Government Size, Optimal Inflation Tax, and Tax Collection Costs

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I. Introduction

Numerous studies have tried to determine the optimal inflation level. Most have pointed out the existence of some optimal rate of deflation. (Sidrauskis, 1967; Friedman, 1969; Stockman, 1981) and suggested that higher inflation reduces welfare. Nevertheless, taxation via inflation is widespread, although its intensity differs across countries (Fischer, 1982). These empirical facts are inconsistent with theoretical conclusions because of the models' failure to address two fundamental questions: first, why are the proceeds of the taxes needed (i.e., what is the optimal size of government); and second, what are alternative ways of raising taxes? The purpose of this paper is to analyze how consideration of these questions affects optimal inflation.

The crucial assumption is that the collection of direct taxes induces real costs, whereas the cost of collecting taxes via inflation is negligible. Real resources are required to collect direct taxes, therefore an optimal inflation tax depends on the structure of those costs as well as on the optimal size of government expenditure. Given the desired size of the government, the burden of taxes is allocated between inflation tax and direct taxes in a way that will minimize the resulting distortions.1

The new aspect of the subsequent analysis is in assessing the dependence of inflation on optimal government size.

II. The Model

Consider an intergeneration model of the type popularized by Samuelson (1958). Assuming that each individual lives for only two periods, an individual born at time $t$ will die at the end of $t+1$. Each generation consists of identical people, so that $2N$ people are alive at each $t$. An individual's utility function depends on his consumption in each period of a composite good, as well as on per worker government net spending. To simplify analysis, individuals are assumed not to derive utility from government spending in their retirement period. The analysis will concentrate on the properties of the optimal stationary equilibrium under conditions of full information, i.e., an equilibrium in which government policy is set in advance in a time-independent fashion to maximize the utility of a representative consumer. An individual entering the labor force in period $t$ seeks to maximize a utility function of the form:

$$\log C_t + \beta \log C_{t+1} + \gamma \log G_t$$ (1)

where $C_t$ denotes his consumption in the working period and $C_{t+1}$ in the retirement period, and $G_t$ denotes per worker government spending. $(1/\beta) - 1$ reflects the rate of time preference, and $\gamma$ indicates the weight placed on government spending relative to private consumption.

Individuals have money as stores of value which are used to transfer purchasing power to the future. Each individual produces $A$ output units while he is young. His net real in-
come is $Y = A - T$, where $T$ is direct taxes. If he consumes $C^T$ during the working period, he will consume $(Y - C^T)/P_C$ units while he is old. Denoting inflation by $\pi = P_{-1}/P_0$, in a stationary economy (i.e., $\pi = \pi_0$),

$$C^e = \frac{Y - C^t}{1 + \pi}$$  \hspace{1cm} (2)

Government has two income sources: (1) a tax $T$ on young workers, (2) the seigniorage charge for providing money. The net tax proceeds (per worker) are $T(1 - \theta)$, where $\theta$ is the average cost of direct tax collection. In general, $\theta = 8(T)/T$. To simplify, the analysis will proceed by first assuming a constant $\theta$.

The young generation demands $Y - C^t$ real balances (per capita); the older generation supplies only $(Y - C^t)/(1 + \pi)$. The excess demand for real balances, $(\pi(1 + \pi)) (Y - C^t)$, is supplied by government, which uses the seigniorage to finance (in part) its activity.

The budget constraint facing the government is

$$G = (1 - \theta) T + \pi - (Y - C^t).$$  \hspace{1cm} (3)

A representative individual is faced with given $G$, and the optimal consumption plan is to choose $C^* \text{ in order to maximize}$

$$\max \text{ log } C^t + \beta \text{ log } Y - \frac{C^t}{1 + \pi} + \gamma \text{ log } G$$  \hspace{1cm} (4)

which results in

$$C^T = \frac{1}{1 + \beta} \gamma.$$  \hspace{1cm} (5)

Thus, the budget constraint facing government is

$$G = (1 - \theta) T + \frac{\pi}{1 + \pi} (Y - C^t).$$  \hspace{1cm} (6)

Government is assumed to choose its size, and the structure of taxes in such a way as to maximize the utility of a representative individual:

$$\max \log p(A - T)$$

$$\text{ s.t. eq. 6}$$  \hspace{1cm} (7)

In each period government taxes each worker $T^*$, and buys $\gamma^*(1 + \pi^*)^{(1 - \theta)p/A - T^*}$ units of the composite good from him where $T^*$, $\pi^*$ are the optimal values found by solving eq. 7. Government purchases are financed by printing $\Delta M$, extra (nominal) money balances:

$$\Delta M = P_0 \gamma^* \frac{(1 + \pi)}{1 + \pi} (1 - \theta)(A - T^*).$$  \hspace{1cm} (8)

In a full information world such a policy will generate an inflation of $\pi^*$. Assuming that $\theta < p$ (a non-corner solution) and solving for $\pi^*$, $G^*$ (eq. 7) yields

$$\pi^* = \frac{\gamma^*}{\gamma^* - \theta}$$  \hspace{1cm} (9)

$$\gamma^* = \frac{A(1 - \theta) \gamma_0}{\gamma_0 - \theta(1 + \beta)}$$  \hspace{1cm} (9a)

Note that if the cost of direct tax collection is zero ($\theta = 0$), standard solution for optimal inflation emerges as the rate of growth (zero in our case). In this case, all tax collection is by direct and undistorted means. Increasing $\theta$ implies that there is a welfare loss from direct taxes that motivates shifting part of the tax burden from direct taxes to inflation tax. Because an increased $\theta$ implies that the shadow cost of government services increases, it also implies lower optimal government size:

$$\frac{\partial G^*}{\partial \theta} < 0; \quad \frac{\partial \pi^*}{\partial \theta} > 0; \quad \frac{\partial T^*}{\partial \theta} < 0.$$  \hspace{1cm} (10)

As might be expected, a higher weight placed on government services will increase optimal government size ($\partial G^* / \partial \theta > 0$). If the average cost of direct tax collection is constant ($\theta(1/T) = 0$), the increase in government services is financed only by higher taxes ($\partial T^* / \partial \theta > 0$) without affecting inflation. This, in turn, implies lower seigniorage because of the lower base for the inflation tax ($\partial \pi^* / \partial \theta > 0$).

It can be shown that in the more general case, in which $\theta(1/T) \neq 0$, optimal inflation is given by:

$$\pi^* = \frac{G^*(1 + \pi)}{\beta - \theta(1 + \pi)}$$  \hspace{1cm} (11)

where $\eta = \theta(1/T)$. $\pi^*$ is the elasticity of the average costs of tax collection (with respect to the tax level). Assuming a positive elasticity, we find that a higher weight placed on government services will be accompanied by higher direct tax collection as well as higher optimal inflation. Thus, in the more general case, optimal inflation will be positively correlated with desired government size.

Note that inefficient taxing capacity (high $\theta$) causes welfare loss via three channels: it reduces the size of government services below what is optimal in a more efficient system, with lower $\theta$; it increases inflation thereby causing welfare loss; and finally, it has the direct effect of using more real resources for tax collection purposes.

### III. Concluding Remarks

Although this paper uses a very simple approach, its general point should prove robust to alternative model specifications: the issue of optimal inflation should be addressed together with the questions of optimal government size, the capacity of the taxing system, and the welfare costs of using different taxes. In a distorted tax system the solution is to use different sources of revenue, including inflation tax, in a way that will minimize the cost of raising the optimal net taxes.

In the context of our paper, it is shown that a higher cost of direct tax collection will reduce optimal government size and will increase optimal inflation. If the average cost of tax collection rises with the volume of taxes, an increase in the desirable size of the government will increase optimal inflation.

### References


