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No. 6497

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PUBLIC POLICY

Centre for Economic Policy Research

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Available online at: **www.cepr.org/pubs/dps/DP6497.asp**

ISSN 0265-8003

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Discussion Paper No. 6497
October 2007

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CEPR Discussion Paper No. 6497

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ABSTRACT

Vote-share Contracts and Democracy*

In this paper we introduce vote-share contracts. Such contracts contain a vote-share threshold that incumbents must reach in order to be reelected. In a simple model, we illustrate the working of vote-share contracts. Such vote-share contracts curb socially detrimental incumbency advantages by improving the average ability level of re-elected politicians and also increase effort. We show that the socially optimal vote-share threshold for incumbents is larger than one half. Competing candidates offer vote-share contracts with socially optimal thresholds.

JEL Classification: D7, D82 and H4
Keywords: elections, political contracts and vote-share thresholds

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* I take great pleasure in expressing my thanks to many colleagues who have helped critically assess these ideas on introducing political contracts in democracies. Johannes Becker, Clive Bell, Klaas Beniers, Peter Bernholz, Robert Dur, Jürgen Eichberger, Lars Feld, Amihai Glazer, Volker Hahn, Hans Haller, Verena Liessem, Susanne Lohmann, Martin Hellwig, Markus Müller, Joel Sobel, Robert Solow, Otto Swank have provided valuable feedback. I am also grateful to seminar audiences at the Universities of California, Los Angeles, Davis, Irvine, and San Diego, the Universities of Basel, Cologne, Leuven, Heidelberg, Rotterdam, and Tilburg for many helpful comments and suggestions.

Submitted 07 September 2007

1 Introduction

Once in office, politicians in parliament enjoy an incumbency advantage; incumbent re-election rates top the 90 percent mark. It would be useful to have a device that eliminates welfare-reducing incumbency advantages while preserving the welfare-improving ones. Such a device should not, however, interfere with the fundamental values of liberal democracy.

We propose vote-share contracts as a way of achieving these objectives. Candidates competing for public office can stipulate a vote-share threshold equal to or above one-half, which they need to reach in order to be re-elected. If the incumbent does not obtain enough votes to reach the vote-share threshold, either his challenger is elected, or a run-off ballot between two new candidates takes place. The commitment of a candidate to a vote-share threshold is called a vote-share contract.

We illustrate the working of vote-share contracts in a simple model which allows the incumbent to increase his reelection chances by socially costly actions. Vote-share thresholds for incumbents have two effects: A higher threshold stimulates greater effort, as the incumbent wants to be reelected. This is socially desirable. A higher vote-share threshold allows only those incumbents of high ability to be reelected, as they will be able to garner enough votes for the purpose. This is socially desirable as long as incumbents with above-average ability are reelected. If the threshold is too high, even incumbents with above-average qualities will be deselected, which is socially undesirable. A socially optimal vote-share threshold for incumbents balances these effects and the socially optimal vote-share threshold for incumbents is typically larger than one half.

A socially optimal vote-share threshold can be set by the public. More interestingly, we allow that candidates compete with vote-share contracts. We show that the majority of voters will elect the candidate who commits to a vote-share threshold that is closer to the socially optimal threshold. As a result, both candidates will commit to the

socially optimal vote-share threshold.

Our paper is part of a recent strand of literature that proposes supplementing liberal democracy with political contracts (see e.g. Gersbach (2004), Gersbach (2005), Gersbach and Müller (2006), and Gersbach and Liessem (2007)). Political contracts differ from contracts in the private sector[1] in two important respects. First, political contracts are not agreements between two parties, but one-sided written expressions of promises made by politicians, coupled with rewards and sanctions that depend on whether these promises are kept. Second, political contracts are subordinated to the rules of liberal democracy, i.e. only contracts that do not alter the fundamental values of liberal democracy can become political contracts. The vote-share contracts proposed in this paper represent a new type of political contract.

Our paper is closely related to the large literature dealing with the fact that incumbents are extraordinarily successful when they seek re-election.

At least three explanations have been advanced for the existence of incumbency advantages. First, the incumbent may be perceived as a safer bet than his challengers (Bernhardt and Ingberman (1985), Anderson and Glomm (1992)). For example, the incumbent may have gained a communication advantage over his challengers. Second, incumbents may have, on average, higher qualities than challengers. The reason is twofold: candidates who have won in the past are of higher quality[2] and challengers may be deterred from running against them (Jacobson and Kernell (1983), Cox and Katz (1996), Stone, Maisel and Maestas (2004), and Gordon, Huber and Landa (2007)).

Third, the incumbent may be able to increase his re-election prospects by the provision of constituency service (Cain, Ferejohn and Fiorina (1987)) or (socially) costly actions like government expenditures or war (Rogoff and Sibert (1988), Alesina and Cukierman (1990), Hess and Orphanides (1995, 2001), and Cukierman and Tommasi (1998)).[3] We

[1]The corresponding contract theory in the private area is covered, e.g., in Schweizer (1999), and Bolton and Dewatripont (2005).

[2]See Samuelson (1984), Londregan and Romer (1993), Banks and Sundaram (1998), Zaller (1998), Ashworth (2005), and Diermeier, Keane and Merlo (2005).

[3]Other explanations of incumbency advantage are based on the incumbents' voting behavior and

incorporate the latter two reasons for incumbency advantages into our model. Then we show that vote-share contracts may be particularly effective in eliminating the incumbency advantage generated by socially costly actions.

The paper is organized as follows: In the next section we introduce the model. Section 3 discusses the benchmark case when there are only standard elections. In section 4 we introduce vote-share contracts and derive their welfare properties. In section 5 we discuss various extensions of the model and alternative election procedures. Section 6 concludes.

2 The Model

2.1 Agents

We consider a society that decides democratically to whom it should delegate policy-making. At the beginning of each of two periods, $t = 1$ and $t = 2$, voters must elect a politician. At both election dates, the same two candidates are competing for office. Candidates are denoted by k or $k' \in [R, L]$. Candidate R (L) is the right-wing (left-wing) candidate. There is a continuum of voters. Each individual voter is indexed by $i \in [0, 1]$.

2.2 Policies

There are three types of policy problems the policy-maker faces.

- Public Project: P

  In each period, the office holder can undertake a public project. The result is determined by the effort invested by the policy-maker and his ability. The amount

face-recognition (Ansolabehere, Snyder an Stewart (2000) and Prior (2006)). Finally, challengers may have less access to campaign funds (Gerber (1988)). Whether these explanations can themselves be explained by a quality-based incumbency advantage is addressed in Ashworth and Bueno de Mesquita (2007). Given the existence of large incumbency advantages, Buchler (2007) challenges the assumption that competitive elections are a priori socially desirable.

of this public project in period t is given as

$$g_t = \gamma(e_{kt} + a_k), \gamma > 0 \tag{1}$$

where e_{kt} represents the effort exerted by the policy-maker in period t and a_k represents his ability. Ability a_k is a random variable distributed uniformly on $[-A, A]$, $A > 0$. After the office-holder has exerted e_{kt}, he will know how able he is. This will remain private information. Voters will observe g_t. The citizens derive utility from the public project according to the instantaneous utility function $U^P(g_t) = g_t$.

- Ideological (or Redistribution) Policy: I

  In each period, the policy-maker decides on an ideological policy I that affects voters differently. The choice set for I is represented by a one-dimensional policy space $[0, 1]$. We assume that voters are ordered according to their ideal points regarding I. Voter i has preferences over I according to the instantaneous utility function

$$U_i^I(i_{kt}) = -(i_{kt} - i)^2, \tag{2}$$

  where i_{kt} is the platform chosen by the policy-maker and i is the ideal point of voter i.

- Output-Shift Policy: O

  If the policy-maker has exerted effort e_{k1} and has observed his own ability a_k in period 1, he can decide whether or not to shift the realization of a specific part of the output of size Δ ($\Delta > 0$) from period 1 to period $t = 2$.[4] In particular, if $\gamma(e_{k1} + a_k) > \Delta$ he can decide to realize the amount $\gamma(e_{k1} + a_k) - \Delta$ in period $t = 1$. If he is still in office in $t = 2$, he can realize $f\Delta$ in $t = 2$ ($f < 1$) from his activities in $t = 1$. We assume that a new office-holder in $t = 2$ cannot reap the benefits of the effort invested by a preceding policy-maker.

[4] An interesting variant of the model is to allow backward shifts of policies.

This policy option O needs more explanation. It represents a policy that requires policy-specific efforts by the policy-maker and enables the policy-maker to determine the time at which the output is realized. Examples are international treaties, foreign policy or new regulatory frameworks for specific industries such as the health care system. Such policies require policy-specific human capital that is lost at least partially when a new government comes into office. Moreover, the timing for the realization of the benefits from such policies lies in the hands of the policy-maker.

Output shift can also occur in the legislative sector. For instance, a member of parliament may lobby to have government funds or infrastructure projects channeled to his district. The member may decide to postpone some of the benefits from his activities in order to make it costly to replace him. The option to shift output across time is a simple device generating an incumbency advantage. Note that our assumption $f < 1$ implies that output-shifts are socially detrimental.[5]

2.3 Utilities

In this section we describe the utilities of voters and candidates. We use ϵ_k to denote the output-shift decision of candidate k in the first period. ϵ_k is equal to 1 if policy-maker k shifts output in period 1. Otherwise ϵ_k is zero. The discount factor of voters and politicians is denoted by β with $0 < \beta \leq 1$.

The expected utility of voter i evaluated at the beginning of $t = 1$ is given by the discounted sum of the benefits from the public project and from the ideological policy. We distinguish two cases.

(i) If the same politician k is in office in both periods, lifetime utility is given by

$$V_i = g_1 - \epsilon_k \Delta + U_i^I(i_{k1}) + \beta[g_2 + \epsilon_k f \Delta + U_i^I(i_{k2})]. \tag{3}$$

(ii) If politician k is in office in period $t = 1$ and politician k' ($k' \neq k$) holds office in

[5] Our model and conclusions can also be applied to the case $f > 1$ when output shifting is potentially socially valuable.

period $t = 2$, lifetime utility is given by

$$V_i = g_1 - \epsilon_k \Delta + U_i^I(i_{k1}) + \beta[g_2 + U_i^I(i_{k'2})]. \tag{4}$$

The candidates derive utility from two sources.

- Office holding

  A policy-maker derives private benefits b from holding office, including monetary and non-monetary benefits such as power and enhanced career prospects. He incurs costs of $C(e_{kt}) = ce_{kt}^2$ $(c > 0)$ from exerting effort.

- Benefits from policies

  We assume that candidate L is a left-wing candidate, i.e. his most preferred point, denoted by μ_L with regard to policy I, satisfies $\mu_L < \frac{1}{2}$. Similarly, candidate R is a right-wing candidate with an ideal point $\mu_R > \frac{1}{2}$. To simplify the exposition, we assume that $\frac{1}{2} - \mu_L = \mu_R - \frac{1}{2}$. Hence the candidates' ideal points are symmetrically distributed around the median's ideal point of $\frac{1}{2}$. Moreover, the candidates derive the same benefits from public projects as voters.

To describe the overall utility of politicians, we have to distinguish four cases. For example, politician R's lifetime utility, denoted by V_R, can be computed as follows:

(i) If R is in office over both periods:

$$V_R = b - (i_{R1} - \mu_R)^2 - ce_{R1}^2 + g_1 - \epsilon_R \Delta + \beta[b - (i_{R2} - \mu_R)^2 - ce_{R2}^2 + g_2 + \epsilon_R f \Delta].$$

(ii) If R is in office in $t = 1$ only:

$$V_R = b - (i_{R1} - \mu_R)^2 - ce_{R1}^2 + g_1 - \epsilon_R \Delta + \beta[-(i_{L2} - \mu_R)^2 + g_2].$$

(iii) If R is in office in $t = 2$ only:

$$V_R = -(i_{L1} - \mu_R)^2 + g_1 - \epsilon_L \Delta + \beta[b - (i_{R2} - \mu_R)^2 - ce_{R2}^2 + g_2].$$

(iv) If R never is in office:

$$V_R = -(i_{L1} - \mu_R)^2 + g_1 - \epsilon_L \Delta + \beta[-(i_{L2} - \mu_R)^2 + g_2 + \epsilon_L f \Delta].$$

2.4 Parameter Assumptions

Throughout the paper, we assume $\frac{f\Delta}{\gamma} < A$. This assumption ensures that re-election probability in equilibrium is below 1. Moreover, we assume that b is sufficiently large, so that candidates will prefer to be in office under any of the circumstances we consider. To simplify the exposition, we assume $\beta = 1$. The extension to $\beta < 1$ is straightforward.

2.5 The Overall Game

We summarize the overall game in the following figure:

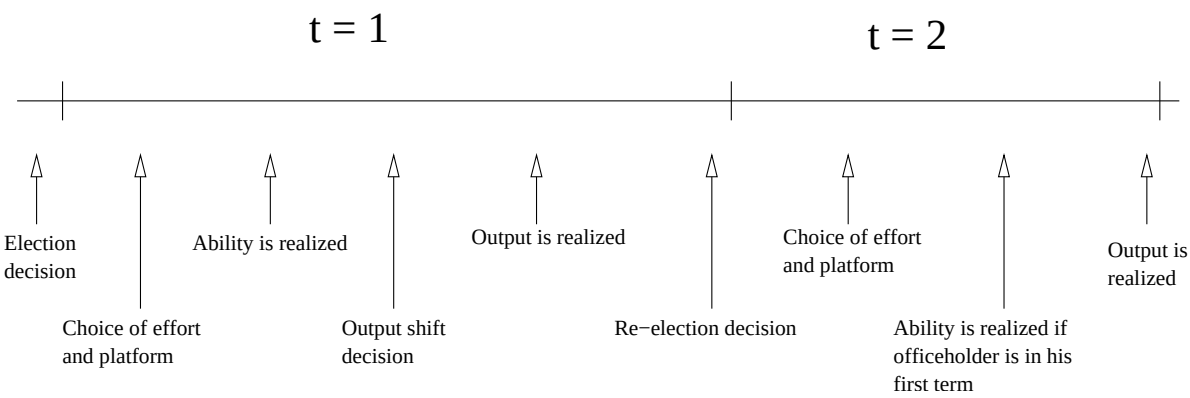

Figure 1: Time-line with standard elections

2.6 Assumptions and Equilibrium Concept

We assume that politicians cannot commit themselves to a policy platform. Voters observe the policy maker's choice with regard to policies I and O. Moreover, we assume that voters observe only output g_1 and not its composition between effort and ability.[6] Output g_1 is not contractible so it cannot be used to generate rewards for politicians beyond elections. Finally, voters observe whether the incumbent shifts output or not.

[6]This assumption follows Alesina and Tabellini (2007).

Moreover, citizens are assumed to vote sincerely, i.e. they vote for the candidate from whom they expect a higher utility.[7] We are looking for perfect Bayesian Nash equilibria for the game under these assumptions.

3 Elections Alone

We first examine the standard case where elections are held before the first and second term start. The candidate with the higher share of votes will be elected. If both candidates obtain the same share of votes, the probability of each candidate to win in the first period is 0.5. In the second period, we consider the tie-breaking rule determining that in this case, the incumbent will be elected.

3.1 The Second Period

As candidates cannot commit to policy platforms, a policy-maker will choose his most preferred platform in the second period. The amount of the public project depends on whether the policy-maker is in his first term and does not know his ability, or whether he is in his second term and has observed his ability in period 1. In the Appendix, we show.

Proposition 1

Suppose that candidate k is elected at date $t = 2$. Then

(i) he will choose $i_{k2} = \mu_k$ for policy I;

(ii) irrespective of whether k is in his first or second term, he will choose $e^*_{k2} = \frac{\gamma}{2c}$;

(iii) the expected utility of a policy maker at the beginning of period 2 is given by

α) first-term policy maker: $V^*_{k2} = b + \frac{\gamma^2}{4c}$

β) second-term policy maker: $V^*_{k2} = b + \frac{\gamma^2}{4c} + \gamma a_k + \epsilon_k f \Delta$.

[7] Obviously, with a continuum of voters, the individual voter has no influence on the outcome of an election. The optimality of sincere voting can be justified for a model variant with a large but finite number of voters or when the act of voting generates benefits.

(iv) The expected utility of the politician $k' \neq k$ who has lost the second election is given by

α) $V^D_{k'2} = \gamma\left(\frac{\gamma}{2c}\right) - (\mu_R - \mu_L)^2 + \epsilon_k f \Delta$ *if k has been in office in the first period*

β) $V^D_{k'2} = \gamma\left(\frac{\gamma}{2c}\right) - (\mu_R - \mu_L)^2$ *if k' has been in office in the first period.*

3.2 The First Period

We now look at the equilibria in the first period. As the candidates' ideal points are distributed symmetrically around the median voter's ideal point, the probability of each candidate winning is one half. Once in office, the candidate has to choose e_{k1} and i_{k1}. Without loss of generality, we assume that candidate R has been elected. We first make two simple observations that will hold in every equilibrium with pure strategies.

Fact 1

Suppose that candidate R is elected at date $t = 1$. Then

(i) he will choose $i_{R1} = \mu_R$;

(ii) voters will perfectly infer the ability of the policy-maker at the end of period 1.

The first fact is obvious, as voters know that policy-makers will choose their bliss points in the last period. So politician R will not gain more votes in the second election by choosing a different platform than μ_R in period 1. The second fact follows from the informational structure of the game. As candidates will observe their ability after they have exerted effort, in any pure strategy equilibrium, exactly one level of effort will be chosen and expected by the voters. Any deviation of g_t from the expected effort multiplied by γ will be interpreted correctly as variation in ability.[8]

Now we derive the optimal choice of effort by the office holder in the first period. For this purpose, a few preliminary steps are necessary. Let $\hat{e}_1$ denote the public's expectations about the incumbent's effort level in the first period. We have to distinguish

[8] Formally, $a_R = \frac{g_t - \gamma \hat{e}_1}{\gamma}$, where $\hat{e}_1$ is the effort level expected by the electorate.

between three cases. First, candidate R's ability may be so high that he will be re-elected even if he does not choose output-shift policies. In this case, he will not choose output-shift policies ($\epsilon_R = 0$) and will be re-elected. We use $p^0(e_{R1}, \hat{e}_1)$ to denote the probability the office holder assigns to this eventuality. Second, the office holder may have an intermediate level of ability, which implies that he will be re-elected only if he chooses the output-shift policy ($\epsilon_R = 1$). Because we have assumed that b is sufficiently high, the office holder will choose the socially detrimental option $\epsilon_R = 1$, which implies re-election. We introduce $p^1(e_{R1}, \hat{e}_1)$, which represents the incumbent's estimate of the probability of this eventuality. Third, candidate R's ability may turn out to be very low. As a result, he will never be re-elected, irrespective of his decision about output-shift policies. In this case, it is optimal to choose $\epsilon_R = 0$. The probability of this happening is $1 - p^0(e_{R1}, \hat{e}_1) - p^1(e_{R1}, \hat{e}_1)$.

Finally, we introduce $\widetilde{a}_R(e_{R1}, \hat{e}_1)$ as candidate R's expected level of ability conditional on the fact that he is re-elected. In the Appendix, we show

Fact 2

$$p^0(e_{R1}, \hat{e}_1) = \frac{1}{2}\left(1 + \frac{1}{A}(e_{R1} - \hat{e}_1)\right), \tag{5}$$

$$p^1(e_{R1}, \hat{e}_1) = \frac{f\Delta}{2A\gamma}, \tag{6}$$

$$\widetilde{a}_R(e_{R1}, \hat{e}_1) = \frac{A + \hat{e}_1 - e_{R1} - \frac{f\Delta}{\gamma}}{2}. \tag{7}$$

Note that the probability of R's being re-elected, which is given by $p^0(e_{R1}, \hat{e}_1) + p^1(e_{R1}, \hat{e}_1)$, increases in e_{R1}. In terms of given expectations about his effort $\hat{e}_1$, the office holder can improve the public's estimate of his ability by exerting more effort. A more favorable evaluation of his ability increases the incentives of voters to vote for him. Similarly, we can explain why the expected level of R's ability contingent on the fact of his being re-elected decreases with e_{R1}. Increases in e_{R1} imply that R will be re-elected even if he displays lower levels of ability. As a consequence, $\widetilde{a}_R(e_{R1}, \hat{e}_1)$ is lower.

Now the incumbent's optimization problem can be stated in the following way:

$$\max_{e_{R1}\geq 0}\Bigg\{ b+\gamma e_{R1}-ce_{R1}^2-p^1(e_{R1},\hat{e}_1)\Delta(1-f) \\ +\left(p^0(e_{R1},\hat{e}_1)+p^1(e_{R1},\hat{e}_1)\right)\left(b+\gamma\left(\frac{\gamma}{2c}+\widetilde{a}_R(e_{R1},\hat{e}_1)\right)-\frac{\gamma^2}{4c}\right) \\ +\left(1-p^0(e_{R1},\hat{e}_1)-p^1(e_{R1},\hat{e}_1)\right)\left(\frac{\gamma^2}{2c}-(\mu_R-\mu_L)^2\right)\Bigg\} \tag{8}$$

Here, we have used the facts that candidate R is re-elected with probability $p^0(e_{R1},\hat{e}_1)+p^1(e_{R1},\hat{e}_1)$ and dismissed with probability $1-p^0(e_{R1},\hat{e}_1)-p^1(e_{R1},\hat{e}_1)$. With probability $p^1(e_{R1},\hat{e}_1)$, net losses $\Delta(1-f)$ occur as a result of output-shift policies.

We are now in a position to calculate the effort level chosen by candidate R in the first period. In the Appendix we show

Proposition 2

(i) The policy-maker R chooses $e^*_{R1}=\frac{1}{2c}\left\{\gamma+\frac{1}{2A}[b-\frac{\gamma^2}{4c}-f\Delta+(\mu_R-\mu_L)^2]\right\}$.

(ii) The probability of R choosing $\epsilon_R=0$ and being re-elected is given by

$$p^0(e^*_{R1},e^*_{R1})=\frac{1}{2}. \tag{9}$$

(iii) The probability of R choosing $\epsilon_R=1$ and being re-elected is given by

$$p^1(e^*_{R1},e^*_{R1})=\frac{f\Delta}{2A\gamma}. \tag{10}$$

(iv) The average ability level of a re-elected candidate corresponds to

$$\widetilde{a}_R(e^*_{R1},e^*_{R1})=\frac{A-\frac{f\Delta}{\gamma}}{2}. \tag{11}$$

The equilibrium effort e^*_{R1} depends on the parameters in an intuitive way. The larger the utility loss of the incumbent if he is deselected, i.e. the larger $(M_R-M_L)^2$ and b, the higher the effort the politician is willing to invest. The higher A, the lower the marginal gain in re-election chances when R marginally increases effort. Accordingly, greater uncertainty regarding quality will depress effort. The impact of γ is more

subtle. On the one hand, higher γ increases the marginal value of higher effort today and the value of office tomorrow, which both motivate R to invest more effort. On the other hand, higher γ increases the utility in period 2 when the opponent is in office and increases the losses if the incumbent is re-elected with lower ability than average. These two effects reduce the effort choice of R.

Proposition 2 reveals a particular type of inefficiency associated with the fact that incumbents with an ability level below average may ensure re-election by choosing output-shift policies. This happens with probability $p^1(e^*_{R1}, e^*_{R1})$. The socially optimal re-election rule would stipulate that a candidate R will be re-elected if and only if his ability is equal or above average, i.e. if $a_R \geq 0$. This would imply that the average ability level of a re-elected politician would amount to $A/2$. With standard elections, this average level is lower, namely $\widetilde{a}_R(e^*_{R1}, e^*_{R1}) = \frac{A - \frac{f\Delta}{\gamma}}{2}$. In the following, we will see that vote-share contracts can alleviate this particular type of inefficiency and can increase the output of the public project.

4 Vote-Share Contracts

4.1 Vote-Shares as Political Contracts

In this section, we allow both candidates to offer vote-share contracts by stipulating a vote-share threshold s_k with $\frac{1}{2} \leq s_k \leq 1$. Throughout the section, we assume that $\frac{2\mu_R - 1}{2A\gamma} < \frac{1}{2}$, which ensures interior solutions.[9] The interpretation is as follows: If politician k takes office in $t = 1$, he must win a share of votes at least equal to s_k at the next election date if he wants to retain office. Otherwise, the challenger will take office. Hence, the incumbent faces a self-imposed vote threshold in the election at the end of period 1.

The vote-share threshold is a particular type of political contract. Generally, political

[9] Corner solutions are an important variant of our model. If $\frac{2\mu_R - 1}{2A\gamma} > \frac{1}{2}$, the incumbent may have an incentive to renounce exerting high effort, since reelection chances are too low or zero when vote-share thresholds are high.

contracts are verifiable election promises, associated with rewards or sanctions depending on whether promises are kept or not. They describe what a politician is willing to offer to society. Political contracts have to be approved by an independent body.

The timing of the extended game is summarized in the following figure:

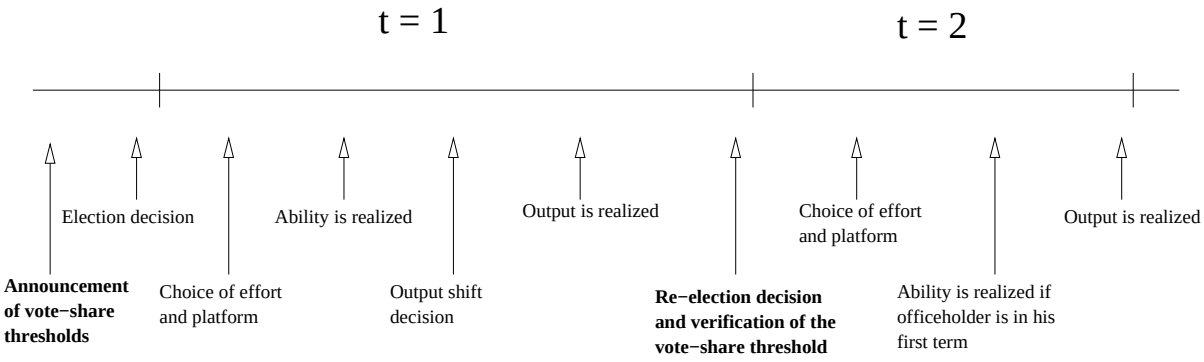

Figure 2: Time-line with elections and vote-share contracts

4.2 The Second and First Period

For the first step of the analysis, we assume that a candidate k, say R, has been elected with a vote-share threshold $s_R \geq \frac{1}{2}$.

In the second period, the choice regarding P and I by R (if he remains in office), or by L (if he enters office) will remain the same as in Proposition 2. However, the election probabilities of R and L will change in period 2, which will be examined next.

In the Appendix, we show that equations (5), (6), and (7) have to be modified in the following way:

Fact 3

$$p^0(e_{R1}, \hat{e}_1) = \frac{1}{2}\left(1 + \frac{1}{A}\left(e_{R1} - \hat{e}_1 - \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1)\right)\right), \tag{12}$$

$$p^1(e_{R1}, \hat{e}_1) = \frac{f\Delta}{2A\gamma}, \tag{13}$$

$$\widetilde{a}_R(e_{R1}, \hat{e}_1) = \frac{A + \hat{e}_1 + \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1) - e_{R1} - \frac{f\Delta}{\gamma}}{2}. \tag{14}$$

It is straightforward to see that these equations correspond to equations (5), (6) and (7) for $s_R = \frac{1}{2}$.

The optimal choice of e_{R1} is the solution to the optimization problem (8), together with equations (12), (13), and (14). Equilibrium values with vote-shares are labelled by V. In the Appendix, we show

Proposition 3

(i) $e^{*V}_{R1} = \frac{1}{2c}\left\{\gamma + \frac{1}{2A}\left[b - \frac{\gamma 2}{4c} + (2\mu_R - 1)(2s_R - 1) - f\Delta + (\mu_R - \mu_L)^2\right]\right\}$

(ii) The probability of R choosing $\epsilon_R = 0$ and being re-elected is given by

$$p^{0V}(e^{*V}_{R1}, e^{*V}_{R1}) = \frac{1}{2} - \frac{(2\mu_R - 1)(2s_R - 1)}{2A\gamma}. \tag{15}$$

(iii) The probability of R choosing $\epsilon_R = 1$ and being re-elected is given by

$$p^{1V}(e^{*V}_{R1}, e^{*V}_{R1}) = \frac{f\Delta}{2A\gamma}. \tag{16}$$

(iv) The average ability level of a re-elected candidate corresponds to

$$\widetilde{a}^V_R(e^{*V}_{R1}, e^{*V}_{R1}) = \frac{A + \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1) - \frac{f\Delta}{\gamma}}{2}. \tag{17}$$

We observe that the equilibrium effort level is higher compared to standard elections. The intuition is that the marginal gain from higher effort is increasing with a higher vote-share threshold.

Note that the average ability level of a re-elected candidate, given by $\widetilde{a}^V_R(e^{*V}_{R1}, e^{*V}_{R1})$, is increasing in s_R. Thus, larger vote shares increase the average ability of re-elected incumbents.

4.3 Competition for Vote-Share Contracts and Welfare

Finally, we consider the initial stage when both candidates compete for office with vote-share contracts. We call a vote-share threshold ex ante optimal if it maximizes expected aggregated utility.[10] For that purpose, we define the optimal vote-share from the perspective of the median voter. This vote-share is denoted by s^* and is the solution of the following problem.[11]

$$\max_{\frac{1}{2}\leq s_R\leq 1}\left\{\gamma e_{R1}^{*V}+\left(p^{0V}(e_{R1}^{*V},e_{R1}^{*V})+p^{1V}(e_{R1}^{*V},e_{R1}^{*V})\right)\gamma\tilde{a}_R^V(e_{R1}^{*V},e_{R1}^{*V})\right\} \tag{18}$$

We obtain

Fact 4

$$s^*=\min\left\{\frac{1}{2}+\frac{f\Delta}{2(2\mu_R-1)}+\frac{\gamma^2}{4c(2\mu_R-1)};1\right\}. \tag{19}$$

The fact is proven in the Appendix.[12] We are now ready to state our main theorem.

Theorem 1

(i) In the first campaign, both candidates R and L offer s^*. Each candidate wins the election with probability 0.5.

(ii) $s^*>\frac{1}{2}$

(iii) s^* is the ex ante optimal vote-share.

Proof of Theorem 1

We first observe that the re-election probability of an incumbent offering s^* is larger than $\frac{f\Delta}{2A\gamma}$, as $p^{0V}(e_{R1}^{*V},e_{R1}^{*V})>0$ according to our assumption $\frac{2\mu_R-1}{2A\gamma}<\frac{1}{2}$. Hence, according to our general assumption that b is sufficiently large, the incumbent has no

[10] Precisely, an optimal vote-share threshold maximizes aggregate utility when voters can impose vote-share thresholds and use elections to select a candidate.

[11] Note that the expected utility of a new candidate is zero.

[12] The vote-share threshold s^* is larger than $\min\left\{\frac{1}{2}+\frac{f\Delta}{2(2\mu_R-1)};1\right\}$, which is the vote-share threshold ensuring that the incumbent will be re-elected if and only if his ability is equal to or greater than zero. The median voter trades off higher effort versus lower re-election probability of incumbents with high ability.

incentive to exert lower effort, thereby losing his chances of getting re-elected. If a candidate deviates from s^* (higher or lower vote shares), he will not be elected, as the median voter is better off with the candidate offering s^*. Hence, deviation is not profitable. Uniqueness of the equilibrium choice s^* follows from the same considerations. If a candidate chooses a share $s_k \neq s^*$, the other candidate k' can win the election with certainty by choosing a vote-share threshold marginally closer to s^*. The second point is obvious. For the third point, we observe that any other vote-share threshold lowers the expected utility derived from public projects, as citizens are homogeneous with respect to public project provision. Due to the symmetry of ideal points of candidates and voters, aggregate utility from the ideological project does not depend on whether the left- or right-wing candidate is elected. This proves the Theorem.

■

The consequence of the Theorem is that vote-share contracts lead to higher welfare than standard elections. Vote-share contracts induce higher efforts and curb the incumbency advantage in the sense that the ability of re-elected incumbents is above average. We stress that vote-share contracts cannot avoid all inefficiencies. Once in office, politicians will still shift output from one office period to the other, which is socially wasteful.

A final remark is in order. The utility of the politicians in office is negligible in our model, as we have a continuum of voters. Here, their utility does not affect welfare considerations. In a finite version of our model, the utility of the politician and the cost of exerting effort will affect the welfare optimizing vote-share threshold. As a result, the welfare-optimal vote-share in a finite version of our model tends to be slightly lower.

5 Extensions and Ramifications

We have illustrated the working of vote-share contracts in a simple model. Numerous extensions can and should be pursued to address the robustness and validity of the argument for using vote-threshold contracts in a broader context.

5.1 Communication Advantage

It is useful to consider other sources of incumbency advantage. Suppose that candidates can commit to a specific platform regarding ideological policy during campaigns. The final position a candidate will adopt when he is in office differs, however, by some random disturbance. Suppose a candidate can achieve a communication advantage when he is in office, e.g. uncertainty (variance) about implemented policies is usually lower for incumbents than it is for challengers (Bernhardt and Ingbermann (1985)). Such an incumbent will move towards his own preferred position in the next election. Vote-share contracts can draw the platform choice of the incumbent towards the center, and by using the approach set out in Gersbach (1992), one can show that it is welfare-improving from a utilitarian perspective.[13]

5.2 Learning by Doing

Another fruitful extension is learning by doing. Suppose the politician in office experiences learning effects during the first term in office. Then, his marginal effort costs may decline for the second term. The incumbent will thus have an election probability higher than one-half. In contrast to the output-shift case, however, the source of the incumbency advantage is now socially desirable ex ante. As competing candidates will choose welfare-optimal vote-share thresholds, the positive welfare effect of vote-share thresholds tends to hold.

5.3 Alternative Election Procedures

Two alternative election procedures involving vote-share contracts can be considered. First, an election procedure would be a separate election between a new right-wing candidate and candidate L if the incumbent R does not win at least the self-imposed share of votes s_i. Such a procedure ensures that politicians are only elected if they

[13] The situation is more complicated, but qualitatively the same, if two new candidates with different communication skills compete for office on the basis of vote-share contracts.

receive at least 50% of the votes. Second, instead of the candidates, society may impose a term-dependent vote share or reelection threshold. Both variants of the model yield the same (latter version) or qualitatively similar results (former version). The result is obvious for the latter version. The public will set the threshold s^*, as any other threshold will lower the utility of all voters, given the election of one of the candidates. Details on the former version are available upon request.

5.4 Repeated Competition with Vote-share Contracts

A useful extension of the model is to consider a larger time horizon or a version of the model with an infinite horizon, where candidates for public office compete in each term on the basis of vote-share contracts. In such a framework, the election hurdle will typically increase with the number of terms an incumbent stays in office. We conjecture that vote-share contracts are also welfare-improving in this type of dynamic versions of our model.

5.5 No Output-Shift Policy

A final and important remark concerns the risk of using vote-share thresholds, i.e. whether competition with vote-share thresholds could lower welfare. Suppose, for example, that socially wasteful output-shifts are not possible. Vote-share contracts are still welfare-improving, as they increase effort. So in our model, competition for vote-share contracts does not produce down-side risk in terms of welfare.

5.6 Constraining Government Debt Accumulation

Increasing vote-share thresholds can also be used to constrain government debt accumulation. Suppose the government wants to issue debt beyond normal rules. A standard rule is e.g. to constrain public debt financing by government net investment. Possible exceptions are recessions or natural disasters. We suggest using the following correction mechanism when governments have issued debt beyond normal rules: The

government can roll over the exceptional debt from year to year, but for this it needs the support of the parliament. The required vote-share threshold is increasing over time, which makes rolling over debt more and more difficult. Such a rule allows the legislature to determine the timing of fiscal consolidation and also ensures that exceptional debt will eventually be repaid if the limit of the vote-share threshold schedule is set close to the unanimity rule. Moreover, if the same vote-share threshold needs to be applied to situations when the government wants to issue new exceptional debt although past exceptional debt has not yet been repaid, accumulation of exceptional debt is also excluded.

6 Conclusion

We have made a simple proposal for improving the functioning of liberal democracy. Of course, institutional changes may trigger feedback and consequences that are unintended and unknown yet, both when the change is proposed and when it actually happens. Nevertheless, vote-share contracts are a new institution that liberal democracies would be well-advised to explore.

Appendix

Proof of Proposition 1

The first point is obvious. Suppose next that in $t = 2$, the politician is in his first term. Accordingly, he does not know his ability yet. His problem is given by

$$\max_{e_{k2}}\{\mathbb{E}[\gamma(e_{k2} + a_k)] - ce_{k2}^2\}.$$

The solution is given by $e_{k2} = \frac{\gamma}{2c}$. Suppose that the politician is in his second term and has observed his ability in the first period. His problem is given by

$$\max_{e_{k2}}\{\gamma(e_{k2} + a_k) - ce_{k2}^2\},$$

which yields the same solution. The expected utility for the first-term office holder from the public project is given by $\gamma\left(\frac{\gamma}{2c}\right) - c\left(\frac{\gamma}{2c}\right)^2 = \frac{\gamma^2}{4c}$. For an office holder in his second term, the corresponding utility is

$$\gamma\left(\frac{\gamma}{2c} + a_k\right) - c\left(\frac{\gamma}{2c}\right)^2 = \frac{\gamma^2}{4c} + \gamma a_k.$$

■

Proof of Fact 2

In the following we consider the re-election decision of the median voter $i = \frac{1}{2}$. It is optimal for the median voter to re-elect R if this implies that the median voter's utility in the second period is higher. Formally, this can be stated as

$$\gamma\left(e_2^* + (a_R + e_{R1} - \hat{e}_1)\right) + \epsilon_R f\Delta \geq \gamma e_2^*, \tag{20}$$

$$\gamma\left(a_R + e_{R1} - \hat{e}_1\right) + \epsilon_R f\Delta \geq 0, \tag{21}$$

$$a_R \geq -\epsilon_R \frac{f\Delta}{\gamma} - e_{R1} + \hat{e}_1, \tag{22}$$

where we have applied the observation that upon observing g_1, the median voter expects the ability level of R to be $\frac{g_1}{\gamma} - \hat{e}_1 = a_R + e_{R1} - \hat{e}_1$. The above condition states that R

is re-elected if his ability level is equal or above the critical level $-\epsilon_R \frac{f\Delta}{\gamma} - e_{R1} + \hat{e}_1$.[14]

Now we turn to R's decision about ϵ_R. If $a_R \geq -e_{R1} + \hat{e}_1$, then R is re-elected even for $\epsilon_R = 0$. Then, it is optimal to choose $\epsilon_R = 0$, which eliminates the losses from output-shift policies. Applying the fact that a_R is uniformly distributed on $[-A; +A]$, we conclude that the probability of a_R being higher than $-e_{R1}+\hat{e}_1$ amounts to $p^0(e_{R1}, \hat{e}_1) = \frac{A+(e_{R1}-\hat{e}_1)}{2A}$. If $-e_{R1} + \hat{e}_1 > a_R \geq -e_{R1} + \hat{e}_1 - \frac{f\Delta}{\gamma}$, then it is optimal to choose $\epsilon_R = 1$, which prevents the office holder from being dismissed. The probability of a_R lying in this interval is given by $\frac{f\Delta}{2A\gamma}$, because the length of the interval amounts to $\frac{f\Delta}{\gamma}$. Finally, for $a_R < -e_{R1} + \hat{e}_1 - \frac{f\Delta}{\gamma}$, R's ability is too low to enable him to become re-elected. This will induce him to refrain from ultimately fruitless efforts to increase his re-election chances by pursuing output-shift policies ($\epsilon_R = 0$).

It remains to derive the expression for $\widetilde{a}_R(e_{R1}, \hat{e}_1)$ stated in the text. Recall that this variable denotes the ability level of R, conditional on the fact that he is re-elected. We have already shown that R is re-elected if and only if $a_R \geq -e_{R1} + \hat{e}_1 - \frac{f\Delta}{\gamma}$. The arithmetical average of $-e_{R1} + \hat{e}_1 - \frac{f\Delta}{\gamma}$ and A yields the desired expression, i.e. $\widetilde{a}_R(e_{R1}, \hat{e}_1) = \frac{A+\hat{e}_1-e_{R1}-\frac{f\Delta}{\gamma}}{2}$.

■

Proof of Proposition 2

Together with equations (5), (6), and (7), the maximization problem (8) yields the following first-order condition:

$$\gamma - 2ce_{R1} + \frac{1}{2A}\left(b + \frac{\gamma^2}{4c} + \frac{\gamma\left(A - \frac{f\Delta}{\gamma} + \hat{e}_1 - e_{R1}\right)}{2}\right)$$
$$-\frac{\gamma}{2}\left(\frac{e_{R1} - \hat{e}_1}{2A} + \frac{1}{2} + \frac{f\Delta}{2A\gamma}\right) - \frac{1}{2A}\left(\frac{\gamma^2}{2c} - (\mu_R - \mu_L)^2\right) = 0.$$

In equilibrium, $\hat{e}_1 = e_{R1}$ will hold, so the equilibrium effort e^*_{R1} is given by

$$2ce^*_{R1} = \gamma\left(1 + \frac{1}{4} - \frac{1}{4}\right) + \frac{b}{2A} - \frac{\gamma^2}{8Ac} + \frac{1}{2A}(\mu_R - \mu_L)^2 - \frac{f\Delta}{2A}$$

[14] For simplicity, we use the tie-breaking rule that the incumbent is re-elected if he receives exactly half of the votes.

or

$$e^*_{R1} = \frac{1}{2c}\left\{\gamma + \frac{1}{2A}[b - \frac{\gamma^2}{4c} - f\Delta + (\mu_R - \mu_L)^2]\right\}.$$

■

Proof of Fact 3

The derivation of (12), (13), and (14) is very similar to the derivation of (5), (6), and (7). However, with $s_R > \frac{1}{2}$, candidate R is re-elected only if voter $i = 1 - s_R$ prefers to vote for R, which implies that all voters with $i > 1 - s_R$ also prefer R to L.[15] This leads to the following condition:

$$\gamma\left(e_2^{*V} + (a_R + e_{R1} - \hat{e}_1)\right) + \epsilon_R f\Delta - (\mu_R - (1 - s_R))^2 \geq \gamma e_2^{*V} - (\mu_L - (1 - s_R))^2. \quad (23)$$

Using $\mu_L = 1 - \mu_R$, this can be rewritten as

$$a_R \geq -\epsilon_R \frac{f\Delta}{\gamma} - e_{R1} + \hat{e}_1 + \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1). \quad (24)$$

The right-hand side of this inequality gives the minimum ability that R must have in order to be re-elected. The higher the fraction s_R, the higher this minimum ability.

With this condition it is straightforward to show that (5), (6), and (7) generalize to (12), (13), and (14).

■

Proof of Proposition 3

The problem of the incumbent is the same as in Proposition 2, except that we have to use equations (12), (13), and (14) rather than (5), (6), and (7). Then, the first-order

[15] We use the tie-breaking rule that the incumbent is re-elected if he receives exactly s_R votes.

condition of the maximization problem (8) is given by

$$\gamma - 2ce_{R1} + \frac{1}{2A}\left(b + \frac{\gamma^2}{4c} + \frac{\gamma\left(A + \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1) - \frac{f\Delta}{\gamma} + \hat{e_1} - e_{R1}\right)}{2}\right)$$
$$-\frac{\gamma}{2}\left(\frac{A - \frac{1}{\gamma}(2\mu_R - 1)(2s_R - 1) + \frac{f\Delta}{\gamma} + e_{R1} - \hat{e_1}}{2A} + \frac{f\Delta}{2A\gamma}\right)$$
$$-\frac{1}{2A}\left(\frac{\gamma^2}{2c} - (\mu_R - \mu_L)^2\right) = 0.$$

In equilibrium, $\hat{e}_1 = e_{R1}$ must hold, so the equilibrium effort e_{R1}^{*V} is given as

$$e_{R1}^{*V} = \frac{1}{2c}\Big\{\gamma + \frac{1}{2A}\left[b - \frac{\gamma 2}{4c} + (2\mu_R - 1)(2s_R - 1) - f\Delta + (\mu_R - \mu_L)^2\right]\Big\}.$$

■

Proof of Fact 4

Together with equations (15), (16), and (17) the maximization problem (18) yields the following first-order condition:

$$\frac{(2\mu_R - 1)\gamma}{2Ac} - \frac{(2\mu_R - 1)}{A\gamma}\Big(\frac{A\gamma + (2\mu_R - 1)(2s_R - 1) - f\Delta}{2}\Big)$$
$$+(2\mu_R - 1)\Big(\frac{1}{2} - \frac{(2\mu_R - 1)(2s_R - 1) - f\Delta}{2A\gamma}\Big) = 0.$$

Solving for s_R yields $s^* = \frac{1}{2} + \frac{f\Delta}{2(2\mu_R - 1)} + \frac{\gamma^2}{4c(2\mu_R - 1)}$.

■

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