenditures.[3] The orientation of the model in this paper differs from that in Calvo (1978) and Barro (1983). Calvo establishes that an optimal rate of monetary expansion – a rate that maximizes the discounted

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[1] For a contemporary treatment of seigniorage from inflation using the Cagan model, see *Blanchard* and *Fischer* (1989, 195 - 221).

[2] *Auernheimer*'s concern, however, is not with the effects of surprise inflation. In fact, he explicitly rules out such surprises; hence his adjective "honest." This obviates the time consistency issue, which is the explicit concern of *Calvo* (1978). Furthermore, *Auernheimer*'s agents are continually in equilibrium. The argument of this paper takes the *Auernheimer* insight regarding the "once and for all" change and inquires into the revenue effect when agents may be surprised.

[3] Much of the discussion of policy inconsistency has been developed in connection with the inflation-unemployment issue. The analysis in this paper has a public choice orientation. It assumes that the government wishes to maximize seigniorage through inflation. It is concerned neither with optimal rate of inflation nor unemployment issues.

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value of inflation tax revenue – exists when expectations are rational. Barro is not concerned exclusively with the amount of seigniorage under discretion and rules. Rather he has the government weighing the tradeoff between seigniorage and the perceived costs of inflation. A thoughtful discussion of the principal results in the "positive analysis of monetary policy" literature, of which the seigniorage issue is one part, is Grossman's review essay (1991, esp. 335 - 40).

In this paper, I take as the base point for revenue comparisons the unit elastic revenue maximizing result of the stationary state. Two propositions are established. First, it is shown that there is an incentive for government to gain additional revenue through surprise inflation by varying the rate around the traditional unit elastic revenue maximizing point. Second, it is demonstrated that this incentive is muted and in some cases entirely negated by the public's actions based on its expectations of such revenue enhancing activity.

The reason for this result is that expectations-induced actions by private agents concerning the government's "policy" results generally in *less* inflation tax revenue than when a policy of inflating at the rate associated with the unit elastic point is pursued.[4] Since more revenue is preferred to less, it is in the government's financial interest to be credible, to try to grope for and then maintain the rate of monetary expansion that generates the revenue maximizing inflation rate, and it is in this sense that policy is time consistent.

## II. The Analysis

The simplest setup has government financing its expenditures entirely through taxes on real balances.[5] The setup of the model follows Johnson (1977). The budget restraint therefore has real expenditures $g_t$ financed by real inflation tax revenues $R_t$.

$$(1) \qquad g_t = DM_t/P = (DM_t/M)(M/P) = \mu m_t, \qquad D \equiv d(\cdot)/dt$$

[4] This prescription is similar to *Barro*'s (1986) in his elaboration of *Kydland* and *Prescott*'s example of patents. A policy of invalidating extant patents is attractive because it increases current supplies of "protected" products. The disincentive effects of such a policy clearly have adverse consequences on future inventive activities. An optimal patent policy therefore "contains a mechanism to preclude or at least inhibit the abolition of old patents" (1986, p. 23).

[5] Maximum one-period seigniorage occurs when government increases its expenditures to the level at which it buys the entire national output, $g_t = y_t$. Such actions may be dismissed as being inconsistent with a market economy.

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where $\mu$ is the rate of monetary expansion and $m_t$ is real balances $M_t/P$. Differentiating $m_t$ with respect to time gives the revenue $R_t$ from monetary expansion that finances expenditures $g_t$.

$$R_t = DM_t/P = \mu m_t = Dm_t + m_t \pi_t \tag{2}$$

In a stationary economy $Dm_t = 0$. To obtain the revenue maximizing inflation rate, differentiate (2) with respect to the inflation rate $\pi$.

$$\frac{\pi\, dm}{m d\, \pi} = -1 \tag{3}$$

the standard seigniorage maximizing expression for a stationary economy.

Let the demand for real balances in such an economy be given in Figure 1. Assume it is linear. Denote $a_{ij}$ as the revenue in the corresponding rectangle $a_{ij}$. Because of linearity, the following equalities hold.[6]

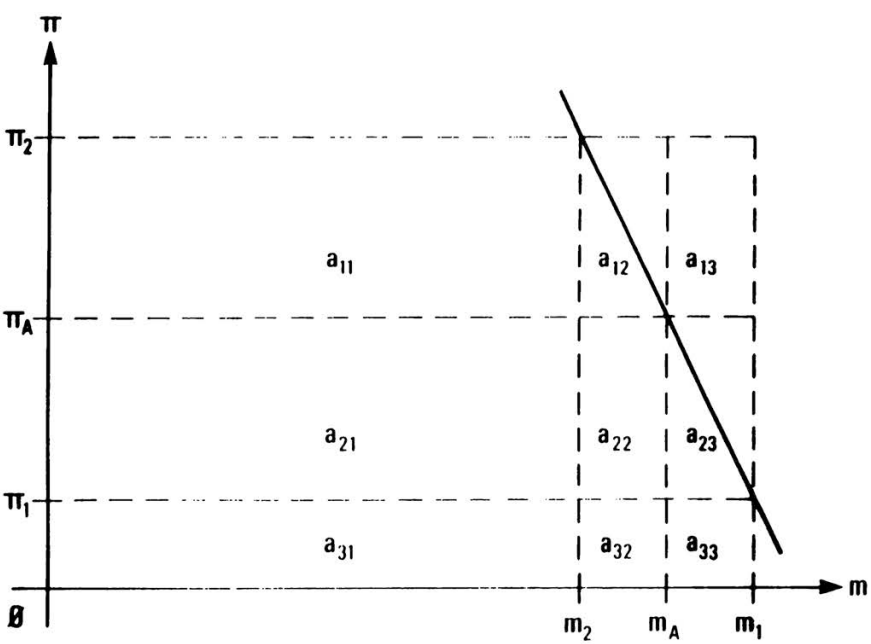


*Figure 1:* Demand for Real Balances

[6] These equalities hold because the simplest tractable experiment of deliberately changing the rate of inflation subject to an average inflation rate equal to the stationary-state-revenue-maximizing rate $\pi_A$ must have $\pi_A = (\pi_1 + \pi_2)/2$.

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(4) $$a_{11} = a_{21}$$

(5) $$a_{12} = a_{13} = a_{22} = a_{23}$$

(6) $$a_{32} = a_{33}$$

Assume the demand for real balances is unit elastic at the point associated with the rate of inflation $\pi_A$. In the traditional analysis, a government concerned with maximizing revenue would inflate at that rate, thereby obtaining revenue of

(7) $$\sum_{i=2}^{3} \sum_{j=1}^{2} a_{ij} = \pi_A m_A$$

To show that the government can obtain greater revenue from inflation surprises, assume that the current inflation rate is $\pi_1$ with the public holding $m_1$ balances: this gives revenue of $\sum^{3} a_{3j}$. A surprise increase in the inflation rate to $\pi_2$ has agents still holding $m_1$ real money. Revenue to the government becomes $\sum^{3} \sum^{3} a_{ij}$. The additional seigniorage $\sum_{i}^{2} \sum_{j}^{3} a_{ij}$ arises because the surprise inflation catches agents still holding $m_1$ balances.

It is the prospect of additional revenue that suggests a policy of varying the inflation rate. Assume the government attempts to surprise the public by varying the inflation rate around the level $\pi_A$. It first tries to generate inflationary expectations of $\pi_1$, for which the public holds $m_1$ real balances. It then actually inflates at $\pi_2$, thereby generating revenue of $\pi_2 m_1 = \sum^{3} \sum^{3} a_{ij}$. To the extent that the public believes the government will continue inflating at $\pi_2$, real balances demanded are reduced to $m_2$. If the government now decreases the actual inflation rate to $\pi_1$, its revenue falls to $a_{31} = \pi_1 m_2$.

On average then, the revenue received each period is $a_{23}$ more than that received from constantly inflating at $\pi_A$. This follows from conditions (4) - (6) because average revenue is $\left[ \sum^{3} \sum^{3} a_{ij} + a_{31} \right] / 2$, which is $a_{23}$ greater than the revenue received when inflation proceeds at the $\pi_A$ revenue maximizing rate. It is the prospect of this greater revenue that is the incentive for attempting to generate inflation surprises.

Rational expectations considerations dictate that the government cannot be successful in continually deceiving the public. The public after all has a clear financial incentive (of $a_{23}$) to try to anticipate the variable inflation policy.

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Assume it is successful in anticipating *exactly* the government's inflation policy. When it inflates at $\pi_2$, believing the public to have inflationary expectations of $\pi_1$ when in fact its expectations are $\pi_2$, revenue is $\sum^{3} a_{i1}$ because the public holds only $m_2$ real balances. Similarly, inflating at rate $\pi_1$ when the public expects that rate of inflation and therefore holds $m_1$ balances yields revenue of $\sum^{3} a_{3j}$. Summing and averaging yields government revenues of $\left[\sum^{3} a_{i1} + \sum^{3} a_{3j}\right]/2$. Comparing this with (7) proves that seigniorage averages $a_{22}$ *less* than when government tries to surprise the public about its inflation activity, but is unsuccessful in so doing. Note also that the $a_{22}$ revenue reduction when the public successfully anticipates the government's variable inflation policy is the same amount as the $a_{23}$ additional seigniorage when the government successfully surprises the public.[7]

For government "policy" of varying the inflation rate around the standard revenue maximizing rate, the result is less revenue. Suppose instead that the "once and for all" revenue increase – the $\sum_{i}^{2} \sum_{j}^{3} a_{ij}$ resulting from moving from $\pi_1$ to $\pi_2$ – from inflation surprises is successively repeated, i.e., the government increasingly moves to higher and higher inflation as a means of trying to gain more revenue. Such a policy is unsuccessful because the seigniorage progressively declines as the public adjusts to equilibrium at increasingly elastic points on the demand for real balances.

Assume instead that in its attempt to continually surprise the public, the government *randomly* generates inflation, where the mean inflation rate is equal to that associated with the unit elastic point. Because of the prohibitive cost of trying to anticipate such a policy, the optimal risk-averse policy of the public would be to hold real balances of $m_A$, the amount associated with the unit elastic point, regardless of the actual inflation rate. Holding of that amount of balances would result in average revenue of $\pi_A m_A$.

Let the public hold $m_A$ real balances. Assume the initial inflation rate is $\pi_1$. It then is increased to $\pi_2$. Seigniorage from $\pi_1$ inflation thus is $\sum^{2} a_{3j}$; from the higher $\pi_2$ rate it is $\sum^{3} \sum^{2} a_{ij}$. Average revenue is therefore equal to

[7] The general qualitative results of these notes hold for any "nearly" linear demand to the function, though this last (equality of revenue loss) results holds only approximately for a nearly linear demand function for real balances.

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that obtained from maintaining a constant rate of inflation equal to that at which the demand for real balances is unitarily elastic. The public completely thwarts the government's attempt to raise additional revenue through random inflation surprises. There is thus no incentive to create inflation surprises.

The principal point of the analysis is simply that the incentive to increase government revenues by surprise inflation is inhibited, and in fact in the present framework entirely precluded, because the public's successful anticipation of the government's "surprise" inflation rate policy generates seigniorage of at most the amount received from a constant inflation.

## III. Concluding Comments

If the government believes it can in fact successfully and continually surprise the public, it would receive more revenue than from either a policy of constant inflation or one of variable – but correctly anticipated – inflation. In the event, however, that government is of the view that it cannot continually deceive the public successfully, its own financial interest dictates that it inflate at the constant revenue maximizing rate of $\pi_A$. The credibility of such a policy would enhance its coffers. The importance of credibility in monetary policymaking has not gone unrecognized.

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## Zusammenfassung

### Wie eine unehrliche Regierung zu einer glaubwürdigen werden kann: durch die Inflationssteuer

In einer stationären Volkswirtschaft maximiert die Regierung ihre Einnahmen durch Besteuerung der Realvermögen, wenn die Nachfrageelastizität gleich eins ist. In diesem Beitrag werden zwei Behauptungen aufgestellt: Erstens wird gezeigt, daß für die Regierung ein Anreiz darin besteht, zusätzliche Einnahmen durch Inflationierung zu erzielen, indem sie die Rate um den Punkt der Einnahmenmaximierung herum variiert, der traditionell einen Elastizitätskoeffizienten von eins hat. Zweitens wird gezeigt, daß dieser Anreiz gedämpft wird und in einigen Fällen auf Grund von Handlungen der Bevölkerung völlig entfällt, die diese im Hinblick auf eigene Einnahmenmaximierung ausübt.



## Summary

### Making a Dishonest Government Credible: The Inflation Tax

In a stationary economy a government maximizes revenue from the tax on real balances where the demand is unit elastic. In this paper, two propositions are established. First, it is shown that there is an incentive for government to gain additional revenue through surprise inflation by varying the rate around the traditional unit elastic revenue maximizing point. Second, it is demonstrated that this incentive is muted and, in some cases, entirely negated by the public's actions based on its expectations of such revenue enhancing activity.



## Résumé

### Rendre vraissemblable un gouvernement malhonnête: la taxe d'inflation

Dans une économie stationnaire, un gouvernement maximise les revenus de la taxe sur les revenus réels quand l'élasticité de la demande est égale à un. Dans cet article, l'auteur établit deux propositions. Premièrement, il montre qu'il existe un stimulant pour le gouvernement afin d'obtenir des revenus supplémentaires en provoquant une inflation non-attendue à travers une variation du taux autour du point qui, traditionnellement maximise le revenu avec une élasticité unitaire. Deuxièmement, il montre que cette tendance est contrée, et dans certains cas entièrement annulée, par les réactions du public, basées sur les attentes que de tels revenus relancent l'activité.


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