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NORTH-HOLLAND

## Economic Note

# Do Policymakers' Distributional Desires Lead to an Inflationary Bias?

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The political interpretation behind the Barro–Gordon model hinges on two assumptions: Inflation and output growth have distributional effects, and policymakers' distributional desires can be represented by a quadratic loss function in terms of output and inflation. In this article we have examined these two assumptions. Our main results are (1) inflation and output growth have significant effects on the size income distribution, (2) if policymakers are only concerned with the income distribution, no inflationary bias will arise; and (3) the Barro–Gordon model may represent a political model in which political parties care about *both* the size income distribution and output growth. However, the inflationary bias implied by the Barro–Gordon model should not be associated with the political color of the policymakers.

## 1. INTRODUCTION

During the last decade, the monetary policy model as developed by Barro and Gordon (1983) has acquired a stable position in the economic literature. The three basic assumptions underlying the Barro–Gordon model (henceforth BG model) are (1) inflation surprises have real effects, (2) the policymaker cannot enter into a binding policy commitment, and (3) due to economic distortions (taxation), output lies below its socially optimal level. The outcomes of the BG model are well known. The policymaker has an incentive to create inflation surprises, but because inflation is fully anticipated in equilibrium, output remains at its natural level.

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Originally, the BG model typically fitted with the traditional approach to economic policy, for the policymaker was assumed to care primarily about social welfare. However, since the late 1980s the BG model has been put more and more in a political context (Cukierman, 1992, pp. 43–45 and references therein). Political economic researchers adopted the structure of the BG model (with its implications) but provided an alternative interpretation on the objective function. Like Barro and Gordon, these researchers assume the policymaker to care about output and inflation, but regard the objective function as the outcome of some political process.

What are the basic ideas behind the political interpretation of the objective function? Most frequently, it is argued that the economy is composed of individuals whose incomes are differently affected by output and inflation (Hibbs, 1977; Alesina and Rosenthal, 1989; Chappell and Keech, 1988). This claim is based on several empirical studies, indicating that macroeconomic outcomes have important distributional effects: The share of income of low (high) income groups in total income increases (decreases) with output and inflation (see, e.g., Blinder and Esaki, 1978; and Blank and Blinder, 1986). As a consequence, citizens' preferences over output and inflation are related to their personal incomes. Political institutions translate citizens' preferences into the preference function of the policymaker. How depends on the final objective of the policymaker. For example, if the policymaker is only interested in staying in power, he will adopt the preference function of the median voter (e.g., Cukierman and Meltzer, 1986). Alternatively, if the policymaker caters to the distributional desires of his constituency, the policymaker's preference function will depend on his political color (e.g., Alesina, 1987).

The political approach to economic policy has proved useful. It has increased our understanding of how policymakers may behave under various incentive constraints and it has enabled us to examine the advantages and drawbacks of alternative economic political institutions. For example, a well-known policy recommendation from this literature is to delegate monetary policy to an independent, conservative banker, who gives high priority to price stability. However, the political interpretation of the policymaker's objective function is still based on rather casual arguments. In this paper, we address the question of whether or not the quadratic objective function adopted in most political versions of the BG model fits with the empirical literature on the distributional effects of macroeconomic outcomes as it is claimed by its users. In Section 2, we briefly discuss this literature and reexamine the distributional effects of output and inflation building on the Blank and Blinder (1986) model. From this section, it emerges that macroeconomic outcomes have distributional effects, but that distributional motives alone do not imply an inflationary bias. Next, in Section 3, we examine a model in which citizens and policymakers care about both income distribution and output growth. In this model an inflationary bias is always generated. However, the magnitude of the inflation bias appears independent of the distributional desires of the policymaker. This result casts doubts on the result derived from the BG model that monetary policy should be carried over to an independent conservative banker (Rogoff, 1985). Section 4 concludes this paper.

## 2. POLITICAL BARRO-GORDON MODELS AND THE SIZE INCOME DISTRIBUTION

The BG model revolves around two equations. The first equation describes a short-run Phillips curve, relating real output, $x$, or unemployment, to the difference between actual and expected inflation, $\pi$ respectively $\pi^e$:

$$x = \beta_0 \cdot (\pi - \pi^e) + \beta_1 \quad \beta_0 > 0 \tag{1}$$

where $\beta_1$ denotes the natural level of output. The second equation describes the preferences of the policymaker by means of a quadratic loss function in terms of output and inflation in deviation from their desired values ($\chi$ respectively c):[1]

$$\mathcal{L} = (\pi - c)^2 + \lambda_{BG} \cdot (x - \chi)^2 \quad \lambda_{BG} \geqslant 0 \text{ and } \chi > \beta_1 \tag{2}$$

where $\lambda_{BG}$ denotes the costs of a one unit deviation of $x$ from $\chi$, relative to the costs of a one unit deviation of $\pi$ from $c$. To minimize algebra, we assume throughout the paper that the policymaker perfectly controls the inflation, which thus serves as instrument variable. Under the assumption that the policy maker cannot enter into a binding commitment, the policy model can be solved by minimizing Equation 2 with respect to $\pi$, subject to Equation 1, taking $\pi^e$ as given. In equilibrium, private expectations come out so that the equilibrium inflation rate, $\pi_{BG}$, is equal to

$$\pi_{BG} = c + \lambda_{BG} \cdot \beta_0 \cdot (\chi - \beta_1) \tag{3}.$$

Equation 3 reflects the well-known result from the literature on monetary policy games that inflation is higher, the larger the gap between desired and natural output ($\chi - \beta_1$), the higher the desired inflation level ($c$) and the higher the relative weight attributed to the output target ($\lambda_{BG}$). All governments that are willing to raise output above its natural level have an incentive to generate inflation surprises. However, the public anticipates this incentive and sets expectations up to the point where the marginal costs of unanticipated inflation equal the marginal gains. As a consequence, the resulting inflation leaves output unaffected ($x = \beta_1$).

As mentioned in the introduction, the BG model and the political BG model differ in their interpretation of Equation 2. In the BG model, Equation 2 measures welfare loss. The parameters $\chi$ and $c$ denote the socially optimal values of output and inflation (usually $c$ is set at zero). There are no political conflicts, so that Equation 2 represents the preferences of all citizens.

The political interpretation of Equation 2 can be traced back to Hibbs (1977), who argued that different citizens have different preferences over unemployment (output) and inflation. His rationale for heterogeneous preferences is based on empirical studies on the distribution effects of macroeconomic outcomes (e.g., Thurow, 1970; Mirer, 1973; Blinder and Esaki, 1978; Blank and Blinder, 1986). These studies suggest that the share of aggregated income in total income received

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[1] Various specifications are used in the literature. Sometimes, output is replaced by employment, $c$ is set at zero or $(x - \chi)$ enters into the loss function linearly.

by lower (higher) income groups increases (decreases) with output and inflation. According to Hibbs, these findings imply that lower income groups are more averse to unemployment, or to deviations of output from its natural rate, while higher income groups are more concerned with inflation. In partisan models of monetary policy (see Persson and Tabellini, 1990, for a survey), these findings are captured by the assumption that political parties that promote the interests of lower-income groups (left-wing or liberal parties) give high priority to output growth relative to inflation, $\lambda_{BG}$, and that parties that cater to the distributional desires of higher-income groups (right-wing or conservative parties) attribute low priority to output growth. This literature has led to the view that monetary policy should be delegated to a conservative banker, because a high value of $\lambda_{BG}$ raises inflation without affecting output.

In principle, the political foundation of Equation 2 provided by Hibbs hinges on two claims. First, citizens have different attitudes towards output and inflation, due to the distributional effects of output and inflation and, second, these attitudes can be represented by Equation 2. The first claim is essentially an empirical matter. To examine it, we have updated (1961–1989) Blank and Blinder's estimates of equations which explain quintile-income shares by their lagged values, the unemployment rate, inflation, and a time trend. Apart from the sample period, we deviate from the Blank and Blinder study in two respects. First, to be in keeping with Equation 2, we have replaced the unemployment rate by the growth rate of GNP, $x$. Thus the specification becomes

$$S_{i,t} = \alpha_0 + \alpha_1 \cdot X_t + \alpha_2 \cdot \pi_t + \alpha_4 \cdot t_t + \alpha_5 \cdot S_{i,t-1} \qquad (4)$$

where $S_{i,t}$ is the income share of the $i$th quintile and $t$ is time.[2] Second, we have estimated Equation 4 with two-stage least squares instead of with ordinary least squares to reduce the problem of simultaneity bias, which may result from inflation policies aimed at affecting the income distribution (compare Beetsma and van der Ploeg, 1992). The estimation results are presented in Table 1.

Basically, the estimates confirm the conclusions of Blank and Blinder (1986): Increases in output growth and inflation decrease inequality. Moreover, the distributive effects of output growth seem more profound than those of inflation. We have also looked at the effects of output growth and inflation on a single measure of income inequality, the Gini coefficient, $D$. The last row in Table 1 shows that again the estimation results are as expected. Apart from the regressions presented in Table 1, we have run regressions where (1) inflation was replaced with unanticipated inflation, and (2) a political dummy variable was added, taking the value one under Democrat administrations and taking the value zero otherwise. Neither unanticipated inflation nor the political dummy variable appear to be significant at conventional levels. Moreover, Chow tests indicate that the presented estimates are stable over time.

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[2] It could be argued that in Equation 4 inflation, $\pi$, should be replaced by unanticipated inflation, $\pi - \pi^e$. However, Blank and Blinder (1986) found no effect of unanticipated inflation on the size income distribution (see also Fischer and Modigliani, 1978, Footnote 1).

**Table 1:** Effects of Inflation and Output on Quintile Income Shares and the Gini Coefficient (1961-1989)

| | Output | Inflation | Lagged dep. variable | Constant | Trend | $R^2$ | Durbin h-statistic |
|---|---|---|---|---|---|---|---|
| $S_{1,t}$ | 0.060 | 0.035 | 0.810 | 0.779 | −0.010 | 0.908 | 1.018 |
| | (0.017) | (0.016) | (0.111) | (0.585) | (0.004) | | |
| $S_{2,t}$ | 0.041 | 0.030 | 0.781 | 2.546 | −0.017 | 0.944 | 1.191 |
| | (0.020) | (0.017) | (0.163) | (2.062) | (0.011) | | |
| $S_{3,t}$ | 0.007 | 0.035 | 0.470 | 9.419 | −0.023 | 0.923 | 1.896 |
| | (0.014) | (0.015) | (0.188) | (3.345) | (0.007) | | |
| $S_{4,t}$ | −0.012 | 0.009 | 0.716 | 6.767 | 0.002 | 0.711 | 0.328 |
| | (0.015) | (0.011) | (0.155) | (3.672) | (0.003) | | |
| $S_{5,t}$ | −0.116 | −0.124 | 0.665 | 14.146 | 0.051 | 0.927 | 0.196 |
| | (0.047) | (0.049) | (0.157) | (6.386) | (0.020) | | |
| Gini($\times$10) | −0.017 | −0.013 | 0.774 | 0.862 | 0.005 | 0.938 | 0.089 |
| | (0.005) | (0.006) | (0.131) | (0.461) | (0.002) | | |

Standard errors are in parentheses. Instrument variables: $c$, $t$, $x_{t-1}$, $\pi_{t-1}$, nominal wages and the growth rate of world trade. Data source: $S_{i,t}$ and Gini, CPR series P = 60; other variables: OECD.

Overall, the estimates support the first claim of Hibbs (1977) that macroeconomic outcomes have distributional effects. In such an environment, it seems quite natural to assume that citizens differ in their preferences over output and inflation. Note, however, that the distributional effects of output and inflation are far from substantial. For example, an increase in the growth rate of output by 5 percent would shift only 0.6 percent of income from the three upper quintiles to the two lower quintiles.

Let us now examine Hibbs' second claim that the distributional desires embodied in Equation 4 can be captured by Equation 2. Here we follow Hibbs (1977) in assuming that politics mainly revolves around income distribution. In the next section, we examine a model in which the policymaker cares about both the size income distribution and output growth. A direct way to model distributional motives is to assume that policymakers aim at a particular value of the Gini coefficient, $D^d$, (or $S_{i,t}{}^d$) and attaches costs to deviations of $D$ from $D^d$. Suppose that the policy problem can be formulated as minimizing:

$$\mathcal{L} = (D_t - D_t^d)^2 \quad (5)$$

with respect to $\pi$, subject to the Phillips curve (1) and

$$D_t = \alpha_3 + \alpha_1 \cdot x_t + \alpha_2 \cdot \pi_t \quad \text{where } \alpha_3 = \alpha_0\, \alpha_4 \cdot t + \alpha_5 \cdot D_{t-1} \quad (6)$$

given $\pi^e$. From this model it is easy to derive that in equilibrium ($\pi = \pi^e$), optimal inflation policy depends on $D^d$:

$$\pi = (D^d - \alpha_1 \cdot \beta_1 - \alpha_3)/\alpha_2 \quad (7).$$

Policymakers catering to the distributional desires of lower-income groups (high $D^d$) opt for higher inflation than policymakers promoting the interests of higher-income groups (low $D^d$). Because in the above model the policymaker has one target and one instrument, that person is always able to achieve his target, $D^d$. As a consequence, policy under commitment conflicts with policy under discretion, and thus no inflationary bias exists (compare Persson and Tabellini, 1990, p. 5). This result clearly conflicts with that of the BG model in which an inflationary bias is always present. Hence, the BG model does not properly represent the incentive constraints facing a policymaker who is merely interested in the size income distribution.

## 3. DISTRIBUTION AND ECONOMIC GROWTH: AN EXTENDED DISTRIBUTIONAL MODEL

The result obtained in the previous section heavily relies on the one target–one instrument structure of the economic policy problem. In this section, we extend the model so that the policymaker has an excess of targets over instruments. In the extended model, the policymaker cares about both the income distribution and economic growth.[3] Again we assume that the policymaker's preferences can be represented by a quadratic loss function:[4]

$$\mathcal{L} = (D - D^d)^2 + \lambda(x - \chi)^2 \qquad (8).$$

In Equation 8 the second term on the right-hand side expresses that the policymaker is concerned with the growth rate of output. The parameter $\lambda$ denotes the weight the policymaker attributes to the output target relative to the distribution target.

The economic policy problem is to minimize Equation 8 with respect to $\pi$, subject to Equations 1 and 6. Commitment and discretionary policy are now expected to deviate, because the number of targets exceeds the number of instruments. The usual derivation is applied to determine discretionary and commitment inflation rates, ($\pi^d$ and $\pi^c$, respectively) giving:

$$\pi^c = [D^d - \alpha_1 \cdot \beta_1 - \alpha_3]/\alpha_2 \qquad (9)$$

$$\begin{aligned}\pi^d &= [D^d - \alpha_1 \cdot \beta_1 - \alpha_3]/\alpha_2 + \lambda \cdot \beta_0(\chi - \beta_1)/[\alpha_2 \cdot (\alpha_2 + \alpha_1 \cdot \beta_0)] \\ &= \pi^c + \lambda \cdot \beta_0(\chi - \beta_1)/[\alpha_2 \cdot (\alpha_2 + \alpha_1 \cdot \beta_0)]\end{aligned} \qquad (10).$$

From Equations 9 and 10 it is easy to see that discretionary inflation, $\pi^d$, exceeds commitment inflation, $\pi^c$. As expected, the excess of targets generates a temptation to surprise and consequently an inflationary bias: In general, discretionary and commitment policies will differ, and a welfare loss is involved by a lack of commitment possibilities.

[3] In this model, citizens and policymakers care about both their relative and absolute incomes.

[4] We introduce the term representing the output target in the same way as it has been used in Equation 2. Other specifications might be used to account for positive welfare effects of output without affecting the conclusions qualitatively. The specification of Equation 8 facilitates the comparison with the BG model.

Does the BG model embody the same incentive constraints as the extended distributional model given by Equations 1, 6, and 8? To answer this question, we compare the discretionary policy rules implied by the two models. By comparing Equations 3 and 11, it is easy to see that the BG model will embody the same incentive constraints as the extended distributional model if the following restrictions are imposed on the parameters in Equation 2:

$$c = [D^d - \alpha_1 \cdot \beta_1 - \alpha_2]/\alpha_2 \tag{11}$$

and

$$\lambda_{BG} = \lambda/[\alpha_2 \cdot (\alpha_2 + \alpha_1 \cdot \beta_0)]. \tag{12}$$

The first restriction (Equation 11) induces policy under commitment in the BG model to coincide with policy under commitment in the extended distributional model. The second restriction (Equation 12) makes both models generate the same inflationary bias. Hence, the BG model may properly represent the incentive constraints faced by policymakers who aim at a certain income distribution and try to raise output above its natural growth rate. Still, however, great care should be practiced in using the BG model as a representation of the extended distributional model. Equations 11 and 12 show that the inflationary bias implied by the extended distributional model is independent of policymakers' distributional desires. So if political parties only vary in their distributional desires – and there seems no reason to presume that apart from distributional considerations lower-income groups care more about output growth than higher-income groups – left-wing policy is not inferior to right-wing policy, even though inflation is higher under left-wing policymakers than under right-wing policymakers, while output growth is not affected.

As mentioned before, a well-known policy implication of the BG model is that monetary policy should be delegated to an independent conservative banker. Recently, Siebrand and Swank (1994) have presented evidence supporting the main predictions of the partisan version of the BG model, indicating that this recommendation should be taken seriously. However, this paper shows that if a conservative central banker is meant to be a banker who caters to the distributional desires of high-income groups, this recommendation is false. From a normative point of view, this paper suggests that central bankers should abstain from attempting to raise output above its natural level, because this, rather than distributional considerations, is the force behind excessive inflation. More generally this paper indicates that in current debates on monetary reforms more attention should be paid to the distributional implications of monetary policy.

## 4. CONCLUSIONS

The political interpretation behind the Barro–Gordon model hinges on two assumptions: Inflation and output growth have distributional effects, and policymakers' distributional desires can be represented by a quadratic loss function in terms of output and inflation. In this article we have examined these two assumptions. Our main results are (1) inflation and output growth have significant effects on the size income distribution; (2) if policymakers are only concerned with the income distribution, no inflationary bias will arise; and (3) the Barro-Gordon model may represent a political model in which policymakers care about *both* the size income distribution and output growth. However, the inflationary bias implied by the Barro-Gordon model should not be associated with the political color of the policy maker.

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