Democracy, Dictatorship, and the Monetary Commons*

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Abstract

In this paper, we analyze the effect that alternative decision-making structures have on equilibrium inflation rates. Our analysis considers decision-making structures that could be expected to emerge under dictatorship, political instability, and democracy. Each scenario implies different ownership structures over the real value of the money stock, which we treat as a common pool resource. We find that the equilibrium inflation rate that emerges under dictatorship is consistent with the seigniorage-maximizing rate, but under conditions that could be characterized as politically unstable, the inflation rate exceeds the seigniorage-maximizing rate. In the case of democracy, however, we find that under plausible conditions, the inflation rate that emerges will always be below the seigniorage-maximizing rate. In other words, when political property rights over the real value of the money stock are ill-defined, there is a tragedy of the monetary commons. Our analysis explains why inflation rates are lower in more democratic countries and those that experience lower bouts of political instability.

Keywords: Democracy, Dictatorship, Monetary Commons, Political Property Rights

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1 Introduction

The power to create money provides governments with an important source of revenue. As for any valuable asset, the use of seignorage will be a function of the structure of property rights underlying its use. In other words, it is the cost of establishing and maintaining "political" property rights –i.e. the abilities by different agents to control political decision-making– which determines how monetary policy will be conducted.

Standard analyses of the inflation tax often assume that the extent to which governments utilize the tax is the product of a single decision maker. While this assumption may be justified in those cases where the decision structure is such that the incentives faced by the various governmental decision makers yield outcomes that can be meaningfully modeled "as if" they were consciously chosen by a single mind even if they were not, there is no reason to presume *a priori* that such a decision structure is operative in all cases.

In cases where the decision structure permits separate yet interdependent decision makers to determine the utilization of the inflation tax, the value of the government's money-creation authority becomes subject to the simultaneous exploitation by multiple decision makers each competing for the seigniorage revenue. In this setting, the lack of well-defined decision rights may create a "tragedy of the monetary commons" whereby the inflation rate that emerges may be so high as to fully dissipate the real value of the money stock. Whether such an outcome occurs, however depends on the allocation of decision rights implied by the operative decision structure.

The purpose of this paper is to identify the equilibrium inflation rates that will emerge under alternative decision structures. We consider several scenarios, which can be broadly characterized as either being dictatorial or democratic. Under dictatorial regimes, the inflation rate that emerges is only consistent with the seigniorage-maximizing rate when there is a single dictator who is the residual claimant to the revenues produced by the government's monetary monopoly. In the other cases, which are akin to political instability, the inflation rate exceeds the seigniorage-maximizing rate owing to a lack of clearly defined political property rights over the real value of the money stock. Under the more democratic scenarios, we find that the inflation rate will tend to be less than the seigniorage-maximizing rate.

The idea that government resources may subject to a commons problem is not new. Wrede (1999) demonstrates that tax competition in a federation results in an over-utilization of shared fiscal resources as compared to the case of a single taxing authority. Berkowitz & Li (2000) develop a model of tax rights to show that when such rights are poorly defined in developing countries, successfully transitioning to an advanced economy will be less likely. Velasco (2000) illustrates how competition among interest groups to finance their preferred policies results in higher transfers, larger deficits, and greater debt than that implied by models where such decisions are made by a single decision maker. Buchanan & Yoon (2001; 2004) extend this earlier work by apply the commons analogy to majoritarian democracies to show that there are inherent tendencies in majoritarian systems that prevent tax revenues from being dissipated. The focus of this literature has been on revenue collected via traditional taxes rather than on revenue collected via the inflation tax.

To the best of our knowledge, Aizenman (1992) is the only paper that addresses the possibility of a monetary commons problem. Our analysis differs from his in two important respects. First, while his analysis demonstrates that a lack of well-defined seigniorage rights creates the possibility for a monetary commons problem, his model does not explain why democracies will tend to have lower inflation rates. Second, because his analysis does not incorporate multiple majority coalitions, his model does not explain why inflation tends to be less volatile in democracies.

Experiences with inflation vary substantially throughout the world. Aisen & Veiga (2006; 2008b) report that inflation is both higher and more volatile in less democratic countries than in democratic ones. They also report that greater political instability contributes to these differences. Along these lines, Cukierman et al. (1992) and Aisen & Veiga (2008a) report that less democratic and politically unstable countries rely on seigniorage to a greater extent than do more democratic, politically stable ones. In their comprehensive review of the high- and hyperinflation literature, Fischer et al. (2002) report that economies in transition experience high inflation. In short, the empirical evidence suggests that democracies may have different monetary policies than non-democracies, even if they adopt similar policies in other areas (Mulligan et al., 2004).

Despite the accumulation of data on the factors contributing to the difference experiences with inflation and seigniorage across time and space, there has not been any theoretical work that can explain these varied experiences. In a basic sense, we know why inflation is higher in some countries than it is in others: the money supply increases faster than money demand. But this explanation is unsatisfying. This paper's primary contribution is to extend the earlier work on the fiscal commons to monetary affairs in order to not only provide a theoretical explanation of the empirical evidence on inflation and seigniorage, but also to explain why governments adopt different monetary policies.

Our argument is straightforward. Political instability results in seigniorage rights being poorly defined. Competition among various interest groups to capture the revenue that these rights results in the value of the money stock being partially or, in some cases, totally dissipated. A lack of clearly defined decision rights places these interest groups in a Prisoners' Dilemma, which results in rates of inflation in excess of what would maximize seigniorage revenue. To escape this situation, some type of reform is necessary to move from the off-diagonal position to a better equilibrium.

Our analysis suggests that one effective reform would be to move towards a type of majoritarian democracy wherein there is a 50-50 chance of the average voter being a member of the majority coalition. In other words, a system that Buchanan & Yoon (2004) call "fair". The intuition behind this idea is that because there is essentially equal probabilities of the average voter ending up in the majority coalition or in the minority, his own self-interest will compel him to select an inflation rate that reflects the probability that he will be subject to it. In this system there is, what Buchanan & Yoon (2004) call a "membership" externality.

We proceed as follows. In the next section, we lay out the basic assumptions of our model.

In Section 3, we consider the dictatorial decision structures. With the baseline case of a single decision maker - the standard assumption in the inflationary finance literature - we show that in this setting, the utility-maximizing choice for the single decision maker is to set the inflation rate to the seigniorage-maximizing rate. We then show how multiple interdependent but separate decision makers would push the inflation rate above the seigniorage-maximizing rate. In Section 4, we consider democratic decision structures, which show that in majoritarian settings, the inflation rate will tend to be below the seigniorage-maximizing rate. The final section concludes.

2 Assumptions

We assume the government possesses a monopoly franchise in money creation and that the economy is closed. Analyses of the demand for money during hyperinflation typically ignore the effect of real variables on the demand for money because their rates of change would be too small relative to changes in the price level to exert a significant influence on the quantity of real balances demanded by the public. To be consistent with this approach, we assume there is no growth and preferences, endowments, and technology are constant.

We assume the quantity of real balances are inversely related to the inflation rate, which is determined one-for-one by the growth rate of the nominal money supply. In terms of the tax analogy, the quantity of real balances represents the base of the inflation tax, and the inflation rate represents the tax imposed on the base. As the inflation rate increases, people hold fewer real balances. Thus, when one authority selects a higher rate of inflation, he imposes external diseconomies on every other member of the polity, measured by the foregone seigniorage revenue associated with any given inflation rate.

We also assume that those with decision-making authority are part of the polity, meaning that they, too are subject to the inflation tax. This assumption guarantees that the decision-makers internalize part of the cost associated with their choice of inflation rate. While the decision-makers are subject to the same inflation rate as all members of the polity, they receive all the seigniorage revenue collected as a transfer. Since these revenues are not shared with members of the polity without decision-making authority, there is a potential for the decision-makers to fully dissipate the "monetary commons." Whether this potential outcome materializes depends on the decision-making structure governing the choice of inflation rate. We now turn to analyzing the effects of alternative structures.

3 Political Instability and the Monetary Commons

In this section, we consider three different decision structures. The first will be the case of a single decision maker who possesses the right to select the inflation rate and is the residual claimant to the consequent seigniorage revenue. In this setting, the aggregate equilibrium inflation rate will converge to the seigniorage-maximizing rate as the size of the polity, N increases. This result is notable in that it illustrates the unstated assumption regarding the decision structure presumed to govern the choice of inflation rate underlying most analyses of inflationary finance. That is, these analyses presume that the political property rights over the seigniorage revenue generated by the government's monetary monopoly are well defined.

A common feature of most periods of hyperinflation is political instability. In our view, political instability is the result of poorly defined political property rights, so the second and third decision structures we consider in this section analyze the aggregate equilibrium inflation rate that emerges in the case of two independent decision makers and multiple independent decision makers, respectively. In the former case, the aggregate equilibrium inflation rate that emerges will exceed the seigniorage-maximizing rate, but will not fully dissipate the monopoly rents the government's monetary authority confers. In the latter case, however, we have a tragedy of the monetary commons wherein unrestricted entry leads the familiar commons problem.

3.1 Single Decision Maker

We begin with the case of a single decision maker who possesses the right to choose the inflation rate for the economy. The decision maker receives the seigniorage revenue generated by the government's monetary monopoly as a pure income transfer, however the decision maker also uses money to exchange with others. Thus, there are two effects the decision maker must consider when deciding on the inflation rate. One the one hand, higher inflation means greater income, but on the other, the liquidity services money provides decrease as inflation increases, reducing the surplus the decision maker receives from holding real balances.

We assume that each member of the polity, including the decision maker, are identical. We assume also that each member's inverse money demand function is of the following form: $\Pi = a - bm$. Here, Π is the inflation rate, m is the quantity of real balances held by an individual member of the polity, and a and b are positive constants. It follows that the aggregate relationship between inflation and the total quantity of real balances held by the polity: $\Pi = a - (b/N)M$, where M is the total quantity of real balances demanded by all members of the polity.

The decision maker's utility function consists of two components. The first is the utility provided by money's liquidity services and the second is the seigniorage revenue earned from the government's monetary monopoly. We express this utility function formally as:

$$U = \frac{(a - \Pi)m}{2} + \Pi M \tag{1}$$

The first term reflects the consumer's surplus received by the decision maker from the quantity of real balances he holds while the second reflects the seigniorage revenue he receives.

Rearranging the individual and aggregate money demand functions and substituting the resulting equations into the utility function yields:

$$U = \frac{(a - \Pi)^2}{2b} + \frac{N\Pi(a - \Pi)}{2} \tag{2}$$

which will be maximized with respect to the inflation rate when:

$$\frac{a(N-1) - 2N\Pi + \Pi}{b} = 0 \tag{3}$$

Solving for Π yields:

$$\Pi^* = \frac{a(N-1)}{2N-1} \tag{4}$$

Proposition 3.1. *As the size of the polity increases, the utility-maximizing inflation rate will converge to the seigniorage-maximizing rate,* $a/2$.

Proof. Assuming that the marginal cost of producing nominal balances is zero, the seigniorage-maximizing rate of inflation occurs where the demand for real balances is unit elastic:

$$\frac{dM}{d\Pi}\frac{\Pi}{M} = -1$$

Using the aggregate relationship between inflation and real balances, we have:

$$-\frac{N}{b}\frac{\Pi}{M} = -1$$

Solving for Π yields:

$$\Pi = M(\frac{b}{N})$$

Substituting the right-hand side into the aggregate relationship between inflation and real balances gives:

$$\Pi = a - \Pi \implies \Pi = a/2$$

Finally, note that as the size of the polity increases, the utility-maximizing inflation rate converges to the seigniorage-maximizing rate, that is:

$$\lim_{N\to\infty} \Pi^*(N) = a/2$$

In the case of one decision maker and a relatively large number of members of the political community, the utility-maximizing rate of inflation is equivalent to the seigniorage-maximizing rate. What's surprising about this result, is that selecting an inflation rate in excess of $a/2$ would make the decision maker worse off, and yet that's exactly what the empirical literature finds in the case of many periods of severe inflation. We now relax our assumption of a well-defined decision structure in order to determine what happens to the utility-maximizing rate of inflation when there are multiple decision makers.

3.2 Two Decision Makers

We now consider the case of two independent decision makers. This situation could be thought to occur with two rival political leaders have the right to choice the inflation rate but so independently and simultaneously. In other words, we assume that the two decision makers do not collude with one another when selecting the inflation rate. Each decision maker receives only a portion of the seigniorage revenue generated by the government's monetary monopoly.

Formally, this change means the relationship between individual money balances, aggregate money balances, and inflation is now: $\pi_1 + \pi_2 = a - bm$ and $\pi_1 + \pi_2 = a - (b/N)M$, where π_1 and π_2 are the inflation rates selected by the first and second decision makers, respectively. Substituting these relationships into the utility function of either decision maker yields:

$$U = \frac{(a - \pi_1 - \pi_2)^2}{b} + \frac{N\pi_1(a - \pi_1 - \pi_2)}{2} \tag{5}$$

which is maximized with respect to π_1 when:

$$\frac{a(N-1) - 2N\pi_1 - N\pi_2 + \pi_1 + \pi_2}{b} = 0 \tag{6}$$

Solving the first order condition for π_1 yields the first decision maker's reaction function:

$$\pi_1(\pi_2) = \frac{a(N-1)}{(2N-1)} - \frac{\pi_2(N-1)}{(2N-1)} \tag{7}$$

Assuming a symmetric Nash equilibrium where both decision makers choose identical inflation rates yields:

$$\pi^* = \frac{a(N-1)}{(3N-2)} \tag{8}$$

It follows that the aggregate equilibrium inflation that emerges in this setting is given by:

$$\Pi^* = 2\pi^* = \frac{2a(N-1)}{(3N-2)} \tag{9}$$

Proposition 3.2. *As the size of the polity increases, the utility-maximizing inflation rate will converge to* $2a/3$*, which exceeds the seigniorage-maximizing rate.*

The intuition behind this result is straightforward. Since the two decision makers do not collude with another, they do not consider the effect that the other's action has on the quantity of real balances demanded. In consequence, the aggregate equilibrium inflation rate that emerges in this context exceeds the seigniorage-maximizing rate. Note, however, that while the aggregate equilibrium inflation rate exceeds the seigniorage-maximizing rate, it does not totally dissipate the value of the real money stock.

3.3 Multiple Decision Makers

We now turn to a scenario with multiple decision makers, L each with the authority to select an inflation rate and collect the consequent seigniorage revenue. The aggregate equilibrium inflation rate in this setting will be the equal to the sum of the inflation rates chosen by each decision maker, i.e., $\Pi = \pi_1 + \cdots + \pi_L$. In this setting, the relationship between individual and aggregate real balances and inflation is the same as in the case of the single decision maker: $\Pi = a - bm$ and $\Pi = a - (b/N)M$.

As before, we solve each of these relationships for m and M, respectively, and then substitute the resulting expressions into the decision maker's utility function, yielding:

$$U = \frac{(a-\Pi)^2}{2b} + \frac{N\pi_1(a-\Pi)}{b} \tag{10}$$

The first order condition with respect to π_1 in this case is:

$$(\pi_1 + \Pi_1 - a) + N(a - 2\pi_1 - \Pi_1) = 0 \tag{11}$$

where $\Pi_1 = \sum_{L \neq 1}^{L} \pi_L$.

Solving for π_1 yields the decision maker's reaction function:

$$\pi_1 = \frac{(N-1)(a-\Pi_1)}{(2N-1)} \tag{12}$$

As in the prior cases, we solve for the symmetrical Nash equilibrium, yielding:

$$\pi^* = \frac{a(N-1)}{(NL+N-L)} \tag{13}$$

With L decision makers, the aggregate equilibrium inflation rate will be:

$$\Pi^* = L\pi^* = \frac{aL(N-1)}{(NL+N-L)} \tag{14}$$

Proposition 3.3. *As the number of decision makers, L approaches N, and N increases, the aggregate equilibrium inflation rate approaches a, which fully dissipates the value of the real money stock.*

Proof. Consider the case where $L = N$. In this case, the aggregate equilibrium inflation rate will be given by:

$$\Pi^* = \frac{a(N-1)}{N}$$

As N increases, the aggregate equilibrium inflation rate will approach a.

This result is the standard "tragedy of the commons" outcome. In the setting with unlimited decision makers, every member of the polity attempts to capture a portion of the seigniorage revenue generated by the government's monetary monopoly. In the limit, the seigniorage tax base is fully dissipated. Periods of extreme hyperinflation illustrate this sort of scenario, although in most cases we do not observe a total abandonment of the currency, which is what the full dissipation outcome implies.

3.4 Discussion

The major implication of this analysis in this section is that when the decision structure produces outcomes that can be realistically modeled *as if* the choice of inflation rate was made by a single decision maker, then the aggregate inflation rate that emerges will the seigniorage-maximizing rate. However, in those cases where the decision structure leaves some or all of the seigniorage rights in the public domain, the aggregate equilibrium inflation rate that emerges exceeds that which would maximize seigniorage revenue.

The final scenario we considered here bears directly on the issue of political instability. In real-world settings of political instability there are typically several groups vying for control of the state's resources. These groups are interdependent but separate in the sense that the members of each group do not belong to other, rival groups. As such, there is nothing attenuating their decision to inflate. When all groups behave this way, the aggregate equilibrium inflation rate that emerges may vastly exceed the seigniorage-maximizing rate, and may lead to a complete abandonment of the currency once the real value of the money stock is dissipated. This issue of separate but interdependent groups can be contrasted against decision structures that exist in majoritarian systems, which is the question to which we now turn.

4 Inflation and Democracy

4.1 Single Majority

We begin our analysis of democratic politics and inflation with the case of a single majority coalition. The polity consists of N citizens, C of which are members of the majority. This coalition possesses the exclusive right to determine the inflation rate, Π. As before, members of the coalition will be subject to the same inflation rate they impose on members of the minority. We assume that each member of the majority coalition is identical, and receives an equal share of the seigniorage revenue. The representative member of the coalition chooses an inflation rate that maximizes:

$$U = \frac{(a-\Pi)m}{2} + \frac{\Pi M}{C} \tag{15}$$

which consists of the surplus they receive from holding real money balances, m and the seigniorage revenues collected from total quantity of real balances held by the polity, M.

The relationships between an individual's real money balances and the total quantity of real balances held by the polity and the inflation rate continues to be: $\Pi = a - bm$ and $\Pi = a - (b/N)M$ respectively. Substituting these two relationships into the representative majority coalition member's utility function yields:

$$U = \frac{(a-\Pi)^2}{2b} + \frac{N\Pi(a-\Pi)}{bC} \tag{16}$$

which is at its maximum with respect to the inflation rate when:

$$\frac{aN - aC + \Pi C - 2N\Pi}{bC} = 0 \tag{17}$$

Solving for Π yields the utility-maximizing inflation rate for the representative member of the majority coalition:

$$\Pi^* = \frac{a(N-C)}{(2N-C)} \tag{18}$$

Proposition 4.1. *A single majority coalition with a minimally-sized majority will select an inflation rate less than the seigniorage-maximizing rate.*

The minimally sized majority is defined implies that $C = (N/2) + 1$. The utility-maximizing rate of inflation in this setting is:

$$\Pi^*(N) = \frac{a(N+2)}{(3N+2)}$$

As the polity increases, the utility-maximizing rate of inflation converges to:

$$\lim_{N\to\infty} \Pi^*(N) = a/3$$

which is less than the seigniorage-maximizing rate, $a/2$. Note also that the inflation rate that emerges in this setting is also less than that which emerges when a single individual possesses the exclusive right to tax the members of the polity owing to seigniorage revenues being split amongst the members of the coalition.

4.2 Two Majority Coalitions

We now consider a setting with two potential majority coalitions. Each coalition has the right to choose the inflation rate, but does so separately and simultaneously in the same manner that the two independent authorities did in the previous section. As before, we assume that the two coalitions do not collude with one another when choosing the inflation rate. In this scenario, a member of the polity may secure membership in either coalition, or both, but does not know what his status will be at the time the decision about the inflation rate must be made.

Since a member of the polity has the potential to be a member of both coalitions, the inflation rate he selects as a member of one coalition will depend on the probability he assigns to being a member of the other coalition and vice versa. The effect that this possibility has on the representative member's choice of inflation rate is what Buchanan & Yoon (2004) refer to as a "membership externality." This externality will temper the inflation rate the representative member chooses as he will be subject to it in his capacity as a member of the other majority coalition.

Formally, the representative member's utility function now includes the expected seigniorage revenue he would receive as a member of the other coalition:

$$U = \frac{(a - \pi_1 - \pi_2)m}{2} + \frac{\pi_1 M}{C} + \frac{p(\pi_2 M)}{C} \tag{19}$$

where p denotes the probability he will secure membership in the other coalition. In this setting, the relationships between an individual's real money balances and the total quantity of real balances held by the polity and the inflation rate can be modified as before to reflect the inflation rates that each coalition select: $\pi_1 + \pi_2 = a - bm$ and $\pi_1 + \pi_2 = a - (b/N)M$ respectively. Again, we substitute these two relationships into the representative member's utility function to get:

$$U = \frac{(a - \pi_1 - \pi_2)^2}{2b} + \frac{N\pi_1(a - \pi_1 - \pi_2) + Np\pi_2(a - \pi_1 - \pi_2)}{bC} \tag{20}$$

The first order condition with respect to π_1 is:

$$\frac{aN - aC + C\pi_1 + C\pi_2 - Np\pi_2 - N2\pi_1 - N\pi_2}{bC} = 0 \tag{21}$$

Solving for π_1 yields the following reaction function:

$$\pi_1(\pi_2) = \frac{a(N - C) - \pi_2(N - C) - \pi_2(Np)}{(2N - C)} \tag{22}$$

The symmetrical Nash equilibrium in this context is:

$$\pi^* = \frac{a(N - C)}{(3N + pN - 2C)} \tag{23}$$

which implies the following aggregate equilibrium inflation rate:

$$\Pi^* = 2\pi^* = \frac{2a(N - C)}{(3N + pN - 2C)} \tag{24}$$

If we assume the minimally sized coalition, the aggregate equilibrium inflation rate will be:

$$\Pi^* = \frac{2a}{(4 + 2p)} \tag{25}$$

Proposition 4.2. *As the probability of being a member of either coalition increases, the equilibrium* *inflation decreases at an increasing rate, ultimately converging to $a/3$, which again, is below the seigniorage-maximizing rate.*

The change in the aggregate equilibrium inflation rate consequent to an increase in p is:

$$\frac{d\Pi^*}{dp} = -\frac{a}{(p+2)^2}$$

which increases as p increases according to:

$$\frac{d^2\Pi^*}{dp^2} = \frac{2a}{(p+2)^3}$$

Finally, as the probability of being a member of the other majority coalition increases towards absolute certainty, the aggregate equilibrium inflation rate converges to that which exists under a single majority coalition:

$$\lim_{p \to 1} \Pi^*(p) = a/3$$

The intuition behind this result is straightforward. If a member of the polity expects to be a member of both majority coalitions, he will select an inflation rate that reflects the excess burden his choice will have on himself as a member of the other coalition and vice versa. The excess burden of the inflation tax combined with the possibility of being a member of both coalitions tempers his willingness to collect seigniorage from the other coalition.

4.3 Multiple Majority Coalitions

The final case we consider is a setting with multiple potential majority coalitions, denoted by L. We continue to assume that these coalitions have the right to choose the inflation rate, and do so separately and simultaneously. As before, we assume that the coalitions do not collude with one another. A member of the polity may secure membership in the L coalitions, but does not know what his status will be at the time the decision about the inflation rate must be made.

As before, the utility-maximizing inflation rate depends on the probability he assigns to being a member of any of the L coalitions. For simplicity, we assume this probability is the same for each coalition. Formally, the representative member's utility function in this setting is:

$$U = \frac{(a - \Pi)m}{2} + \frac{\pi_1 M}{C} + p[\frac{\pi_2 M + \cdots + \pi_L M}{C}] \quad (26)$$

The relationship between an individual's real money balances and the total quantity of real balances held by the polity and the inflation rate can be modified from the prior scenario to account for the L coalitions: $\pi_1 + \Pi_1 = a - bm$ and $\pi_1 + \Pi_1 = 2 - (b/N)M$, where $\Pi_1 = \sum_{L \neq 1}^{L} \pi_L$. Substituting these relationships into the representative member's utility function gives:

$$U = \frac{(a - \pi_1 - \Pi_1)^2}{2b} + \frac{N\pi_1(a - \pi_1 - \Pi_1)}{bC} + p[\frac{(\pi_2 + \cdots + \pi_L}{C}][\frac{N(a - \pi_1 - \Pi_1)}{b}] \quad (27)$$

The utility-maximizing value of π_1 is:

$$\frac{aN - aC + C\pi_1 + C\Pi_1 - 2N\pi_1 + N\Pi_1 - N\Pi_1 - Np\Pi_1}{bC} = 0 \quad (28)$$

Solving for π_1 yields the representative member's reaction function:

$$\pi_1(\pi_L) = \frac{a(N - C) - \Pi_1(N - C) - Np\Pi_1}{(2N - C)} \quad (29)$$

Note that $\Pi_1 = (L - 1)\pi_1$. Substituting that relationship into equation the reaction function and assuming as before, the symmetrical Nash equilibrium yields:

$$\pi^* = \frac{a(N - C)}{(2N - C) + (L - 1)(N - C) + 2Cp(L - 1)} \quad (30)$$

If we again assume the minimally-sized coalition, we have:

$$\pi^* = \frac{a}{2P(L - 1) + L + 2} \quad (31)$$

Since there are L potential coalitions, the aggregate equilibrium inflation rate in a setting with multiple majority coalition is:

$$\Pi^* = L\pi^* = \frac{aL}{2P(L-1)+L+2} \tag{32}$$

As the number of potential coalitions increases, the aggregate equilibrium inflation rate will converge to:

$$\lim_{L\to\infty} \Pi^*(L) = \frac{a}{1+2p} \tag{33}$$

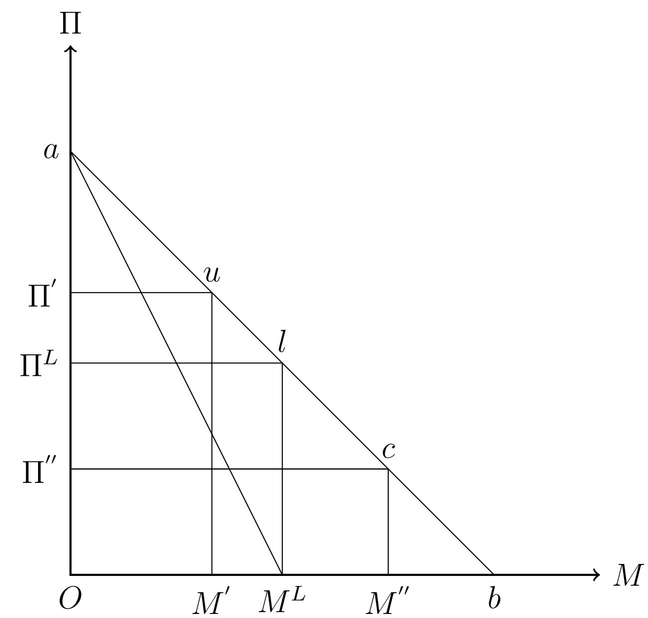
As with the case of two majority coalitions, the equilibrium inflation rate decreases at an increasing rate, and ultimately converges to $a/3$ as p increases. This result is not surprising since the two-coalition scenario is simply a special case of the more general L-coalition scenario.

4.4 Discussion

The intuition of our results in both of the prior sections can be summarized by the graph below representing money demand –segment [ab]– as a function of inflation (Π). Starting with our first scenario, as long as the marginal cost of producing money balances is zero, a wealth maximizing autocrat having full control of monetary policy will increase the money supply until the quantity of money demanded is unit elastic with respect to inflation. The autocrat will thus collect area $\Pi^L lM^L O$ as real seignorage for a deadweight cost to money holders equal to lbM^l.

The very existence of a deadweight cost in the previous case indicates the presence of certain transaction costs preventing the owners of money balances to compensate the autocrat in exchange of a lower inflation rate. Under a well-functioning democracy with low enough political transaction costs, however, multiple political decision makers can negotiate over monetary policy and, by a process of political exchange, can formulate a monetary policy while taking into account the interests of other political groups. In addition, the greater the proportion of money balances the members of the minimum winning coalition own, the lower the incentive for that coalition to inflate –inflation being a tax on those balances. Hence under a well-functioning democracy, we might expect the inflation rate to be lower than the seignorage maximizing rate and the deadweight cost of inflation to be lower. this is represented by inflation rate Π'' in the figure.

Finally, while lower political transaction costs would lead to lower inflation rates, a higher cost to maintain and delineate ownership over the printing press can lead to more inflation. If two or more groups, for instance, can issue currency as they wish independently and without regard for the other, then seignorage will be over-exploited in the sense that the inflation rate will be greater than the seignorage maximizing rate. In the figure, this would correspond to the case where the inflation rate prevailing is Π'.



5 Conclusion

Inflation rates, inflation volatility, and the reliance on seigniorage vary considerably by country. Among the factors that contribute to these differences are political stability and democracy. In this paper, we have endeavored to provide a theoretical justification for the empirical results found in the inflation literature. The primary conclusion from our analysis are that the equilibrium inflation rates that emerge under alternative decision structures vary in response to the incentives created by that structure. Specifically, our analysis suggests that only under a case of a single decision maker would the utility-maximizing inflation rate also be the seigniorage-maximizing rate, and that with multiple independent decision makers the inflation rate will exceed the seigniorage-maximizing rate. Thus, our analysis explains the finding in the literature that the inflation rate in many countries exceeds the seigniorage-maximizing rate, particularly during periods of political instability.

The primary limitation of our analysis is the highly-stylized setting in which we analyzed the equilibrium inflation rates under alternative decision structures. In reality, the electorate of a majoritarian democracy doesn't vote directly for a specific inflation rate. Likewise, during periods of political instability one party typically has control over the monetary authority rather than there being multiple decision makers. That said, our model does capture the interest group dynamics that drive the equilibrium inflation rate in different settings. Thus, while our model is highly abstract, it captures the effects that interest-group competition will have on inflation in a variety of settings.

As we see the matter, future research should focus on two margins. The first is to investigate examples of successful monetary reform through the lens of the decision structures created by the reforms. Rather than focus on the laws that may have accompanied the reform, researchers should examine changes to the underlying way in which voters interact with one another to determine what the underlying causes of successful reform are. Doing so is critical to helping people in countries currently suffering from high and volatile inflation. The second area of future research concerns incorporating the fiscal policy into the model. Namely, we think it would be worthwhile to analyze how the inclusion of poorly defined tax and seigniorage rights would affect the conclusions of optimal seigniorage models. Along these same lines, investigating whether there is a tendency for majoritarian democracies to adopt optimal taxes, including the inflation tax.

An important implication of our analysis is that as the size of the minimum majority increases, the equilibrium inflation decreases. In many developed countries, inflation remains relatively mild. While monetary policy is not subject to a vote by all members of the polity, there are institutional mechanisms that would appear to make monetary policy more difficult to implement than would be the case where the minimal majority is 51%. Thus, one reason why these countries may have been able to successfully restrain inflation is why adopting mechanisms that increase the size of the minimum coalition. If this conjecture is correct, then the structural reforms that occurred prior to and during the the “great moderation” may deserve more credit for reducing inflation in these countries than previously understood.

References

Aisen, A., & Veiga, F. J. (2006). Does Political Instability Lead to Higher Inflation? A Panel Data Analysis. *Journal of Money, Credit and Banking*, *38*(5), 1379–1389.

Aisen, A., & Veiga, F. J. (2008a). The political economy of seigniorage. *Journal of Development Economics*, *87*(1), 29–50.

Aisen, A., & Veiga, F. J. (2008b). Political Instability and Inflation Volatility. *Public Choice*, *135*(3/4), 207–223.

Aizenman, J. (1992). Competitive Externalities and the Optimal Seigniorage. *Journal of Money, Credit and Banking*, *24*(1), 61–71.

Berkowitz, D., & Li, W. (2000). Tax rights in transition economies: a tragedy of the commons? *Journal of Public Economics*, *76*(3), 369–397.

Buchanan, J. M., & Yoon, Y. J. (2001). Majoritarian Management of the Commons. *Economic Inquiry*, *39*(3), 396–405.

Buchanan, J. M., & Yoon, Y. J. (2004). Majoritarian exploitation of the fiscal commons: general taxes–differential transfers. *European Journal of Political Economy*, *20*(1), 73–90.

Cukierman, A., Edwards, S., & Tabellini, G. (1992). Seigniorage and Political Instability. *The American Economic Review*, *82*(3), 537–555.

Fischer, S., Sahay, R., & Végh, C. A. (2002). Modern Hyper- and High Inflations. *Journal of Economic Literature*, *40*(3), 837–880. (Publisher: American Economic Association)

Mulligan, C. B., Gil, R., & Sala-i Martin, X. (2004). Do Democracies Have Different Public Policies than Nondemocracies? *The Journal of Economic Perspectives*, *18*(1), 51–74.

Velasco, A. (2000). Debts and deficits with fragmented fiscal policymaking. *Journal of Public Economics*, *76*(1), 105–125.

Wrede, M. (1999). Tragedy of the Fiscal Common?: Fiscal Stock Externalities in a Leviathan Model of Federalism. *Public Choice*, *101*(3), 177–193.