Good Policy Choices Even When Voters Entertain Biased Beliefs: A Model with Endogenous Valence

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Abstract

We introduce the psychological concept of mental models to address voters' naive reasoning about the economy and thereby explain the persistent bias in beliefs. We then develop a game-theoretical model to show that this does not automatically lead to bad policy choices, as has been argued. We introduce endogenous party valence to a model of probabilistic voting and provide an investigation of when good policies are chosen in democracy. Based on our findings, we discuss the impact of different political institutions on economic outcomes.

Keyword: Voting behaviour, dynamic party competition, valence, VP-functions, biased voting

JEL Codes: D72, D78, D83, D90, P16

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1. Introduction

In his provocative monograph “The Myth of the Rational Voter – Why Democracies Choose Bad Policies”, Bryan Caplan (2007) shows that voters entertain biased beliefs about a number of fundamental economic (policy) issues. Among other things, they massively underestimate the benefits from market exchange and foreign trade. Drawing on concepts of social psychology and focussing on the dynamics of social cognition, Bénabou (2008) shows that biased beliefs on important political issues like the optimal scope of markets and government can be persistent because it is individually rational to ignore contradicting signals. Caplan concludes that Condorcet’s Jury Theorem does not apply, therefore. Instead, democratic mechanisms of preference aggregation lead to bad policy choices compared to the case where voters’ beliefs are unbiased. He touches on a number of factors that might improve the policy choices but dismisses them as too weak (e.g. Caplan 2007: chapt. 6 and 7). We argue that he may be over-hasty in his conclusion. More specifically, we challenge his thought experiment 4 in which he argues that even retrospective voting based on the government’s economic performance is insufficient to set incentives for parties to choose good economic policies.[1]

The paper is organized as follows: In the next section, we relate our approach and the contribution of the paper to the existing literature. In section 3, we provide a model of party competition that introduces the concepts of mental models and endogenous valence to the spatial theory of voting. Section 4 provides a game-theoretic analysis which demonstrates that democratic party competition may lead to good policy choices even when voters’ beliefs are biased. Section 5 discusses the implications of our findings for the performance of different political institutions and concludes.

2. Relation to the Literature

The question whether “democracy”—in the sense of popular government—produces good outcomes is old. Plato and Aristotle distinguished a “good” and a “bad” form of popular government: in the good form leaders are interested in common welfare, whereas the bad is a depraved form, characterized by (solely) self-interested leaders (e.g. Inglis and Robertson 2006: 6). The public choice literature re-introduced the perspective that politicians, parties, and governments are, respectively consist of individuals who are primarily self-interested and adapt to

[1] Some authors have challenged his view on different grounds (e.g. Lomarsky 2008; Tullock 2008).

incentives (e.g. Brennan 2008; Grant 2008; Shughart 2006). It has been exactly this drop of the implicit orthodox faith in benevolent political institutions that made the power of the public choice revolution (e.g. Shughart and Tollison 2005). Rent-seeking and other activities of bureaucrats, politicians and other interest groups cause inefficient democratic outcomes (e.g. Stokes 1963; Niskanen 1975; Tollison 1982; Shughart and Razzolini 2001). Thus, institutions like taxes or tariffs, and other interventions, are not created to be socially efficient, but serve the interests of those with the bargaining power to create them (e.g. North 1994: 360). Following this insight, a lot of economic policy failures have been explained by failures in the political sphere. Democratic elections, therefore, do not, *per se*, generate efficient outcomes, as Caplan states. However, a lot of authors are less pessimistic than Caplan. To overcome the political failures at the side of politicians and of lobbying, optimal remuneration of politicians (e.g. Besley 2004; Poutvaara and Takalo 2007), different forms of incentive contracts (e.g. Gersbach 2004, 2007a; Gersbach and Liessem 2007), term limits (e.g. Smart and Sturm 2004), and constitutional rules have been proposed (e.g. Buchanan and Tullock 1962; Gersbach 2005; Gersbach, forthcoming).

While the public choice literature primarily emphasizes on opportunistic politicians, bureaucrats or interest groups to explain poor policy outcomes, Caplan (2007) shifts the focus to the role of voters and points at their biased beliefs as an additional source of inefficiency. In line with this emphasis, Beilharz (2005) and Beilharz and Gersbach (2004), for instance, demonstrate how democracies may vote into crises, if voters do not include general equilibrium effects in reasoning about minimum wage regulation. As a consequence, unemployment and tax burden constantly rise and the economy moves toward crisis. Only if significant crises establish, voters will adjust opinions—and the bad policy may be reversed. Combining problems at the politicians' side and the voters' side, Gersbach (2007b) shows that if voters are unsure about the competence and the preferences of politicians, democracy will also lead to weak policies. He deduces a "paradox of competence" where welfare rises when voters disregard the competence of candidates and solely base their voting decision on their belief whether the candidate is concerned about the long-term effects of his decisions.

In this paper, we assume that beliefs remain biased even if economic outcomes are poor as it is implied by Caplan's results. We explain the persistent bias towards inadequate policies by voters who entertain over-simplified and biased mental models of the economy and do not have an incentive to learn about the correct mental model. At the same time, the empirical literature on vote-popularity (VP) functions shows that voters account for the economic performance of governments when deciding whether to support the current incumbent or vote for a change (e.g. Paldam 2004; Nannestad and Paldam 1994). Incumbents who manage to achieve good macroeconomic results are more likely to be re-elected than incumbents performing poorly. We interpret this as a rudimentary form of learning in the sense that voters update their beliefs concerning the incumbent's competence in economic policy issues. If his economic performance is good (bad), he is considered competent (incompetent). Thus, we endogenize the valence of parties and candidates. In a world with endogenous valence, parties and politicians who want to be re-elected have to take account of the valence perception of the voters. There is a trade-off between choosing policy platforms to maximize votes in the short run and building up valence to attract more votes in the future. Similar to Zakharov (2008), we show that parties strategically choose their platform in order to build up valence.

Our basic question is the following: When does democratic party competition generate good policy outcomes and when will policies be poor yet populist in equilibrium. Having provided this insight, we better understand when promising instruments like incentive contracts, or others, are required and what alternative instruments could be.

Very similar to Gersbach (2003, 2004), Gersbach and Liessem (2007), Liessem (2008), and Müller (2007) we use a model where parties have the option to choose a socially beneficial policy or a bad populist platform. Additionally, we provide an explanation for why voters stick to their biased beliefs. Moreover, we do not distinguish between "populists" and "statesman", respectively "policy success-seekers". We assume that parties are office-seekers and maximize the chances of being (re)elected over a particular span of time, which potentially covers several elections. In this sense we assume that parties are populist. Similar to Müller (2007) we demonstrate that despite purely populist parties socially beneficial outcomes can arise in equilibrium. Thereby, we challenge the pessimistic conclusion made by Caplan (2007).

3. The Basic Model

3.1 The Voting Decision

Let there be a finite number of *N* voters. Voter turnout is assumed to be 100 %. The utility of a single voter *i* in period *t* is given by a utility function

$$U_{it} = U_i(y_{it}, a_t) \tag{1}$$

with y_{it} being voter *i*'s income in period *t* and a_t an indicator or vector of indicators of macroeconomic performance, e.g. the change of the unemployment rate, economic growth, the level of inequality, or changes of the general tax burdens. That is, a voter's utility is determined by his[2] individual income y_{it} and, additionally, by the macroeconomic performance of the economy (or the society as a whole). Both determinants can be influenced by economic policy. Let η_t represent the multidimensional policy vector in period *t*, in which each row represents a certain policy field and the value of η_t in a certain row states which policy instrument is applied. For instance, one row could represent personal income taxation and the value of η_t in this row states whether the current government applies a dual income tax, a classical income tax, a flat tax or some other concept. Another row may represent wage policy and the value states whether or not there is a minimum wage. Depending on individual circumstances, different voters' income y_{it} may obviously be influenced by a given η_t in different ways, for instance, due to tax burden. Next to this direct effect, η_t also has an indirect impact on y_{it} by influencing the overall macroeconomic performance a_t which in turn has a direct impact on y_{it}. Moreover, y_{it} depends on the policies pursued in connection to voter *i*'s individual circumstances of living, e.g. the sector in which he is employed, his qualification etc. The income y_{it} is thus determined as follows:

$$y_{it} = y_i\left(\eta_t, a_t\left(\eta_t\right)\right) \qquad (2)$$

Overall, utility is determined by:

$$U_{it} = U_i\left(y_{it}\left(\eta_t, a_t\left(\eta_t\right)\right), a_t\left(\eta_t\right)\right) \qquad (3)$$

Due to the complexity of the economy and the fact that voters lack incentives to explore it in detail, the functional form of the functions a_t and y_{it} is unknown to the individual voter. Voters use their mental models in mental simulations to make predictions concerning the expected values of y_{it} and a_t depending on η_t (e.g. Johnson-Laird 1983; Bischoff 2007, 2008). The mental model mm_i can be thought of as a function assigning certain estimates for y_{it} and a_t to certain policy vectors, that is, $mm_i\colon \mathbb{R}^K \to \mathbb{R}^2$, with *K* being the number of policy dimensions in η_t. Estimated values are labelled by a hat, e.g., $\hat{a}_{it}$ represents the macroeconomic performance of the economy in period *t*, estimated by the mental model of voter *i*:

[2] It will be convenient to refer to the voters as 'he' with no implied value judgement attached to this designation.

$$\left\{\hat{y}_{it}\left(\eta_t\right), \hat{a}_{it}\left(\eta_t\right)\right\} = mm_i(\eta_t) \tag{4}$$

The mental model determines the voters' politico-economic view of the world. The policy platform η_i which—in the eyes of voter *i*—is the best, maximizes his utility $\hat{U}_{it}\left(\eta_t\right) = U_i\left(\hat{y}_{it}\left(\eta_t\right), \hat{a}_{it}\left(\eta_t\right)\right)$:

$$\eta_{it}^{opt} = \underset{\left\{\eta_t\right\}}{\arg\max}\ \hat{U}_{it}\left(\eta_t\right) \tag{5}$$

For reasons of simplicity, we assume that there are two competing political parties *A* and *B* which offer policy platform η_t^A, respectively η_t^B. In each election of term *t*, voters can choose between these two parties' platforms. The individual voter uses his mental model to estimate the consequences of the proposed policy platforms with respect to y_{it} and a_t, and thus for U_{it}. That is, the voter compares the two $\hat{U}_{it}^j = \hat{U}_{it}\left(\eta_t^j\right)$, $j = A, B$. Other things equal, voter *i* favours the party for which the estimated utility is larger.

In addition, we assume that voters account for the macroeconomic performance of the incumbent party, i.e. the party in government in term *t-1*. This assumption is backed by the literature on so-called vote-and-popularity (VP) functions (e.g. Paldam 2004; Nannestad and Paldam 1994). It shows that voters hold the government responsible for the macroeconomic performance, in particular for the unemployment rate and GDP-growth. They punish governments for bad economic results and reward them for good performance even if their individual prospects are not affected (e.g. Paldam 2004). By introducing this empirical result to our model, we endogenize the concept of valence (e.g. Zakharov 2008). Following Stokes (1963), valence refers to party or candidate characteristics, other than policy platforms, that codetermine voting behavior (e.g. Groseclose 2001). In our model, a party's valence reflects the degree to which voters consider the party capable of producing good economic outcomes (e.g. Ansolabehere and Snyder 2000). Incumbents who managed to achieve good macroeconomic results are considered competent and thus are assigned a high valence. The fact that voters are unable to predict the correct macroeconomic figures—as e.g. pointed out by Caplan (2007: chapt. 6)—does not challenge the empirical result of the literature on VP-functions. Nor does it challenge our above-named assumption, because the latter merely states that the voters, *ex post*, can tell good economic results from poor ones.

We assume that all voters basically assign the same valence to a particular party, for simplicity. Then, party *j*'s valence is determined in the following way:

$$\psi_{t+1}^{j}\left(\eta_t^j\right)=\begin{cases} a_t\left(\eta_t^j\right)/\bar{a} & \text{if party } j \text{ is in power in period } t \\ 1 & \text{otherwise} \end{cases} \tag{6}$$

where $\bar{a}$ is a constant benchmark value of the voters for the macroeconomic performance. This establishes a dynamic link between period *t* and *t+1*.[3]

The individual voting decision depends on the valence of the incumbent and the opposition party as well as on the policy platforms offered by them. Applying the concept of probabilistic voting yields the following expression for the probability π_{it}^{j} that voter *i* votes for party *j* in term *t*:

$$\pi_{it}^{j} = f_i(\psi_t^j, \psi_t^{-j}, \hat{U}_{it}^{j}, \hat{U}_{it}^{-j}) \tag{7}$$

$$\frac{\partial f_i}{\partial \psi_t^j} > 0, \quad \frac{\partial f_i}{\partial \psi_t^{-j}} < 0, \quad \frac{\partial f_i}{\partial \hat{U}_{it}^{j}} > 0, \quad \frac{\partial f_i}{\partial \hat{U}_{it}^{-j}} < 0 \tag{8}$$

We assume the non-negativity and the adding up conditions to hold:

$$\pi_{it}^{j} = 1-\pi_{it}^{-j} \in [0,1] \tag{9}$$

If $\psi_t^j = \psi_t^{-j}$ and $\hat{U}_{it}^{j} = \hat{U}_{it}^{-j}$, voter *i* is indifferent between the two parties and thus $\pi_{it}^{j} = \frac{1}{2}$. However, if $\hat{U}_{it}^{j}\left(\eta_t^j\right) = \hat{U}_{it}^{-j}\left(\eta_t^{-j}\right)$, voter *i* will rather vote for the party that has more valence, so that $\pi_{it}^{j} < \frac{1}{2}$ if $\psi_t^j < \psi_t^{-j}$, and *vice versa*. Being aware of the model uncertainty, voters vote for party *j* if the expected utility of η^j is lower than the expected utility from η^{-j}, if party *j* has a sufficiently high valence advance.

As a single vote is very rarely decisive and learning is costly, we assume that a voter does not have any incentive to learn about the complex system the economy represents. Hence, the mental models of the voters are not updated. This assumption is well backed by the empirical research on mental models (e.g. DiSessa 1982; Suen 2004). Especially mental models of social and political phenomena prove to be stable. Very rarely do individuals, even experts, question their mental model even when its predictions prove to be well off the mark

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[3] This form of valence updating represents a very simple rule of learning which is backed by the empricial findings of the VP-function research showing that voters have a short memory (e.g. Paldam 2004).

(e.g. Tetlock 1989, 1999). Bénabou (2008) provides an alternative theoretical explanation for the stability of mental models based on a model of belief formation and voting that draws on concepts from social psychology.

3.2 The Behaviour of Parties

Summing across all *N* voters yields the expected number of votes party *j* can expect to win in election *t*:

$$\Pi_t^j\left(\psi_t^j,\psi_t^{-j},\hat{U}_{it}^j,\hat{U}_{it}^{-j}\right)=\sum_{i=1}^{N}\pi_{it}^j \quad \in [0,N] \tag{10}$$

We assume that both parties *A* and *B* are utility maximizing with the utility from being in office for one term is 1 and from not being in office is 0. Hence, both parties are assumed to be office-seeking and maximize the expected terms in office over a particular span of time, labelled Θ_t^j. We assume that both parties have an equal time-horizon, denoted by T. Then, the expected utility of party *j* in election *t* is given by its probability to win the election, Π_t^j. We neglect from discounting utility from future elections and obtain:

$$\Theta_t^j=\sum_{\tau=t}^{t+\mathrm{T}} \Pi_\tau^j \tag{11}$$

The optimal strategy $\vec{\eta}_t^j=\left(\eta_k^j\right)_{k=t}^{t+T}$ to be chosen by party j is given by:

$$\eta_t^j=\underset{\{\vec{\eta}_t\}}{\arg\max}\,\Theta_t^j \tag{12}$$

4. Party Competition

For simplicity, there are only two possible policy platforms $\{\eta_I, \eta_{II}\}$ from which the parties can choose.[4] Though, ultimately, nobody knows exactly the correct mental model, we assume that η_{II} is an adequate, good policy platform and η_I an inadequate, bad platform. The empirical findings of Caplan (2007) suggest that voters entertain biased beliefs about a number of fundamental economic (policy) issues. Therefore, we assume that the mental models of a majority of voters assert $\hat{U}_{it}\left(\eta_I\right)\succ_i \hat{U}_{it}\left(\eta_{II}\right)$ for all *t*, despite the fact that the opposite is true (see

[4] Suppose, for instance, that there are a couple of policy proposals of "experts" that reduce the otherwise infinitely high number of possible platforms (Beilharz 2005: 90), but that these policy proposals still are alternatives to each other.

also Beilharz 2005; Beilharz and Gersbach 2004). Only a minority of voters apply mental models that yield the reverse preference ordering.

For simplicity, we assume complete information at the parties' side.[5] Since policy platform η_{II} will yield superior economic outcomes, if pursued, the parties know that $a_{t+1}(\eta_{II}) > a_{t+1}(\eta_I)$. Let $a_t(\eta_I) < \bar{a}$ and $a_t(\eta_{II}) > \bar{a}$. Consequently, a government will be attributed a higher valence in t+1, if it realizes η_{II} in t (compared to offering η_I). That is, platform η_I is a popular but harmful policy and η_{II} is a good but temporarily less popular policy. Hence, if a party wins the election in period t and pursues good policy platform η_{II}, it will be allocated valence $\Psi^j_{t+1} > 1$, and if a party wins the election in period t and pursues populist platform η_I, it will be allocated valence $\Psi^j_{t+1} < 1$.

We give the model more structure by assuming that a party's probability of winning an election can be separated into two additive effects. First, the probability of being elected depends on the competing platforms η^j_t and η^{-j}_t. Second, the probability depends on the valence perceptions of the voters. Therefore, we re-define the function for the number of expected votes in election t by the following form:

$$\Pi^j_t\left(\eta^j_t, \eta^{-j}_t, \Psi^j_t, \Psi^{-j}_t\right) = f\left(\eta^j_t - \eta^{-j}_t\right) + g\left(\Psi^j_t - \Psi^{-j}_t\right) \in [0,1] \tag{13}$$

with
$$f(0) \equiv \tfrac{1}{2} \tag{14}$$

$$f(\eta_I - \eta_{II}) \equiv \tfrac{1}{2} + f \tag{15}$$

$$f(\eta_{II} - \eta_I) \equiv \tfrac{1}{2} - f \tag{16}$$

$$g(0) \equiv 0 \tag{17}$$

$$g\left(\Psi^j_t - \Psi^{-j}_t > 0\right) \equiv g \tag{18}$$

$$g\left(\Psi^j_t - \Psi^{-j}_t < 0\right) \equiv -g \tag{19}$$

That is, we reinterpret the function of expected votes as a real valued function on $[0,1]$, so that it expresses the expected fraction of total votes N. Hence, we restrict the function value

[5] Parties face substantial incentives to learn because their stakes are high. Thus, we expect them to be informed about the expected economic impact of different policies and identify good policies.

to move within interval $\left[0,1\right]$ and assume $1/2+\mathrm{f}+\mathrm{g}\leq 1$. Variable f measures the additional fraction of votes (beyond $1/2$) stemming from proposing platform η_I when the other party proposes platform η_{II}, and g the additional fraction of votes stemming from the comparative advantage of valence. This implies that the valence term has three possible values: 1, $1+\overline{\Psi}$ and $1-\overline{\Psi}$, with $\overline{\Psi}=\mathrm{a}_t(\eta_{II})/\overline{\mathrm{a}}$. As the advantage in support of one party must be equal to the disadvantage of the other, we subtract the corresponding variable, if a party suffers a disadvantage in one of these respects.[6]

Party competition is then modelled as a non-cooperative dynamic game. Besides the repeated elections, the dynamics result from the fact that the valence of parties in *t* depends on which party won the election in *t-1* and the policy platform pursued by it (endogenous valence). Figure 1 presents the structure of the game. The four stages game described in Figure 1 is analyzed by the parties as a *T* times repeated game.

[Figure 1 about here]

If both parties are allocated the same valence in the first period, we obtain $\Pi_t^A = \Pi_t^B$ whenever both parties choose the same policy platform. In the other cases, the party which chooses the popular platform η_I has a higher probability of winning the election. Initially both parties can have equal valence or one party can have a valence advantage. Deducing expected payoffs, we must differentiate between the two possible states "party A wins the election" and "party A loses the election". They occur with probability $\Pi_t^A=1-\Pi_t^B$, respectively $(1-\Pi_t^A)=\Pi_t^B$. This differentiation is necessary because the valence parameters for period 2 differ depending on which state emerges, since voters update their valence parameter ψ_{t+1}^j.

If $\psi_{t+1}^A>\psi_{t+1}^B$, party A will have a larger probability of winning when both parties choose the same policy platform. The critical situation for choosing good policy η_{II} is given by ($\eta_t^A=\eta_{II}$; $\eta_t^B=\eta_I$). If in this situation $\Pi_t^A \geq \Pi_t^B$, party *A* will maintain a good chance of

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[6] Note that we assume the following condition to hold for a given combination of (η_t^j, η_t^{-j}):

$$\Pi_t^j(\eta_t^j,\eta_t^{-j},\psi_t^j>1,\psi_t^{-j}=1)=\Pi_t^j(\eta_t^j,\eta_t^{-j},\psi_t^j=1,\psi_t^{-j}<1)$$

That is, it makes no difference of whether the incumbent has the valence advantage for having applied η_{II} or the opposition party has the advantage because the incumbent applied η_I. This implies $\mathrm{a}_t\left(\eta_I\right)+\mathrm{a}_t\left(\eta_{II}\right)=2\overline{\mathrm{a}}$.

winning when choosing η_{II}, even if party *B* offers the popular η_I. The crucial question is whether $\frac{1}{2} - f + g \geq \frac{1}{2}$ holds, that is, whether $g > f$ and thus the advantage of valence outweighs the disadvantage of proposing the less popular platform. However, regardless of whether this condition is satisfied, offering η_{II} will result in short-term losses in utility, because the expected share of votes in election *t* is always higher when offering η_I.

As the government pursues a good or a bad policy, from election 2 on, we only have to differentiate between two possible starting situations for party competition: One is characterized by $\psi_{t+1}^A > \psi_{t+1}^B$ (situation A^+), the other one by $\psi_{t+1}^A < \psi_{t+1}^B$ (situation A^-).

Finally, we accommodate Caplan with two assumptions: (i) We set the tie-breaking rule such that if a party is indifferent between the two platforms, it will choose the populist platform η_I; (ii) we assume that parties commit to the platform proposed in the campaign and exclude "cheap talk" strategies. Such strategies would destroy their credibility and the capacity to commit to policy platforms in the future which in turn causes losses in votes (e.g., Aragonès et al. 2007). Given our assumption (ii), parties cannot play the populist platform in the campaign and pursue the good policy in order to build up valence. If they could, good policies would occur more often. In this sense, we investigate a "worst case"-scenario.

4.1 When Parties Have Short-Term Objectives

We introduce notation $P_{\eta^A,\eta^B}^{A,x}$ for the payoff of party *A* and $P_{\eta^A,\eta^B}^{B,x}$ for the payoff of party *B*, with $x = \{A^-, 0, A^+\}$ denoting the initial valence difference, given the proposed platforms η^A and η^B. If we analyze the case where the two parties compete only in one election, we have the following one-shot simultaneous-move election game, represented in normal-form:

		B: η_I	B: η_{II}
A	η_I	$P_{\eta_I,\eta_I}^{A,x}$, $P_{\eta_I,\eta_I}^{B,x}$	$P_{\eta_I,\eta_{II}}^{A,x}$, $P_{\eta_I,\eta_{II}}^{B,x}$
	η_{II}	$P_{\eta_{II},\eta_I}^{A,x}$, $P_{\eta_{II},\eta_I}^{B,x}$	$P_{\eta_{II},\eta_{II}}^{A,x}$, $P_{\eta_{II},\eta_{II}}^{B,x}$

Game 1: One-shot election game

Lemma 1: *In Game 1* $(T=1)$ *the unique Nash equilibrium (henceforth abbreviated by NE) is given by actions*[7] (η_I,η_I) *and payoffs* $\left(P^{A,x}_{\eta_I,\eta_I},P^{B,x}_{\eta_I,\eta_I}\right)$, *irrespective of valence realization* $x=\left\{A^-,0,A^+\right\}$.

Proof: If $x=0$, the respective payoffs are $\left(P^{A,0}_{\eta_I,\eta_I},P^{B,0}_{\eta_I,\eta_I}\right)=\left(P^{A,0}_{\eta_{II},\eta_{II}},P^{B,0}_{\eta_{II},\eta_{II}}\right)=\left(\frac{1}{2},\frac{1}{2}\right)$, $\left(P^{A,0}_{\eta_I,\eta_{II}},P^{B,0}_{\eta_I,\eta_{II}}\right)=\left(\frac{1}{2}+f,\frac{1}{2}-f\right)$ and $\left(P^{A,0}_{\eta_{II},\eta_I},P^{B,0}_{\eta_{II},\eta_I}\right)=\left(\frac{1}{2}-f,\frac{1}{2}+f\right)$. If $x=A^+$, the payoff vectors are given by $\left(P^{A,A^+}_{\eta_I,\eta_I},P^{B,A^+}_{\eta_I,\eta_I}\right)=\left(P^{A,A^+}_{\eta_{II},\eta_{II}},P^{B,A^+}_{\eta_{II},\eta_{II}}\right)=\left(\frac{1}{2}+g,\frac{1}{2}-g\right)$, $\left(P^{A,A^+}_{\eta_I,\eta_{II}},P^{B,A^+}_{\eta_I,\eta_{II}}\right)=\left(\frac{1}{2}+f+g,\frac{1}{2}-f-g\right)$ and $\left(P^{A,A^+}_{\eta_{II},\eta_I},P^{B,A^+}_{\eta_{II},\eta_I}\right)=\left(\frac{1}{2}-f+g,\frac{1}{2}+f-g\right)$. And if $x=A^-$, payoffs are given by $\left(P^{A,A^-}_{\eta_I,\eta_I},P^{B,A^-}_{\eta_I,\eta_I}\right)=\left(P^{A,A^-}_{\eta_{II},\eta_{II}},P^{B,A^-}_{\eta_{II},\eta_{II}}\right)=\left(\frac{1}{2}-g,\frac{1}{2}+g\right)$, $\left(P^{A,A^-}_{\eta_I,\eta_{II}},P^{B,A^-}_{\eta_I,\eta_{II}}\right)=\left(\frac{1}{2}+f-g,\frac{1}{2}-f+g\right)$ and $\left(P^{A,A^-}_{\eta_{II},\eta_I},P^{B,A^-}_{\eta_{II},\eta_I}\right)=\left(\frac{1}{2}-f-g,\frac{1}{2}+f+g\right)$. In all three scenarios it holds that only if both parties choose platform η_I, none of the two parties will have an incentive to deviate unilaterally. □

Suppose both parties' time-horizon only spans the next election. It follows that Game 1 is played repeatedly in subsequent elections. Both parties and voters observe the outcome of the preceding elections before the next election begins. Then, Game 1 is a stage game that is played on and on. We obtain:

Proposition 1: *Suppose parties have a time horizon of one election (T=1). Then, the finitely or infinitely repeated Game 1 has the unique subgame-perfect NE with actions* (η_I,η_I) *and payoffs* $\left(P^{A,x}_{\eta_I,\eta_I},P^{B,x}_{\eta_I,\eta_I}\right)$ *in all elections.*

Proof: According to Lemma 1 every single stage game's unique NE is (η_I,η_I), regardless of the preceding stages' outcomes. It directly follows that this NE of the stage game is the unique subgame-perfect NE of the repeated stage game (e.g. Gibbons 1992: 84).[8] □

[7] The first (second) term in parentheses denotes the played platform of party A (B).

Hence, even in a dynamic game with endogenous valence, where a party can win a valence advantage by realizing good policy platform η_{II}, parties will always propose populist platform η_{I} in elections. Platform η_{II}, although known as the economically better policy, is never chosen in equilibrium. As claimed by Caplan (2007) democracy would be characterized by weak, populist policy.

4.3 When Parties Have Long-Term Objectives

4.3.1 The Two-Elections Case

Let us now alternatively assume that parties have an inter-temporal objective function and maximize the number of expected votes in the next two elections (T=2). Then, the corresponding payoffs are simply the sum of the payoffs from the $T=2$ stage games, as described by equation (11). The game is described by Figure 1 with T=2.

Having objectives beyond the next election, the parties care about the valence effect for the second election. We have to distinguish three possible scenarios: in the first election, party *A* has a valence advantage (A^+), so that $g\left(\Psi_t^A - \Psi_t^B\right) = g$; party *A* has a valance disadvantage in the first election (A^-), so that $g\left(\Psi_t^A - \Psi_t^B\right) = -g$; or both parties have equal initial valence (0), so that $g\left(\Psi_t^A - \Psi_t^B\right) = 0$. Solving the game by backwards induction, we obtain:

Proposition 2: *Suppose scenario 0.*

(a) If $g > f$ *, the unique subgame perfect NE is* $\left(\eta_{II}, \eta_{II}, \eta_{I}, \eta_{I}\right)$.

(b) If $g \leq f$ *, the unique subgame perfect NE is* $\left(\eta_{I}, \eta_{I}, \eta_{I}, \eta_{I}\right)$.

Proof: *See Appendix.*

If no party has a valence advantage, we obtain the obvious result that a party proposes the good platform η_{II} as long as the dynamic expected gain of votes of doing so, given by g, is higher than the expected loss of votes of doing so, given by f. Only if this is the case, a party will propose the good instead of the populist platform. It is clear, however, that in the last

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[8] In the infinitely repeated game scenario, we assume that the presumptions of the Folk Theorem are satisfied, such that the discount factor is sufficiently close to one (e.g. Friedman 1971).

election no party will choose the economically better platform. This follows from the logic of Lemma 1**:** given biased beliefs of voters toward the bad policy, there is simply no point in choosing the better policy, if there is no next election to take into account.

Next, we turn to the scenarios with unequal initial valence perceptions.

Proposition 3: *Suppose scenario A^+.*

(a) If $f < g(1-2g)$, *the unique NE is* $(\eta_{II}, \eta_{II}, \eta_I, \eta_I)$.

(b) If $g(1-2g) \leq f < g(1+2g)$, *the unique NE is* $(\eta_{II}, \eta_I, \eta_I, \eta_I)$.

(c) If $f \geq g(1+2g)$, *the unique NE is* $(\eta_I, \eta_I, \eta_I, \eta_I)$.

Proof: *See Appendix.*

Proposition 4: *Suppose scenario A^-.*

(a) If $f < g(1-2g)$, *the unique NE is* $(\eta_{II}, \eta_{II}, \eta_I, \eta_I)$.

(b) If $g(1-2g) \leq f < g(1+2g)$, *the unique NE is* $(\eta_I, \eta_{II}, \eta_I, \eta_I)$.

(c) If $f \geq g(1+2g)$, *the unique NE is* $(\eta_I, \eta_I, \eta_I, \eta_I)$.

Proof: *See Appendix.*

Given the symmetry of the game, it is intuitively clear that the equilibria of scenario A^+ and A^- are identical, with the exception that case (b) is mirror-inverted: if party A has a disadvantage, party B has the corresponding advantage. Compared to scenario 0, the area in the (f, g)-space where both parties choose η_{II} is smaller as is the area where both choose η_I (see Figure 2). In addition, there exists an area in which the party with the valence-advantage offers η_{II} while the disadvantaged opponent party offers η_I. Figure 3 maps the three relevant areas in the two-dimensional (f, g)-space. It shows that the area where both parties choose η_{II} is larger than in scenario A^+ (and mirror-inverted in A^-). At the same time, the new area where one party chooses η_{II} while the other party chooses η_I in A^+ or A^- covers part of the area where η_I is chosen by both parties in scenario 0.

[Figure 2 and 3 about here]

In repeated games, scenario 0 may serve as a theoretical starting point but becomes irrelevant in our model once the first policy platform has been pursued. In the long run, Proposition 3 and 4 are relevant. Accordingly, parties with a time-horizon of T = 2 will always choose η_{II} if f < g(1-2g). If g(1-2g) ≤ f < g(1+2g), the party with the valence-advantage will always offer η_{II} while the other party offers η_I. Finally, if f ≥ g(1+2g), both parties will offer η_I.

4.3.2 The three-elections case

The analysis above showed that a shift in the parties' time horizon from T = 1 to T = 2 leads office-seeking parties to adopt the adequate policy platform η_{II} even at the expense of short-term losses in votes. In this section, we show that a further increase to T = 3 widens the area in the (f, g)-space for which η_{II} is chosen by both parties. Here, parties will choose η_{II} in t = 1 if the resulting increase in utility from an increased chance of starting in t = 2 with a valence advantage outweighs the short-term losses in votes in t = 1. From party A's point of view, the following payoffs have to be compared in the case of scenario 0:

$$\begin{aligned}
P^{A,0}_{\eta_I,\eta_I} &= \tfrac{1}{2}+\tfrac{1}{2}\left(\Theta^A_2(\cdot,A^-)+\Theta^A_2(\cdot,A^+)\right)\\
P^{A,0}_{\eta_I,\eta_{II}} &= \tfrac{1}{2}+f+\Theta^A_2(\cdot,A^-)\\
P^{A,0}_{\eta_{II},\eta_I} &= \tfrac{1}{2}-f+\Theta^A_2(\cdot,A^+)\\
P^{A,0}_{\eta_{II},\eta_{II}} &= \tfrac{1}{2}+\tfrac{1}{2}\left(\Theta^A_2(\cdot,A^+)+\Theta^A_2(\cdot,A^-)\right)
\end{aligned},$$

where $\Theta^A_2(\cdot,A^+)$, respectively $\Theta^A_2(\cdot,A^-)$, represents the probability of being elected in elections t = 2 and t = 3, when having a valence advantage, respectively disadvantage, in election 2 (see equation (11)). These depend on the policy choices of both parties in these elections, which in turn depend on f and g. Given that the remaining game is a two-elections game, Proposition 3 and Proposition 4 informs us about the respective equilibria values of $\Theta^A_2(\cdot,A^+)$ and $\Theta^A_2(\cdot,A^-)$.

Proposition 5: *Suppose scenario 0.*

(a) If $f < g$*, both parties choose the good policy platform* η_{II} *in election 1.*

(b) If $f \geq g$*, both parties choose the populist platform* η_I *in election 1.*

Proof: *See Appendix.*

The subgame perfect NE are summarized in Corollary 1.

Corollary 1: *Suppose scenario 0.*

(a) If $f < g(1-2g)$, the unique subgame-perfect NE is $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I)$.

(b) If $g(1-2g) \le f < g$, with probability $\frac{1}{2}$ the subgame-perfect NE is $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I, \eta_I)$ and $(\eta_{II}, \eta_{II}, \eta_I, \eta_{II}, \eta_I, \eta_I)$ with counter-probability $\frac{1}{2}$.

(c) If $g \le f < g(1+2g)$, with probability $\frac{1}{2}$ the subgame-perfect NE is $(\eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I, \eta_I)$ and $(\eta_I, \eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I)$ with counter-probability $\frac{1}{2}$.

(d) If $f \ge g(1+2g)$, the unique subgame-perfect NE is $(\eta_I, \eta_I, \eta_I, \eta_I, \eta_I, \eta_I)$.

Proof: *See Appendix.*

It remains to investigate the case where one party starts with an initial advantage in the valence perception of the voters.

Proposition 6: *Suppose scenario A^+.*

(a) If $f < g\frac{(1-2g)}{(1-g)}$, *both parties choose the good policy platform* η_{II} *in election 1.*

(b) If $g\frac{(1-2g)}{(1-g)} \le f < g\frac{(1+2g)}{(1+g)}$, *party A chooses the good policy platform* η_{II} *in election 1 and party B chooses the populist platform* η_I *in election 1.*

(c) If $f \ge g\frac{(1+2g)}{(1+g)}$, *both parties choose the populist platform* η_I *in election 1.*

(d) In election 1, outcome (η_I, η_{II}) *never occurs in subgame-perfect NE.*

Proof: *See Appendix.*

The relevant areas of the (f, g)-space are shown in Figure 4. We obtain:

[Figure 4 about here]

Corollary 2: *Suppose scenario A^+.*

(a) If $f < g(1-2g)$, *the unique subgame-perfect NE is* $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I)$.

(b) If $g(1-2g) \le f < g\frac{(1-2g)}{(1-g)}$*, the subgame-perfect NE is* $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{I}, \eta_{I}, \eta_{I})$ *with probability* $\frac{1}{2}+g$ *and* $(\eta_{II}, \eta_{II}, \eta_{I}, \eta_{II}, \eta_{I}, \eta_{I})$ *with counter-probability* $\frac{1}{2}-g$.

(c) If $g\frac{(1-2g)}{(1-g)} \le f < g\frac{(1+2g)}{(1+g)}$*, the unique subgame-perfect NE is* $(\eta_{II}, \eta_{I}, \eta_{II}, \eta_{I}, \eta_{I}, \eta_{I})$.

(d) If $g\frac{(1+2g)}{(1+g)} \le f < g(1+2g)$*, the subgame-perfect NE is* $(\eta_{I}, \eta_{I}, \eta_{II}, \eta_{I}, \eta_{I}, \eta_{I})$ *with probability* $\frac{1}{2}-g$ *and* $(\eta_{I}, \eta_{I}, \eta_{I}, \eta_{II}, \eta_{I}, \eta_{I})$ *with counter-probability* $\frac{1}{2}+g$.

(e) If $f \ge g(1+2g)$*, the unique subgame-perfect NE is* $(\eta_{I}, \eta_{I}, \eta_{I}, \eta_{I}, \eta_{I}, \eta_{I})$.

Proof: *See Appendix.*

Note that party A represents the party with initial valence advantage. That is, in scenario A^- party B and party A switch parts, and Proposition 6 and Corollary 2 hold mirror-inverted.

Again, in the long run, Proposition 6 is relevant. Accordingly, parties with a time-horizon of three elections will always choose η_{II} (except in the final election) if $f < g\frac{(1-2g)}{(1-g)}$. If $g\frac{(1-2g)}{(1-g)} \le f < g\frac{(1+2g)}{(1+g)}$, the party with the valence-advantage will always offer η_{II}, while the other party offers η_I. Finally, if $f \ge g\frac{(1+2g)}{(1+g)}$, both parties will offer η_I.

Figures 4 and 5 map the relevant areas for T = 2 and T = 3. We can see that the area of (f, g)-combinations for which both parties offer η_{II} is larger for T = 3 than in the game with T = 2. Given that offering this policy platform is an investment in a higher expected valence for the consecutive elections, this result is not surprising. It is, however, surprising to see that simultaneously the area for which both parties offer η_I in the first election has also become larger. Consequently, we see in Figure 5 that the area where the good policy is chosen by both parties in the first election increases from the left, but that the area where both parties choose the populist platform in the first election increases from the right, too. The latter result is particularly counter-intuitive for the party with the valence advantage. It has a higher ex ante probability of winning the next election and should choose η_{II} to keep this advantage, rather than put it at risk with the high probability of (½ + *f* + *g*) by offering the populist platform η_I in the first election.

[Figure 5 about here]

Finally, one remark on robustness is apposite. It could be argued that party competition should be modelled as sequential- instead of simultaneous-move game. For instance, because the government party, as incumbent, can or has to move first. However, our results are based on strictly dominant strategies for both parties. That is, the platform chosen is optimal irrespective of the other party's platform. Therefore, knowing the other parties platform does not change the chosen strategy. It follows that our results will remain valid if party competition would be modelled as sequential-move game.

5. Conclusion

Starting from Caplan's pessimistic view on the policy outcome in democracy, we provide a game-theoretic model of party competition. Voters entertain biased beliefs and inadequate policies are more popular than adequate policies. The model endogenizes the parties' valence which is updated depending on the parties' past macroeconomic performance. This assumption is backed by the empirical literature on VP-functions. We show that political parties face incentives to apply less popular but good policy platforms even though these have less intuitive appeal to the voters than alternative more popular platforms. This contradicts Caplan's claim that, given biased beliefs of voters, democracy inevitably leads to poor policies. The essential condition for the existence of incentives to realize good policy is that the advantage in valence in t+1 from applying good policy platform η_{II} in t outweighs the losses in votes from proposing η_{II} in t. Good policies are more likely (a) the less popular the inadequate mental model is among voters (i.e. the lower f), (b) the more voters account for the parties' past economic performance and (c) the less polarized the distribution of mental models is (i.e. the larger g). This result provides additional rationale for the crucial influence of e.g. free press, literacy and education in general on the policy outcome in democracy. In addition, our model is in line with other tools proposed to improve the design of democracy, for instance, improved remuneration of politicians (e.g. Poutvaara and Takalo 2007) and competition of parties for incentive contracts (e.g. Gersbach 2005). These steps would increase variable g, too, if we interpret this variable more broadly as "dynamic advantage in the next election". Hence, in our model, applying these tools would increase the area in which good policies are chosen in equilibrium.

As might be expected, the parties' time horizon proves to be of crucial importance for the quality of policy choices in our model. As the parties' time horizon widens, the range of constellations where sufficient incentives exist for choosing good policies grows. At the same time and somewhat surprisingly, the range of constellations for which populist policy platforms are the rational choice for both parties becomes larger as well. For some constellations, a long time horizon promotes good policy choices while it prevents them for other constellations. The question which constellations are more likely is essentially an empirical one. In any case, Caplan (2007) may be overhasty when dismissing the possibility of good democratic policy choices when voters' beliefs are biased.

Our model only draws a crude picture of the political institutions underlying policy choices. Nevertheless, we can draw interesting conclusions with respect to the economic performance of different political institutions. The essential line of reasoning is that institutions determine the time horizon T of political parties and thereby the incentives to offer economically superior yet unpopular policies. First, democracies in which the supply side of policies is dominated by political parties operate with a larger time horizon than democracies in which the individual candidates, possibly even without any party affiliation, dominate policy supply. The reason is that parties will discipline their candidates and force them to account for the valence-effects of their policy choices even in their last term in office. Assuming that the (f, g) constellation is favourable to good policy choices, party-dominated democracies should thus witness better economic policies, because the relevant actors on the supply side face stronger incentives to invest in a higher valence by offering economically superior yet unpopular policy platforms. Given that party control is generally stronger in parliamentary systems than in presidential systems, we expect, all other things equal, the latter to operate at a lower T and thus witness poorer economic results. The empirical evidence by Persson and Tabellini (1999; 2003: chapt. 7) partly points in this direction by showing that productivity is higher in parliamentary than in presidential democracies. However, this effect does not hold for other indicators of government activity. This may be due to the fact that the prediction offered here only holds for certain combinations of f and g in our model, while the opposite prediction emerges for other combinations.

Second, term limits represent political institutions with a direct link to the time horizon T. While some authors have deduced arguments in favour of restricting reelection possibilities by term limits (e.g. Dick and Lott 1993; Reed et al. 1998; Smart and Sturm 2004), our analysis suggests that this could lead to weaker policy outcomes in democracy, because the time-horizon of politicians, respectively parties are shortened. Again, however, the results are conditional on the values for f and g. This might explain the mixed evidence on the effect of term limits. While for the United States term limits seem to have had a significant effect on the quality of policy (e.g. Besley and Case 2003, 1995; Crain and Tollison 1993; List and Sturm

2004), the evidence for cross sections of countries is mixed (e.g. Dalle Nogare and Ricciuti 2008; Johnson and Crain 2004).

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Game begins at period t = 1		
Period t begins.		
Stage	*Activities*	*Additional information*
1	The parties choose η_t^A resp. η_t^B simultaneously	platforms
2	Voters make their decision (given η_t^A, η_t^B, ψ_t^A, ψ_t^B)	distribution of votes; election winner
3	The election winner pursues the policies offered in the election (η_t)	$a_t(\eta_t)$
4	Voters update their expected valence for round *t+1*	ψ_{t+1}^A, ψ_{t+1}^B
Period t ends. *(equivalent to the start of period t+1 as long as t+1 < T)*		
Game ends at period t = T		

Figure 1: The structure of the game

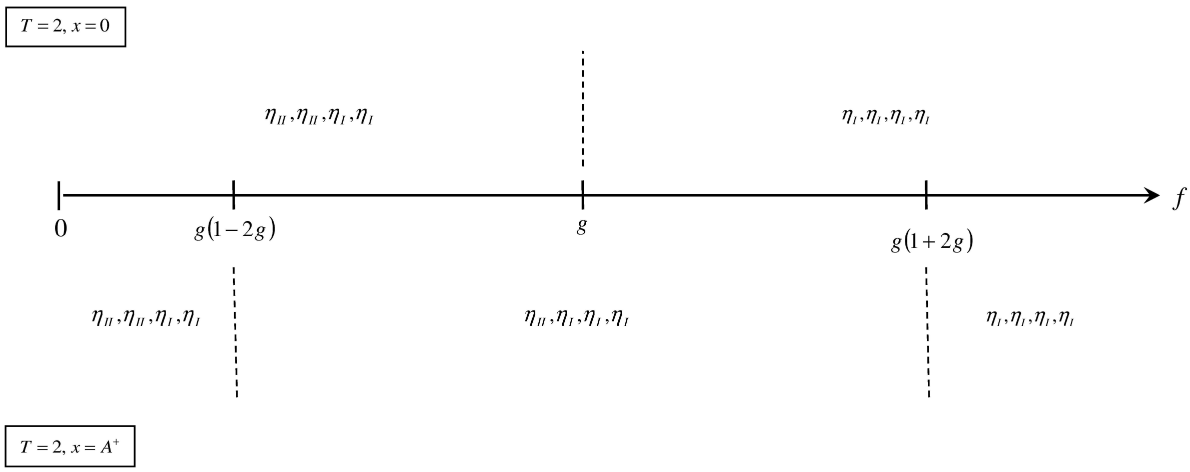

Figure 2: Comparison of the subgame perfect NE in case of T=2 when x=0 and when x=A^+.

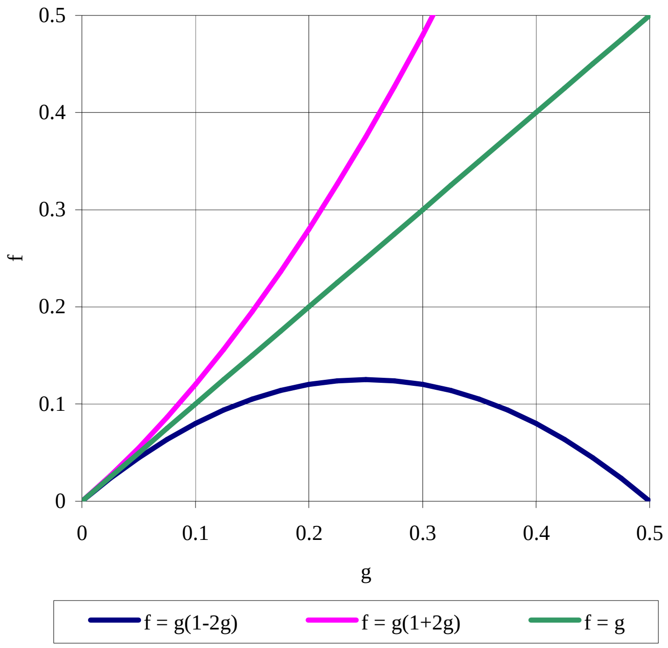

Figure 3: Subgame perfect NE for T=2 when x=0 and when x=A^+ in the two-dimensional (f, g)-space

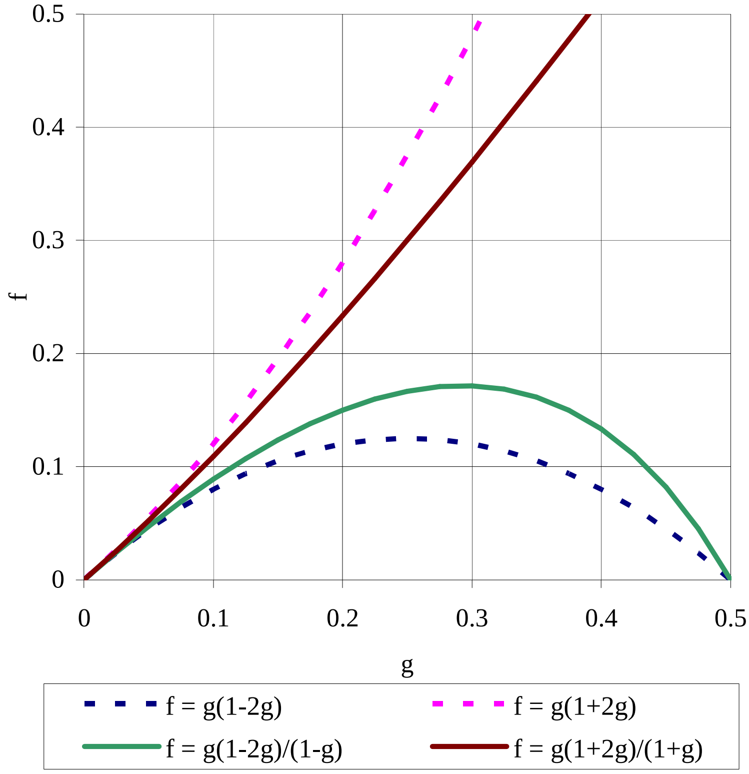

Figure 4: Comparison of the subgame perfect NE in the case T=2 and T=3, when x=A$^+$ in the two-dimensional (f, g)-space

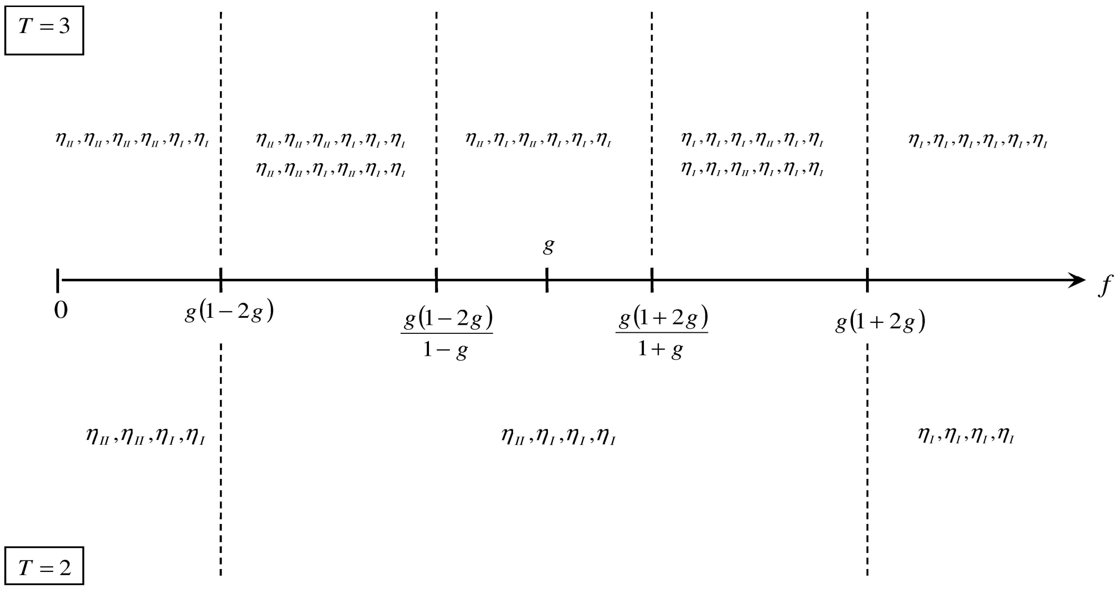

Figure 5: Comparison of the subgame perfect NE in the case T=2 and T=3, when x=A$^+$

Appendix

A 1. The payoff notation

To simplify notation, we denote the payoffs of the 16 possible strategies by P_k, $k = \{1, 2, \ldots, 16\}$. The payoffs correspond with the 16 possible permutations of the vector $(\eta_y, \eta_y, \eta_y, \eta_y)$, with $y = \{I, II\}$. We define:

P_1: Payoff when $(\eta_I, \eta_I, \eta_I, \eta_I)$

P_2: Payoff when $(\eta_I, \eta_I, \eta_I, \eta_{II})$

P_3: Payoff when $(\eta_I, \eta_I, \eta_{II}, \eta_I)$

P_4: Payoff when $(\eta_I, \eta_I, \eta_{II}, \eta_{II})$

P_5: Payoff when $(\eta_I, \eta_{II}, \eta_I, \eta_I)$

P_6: Payoff when $(\eta_I, \eta_{II}, \eta_I, \eta_{II})$

P_7: Payoff when $(\eta_I, \eta_{II}, \eta_{II}, \eta_I)$

P_8: Payoff when $(\eta_I, \eta_{II}, \eta_{II}, \eta_{II})$

P_9: Payoff when $(\eta_{II}, \eta_I, \eta_I, \eta_I)$

P_{10}: Payoff when $(\eta_{II}, \eta_I, \eta_I, \eta_{II})$

P_{11}: Payoff when $(\eta_{II}, \eta_I, \eta_{II}, \eta_I)$

P_{12}: Payoff when $(\eta_{II}, \eta_I, \eta_{II}, \eta_{II})$

P_{13}: Payoff when $(\eta_{II}, \eta_{II}, \eta_I, \eta_I)$

P_{14}: Payoff when $(\eta_{II}, \eta_{II}, \eta_I, \eta_{II})$

P_{15}: Payoff when $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_I)$

P_{16}: Payoff when $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{II})$

A 2. Proofs

Remark to the proofs: In the following stage 1 is the first election, stage 2 the second, and stage 3 the third.

Proof of Proposition 2: We solve the game by backwards induction. Stage 2 represents a subgame that is equal to Game 1. Hence playing strategy η_I is optimal for both parties. Therefore, we only need to deduce payoff vectors P_1, P_5, P_9 and P_{13} for the subgame at stage 1. If $g\left(\Psi_t^A - \Psi_t^B\right) = 0$, we obtain:

$$P_1 = P_{13} = (1,1)$$

$$P_5 = (1 + f - g,\ 1 - f + g)$$

$$P_9 = (1 - f + g,\ 1 + f - g)$$

Here, the first (second) term is the payoff of party *A* (*B)*. Setting these payoffs into the payoff matrix of Game 1, we can solve the subgame at stage 1. Comparing party A’s payoffs of these payoff vectors, platform η_{II} is the dominant strategy, if $g > f$. Otherwise, the dominant strategy is playing η_I. Since the payoffs of party A and B are mirror-inverted, the same holds for party B. Therefore, in equilibrium both parties choose η_{II} if $g > f$ and η_I if $g < f$ in election 1. □

Proof of Proposition 3: We solve the game by backwards induction. Following Lemma 1 both parties know that the equilibrium of the residual subgame at stage 2 is (η_I, η_I). Therefore, only payoff vectors P_1, P_5, P_9 and P_{13} are relevant for subgame-perfection at stage 1. If $g\left(\Psi_t^A - \Psi_t^B\right) = g$, we obtain:[9]

$$P_1 = \left(1 + g - 2g^2, \quad 1 - g + 2g^2\right)$$

$$P_5 = \left(1 + f, \quad 1 - f\right)$$

$$P_9 = \left(1 - f + 2g, \quad 1 + f - 2g\right)$$

$$P_{13} = \left(1 + g + 2g^2, \quad 1 - g - 2g^2\right)$$

Setting these payoffs into the payoff matrix of Game 1, we can solve the subgame at stage 1. Comparing party A's payoffs of these vectors, platform η_{II} is the dominant strategy, if $f < g(1 + 2g)$, otherwise η_I is the dominant strategy of party A. For party B, η_{II} is the dominant strategy, if $f < g(1 - 2g)$ and, otherwise, η_I is the dominant strategy. □

Proof of Proposition 4: If $g\left(\Psi_t^A - \Psi_t^B\right) = -g$, the relevant payoff vectors at stage 1 are given by:

$$P_1 = \left(1 - g + 2g^2, \quad 1 + g - 2g^2\right)$$

$$P_5 = \left(1 + f - 2g, \quad 1 - f + 2g\right)$$

$$P_9 = \left(1 - f, \quad 1 + f\right)$$

$$P_{13} = \left(1 - g - 2g^2, \quad 1 + g + 2g^2\right)$$

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[9] To deduce the payoffs given in vectors P_1, P_5, P_9 and P_{13}, use (13) to (19). For instance, the payoff of party A in P_1 is $\left(\frac{1}{2} + g\right) + \left(\frac{1}{2} + g\right)\left(\frac{1}{2} - g\right) + \left(\frac{1}{2} - g\right)\left(\frac{1}{2} + g\right) = 1 + g - 2g^2$. That is, in election 2 the probability that party A has a valence disadvantage (because of winning election 1 and pursuing η_I) is $\left(\frac{1}{2} + g\right)$, and with counter-probability $\left(\frac{1}{2} - g\right)$ is looses election 1 and has a valence advantage in election 2 (because of party B is pursuing η_I).

It is easy to see that this game is identical to the game discussed in the proof of Proposition 3, the only difference being that party A now has the valence disadvantage while party B has the valence advantage. Thus, the results are mirror-inverted. □

Proof of Proposition 5: We again solve the game by backwards induction. If no party displays valence advantage g, the payoffs at stage 1 are given by:

$$P^{j,0}_{\eta_I,\eta_I} = \tfrac{1}{2} + \tfrac{1}{2}\left(\Theta^j_2(\cdot, A^-) + \Theta^j_2(\cdot, A^+)\right)$$

$$P^{j,0}_{\eta_I,\eta_{II}} = \tfrac{1}{2} + f + \Theta^j_2(\cdot, A^-)$$

$$P^{j,0}_{\eta_{II},\eta_I} = \tfrac{1}{2} - f + \Theta^j_2(\cdot, A^+)$$

$$P^{j,0}_{\eta_{II},\eta_{II}} = \tfrac{1}{2} + \tfrac{1}{2}\left(\Theta^j_2(\cdot, A^+) + \Theta^j_2(\cdot, A^-)\right)$$

To calculate payoff $\Theta^j_2(\cdot, A^+)$, respectively $\Theta^j_2(\cdot, A^-)$, $j = \{A, B\}$, it is essential for party j to know which policy choice the other party will make in election 2, that is, at stage 2 of the game. Since one party possesses valence advantage g at stage 2, the subgame-perfect NE of the subgame at stage 2 is given in Proposition 3 or Proposition 4, depending on whether situation A^+ or A^- is realized: If $f < g(1-2g)$, both parties choose η_{II} in election 2, irrespective of valence distribution. Now let B^+ denote the situation where party B has valence advantage g, and B^- denotes the case where party B face disadvantage –g; thus A^+ is identical to B^-, and *vice versa*. Then, we obtain $\Theta^j_2(\cdot, j^+) = 1 + g + 2g^2$ and $\Theta^j_2(\cdot, j^-) = 1 - g - 2g^2$. Setting the resulting payoffs into the payoff matrix of Game 1, we can solve the subgame at stage 1.

Platform η_{II} is the dominant strategy of both parties in election 1, if $P^{j,0}_{\eta_{II},\eta_I} > P^{j,0}_{\eta_I,\eta_I}$ and $P^{j,0}_{\eta_{II},\eta_{II}} > P^{j,0}_{\eta_I,\eta_{II}}$. Due to symmetric payoff terms, it suffices to analyze the conditions for either party A or party B. (Note that $\Theta^B_2(\cdot, A^+) = \Theta^A_2(\cdot, A^-)$ and $\Theta^B_2(\cdot, A^-) = \Theta^A_2(\cdot, A^+)$.) The conditions are met if $f < g(1+2g)$. Therefore, both parties' dominant strategy in election 1 is η_{II} if $f < g(1-2g)$.

If $f > g(1+2g)$, both parties choose η_I in election 2. Thus, $\Theta^j_2(\cdot, j^+) = 1 + g - 2g^2$ and $\Theta^j_2(\cdot, j^-) = 1 - g + 2g^2$. Choosing η_I in election 1 is the dominant strategy of both parties if $P^{j,0}_{\eta_I,\eta_I} > P^{j,0}_{\eta_{II},\eta_I}$ and $P^{j,0}_{\eta_I,\eta_{II}} > P^{j,0}_{\eta_{II},\eta_{II}}$. This holds if $f > g(1-2g)$. Because of $f > g(1+2g)$ this is always fulfilled and both parties' dominant strategy in election 1 is η_I if $f > g(1+2g)$.

Finally, if $g(1-2g) < f < g(1+2g)$, the parties' policy choices in election 2 depend on whether they have a valence advantage or disadvantage. The party with valence advantage g chooses η_{II} in election 2 and the other η_I. Therefore $\Theta_2^j(\cdot, j^+) = 1 - f + 2g$ and $\Theta_2^j(\cdot, j^-) = 1 + f - 2g$. Given these payoffs, the dominant strategy of party A and B is choosing η_{II} in election 1 if $f < g$. Otherwise, both parties' dominant strategy is choosing η_I. Hence, the three areas (for the size of variable f) reduce to the two conditions stated in Proposition 5.

□

Proof of Corollary 1: Proposition 5 tells us that the subgame perfect outcome is (η_{II}, η_{II}) if $f < g$ and (η_I, η_I) if $f > g$. To deduce the subgame perfect NE of the game we have to take account of Proposition 3 and Proposition 4. In both propositions the subgame perfect NE is $(\eta_{II}, \eta_{II}, \eta_I, \eta_I)$ if $f < g(1-2g)$ and $(\eta_I, \eta_I, \eta_I, \eta_I)$ if $f > g(1+2g)$. Therefore, the subgame perfect NE is $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I)$ if $f < g(1-2g)$ and $(\eta_I, \eta_I, \eta_I, \eta_I, \eta_I, \eta_I)$ if $f > g(1+2g)$. However, if $f \in (g(1-2g),\ g(1+2g))$, the outcome of the second and third stages is $(\eta_{II}, \eta_I, \eta_I, \eta_I)$ if party A wins the valence advantage but $(\eta_I, \eta_{II}, \eta_I, \eta_I)$ if party B wins the advantage of valence. Given equal initial valence and equal dominant strategies at stage 1 of the game the chance of having valance advantage g at stage 2 is 50:50. It follows that the subgame perfect NE is $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I, \eta_I)$ or $(\eta_{II}, \eta_{II}, \eta_I, \eta_{II}, \eta_I, \eta_I)$, respectively with a probability of $\frac{1}{2}$, if $f \in (g(1-2g), g)$. Moreover, the subgame perfect NE is $(\eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I, \eta_I)$ or $(\eta_I, \eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I)$, respectively with a probability of $\frac{1}{2}$, if $f \in (g, g(1+2g))$. □

Proof of Proposition 6: The relevant payoffs party A has to compare at stage 1 are given by:

$$P^{A,A+}_{\eta_I,\eta_I} = \tfrac{1}{2} + g + \left(\tfrac{1}{2} + g\right)\Theta_2^A(\cdot, A^-) + \left(\tfrac{1}{2} - g\right)\Theta_2^A(\cdot, A^+)$$

$$P^{A,A+}_{\eta_I,\eta_{II}} = \tfrac{1}{2} + g + f + \Theta_2^A(\cdot, A^-)$$

$$P^{A,A+}_{\eta_{II},\eta_I} = \tfrac{1}{2} + g - f + \Theta_2^A(\cdot, A^+)$$

$$P^{A,A+}_{\eta_{II},\eta_{II}} = \tfrac{1}{2} + g + \left(\tfrac{1}{2} + g\right)\Theta_2^A(\cdot, A^+) + \left(\tfrac{1}{2} - g\right)\Theta_2^A(\cdot, A^-)$$

For party B, the corresponding payoffs are given by:

$$P^{B,B-}_{\eta_I,\eta_I} = \tfrac{1}{2} - g + \left(\tfrac{1}{2} - g\right)\Theta^B_2(\cdot, B^-) + \left(\tfrac{1}{2} + g\right)\Theta^B_2(\cdot, B^+)$$

$$P^{B,B-}_{\eta_I,\eta_{II}} = \tfrac{1}{2} - g - f + \Theta^B_2(\cdot, B^+)$$

$$P^{B,B-}_{\eta_{II},\eta_I} = \tfrac{1}{2} - g + f + \Theta^B_2(\cdot, B^-)$$

$$P^{B,B-}_{\eta_{II},\eta_{II}} = \tfrac{1}{2} - g + \left(\tfrac{1}{2} - g\right)\Theta^B_2(\cdot, B^+) + \left(\tfrac{1}{2} + g\right)\Theta^B_2(\cdot, B^-)$$

Party A's dominant strategy at stage 1 is η_{II} if $P^{A,A^+}_{\eta_{II},\eta_I} > P^{A,A^+}_{\eta_I,\eta_I}$ and $P^{A,A^+}_{\eta_{II},\eta_{II}} > P^{A,A^+}_{\eta_I,\eta_{II}}$, while party B's dominant strategy at stage 1 is η_{II} if $P^{B,B^-}_{\eta_I,\eta_{II}} > P^{B,B^-}_{\eta_I,\eta_I}$ and $P^{B,-}_{\eta_{II},\eta_{II}} > P^{B,-}_{\eta_{II},\eta_I}$. Again the payoffs at stage 1 depend on the subgame perfect NE of the subgame at stage 2, which is given in Proposition 3 and Proposition 4, so that three cases have to be distinguished.

If $f < g(1-2g)$, both parties will choose η_{II} in election 2 in equilibrium and the outcome of the subgame is P_{13}. Thus $\Theta^j_2(\cdot, j^+) = 1 + g + 2g^2$ and $\Theta^j_2(\cdot, j^-) = 1 - g - 2g^2$. Given these payoffs, party A's dominant strategy is η_{II} in the first election if $f < g(1 + 4g + 4g^2)$. This always holds because of $f < g(1-2g)$. Party B's dominant strategy, in turn, is also η_{II}, if $f < g(1-4g^2)$. This also always holds because of $f < g(1-2g)$. Thus, both parties' dominant strategy is η_{II} at stage 1, if $f < g(1-2g)$.

If $f > g(1+2g)$, we know that the payoffs of the subgame at stage 2 are given by P_1 and that both parties choose η_I in election 2. It follows that $\Theta^j_2(\cdot, j^+) = 1 + g - 2g^2$ and $\Theta^j_2(\cdot, j^-) = 1 - g + 2g^2$. Given these payoffs, party A's dominant strategy at stage 1 is η_{II}, if $f < g(1-4g^2)$, while η_{II} is party B's dominant strategy, if $f < g(1 - 4g + 4g^2)$. Both inequalities are never fulfilled, since $f > g(1+2g)$. Thus, both parties' dominant strategy is η_I at stage 1 if $f > g(1+2g)$.

Finally we have to investigate the case where $g(1-2g) < f < g(1+2g)$. Then, we know that the payoffs are given by P_9, if party A has the valence advantage, and by P_5, if party B has the valence advantage at stage 2. Hence, we obtain $\Theta^j_2(\cdot, j^+) = 1 - f + 2g$ and $\Theta^j_2(\cdot, j^-) = 1 + f - 2g$. In this constellation, party A's dominant strategy, given its initial valence advantage, is η_{II}, if $f < g\frac{(1+2g)}{1+g}$. Party B's dominant strategy, given its initial valence disadvantage, is η_I, if $f > g\frac{(1-2g)}{(1-g)}$. Therefore, both parties' dominant strategy is η_{II}, if

$g(1-2g) < f < g\frac{(1-2g)}{1-g}$, but if $g\frac{(1-2g)}{(1-g)} < f < g\frac{(1+2g)}{1+g}$ party A chooses η_{II} while party B chooses η_I. Moreover, both parties' dominant strategy is η_I if $g\frac{(1+2g)}{1+g} < f < g(1+2g)$. It follows that outcome (η_I, η_{II}) at stage 1 is never an element of the subgame perfect NE.

□

Proof of Corollary 2: Proposition 3 and Proposition 4 inform us about the subgame perfect NE of the subgame at stage 2. Proposition 6, in turn, informs us about the platforms in equilibrium at stage 1. From Proposition 3 and Proposition 4 we know that the subgame perfect outcome of the final two elections is $(\eta_{II}, \eta_{II}, \eta_I, \eta_I)$ if $f < g(1-2g) < g\frac{(1-2g)}{(1-g)}$. Therefore, the subgame perfect NE is $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I)$ if $f < g(1-2g)$. However, if $f \in \left(g(1-2g),\ g(1+2g)\right)$, the subgame perfect NE depends on which party has valance advantage g at stage 2. Party A wins the first election with probability $\frac{1}{2}+g$ and plays the good policy platform in this election. As long as $f < g\frac{(1-2g)}{(1-g)}$, both parties choose η_{II} at stage 1. Hence, if $f \in \left(g(1-2g),\ g\frac{(1-2g)}{(1-g)}\right)$, with probability $\frac{1}{2}+g$ sequence $(\eta_{II}, \eta_{II}, \eta_{II}, \eta_I, \eta_I, \eta_I)$ is the subgame perfect NE and with counter probability $\frac{1}{2}-g$ sequence $(\eta_{II}, \eta_{II}, \eta_I, \eta_{II}, \eta_I, \eta_I)$ is the subgame perfect NE. When $f \in \left(g\frac{(1-2g)}{(1-g)},\ \frac{g(1+2g)}{(1+g)}\right)$, we know that at stage 1 party A chooses η_{II} in equilibrium but party B η_I. Hence, party A will definitely keep its valence advantage at stage 2. It follows that the unique subgame perfect NE is $(\eta_{II}, \eta_I, \eta_{II}, \eta_I, \eta_I, \eta_I)$. Moreover, we know that both parties will choose η_I at stage 1 in equilibrium if $f > g\frac{(1+2g)}{(1+g)}$. However, as long as $f \in \left(g\frac{(1+2g)}{(1+g)},\ g(1+2g)\right)$ we still obtain valence-contingent outcomes at stage 2. As both parties choose the populist platform, party A will have the valence disadvantage –g with probability $\frac{1}{2}+g$. Therefore, in the area $f \in \left(g\frac{(1+2g)}{(1+g)},\ g(1+2g)\right)$ the subgame perfect NE is $(\eta_I, \eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I)$ with probability $\frac{1}{2}+g$ and $(\eta_I, \eta_I, \eta_{II}, \eta_I, \eta_I, \eta_I)$ with counter probability $\frac{1}{2}-g$. Finally, if $f > g(1+2g)$, the dominant strategy of both parties is choosing η_I in all three elections. □