Political Budget Cycles, Incumbency Advantage and Propaganda

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Abstract

This paper combines incumbency advantage and political budget cycle theory. An opportunistic politician is given two instruments: deficit-financed transfers and propaganda. Unlike earlier analytical models, but in accordance with the empirical literature, government manipulations do actually improve re-election chances. However, the optimal level of government manipulation depends on country characteristics, in particular the competence dispersion among potential candidates. This may explain why it is easier to detect political budget cycles in, for instance, developing countries or new democracies. Results are robust to alternative competence distribution and propaganda cost assumptions.

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I Introduction

Recent empirical research suggests that political budget cycles can only be observed in particular country groups or countries with specific characteristics: developing countries (Block, 2002, Schuknecht, 1996 and 2000, Shi and Svensson, 2006, and Vergne, 2009); new democracies (Brender and Drazen, 2005); or countries with low levels of fiscal or government transparency or media freedom (Alt and Lassen (2006), Akhmedov and Zhuravskaya (2004), and Veiga, Veiga and Morozumi (2017), respectively). Surveys on the literature on "context-conditional cycles" are provided by Francese (2002) and de Haan and Klomp (2013a). As a common feature, all these papers observe (explicitly or implicitly) that political budget cycles are smaller or non-existent in established OECD democracies – an issue to be picked up later on in this paper.

In the *model-theoretic literature*, two types of information asymmetries have been suggested to rationalise budgetary manipulations in opportunistic political cycle models. First, in papers in the tradition of Rogoff (1990) policymakers know about their own competence before it is revealed to voters who face an adverse selection problem. By expanding the public goods provision policymakers can send to voters a more positive signal about their competence, with the intention of increasing their re-election chances. Second, papers along the lines of Shi and Svensson (2006) model a pure moral hazard story, instead. (In Lohmann (1998), a similar model can be found for monetary policy manipulations.) The incumbent cannot use an informational advantage to signal competence, because neither politicians nor voters can observe the current competence level of the government. However, since part of the electorate is uninformed, the incumbent has an incentive to expand fiscal policy in order to appear as competent as possible, thereby increasing her re-election chances.

Both approaches, signalling and moral hazard, can explain political budget cycles. To my knowledge there is, however, no paper of either tradition which allows policymakers

to expand the share of votes, systematically, in equilibrium. Political manipulations affect the economy, but do not, on average, achieve the intended increase in the chance of political survival. This does, however, contradict empirical evidence presented by, for instance, Akhmedov and Zhuravskaya (2004), Aidt, Veiga and Veiga (2011) and de Haan and Klomp (2013b) who find that politico-economic machinations positively influence re-election chances – another issue to be picked up in this paper later on. Boylan (2008) and Aidt, Veiga and Veiga (2011) even find evidence for a "close election bias", i.e. that government manipulations increase, if the election is closely contested.

This paper presents a political budget cycle model in the Lohmann (1998) and Shi and Svensson (2006) tradition, though with significant modifications. Voters are either informed or uninformed about the budget deficit as in Shi and Svensson. However, uninformed voters cannot form rational expectations because they are susceptible to government disinformation (henceforth also propaganda).[1] Uninformed voters are naïve in that disinformation by the government lowers their deficit perception. Instead of providing a signalling model based on propaganda that results in an incumbency advantage as in Caselli et al. (2014), we use propaganda as government instrument that can directly affect the beliefs of some voters. This is a simplifying assumption, but this paper does not seek to explain theoretically the empirically existing incumbency advantage. Instead, it combines the information-provision advantage the incumbent has with political budget cycle theory. If the incumbency advantage can be used for influencing voter perception, we can explain the aforementioned empirical finding of increasing re-election chances due to politico-economic machinations. Moreover, the model suggests another empirical phenomenon (to be discussed further down) which may help explain why we

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[1] Disinformation is not unintentional misinformation, i.e. incorrect information. Instead, disinformation can be defined as the deliberate and malicious dissemination of false or misleading information. The term propaganda has a slightly different meaning and is typically preferred when the purpose of influencing a large number of people is stressed. Nonetheless, this paper uses the terms disinformation and propaganda synonymously. For a discussion of occurrence and relevance of disinformation, see Section II.

do not find political budget cycles in advanced OECD democracies.

Similar to Alesina and Roubini with Cohen (1997) this paper argues that if the government can appear more competent by raising the level of government spending, then it should appear even more competent, if it could convince (at least some) voters of being able to do so without incurring large deficits. In the model, the incumbent can, therefore, use two instruments for appearing more competent. Increasing the deficit allows the government to expand transfers which are appreciated by voters. Raising propaganda reduces the deficit perception and makes voters less aware of the deficit problem. The use of both instruments is limited because there are deficit repayment costs as well as costs for deceiving voters. The opposition, independent research institutes, the press and the (social) media may counteract the government machinations. In the literature, it is argued, however, that there is an incumbency advantage, i.e. that there is a per se advantage from being an incumbent rather than a challenger. This advantage may arise from having an edge in the use of propaganda. Evidence on the incumbency advantage for elections and the role of media coverage are discussed in Section II. It may be costly to disinform voters, but the government will typically be able to stir the public opinion in the desired direction.[2]

Giving the government a fiscal as well as a disinformation instrument for improving re-election chances reverses some of the previous theoretical results in the literature. In particular, it can be shown that governments' winning chances can be increased by their manipulation efforts – as suggested in empirical papers by Akhmedov and Zhuravskaya (2004), Aidt, Veiga and Veiga (2011), de Haan and Klomp (2013b). In addition and as a consequence thereof, it can also be shown that the optimal level of government manipulation depends on country characteristics, in particular the competence dispersion

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[2] There are also many examples for successful propaganda in the political domain, even in today's world. Take, for instance, the public opinion in Russia (with respect to the "legitimacy" of the annexation of the Crimean peninsula) or in Turkey (with regard to the role of the Kurdish "insurgency", the role of the Gülen movement in the 2016 coup, or the need for a presidential system).

among potential candidates. The intuitive (positive) link – as obtained by Shi and Svensson (2006) – between increasing the share of uninformed voters on the one hand and reinforced budget and deficit cycles on the other hand does not hold unambiguously any longer. In Section IV, it is shown that an increase in uninformed voters does not lead to magnified cycles, if incumbents are drawn from a pool of politicians with very similar competence levels. This holds for alternative standard distributions (Normal, Laplace and triangular).

The paper then goes one step further. Based on anecdotal and empirical evidence on real world competence distributions presented in Section II, it is argued that more dispersed competence distributions can be associated with developing countries and new democracies, more condensed competence distributions with established OECD democracies. This implies (and is a testable prediction of this paper) that developing countries and new democracies should exhibit larger variations in cycles for similar variations in information dispersion between countries, i.e. for similar variations in the shares of uninformed voters across countries. If the variation in the magnitude of cycles is larger in non-OECD democracies, then it might be easier to detect political budget cycles at least in some developing countries or new democracies. This paper may, therefore, help explain why political budget cycles are rarely found in established OECD democracies, but often in developing countries and new democracies.

The remainder of the paper is structured as follows. Section 2 completes the empirical picture with respect to model assumptions and interpretations. It discusses the relevance of disinformation and incumbency advantage, which are key assumptions of the model. It also shows that competence distributions differ for different country groups, which matters for the aforementioned interpretation of the results. Section 3 presents a simple model combining political budget manipulations with propaganda (with details provided in the appendix). Disinformation is costly in terms of reputation costs occurring after elections. However, the model results do not differ, qualitatively, to those obtained in an

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alternative model (not presented here) which captures contemporaneous disinformation costs to be paid out of the budget. In Section 4, several propositions are derived (with indications for the proofs provided in the appendix) and related to results previously obtained in the literature. The results are then reviewed under some standard distributional assumptions for competence; empirical implications are discussed. Section 5 concludes.

II   EMPIRICAL RELEVANCE OF ASSUMPTIONS AND RESULTS

This paper is a theoretical contribution, but argues that its assumptions and interpretations are based on real world phenomena. In particular, three aspects will be stressed. First, the occurrence of disinformation, also in the form of forecast manipulation, will be documented; and their link to rational behaviour will be discussed. Second, the key incumbency advantage assumption will be empirically justified and linked to the signalling model by Caselli et al. (2014). Third, empirical evidence will be presented to support the link between compressed competence distributions and established OECD democracies on the one hand and more dispersed competence distributions and developing countries/new democracies on the other hand. The latter will be needed for interpreting Proposition 3.

II.A   DISINFORMATION, FORECASTS AND RATIONALITY

It seems plausible that a government, which is willing to use fiscal policy for manipulating the whole economy, would a fortiori also be willing to foster the dissemination of false or misleading information. But is government disinformation in the context of fiscal policy empirically relevant? And if so, is it theoretically feasible that such disinformation affects the political budget cycle? As for the empirical aspect, Lipford (2001) is – to

my knowledge – the first one to clearly distinguish two issues. First, there is a general tendency of governments – at all times – to present the state of fiscal affairs in an overly optimistic light. She quotes Brennan and Buchanan (1980), according to whom "politicians will want to overestimate the benefits of government programs and underestimate the current and future taxes required to pay for those programs."[3] Second, there is a specific inclination during election years to produce even more optimistic public finance forecasts. She cites, for instance, Miller (1994) and Alesina and Roubini with Cohen (1997) who argue that the government may deliberately want to misinform the public about the true state of the budget in an election year, thereby justifying higher transfers or expenditures to raise its re-election chances.

The government's attempt to use public and/or research agencies to misrepresent the fiscal situation in a country is called "electoral forecast cycles" by Brück and Stephan (2006). Boylan (2008) argues that, in particular prior to elections, revenue forecasts are based on favourable estimates of the macroeconomic environment and unrealistic growth assumptions. As a consequence, pre-election budgets are overly optimistic, thus resulting in unexpected deficits. His panel data analysis for all 50 US states reveals significant coefficients for the underreporting of pre-election deficit figures. Krause and Corder (2007) claim that "less stable [US federal] agencies are more likely to accommodate political pressures for forecast optimism". There is also strong evidence for manipulations in other OECD countries, but also some mixed evidence.[4] The sovereign debt and

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[3] There is plenty of supporting, but also some mixed evidence. General "budget propaganda" is already reported by Porritt (1910) for early twentieth century England. Blackley and DeBoer (1993) claim that there is a "substantial bias in outlay proposals", but not in economic forecasts or revenue estimates for US federal budgets prior to 1989. In contrast, Boylan (2008) finds biases in forecasts for an array of US state budget variables from 1982 to 2005 and attributes them to both economic and political factors. This is confirmed by Lehmann and Jochimsen (2017) for a sample of 18 OECD countries. They find that left-wing and *less* fragmented governments produce more optimistic tax revenue forecasts; they do, however, not find any evidence for political budget cycles. Buettner and Kauder (2015) argue that external experts can (at least in Germany) not prevent the government from exerting influence on tax revenue forecasts.

[4] Heinemann (2006) contributes evidence for official forecasts of Germany's federal budget from 1969 to 2003. His results support the idea that deficit forecasts are more optimistic prior to elections. Similar,

banking crisis in the Eurozone revealed successful government attempts to manipulate the international public's perception of a country's fiscal situation. Greece and other European countries cheated to hide "excessive" public debt and/or deficits so that they could gain access to the European Monetary Union and/or fulfill the criteria laid out by the European Stability and Growth Pact. To my knowledge no econometric study has been conducted for developing countries yet, but Kyobe and Danninger (2005) claim that discretionary adjustments of forecast figures are certainly not uncommon.[5] All the aforementioned evidence suggests that many governments try to influence budget perceptions and forecasts more or less directly, especially prior to elections.

According to the Condorcet Jury Theorem (Condorcet, 1785; Grofman, Owen and Feld, 1983; Myerson, 1998) the "correct" decision can be reached with a high probability (under fairly mild assumptions on the distribution of information), even if voters receive imprecise signals. With disinformation, i.e. deliberate misinformation, the situation is different; the government tries to skew the information distribution in its own favour. Disinformation can produce distortions, even if agents are fully rational. Eichenberger (1996) argues that incorrect ("dirty") information increases the variance and has "systematic effects at the aggregate level" because of asymmetries in "political decision-making processes". Congleton (2001) discusses biased rational expectations, especially in cases when not all possibilities are known explicitly ("the dimensionality of the event space is, itself, to be learned"). Ursprung (1994) finds that a government can influence

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though weaker evidence is obtained for German states by Bischoff and Gohout (2010). Couture and Imbeau (2009) find evidence for a pre-election revenue bias (in Canadian provinces from 1986-2004), Paleologou (2005) for a pre-election expenditure and revenue, but not for a deficit bias (for UK budget forecasts from 1969 to 1995). Ohlsson and Vredin (1996) encounter partisan, but no electoral effects (for Swedish data from 1969 to 1993). Evidence for pre-election budget balance errors in EU member countries is found by von Hagen (2010). Brück and Stephan (2006) even suggest that the euro zone Stability and Growth Pact has spurred electoral forecast cycles.

[5] They report on the revenue forecasting practices in 34 low-income countries. Their study is based on a questionnaire circulated to IMF fiscal economists in 2003. While most countries score low on the quality and the accountability of the forecasting process, discretionary adjustments seem to be particularly severe in countries with low levels of governance.

an uninformed, but rational electorate to some degree. If, however, we are willing to acknowledge that not all voters deal with manipulated information in a fully rational way[6] (especially when it comes to deficits and other fiscal variables), the effect measured by Ursprung (1994) should be even larger. In addition, even if voters anticipate that governments try to misrepresent fiscal data, governments seem to particularly increase their efforts prior to elections. Would all voters anticipate that? How would voters know that they should trust "stable agencies" (who might be more independent) more than less stable ones (Krause and Corder, 2007)? In a country where the media are controlled by the government, many people suspect government disinformation, but will all voters be able to rationally anticipate the correct degree of disinformation? If they could, why should censorship and media control be such an important issue, especially in developing countries and new democracies?[7]

II.B INCUMBENCY ADVANTAGE AND SIGNALLING

The incumbency advantage has empirically been confirmed in numerous papers (more recently by Freier, 2015), even though it does not apply to all circumstances (Ade, Freier, Odendahl, 2014; da Fonseca, 2015). The advantage has often been linked to media

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[6] Caplan (2002, 2006) reports strong evidence that non-economists hold very different beliefs from economists (who are trained in rational expectations), thereby suggesting that agents hold biased beliefs on the economy and economic policies. Based on the "Survey of Americans and Economists on the Economy" he rejects the hypothesis that the measurable differences in beliefs between economists and the general public can be explained by the economists' self-serving bias, i.e. their socio-economic background.

[7] In democratic countries this may also work against the government. During the recent 2016 Brexit referendum in the UK, disinformation played a significant role (e.g. the false claim that EU membership costs the UK £350m a week; the insinuation that the UK could get out of the EU in order to prevent migration while remaining in the common market). Hetherington (1996) suggests that the US media were undermining Bush's re-election bid by "Forming Voters' National Economic Evaluations in 1992". – Press empires play a significant role in determining public opinion: Murdoch's papers during the Brexit campaign; Berlusconi's media during his own time in office and thereafter (see also Durante and Knight, 2009). Media capture is analysed by Besley and Prat (2006). The literature on mass media is surveyed by Prat and Strömberg (2011).

coverage and applies even if the media are not (fully) controlled by the government. Incumbents get more media attention (Goldenberg and Traugott, 1987) and are (therefore) better known and more positively evaluated (Abramowitz, 1980). Hinckley (1980) and Ragsdale (1981) find that incumbents are more visible in the media than challengers. When the seat is open, ie. no incumbent running, there is, overall, more media coverage according to Kahn (1991). Iyengar, Peters and Kinder (1982) show experimentally that it is possible to influence the weight voters give to certain topics (priming) and then affect their voting by focussing media coverage on those topics. Prior (2006) argues that local TV stations broadcast material for the incumbent at below market costs. This makes propaganda costlier for the challenger.

In Kartik (2009) lying is also costly, but his model studies the strategic interaction between the sender and the receiver of false information (as pioneered by Crawford and Sobel, 1982). The (relatively small) literature on disinformation in political economy games focuses more specifically on the interaction between incumbents and voters; propaganda is used to affect agents' perceptions and thus the probability of appropriating a given rent. Ursprung (1994), for instance, models a propaganda campaign by competing interest groups. In Austen-Smith (1987) candidates use campaign expenditures to affect their perceived position. A disinformation technology is drawn upon and probabilistic voting is applied to determine the optimal investment in disinformation. Ursprung (1994) finds that "the electorate can be influenced [by disinformation] to a certain degree." In Congleton (1986) the voter perception can be affected by the number of repetitions of certain messages.

Based on the evidence on media coverage Caselli et al. (2014) assume that only the incumbent can send a signal which is interpreted as propaganda. The incumbent tries to raise her perceived competence (or "talent" or "quality" as referred to in their paper) above the average, i.e. the challenger's expected competence. Rational voters cannot be fooled on average. But because signals are sent specifically when incumbents are of

medium quality and hence close to the re-election threshold, there is an incumbency advantage on average. This paper differs in that there is no signalling. However, the incumbent behaves as the medium quality incumbents in Caselli et al. (2014); she does send a sort of disinformation signal to voters. In both papers, a (medium quality) incumbent can effectively influence voters' beliefs of her competence and, thereby, raise her re-election probability. Caselli et al. provide a rational expectations explanation for improving re-election chances by using (propaganda) signals. However, it is this paper that justifies such electoral success based on manipulations in the context of a political (budget) cycle model. This can only be achieved because the fiscal instrument is augmented with a propaganda instrument which produces an incumbency effect.

II.C   COMPETENCE DISTRIBUTIONS IN DIFFERENT COUNTRY GROUPS

The interpretation of Proposition 3 on the effects of changing the share of disinformed voters depends upon the distribution of competence in the pool of candidates. There are different arguments that could be made on the selection of politicians in different countries or country groups. If money is the major determinant for politicians to choose their job, then one would suspect that less corrupt (Western) countries should bring forth low competence politicians because more competent politicians face larger opportunity costs. In more corrupt countries, it might be more worthwhile to become a politician for highly competent individuals because of rent extraction possibilities. One could also make an argument about the link between competence and the education level of politicians.

However, what matters for this paper is not the average level of competence, but the dispersion of competence. Is the competence level in the pool of candidates very diverse? In the UK many politicians of the major parties studied at Oxford or Cambridge; in

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France they typically attended a Grande Ecole. Although similar education does not necessarily result in similar competence, it does hint at it given that these politicians acquire similar skills and abilities. In contrast, government competence may be more dispersed in developing countries and new democracies where power and personal relationships largely influence who can become a politician. When voters are susceptible to populism, one could also speculate that the competence of potential politicians is more dispersed.

This paper argues that we can use the change over time of two Worldwide Governance Indicators by the World Bank (2016) as a proxy for *competence dispersion*. Government Effectiveness captures perceptions of the quality of public services and policies; Regulatory Quality depicts perceptions of government policies and regulation which promote private sector development. The levels of both variables would not say much about government competence, but it can be argued that changes over time reflect the influence of competent or incompetent politicians on the functioning of the government. Hence lower standard deviations (s.d.s) indicate less variation in regulatory quality and government effectiveness. Table 1 comprises comparisons of averages for country groups; disaggregated s.d.s are reported in Appendix A. Let us interpret the results. For individual countries one could argue that regulatory quality and/or government effectiveness change over time for country-specific reasons and not necessarily for changing competence levels of presidents or prime ministers. It is, however, noteworthy that there are systematically higher values for developing countries and new democracies compared to most established OECD democracies.[8] These results are, therefore, taken as an indication for a more dispersed competence distribution within the pool of candidates in developing countries and new democracies.

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[8] Two exceptions are Italy and Japan (see Appendix A). Italy was excluded from the sample of Western European democracies because the s.d. for government effectiveness and regulatory quality may not be meaningful for a country which had 65 governments since 1945. I do not have an explanation for the large s.d. for Japan.

Table 1: VOLATILITY DIFFERENCES BETWEEN COUNTRY GROUPS

	Government Effectiveness	Regulatory Quality
Latin America versus Western Europe (without Italy)	4.80	125.05
Latin America versus US+Canada	60.56	106.42
New Democracies versus Western Europe (without Italy)	14.47	66.48
New Democracies versus US+Canada	75.37	52.70

Notes: The numbers in the table indicate by how many percent the standard deviation for Latin American countries (or New Democracies) exceeds the standard deviation for Western Europe (or US+Canada).

III   A DISINFORMATION MODEL WITH REPUTATION COSTS

The model captures an incumbent who can improve her re-election chances because a share ψ of the electorate is susceptible to government manipulations. The government in power has two instruments for appearing more competent: (i) it can increase deficit-financed transfers before elections and cut transfers to repay the pre-election deficit after elections; and (ii) it can reduce the deficit perception by spreading disinformation. The government incurs a reputation cost *after* elections, if the dissemination of disinformation is detected. An alternative model with *contemporaneous* budgetary costs to disinformation produces similar results, but is not shown here. Note that the way of modelling costs to disinformation does not affect the results qualitatively. Both models share that every alternate period an incumbent politician and a challenger representing different parties run for office. Politicians' motivation is purely opportunistic. Nonetheless, voters' utility does not hinge on economic considerations alone, but also on a more or less strong personal predisposition or sympathy for one of the candidates.[9]

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[9] Henceforth the terms voter and individual (agent) are used interchangeably. Similarly, the terms politician and policymaker are used as synonyms. Furthermore, we associate the incumbent with party a and the challenger with party b without limiting the generality of the analysis.

III.A Preferences, budget constraint and competence

The expected utility function for any voter i reflects both economic and non-economic components:

$$U_t^i = \sum_{s=t}^{\infty} (\beta^i)^{s-t} E_s[c_s + \alpha\theta^i z_s]. \tag{1}$$

The economic component c_s (consumption) and the sympathy component $\theta^i z_s$ are additively-separable with relative weight α in each period. E_s captures the expectations operator. Discount factor β^i does not affect the results – as can be seen later on. To keep the model tractable, another simplification is that utility is linear in consumption.[10] Utility derived from sympathy is constrained to $\theta^i z_s \in [-\frac{1}{2}, \frac{1}{2}]$ since z_t is either $-\frac{1}{2}$ (when party a is elected) or $+\frac{1}{2}$ (when party b is elected); and the personal sympathy parameter θ^i is uniformly distributed over the interval $[-1, 1]$.[11] The sympathy component represents any attribute of the candidates that does not affect economic policies, be it their stance on societal issues or their good looks.

Both politicians $j = a, b$ face a utility function similar to the one for voters consisting, again, of an economic and a non-economic component. The non-economic component is, however, different and includes both a political rent and a political cost. The politician's expected utility function is thus:

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[10] Explicitly capturing discounting and decreasing marginal utility in consumption (convex indifference curves) would not affect the results of this paper. As for the possibility of result reversion in Proposition 3, this can be seen from the graphical illustration (Figure 3 in Appendix E) of the resulting maximisation problem (E.1).

[11] If individual i has somewhat more sympathies for party a, say at $\theta^i = -\frac{1}{2}$, then her utility derived from sympathy is positive ($\frac{1}{4}$), if party a is elected ($z_i = -\frac{1}{2}$); but it is negative ($-\frac{1}{4}$), if party b is elected ($z_i = \frac{1}{2}$).

$$V_t^j = \sum_{s=t}^{\infty} (\beta^j)^{s-t} E_s[c_s + \mathbf{I}_s X - \mathbf{I}_{s-1}\lambda_s P_s] \qquad\qquad j = a, b. \qquad\qquad (2)$$

$$\mathbf{I}_r = \begin{cases} 1 & \text{if in power in period } r \\ \\ 0 & \text{otherwise} \end{cases}$$

The policymaker receives exogenous ego rent X only, if she is in power in period s. She incurs a cost, if it is discovered in that period that she was spreading disinformation as an incumbent in the previous period $(s-1)$ and, thereby, influencing the previous period deficit perception of share ψ of the electorate (the uninformed voters). The expected disutility depends on exogenous detection probability λ_s and endogenous propaganda costs in money terms, P_s. There is a one-to-one relationship between P_s and the incumbent's optimal choice of the manipulation of deficit perception in the previous period (to be modelled further down). For simplicity, we make three assumptions: (i), voters are willing to punish the incumbent, but do not (want to) remember the incumbent's dishonesty for more than one period (see also footnote 14); (ii), the magnitude of propaganda costs does not depend on whether the previous period incumbent is still in power or lost the elections; and (iii), the policymaker's discount factor β^j will be ignored in the analysis later on.[12]

Voters' and politicians' consumption alike are constrained by each agent's constant net-of-tax income y and period-specific transfers T_t:

$$c_t = y + T_t. \qquad\qquad (3)$$

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[12] As for (ii), those costs may be different in nature: if in power, costs may accrue due to the loss of political capital; if out of power, these costs may have more to do with diminished revolving-door opportunities. As for (iii), we shall see later on that the model can be split into 2-period election cycles (also because of assumption (i)); then the explicit inclusion of the discount rate does not contribute to substance nor exposition. Note that the latter two assumptions do not affect the model results qualitatively.

The government budget constraint is

$$T_t = D_t - R(D_{t-1}) + \eta_t^j. \tag{4}$$

Transfers are deficit-financed intertemporal transfers, not income redistribution. Providing additional government subsidies or benefits enables the policymaker in power to appear more competent since current period skills are not observable (notwithstanding that current skills can be deduced by informed voters; see Appendix C, equation C.3). Transfers depend on current deficit, D_t, minus repayment for (accumulated) previous deficit, $R(D_{t-1})$, but they are also affected by the incumbent's positive or negative competence shock.[13] Repayment function $R(D_{t-1})$ is assumed to be common knowledge and has some intuitive properties which guarantee that the government wants to repay the deficit as quickly as possible: $R(0) = 0$, $R'(0) = 1$, and $R''(D_{t-1}) > 0$ for all $D_{t-1} \geq 0$. Competence η_t^j consists of a skills shock for the current period and another one for the previous period:

$$\eta_t^j = \mu_t^j + \mu_{t-1}^j. \tag{5}$$

Hence competence persistence is modelled as an MA(1) process.[14] Each skills shock μ_t^j is an i.i.d. random variable with mean 0, distribution function $F(\mu_t^j) = F(\bullet)$, $F(0) = \frac{1}{2}$, and density function $f(\mu_t^j) = f(\bullet) = F'(\bullet)$ which is (weakly) monotonously increasing up to the mean.[15] Past shocks are common knowledge, but current or future shocks

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[13] For $\eta_t^j > 0$, (net) transfers T_t would surpass the net deficit, $D_t - R(D_{t-1})$. In a developing country, we could interpret η_t^j as the government's ability to secure foreign aid, which does not have to be repaid. In any country, it may also reflect its ability to seize and exploit profitable investment opportunities.

[14] Limited persistence is a compromise. It allows some persistence while acknowledging that competence also changes over time as new tasks for politicians emerge. For persistence longer than 1 period, the model would not be easily solvable. Rogoff's (1990) suggestion of an MA(1) process is one of three conditions for splitting the model into separate 2-period cycles as is so common in this literature. (The other conditions are the aforementioned assumptions of repayment being costly and politicians' punishment for cheating being limited to the following period.) See the timing of events on page 17.

[15] For more unusual density functions (for instance, with $F''(\mu_t^a) < 0$ for some $\mu_t^a \leq 0$), we could get ambiguous results. However, the limiting case of $F''(\mu_t^a) = 0$ for some $\mu_t^a \leq 0$ or even over the entire range (uniform distribution) is acceptable.

are unknown to both policymakers and private agents. Even the incumbent does not know her own current competence – an idea suggested by Shi and Svensson (2006) – because she always faces new tasks and challenges (like the international financial crisis, the Greek sovereign debt crisis, the Transatlantic Trade and Investment Partnership (TTIP) negotiations, the refugee crisis, or the Brexit vote in the UK) or she wants to start new programmes and cannot foresee how efficiently she can manage them. Not knowing one's own competence, any incumbent has an incentive to provide additional transfers in order to appear more competent and increase her re-election chances. Since policymakers do not have an informational advantage, there is no signalling as in Rogoff (1990), only moral hazard as in Shi and Svensson (2006).

III.B   GOVERNMENT MANIPULATION AND TIMING OF EVENTS

Recall the government budget constraint 4. Every period, transfers, last period's deficit and last period's competence can be observed by all voters. A share of voters $(1 - \psi$, with $0 \geq \psi \geq 1)$ also observes the government's policy choice of current period deficit, D_t. If the government policy could be observed by all voters, the government would gain nothing from manipulating the deficit and from trying to disinform voters in order to affect their perception of the deficit. The moral hazard problem arises because a share of voters ψ is uninformed. Not only can they not infer government competence in election period t, but they can also not form unbiased beliefs about the incumbent's performance after elections.[16] This is so because the government can affect their perceived deficit, $\widehat{D_t}$, by using disinformation. The interdependence between government propaganda, opposition counter-propaganda, the role of the media and communication among individuals is ignored; instead the model makes use of the empirical finding of an incumbency advantage discussed in Section II. Nonetheless, if the deception is detected

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[16] Hence the solution here is not based on the perfect Bayesian equilibrium concept, but on subgame perfect Nash.

(with probability λ), the incumbent suffers some disutility in the following period (as captured in the politicians' utility function 2). It is assumed that propaganda costs P_{t+1} increase with the degree of manipulation of perceived deficit $\widehat{D}_t$.

$$P_{t+1} = \Phi(\widehat{D}_t), \tag{6}$$

with $\Phi'(\widehat{D}_t) < 0$ and $\Phi''(\widehat{D}_t) > 0$. However, it is easier to solve this model and interpret it, when we consider the inverse function:

$$\widehat{D} := \widehat{D}_t = \widehat{D}(P_{t+1}). \tag{7}$$

The incumbent has thus full control over $\widehat{D}_t$, the perception of deficit by a share ψ of voters. She uses disinformation which bears a cost in the following period only, and only if detected. Nonetheless, equation (7) is referred to as disinformation technology with $P_{t+1} \geq 0$ being interpreted as investment. The properties of equation (6) imply $\widehat{D}'(P_{t+1}) < 0$ and $\widehat{D}''(P_{t+1}) > 0$, i.e. disinformation investment is effective and reduces the perceived deficit, but with a decreasing marginal effect. Some additional plausible assumptions are suggested to obtain an interior solution: $\widehat{D}(0) = D^*$ (without disinformation even uninformed voters base their decision on the correct level of deficit) and $\widehat{D}(\infty) = 0$ (even disinformation cannot make uninformed voters believe in a surplus instead of a deficit). So, there will always be some disinformation at the optimum.

The timing of events is summarised in Table 2; the reasons why the model can be sliced into two-period models consisting of an election and an off-election period each is given further down. Consider the incumbent to whom we refer to as party a without loss of generality. In election period t, she chooses deficit level D_t, thus providing transfers T_t for the public according to equation (4). She also decides how much she wants to manipulate disinformed voters' deficit perception $\widehat{D}$, thereby being willing to incur propaganda costs P_{t+1} in period $t+1$ given detection probability λ and disinformation

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Table 2: THE TIMING OF EVENTS

All voters and incumbent a observe:	All voters observe:	The winner of the period t elections takes office and receives ego rent X.
- last period's deficit $\boldsymbol{D_{t-1}}$	- transfers $\boldsymbol{T_t}$	
- the incumbent's last period skills $\boldsymbol{\mu_{t-1}^a}$	**Informed voters observe:** - the incumbent's deficit choice $\boldsymbol{D_t}$	With probability λ the period t incumbent, if re-elected in period $t+1$, suffers disutility P_{t+1}.
Incumbent a:	**Informed voters:** - deduce the incumbent's current period skills $\boldsymbol{\mu_t^a}$	The winner repays the deficit of the previous year and chooses $D_{t+1} = 0$ as deficit is costly.
- chooses the deficit $\boldsymbol{D_t}$ (thereby providing $\boldsymbol{T_t}$)	- and vote	
- chooses the degree of manipulation of perceived deficit $\boldsymbol{\widehat{D}_t}$ (thereby incurring propaganda costs $\boldsymbol{P_{t+1}}$, if the manipulation is detected)	**Disinformed voters:** - form expectations of the incumbent's current period skills $\boldsymbol{\widehat{\mu_t^a}}$ (based on perceived deficit $\boldsymbol{\widehat{D}_t}$) - and vote	
Period t		**Period $t+1$**

technology (7). Individuals vote for incumbent or challenger depending on whether their own utility (which is affected by the incumbent's competence) is likely to be higher under one or the other in period $(t+1)$, i.e. after the elections. All voters observe past skills shock μ_{t-1}^a, last period deficit D_{t-1}, and transfer level T_t. Only informed voters also observe deficit level D_t and can, therefore, deduce the level of current skills μ_t^a. They can, therefore, extract some information about the future competence η_{t+1}^a of the incumbent since $\eta_{t+1}^a = \mu_{t+1}^a + \mu_t^a$. Uninformed (disinformed) voters can only form expectations of current skills, $\widehat{\mu_t^a}$, based on perceived deficit $\widehat{D}(P_{t+1})$. Then, all voters cast their vote based on their different beliefs and information sets. What matters is that some voters can be disinformed by the incumbent.

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In period $(t+1)$, the winner (incumbent or challenger) takes office and receives exogenous ego rent X. If re-elected, the period t incumbent suffers disutility P_{t+1} for the propaganda she spread in period t with probability λ. Voters are no longer relevant for the period $(t+1)$ policymaker's decision making because they cannot vote in period $(t+1)$ (and in voting period $(t+2)$ they will be concerned about the incumbent's future competence, not about her past behaviour). Politicians have no incentive for manipulating the deficit and/or disinforming voters in $(t+1)$. They want to repay the previous period deficit because the deficit is costly[17] and voters cannot sanction the policymaker for reducing transfers, i.e. effectively levying additional taxes to finance deficit repayment. Given that voters are only concerned about politicians' competence after the election it does not matter that individuals anticipate in election period t that any politician will repay the deficit in the off-election period $(t+1)$. Note also that voters do not consider expected utility in $(t+2)$ in their voting decision in t, because even informed voters cannot distinguish between the incumbent and her challenger in $(t+2)$ (competence is an MA(1) process only). Politicians, too, are not concerned about the more distant future, because they have no instrument for affecting utility or re-election chances in $(t+2)$. Nonetheless, $(t+2)$ and $(t+3)$ form a new election cycle, possibly with more sceptical voters and higher propaganda costs, but the same qualitative results.

III.C SOLUTION

The model is solved in four steps – with details given in the appendix. *First*, we can determine the probability that an individual agent votes for incumbent a. The probability depends on whether a voter expects the incumbent or the challenger to deliver a

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[17] Repayment is guaranteed, technically, because the marginal utility of additional deficit (through its 1-for-1 effect on transfers and, finally, on consumption) is 1 (given that the discount factor is assumed to be 1), whereas the marginal cost $(R'(D))$ and, therefore, the marginal disutility is greater than 1. The unity marginal utility assumption is also used by Shi and Svensson (2006) for the same purpose as here, albeit with respect to the public goods consumption. – With less restrictive assumptions, we could get a rising trend in debt.

higher level of utility *after* the elections. This depends on two components: (i) on the individual's sympathy θ^i towards the candidates; and (ii) on who is expected to deliver more transfers next period which, in turn, depends on the then relevant skill shock of challenger a and incumbent b, $\eta_{t+1}^j = \mu_{t+1}^a + \mu_t^a$, $j = a, b$. Individuals know nothing about either politician's future skills shock, μ_{t+1}^j; nor do they know anything about the challenger's current skills shock, μ_t^b; they may, however, have expectations on the incumbent's current skills shock $(E_t[\mu_t^a])$ based on her performance in office in period t. It is shown in the appendix that an individual agent votes for incumbent a, if the following inequality (which corresponds to (B.6) in Appendix B) holds:

$$E_t[\mu_t^a] \quad > \quad \alpha \theta^i. \tag{8}$$

Even if incumbent a is expected to be (slightly) less skilled than average, an individual will still vote for incumbent a, if the voter is sufficiently sympathetic towards the incumbent (remember that $\theta^i < 0$ indicates sympathy for party a and α is a positive weight.) Conversely, even if a voter is sympathetic towards the challenger ($\theta^i > 0$), the incumbent could still be chosen, if the incumbent is expected to exhibit sufficiently strong (above average) competence in the current period.

Second and on this basis, we can derive the probability for the incumbent to win the election, i.e. obtain more than 50 percent of the votes, for a given level of transfers, which depends on the deficit level, the disinformation investment and the competence level of the incumbent. Here is the probability for the incumbent to win the election (same as (C.1) in Appendix C):

$$\text{Prob} \left\{ \underbrace{(1 - \psi) \, [\frac{E_t^{inf}[\mu_t^a]}{2\alpha} + \frac{1}{2}]}_{\text{informed}} + \underbrace{\psi \, [\frac{E_t^{disinf}[\mu_t^a]}{2\alpha} + \frac{1}{2}]}_{\text{disinformed}} \quad \geq \quad \frac{1}{2} \right\}. \tag{9}$$

The probability depends on whether informed voters (share$(1 - \psi)$) and disinformed voters (share ψ) think that the incumbent's skills are above average ($E_t[\mu_t^a] > 0$) or

not. The difference for informed and disinformed voters occurs because informed voters have all information for deducing μ_t^a from the period t transfer equation (4), unlike disinformed voters who have to use their perception of the incumbent's deficit in period t, $\widehat{D}_t$. Disinformed voters overestimate the incumbent's competence by $D_t - \widehat{D}_t$. On this basis, we can derive the incumbent's probability of winning (identical to (C.5) and (C.6) in the appendix):

$$\text{Prob} \quad \left\{ \mu_t^a \quad \geq \quad \psi \, (\widehat{D}_t - D_t) \right\} \tag{10}$$

$$= \quad 1 \quad - \quad F \, [\, \psi \, (\widehat{D}_t - D_t)] \, , \tag{11}$$

where $F(\bullet)$ is the distribution function of the skills shock. It can be seen that producing (or increasing) a deficit and reducing the perception thereof raises the government's chance of being re-elected above 50%. The incumbent who is ex ante uncertain about her competence will try to appear more competent by increasing transfers which also increases the deficit while at the same time trying to invest in disinformation, thereby reducing the disinformed voters' perception of the deficit relative to the actual (equilibrium) level of deficit. Note that the aforementioned equations, therefore, also show that the incumbent can increase her winning probability even *in equilibrium*. See Proposition 1.

Third, we can maximise the incumbent's expected utility over any 2-period cycle, i.e. period t utility *plus* period $(t + 1)$ utility in case of winning the election multiplied by the probability of winning (as determined in step 2) *plus* period $t + 1$ utility in case of losing multiplied by the probability of losing. For simplicity (as suggested before), let us

assume that discount factor $\beta = 1$.

$$max_{D_t, P_{t+1}} \ V \ = \ max_{D_t, P_{t+1}} \ V_t^a \ + \ V_{t+1}^a \ =$$

$$max_{D_t, P_{t+1}} \qquad E_t\{y + D_t + \eta_t^a + X\}$$

$$+ \ E_t\{ \ \underbrace{[1 - F[\psi(\widehat{D} - D_t)]]}_{\text{prob. incumbent wins}} \ [y - R(D_t) + \eta_{t+1}^a + X - \lambda_{t+1}P_{t+1}]\}$$

$$+ \ E_t\{ \ \underbrace{[F[\psi(\widehat{D} - D_t)]]}_{\text{prob. incumbent loses}} \ [y - R(D_t) + \eta_{t+1}^b - \lambda_{t+1}P_{t+1}]\} \ (12)$$

To characterise the optimal level of deficit and disinformation investment we derive two first order conditions (FOCs; equivalent to (D.2) and (D.3) in Appendix D):

$$1 \quad - \quad R'(D_t^*) \quad + \quad \psi \quad F'[\psi(\widehat{D} - D_t^*)] \quad X \quad = \quad 0, \tag{13}$$

$$- \quad \lambda_{t+1} \quad - \quad \psi\widehat{D}' \quad F'[\psi(\widehat{D} - D_t^*)] \quad X \quad = \quad 0, \tag{14}$$

where $F'[\bullet] = f[\bullet]$ refers to the probability density function. The maximisation problem can also be illustrated graphically (see Figure 3 in Appendix E). As for the interpretation of the first FOC, $1 - R'(D_t^*)$ is the marginal direct net effect of deficit, which is negative, because deficit including repayment is costly. Deficit is optimally chosen by the government, when the negative marginal direct net effect equals the positive marginal effect on the expected ego rent. This is the impact of a marginal change of deficit on competence and, thereby, on the probability of receiving the ego rent (the marginal winning probability), multiplied by the share of disinformed voters times the ego rent. The second FOC is similar with two differences: (i), the negative marginal direct effect of disinformation investment equals $-\lambda$, the probability of being detected in the post-election period; and (ii), the positive indirect effect through competence now also depends on the effect of disinformation on perceived deficit $\psi\widehat{D}'$, where $\widehat{D}'$ is the negative slope of the disinformation technology at the equilibrium. Given $F'[\bullet] > 0$ it is clear from the FOCs

that it is optimal for the government to always use both its instruments, i.e. manipulate the deficit and disinform voters. For $\lambda = 0$ unrealistically, propaganda would be costless and hence used without bounds, thus producing $\widehat{D}(\infty) = \widehat{D}'(\infty) = 0$, which would imply that deficit manipulations are maximally effective.

Forth, perturbation results are obtained by using the Implicit Function Theorem (see Appendix F). We are interested in marginal effects of changes in the political rent X, detection probability λ or of shifts between the two groups of voters *on* the government's optimal choice both of the deficit D^* (in t) and of its investment in propaganda P^* (in $t+1$).

IV   RESULTS AND DISCUSSION

Before studying perturbation results, let us go back to equation (11), which tells us that the incumbent's probability of getting re-elected depends on the wedge between the deficit perceived by disinformed voters, $\widehat{D}$, and the equilibrium deficit D_t^*.

Proposition 1. - *Re-election Chances.*

Manipulations by the incumbent are effective in that they increase the incumbent's vote share.

Proof: Simple inspection of equation (11); see also discussion thereof on page 21.

The proposition corroborates evidence by Akhmedov and Zhuravskaya (2004), Aidt, Veiga and Veiga (2011) and de Haan and Klomp (2013b) who find that politico-economic machinations positively influence re-election chances. Boylan (2008) and Aidt, Veiga and Veiga (2011) even find evidence for a "close election bias", i.e. that government manipulations increase, if the election is closely contested.

The effects of changing the ego rent and detection probability are much more straighforward:

Proposition 2. - *Some Obvious Results: Ego Rents and Detection Probability.*

A. Higher political rents increase optimal borrowing and disinformation investment at the equilibrium:

$$(i) \quad \frac{dD^*}{dX} > 0 \qquad\qquad (ii) \quad \frac{dP^*}{dX} > 0.$$

B. Higher probability of being found out to use disinformation leads to shifts from disinformation investment to borrowing at the equilibrium:

$$(iii) \quad \frac{dD^*}{d\lambda} > 0 \qquad\qquad (iv) \quad \frac{dP^*}{d\lambda} < 0.$$

Proof: See appendix F.

As for part A, if the ego rent of being in power increases, then, intuitively, the incentive to distort the economy also increases. The incumbent is more willing to incur the costs both for increasing the deficit (repayment cost $R(D_t)$) and for lowering the perception of the deficit (viz. increasing disinformation cost P_{t+1}) in order to appear more competent in the eye of voters. Result *(i)* confirms the theoretical and empirical finding obtained in Shi and Svensson (2006). Result *(ii)* extends the same logic to the disinformation instrument. In part B, we make one of the two instruments more expensive and get the standard result of a shift from the more costly disinformation instrument (result *(iv)*) to the less costly deficit instrument (result *(iii)*). As already shown by first order conditions (13) and (14) it is, however, always optimal to use both instruments, at least to some degree.

The effects of changing the share of disinformed voters are ambiguous:

Proposition 3. - *Changing the Share of Voters Who Are Susceptible to Disinformation.*

A. A larger share of voters who are susceptible to disinformation increases optimal borrowing and disinformation at the equilibrium, if and only if the competence density

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function is relatively inelastic at the equilibrium:[18]

(i) $\quad \dfrac{dD^*}{d\psi} > 0$ $\qquad\qquad\qquad$ (ii) $\quad \dfrac{dP^*}{d\psi} > 0.$

B. If and only if the competence density function is relatively elastic at the equilibrium, the results reverse:

(iii) $\quad \dfrac{dD^*}{d\psi} < 0$ $\qquad\qquad\qquad$ (iv) $\quad \dfrac{dP^*}{d\psi} < 0.$

Proof: See appendix F.

This result can only be explained because the chance of winning the election can be affected by the government. The competence distribution actually determines how effective government manipulations are in increasing the incumbent's re-election chances. Consider an increase of the share of disinformed voters ψ at the equilibrium. This increases the chance of winning ceteris paribus (the effect of increasing ψ), but may increase or decrease the *marginal* winning probability $F'[\mu_t^a]$ at the equilibrium[19] and thus require reoptimisation. If increasing government manipulations lead to a decrease in the marginal winning probability, then the overall effect would be ambiguous. With a very strong reduction of the marginal probability of winning, additional manipulations by the policymaker may become ineffective. More voters could be manipulated, but the effect per voter would be reduced too much. As a consequence, the policymaker may want to do the opposite; she may want to reduce costly repayment costs, i.e. lower the deficit, instead of increasing it. This means a dampening of the political budget cycle.

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[18] Inelastic at the equilibrium means that the competence density function $f[\psi(\widehat{D} - D_t^*)]$ $(= F'[\mu_t^a])$ responds little to changes in competence (relative to the density-competence ratio at the equilibrium). This is required for satisfying the "if and only if" condition (15) below.

[19] The marginal winning probability was already mentioned in the discussion of FOC (13). It is determined by the slope of the competence distribution function F at the equilibrium. A change of the marginal winning probability refers to the change of the slope.

The "if and only if" condition (see Appendix F) for obtaining the results of part A of Proposition 3 can be written as

$$F'[\psi(\widehat{D} - D_t^*)] + \psi F''[\psi(\widehat{D} - D_t^*)](\widehat{D} - D_t^*) > 0. \tag{15}$$

It is clear that the first term is positive and the second one typically negative (and always non-positive) as long as $\widehat{D} < D_t^*$ (while taking note of the (weak) monotonicity assumption for F' up to the mean, see page 15). For $F''[\bullet] = 0$, for instance if the distribution is uniform, the second term completely vanishes and condition (15) holds. The second term also disappears, if $\widehat{D} = D_t^*$ in equilibrium, i.e. all agents (including those who are susceptible to disinformation) would correctly perceive the actual deficit. This would be the case for prohibitive disinformation costs which make it impossible for the incumbent to increase her re-election chances by trying to appear more competent than she actually is. She would not even try to manipulate the deficit. This case is very different from a seemingly similar situation in Shi and Svensson (2006). In their paper, $\widehat{D} = D_t^*$ at the equilibrium is not an outcome, but an assumption. They postulate that the government would increase the deficit to cheat on voters because they are uninformed and can, therefore, not observe the deficit ex ante. However, in their model those same uninformed voters are, nonetheless, able to rationally anticipate the *correct* deficit in equilibrium, although they cannot extract the relevant information anywhere.[20] As a result, the government does manipulate the deficit, but cannot increase its re-election chances because $\widehat{D} = D_t^*$ at the equilibrium and the critical competence value always remains at its mean of zero. All this is an artifact of their model assumptions and implies

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[20] That is why there are conceptual objections. Grossman (1977), for instance, argues that informed and uninformed agents must hold different beliefs in equilibrium. His assertion was made in the context of a financial market model. According to Grossman, informed and uninformed agents can only hold identical beliefs in equilibrium, if there is an observable economic variable, which contains the entire information the uninformed agent could otherwise not have observed. In his model, a price may (or may not) fulfil this role, but in Shi and Svensson's (2006) model there is no such variable which would allow the uninformed voters to extract the relevant information.

that the possibility of reverse results according to Proposition 3, part B, is ruled out in their model.

In contrast, a key result of this paper is that an increase in voters who are susceptible to disinformation does not necessarily lead to a larger budget cycle. Condition (15), which guarantees larger cycles when the share of voters who are susceptible to disinformation is increased (see also discussion in Appendix F), basically occurs when the competence is very dispersed and its density function very flat. For $F'' > 0$, condition (15) can be rewriten as

$$\frac{F'}{F''} > \psi(D_t^* - \widehat{D}) \tag{16}$$

which simplifies under standard distributional assumptions to:

- $\sigma^2 > [\psi(D_t - \widehat{D})]^2$ in case of a normal distribution;

- $b > [\psi(D_t - \widehat{D})]$ in case of a Laplace distribution;

- $a > 2[\psi(D_t - \widehat{D})]$ in case of a triangular distribution.[21]

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[21] These simplifications relate to symmetrical distributions with the following properties: normal distribution with mean 0, variance σ^2 and density function $f(\mu_t^a) = f(\mu) = \frac{1}{2\pi\sigma^2}e^{\frac{-\mu^2}{2\sigma^2}}$; Laplace distribution (double exponential distribution) with mean 0, variance $2b^2$ and density function $f(\mu_t^a) = f(\mu) = \frac{1}{2b}e^{\frac{\mu}{b}}$ (for $\mu < 0$); triangular distribution with support [-a,a], mean 0, variance $\frac{a^2}{6}$ and density function $f(\mu_t^a) = f(\mu) = \frac{\mu+a}{a^2}$.
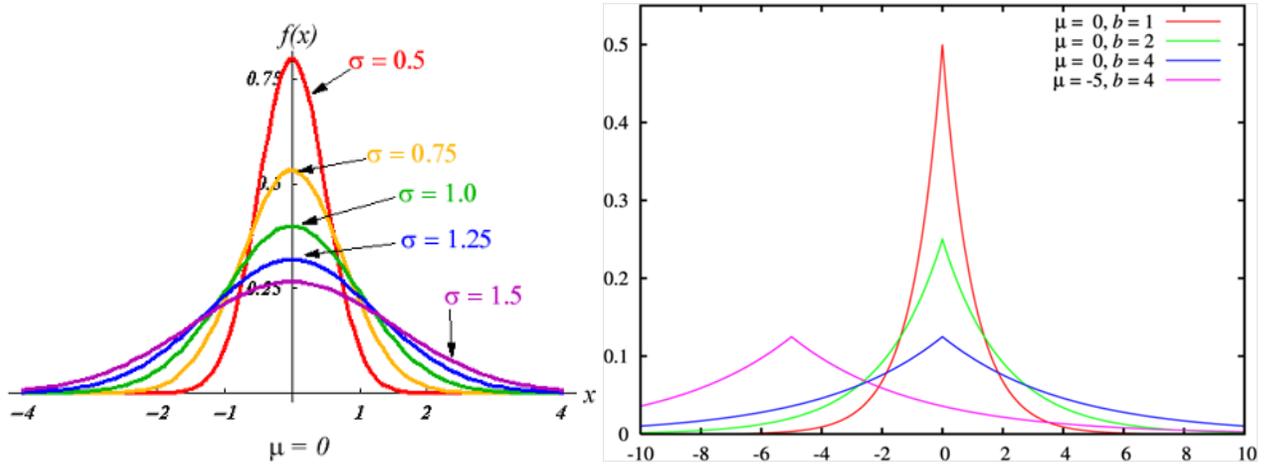
Figure 1: Normal and Laplace distributions with different b's and σ's

(Note that μ refers to the mean in the graph, but to government competence in the main text and in Footnote 21.)

Note that condition 16 simplifies to a similar expression for each one of the aforementioned probability distributions:

$$Variance > g_{dist}(manip). \tag{17}$$

The effect (function g_{dist} depending on each distribution) of the manipulation $manip$ on the critical competence value must be smaller than the variance of the competence distribution. Suppose voters belief that the distribution of government competence is very condensed, i.e. the density function is concentrated near the mean (small σ or b or a). In this case, the condition is only fulfilled, if manipulations of deficit and perceived deficit are very small in the equilibrium, i.e. $(D_t - \widehat{D})$ small. The more dispersed the government competence is believed to be, the more likely is it that we obtain the intuitive result of Proposition 3, part A.

Proposition 3 leads to testable empirical predictions. Suppose competence were really more dispersed in developing countries and newly democratic countries as suggested in Section II. Then we could test within each country group the impact of having

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different shares of voters who are (fully) informed about the deficit. As a proxy for informedness one might use the level of education or the availability of smart phone. Within the group of developing or newly democratic countries, those countries with a higher share of *dis*informed voters (for instance, less education) should exhibit larger budget cycles compared to other newly democratic or developing countries. Conversely for advanced OECD democracies, we should not see such a clear-cut *effect* of changes in the share of *dis*informed voters. Advanced OECD countries having a lower level of eduction compared to other advanced OECD countries should, on average, not exhibit (much) stronger PBCs. The effects could even go in the opposite direction compared to those seen for new democracies/developing countries. Furthermore, if the variation in the magnitude of cycles is larger in non-OECD democracies, then it might be easier to detect political budget cycles at least in some developing countries or new democracies. Therefore, this paper may also help explain why political budget cycles are rarely found in established OECD democracies, but often in developing countries and new democracies.

V   CONCLUSION

The present analysis combines two aspects of government behaviour which seem to belong together, but have not been included in one and the same model before. As suggested by Alesina and Roubini with Cohen (1997) it seems plausible that a government, which is willing to use fiscal policy for manipulating the whole economy, would a fortiori also be willing to foster the dissemination of false or misleading information. The model builds on empirical findings (existence of government disinformation strategies; incumbency advantage) and produces results which corroborate other empirical findings (governments' ability to increase re-election chances through politico-economic manipulations; predominant occurrence of political budget cycles in certain country groups, for instance developing countries and new democracies).

Further research could go at least in two directions. As for theoretical modelling, the disinformation tool could be inserted into a signalling model of the Rogoff (1990) type where the government observes its competence prior to private agents. How are political cycles and re-election chances affected, if both aspects of government behaviour are included, fiscal signalling and propaganda? As for empirical research, we could test, if political budget cycles do indeed respond differently – depending on the country group – to variations in the share of voters who are informed about the deficit. This aforementioned prediction is based on the model results and the empirical finding that competence is generally more dispersed in newly democratic countries as well as developing countries compared to advanced OECD democracies. Within the group of developing or newly democratic countries, those countries with a higher share of *dis*informed voters should thus exhibit larger budget cycles compared to other newly democratic or developing countries. Conversely for advanced OECD democracies, we should not see such a clear-cut effect of changes in the share of *dis*informed voters. This paper lays the foundation for both possible extensions.

Appendix and Indications for the Referees

The appendix presents background information for the competence distribution measure of subsection II.C and indications for the four steps of the model solution plus a graphical illustration of the maximisation problem.

A   Competence distribution measure

The measure for the dispersion of government competence is based on annual data for Government Effectiveness and Regulatory Quality, two Worldwide Governance Indicators provided by the World Bank (2016), for the period 1996 to 2014 for a total of 56 countries. A higher value indicates a higher level of government effectiveness or regulatory quality, respectively. The indicator values range from -2.5 to 2.5. We calculate the standard deviation (s.d.) for each country. The results are listed in Tables 3 to 6. It should be noted by the reader that the summary value given for each region (Western Europe, new democracies, Latin America) is not an s.d. for the entire region, but the average of individual countries' s.d.s within that region. Table 3 depicts Western Europe. In all countries but one, individual country CVs are very close to the low average for Western Europe. Tables 4 and 5 show the results for a country group of new democracies as defined by Brender and Drazen (2005) and a country group of Latin American developing countries, respectively. In both country groups, s.d.s for individual countries are very diverse, but typically far above the s.d.s for the Western European countries as well as for the US and Canada, though not the s.d. for Japan – as reported in Table 6.

Table 3: Standard Deviations in Western Europe

Country	Government Effectiveness	Regulatory Quality
Austria	0.16	0.09
Belgium	0.19	0.09
France	0.15	0.12
Germany	0.13	0.11
Italy	0.21	0.14
Ireland	0.13	0.13
Luxembourg	0.15	0.1
Netherlands, the	0.13	0.11
Switzerland	0.11	0.11
United Kingdom	0.14	0.13
Western Europe	0.15	0.11
Western Europe (without Italy)	0.14	0.11

Table 4: STANDARD DEVIATIONS IN NEW DEMOCRACIES

Country	Government Effectiveness	Regulatory Quality
Argentina	0.18	0.50
Bolivia	0.18	0.41
Brazil	0.12	0.18
Bulgaria	0.13	0.24
Chile	0.09	0.06
Czech Republic	0.14	0.13
Dominican Republic	0.14	0.11
Ecuador	0.20	0.32
El Salvador	0.20	0.19
Estonia	0.18	0.14
Fiji	0.31	0.25
Greece	0.19	0.25
Guatemala	0.11	0.11
Honduras	0.09	0.16
Hungary	0.18	0.18
Korea	0.25	0.22
Lithuania	0.25	0.12
Madagascar	0.33	0.23
Mali	0.15	0.13
Mexico	0.09	0.10
Nepal	0.20	0.16
Nicaragua	0.12	0.12
Pakistan	0.16	0.11
Panama	0.13	0.16
Paraguay	0.09	0.20
Peru	0.22	0.18
Philippines	0.14	0.13
Poland	0.13	0.12
Portugal	0.12	0.21
Romania	0.13	0.27
Russia	0.15	0.13
Slovak Republic	0.14	0.19
Slovenia	0.11	0.14
Spain	0.34	0.18
Turkey	0.18	0.13
Uruguay	0.08	0.18
New Democracies	0.16	0.18

Table 5: STANDARD DEVIATIONS IN LATIN AMERICA

Country	Government Effectiveness	Regulatory Quality
Argentina	0.18	0.5
Bolivia	0.18	0.41
Brazil	0.12	0.18
Chile	0.09	0.06
Colombia	0.15	0.2
Ecuador	0.2	0.32
Guyana	0.12	0.19
Paraguay	0.09	0.2
Peru	0.22	0.18
Suriname	0.18	0.06
Uruguay	0.08	0.18
Venezuela	0.19	0.53
Latin American Developing Countries	0.15	0.25

Table 6: STANDARD DEVIATIONS IN OTHER COUNTRIES

Country	Government Effectiveness	Regulatory Quality
United States	0.11	0.15
Canada	0.08	0.09
Japan	0.26	0.23

B STEP 1: PROBABILITY OF VOTING FOR THE INCUMBENT

In step 1, the probability of voting for the incumbent is derived. We consider an individual voter, no matter if informed or susceptible to disinformation with respect to the deficit level (the latter are henceforth called disinformed voters). She votes for incumbent a, if

$$\underbrace{E_t[c_{t+1}^a + \alpha\theta^i(-\frac{1}{2})]}_{\text{exp. utility when } a \text{ in power}} \quad > \quad \underbrace{E_t[c_{t+1}^b + \alpha\theta^i(+\frac{1}{2})]}_{\text{exp. utility when } b \text{ in power}} \quad . \tag{B.1}$$

Depending on who is in power, $t+1$ consumption will typically differ because of differences in policymakers' competence and individuals' expectations about it:

$$E_t[c_{t+1}^a] = E_t[y] + E_t[T_{t+1}^a]; \qquad E_t[c_{t+1}^b] = E_t[y] + E_t[T_{t+1}^b]; \tag{B.2}$$

$$T_{t+1}^j = -R(D_t) + \eta_{t+1}^j. \tag{B.3}$$

Period $t+1$ government budget constraint (B.3) says that the period t deficit must be repaid in period $t+1$.[22] As a result, $t+1$ transfers are negative (i.e. taxes) corresponding to deficit repayment modulo the effect of the policymaker's competence. Individuals have no idea about the skills shock of either potential policymaker in $t+1$. Nor do they know the skills shock of the challenger in period t, and, therefore, expect 0. However, they can use the incumbent's period t deficit policy to draw conclusions about her skills shock in period t (see further down).

$$E_t[T_{t+1}^b] = -E_t[R(D_t^*)]. \tag{B.4}$$

$$E_t[T_{t+1}^a] = -E_t[R(D_t^*)] + E_t[\mu_t^a], \tag{B.5}$$

where D_t^* denotes the incumbent's optimal period t choice for the deficit (to be determined further down). Combining equations (B.1) to (B.5) we can obtain a condition for an individual to vote for incumbent a:

$$E_t[\mu_t^a] \quad > \quad \alpha\theta^i. \tag{B.6}$$

Using the distribution of the skills shock we can determine the probability (Pr) of any voter, be she informed or disinformed, to vote for incumbent a:

$$Pr[E_t[\mu_t^a] - \alpha\theta^i \geq 0] \quad = \quad \frac{E_t[\mu_t^a] - (-\alpha)}{\alpha - (-\alpha)} \quad = \quad \frac{E_t[\mu_t^a]}{2\alpha} + \frac{1}{2}. \tag{B.7}$$

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[22] Remember that policymakers will not borrow in period $t+1$ because there is no election at the end of that period. See the discussion in the paragraph on the timing of events on page 17.

Now, we can determine the probability $Prob$ that incumbent a obtains 50% of the votes in period t elections. It is the probability that the number of voters times their individual probability Pr to vote for incumbent a (as determined in equation B.7) is greater or equal to $\frac{1}{2}$. However, the individual probability Pr is different for informed and disinformed voters because their expectations of period t skills, $E_t[\mu_t^a]$, differ. Here is the probability for the incumbent to win the election:

$$Prob \left\{ \underbrace{(1-\psi)\,[\frac{E_t^{inf}[\mu_t^a]}{2\alpha} + \frac{1}{2}]}_{\text{informed}} + \underbrace{\psi\,[\frac{E_t^{disinf}[\mu_t^a]}{2\alpha} + \frac{1}{2}]}_{\text{disinformed}} \quad \geq \quad \frac{1}{2} \right\}. \tag{C.1}$$

So why is there a difference in expectations for informed and disinformed voters? Consider the government budget constraint for election period t:

$$T_t = D_t + \eta_t \tag{C.2}$$

Remember that policymakers will not borrow or disinform in off-election periods because appearing more competent does not affect the duration of the incumbent's time in office. Without deficit in off-election period $(t-1)$ there is no repayment in election period t. Let us now rewrite equation (C.2):

$$\eta_t \;=\; T_t - D_t$$

For informed voters we obtain:

$$E_t^{inf}[\mu_t^a] = \mu_t^a \;=\; T_t - D_t - \mu_{t-1}^a \tag{C.3}$$

The point is that informed voters can determine $E_t^{inf}[\mu_t^a]$ deterministically, because they can observe D_t. By contrast, disinformed voters must form an estimate of the incumbent's skills, $\widehat{\mu_t^a}$, based on their perceived deficit level, $\widehat{D_t}$:

$$\widehat{\mu_t^a} \;=\; T_t - \widehat{D_t} - \mu_{t-1}^a \qquad \text{or} \qquad \widehat{D_t} = T_t - \widehat{\mu_t^a} - \mu_{t-1}^a$$

$$\widehat{\mu_t^a} \;=\; \underbrace{T_t - D_t - \mu_{t-1}^a}_{\mu_t^a \text{ from (C.3)}} + D_t - \widehat{D_t}$$

$$E_t^{disinf}[\mu_t^a] \;=\; \mu_t^a + D_t - \widehat{D_t} \tag{C.4}$$

Disinformed voters overestimate the incumbent's competence by $D_t - \widehat{D}_t$. Using equations (C.3) and (C.4) we can now determine the probability that incumbent a receives 50% of the votes in period t:

$$\text{Prob} \left\{ (1 - \psi) \left[\frac{\mu_t^a}{2\alpha} + \frac{1}{2}\right] + \psi \left[\frac{\mu_t^a + D_t - \widehat{D}_t}{2\alpha} + \frac{1}{2}\right] \geq \frac{1}{2} \right\}$$

$$= \text{Prob} \left\{ \frac{\mu_t^a}{2\alpha} + \psi \frac{D_t - \widehat{D}_t}{2\alpha} + \frac{1}{2} \geq \frac{1}{2} \right\}$$

$$= \text{Prob} \left\{ \mu_t^a \geq \psi \left(\widehat{D}_t - D_t\right) \right\} \tag{C.5}$$

$$= 1 - F\left[\psi \left(\widehat{D}_t - D_t\right)\right], \tag{C.6}$$

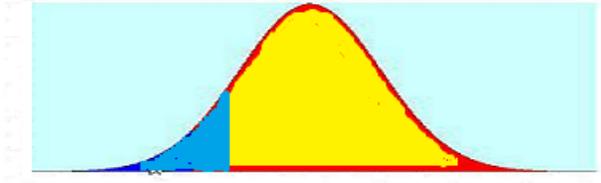where $F(\bullet)$ is the distribution function of the skills shock.

Figure 2: Bell-shaped competence density function F' as an example

The marked area towards the right (light grey or yellow [if in colour]) under the density function depicted in Figure 2 corresponds to the probability described by equation (C.5) and by the distribution function representation in equation (C.6). The expected competence overall (combine equations C.3 and C.4) is always greater than the actual competence, if the perceived deficit is smaller than the actual deficit $(\widehat{D} < D_t)$. Then the probability (see equation (C.6) or the light grey [or yellow] area under the density function) is always greater than $\frac{1}{2}$. We can see that producing or increasing a deficit (or reducing $\widehat{D}$, the perception thereof) increases the government's chance of being re-elected.

D Step 3: Incumbent's maximisation problem

Now, we can maximise incumbent a's utility over the entire election cycle, i.e. periods t and $t+1$. Period $t+1$ utility is the sum of the utilities for winning and losing the election weighted by the probability determined in step 2:

$$max_{D_t,P_{t+1}} \ V \ = \ max_{D_t,P_{t+1}} \ V_t^a \ + \ V_{t+1}^a \ =$$

$$max_{D_t,P_{t+1}} \qquad E_t\{y + D_t + \eta_t^a + X\}$$

$$+ \ E_t\{ \ \underbrace{[1 - F[\psi(\widehat{D} - D_t)]]}_{\text{prob. incumbent wins}} \ \ [y - R(D_t) + \eta_{t+1}^a + X - \lambda_{t+1}P_{t+1}]\}$$

$$+ \ E_t\{ \ \underbrace{[F[\psi(\widehat{D} - D_t)]]}_{\text{prob. incumbent loses}} \ \ [y - R(D_t) + \eta_{t+1}^b - \lambda_{t+1}P_{t+1}]\}$$

Given that the incumbent knows her past, but not her present and future skills (and not the skills shock of the challenger) the maximisation problem looks as follows:

$$max_{D_t,P_{t+1}} \quad y + D_t + \mu_{t-1}^a + X$$

$$+y - R(D_t) - \lambda_{t+1}P_{t+1}$$

$$+[1 - F[\psi(\widehat{D} - D_t)]]X \tag{D.1}$$

Having verified the second order conditions for a well-behaved maximisation problem we can focus on the two first order conditions (FOCs):

$$V_D \ = \ 1 \ - \ R'(D_t^*) \ + \ \psi \ F'[\psi(\widehat{D} - D_t^*)] \ X \ = \ 0, \tag{D.2}$$

$$V_P \ = \ - \ \lambda_{t+1} \ - \ \psi\widehat{D}' \ F'[\psi(\widehat{D} - D_t^*)] \ X \ = \ 0, \tag{D.3}$$

where $F'[\bullet] = f[\bullet]$ refers to the probability density function.

E Illustration of maximisation problem

To get an idea of the maximisation problem we make the following simplifying assumptions: equally distributed competence (which means that we cannot obtain reverse results as suggested by Proposition 3, part B); zero previous period competence ($\mu_{t-1}^a = 0$); no chance of being detected ($\lambda = 0$) which implies that propaganda is costless and will be used maximally, thereby ensuring that disinformed voters will believe in zero deficit ($\widehat{D} = 0$). The maximisation problem simplifies to:

$$max_{D_t, P_{t+1}} \quad y + D_t + X$$

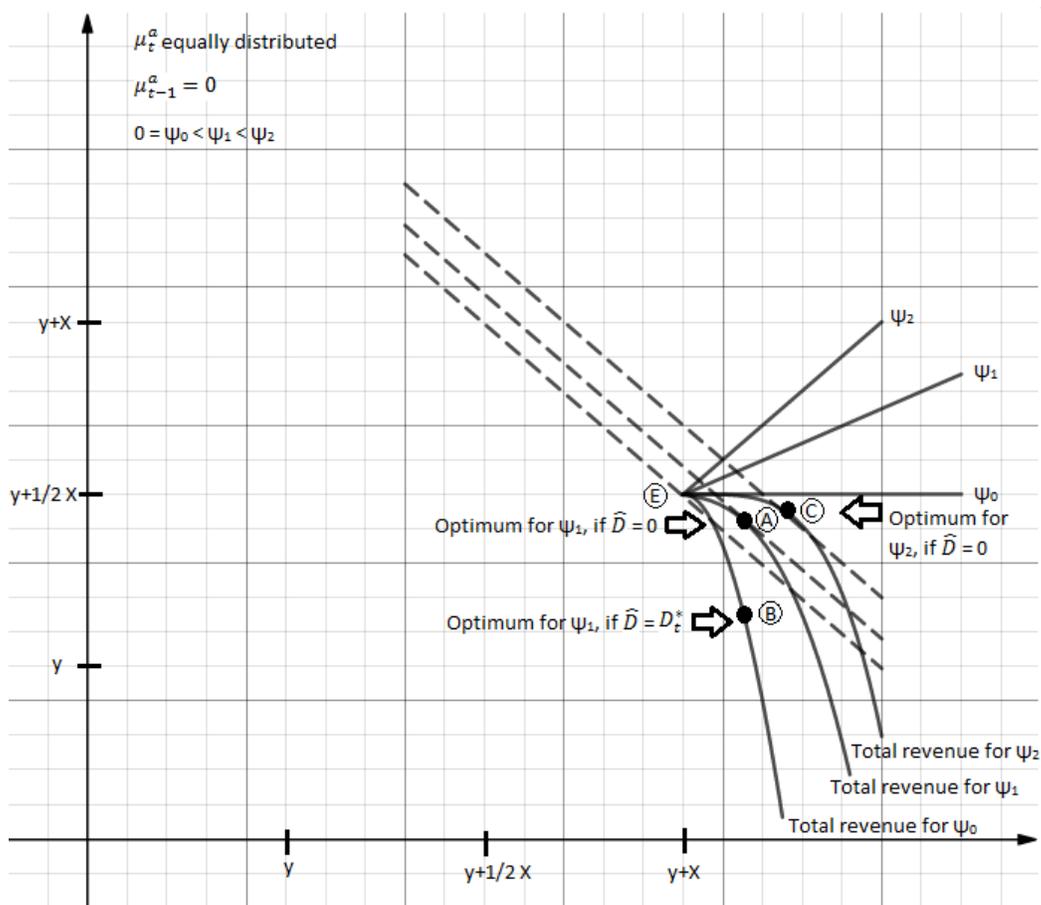$$+y - R(D_t) + [1 - F[\psi(0 - D_t)]]X \tag{E.1}$$

Figure 3: Election cycle optimum, when detection probability $\lambda = 0$

Without discount rate the incumbent tries to achieve the highest overall return, i.e. the (dashed) minus 45° line furthest away from the origin. The diagram captures the

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optimum for three situations. If all voters are informed ($\psi_0 = 0$), increasing D has no effect on winning the elections and will not result in a higher probability of receiving ego rent X in period 2 (expected future ego rent). The flat ψ_0 line depicts the (hypothetical) period 2 return $y + [1 - F[0]]X = y + \frac{1}{2}X$ (for any period 1 return $y + X + D$), if we ignore any deficit repayment costs. However, any increase of D will only be painful, because the repayment in period 2 will be larger than the original D, thereby reducing the overall return. This is captured by the downward sloping "total return for ψ_0" line which is tangential to the ψ_0 line in E. As a result, the incumbent will choose equilibrium E. Any increase in the share of disinformed voters ψ will rotate the hypothetical period 2 return curve counterclockwise because the deficit manipulation will now increase the expected ego rent in period 2, thereby leading to equilibria A (for ψ_1) and C (for ψ_2). The graph can also be used to illustrate the difference to the Shi and Svensson (2006) assumption of rational expectations. Here, point A is the equilibrium for ψ_1 since we assumed (for constructing the figure) that voters believe $\widehat{D} = 0$. However, if $\widehat{D}$ were rationally expected, we would end up in point B where there is deficit manipulation, but without any effect on the expected ego rent in period 2.

F STEP 4: PROPOSITIONS: PERTURBATION RESULTS AND THE "IF AND ONLY IF" CONDITION

Indications on the results of Section 2 and 3:

$$\frac{\mathrm{d}D}{\mathrm{d}X} = -\frac{1}{|H|}\left[V_{PP}\frac{\partial V_D}{\partial X} - V_{DP}\frac{\partial V_P}{\partial X}\right] > 0$$

$$\frac{\mathrm{d}D}{\mathrm{d}\lambda} = -\frac{1}{|H|}\left[V_{PP}\frac{\partial V_D}{\partial \lambda} - V_{DP}\frac{\partial V_P}{\partial \lambda}\right] > 0$$

$$\frac{\mathrm{d}D}{\mathrm{d}\psi} = -\frac{1}{|H|}\left[V_{PP}\frac{\partial V_D}{\partial \psi} - V_{DP}\frac{\partial V_P}{\partial \psi}\right] \tag{F.1}$$

$$\frac{\mathrm{d}P}{\mathrm{d}X} = -\frac{1}{|H|}\left[V_{PD}\frac{\partial V_D}{\partial X} - V_{DD}\frac{\partial V_P}{\partial X}\right] > 0$$

$$\frac{\mathrm{d}P}{\mathrm{d}\lambda} = -\frac{1}{|H|}\left[V_{PD}\frac{\partial V_D}{\partial \lambda} - V_{DD}\frac{\partial V_P}{\partial \lambda}\right] < 0$$

$$\frac{\mathrm{d}P}{\mathrm{d}\psi} = -\frac{1}{|H|}\left[V_{PD}\frac{\partial V_D}{\partial \psi} - V_{DD}\frac{\partial V_P}{\partial \psi}\right] \tag{F.2}$$

The determinant of the Hessian is $|H| = V_{DD}V_{PP} - V_{PD}^2$.

"If and only if" condition (15) requires that the density responds little to changes in competence (relative to the density-competence ratio at the equilibrium), i.e. the density function $f[\psi(\widehat{D} - D_t^*)]$ $(= F'[\mu_t^a])$ is inelastic at the equilibrium. Condition (15) can be rewritten accordingly:

$$-1 < f' \frac{\psi(\widehat{D} - D_t^*)}{f} \quad \Longleftrightarrow \quad -1 < \frac{\frac{\mathrm{d}f}{f}}{\frac{\mathrm{d}\mu_t^a}{\mu_t^a}}. \tag{F.3}$$

Condition (15) is actually the derivative of a derivative:

$$\frac{\mathrm{d}\frac{\mathrm{d}(1-F[\psi(\widehat{D}-D_t)])}{\mathrm{d}D}}{\mathrm{d}\psi} > 0, \tag{F.4}$$

where $1 - F[\psi(\widehat{D} - D_t)]$ is the (positive) probability of winning and thus receiving the ego rent; and

$$\frac{\mathrm{d}(1 - F[\psi(\widehat{D} - D_t)])}{\mathrm{d}D} = \psi F'[\psi(\widehat{D} - D_t^*)] \tag{F.5}$$

is the (positive) marginal winning probability of deficit D. Inequality F.4 means that a marginal increase in the share of disinformed voters must increase the marginal winning probability of D. If D is more productive with respect to obtaining the ego rent, then the government can afford higher marginal repayment costs $R'(D_t)$ according to FOC (13). If increasing D is more productive, reducing the perceived deficit $\widehat{D}$ is also more productive (given that D and $\widehat{D}$ have opposite signs in the density function). According to FOC (14) the government can thus also afford to increase propaganda investment P (thereby reducing $-\widehat{D}'$, the absolute value of the marginal perceived deficit).

Acknowledgements

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