Partisan Politics and Central-Bank Independence

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Abstract

This paper examines the effects of the independence of central banks from partisan politics on average inflation rates, variances of inflation rates, average rates of growth and variances of output growth. There are two competing parties with different preferences. If terms of three board members appointed by the parties are overlapping and the probability that the conservative party wins the election is not less than 0.5, the trade-off between the average inflation rate and the variance of growth disappears. If the central bank sets an appropriate inflation target under the partisan politics, the average inflation is lower with no effects on the variance of inflation, the average growth and the variance of growth.

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1.Introduction

Time-inconsistency of monetary policy has been studied by many authors[1]. In order to eliminate an inflation bias and implement a time-consistent policy, Rogoff(1985) has presented the model in which a government delegates the monetary policy to the "conservative" central banker who has a larger weight on stabilization of inflation than that of the government and has pointed that the lower the inflation rate is, the more the output fluctuates. There is a trade-off between credibility and flexibility. Then, the conservative central banker is considered independent. However, under the partisan politics where two parties with different preferences compete, the conservative central banker is not always independent. Waller(1989) has incorporate a politically independent central bank into the monetary policy game under the partisan politics. Alesina and Gatti(1995) and Alesina and Roubini with Cohen(1997) have suggested that if the party which wins an election implements its own policy, then the "political" variability of output caused by uncertainty of the policy would be larger than the "economic" variability of output caused by an economic shock. Svensson(1995)(1997) has called the Rogoff 's central bank the "weight-conservative" central bank and shown that the "inflation-target-conservative" central bank which sets an explicit inflation target can lower the average inflation without destabilizing the output, but has not considered the effects of the independence[2] under the partisan politics. This paper examines the effects of independence central banks under the partisan politics on the average inflation rates, the variances of inflation rates average rates of growth and the variances of output growth.

This paper is organized as follows. Section 2 defines a basic monetary policy game and shows the trade-off. Section 3 defines a monetary policy game under the partisan politics as Alesina and Gatti(1995) and Alesina and Roubini with Cohen(1997). Section 4 extends the model of Waller(1989) in which the board members whose terms are overlapping decide the policy of the central bank to the economy with a shock. Section 5 extends the inflation-target-conservative central bank of Svensson(1995) (1997) to the economy with the two parties. Section 5 concludes the results.

2. Monetary Policy Game

Assume that there are a policymaker and private agents. Output growth is derived from

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[1] See Scaling(1995) and Cukierman(1992).

[2] There are many indexes of central-bank independence. See Scaling(1995).

$$y_t = \pi_t - \pi_t^e + \varepsilon_t, \tag{1}$$

where y_t is the rate of output growth in period t, π_t is the inflation rate in period t, π_t^e is the expected inflation rate in period t and ε_t is an independently and identically distributed shock in period t with mean zero and variance σ_ε^2.

Assume rational expectation of the private agents, therefore,

$$E(\pi_t | I_{t-1}) = \pi_t^e, \tag{2}$$

where I_{t-1} is all the information available at the end of period $t-1$ and $E(\cdot)$ is expectation operator. We write $E(\pi_t | I_{t-1}) = E_{t-1}\pi_t$. The loss function of the policymaker in period t is

$$L_t = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{b}{2}(y_t - k)^2, \tag{3}$$

where π^* is an inflation target, b is a weight on output variability, $b > 0$ and k is a target rate of growth, $k > 0$. Substituting (1) into (3), the loss function of the policymaker in period t becomes

$$L_t = \frac{1}{2}(\pi_t - \pi^*)^2 + \frac{b}{2}(\pi_t - \pi^e + \varepsilon_t - k)^2. \tag{4}$$

Taking first order condition, we obtain

$$\pi_t = \frac{1}{1+b}\pi^* + \frac{b}{1+b}(\pi_t^e - \varepsilon_t + k). \tag{5}$$

By rational expectation, we obtain

$$E_{t-1}\pi_t = \frac{1}{1+b}\pi^* + \frac{b}{1+b}(\pi_t^e + k) = \pi_t^e. \tag{6}$$

Solving (6) with respect to π_t^e, we obtain

$$\pi_t^e = \pi^* + bk. \tag{7}$$

Substituting (7) into (5), the discretionary policy is given by

$$\pi_t^D = \pi^* + bk - \frac{b}{1-b}\varepsilon_t, \tag{8}$$

where superscript D means discretion. The second term of (8) is inflation bias and the third term of (8) is stabilization effect against the shock. The output growth under the discretionary policy is given by

$$y_t^D = \frac{1}{1+b}\varepsilon_t. \tag{9}$$

Under the discretionary policy, the average inflation, the variance of inflation, the average growth and the variance of growth are given by

$$E(\pi^D) = \pi^* + bk, \tag{10}$$

$$V(\pi_t^D) = \left(\frac{b}{1+b}\right)^2 \sigma_\varepsilon^2, \tag{11}$$

$$E(y_t^D) = 0, \tag{12}$$

$$V(y_t^D) = \left(\frac{1}{1+b}\right)^2 \varepsilon_t, \tag{13}$$

respectively. Then,

$$\frac{\partial E(\pi_t^D)}{\partial b} = k > 0, \tag{14}$$

$$\frac{\partial V(\pi_t^D)}{\partial b} = \frac{2b}{(1+b)^3} > 0, \tag{15}$$

$$\frac{\partial E(y_t^D)}{\partial b} = 0, \tag{16}$$

$$\frac{\partial V(y_t^D)}{\partial b} = -\frac{2}{(1+b)^3} < 0. \tag{17}$$

From (14), the smaller the coefficient b, the smaller the average inflation and the variance of inflation. From (15), the smaller the b, the smaller the variance of inflation. From (16), the coefficient b has no effect on the average growth. From (17), the smaller the b, the larger the variance of growth. In Rogoff(1985), the smaller b means that the policymaker is conservative and independent[3]. Thus, there is a trade-off between the variance of inflation and the variance of growth. And there is another trade-off between the variance of inflation and the variance of growth.

3. Partisan Politics

Assume that there are two competing parties, L and R, which have different preferences and that the central bank implements the policy of the party in office. The timing of events is as follows. First, the private agents set π_t^e. Second, an election is held. P is the probability that the party L wins and $1-P$ is the probability that the party R wins. P is exogenously given and $0 \le P \le 1$. After the election, ε_t occurs. Finally, the party in office chooses the policy.

The loss function of the party $i(=L,R)$ in period t is

$$L_t^i = \frac{1}{2}(\pi_t - \pi^{*i})^2 + \frac{b^i}{2}(\pi_t - \pi_t^e + \varepsilon_t - k)^2, \tag{18}$$

where $0 < b^R < b^L$. The weight of party L is larger than the weight of party R. Then the parties are partisan and party R is more conservative than party L. Following Alesina and Gatti(1995) and Alesina and Roubini with Cohen(1997), we assume that the inflation target of each party is zero, $\pi^{*L} = \pi^{*R} = 0$.

The expected inflation rate of the private agents in period t is given by

[3] In Rogoff(1985), the policymaker is the conservative central banker.

$$\pi_t^e = PE_{t-1}\pi_t^{PR} + (1-P)E_{t-1}\pi_t^{PL}, \tag{19}$$

where π_t^{Pi} is the discretionary policy of party $i(=L,R)$ in period t and the superscript P means partisan.

Taking first order conditions, we obtain

$$\pi_t^{Pi} = \frac{b^i}{1+b^i}(\pi_t^e - \varepsilon_t + k), \qquad i=L,R. \tag{20}$$

By rational expectation, we obtain

$$E_{t-1}\pi_t^{Pi} = \frac{b^i}{1+b^i}(\pi_t^e + k) = \pi_t^e, \quad i=L,R \tag{21}$$

Substituting (21) into (19) and solving with respect to π_t^e, we obtain

$$\pi_t^e = \frac{b^R(1+b^L)+P(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k. \tag{22}$$

Substituting (22) into (20), the discretionary policies of the parties in period t are given by

$$\pi_t^{PL} = \frac{b^L(1+b^R)}{(1+b^L)-P(b^L-b^R)}k - \frac{b^L}{1+b^L}\varepsilon_t, \tag{23}$$

$$\pi_t^{PR} = \frac{b^R(1+b^L)}{(1+b^L)-P(b^L-b^R)}k - \frac{b^R}{1+b^R}\varepsilon_t. \tag{24}$$

The output growth in period t are given by

$$y_t^{PL} = \frac{(1-P)(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k + \frac{1}{1+b^L}\varepsilon_t, \tag{25}$$

$$y_t^{PR} = -\frac{P(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k + \frac{1}{1+b^R}\varepsilon_t. \tag{26}$$

Thus, under the partisan politics without an independent central bank, the average inflation is

$$E(\pi_t^P) = \frac{b^R(1+b^L)+P(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k, \tag{27}$$

the variance of inflation is

$$V(\pi_t^P)$$
$$= \frac{Pk^2\{(b^L)^2(1+b^R)^2-(b^R)^2(1+b^L)^2-2b^R(b^L-b^R)(1+b^L)-P(b^L-b^R)^2\}}{\{(1+b^L)-P(b^L-b^R)\}^2}$$
$$+\left\{P\left(\frac{b^L}{1+b^L}\right)^2+(1-P)\left(\frac{b^R}{1+b^R}\right)^2\right\}\sigma_\varepsilon^2, \tag{28}$$

the average growth is

$$E(y_t^P) = 0, \tag{29}$$

and the variance of growth is

$$V(y_t^P)=\frac{P(1-P)(b^L-b^R)^2k^2}{\{(1+b^L)-P(b^L-b^R)\}^2}+\left\{\frac{P}{(1+b^L)^2}+\frac{1-P}{(1+b^R)^2}\right\}\sigma_\varepsilon^2. \qquad (30)$$

The first term of (28) is the "political" variance of inflation caused by the electoral uncertainty and the second term of (28) is the "economic" variance of inflation caused by the response to the shock. Also, the first term of (30) is the "political" variance of growth caused by the electoral uncertainty, and the second term of (30) is the "economic" variance of growth caused by the response to the shock[4].

4.Board members with overlapping terms

Waller(1989) has presented the model with the board members whose terms are overlapping decide the policy of an central bank in an economy without an shock. This section extends his model to the economy with the shock.

Assume that the board of the central bank has three members. The terms of each member are three periods. At the end of period $t-1$, there is a vacancy of the board. The election is held at every period and the party which wins in period t decides a new member. The member appointed by the party chooses the policy of the party. The party in office cannot change other two members. In this sense, the central bank is independent. The board decides the policy by majority voting of the board members.

The timing of events is as follows. First, the private agents set π_t^e. Second, the election is held and a new member is appointed. Third, ε_t occurs. Finally, the board decides the policy by majority voting.

The combinations of incumbents of the board are *(L,L)*, *(L,R)*, and *(R,R)*. *P(,)* is the probability that the combination *(,)* occurs. *P(,)* is given by binominal theorem.

$$P(L,L)={}_2C_2P^2(1-P)^0=P^2 \qquad (31)$$

$$P(L,R)={}_2C_1P(1-P)=2P(1-P) \qquad (32)$$

$$P(R,R)={}_2C_0P^0(1-P)^2=(1-P)^2 \qquad (33)$$

Then, the average inflation, the variance of inflation, the average growth and the variance of growth are given by

$$E(\pi_t^O)=\frac{P^2(3-2P)(b^L-b^R)+b^R(1+b^L)}{(1+b^L)-P(b^L-b^R)}k, \qquad (34)$$

$$V(\pi_t^O)=P^2\left(\frac{b^L}{1+b^L}\right)^2\sigma_\varepsilon^2+2P(1-P)V(\pi_t^P)+(1-P)^2\left(\frac{b^R}{1+b^R}\right)^2\sigma_\alpha^2, \qquad (35)$$

$$E(y_t^O)=0, \qquad (36)$$

[4] For "political" variance and "economic" variance, see Alesina and Gatti(1995) and Alesina and Roubini with Cohen(1997, Chapter 8).

$$V(y_t^O)=P^2\left(\frac{1}{1+b^L}\right)^2\sigma_\varepsilon^2+2P(1-P)V(y_t^P)+(1-P)^2\left(\frac{1}{1+b^R}\right)^2\sigma_\varepsilon^2, \qquad (37)$$

,where the superscript O means overlapping.

Proposition 1: If $0\le P\le 0.5$, then $E(\pi_t^O)\le E(\pi_t^P)$, and $V(y_t^O)\le V(y_t^P)$.

Proof of Proposition 1: From (27) and (34), if

$$\frac{P(1-P)(2P-1)(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k\le 0, \qquad (38)$$

then $E(\pi_t^O)\le E(\pi_t^P)$. The inequality (38) holds if $0\le P\le 0.5$. From (30) and (37), if

$$\frac{(2P^2-2P+1)(b^L-b^R)^2k^2}{\{(1+b^L)-P(b^L-b^R)\}^2}\ge P(1-P)(2P-1)\left\{\frac{1}{(1+b^R)^2}-\frac{1}{(1+b^L)^2}\right\}\sigma_\varepsilon^2, \qquad (39)$$

then $V(y_t^O)\le V(y_t^P)$. The inequality (39) holds if $0\le P\le 0.5$.

Corollary 1: If $0<P<0.5$, then $E(\pi_t^O)<E(\pi_t^P)$, and $V(y_t^O)<V(y_t^P)$.

Proposition 2 : If $0\le P\le 0.5$ and
$Pk^2\{(b^L)^2(1+b^R)^2-(b^R)^2(1+b^L)^2-2b^R(b^L-b^R)(1+b^L)-P(b^L-b^R)^2\}\ge 0$,
then $V(\pi_t^O)\le V(\pi_t^P)$.

Proof of Proposition 2 : From (28) and (35),

$$(2P^2-2P+1)\times\frac{Pk^2\{(b^L)^2(1+b^R)^2-(b^R)^2(1+b^L)^2-2b^R(b^L-b^R)(1+b^L)-P(b^L-b^R)^2\}}{\{(1+b^L)-P(b^L-b^R)\}^2}$$
$$\ge P(1-P)(2P-1)\left\{\frac{b^R}{(1+b^R)^2}-\frac{b^L}{(1+b^L)^2}\right\}\sigma_\varepsilon^2, \qquad (40)$$

then $V(\pi_t^O)\le V(\pi_t^P)$. The inequality (40) holds if $0\le P\le 0.5$ and
$Pk^2\{(b^L)^2(1+b^R)^2-(b^R)^2(1+b^L)^2-2b^R(b^L-b^R)(1+b^L)-P(b^L-b^R)^2\}\ge 0$. Q.E.D.

Corollary 2 : If $0\le P\le 0.5$ and
$Pk^2\{(b^L)^2(1+b^R)^2-(b^R)^2(1+b^L)^2-2b^R(b^L-b^R)(1+b^L)-P(b^L-b^R)^2\}\ge 0$,
then $E(\pi_t^O)\le E(\pi_t^P)$, $V(\pi_t^O)\le V(\pi_t^P)$, $E(y_t^O)=E(y_t^P)$ and $V(y_t^O)\le V(y_t^P)$.

If the probability that the party L wins is $0\le P\le 0.5$, the trade-off between the average inflation and the variance of growth disappears. If the probability that the conservative party win is more than 0.5 and less than 1, both the average inflation and the variance of growth are smaller with this central bank than without an independent central bank. If the conditions of Proposition 2 are satisfied, the trade-off between the variance of inflation and the variance of growth disappears. The second condition of Proposition 2 means the political variance of inflation is not negative. The average growth is not affected.

5.Inflation Targeting

Svensson(1995)(1997) has shown that the inflation-target-conservative central bank which has an explicit inflation target can achieve price stability without destabilizing output. This section extend his model to the economy with the two parties.

Assume that the party in office delegates the policy to the central bank which has the same weight on output variability as the party in office but has the different inflation target. Thus, the central bank is independent in the sense that it can set the different inflation target.

The timing of events is as follows. First, the private agents set π_t^e. Second, the election is held. Third, ε_t occurs. Finally, the central bank chooses the policy.

The loss function of the central bank when party $i(=L,R)$ is in office in period t is

$$L_t^B = \frac{1}{2}(\pi_t^{Bi} - \pi^{*B})^2 + \frac{b^i}{2}(\pi_t^{Bi} - \pi_t^e + \varepsilon_t - k)^2, \quad i=L,R, \tag{41}$$

where π_t^{Bi} is the discretionary policy of the central bank when party $i(=L,R)$ is in office in period t and π^{*B} is the inflation target of the central bank. Taking first order conditions, we obtain,

$$\pi_t^{Bi} = \frac{1}{1+b^i}\pi^{*B} + \frac{b^i}{1+b^i}(\pi_t^e - \varepsilon_t + k), \qquad i=L,R. \tag{42}$$

By rational expectation, we obtain

$$E_{t-1}\pi_t^{Bi} = \frac{1}{1+b^i}\pi^{*B} + \frac{b^i}{1+b^i}(\pi_t^e + k). \qquad i=L,R. \tag{43}$$

The expected inflation is given by

$$\pi_t^e = PE_{t-1}\pi_t^{BL} + (1-P)E_{t-1}\pi_t^{BR}. \tag{44}$$

Substituting (43) into (44), we obtain

$$\pi_t^e = \pi^{*B} + \frac{b^R(1+b^L) + P(b^L - b^R)}{(1+b^L) - P(b^L - b^R)}k. \tag{45}$$

By substituting (45) into (42), the discretionary policies in period t are

$$\pi_t^{BL} = \pi^{*B} + \frac{b^L(1+b^R)}{(1+b^L)-P(b^L-b^R)}k - \frac{b^L}{1+b^L}\varepsilon_t \tag{46}$$

$$\pi_t^{BR} = \pi^{*B} + \frac{b^R(1+b^L)}{(1+b^L)-P(b^L-b^R)}k - \frac{b^R}{1+b^R}\varepsilon_t . \tag{47}$$

Therefore, the discretionary policy when the party $i(=L,R)$ is in office in period t is given by

$$\pi_t^{Bi} = \pi^{*B} + \pi_t^{Pi} . \tag{48}$$

The output growth in period t are

$$y_t^{BL} = \frac{(1-P)(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k + \frac{1}{1+b^L}\varepsilon_t , \tag{49}$$

$$y_t^{BR} = -\frac{P(b^L-b^R)}{(1+b^L)-P(b^L-b^R)}k + \frac{1}{1+b^R}\varepsilon_t . \tag{50}$$

Therefore, the output growth when the party $i(=L,R)$ is in office in period t is given by

$$y_t^{Bi} = y_t^{Pi} . \tag{51}$$

The average inflation, the variance of inflation, the average growth, and the variance of growth are given by

$$E(\pi_t^B) = \pi^{*B} + E(\pi_t^P) , \tag{52}$$

$$V(\pi_t^B) = V(\pi_t^P) , \tag{53}$$

$$E(y_t^B) = 0 , \tag{54}$$

$$V(y_t^B) = V(y_t^P) , \tag{55}$$

respectively. From (52), the central bank can lower the average inflation by inflation targeting.

Proposition 3 : If $0 \geq \pi^{*B} \geq -E(\pi_t^P)$, then $0 \leq E(\pi_t^B) \leq E(\pi_t^P)$.

Proposition 4 : For any π^{*B}, $V(\pi_t^B) = V(\pi_t^P)$, $E(y_t^B) = E(y_t^P)$ and $V(y_t^B) = V(y_t^P)$.

Corollary 3 : If $0 \geq \pi^{*B} \geq -E(\pi_t^P)$, then $0 \leq E(\pi_t^B) \leq E(\pi_t^P)$, $V(\pi_t^B) = V(\pi_t^P)$, $E(y_t^B) = E(y_t^P)$ and $V(y_t^B) = V(y_t^P)$.

Corollary 4 : If $0 > \pi^{*B} \geq -E(\pi_t^P)$, then $0 \leq E(\pi_t^B) < E(\pi_t^P)$, $V(\pi_t^B) = V(\pi_t^P)$, $E(y_t^B) = E(y_t^P)$ and $V(y_t^B) = V(y_t^P)$.

Corollary 5 : If $\pi^{*B} = -E(\pi_t^P)$, then $E(\pi_t^B) = 0$.

Corollary 6 : If $\pi^{*B} < -E(\pi_t^P)$, then $E(\pi_t^B) < 0$.

The central bank which sets a different inflation target from that of the party in office can lower the average inflation. The variance of inflation and the variance of growth are not affected by the inflation targeting. If the central bank sets the inflation target which is not more than zero, the trade-off between the average inflation and the variance of growth disappears under the partisan politics. If the inflation target is less than zero, the average inflation is lower without destabilizing the inflation and the output growth. If the inflation target is equal to the negative value of the expected inflation without an independent central bank, the average inflation is zero. If the inflation target is less than the negative value of the expected inflation without an independent central bank, average inflation is below zero. It causes deflation.

6.Conclusion

This paper examined the effects of the independence of central banks from the partisan politics on the average inflation, the variances of inflation, the average growth and the variances of growth. The results are as follows.

First, the independent central bank with three board members whose terms are overlapping is considered. If the probability that the conservative party wins is not less than 0.5, the trade-off between the average inflation rate and the variance of growth disappears. If the probability that the conservative party wins is more than 0.5 and less than 1, both the average inflation and the variance of growth are smaller with this central bank than without an independent central bank. If the conservative party wins is not less than 0.5 and the political variance of inflation is not negative, the trade-off between the variance of inflation and the variance of growth disappears. The average growth is not affected.

Second, the central bank which has the same weight on output variability as the party in office sets a different inflation target is considered. The central bank can lower the average inflation by inflation targeting. The variances of inflation, the average growth and the variances of growth are not affected by inflation targeting. If the inflation target of the central bank is not more than zero, the trade-off between the average inflation and the variance of output growth disappears. If the inflation target is less than zero, the average inflation is lower with no effects on the variance of inflation and the average growth and the variance of growth. Inflation targeting can make the average inflation zero. If the inflation target is too low, the average inflation becomes below zero. It causes deflation.

We compare the two independent central banks. The first independent central bank can influence the average inflation, the variance of inflation and the variance of growth, but the effects depend on the exogeneous parameter such as the probability that each party wins the election and the weights on output variability of the parties. The second independent central bank influences only the average inflation, but lower the average inflation by inflation targeting. The effect depends on the endogeneous variable. Which independent central bank is better depends on the effects that we want to influence.

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