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A MODEL OF APPOINTING GOVERNORS

TO THE CENTRAL BANK

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ABSTRACT

In this paper, a formal model has been developed to analyze the appointment of individuals to serve as central bank governors in a two-party political system when confirmation hearings exist and monetary policy is determined according to a majority-rule voting system. The major results of the paper are that appointed governors will tend to be more moderate (i) if the nominating party and the confirming party do not coincide, (ii) the lower the chance the nominating party and the confirming party coincide in the future, (iii) if the term governors must serve out overlaps an election, (iv) as the next election approaches, and (v) the lower the probability the nominating party wins the next election. Some of these theoretical results are consistent with existing empirical evidence related to the Board of Governors of the Federal Reserve System.

RESUMEN

En este trabajo se desarrolla un modelo para analizar el nombramiento de individuos como miembros del consejo del banco central en un sistema político bipartidista cuando dichos miembros deben ser confirmados por el Parlamento y la política monetaria se determina mediante la regla de la mayoría en el consejo del banco central. El principal resultado obtenido es que los gobernadores nombrados tenderán a ser más moderados (i) si el partido nominador y el confirmador son diferentes, (ii) cuanto menor sea la probabilidad de que ambos partidos coincidan en el futuro, (iii) si el mandato que debe servir un gobernador se solapa con una elección, (iv) a medida que la próxima elección se acerca, y (v) cuanto menor sea la probabilidad de que el partido hoy en el gobierno gane la próxima elección. Varios de estos resultados teóricos son consistentes con la evidencia empírica existente para el Consejo de Gobernadores del Sistema de la Reserva Federal.

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1. Introduction

Recent research indicates that partisan pressures have considerable influence on monetary policy. The main channels through which partisan influences can be transmitted to the central bank are direct signalling of desired monetary policies (Havrilesky, 1988, 1991), coercion and bashing (Waller, 1991) and central bank appointments (Havrilesky and Schweitzer, 1990; Gildea, 1990; Havrilesky and Gildea, 1992). From an empirical point of view, Chappell, Havrilesky, and McGregor (1993) conclude that in the U.S. case partisanship in the appointment process is the primary mechanism by which partisan differences in desired monetary policies arise.

Since in practice the appointment process is structured in a way such that central bank governors will always be appointed through a political process, it is important to know how particular institutional structures affect the composition of the central bank board and, in turn, monetary policy.

Previous work by García de Paso (1993) shows that in a model where confirmation hearings do not exist, monetary policy uncertainty is affected by several institutional features. In particular, the lengthening of governors' terms in office reduces monetary policy uncertainty and the membership of administration officials on the central bank board increases monetary policy uncertainty.

However, if confirmation hearings do exist (as it is in the U.S.) and the out-of-power party currently has or may have in the future a majority in the legislative body which must confirm nominated governors, this party will have some influence over the appointment of central bankers. Therefore, it seems that a formal model of the appointment process in the presence of confirmation hearings is required as a further step towards a positive theory of monetary institutions.

Waller (1992) has developed such a model under the assumption that the utility a party obtains from an additional central banker on the board is independent of the previous composition of the board and that the total utility a party obtains from all the board members is the sum of the individual utilities.

However, monetary policy is typically determined according to a majority-rule voting system and Waller's model does not account for this fact. Thus, the purpose of this paper is to construct a model which explicitly accounts for the majority-rule voting system at central banks in order to study the effects of several institutional features when confirmation hearings are present.

The paper is structured as follows. Section 2 outlines the basic institutional structure. Section 3 develops the appointment game for a case where governors' nominating and confirming parties never coincide. Section 4 extends the game for a case where nominating and confirming parties may or may not coincide, as it is in practice. Subsection 4.1. centers upon a case where the appointed governor must serve out a term which does not overlap an election. Subsection 4.2. analyzes the case where the term overlaps an election. Section 5 discusses the results obtained in the light of previous empirical evidence on the subject. Finally, section 6 concludes.

The key results obtained are the following:

-if the confirming party is always different from the nominating party, the appointed governor will be of a type such that the expected utility both parties obtain from his appointment is zero.

-if there exists a chance that the nominating and the confirming party coincide and the term to be served out does not overlap an election, the appointed governor will be more partisan (i) the more patient parties are, (ii) the shorter the term which must be served out, and (iii) the higher the chance the nominating party and the confirming party coincide.

-appointed governors will tend to be less partisan (i) if the term they must serve out overlaps an election, (ii) as the next election approaches, and (iii) the lower the probability the nominating party wins the next election.

2. The basic institutional structure

Our economy is characterized by a two-party system, consisting of party 1 and party 0. Moreover, there exists a government that carries out certain administrative and legislative duties. The branch of government that performs administrative duties will be referred to as the executive body. The branch of government that carries out legislative duties will be referred to as the legislative body.

The two parties compete electorally for the executive body. An election is held every n periods of time. For instance, if at the beginning of period t an election takes place, the next election will take place at the beginning of period $t+n$.

Monetary policy is conducted by a group of central bankers who compose the central bank board. There are r seats on the central bank board and each seat carries with it a term of r periods of time. These r terms are staggered so that they overlap each other by one period. Then, in our model a term expires at the start of every period.

The victor of the last election is allowed to nominate candidates to serve as central bankers but these candidates must be confirmed by the legislative body. Therefore, there exists a confirmation process through which prospective central bankers must go, whereby the majority party at the legislative body can veto a nominee if it desires to do so.

As a consequence, at the start of every period the governmental party nominates a candidate to fill the seat that becomes vacant. If the candidate is vetoed, the party in power nominates a new candidate at the start of the next period. If this new nominee is rejected such a nomination-veto process keeps repeating itself every period until a nominee is accepted by the legislative body.

The legislative body can be controlled by either of the two parties. Since the party that controls the legislative body must confirm the nominees, this party will be referred to as the confirming party. As a consequence, the nominating party and the confirming party may or may not coincide.

If a central banker is appointed and confirmed in the first period of a term, he will serve r periods. However, a seat can become vacant before its term expires because of a resignation or death. In such a case, a successor central

banker serves out the remainder of the term to preserve the overlapping structure of the board. The successor must go through a new confirmation process and if confirmed he will serve $1 \leq s < r$ periods.

The central bank board conducts monetary policy through controlling a monetary instrument denoted by y . Party 1 and party 0 differ in their most preferred value of such a monetary instrument. Party 1's most preferred value is $y^1 = 1$, whereas party 0's most preferred value is $y^0 = 0$. Each prospective central banker has also a monetary instrument bliss point. We will assume that the range of central bank candidates' bliss points is the closed unit interval: $y \in [0,1]$. A candidate will be referred to as being of type y if his monetary instrument bliss point is y .

Within the central bank board monetary policy will be determined according to a majority-rule voting system. As a result, the monetary policy actually implemented will be the value of the monetary instrument preferred by the median governor on the board, denoted by \bar{y} and there will be no incentive for a governor to misrepresent his true bliss point. Every period t , each party obtains utility from the monetary policy actually implemented in that period (\bar{y}_t). Therefore, a party obtains utility from the board of governors as a whole in the following manner:

$$(1a) \quad u(\bar{y}_t)_0 = (1 - \bar{y}_t)$$

$$(1b) \quad u(\bar{y}_t)_1 = \bar{y}_t$$

where the subscripts 0 and 1 denote parties 0 and 1, respectively.

Equations (1a) and (1b) show that each party's most preferred monetary policy is the least preferred monetary policy by the other party.

Since the board consists of r central bankers and parties obtain utility from the median governor on the board, the utility that a party obtains from an individual central banker depends on the other central bankers' types.

Let y_t denote the type of a candidate nominated at the start of period t . Moreover, let $\bar{y}_{t+i}^{c(t)}$ denote the median central banker on the board in period $t+i$ if y_t was appointed at the start of period t and $\bar{y}_{t+i}^{s(t)}$ denote the median central banker on the board in period $t+i$ if y_t was not appointed at the start of period t . Thus, $\bar{y}_{t+i}^{c(t)}$ and $\bar{y}_{t+i}^{s(t)}$ differ because of the presence of a type y_t central banker on the board at time $t+i$ to conform the median member $\bar{y}_{t+i}^{c(t)}$.

Let $u(y_t)_{z,t+i}$ denote the utility a party z ($z=0,1$) obtains in period $t+i$ from a candidate of type y_t . Such a utility is given by the difference between the utility the party obtains from the board in period $t+i$ if the candidate was appointed and the utility the party obtains from the board in period $t+i$ if the candidate was not appointed:

$$(2a) \quad u(y_t)_{0,t+i} = u(\bar{y}_{t+i}^{c(t)})_0 - u(\bar{y}_{t+i}^{s(t)})_0$$

$$(2b) \quad u(y_t)_{1,t+i} = u(\bar{y}_{t+i}^c)_1 - u(\bar{y}_{t+i}^s)_1$$

Substituting equation (1a) into (2a) and (1b) into (2b) we obtain:

$$(3a) \quad u(y_t)_{0,t+i} = (1 - \bar{y}_{t+i}^c) - (1 - \bar{y}_{t+i}^s) = \bar{y}_{t+i}^s - \bar{y}_{t+i}^c$$

$$(3b) \quad u(y_t)_{1,t+i} = \bar{y}_{t+i}^c - \bar{y}_{t+i}^s$$

Equations (3a) and (3b) reveal that $u(y_t)_{0,t+i} = -u(y_t)_{1,t+i}$, that is, if a party obtains a utility gain from a candidate, the other party obtains a utility loss of the same order of magnitude so that the nomination-confirmation process can be considered as a zero-sum game. This result follows from the fact that parties obtain utility from a majority-rule based monetary policy.

In particular, this fact implies that the value of an additional central banker for a party will depend on the relative strengths of voting blocs existing on the board for the entire term a central banker is appointed for. Moreover, pivotal appointments to the board will not have the same value for a party as any other appointment because a pivotal appointment will change the median member of the board and, in turn, the monetary policy actually implemented.

Let \emptyset_t denote a vacancy that it is not filled in period t . In this case, $y_t = \emptyset_t$. Then, it happens that $\bar{y}_{t+i}^c = \bar{y}_{t+i}^s$ because the seat was not filled. As a consequence, the utility that parties obtain in period $t+i$ if the vacant was not filled in period t are the following:

$$(4a) \quad u(\emptyset_t)_{0,t+i} = u(\bar{y}_{t+i}^c)_0 - u(\bar{y}_{t+i}^s)_0 = \bar{y}_{t+i}^s - \bar{y}_{t+i}^s = 0$$

$$(4b) \quad u(\emptyset_t)_{1,t+i} = u(\bar{y}_{t+i}^c)_1 - u(\bar{y}_{t+i}^s)_1 = \bar{y}_{t+i}^s - \bar{y}_{t+i}^s = 0$$

Equations (4a) and (4b) show that if a vacant is not filled in period t , both parties experiment neither a utility gain nor a utility loss. The reason being that if the vacant seat is not filled, the median central banker on the board and, in turn, the monetary policy actually implemented does not change. Since monetary policy remains the same, parties do not experiment a utility change.

In the case the nominating party obtains the same utility from nominating a candidate than from not filling the vacancy, we will assume that the candidate is nominated. Similarly, if the confirming party obtains the same utility from accepting a candidate than from rejecting it, we will assume that the candidate will be accepted.

3. The appointment game when nominating and confirming parties never coincide

In this case a party controls the executive body and the other party controls the legislative body. Since the confirming party at any time t can veto a nominee, this confirming party has a strong bargaining power over current appointments. Although a central bank can be contemplated as an ongoing organization (Cothren, 1988), the fact that a seat carries with it a finite term (r periods of time, where $r < \infty$) turns the appointment process into a bargaining game over payoffs (utilities) that the parties receive over a finite time interval.

Therefore, we have a finite horizon alternating offer bargaining model, where there is a positive probability that the roles of nominating and confirming parties will be reversed during the game. Since the horizon is finite the solution to our game will be obtained by backwards induction.

Let k denote the nominating party (the governmental party) and j denote the confirming party, with $j=0,1$ and $k=1-j$. This assumption (only for section 3) implies that the opposition party always controls the legislative body which must confirm the candidates. Every period t a term expires and this vacancy must be filled. The new seat on the board to be filled carries with it a term of $r = s$ periods of time, where s denotes the number of periods remaining in a term if a vacancy arises within it.

Moreover, every period t more vacancies can arise if one or more governors quit the board before their terms expire. In such cases, these seats have s periods remaining in the current term, with $1 \leq s < r$.

For each vacancy to be filled at the start of period t , party k nominates a candidate of type y_t that it finds suitable to fill a seat on the board. After that, party j decides to confirm or veto the nominee.

If party k candidate is accepted, he serves out s periods. If party k candidate is vetoed, the vacancy is not filled during period t and a new candidate will be nominated in period $t+1$ by the then nominating party.

At the start of period t , party k faces the following problem: either nominate a candidate at time t (and obtain from him an expected utility in the s following periods) or not nominate a candidate (and wait for a more suitable nomination next period).

The decision that party j faces at the start of period t if a nomination is made by party k is the following: either accept the nominee (and obtain from him an expected utility in the s following periods) or reject him (and wait for a more suitable candidate next period).

Let Y_t denote the acceptable candidate in period t by both parties. Acceptable period t candidates ($y_t = Y_t$) must satisfy the following condition:

$$(5) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{z,t+i} \right\} \geq u(\emptyset_t)_{z,t} + E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{z,t+i} \right\}, \quad z = 0, 1$$

where E_t is the expectation given time t information, δ is the common discount factor for both parties, Y_{t+1} is an acceptable candidate for both parties in period $t+1$, and $1 \leq s \leq r$.

The candidates that jointly satisfy equation (5) for $z=0$ and $z=1$ are the types of candidates that will be both nominated and confirmed. From equations (4a) and (4b), we have

$$(6) \quad u(\emptyset_t)_{z,t} = 0, \quad z = 0,1$$

Substituting equation (6) into equation (5), we obtain

$$(7) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{z,t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{z,t+i} \right\}, \quad z = 0,1$$

We can rewrite (7) as (8a) and (8b):

$$(8a) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{0,t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{0,t+i} \right\}$$

$$(8b) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{1,t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{1,t+i} \right\}$$

From equations (3a) and (3b) we know that $u(y_t)_{0,t+1} = -u(y_t)_{1,t+1}$. Using this equation in (8a), we can write

$$(9a) \quad -E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{1,t+i} \right\} \geq -E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{1,t+i} \right\}$$

$$(9b) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{1,t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{1,t+i} \right\}$$

Equations (9a) and (9b) jointly hold if and only if

$$(10a) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{1,t+i} \right\} = E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{1,t+i} \right\}$$

$$(10b) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{0,t+i} \right\} = E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{0,t+i} \right\}$$

We can jointly write (10a) and (10b) as equation (11):

$$(11) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{z,t+i} \right\} = E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+1})_{z,t+i} \right\}, \quad z = 0,1$$

Since equation (11) applies for $1 \leq s \leq r$, we can solve for the equilibrium appointments by working backwards.

For $s = 1$, equation (11) reads

$$(12) \quad E_t \left\{ \sum_{i=0}^{1-1} \delta^i u(Y_t)_{z,t+i} \right\} = 0, \quad z = 0,1$$

Rearranging (12) we obtain

$$(13a) \quad E_t \left\{ u(Y_t)_{z,t} \right\} = 0, \quad z = 0,1$$

When $s = 1$, we are considering a vacancy that arises in a seat whose term expires at the end of period t . If party k nominates and party j confirms a candidate of type Y_t , they obtain in period t an expected utility given by $E_t\{u(Y_t)_{z,t}\}$. Moreover, since at the beginning of period t it is known who the median governor on the board was before the vacancy is filled and who the median governor will be if a candidate of type Y_t is appointed to the board, we can write

$$(13b) \quad E_t \left\{ u(Y_t)_{z,t} \right\} = u(Y_t)_{z,t} = 0, \quad z = 0,1$$

However, if party k does not nominate a candidate to fill the vacancy or party j vetoes the nominee, the seat remains vacant in period t and a new term begins for the vacant seat at the start of period $t+1$. As a consequence, the expected payoff a party obtains if it waits for a more suitable candidate next period is zero because there is no next period within the current term. This fact is reflected in the right-hand-side of equation (13a).

The idea is that if a seat becomes vacant in the last period of its respective term, parties may extract utility by filling the vacancy with a candidate that serves out this last period. Once the vacancy has emerged there will be a median governor on the board (the incumbent median governor). Suppose party k nominates a candidate. If this candidate is appointed, the new median governor on the board will be different from the incumbent median governor. Obviously, party k will not nominate a candidate such that -if appointed- the new median governor will be further from its monetary instrument bliss point than the incumbent median governor actually is. However, the same strategy will be followed by party j in deciding whether or not to accept the nominee.

As a result, the only acceptable candidate for both parties will be of a type Y_t such that both parties obtain zero utility from that candidate. Therefore, the appointment of this candidate will not change the median governor on the board. This result can be seen by substituting equations (3a) and (3b) into equation (13b):

$$(14a) \quad u(Y_t)_{0,t} = \bar{Y}_t^{s(t)} - \bar{Y}_t^{c(t)} = 0$$

$$(14b) \quad u(Y_t)_{1,t} = \bar{Y}_t^{c(t)} - \bar{Y}_t^{s(t)} = 0$$

For equations (14a) and (14b) to hold, it is necessary that $\bar{Y}_t^{c(t)} = \bar{Y}_t^{s(t)}$.

Suppose now that a vacancy arises in the seat considered above (the one whose term expires at the end of period t) at the beginning of period $t-1$. Then, this seat has $s = 2$ periods remaining in the current term.

Lagging equation (11) and using it for $s = 2$, we have

$$(15) \quad E_{t-1} \left\{ \sum_{i=0}^2 \delta^i u(Y_{t-1})_{z,t-1+i} \right\} = E_{t-1} \left\{ \sum_{i=1}^2 \delta^i u(Y_t)_{z,t-1+i} \right\}, \quad z = 0,1$$

Manipulating this expression, one obtains

$$(16) \quad E_{t-1} \left\{ u(Y_{t-1})_{z,t-1} + \delta u(Y_{t-1})_{z,t} \right\} = \delta \cdot E_{t-1} \left\{ u(Y_t)_{z,t} \right\}, \quad z = 0,1$$

Since we have already obtained that $E_t \{ u(Y_t)_{z,t} \} = u(Y_t)_{z,t} = 0$, it is clear that at the start of period $t-1$ both parties expect that no utility gain will be obtained if they wait for an acceptable candidate until the beginning of period t . As a consequence, we can write

$$(17) \quad E_{t-1} \left\{ u(Y_t)_{z,t} \right\} = 0, \quad z = 0,1$$

Substituting equation (17) into the right-hand-side of equation (16), one obtains

$$(18) \quad E_{t-1} \left\{ u(Y_{t-1})_{z,t-1} + \delta u(Y_{t-1})_{z,t} \right\} = 0, \quad z = 0,1$$

Equation (18) reveals that the only acceptable candidate to fill a vacancy with $s = 2$ remaining periods must be of a type such that the expected discounted utility that both parties extract from his appointment during the $s = 2$ remaining periods is zero.

Imagine that at the beginning of period $t-2$ a vacancy arises in the seat whose term expires at the end of period t . Therefore, the current term has $s = 3$ remaining periods.

Using equation (11) for $s = 3$, we have

$$(19) \quad E_{t-2} \left\{ \sum_{i=0}^2 \delta^i u(Y_{t-2})_{z,t-2+i} \right\} = E_{t-2} \left\{ \sum_{i=1}^2 \delta^i u(Y_{t-1})_{z,t-2+i} \right\}, \quad z = 0,1$$

Manipulating equation (19) one obtains

$$(20) \quad E_{t-2} \left\{ u(Y_{t-2})_{z,t-2} + \delta u(Y_{t-2})_{z,t-1} + \delta^2 u(Y_{t-2})_{z,t} \right\} = \delta \cdot E_{t-2} \left\{ u(Y_{t-1})_{z,t-1} + \delta u(Y_{t-1})_{z,t} \right\}, \quad z = 0,1$$

Since from equation (18) we know that an acceptable candidate Y_{t-1} will provide zero expected discounted utility gain during periods $t-1$ and t , we can write

$$(21) \quad E_{t-2} \left\{ u(Y_{t-1})_{z,t-1} + \delta u(Y_{t-1})_{z,t} \right\} = 0, \quad z = 0,1$$

Substituting equation (21) into the right-hand-side of equation (20), one obtains

$$(22) \quad E_{t-2} \left\{ u(Y_{t-2})_{z,t-2} + \delta u(Y_{t-2})_{z,t-1} + \delta^2 u(Y_{t-2})_{z,t} \right\} = 0, \quad z = 0,1$$

Repeating this sequence of substitutions until $s = r$, we have

$$(23) \quad E_{t-r+1} \left\{ \sum_{i=0}^{r-1} \delta^i u(Y_{t-r+1})_{z,t-r+1+i} \right\} = E_{t-r+1} \left\{ \sum_{i=1}^{r-1} \delta^i u(Y_{t-r+2})_{z,t-r+1+i} \right\}, \quad z = 0,1$$

Equation (23) can be rewritten as

$$(24) \quad E_{t-r+1} \left\{ \sum_{i=0}^{r-1} \delta^i u(Y_{t-r+1})_{z,t-r+1+i} \right\} = \delta E_{t-r+1} \left\{ \sum_{i=1}^{r-1} \delta^{i-1} u(Y_{t-r+2})_{z,t-r+1+i} \right\}, \quad z = 0,1$$

Since, by backwards induction, it is known that

$$(25) \quad E_{t-r+1} \left\{ \sum_{i=1}^{r-1} \delta^{i-1} u(Y_{t-r+2})_{z,t-r+1+i} \right\} = 0, \quad z = 0,1$$

substituting equation (25) into equation (24) yields

$$(26) \quad E_{t-r+1} \left\{ \sum_{i=0}^{r-1} \delta^i u(Y_{t-r+1+i})_{z,t-r+1+i} \right\} = 0, \quad z = 0,1$$

Updating equation (26) $r-1$ periods yields

$$(27) \quad E_t \left\{ \sum_{i=0}^{r-1} \delta^i u(Y_t)_{z,t+i} \right\} = 0, \quad z = 0,1$$

Equation (27) provides the two conditions for a candidate to be both nominated and confirmed at the start of time t to fill a vacancy arising in the first period of the term ($s = r$). However, through the sequence of backwards induction we have found that similar conditions do exist for acceptable candidates to fill vacancies arising in the second, third, ... periods of the term ($1 \leq s \leq r$). Therefore, equation (28) nests all those conditions:

$$(28) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t)_{z,t+i} \right\} = 0, \quad z = 0,1, \quad (1 \leq s \leq r)$$

Equation (28) establishes that if a party always has the right to veto a candidate from the other party, the acceptable candidate will be of a type so that the expected discounted utility both parties receive during the remainder of his term is zero.

The reason is clear. Since the utility gain a party receives from an appointment is exactly the utility loss the other party obtains, the confirming party will never confirm a candidate that provides it an expected utility loss. Similarly, the nominating party will never nominate a candidate that provides it an expected utility loss. Then, the only acceptable candidate will be of a type such that both parties obtain neither an expected utility loss nor an expected utility gain.

4. The appointment game when nominating and confirming parties may coincide

Now, we consider the case where, as it is in practice, the same party may control both the executive and the legislative branches of government.

4.1. Appointments for terms that do not overlap elections

Recall that elections take place every n periods. Let P the probability that the victor of the last election (party k) wins the next election, with $1-P$ being the probability that the losing party of the last election (party j) wins the next election.

Let H denote the probability that every period of time the losing party of the previous election has the power to confirm or reject the nominees (that is, the opposition party may or may not control the legislative body)¹. In this case, $k = j$ if the opposition party does not control the legislative body and $k \neq j$ if the opposition party controls the legislative body and must confirm

¹This assumption implies that every period there exists an election for the legislative body different from the election for the executive body (the latter being held every n periods).

the nominees.

In order to simplify the solution to the model we assume that both P and H are exogenously determined and time-stationary. Moreover, assume that the events "party X is elected for the executive body" ($X=0,1$) and "the non-elected party T has veto power at the legislative body" ($T=0,1$) are independent.

Let Y_t^V denote an acceptable candidate in period t for both parties if the losing party has veto power. Similarly, let Y_t^N denote an acceptable candidate in period t for both parties if the losing party has no veto power.

In the case the losing party has veto power in period t , from equation (11) we know that acceptable candidates ($y_t = Y_t^V$) must satisfy the following condition

$$(29) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t^V)_{z,t+i} \right\} = E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+i})_{z,t+i} \right\}, \quad z = 0,1$$

where $Y_{t+1} = Y_{t+1}^V$ if the losing party has veto power in period $t+1$ and $Y_{t+1} = Y_{t+1}^N$ if the losing party has no veto power in period $t+1$.

In the case the losing party has no veto power in period t , acceptable period t candidates ($y_t = Y_t^N$) must satisfy:

$$(30) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_t^N)_{k,t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+i})_{k,t+i} \right\}$$

where $k=0,1$ denotes the nominating party (that is, the victor of the last election).

Assume that at the start of period t a vacancy arises in a seat whose term expires at the end of period t . Period t is not an electoral period. In period t the losing party either may have veto right (with probability H) or may not have veto right (with probability $1-H$).

If there exists veto right and since $s=1$, the condition for an acceptable period t candidate reads:

$$(31a) \quad u(Y_t^V)_{z,t} = 0$$

If there is no veto power, such a condition reads:

$$(31b) \quad u(Y_t^N)_{k,t} \geq 0$$

Obviously, if the out-of-power party has not a say in the selection process the nominating party will nominate (and, in turn, will appoint) a central banker Y_t^N that maximizes the party's utility. As a result, this candidate will tend to be more partisan (less moderate) than a candidate that must pass through confirmation hearings.

Now, by making use of the law of iterated expectations, we can obtain the utility that at the beginning of period $t-1$ the nominating party k expects to obtain in period t from the candidate appointed at the start of period t :

$$(32a) \quad E_{t-1} \left\{ u(Y_t)_{k,t} \right\} = H \cdot E_{t-1} \left\{ u(Y_t^V)_{k,t} \right\} + (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\}$$

Then, by using (31a) and (31b), expression (32a) can be rewritten as (32a')

$$(32a') \quad E_{t-1} \left\{ u(Y_t)_{k,t} \right\} = (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \geq 0$$

Similarly, we obtain the utility that at the beginning of period $t-1$ the out-of-power party j expects to obtain in period t from the candidate appointed at the start of period t :

$$(32b) \quad E_{t-1} \left\{ u(Y_t)_{j,t} \right\} = H \cdot E_{t-1} \left\{ u(Y_t^V)_{j,t} \right\} + (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{j,t} \right\}$$

By using (31a) and (31b), and since $u(Y_t^N)_{k,t} = -u(Y_t^N)_{j,t}$, expression (32b) can be rewritten as

$$(32b') \quad E_{t-1} \left\{ u(Y_t)_{j,t} \right\} = - (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \leq 0$$

Assume now that at the beginning of period $t-1$ a vacancy arises in the seat considered above (the one whose term expires at the end of period t). As a result, $s = 2$. Moreover, assume that neither $t-1$ nor t are electoral periods. Since we are not considering elections, parties k and j at period t are the same that parties k and j at period $t-1$.

If party j has veto right in period $t-1$, acceptable period $t-1$ candidates ($y_{t-1} = Y_{t-1}^V$) must satisfy:

$$(33a) \quad E_{t-1} \left\{ \sum_{i=0}^1 \delta^i u(Y_{t-1}^V)_{z,t-1+i} \right\} = E_{t-1} \left\{ \sum_{i=1}^1 \delta^i u(Y_t)_{z,t-1+i} \right\}, \quad z = 0, 1$$

That is,

$$(33b) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{k,t-1} + \delta u(Y_{t-1}^V)_{k,t} \right\} = \delta \cdot E_{t-1} \left\{ u(Y_t)_{k,t} \right\}$$

$$(33c) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{j,t-1} + \delta u(Y_{t-1}^V)_{j,t} \right\} = \delta \cdot E_{t-1} \left\{ u(Y_t)_{j,t} \right\}$$

Substituting expression (32a') into (33b) and (32b') into (33c) yields:

$$(34a) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{k,t-1} + \delta u(Y_{t-1}^V)_{k,t} \right\} = \delta \cdot (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \geq 0$$

$$(34b) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{j,t-1} + \delta u(Y_{t-1}^V)_{j,t} \right\} = -\delta \cdot (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \leq 0$$

If party j has no veto right in period $t-1$, acceptable period $t-1$ candidates ($y_{t-1} = Y_{t-1}^N$) must satisfy:

$$(35a) \quad E_{t-1} \left\{ \sum_{i=0}^1 \delta^i u(Y_{t-1}^N)_{k,t-1+i} \right\} \geq E_{t-1} \left\{ \sum_{i=1}^1 \delta^i u(Y_t)_{k,t-1+i} \right\}$$

That is,

$$(35b) \quad E_{t-1} \left\{ u(Y_{t-1}^N)_{k,t-1} + \delta u(Y_{t-1}^N)_{k,t} \right\} \geq \delta \cdot (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \geq 0$$

As a result, expected discounted utility for party j will be:

$$(35c) \quad E_{t-1} \left\{ u(Y_{t-1}^N)_{j,t-1} + \delta u(Y_{t-1}^N)_{j,t} \right\} \leq -\delta \cdot (1-H) \cdot E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\} \leq 0$$

The utility that at the beginning of period $t-2$ the nominating party k expects to obtain in periods $t-1$ and t from the candidate appointed at the start of period $t-1$ is given by:

$$(36a) \quad E_{t-2} \left\{ u(Y_{t-1})_{k,t-1} + \delta u(Y_{t-1})_{k,t} \right\} = (1-H) E_{t-2} \left\{ u(Y_{t-1}^N)_{k,t-1} + \delta u(Y_{t-1}^N)_{k,t} \right\} + H E_{t-2} \left\{ u(Y_{t-1}^V)_{k,t-1} + \delta u(Y_{t-1}^V)_{k,t} \right\}$$

By making use of the law of iterated expectations we can lag one period the expectation operator in expressions (35b) and (34a). Then, substituting these two new expressions into (36a) yields:

$$(36b) \quad E_{t-2} \left\{ u(Y_{t-1})_{k,t-1} + \delta u(Y_{t-1})_{k,t} \right\} \geq (1-H) \delta (1-H) E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\} + H \delta (1-H) E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

Rearranging the right-hand-side of this expression yields

$$(36c) \quad E_{t-2} \left\{ u(Y_{t-1})_{k,t-1} + \delta u(Y_{t-1})_{k,t} \right\} \geq \delta(1-H)E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

Similarly, the expected discounted utility that party j obtains in periods $t-1$ and t from such a candidate is given by:

$$(36d) \quad E_{t-2} \left\{ u(Y_{t-1})_{j,t-1} + \delta u(Y_{t-1})_{j,t} \right\} \leq -\delta(1-H)E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

Now assume that at the beginning of period $t-2$ a vacancy arises in the seat whose term expires at the end of period t . Thus $s = 3$. Assume further that $t-2$, $t-1$, and t are not electoral periods.

If party j has veto right at the start of period $t-2$, acceptable period $t-2$ candidates ($y_{t-2} = Y_{t-2}^V$) must satisfy:

$$(37a) \quad E_{t-2} \left\{ \sum_{l=0}^2 \delta^l u(Y_{t-2}^V)_{z,t-2+l} \right\} = E_{t-2} \left\{ \sum_{l=1}^2 \delta^l u(Y_{t-1})_{z,t-2+l} \right\}, \quad z = 0, 1$$

That is,

$$(37b) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{k,t-2} + \delta u(Y_{t-2}^V)_{k,t-1} + \delta^2 u(Y_{t-2}^V)_{k,t} \right\} = \delta E_{t-2} \left\{ u(Y_{t-1})_{k,t-1} + \delta u(Y_{t-1})_{k,t} \right\}$$

$$(37c) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{j,t-2} + \delta u(Y_{t-2}^V)_{j,t-1} + \delta^2 u(Y_{t-2}^V)_{j,t} \right\} = \delta E_{t-2} \left\{ u(Y_{t-1})_{j,t-1} + \delta u(Y_{t-1})_{j,t} \right\}$$

Substituting (36c) into (37b) and (36d) into (37c) yields:

$$(37d) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{k,t-2} + \delta u(Y_{t-2}^V)_{k,t-1} + \delta^2 u(Y_{t-2}^V)_{k,t} \right\} \geq \delta^2(1-H)E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

$$(37e) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{j,t-2} + \delta u(Y_{t-2}^V)_{j,t-1} + \delta^2 u(Y_{t-2}^V)_{j,t} \right\} \leq -\delta^2(1-H)E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

If party j has no veto right at the start of period $t-2$, acceptable period $t-2$ candidates ($y_{t-2} = Y_{t-2}^N$) must satisfy:

$$(38a) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k,t-2} + \delta u(Y_{t-2}^N)_{k,t-1} + \delta^2 u(Y_{t-2}^N)_{k,t} \right\} \geq$$

$$\delta E_{t-2} \left\{ u(Y_{t-1})_{k,t-1} + \delta u(Y_{t-1})_{k,t} \right\}$$

Substituting (36c) into (38a) we have

$$(38b) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k,t-2} + \delta u(Y_{t-2}^N)_{k,t-1} + \delta^2 u(Y_{t-2}^N)_{k,t} \right\} \geq \delta^2(1-H)E_{t-2} \left\{ u(Y_t^N)_{k,t} \right\}$$

Repeating these sequences until period $t-q$ (where $q < n$), we can find the conditions that acceptable period $t-q$ candidates must satisfy.

If party j has veto right at the start of period $t-q$ (where $n > q > 1$), these conditions read:

$$(39a) \quad E_{t-q} \left\{ \sum_{l=0}^q \delta^l u(Y_{t-q}^V)_{k,t-q+l} \right\} \geq \delta^q(1-H)E_{t-q} \left\{ u(Y_t^N)_{k,t} \right\}$$

$$(39b) \quad E_{t-q} \left\{ \sum_{l=0}^q \delta^l u(Y_{t-q}^V)_{j,t-q+l} \right\} \leq -\delta^q(1-H)E_{t-q} \left\{ u(Y_t^N)_{k,t} \right\}$$

However, if $q=1$ these conditions read:

$$(39c) \quad E_{t-2} \left\{ u(Y_{t-1}^V)_{k,t-1} + \delta u(Y_{t-1}^V)_{k,t} \right\} = \delta(1-H)E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\}$$

$$(39d) \quad E_{t-2} \left\{ u(Y_{t-1}^V)_{j,t-1} + \delta u(Y_{t-1}^V)_{j,t} \right\} = -\delta(1-H)E_{t-1} \left\{ u(Y_t^N)_{k,t} \right\}$$

Moreover, if $q = 0$, the conditions can be rewritten as:

$$(39e) \quad u(Y_t^N)_{z,t} = 0$$

If party j has no veto power at the start of period $t-q$ (where $n > q > 0$), the condition reads:

$$(40a) \quad E_{t-q} \left\{ \sum_{i=0}^q \delta^i u(Y_{t-q}^N)_{k,t-q+i} \right\} \geq \delta^q (1-H) E_{t-q} \left\{ u(Y_t^N)_{k,t} \right\}$$

For $q = 0$, the condition becomes:

$$(40b) \quad u(Y_t^N)_{k,t} \geq 0$$

Moreover, $\forall q$ it happens that

$$(41) \quad E_{t-q} \left\{ \sum_{i=0}^q \delta^i u(Y_{t-q}^N)_{k,t-q+i} \right\} \geq E_{t-q} \left\{ \sum_{i=0}^q \delta^i u(Y_{t-q}^V)_{k,t-q+i} \right\}$$

Expression (41) indicates that if at the time a vacancy arises -whose term does not overlap an election- the out-of-power party has no veto right, the then directly appointed governor will be more partisan than the nominee would be in the case veto power does exist. The reason being that the nominating party k will obtain more expected utility from a directly appointed governor than from a candidate that should be confirmed by the out-of-power party.

Expressions (39c), (39d), and (40a) show that the type of central bank governors depends on the discount factor, δ , the unexpired portion of the term, q , the probability that the losing party has veto right, H , and the expected utility the nominating party would obtain from a type Y^N central banker appointed to serve out the last period of the term. Such an expected utility depends, in turn, on the expected incumbent board composition at the start of the last period of the term.

In particular, the acceptable central banker appointed in period $t-q$ to serve out the unexpired portion of a term that expires at the end of period t will be more partisan (in the sense that his type will be closer to his nominating party's bliss point):

(i) the more patient parties are (that is, the higher δ).

If δ grows, the nominating party k gives greater importance to future utilities obtained from an appointed governor. Since there exists a positive probability that party k will appoint directly a governor in the future and such a governor would generate more utility for party k due to the higher δ , then for a candidate to be nominated today he must be more partisan. Consider expression (39a) and rewrite it as

$$(39a') \quad E_{t-q} \left\{ \sum_{i=0}^q \delta^{i-q} u(Y_{t-q}^V)_{k,t-q+i} \right\} \geq (1-H) E_{t-q} \left\{ u(Y_t^N)_{k,t} \right\}$$

If δ rises, the δ^{i-q} terms decline, so that the $u(Y_{t-q}^V)_{k,t-q+i}$ terms must rise for the weak inequality to hold. As a result, appointments will be more partisan.

(ii) the shorter the unexpired portion of the term the candidate must serve

out (that is, the lower q)².

If q decreases, the nominating party has less periods remaining to extract utility from a current appointment, so that the appointed governor must be more partisan. Observe that if q decreases there are fewer $u(Y_{t-q}^V)_{k,t-q+i}$ terms in the left-hand-side of expression (39a') so that these terms must be higher for the weak inequality to hold. Then, appointments will be more partisan.

(iii) the lower the probability of the out-of-power party j having veto power. If H is lower, the right-hand-side of (39a') rises and the left-hand-side must also rise for the inequality to hold. Therefore, appointments will be more partisan. If H decreases, there is more chance for future periods where party j will not have veto power, so that it will pay more for party k to wait for such periods to directly appoint a governor. Therefore, a current acceptable candidate must be more partisan to compensate party k for not waiting until future periods.

(iv) the higher the expected utility party k would obtain if it could directly appoint a governor the last period of the term. If waiting for a more appropriate candidate pays more to party k , then a current acceptable candidate must pay more to offset this fact. Therefore, he must be more partisan.

Observe that if the probability of party j having veto power is $H = 1$, then the results in this subsection collapse to the results in the previous section. This is related to point (iii) above: as H tends to unity, appointments will be more moderate.

4.2. Appointments for terms that overlap elections

Frequently, the term a governor must serve out overlaps one or more elections. Thus, we are interested in exploring (i) how such an overlapping and (ii) how the distance from the next election affect the appointment of governors to the central bank board.

In this subsection we extend the analysis in the previous subsection and develop two examples in order to answer the questions above.

Now, we consider appointments for either an entire term or for the unexpired portion of a term which overlap elections. In such circumstances, the roles of parties as governmental party and opposition party may change after the election.

Therefore, we will need to change notation slightly. Thus, let $k(t+i)$ denote the nominating party at time $t+i$ and $j(t+i)$ denote the confirming party at time $t+i$. Thus, $k(t+i) = j(t+i)$ if the opposition party controls the legislative body at time $t+i$ and $k(t+i) \neq j(t+i)$ if the opposition party does not control the legislative body at time $t+i$.

Similarly, let $u(Y_t)_{k(t),t+i}$ denote the utility the period t nominating party obtains in period $t+i$ from an acceptable candidate appointed at the start of period t . Similarly, let $u(Y_t)_{j(t),t+i}$ denote the utility the period t confirming party obtains from an acceptable candidate appointed at the

²Except for $q=0$ and veto right, in which case the candidate is the most moderate because his type is similar to the median incumbent member's.

beginning of period t .

In the case the out-of-power party has veto right in period t , acceptable period t candidates ($y_t = Y_t^V$) must satisfy the following condition

$$(42a) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_{t+i}^V)_{z(t), t+i} \right\} = E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+i})_{z(t), t+i} \right\}, \quad z = 0, 1$$

In the case there is no veto power in period t , the condition for acceptable period t candidates ($y_t = Y_t^N$) reads:

$$(42b) \quad E_t \left\{ \sum_{i=0}^{s-1} \delta^i u(Y_{t+i}^N)_{k(t), t+i} \right\} \geq E_t \left\{ \sum_{i=1}^{s-1} \delta^i u(Y_{t+i})_{k(t), t+i} \right\}$$

Assume that at the start of period t a vacancy arises in a seat whose term expires at the end of period t . At the time the vacancy arises an election takes place and the victor of this election (party $k(t)$) can nominate a candidate to fill the vacancy. The losing party, $j(t)$, may or may not have a say in the selection process.

Suppose party $j(t)$ has veto power. The conditions for an acceptable candidate ($y_t = Y_t^V$) are

$$(43a) \quad u(Y_t^V)_{z(t), t} = 0$$

If party $j(t)$ has no veto power, then the condition for an acceptable candidate ($y_t = Y_t^N$) is

$$(43b) \quad u(Y_t^N)_{k(t), t} \geq 0$$

It is clear that expressions (43a) and (31a) coincide. The same result applies for expressions (43b) and (31b). The reason being that -since the central banker appointed in period t to serve out this period is nominated and, where necessary, confirmed after the election- the portion of the term this central banker serves out does not overlap the election.

However, because of the existence of an election at the start of period t , the utilities that parties expect at the beginning of period $t-1$ to obtain from the candidate appointed in period t should change. These utilities are now:

$$(44a) \quad E_{t-1} \left\{ u(Y_t^V)_{k(t-1), t} \right\} = P E_{t-1} \left\{ u(Y_t)_{k(t), t} \right\} + (1-P) E_{t-1} \left\{ u(Y_t)_{j(t), t} \right\}$$

Substituting (32a') and (32b') into the right-hand-side of equation (44a) yields

$$(44b) \quad E_{t-1} \left\{ u(Y_t)_{k(t-1), t} \right\} = P(1-H) E_{t-1} \left\{ u(Y_t^N)_{k(t), t} \right\} -$$

$$(1-P)(1-H) E_{t-1} \left\{ u(Y_t^N)_{k(t), t} \right\} = (2P-1)(1-H) E_{t-1} \left\{ u(Y_t^N)_{k(t), t} \right\}$$

because the probability of party $k(t-1)$ being $k(t)$ is P and being $j(t)$ is $1-P$. Similarly,

$$(44c) \quad E_{t-1} \left\{ u(Y_t)_{j(t-1), t} \right\} = - (2P-1)(1-H) E_{t-1} \left\{ u(Y_t^N)_{k(t), t} \right\}$$

In order to simplify notations, define $\Omega \equiv u(Y_t^N)_{k(t), t}$.

Assume that a vacancy arises now at the start of period $t-1$ in the seat whose term expires at the end of period t . Moreover, keep on assuming that an election takes place at the start of period t .

Lagging expressions (42a) and (42b) one period we can obtain the conditions for an acceptable period $t-1$ candidate if in such a period the out-of-power party $j(t-1)$ has veto right:

$$(45a) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{k(t-1), t-1} + \delta u(Y_{t-1}^V)_{k(t-1), t} \right\} = \delta E_{t-1} \left\{ u(Y_t)_{k(t-1), t} \right\}$$

$$(45b) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{j(t-1), t-1} + \delta u(Y_{t-1}^V)_{j(t-1), t} \right\} = \delta E_{t-1} \left\{ u(Y_t)_{j(t-1), t} \right\}$$

Substituting (44b) and (44c) into (45a) and (45b) yields

$$(46a) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{k(t-1), t-1} + \delta u(Y_{t-1}^V)_{k(t-1), t} \right\} = \delta(2P-1)(1-H) E_{t-1} \{ \Omega \} \geq 0$$

$$(46b) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{j(t-1), t-1} + \delta u(Y_{t-1}^V)_{j(t-1), t} \right\} = - \delta(2P-1)(1-H) E_{t-1} \{ \Omega \} \geq 0$$

since $(2P-1)$ can be positive, negative or zero for $P > 1/2$, $P < 1/2$, and $P = 1/2$, respectively.

Suppose now that party $j(t-1)$ has no veto power. Then, the condition for an acceptable period $t-1$ central banker is

$$(46c) \quad E_{t-1} \left\{ u(Y_{t-1}^N)_{k(t-1), t-1} + \delta u(Y_{t-1}^N)_{k(t-1), t} \right\} \geq \delta(2P-1)(1-H) E_{t-1} \{ \Omega \} \geq 0$$

Therefore, if the term a central banker must serve out overlaps the next election, the nominating party may even obtain an expected disutility from his appointment. This is the case if the probability of this party winning the next election is lower than $1/2$. In fact, expression (46a) shows that if $P < 1/2$ and party $j(t-1)$ has veto power, party $k(t-1)$ accepts to experiment an expected disutility when it nominates a candidate.

We can check now how the pattern of appointments to the central bank differ for terms which overlap elections and for terms which do not overlap elections. To do so we compare expressions (34a) and (46a) and expressions (34b) and (46b). We can write:

$$(47) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{k(t-1), t-1} + \delta u(Y_{t-1}^V)_{k(t-1), t} \right\} = (2P-1) \cdot E_{t-1} \left\{ u(Y_{t-1}^V)_{k, t-1} + \delta u(Y_{t-1}^V)_{k, t} \right\}$$

$$(48) \quad E_{t-1} \left\{ u(Y_{t-1}^V)_{j(t-1), t-1} + \delta u(Y_{t-1}^V)_{j(t-1), t} \right\} = (2P-1) \cdot E_{t-1} \left\{ u(Y_{t-1}^V)_{j, t-1} + \delta u(Y_{t-1}^V)_{j, t} \right\}$$

If $0 < P < 1$ and $0 < H < 1$, we find that (34a) $>$ (46a) and (34b) $<$ (46b) because $(2P - 1) < 1$, VP.

As a result, nominated and confirmed central bankers will tend to be more moderate if their terms overlap elections. The reason being that the governmental (and nominating) party has less bargaining power and the opposition party has more bargaining power if there exists a chance that parties change roles because of an election during the term the candidate must serve out.

The same conclusion arises from comparing expressions (35b) and (46c), so that directly appointed central bankers will tend to be more moderate if their terms overlap elections.

It can be seen that appointed governors to serve out terms that overlap elections will be more partisan the higher the probability the nominating party at the time the vacancy occurs will win the next election (P). The reason is clear: the higher P the less likely that parties change roles because of the election.

Now, we are interested in the pattern of appointments to the central bank as the next election approaches. In particular, consider two governors appointed to serve out two terms consisting of the same number of periods. Moreover, assume that the next election is closer to the time one governor is appointed than to the time the other governor is appointed. We want to know if there exists a difference between these two governors' type.

To analyze this pattern we will consider an example including the appointment of two central bankers to serve out $s = 3$ periods remaining at the start of period $t-2$ (that is, the three periods remaining are periods $t-2$, $t-1$, and t). We will consider the proximity of an election in the following way. Suppose that when the first central banker is appointed, the election will be held at the start of period t (so that there are two periods to go for the next election). Moreover, suppose that when the second central banker is appointed, the election will be held at the start of period $t-1$ (so that there is just one period to go for the next election).

Since the vacancies arise at the start of period $t-2$, expression (42b) for $t-2$ provides the condition for an acceptable period $t-2$ candidate if party $j(t-2)$ does not have veto power:

$$(49) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k(t-2), t-2} + \delta u(Y_{t-2}^N)_{k(t-2), t-1} + \delta^2 u(Y_{t-2}^N)_{k(t-2), t} \right\} \geq \delta E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\}$$

We know that

$$(50) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\} = (1-H) E_{t-2} \left\{ u(Y_{t-1}^N)_{k(t-1), t-1} + \delta u(Y_{t-1}^N)_{k(t-1), t} \right\} + H E_{t-2} \left\{ u(Y_{t-1}^V)_{k(t-1), t-1} + \delta u(Y_{t-1}^V)_{k(t-1), t} \right\}$$

since -as the election will be held at the start of period t - party $k(t-1)$ and party $k(t-2)$ coincide.

Using the law of iterated expectations in expressions (46a) and (46c) and inserting them in equation (50) we obtain:

$$(51) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\} \geq \delta(1-H)(2P-1)E_{t-2}(\Omega)$$

Using (51) into (50) yields

$$(52) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k(t-2), t-2} + \delta u(Y_{t-2}^N)_{k(t-2), t-1} + \delta^2 u(Y_{t-2}^N)_{k(t-2), t} \right\} \geq \delta^2(2P-1)(1-H)E_{t-2}(\Omega)$$

Suppose now that party $j(t-2)$ does have veto power. Therefore, using (42a) for $t-2$ provides the conditions for an acceptable period $t-2$ candidate:

$$(53) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{z(t-2), t-2} + \delta u(Y_{t-2}^V)_{z(t-2), t-1} + \delta^2 u(Y_{t-2}^V)_{z(t-2), t} \right\} = \delta E_{t-2} \left\{ u(Y_{t-1})_{z(t-2), t-1} + \delta u(Y_{t-1})_{z(t-2), t} \right\}, \quad z(t-2) = 0, 1$$

Since

$$(54a) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\} \geq \delta(1-H)(2P-1)E_{t-2}\{\Omega\}$$

$$(54b) \quad E_{t-2} \left\{ u(Y_{t-1})_{j(t-2), t-1} + \delta u(Y_{t-1})_{j(t-2), t} \right\} \leq -\delta(1-H)(2P-1)E_{t-2}\{\Omega\}$$

using (54a) and (54b) in the right-hand-side of (53), we obtain:

$$(55a) \quad E_{t-2} \left\{ u(Y_{t-2})_{k(t-2), t-2} + \delta u(Y_{t-2})_{k(t-2), t-1} + \delta^2 u(Y_{t-2})_{k(t-2), t} \right\} \geq \delta^2(1-H)(2P-1)E_{t-2}\{\Omega\}$$

$$(55b) \quad E_{t-2} \left\{ u(Y_{t-2})_{j(t-2), t-2} + \delta u(Y_{t-2})_{j(t-2), t-1} + \delta^2 u(Y_{t-2})_{j(t-2), t} \right\} \leq -\delta^2(1-H)(2P-1)E_{t-2}\{\Omega\}$$

Now, we analyze the case for an appointment at the start of period $t-2$ for $s=3$ remaining periods with the election being held at the start of period $t-1$.

In this case, party $k(t-1)$ and party $k(t)$ coincide. Therefore:

$$(56) \quad E_{t-1} \left\{ u(Y_t)_{k(t-1), t} \right\} = E_{t-1} \left\{ u(Y_t)_{k(t), t} \right\} = (1-H)E_{t-1}\{\Omega\}$$

First of all, assume that a vacancy arises at the start of period $t-1$ whose term expires at the end of period t and that party $j(t-1)$ has veto power. Then,

$$(57a) \quad E_{t-1} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} = \delta E_{t-1} \left\{ u(Y_t)_{k(t-1), t} \right\}$$

$$(57b) \quad E_{t-1} \left\{ u(Y_{t-1})_{j(t-1), t-1} + \delta u(Y_{t-1})_{j(t-1), t} \right\} = \delta E_{t-1} \left\{ u(Y_t)_{j(t-1), t} \right\}$$

Using (56) into (57a) and (57b) we have

$$(58a) \quad E_{t-1} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} = \delta(1-H)E_{t-1}\{\Omega\}$$

$$(58b) \quad E_{t-1} \left\{ u(Y_{t-1})_{j(t-1), t-1} + \delta u(Y_{t-1})_{j(t-1), t} \right\} = -\delta(1-H)E_{t-1}\{\Omega\}$$

Suppose now that party $j(t-1)$ has not veto power. Then, the conditions for an acceptable period $t-1$ candidate are:

$$(59) \quad E_{t-1} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} \geq \delta(1-H)E_{t-1}\{\Omega\}$$

Assume now that at the start of period $t-2$ a vacancy arises in a seat whose term expires at the end of period t . Moreover, at the start of period $t-1$ there is an election. Then, since there is a probability P that party $k(t-2)$ and party $k(t-1)$ coincide, we can write:

$$(60) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\} = PE_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} - (1-P)E_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} + (2P-1)E_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\}$$

Now, since there exists a probability H that party $j(t-1)$ has veto power, we can write:

$$(61) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} = HE_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} + (1-H)E_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\}$$

Using (58a) and (59) in (61), we have

$$(62) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-1), t-1} + \delta u(Y_{t-1})_{k(t-1), t} \right\} \geq \delta(1-H)E_{t-2}\{\Omega\}$$

Therefore, using (62) into (60) we obtain

$$(63) \quad E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\} \geq \delta(1-H)(2P-1)E_{t-2}\{\Omega\}$$

Now, we can obtain the conditions for an acceptable period $t-2$ candidate if in such a period the out-of-power party $j(t-2)$ has veto right:

$$(64) \quad E_{t-2} \left\{ u(Y_{t-2})_{z(t-2), t-2} + \delta u(Y_{t-2})_{z(t-2), t-1} + \delta^2 u(Y_{t-2})_{z(t-2), t} \right\} = \delta E_{t-2} \left\{ u(Y_{t-1})_{z(t-2), t-1} + \delta u(Y_{t-1})_{z(t-2), t} \right\}, \quad z(t-2) = 0, 1$$

Since by (63) we also know that

$$(65) \quad E_{t-2} \left\{ u(Y_{t-1})_{j(t-2), t-1} + \delta u(Y_{t-1})_{j(t-2), t} \right\} \geq -\delta(1-H)(2P-1)E_{t-2}(\Omega)$$

using (63) and (65) in the right-hand-side of (64), we obtain:

$$(66a) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{k(t-2), t-2} + \delta u(Y_{t-2}^V)_{k(t-2), t-1} + \delta^2 u(Y_{t-2}^V)_{k(t-2), t} \right\} \geq \delta^2(1-H)(2P-1)E_{t-2}(\Omega)$$

$$(66b) \quad E_{t-2} \left\{ u(Y_{t-2}^V)_{j(t-2), t-2} + \delta u(Y_{t-2}^V)_{j(t-2), t-1} + \delta^2 u(Y_{t-2}^V)_{j(t-2), t} \right\} \geq -\delta^2(1-H)(2P-1)E_{t-2}(\Omega)$$

The condition for an acceptable period $t-2$ candidate if in such a period the out-of-power party $j(t-2)$ has not veto right is:

$$(67) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k(t-2), t-2} + \delta u(Y_{t-2}^N)_{k(t-2), t-1} + \delta^2 u(Y_{t-2}^N)_{k(t-2), t} \right\} \geq \delta E_{t-2} \left\{ u(Y_{t-1})_{k(t-2), t-1} + \delta u(Y_{t-1})_{k(t-2), t} \right\}$$

Using (63) we can write:

$$(68) \quad E_{t-2} \left\{ u(Y_{t-2}^N)_{k(t-2), t-2} + \delta u(Y_{t-2}^N)_{k(t-2), t-1} + \delta^2 u(Y_{t-2}^N)_{k(t-2), t} \right\} \geq \delta^2(1-H)(2P-1)E_{t-2}(\Omega)$$

The conditions for an acceptable period $t-2$ central banker if party $j(t-2)$ has veto right are given by expression (52) if the election is held at the start of period t and by expression (68) if the election is held at the beginning of period $t-1$. It can be seen that these expressions do not coincide.

The conditions for an acceptable period $t-2$ central banker if party $j(t-2)$ has not veto power are given by expressions (55a) and (55b) if the election is held at the start of period t and by expressions (66a) and (66b) if the election is held at the beginning of period $t-1$. Now again the expressions do not coincide.

In particular, we can rewrite the condition for an acceptable period $t-2$ central banker who must serve out three periods if the election is held at the beginning of period t as:

$$(69) \quad E_{t-2} \left\{ \sum_{i=0}^2 \delta^i u(Y_{t-2})_{k(t-2), t-2+i} \right\} \geq \delta^2(1-H)(2P-1)E_{t-2}(\Omega)$$

Such a condition for the election being held at the start of period $t-1$ can be rewritten as:



$$(70) \quad E_{t-2} \left\{ \sum_{i=0}^2 \delta^i u(Y_{t-2})_{k(t-2), t-2+i} \right\} \geq \delta^2(1-H)(2P-1)E_{t-2}(\Omega)$$

Accordingly, the utility that the period $t-2$ nominating party expects to obtain from an acceptable candidate during the three following periods is higher for the election being held at the beginning of period t than for the election being held at the start of period $t-1$. In other words, we have found that a governor appointed to serve three periods of time will be more partisan the more distant the next election. Therefore, from this example we can conclude that the proximity of elections have effects on the type of central bankers appointed. That is, as the next election approaches, appointed governors will tend to be more moderate provided the remaining term they must serve out consists of the same number of periods.

The intuition behind this result follows from the fact that if the out-of-power party has a majority in the legislative body, it has an incentive to reject partisan nominations to the board. This incentive to hold out is stronger as the next election is closer because the term the appointee must serve out will include a higher number of periods after the election. This ranks as a longer time horizon for which the current out-of-power party could be the nominating party. Then, the current out-of-power party has greater bargaining power the less distant the next election and, therefore, the more moderate the currently appointed central banker.

5. Discussion

Our analysis suggests that the higher the probability of the out-of-power party having veto power the more moderate the appointed governors. Moreover, if at the time a vacancy arises the opposition party does not control the legislative body, the appointed governor will be more partisan than the nominee would be in the case veto power does exist.

Havrilesky and Gildea (1992) have found empirical evidence supporting this type of results for the U.S. case. By using probit analysis, they find that partisan governors (economists³) are much less likely to be appointed when the Senate and the Presidency are controlled by opposing parties. They estimated a probit regression which used as dependent variable appointees who were economists and as explanatory variables the number of months into the Presidential term, a variable measuring if the Senate was controlled or not by the opposition party and a measure of the partisan composition of the board. The coefficients for the President's months in office and Senate control variables had negative signs and were significant at the conventional five percent level.

The result for the Senate control variable supports the views that the

³ Havrilesky and Gildea examine the voting records of Fed governors when split voting occurred and divide the governors into two groups: reliable and unreliable governors. Reliable governors are those who tend to vote for monetary policies preferred by the party that appointed them. Unreliable governors are those who have no well-defined tendency to vote the party line or tend to vote for the opposition monetary policy. By regressing reliability against career characteristics, they find that reliable governors tend to be economists, especially Ph. D. academic economists.

existence of veto right at the Senate causes moderate appointments.

The result for the President's months in office variable indicates that as the next election approaches appointments are less partisan. This empirical result is consistent with our theoretical finding, derived in subsection 4.2. above. Moreover, from expressions (69) and (70) it can be seen that irrespective of the probability of the opposition party controlling the legislative body (except for $H=1$), the closer the next election the more moderate the appointments. Again, this finding is consistent with results provided by Havrilesky and Gildea (1992). They split the sample into two subsets, governors appointed when the Senate is controlled by the opposition and governors appointed when it was not and probit regressions were estimated from both subsamples. The months-in-office coefficients were negative, of similar magnitude, and significant at the ten percent level in both cases, implying that appointments tend to be more moderate as the next election approaches irrespective of the opposition controlling the Senate.

Since we have found that central bankers will be more moderate if their terms overlap elections, an immediate result of our analysis is that if a term exists which runs concurrently with the administration's and thus provides it with its first opportunity to appoint a central banker to the board, this term will be filled by a central banker more partisan than in the case the term were not concurrent with administration's. Therefore, it seems that the 26 Congressional bills over the period 1979-1990 (Akhtar and Howe, 1991) which intended to change the term structure of the board such that the chairman and vice chairman's (essentially) terms run concurrently with the President rather than precede it by one year would lead to the appointment of a chairman more partisan, in the sense that his type would be closer to his nominating party's bliss point.

6. Summary

In this paper, a formal model has been developed to analyze the appointment of individuals to serve as central bank governors in a two-party political system when confirmation hearings exists and monetary policy is determined according to a majority-rule voting system within the central bank board of governors. The major results of the paper are that appointed governors will tend to be more moderate (i) if the nominating party and the confirming party do not coincide at present, (ii) the lower the chance the nominating party and the confirming party coincide in the future, (iii) if the term governors must serve out overlaps an election, (iv) as the next election approaches, and (v) the lower the probability the nominating party wins the next election.

Moreover, some of these results are consistent with existing empirical evidence related to the Board of Governors of the Federal Reserve System.

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