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When do more selfish politicians manipulate less, not more?

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ABSTRACT

We model the political manipulation of deficits in a political budget cycle model. Assuming that a share of voters suffers from debt illusion the incumbent can increase her re-election chances by expanding government spending. However, the optimal manipulation may exceed the amount necessary to maximize re-election chances (over-manipulation) if the deficit is not very costly (low repayment obligation). Then, more selfish politicians (higher ego rents and, therefore, increased re-election motivation) reduce the over-manipulation. Conversely, "excessive" spending may wrongly be interpreted as opportunistic government manipulation. Theoretical results are supported empirically, with very robust evidence in a sample of 87 democracies.

1. Introduction

In the current (2022) energy crisis triggered by Putin's aggression against the Ukraine, Western governments seem to be willing to spend unprecedented amounts of money for subsidizing socially weaker groups in society. Incurring the necessary deficit seems to be generally accepted in order to cushion social hardship and preserve social cohesion in society. It seems feasible because the repayment burden is limited; interest rates are still fairly low and repayment of the deficit is not expected to happen in the near future. Political economists are suspicious of the governments' motivations. They believe that, once again, politicians may behave opportunistically to increase their re-election chances. We argue that this may actually not be the case and present an argument why more opportunistic politicians may actually be better off with a lower budget deficit.

In this paper, we build on Shi and Svensson's (2006) seminal paper,[1] which captures the deficit manipulation by the incumbent, but we allow for non-full repayment of the deficit in off-election years.[2] We also replace uninformedness with the, arguably, more

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[1] Shi and Svensson (2006) propose a model in which the incumbent (without informational advantage) can exert a hidden effort (for instance, expand the deficit) to manipulate voters because they are uninformed and cannot observe the manipulation. A possible drawback of their model is that it is implied that the incumbent repays the deficit in the off-election period.

[2] Shi and Svensson (2006) argue that deficit repayment makes sense because voters cannot punish the government for cutting the public goods provision in off-election years. This is, however, problematic when voters are modelled to be rational and maximize utility while also keeping in mind the public goods provision in off-election years. Shi and Svensson also do not discuss why incumbents should not produce a surplus that can be used as a war chest in the following election period. – They do mention that non-full repayment of the deficit would also be possible. However, we can show in this paper that non-full repayment may actually reverse their comparative static result with respect to ego rents.

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realistic assumption of fiscal illusion, more specifically debt illusion,[3] where the degree of illusion depends on the total debt level (as suggested by Oates, 1985 and Dalamagas, 1993), but refers to the newly created deficit. Against this backdrop our argument goes as follows. If the deficit is not very costly, i.e. when interest rates and/or repayment obligation are low, it is optimal for the incumbent to overspend (on public goods provision); the incumbent's manipulation exceeds the amount necessary to maximize re-election chances (over-manipulation). Then, more selfish politicians, with higher ego rents and, therefore, increased re-election motivation, do no longer increase the manipulation (as, for instance, in Shi and Svensson, 2006), but reduce the over-manipulation instead. In the empirical part of the paper, we follow the theoretical assumptions very closely and obtain robust evidence for our theoretical predictions in a sample of 87 democracies[4] covering the years from 1980 to 2017.

The crucial condition for the existence of PBCs is that "voters do not fully catch the debt instrument and underlie fiscal illusion at least to a certain degree" (Afflatet, 2015, p. 3).[5] The debt illusion literature argues that compared to tax finance, government spending that relies on debt is more difficult to be perceived by individuals (Oates, 1985; Vickrey, 1961).[6] How much of (the absolute amount of) debt is not properly perceived by voters seems to depend on the fiscal conditions. The empirical evidence shows that agents' consumption decisions are not affected by future tax implications of current government debt when debt levels are low (Dalamagas, 1993). Oates (1985, p. 67) argues that "Fiscal illusion ... can only operate over a limited range". It cannot persist beyond a certain threshold. Actually, consumers tend to fully discount the future tax obligations when the debt-to-GDP ratio is high (Dalamagas, 1993; Nicoletti, 1988; Gobbin and Van Aarle, 2001). In other words, citizens in a country with a high debt-to-GDP ratio are less likely to suffer from debt illusion. In general, the absolute amount of debt illusion increases with the magnitude of the debt-to-GDP ratio at first, reaches a maximum and then decreases with a further increase of the debt-to-GDP ratio.

We formulate our model assumptions and develop our conclusions against this empirical backdrop. We assume that the electorate consists of fiscally realistic voters and debt illusion suffering persons (henceforth DISPs). The fiscally realistic voters perceive the correct ratio of deficit to GDP and do not suffer from any type of fiscal illusion. But DISPs underestimate the deficit ratio and can, therefore, be manipulated by the incumbent's fiscal policy choices. The underestimation of the absolute amount of debt is captured by a continuous debt illusion function with the aforementioned properties and the debt ratio as its argument. The debt illusion parameter increases with an increasing ratio of debt-to-GDP at first until it reaches a maximum; thereafter it decreases (inverted U-shape).

The assumption of a non-linear relationship between debt illusion and the magnitude of government debt implies that there is a level of utilization of the incumbent's deficit instrument that maximizes the winning probability for the incumbent. However, and this is our first result, the incumbent's optimal manipulation may exceed (over-manipulation), be equivalent to or be lower than (under-manipulation) this winning maximization point. This is so because spending does not only increase the incumbent's utility by increasing the chance of re-election, but also because additional spending has, by itself, a beneficial effect on utility. It turns out that the optimal manipulation depends on the costs of deficit which include the interest rate and the incumbent's repayment obligation in the off-election period. Over-manipulation is obtained when additional spending is particularly beneficial because deficit spending is not very costly.

As a consequence, we obtain a second result. As the ego rent goes up (and with it the desire to stay in power), the degree of (both over and under) manipulation decreases. In other words, the increased ego rent renders the previously optimal over-manipulation too costly, while the under-manipulation appears too prudent; the optimal manipulation gets closer to the winning probability maximization point. In case of over-manipulation (which occurs for low deficit costs, for instance when the repayment obligation is low), more selfish politicians may actually be beneficial for society in the sense that they reduce the degree of fiscal manipulation.

In the empirical part we use proxies for debt illusion, deficit costs and the ego rent. The debt illusion variable, based on the aforementioned inverted U-shaped relationship between debt illusion and the debt-to-GDP ratio, turns out to be significant. Our main finding is, however, that the predictions of the theoretical model are confirmed by the empirical analysis. The empirical results show that (i) the level of deficit decreases with the repayment obligation and (ii) the benefit of being elected (called ego rent in the theoretical model) moderates the effect of the repayment obligation on the deficit, i.e. a higher ego rent reduces the deficit when the repayment obligation is low (and increases the deficit when the repayment obligation is high). The result is robust to using alternative proxies of debt illusion, of the repayment obligation, and of the benefit of being re-elected.

The paper is structured as follows. In Section 2, we present our illustrative PBC model encompassing debt illusion and repayment obligation. In Section 3, we derive the equilibrium, a lemma and a proposition. The data and empirical baseline model are summarized in Section 4. Section 5 presents empirical findings and a series of robustness checks. Section 6 concludes. Details of the theoretical model and further empirical results are moved to the Appendix.

[3] Debt illusion captures the empirical finding that the cost of public goods is more likely perceived incorrectly by individuals if it is financed by deficit creation rather than current taxation (Oates, 1985; Vickrey, 1961).

[4] The size of the sample is determined by the definition of the election year, as well as data availability (see Section 5.1). The number of countries varies from 97, when considering all elections, to 87 countries, when only pre-determined elections are considered and the fiscal year is taken into account. Since we consider the latter to be the most appropriate definition of the election-year dummy, our main results and robustness check are based on a sample covering 87 countries.

[5] Fiscal illusion is a phenomenon which occurs when "self-seeking" politicians design and manipulate fiscal systems so that the taxpayer is incapable or unwilling to internalize the full cost of government spending. The source of fiscal illusion could be the complexity of the tax structure, renter illusion with respect to property taxation, income elasticity of the tax structure, debt illusion, or the flypaper effect (Oates, 1985).

[6] The actual mechanism behind fiscal illusion or debt illusion may not necessarily be caused by imperfect information, but also by a lack of attention (Baekgaard et al., 2016).

2. Illustrative model

We present a simple moral hazard model of political budget cycles. An election is held every other period. Politicians, both incumbent a and challenger b, are opportunistic and aim to win the election. The electorate votes for the party of the candidate who is expected to be more competent and, therefore, deliver a higher level of utility after the election. The incumbent can use a deficit-financed fiscal instrument to convince voters of her competence. She knows in advance that she does not have to repay the entire deficit (contrary to what is imposed by Shi and Svensson, 2006). Instead, only a certain proportion of the deficit has to be repaid. This means that the model embodies a rising trend in debt.

2.1. Agents, public spending and competence

Voter i's utility function is:

$$U_t^i = \sum_{s=t}^{\infty} (\beta^i)^{s-t} \mathrm{E}_s[u(c_s) + g_s + \phi\theta^i z_s], \qquad i = 1, \ldots, n; \tag{1}$$

where β^i is a subjective discount factor; E_t is the expectations operator; superscript i denotes individual i; subscript t denotes the time period; $u(c_t)$ is a concave function which represents the utility from private consumption; g_t is the public goods provision and $\theta^i z_t$ is the political component with relative weight parameter ϕ. Eq. (1) shows that voters derive utility from two economic components (private consumption c_t and public goods provision g_t) and a political component $\phi\theta^i z_t$. Voters share their preferences over private and public goods consumption, but have different political preferences. The political preferences θ^i are derived from the politicians' non-economic characteristics like trustworthiness or good looks. Parameter θ^i is uniformly distributed in the interval $[-1, 1]$; it is negative if voter i is in favour of party a, or positive if party b is preferred. Variable z_t represents the party in power; when a is elected, the value of z_t is $-1/2$, otherwise $+1/2$. Together, $\theta^i z_t$ gives voter i positive utility when her favourite politician is elected, and negative utility when the opponent is in power.

Politicians are opportunistic; both the incumbent (henceforth referred to with superscript a without limiting the general validity of the analysis) and challenger (hereinafter b), share the same preferences. Politician j's utility is composed of two economic components (private goods and public goods provision), which is similar to voters, and one political component, which is a political rent, $X_t > 0$, if the politician is in power in period t. This so-called ego rent could be either political income (Barro, 1973; Bohn and Sturm, 2020) or reputation (Hillman, 2013). Politician j's utility is:

$$V_t^j = \sum_{s=t}^{\infty} (\beta^j)^{s-t} \mathrm{E}_s[u(c_s) + g_s + \mathbf{I}_s X_s], \qquad j = a, b; \tag{2}$$

$$\mathbf{I}_s = \begin{cases} 1 & \text{if in power in period } s; \\ 0 & \text{otherwise.} \end{cases}$$

The expected consumption c_t is given by the expected after-tax income (where τ is the tax rate and y_t is income):

$$\mathrm{E}_t^k[c_t] = \mathrm{E}_t^k[(1-\tau)y_t], \qquad k = i, j. \tag{3}$$

Expected public goods provision, g_t, is financed by the government tax revenue, τy_t, and also affected by government competence, η_t^j. Additionally, the government can incur a deficit to finance government spending, and may have to repay a share (λ) of the previous year deficit.[7] The government's budget constraint is:

$$\mathrm{E}_t^k[g_t] = \mathrm{E}_t^k[\tau y_t + \eta_t^j + \mathbf{H}_t \delta_t^d \overline{D} - \mathbf{H}_{t-1}\lambda(1+r_t)\delta_{t-1}^d \overline{D}], \tag{4}$$

$$\mathbf{H}_t = \begin{cases} 1 & \text{if } t \text{ is an election period } (H_{t-1} = 0); \\ 0 & \text{otherwise } (H_{t-1} = 1). \end{cases}$$

$\overline{D}$ is a debt limit,[8] and $\delta_t^d \overline{D}$ is the amount of deficit that is incurred in an election period. There is a deficit repayment obligation in the off-election period. However, instead of full repayment ($\lambda = 1$) as in Shi and Svensson (2006), partial repayment ($\lambda < 1$) is also allowed.[9] The pre-existing debt, $\delta_t^s \overline{D}$, and the deficit, $\delta_t^d \overline{D}$ ($0 \leqslant \delta_t^d \leqslant 1 - \delta_t^s$), are distinguished here; only part of the deficit (not the pre-existing debt) needs to be repaid. This repayment obligation in the off-election year is captured in the last term of Eq. (4). The

[7] The pre-existing debt increases with interest payments (and is, therefore, not included in the budget constraint). However, the pre-existing debt has an effect on the interest rate r and debt illusion parameter $\alpha(\cdot)$.

[8] For simplicity, we postulate an absolute debt limit. Debt limits have become more and more relevant in policy considerations. In particular, the sovereign debt-to-GDP ratio has received much attention. As we have discussed in Section 1, there is a debt illusion threshold; when the debt-to-GDP ratio is high, consumers tend to fully discount future tax obligations. In our analysis, a debt-to-GDP ratio above $\frac{\overline{D}}{\mathrm{GDP}}$ does no longer offer the government opportunities for manipulation. Therefore, for simplicity, a debt ratio beyond the debt limit will be excluded from the theoretical analysis.

[9] For simplicity, we assume repayment to be also determined in advance (as in Shi and Svensson, 2006). In the empirical analysis, this corresponds to the burden of debt proxied by interest payments observed in the pre-election year. Obviously, this is a simplification from a situation in which the government can determine optimally in the off-election year how much it wants to repay then.

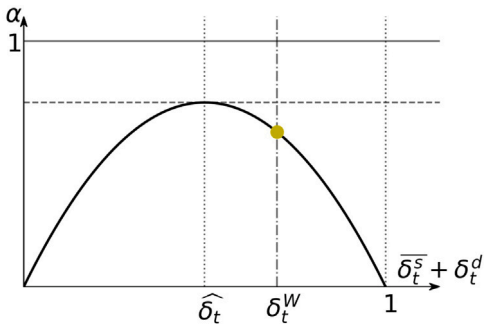


Fig. 1. Debt illusion parameter.

interest rate is modelled as a function of the total debt, $r_t = r((\overline{\delta_t^s} + \delta_t^d)\overline{D})$, with $r_t' > 0$ and $r_t'' > 0$. The repayment ratio λ is common knowledge.

As in Rogoff (1990), politicians' competence η_t^j follows an MA(1) process, i.e. it is determined by skills shocks μ for the current and previous periods:

$$\eta_t^j = \mu_t^j + \mu_{t-1}^j, \qquad j = a, b; \tag{5}$$

where μ_t is an i.i.d. random variable with mean 0, distribution function $F[\mu_t^j] \equiv F[\bullet]$ and monotonically increasing (up to the mean) density function $f[\mu_t^j] = F'[\bullet]$. We assume that the past skills shocks are common knowledge, and current and future shocks are unknown to all agents.

2.2. Debt, debt illusion, and the timing of events

The pre-existing debt ratio, $\overline{\delta_t^s}$, is observable, but the deficit ratio in the election year, δ_t^d, is not observable for everybody. Different voters perceive it in different ways. In an election year, fiscally realistic voters (share $(1-\psi)$) observe the deficit and can, therefore, deduce the current skills shock (from Eq. (4)) once the observable public goods provision has materialized. However, DISPs (debt illusion suffering persons, share ψ) have a distorted perception of the incumbent's skills because of a distorted perception of the deficit. The deficit perception is modelled to depend on debt illusion parameter α, which is an inverted U-shaped function – as discussed before – of δ_t, the total debt ratio: $\alpha(\delta_t) = \alpha(\overline{\delta_t^s} + \delta_t^d) \equiv \alpha(\cdot)$. Hence DISPs underestimate the level of deficit by factor $(1-\alpha(\cdot))$; deficit is perceived as $((1-\alpha(\cdot))\delta_t^d\overline{D})$, instead of the true value $(\delta_t^d\overline{D})$.

Formally, we postulate the following simplifying properties for debt illusion parameter $\alpha(\cdot)$ (as depicted by the inverted U-shaped function of the total debt ratio in Fig. 1): for $0 \leqslant \overline{\delta_t^s} + \delta_t^d \leqslant 1$, $0 \leqslant \alpha(\overline{\delta_t^s} + \delta_t^d) < 1$, $\alpha(0) = \alpha(1) = 0$ and $\alpha''(\overline{\delta_t^s} + \delta_t^d) < 0$. It means that the debt illusion parameter is 0 when there is no debt or deficit ($\delta_t = \overline{\delta_t^s} = \delta_t^d = 0$) and when the total debt ratio reaches the debt ceiling ($\delta_t = \overline{\delta_t^s} + \delta_t^d = 1$), but otherwise between 0 and 1. In other words, the level of debt illusion is affected by both the pre-existing debt ratio, $\overline{\delta_t^s}$, and the deficit, δ_t^d. Note that the absolute mistake in the deficit perception, $\alpha(\cdot)\delta_t^d\overline{D}$, is maximized for a (yet to be determined) value of $\delta_t = \delta_t^W$ (olive coloured dot [grey, if b/w] in Fig. 1) beyond the maximum value of $\delta_t = \widehat{\delta}_t$ (since δ_t^d increases and $\alpha(\cdot)$ decreases beyond $\widehat{\delta}_t$).[10] As will be explained in Section 3, in the paragraph following Eq. (11), δ_t^W also represents the ratio of total debt at which the incumbent's winning probability is maximized.

The timing of events is as follows. Incumbent a chooses the deficit ratio δ_t^d and uses the additional resources for public goods provision in election period t. The level of public goods provision g_t and the past skills shock μ_{t-1} are common knowledge, but the current skills shock μ_t is unknown to all agents. Fiscally realistic voters can deduce the competence of the incumbent correctly, but DISPs' perception of the incumbent's competence is affected by deficit ratio δ_t^d and debt illusion. In the election at the end of period t, the electorate votes for who they believe can provide a higher level of utility after the elections. In period $t+1$, the winner of the election receives an ego rent and (partially) repays the deficit as envisaged. Since $t+2$ considerations do not matter for voters and politicians (because competence follows an MA(1) process),[11] the model can be split into 2-period cycles consisting of an election and off-election period each.

[10] With a higher pre-existing debt ($\overline{\delta_t^s} > \widehat{\delta}_t$), the level of debt illusion parameter, $\alpha(\cdot)$, decreases as the deficit in the election year increases. In this case, it indicates that DISPs are less vulnerable and manipulation becomes less effective.

[11] This implies that even fiscally realistic voters have no information for deducing the incumbent's (or the challenger's) skills in period $t+2$. Politicians have no policy instrument to improve their performance in period $t+2$. Hence, neither voters nor politicians take the utility in the next election period $t+2$ into account.

3. Model solution and discussion

The model is analysed on two levels. First, we show the presence of political budget cycles by obtaining the optimal choice of the incumbent in three steps: in step 1, we derive the probability that an individual voter votes for the incumbent; in step 2, we establish the incumbent's probability of winning; and in step 3, we obtain the equilibrium by solving the incumbent's maximization problem. Second, we dig deeper and analyse the equilibrium. We want to understand the conditions under which the incumbent optimally chooses a level of fiscal manipulation beyond what is optimal for getting re-elected (over-manipulation). Then we perturb the equilibrium. We want to see whether the manipulation is increased or decreased when the incumbent becomes more selfish, i.e. her ego rent increases.

3.1. The incumbent's choice

In step 1, voter i votes for incumbent a if she expects incumbent a to deliver higher utility than challenger b in the period after the elections:

$$\underbrace{\mathrm{E}_t^i[u(c_{t+1}^a)+g_{t+1}^a+\phi\theta^i(-\frac{1}{2})]}_{\text{utility when } a \text{ in power}} > \underbrace{\mathrm{E}_t^i[u(c_{t+1}^b)+g_{t+1}^b+\phi\theta^i(+\frac{1}{2})]}_{\text{utility when } b \text{ in power}}. \tag{6}$$

Opportunistic politicians share the same policy preferences and will implement the same policies in $t+1$, but may differ in terms of competence. Both the skills shock of the incumbent in period $t+1$, μ_{t+1}^a, and the competence of the challenger, $\eta_{t+1}^b = \mu_t^b + \mu_{t+1}^b$, are unknown, and expected to be 0. As for the skills shock of the incumbent in period t, μ_t^a, all voters have to form expectations (either correctly deduced or distorted by debt illusion, if they are DISPs (debt illusion suffering persons)). In Appendix A, it is shown that any voter i votes for the incumbent if she favours the incumbent (θ^i is negative) or if she expects the incumbent's skills ($\mathrm{E}_t[\mu_t^a]$) to be large enough to compensate for a positive value of θ^i:

$$\mathrm{E}_t^i[\mu_t^a] \quad > \quad \phi\theta^i. \tag{7}$$

In step 2 (see Appendix B), we can show that the winning probability of the incumbent, i.e. to obtain at least 50% of the votes, depends on the voters' perceptions of the incumbent's current skills shock, $\mathrm{E}_t[\mu_t^a]$:

$$\mathrm{Prob}^{win} = \{\ (1-\psi)[\frac{\mathrm{E}_t^{REAL}[\mu_t^a]}{2\phi}+\frac{1}{2}]+\psi[\frac{\mathrm{E}_t^{DISP}[\mu_t^a]}{2\phi}+\frac{1}{2}] \geqslant \frac{1}{2}\ \}. \tag{8}$$

Fiscal REALists (share $(1-\psi)$) observe the public goods production and deduce μ_t^a from budget constraint (4) which can be rewritten for period t:

$$\mathrm{E}_t^{REAL}[\mu_t^a] \ = \ \mu_t^a \ = \ g_t - \tau y_t - \mu_{t-1}^a - \delta_t^d \overline{D}. \tag{9}$$

However, DISPs (share ψ) underestimate the amount of deficit required for benefiting from public goods spending because they perceive a too low level of deficit, $(1-\alpha(\cdot))\delta_t^d \overline{D}$. In Appendix B we derive the DISPs' expectations:

$$\mathrm{E}_t^{DISP}[\mu_t^a] \ = \ \widehat{\mu_t^a} \ = \ \mu_t^a + \alpha(\cdot)\ \delta_t^d\ \overline{D}\ . \tag{10}$$

For $0 < \delta_t^d < 1-\overline{\delta_t^s}$ (see Fig. 1), DISPs overestimate the incumbent's competence by $\alpha(\cdot)\delta_t^d \overline{D}$. This means that it pays for the incumbent to increase deficit spending for boosting the public goods provision. We can show (also in Appendix B) that the incumbent's probability to win increases with a higher absolute mistake in the deficit perception by DISPs ($\alpha(\cdot)\delta_t^d \overline{D}$):

$$\begin{aligned}\mathrm{Prob}^{win} \ &= \ \mathrm{Prob}\{\ \mu_t^a \geqslant -\psi\alpha(\cdot)\delta_t^d\overline{D}\ \} \\ &= \ 1 - \ F[\ -\psi\alpha(\cdot)\delta_t^d\overline{D}\ ]\ ,\end{aligned} \tag{11}$$

where F[•] is the aforementioned distribution function of the skills shock. Since debt illusion parameter $\alpha(\cdot)$ decreases with an increase in δ_t^d beyond the maximum value of α in Fig. 1, it is clear that there must be a value $\delta_t^W > \widehat{\delta}_t$ which maximizes the absolute mistake in the deficit perception ($\alpha(\cdot)\delta_t^d\overline{D}$) and hence the winning probability. (In fact, the FOC for the incumbent's maximized winning probability (which determines δ_t^W) is $\alpha(\cdot)+\alpha'(\cdot)\delta_t^d = 0$.) However, δ_t^W is not necessarily the optimal choice by the incumbent because the incumbent's utility also includes the benefit from the public goods provision and the cost from the anticipated deficit repayment.

In step 3, we take all these aspects into account when determining the incumbent's optimal choice by maximizing her expected utility over 2 periods. It corresponds to the utility in period t plus utility in period $t+1$, if the incumbent is elected, times the probability of winning plus the utility in period $t+1$, if the incumbent loses, times the probability of losing. Ignoring the subjective discount factor,[12] we have:

$$max_{\delta_t^d} V \ = \ max_{\delta_t^d}\ V_t^a + V_{t+1}^a$$

[12] This is possible because the model can be split into 2-period cycles (see the timing of events in Section 2.2). Setting $\beta^a = 1$ simplifies the analysis, but does actually make it harder to obtain the novel result of over-manipulation.

$$= max_{\delta_t^d}\ E_t\{\ u(c_t) + g_t^a + X_t\ \}$$
$$+\ E_t\{\ [1 - F[\bullet]]\,[u(c_{t+1}^a) + g_{t+1}^a + X_{t+1}]\ +\ F[\bullet][u(c_{t+1}^b) + g_{t+1}^b]\}, \tag{12}$$

where $F[\bullet] = F[\ -\psi\alpha(\cdot)\delta_t^d\overline{D}\ ]$. For details, see Appendix C. Note that any additional public goods provision in period t also has a positive effect on the winning probability and, therefore, increases the incumbent's utility (see Appendix C, Eq. (C.6)). As second-order condition (C.4) holds, the optimal deficit ratio, $(\delta_t^d)^\star$, is positive and can be fully characterized by the first-order condition (FOC; see also Eq. (C.3) in the Appendix):

$$V_{\delta_t^d} = 1 - \lambda(1 + r_{t+1}) - \lambda r'_{t+1}\delta_t^d + X_{t+1}F'[\bullet]\psi(\alpha(\cdot) + \alpha'(\cdot)\delta_t^d) = 0\,. \tag{13}$$

The FOC is very instructive. The first three terms capture the trade-off between current and future spending. The first term is the unit marginal benefit from deficit-financed increased public goods provision in election period t. The second and third terms represent the repayment obligation which is captured by the marginal cost of incurring a deficit which can also be interpreted as the foregone marginal benefit from public goods provision in off-election period $t+1$. Together, these three terms are the net marginal effect of incurring a deficit on the public goods provision. These three terms cancel out if the fourth term is zero which indicates that the incumbent's winning probability is maximized (when $\alpha(\cdot) + \alpha'(\cdot)\delta_t^d = 0$ as explained below Eq. (11)). Otherwise, they are jointly positive if the fourth term is negative; they are negative, if the fourth term is positive. The sign of the fourth term is determined by the sign of the marginal debt illusion parameter, $\alpha'(\cdot)$. (The marginal winning probability effect is the marginal effect of deficit-financed public goods in period t which is the marginal impact on the chance of re-election times the ego rent.) Essentially, the FOC balances out deficit considerations and winning probability effects.

3.2. Over-manipulation, under-manipulation and ego rent

The interpretation of the FOC immediately gives rise to a key lemma. The optimal deficit manipulation typically deviates from the deficit manipulation that maximizes the winning probability. As shown in Fig. 1, $\overline{\delta_t^s} + (\delta_t^d)^\star = \delta_t^W$ is possible, but two other cases are more likely:

Lemma 1 (*Over-manipulation and Under-manipulation*)**.**

(a) The incumbent's expected utility is maximized at the winning chances maximization point ($\overline{\delta_t^s} + (\delta_t^d)^\star = \delta_t^W$) if and only if $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star = 1$ (when the marginal cost of deficit equals the marginal benefit).

*(b) There is **over-manipulation** ($\overline{\delta_t^s} + (\delta_t^d)^\star > \delta_t^W$) if and only if $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star < 1$ (when the marginal cost of deficit is smaller than the marginal benefit).*

*(c) There is **under-manipulation** ($\overline{\delta_t^s} + (\delta_t^d)^\star < \delta_t^W$) if and only if $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star > 1$ (when the marginal cost of deficit is greater than the marginal benefit).*

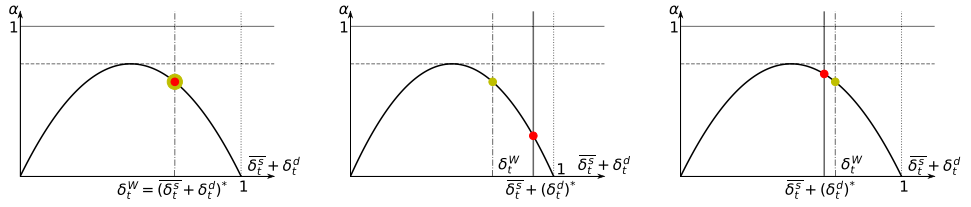
Proof. See Appendix D. ■

Lemma 1 relates the three cases of optimal manipulation of the deficit to the properties of the repayment obligation, $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star$. In Fig. 2 we show the link between the winning chances maximization point (δ_t^W, olive coloured dot [grey, if b/w]) and the optimal manipulation (depicted by $\overline{\delta_t^s} + (\delta_t^d)^\star$; red dot [black, if b/w]). In all three cases, the incumbent uses the deficit to boost public goods provision to appear more competent in the election year. However, to determine her utility maximum, the incumbent faces a three-way trade-off between winning probability, public goods provision in the election year, and public goods provision in the off-election year. In case (a) of Lemma 1 optimal manipulation and maximal winning probability coincide because marginal benefit and marginal cost from (deficit-financed) increased public goods provision exactly cancel out (first three terms in FOC (13)), i.e. $1 = \lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star$. This implies that the incumbent's utility maximization is reduced to maximizing the winning probability, i.e. she chooses the deficit such that the underestimation of the deficit by DISPs and hence the winning probability reach a maximum, i.e. the marginal effect on the winning probability becomes zero (fourth term in FOC (13)).

Lemma 1(b) depicts the situation in which the public goods provision in the election period is more attractive, which happens when the marginal cost of incurring a deficit (the second and third terms in Eq. (13)) is smaller than the marginal benefit (the first term in Eq. (13)). The marginal winning probability effect is negative which indicates over-manipulation (as depicted in Fig. 2(b)); the incumbent is willing to sacrifice votes for a higher public goods provision in the election year. In case (c), the marginal cost of incurring a deficit exceeds the marginal benefit. Public goods in the off-election period are more advantageous than public goods in the election period. The incumbent does not want to fully exploit her winning chances (the red dot in Fig. 2(c) is anywhere on the left of the olive coloured dot); she is willing to restrain deficit creation, thereby sacrificing votes for a higher public goods provision in the off-election period (rather than in the election period.)

Under- and over-manipulation have immediate consequences for the effect of policymakers becoming more selfish. The key intuition is that an increase in the ego rent makes an incumbent more eager to win. Getting closer to the winning chances maximization point means less under- and over-manipulation.[13]

[13] Note that Proposition 1 together with Lemma 1 means that the marginal cost of deficit (repayment obligation and interest rates) determines over- and under-manipulation.



(a) Winning probability and utility maximized simultaneously (b) Over-manipulation (c) Under-manipulation

Fig. 2. Maximization Problem. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Proposition 1 (*Ego Rent*). *At the equilibrium, a perturbation of the ego rent affects the optimal manipulation as follows:*

(a) $\frac{\mathrm{d}(\delta_t^d)^\star}{\mathrm{d}X_{t+1}} = 0$, *if and only if* $\overline{\delta_t^s} + (\delta_t^d)^\star = \delta_t^W$ *(optimal deficit also maximizes the winning chances).*

(b) $\frac{\mathrm{d}(\delta_t^d)^\star}{\mathrm{d}X_{t+1}} < 0$, *if and only if* $\overline{\delta_t^s} + (\delta_t^d)^\star > \delta_t^W$ *(over-manipulation).*

(c) $\frac{\mathrm{d}(\delta_t^d)^\star}{\mathrm{d}X_{t+1}} > 0$, *if and only if* $\overline{\delta_t^s} + (\delta_t^d)^\star < \delta_t^W$ *(under-manipulation).*

Proof. See Appendix D. ■

4. Empirical model and data set

This section describes the empirical baseline model and the data set that is used to test the implications derived from our theoretical model. The theoretical model suggests that (i) the optimal level of opportunistic manipulation of the budget deficit is affected by the level of debt illusion and the repayment obligation, and (ii) a higher ego rent decreases both under- and over-manipulation. Translated into an empirical framework this implies that a higher level of debt illusion, as well as a higher repayment obligation, lead to a higher primary budget deficit in an election year (a higher opportunistic manipulation), and the ego rent moderates the effect of the repayment obligation.

4.1. Empirical model

The baseline empirical model can be summarized as follows:

$$OM_{it} = \beta_0 + \beta_1 DI_{it} + \beta_2 RO_{i,t-1} + \beta_3 ER_{it} + \beta_4 (RO_{i,t-1} * ER_{it}) + \mathbf{X}'_{i,t-1}\boldsymbol{\phi} + \eta_i + \lambda_t + \epsilon_{it}, \tag{14}$$

where OM_{it} is the opportunistic manipulation of the primary budget deficit in country i in election-year t, which is defined as the difference between the primary deficit in t and its average over the previous years of the same electoral cycle (essentially, it indicates by how much the deficit in an election year deviates from its usual level). DI_{it} is the proxy for debt illusion, $RO_{i,t-1}$ is the repayment obligation (or cost of debt), ER_{it} is the ego rent, $(RO_{i,t-1} * ER_{it})$ is the interaction of the repayment obligation with the ego rent (to capture the way in which the ego rent moderates the effect of the repayment obligation), $\mathbf{X}_{i,t-1}$ is a vector of control variables, η_i are country fixed effects, λ_t are time effects (decade dummy variables), and ϵ_{it} is a white-noise error term. Finally, β_0 to β_4 are coefficients and $\boldsymbol{\phi}$ is a vector of coefficients to be estimated.

Considering the implications of the theoretical model, we expect the following signs of the coefficients associated with the main variables of interest:

- $\beta_1 > 0$, as greater debt illusion (which augments the mistake in the deficit perception) leads to an increase in the probability of winning and ceteris paribus an increase in the primary budget deficits (as depicted in winning probability Eq. (11) and FOC (13)).
- $\beta_2 < 0$, since an increase in the repayment obligation (cost of debt, proxied by interest payments) makes under-manipulation more likely, thus producing a lower optimal primary budget deficit (as depicted in Lemma 1).
- $\beta_3 > 0$, because the PBC literature indicates that a higher ego rent tends to be associated with greater manipulation of public finances. But, given that in our theoretical model the ego rent operates only through the cost of debt, a statistically insignificant coefficient would also be in line with our expectations.
- $\beta_4 > 0$, since our model indicates that the ego rent moderates the effect of the repayment obligation on the optimal deficit, the sign of the coefficient of $(RO_{i,t-1} * ER_{it})$ must be the opposite of the sign of β_2 (as depicted in Proposition 1).

The baseline model of Eq. (14) is estimated using the fixed effects estimator, with standard errors clustered by country and robust to heteroskedasticity. As indicated above, only the observations for election years are included in the estimations. The control variables are lagged one period in order to avoid simultaneity problems.

4.2. The data

We assemble a panel data set comprising annual data on fiscal, electoral, political, institutional, macroeconomic and demographic variables, for developed and developing countries. Since some fiscal data is not available for the 1970s, our data set can only cover 1980 to 2017, the last year for which we have all necessary political data. Data on government budget balances, gross debt and interest payments are obtained from the World Economic Outlook (WEO) and the Government Financial Statistics (GFS) databases of the International Monetary Fund (IMF), supplemented with data from the World Development Indicators (WDI) of the World Bank. The WEO and the WDI are also main sources of other macroeconomic and demographic data. Regarding political variables we start by distinguishing democracies from autocracies, using the variable *Polity2* from the Polity 5 database (Marshall and Gurr, 2020). As usual in PBC studies, we restrict the sample to democracies (*Polity2* > 0).[14]

Data on elections for the chief executive are obtained from the Database of Political Institutions (DPI) of Cruz et al. (2018).[15] We consider presidential elections for presidential systems (*System* = 0) and legislative elections for parliamentary systems and for other systems in which the president is not directly elected by universal suffrage. Using data on the dates of presidential (*Dateexec*) and legislative (*Dateeleg*) elections, we construct (and report results for) three alternative election dummies. Our first dummy, *ElectionYear*, naively takes the value of one in election years, and equals zero in non-election years. However, opportunistic policies are easier to plan when elections occur in the initially predicted dates. For our second dummy, *PredElectionYear*, we, therefore, use data on the years left in the current term (*Yrcurnt*). It equals one for pre-determined election years, and zero otherwise (in years of anticipated elections or when no elections occurred). Finally, considering that in several countries (e.g., USA, Canada or the UK) the fiscal year is not coincident with the calendar year, we also create an election dummy which takes into account the fiscal year and the month in which the elections took place.[16]

In order to test the implications of the theoretical model, we restrict the sample to election years and define the main variables in the following way. The dependent variable is the difference between the government's primary budget deficit (as a percentage of GDP) in the election year and the average primary deficit in the previous years of the same electoral cycle. Thus, for a country where elections for the chief executive take place every 4 years, the dependent variable is the primary deficit in the election year minus the average primary deficit of the previous 3 years. As in Aidt et al. (2011), we posit that this dependent variable is a measure of the election-year opportunistic manipulation of the government finances because greater increases of the primary deficit in the election year relative to the previous years are associated with greater degrees of manipulation.

Since there are no readily available measures of debt illusion,[17] we construct a proxy based on Fig. 1, where the level of debt illusion is an inverted U-shaped function of the actual total debt ratio ($\overline{\delta_t^s} + \delta_t^d$). Debt illusion is small for low ratios of debt, increases with debt until reaching a maximum (at δ^W), and then decreases until there is no misperception for very high ratios of debt. Using the government debt-to-GDP ratio as the debt ratio ($\delta = \frac{Debt}{GDP}$), the behaviour of debt illusion can be represented as $DebtIllusion1 = \delta - \gamma(\delta)^2$. $DebtIllusion1$ is maximized at $\delta^* = \frac{1}{2\gamma}$. We know that the maximum of debt illusion is not reached for very low or very high debt ratios. We hypothesize that, in a given period, the DISPs' misperception of debt is highest when the debt-to-GDP ratio equals the median of its past values. With $\delta^* = median(\delta)$, we have $\gamma = \frac{1}{2median(\delta)}$. Therefore, debt illusion for country i in year t is calculated as[18]:

$$DebtIllusion1_{i,t} = \delta_{i,t} - \frac{1}{2median(\delta)_{i,t-1}}(\delta)^2_{i,t} \tag{15}$$

For robustness tests, we consider alternative debt illusion proxies. Voters' misperceptions of debt, which are expected to lead to greater manipulation of public finances, may also be affected by the availability of information on public finances. Veiga et al. (2017) show that PBCs are stronger when media freedom is lower, as voters are more easily deceived when it is harder to obtain independent and unbiased information on the evolution of public finances and of the economy in general. Therefore, higher media freedom and greater freedom of expression are expected to have a negative effect on debt illusion. We take this possibility into account by creating two additional proxies. $DebtIllusion2 = DebtIllusion1/FOTP$, where $FOPT$ is the Freedom of The Press index[19] from Freedom House. $DebtIllusion3 = DebtIllusion1/freeexp$, where $freeexp$ is the freedom of expression index (variable *v2x_freeexp*) from the Varieties of Democracy (V-Dem) database (Coppedge et al., 2020). Finally we use Dalamagas's (1992) proxy of debt illusion

[14] Unlike Brender and Drazen (2013), who define democracy as *Polity2* ⩾ 0, we prefer to exclude from the sample the cases in which *Polity2* takes the value of zero. Those are borderline cases in which it is very hard to tell whether we are dealing with democracies or autocracies. Vreeland (2008) calls special attention to the problems of *Polity2* when dealing with these "anocracies". In practice, this only leads to the loss of two observations (elections) from the sample and does not have an impact on the results. – To check robustness, we use the Database of Political Institutions (DPI; see Section 4.2 and Appendix E).

[15] The construction of the electoral variables closely follows Veiga et al. (2017). The DPI has data on the timing of elections from 1975 to 2017.

[16] For example, if the fiscal year starts in April but the elections take place in March of year t, then the relevant fiscal year is $t-1$. Thus, the dummy *ElectionYear* should equal 1 in $t-1$ instead of t. Information on the fiscal year is available in the IMF's GFS Yearbook.

[17] Dell'Anno and Dollery (2014), Dell'Anno and Mourão (2012), and other authors, have created indices of fiscal illusion using methodologies which involve the use of a large number of variables potentially related to fiscal illusion. Those indices correspond to a broader view of fiscal illusion than the concept of debt illusion considered in our theoretical model. Additionally, they do not cover our entire sample period and are not readily available.

[18] Note that $median(\delta)_{i,t-1}$ stands for the median of the values of the debt-to-GDP ratio (δ) in country i from the initial period to $t-1$.

[19] As in Veiga et al. (2017), we use the overall FOTP scores (0–100), which are based on freedom of both broadcast and print, adjusted so that 0 corresponds to no freedom and 100 to complete freedom. The ranges of each status are: 0–30, Not Free; 31–60, Partially Free; and 61–100, Free. The FOTP scores (from 0 to 100) are available since 1993. From 1979 to 1992, only the statuses (Free, Partially Free, and Not Free) are available. Using the scores of 1993 and the respective statuses, we attribute the same score backwards until 1979 if the status does not change during that period. When the status changes, we attribute the closest value of the range of values of the new status. In the end, we divide the FOTP index by 100, so that it varies between zero and one.

($DebtIllusion4$), which is defined as the ratio of consumption expenditures to the debt level. Although this measure does not involve a non-linear relation between debt illusion and debt levels, as assumed in our theoretical model, it is worth checking if a linear relation works as well.

Regarding the repayment obligation (or cost of debt), we build proxies based on the interest payments on public debt (as percent of GDP), obtained from GFS and WDI. Although it would be interesting to consider capital payments as well, data are not available. Nevertheless, higher interest payments represent a greater drain of resources to service debt and are expected to induce lower primary deficits (so that the drain is reduced). Since the effect of interest payments on a government's electoral manipulation of deficits may depend on whether those payments are above or below what is normal for the respective country, our main proxy, $InterestPayments1$, is defined as the difference between the first lag and the country median of *Interest payments (%GDP)*. We use the first lag instead of the current value in order to avoid simultaneity problems, but also because this is more in line with our theory; the repayment obligation is known by the government before it chooses its deficit level in the election year. Again, to check the robustness of our results, we consider several alternative proxies. $InterestPayments2$ is just the lagged value of *Interest payments (%GDP)*. $InterestPayments3$ (or 4 [or 5]) is the lagged value of *Interest payments (%GDP)* minus its country mean (or the median [or the mean] of past observations for the country, respectively).

Given that direct measures of the ego rent are not available, we use corruption and clientelism indices from the V-Dem database as proxies. These four measures refer to political corruption in general (*v2x_corr*; used in our baseline model), executive corruption (*v2x_execorr*), regime corruption (*v2xnp_regcorr*), public sector corruption (*v2x_pubcorr*) and the degree of clientelism (*v2xnp_client*). These indices from V-Dem have the advantages of being more focused and of having a longer time series than corruption indices from Transparency International and the World Governance Indicators, which are only available from 1995 and 1996, respectively.

A set of control variables that may affect budget deficits, and that are usually considered in PBC studies (for instance, Brender and Drazen, 2013, or Veiga et al., 2017), is included in all estimations: *log of GDP per capita in constant 2010 USD (WDI)*, which controls for the countries' income levels; *real GDP growth rate (WEO)*, to control for economic performance; *dependency ratio (WDI)*, which corresponds to the percentage of the population below 15 or above 65 years old, controls for the effects of the age structure of the population on public finances; *dummy variables for the 1980s, 1990s, 2000s and 2010s*, used to control for common time effects (the dummy for the 2010s is left out to avoid multicollinearity).

5. Empirical results

This section presents the results of the estimation of the baseline empirical model and of a series of robustness checks in which alternative proxies of the main variables of interest are used. We link the results to the theoretical predictions.

5.1. Baseline results

The results of the estimation of the baseline empirical model of Eq. (14) are reported in Table 1. The estimation of column 1 considers all elections for the chief executive that occurred under democracy (*Polity2* > 0); a total of 444 elections, which took place in 97 different countries.[20] Even though many of those elections occurred before the predicted date, and may not have given governments the chance to implement opportunistic policies, the estimated coefficients of the main variables of interest are in accordance with the theoretical model.

The coefficient for $DebtIllusion1$ is positive ($\beta_1 > 0$) and statistically significant, indicating that higher debt illusion leads to greater primary budget deficit manipulation (as depicted in winning probability Eq. (11) and FOC (13)). The repayment obligation, proxied by $InterestPayments1$, the difference between the first lag and the country median of *Interest payments (%GDP)*, has a significantly negative sign ($\beta_2 < 0$), supporting the model's implication that a higher repayment obligation (or cost of debt) reduces the optimal primary deficit and makes under-manipulation more likely (as depicted in Lemma 1). The interaction between the repayment obligation and the ego rent (the latter is proxied by the *Political corruption index*) has the expected positive sign ($\beta_4 > 0$) and is significant, supporting the theoretical model's main result that the ego rent moderates the effect of the repayment obligation. That is, for a given repayment obligation (or cost of debt), a higher ego rent reduces the over- or under-manipulation, bringing the deficit closer to the winning chances maximization level (as depicted in Proposition 1). Although the coefficient associated with the ego rent has the expected positive sign ($\beta_3 > 0$), it is not statistically significant. This is not problematic because our theoretical model does not predict an independent effect of the ego rent. As mentioned above, the ego rent affects the optimal deficit only through the cost of debt.

Regarding the control variables, higher GDP *per capita* is associated with lower primary deficits, a higher growth rate of real GDP leads to lower deficits, the dependency ratio does not seem to affect deficits, and average primary budget deficits seem to have been higher in the 1980s, 1990s and 2000s than in the 2010s (the reference case, whose dummy is left out).[21]

[20] As noted above, the dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle, thus representing the election-year opportunistic manipulation of the budget balance.

[21] When *Trade (%GDP)* is added to the list of control variables, to account for the eventual effects of openness to trade, this variable is never statistically significant and does not change the results for the other variables. The results are also the same when we replace *Real GDP growth* with its deviation from the respective country's trend growth rate. These results are available upon request.

Table 1
Baseline model - Primary deficit.

Variables	(1) All elections	(2) Predetermined elections	(3) Predet. Elections fiscal year Adj.
DebtIllusion1 (based on past median Debt/GDP)	1.843**	2.916**	3.145**
	(2.160)	(2.327)	(2.338)
InterestPayments1 (1st lag - country median)	−0.486***	−0.583***	−0.551***
	(−4.387)	(−3.337)	(−3.212)
Political corruption index	4.173	5.696	4.921
	(1.298)	(1.037)	(0.891)
InterestPayments1 (1st lag - median) ∗ Political corruption index	0.832*	1.055**	1.036**
	(1.736)	(2.146)	(2.219)
L.Log of GDP *per capita* (constant 2010 USD)	2.688***	1.817	1.547
	(2.803)	(1.102)	(0.890)
L.Real GDP growth	−0.180***	−0.197***	−0.186***
	(−4.542)	(−2.973)	(−2.749)
L.Dependency ratio	−0.011	−0.013	−0.009
	(−0.462)	(−0.400)	(−0.269)
Dummy for the 1980s	3.129***	2.047*	1.942
	(4.404)	(1.709)	(1.525)
Dummy for the 1990s	2.426***	1.809***	1.905**
	(5.304)	(2.736)	(2.521)
Dummy for the 2000s	1.733***	1.349**	1.359**
	(4.565)	(2.615)	(2.469)
Constant	−26.393***	−18.357	−15.948
	(−2.761)	(−1.108)	(−0.920)
Observations	444	315	301
Number of countries	97	88	87
Adjusted R^2	0.09	0.07	0.07

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the election years indicated at the top of the respective column, under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.
*$p < 0.10$.
**$p < 0.05$.
***$p < 0.01$.

In the estimation of column 2, only predetermined elections were considered. That is, the sample includes 315 elections which were held in the last year of the constitutionally fixed term in 88 different countries. Since a predetermined election allows the incumbent government to plan opportunistic manipulations of the deficit, we expect that the results for the main variables of interest are somewhat stronger than when all elections are considered (including anticipated elections that were held during the first or second year of the government's term). In fact, the estimated coefficients of debt illusion and of the interaction term are higher than in column 1, and the absolute value of the coefficient for the repayment obligation is also higher. Additionally, the level of statistical significance of the interaction term is higher.

In column 3, we also restrict the sample to predetermined elections, but we further adjust the election-year dummy variable to the fiscal year of each country (as explained in Section 4.2 and Footnote 16). Although we lose one more country (and are left with 87 countries), the results are practically the same as those of column 2. In any case, we believe that this definition of the election-year dummy variable is the most appropriate one, as it takes into account the fact that, in some countries, the fiscal year is not coincident with the calendar year. Therefore, this definition is used in the estimations whose results are reported in the following tables,[22] and we take column 3 of Table 1 as our baseline reference.[23]

5.2. Robustness checks

The estimations of the following tables check the robustness of our baseline reference results (column 3 of Table 1) to the use of alternative proxies of debt illusion (Table 2), of the repayment obligation (Table 3), and of the ego rent (Tables 4 and 5). We also check (and report in the Appendix) the robustness of the results with respect to the use of an alternative proxy of democracy based

[22] The results of the estimations of Tables 2–5 remain practically the same when the fiscal year is not taken into account. Those results are not shown here, but are available from the authors upon request.

[23] Descriptive statistics of the variables used, for the reference sample of 301 predetermined elections in 87 countries, are presented in Table E.1 of Appendix E.

Table 2
Alternative proxies of debt illusion.

	(1)	(2)	(3)
DebtIllusion2 (DebtIllusion1/Freedom of the Press)	1.878*		
	(1.905)		
DebtIllusion3 (DebtIllusion1/Freedom of Expression)		2.588**	
		(2.149)	
DebtIllusion4 (Consumption/Debt)			0.009*
			(1.903)
InterestPayments1 (1st lag - country median)	−0.559***	−0.558***	−0.505***
	(−3.323)	(−3.269)	(−3.187)
Political corruption index	6.101	4.300	5.107
	(1.018)	(0.765)	(1.053)
InterestPayments1 (1st lag - median) ∗ Political corruption index	1.031**	1.030**	0.966**
	(2.137)	(2.181)	(2.243)
Observations	292	301	309
Number of countries	86	87	88
Adjusted R^2	0.06	0.06	0.09

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

on the Database of Political Institutions (DPI),[24] to restricting the sample to stronger democracies,[25] and to using lagged corruption instead of the contemporaneous value.[26]

Table 2 reports the results obtained when using alternative proxies of debt illusion. The first two take into account that the availability of independent information on fiscal variables may also affect debt illusion. In column 1, $DebtIllusion2$ is used; the debt illusion proxy used in Table 1 ($DebtIllusion1$) is divided by the Freedom Of The Press (FOTP) index from Freedom House. Since we re-scale the index to vary between zero and one (see Footnote 19), a lower FOTP index leads to higher values of debt illusion. The same happens to the proxy used in column 2 ($DebtIllusion3$), where the denominator is the Freedom of Expression index from the V-Dem database. Finally, the proxy of debt illusion of Dalamagas (1992), defined as the ratio of consumption to debt, is used in column 3 ($DebtIllusion4$). Since these three alternative proxies have the expected positive sign and are statistically significant, there is additional support for the theoretical model's implication that greater debt illusion leads to a higher primary deficit. It is worth noting that the results regarding the other main variables of interest are practically the same as in column 3 of Table 1.[27]

The results obtained when using alternative measures of the repayment obligation are shown in Table 3. In column 1, we simply use lagged *Interest payments (%GDP)* ($InterestPayments2$). In column 2, we use a proxy that subtracts the country mean to the first lag ($InterestPayments3$). In column 3, we subtract the country past median, that is, the median of *Interest payments (%GDP)*, in the respective country, over the previous years for which data is available to obtain $InterestPayments4$. Finally, in column 4, we subtract the country's past mean to produce $InterestPayments5$. The results for these alternative measures of the repayment obligation are similar to those of the reference case of column 3 of Table 1. The same is true for the remaining variables of interest, providing additional support for the implications of our theoretical model.

Alternative proxies of the ego rent, obtained from the V-Dem database, are considered in the estimations of Table 4. The *Executive corruption index* is used in column 1, the *Regime corruption index* in column 2, the *Public sector corruption index* in column 3, and the *Clientelism index* in column 4. With the exception of column 3, the results are similar to those of the reference case of column 3 of Table 1, where we proxied the ego rent with the *Political corruption index*. The lack of statistical significance of the interaction term involving the *Public sector corruption index* may be due to the fact that it concerns the entire public sector, where there is mostly petty

[24] Using the Executive Index of Electoral Competitiveness (*EIEC*) from the Database of Political Institutions (DPI) we set the democracy dummy variable equal to one if $EIEC \geqslant 6$, and to zero otherwise. Table E.2 in Appendix E reports the results obtained when this definition of democracy is used instead of *Polity2* > 0. The results are very similar to those of Table 1, indicating that our baseline results are robust to the use of an alternative definition of democracy.

[25] Using again the $Polity2$ variable of the Polity 5 database, we set the democracy dummy variable equal to one if $Polity2 \geqslant 6$ (thereby excluding so-called anocracies or semi-democracies), and to zero otherwise. The results reported in Table E.3 in Appendix E are very similar to those of the baseline estimations reported in Table 1. As expected, the number of countries decreases (76 in column 3 of Table E.3, compared to 87 in Table 1).

[26] Since expanding public expenditure by running a larger deficit could create additional opportunities for the extraction of rents, it is possible that the contemporaneous value of the corruption index is affected by the current deficit. To account for that possibility, we alternatively use the lagged corruption index, which cannot be affected by the current deficit. Since the results reported in Table E.4 in Appendix E are practically equal to those of Table 1, using current or lagged corruption does not seem to make a difference. In fact, the results of the estimations of other tables also remain essentially the same when current corruption is replaced by its first lag.

[27] Although the control variables are included in the estimations, their estimated coefficients and t-statistics are not reported in Table 2, nor in the following tables, to economize on space.

Table 3
Alternative proxies of the repayment obligation.

	(1)	(2)	(3)	(4)
DebtIllusion1 (based on past median Debt/GDP)	3.194**	3.145**	2.883**	2.797**
	(2.309)	(2.340)	(2.054)	(2.077)
InterestPayments2 (1st lag)	−0.540***			
	(−2.993)			
InterestPayments3 (1st lag - country mean)		−0.539***		
		(−3.170)		
InterestPayments4 (1st lag - country past median)			−0.505**	
			(−2.024)	
InterestPayments5 (1st lag - country past mean)				−0.611**
				(−2.568)
Political corruption index	3.189	5.432	5.676	5.801
	(0.544)	(0.971)	(0.929)	(0.976)
InterestPayments2 (lagged) ∗ Political corruption index	0.982*			
	(1.969)			
InterestPayments3 (1st lag - mean) ∗ Political corruption index		1.014**		
		(2.114)		
InterestPayments4 (1st lag - past median) ∗ Political corruption index			0.941*	
			(1.769)	
InterestPayments5 (1st lag - past mean) ∗ Political corruption index				1.135*
				(1.865)
Observations	301	301	301	301
Number of countries	87	87	87	87
Adjusted R^2	0.06	0.07	0.06	0.06

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

Table 4
Alternative proxies of the ego rent.

	(1)	(2)	(3)	(4)
DebtIllusion1 (based on past median Debt/GDP)	3.236**	3.273**	2.959**	3.311**
	(2.531)	(2.555)	(2.010)	(2.323)
InterestPayments1 (1st lag - country median)	−0.632***	−0.586***	−0.440**	−0.577***
	(−3.346)	(−3.298)	(−2.628)	(−3.132)
Executive corruption index	0.391			
	(0.136)			
InterestPayments1 (1st lag - median) ∗ Executive corruption index	1.289**			
	(2.431)			
Regime corruption index		0.662		
		(0.196)		
InterestPayments1 (1st lag - median) ∗ Regime corruption index		1.125**		
		(2.318)		
Public sector corruption index			4.721	
			(1.044)	
InterestPayments1 (1st lag - median) ∗ Public sector corruption index			0.993	
			(1.415)	
Clientelism index				11.242***
				(3.268)
InterestPayments1 (1st lag - median) ∗ Clientelism index				1.058*
				(1.861)
Observations	301	301	301	301
Number of countries	87	87	87	87
Adjusted R^2	0.07	0.06	0.05	0.08

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

Table 5
Alternative proxies of the ego rent - dummies for the top tercile.

	(1)	(2)	(3)	(4)
DebtIllusion1 (based on past median Debt/GDP)	2.323	2.476	3.712***	2.956*
	(1.514)	(1.635)	(3.475)	(1.948)
InterestPayments1 (1st lag - country median)	−0.488***	−0.496***	−0.497***	−0.452***
	(−3.247)	(−3.267)	(−3.304)	(−3.490)
Political corruption index (top 1/3)	0.682			
	(0.948)			
InterestPayments1 (1st lag - median) ∗ Political corruption index (top 1/3)	0.807***			
	(2.744)			
Executive corruption index (top 1/3)		0.155		
		(0.179)		
InterestPayments1 (1st lag - median) ∗ Executive corruption index (top 1/3)		0.820***		
		(2.754)		
Regime corruption index (top 1/3)			1.376***	
			(2.959)	
InterestPayments1 (1st lag - median) ∗ Regime corruption index (top 1/3)			0.807***	
			(3.000)	
Clientelism index (top 1/3)				2.272*
				(1.840)
InterestPayments1 (1st lag - median) ∗ Clientelism index (top 1/3)				0.650**
				(2.049)
Observations	301	301	301	301
Number of countries	87	87	87	87
Adjusted R^2	0.07	0.07	0.09	0.08

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

corruption, and not just the government, for which the extraction of rents tends to involve larger amounts. Therefore, we believe that, overall, the results of Table 4 provide further support for our theoretical model. The positive and statistically significant coefficient of the clientelism index is also consistent with the PBC studies which found that higher ego rents are associated with higher deficits.

Additional proxies of the ego rent are considered in Table 5. These are dummy variables which equal one when the value of the underlying index is in the top tercile of the sample, and equal zero otherwise. They thus represent cases of high corruption or clientelism which are expected to be associated with a considerable capacity of governments to extract rents. Again, positive signs are expected for the coefficient of the ego rent proxy and of its interaction with the repayment obligation. As shown in Table 5, this expectation is confirmed in all four estimations.

The use of a dummy variable as proxy of the ego rent facilitates the analysis of its marginal effects over the values taken by the repayment obligation variable (*InterestPayments1*, the difference between the first lag and the country median of *Interest payments (%GDP)*). Recall that, according to our theoretical model, a higher ego rent moderates the effects of the repayment obligation on the optimal deficit. Thus, when the repayment obligation (or cost of debt) is low, and there is over-manipulation, a higher ego rent reduces the deficit. Conversely, if the repayment obligation is high, and there is under-manipulation, a higher ego rent increases the deficit. Therefore, the marginal effect of the ego rent dummy should increase with the repayment obligation, being negative for low values and positive for higher ones.

Based on the results reported in column 1 of Table 5, we illustrate in Fig. 3 the marginal effects of the ego rent, proxied by the *Political corruption index (top 1/3)* over the values of our measure of the repayment obligation, *InterestPayments1*. Consistent with our model's implications, the marginal effect of the ego rent is represented by an upward-sloping line. Additionally, as expected, the marginal effect of the ego rent is negative for the lowest values of the repayment obligation (when there is over-manipulation of the deficit) and is positive for higher ones (in cases of under-manipulation). That is, a higher ego rent reduces the degree of manipulation, in either direction.

6. Conclusion

This paper shows that ignoring in the theoretical argument/model important real-world phenomena (the inverted U-shaped nature of debt illusion and the fact that deficits are cheap when there is partial repayment) leads to ignoring highly relevant empirical hypotheses (over- and under-manipulation and their interaction with selfishness). Only when such hypotheses are theoretically derived and empirically formulated, can they be investigated. In particular, we find that – seemingly counterintuitively – more selfish politicians may actually prefer to reduce the electoral deficit manipulation. Ignoring this finding may even be a reason for why it is sometimes hard to find political budget cycles in Western democracies where the absence of full repayment has made

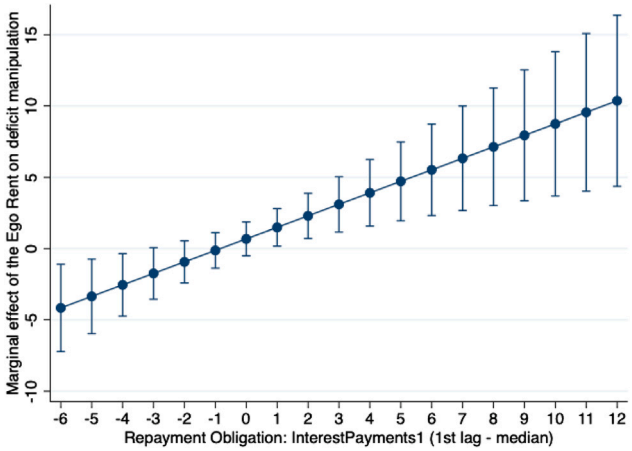


Fig. 3. Marginal effects of the ego rent on the degree of deficit manipulation.

deficits cheap in much of the past 50 years. It may also be the reason why we always and, possibly, prematurely, suspect that any "excessive" spending may be driven by opportunistic government behaviour.

If the debt illusion parameter were linear, more manipulation would always increase the winning chances. Manipulation would only be limited by repayment costs; marginal repayment costs would have to be equal to marginal benefits from increased public goods provision in the election year plus marginal benefits from increased winning chances. In our model, this is different because too much manipulation becomes ineffective when the debt illusion effect is reduced (due to the inverted U-shape of the debt illusion parameter). Hence there is a winning chances maximization point. If under these conditions repayment becomes sufficiently cheap, for instance because the repayment obligation is sufficiently low, it is optimal to sacrifice some chance of winning for the additional benefit of increased public goods provision in the election period. (Low repayment leaves enough resources for public goods provision in the off-election period.) It is these circumstances that lead to a reduction of manipulation when winning becomes more important because the incumbent becomes more selfish (higher ego rent). Conversely, excessive spending can actually become the incumbent's optional choice, even though she is not very selfish.

There is a caveat to our analysis. We assume that the repayment obligation is known by the incumbent ex ante (to simplify the theoretical analysis). One could also argue that repayment is a strategic decision by the incumbent, i.e. part of her maximization problem. Nonetheless, there are also theoretical and empirical counterarguments. Theoretically, if voters know the conditions under which the incumbent operates, they might anticipate the incumbent's repayment choice. Empirically, it is interesting that the ex ante known burden from interest payments (and also their interaction with the ego rent) do show up as significant arguments, no matter how we specify it (and no matter how we specify debt illusion or the ego rent).

We could also interpret our model in a more general way. Politicians can choose between social motives in the short versus the long run (deficit-financed public goods) as well as egoistic re-election motive. If deficit costs are low (for instance, because there is a societal consensus that the repayment obligation should be limited), they tend to overspend in the short run, even if the re-election motive is not very strong. Under these circumstances, more egoistic politicians may realize that they can fool voters better, if they do not increase the debt level to alarming levels which would make everybody aware of the public finance conditions and hence reduce the effect of debt illusion. Instead, they could reduce the deficit so that voters are less aware of the (reduced) manipulation which would, nonetheless, more effectively increase their winning chances. Ultimately, such selfish politicians would play the manipulation game very well, but society would benefit, too.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that support the findings of this study are openly available in the World Economic Outlook (WEO) and the Government Financial Statistics (GFS) databases of the International Monetary Fund (IMF), the World Development Indicators (WDI) of the World Bank, the Polity 5 database, the Database of Political Institutions (DPI), Freedom House, the Varieties of Democracy (V-Dem) database and Dalamagas's (1992) research.

Appendix A. Step 1: Probability of voter i to vote for incumbent

A voter votes for the incumbent if and only if the incumbent delivers higher utility in the coming off-election year:

$$\underbrace{\mathrm{E}_t^i[u(c_{t+1}^a) + g_{t+1}^a + \phi\theta^i(-\frac{1}{2})]}_{\text{utility when } a \text{ in power}} > \underbrace{\mathrm{E}_t^i[u(c_{t+1}^b) + g_{t+1}^b + \phi\theta^i(+\frac{1}{2})]}_{\text{utility when } b \text{ in power}}. \tag{A.1}$$

Both the incumbent and challenger share the same policy preferences and will implement the same policies, for instance, tax policy. The disposable income for individuals and tax revenue for the government are same.

$$\mathrm{E}_t^i[u(c_{t+1}^a)] = \mathrm{E}_t^i[u(c_{t+1}^b)] = \mathrm{E}_t^i[u((1-\tau)y_{t+1})]. \tag{A.2}$$

The only difference between the incumbent and challenger is their competence. Hence, the provision of public goods consumption is affected by politicians' competence and individuals' expectation thereof.

$$\mathrm{E}_t^i[g_{t+1}^a] = \mathrm{E}_t^i[\tau y_{t+1}] + \mathrm{E}_t^i[\mu_t^a] - \mathrm{E}_t^i[\lambda(1+r_{t+1})\delta_t^d \overline{D}]\,; \tag{A.3}$$

$$\mathrm{E}_t^i[g_{t+1}^b] = \mathrm{E}_t^i[\tau y_{t+1}] - \mathrm{E}_t^i[\lambda(1+r_{t+1})\delta_t^d \overline{D}]\,. \tag{A.4}$$

Combine Eqs. (A.1) to (A.4) we can derive the following condition:

$$\mathrm{E}_t^i[\mu_t^a] > \phi\theta^i\,. \tag{A.5}$$

A voter's political preference, θ^i, is uniformly distributed. The probability of voter i to vote for incumbent a can be derived:

$$\text{Prob}\left\{\mathrm{E}_t^i[\mu_t^a] - \phi\theta^i \geqslant 0\right\} = \frac{\mathrm{E}_t^i[\mu_t^a]}{2\phi} + \frac{1}{2}. \tag{A.6}$$

Appendix B. Step 2: The incumbent's probability of winning

The incumbent will win the election if and only if she received more than 50% votes. The incumbent's winning probability is the share of fiscal realists times the probability of fiscal realists' votes plus the share of DISPs (debt illusion suffering persons) times the probability of DISPs' votes:

$$\text{Prob}^{win} = \text{Prob}\,\{\,(1-\psi)\,[\frac{\mathrm{E}_t^{REAL}[\mu_t^a]}{2\phi} + \frac{1}{2}] + \psi\,[\frac{\mathrm{E}_t^{DISP}[\mu_t^a]}{2\phi} + \frac{1}{2}] \geqslant \frac{1}{2}\,\}. \tag{B.1}$$

Why are these expectations different? Both fiscal REALists and DISPs observe the quantity of public goods provided by the incumbent and form expectations about the incumbent's current skills shock based on government budget constraint (4) in election period t and competence Eq. (5):

$$g_t = \tau y_t + \mu_{t-1}^a + \mu_t^a + \delta_t^d \overline{D}\,. \tag{B.2}$$

The expectation of the incumbent's current skills shock by fiscal REALists is the actual skills shock because they have full information including deficit ratio δ_t^d:

$$\mathrm{E}_t^{REAL}[\mu_t^a] = \mu_t^a = g_t - \tau y_t - \delta_t^d \overline{D} - \mu_{t-1}^a\,. \tag{B.3}$$

However, DISPs are suffering from debt illusion which means that they underestimate the deficit, and attribute the higher public goods provision to the incumbent's competence. This faulty perception leads DISPs to overestimate the incumbent's skills shock.

$$\begin{aligned}\mathrm{E}_t^{DISP}[\mu_t^a] = \widehat{\mu_t^a} &= g_t - \tau y_t - (1-\alpha(\cdot))\delta_t^d \overline{D} - \mu_{t-1}^a \\ &= g_t - \tau y_t - \delta_t^d \overline{D} - \mu_{t-1}^a + \alpha(\cdot)\delta_t^d \overline{D} \\ &= \mu_t^a + \alpha(\cdot)\delta_t^d \overline{D}\,.\end{aligned} \tag{B.4}$$

Combining Eqs. (B.1), (B.3) and (B.4), we obtain:

$$\begin{aligned}\text{Prob}^{\text{win}} &= \text{Prob}\,\{\,(1-\psi)\,[\frac{\mathrm{E}_t^{REAL}[\mu_t^a]}{2\phi} + \frac{1}{2}] + \psi\,[\frac{\mathrm{E}_t^{DISP}[\mu_t^a]}{2\phi} + \frac{1}{2}] \geqslant \frac{1}{2}\,\} \\ &= \text{Prob}\,\{\,\mu_t^a \geqslant -\psi\,\alpha(\cdot)\,\delta_t^d\,\overline{D}\,\} \\ &= 1 - F[-\psi\,\alpha(\cdot)\,\delta_t^d\,\overline{D}],\end{aligned} \tag{B.5}$$

where $F[\bullet]$ is the distribution function of the skills shock. The maximum winning probability can be obtained when $F[\bullet]$ is minimized with respect to δ_t^d. Since $\alpha(\cdot) \equiv \alpha(\overline{\delta_t^s} + \delta_t^d)$, the FOC for the winning probability is $\alpha(\cdot) + \alpha'(\cdot)\delta_t^d = 0$.

Appendix C. The incumbent's maximization problem

All agents are utility maximizer. The incumbent's purpose is to maximize her utility over two-periods (see timing of events in Section 2.2). The expected utility equals the utility in period t plus the expected utility in period $t+1$ if she wins the election times the wining probability plus the expected utility if she loses the election times the probability of losing. Assume that $\beta^a = 1$ (see Footnote 12), then

$$\begin{aligned}
max_{\delta_t^d}\, V^a =& max_{\delta_t^d}\, V_t^a + V_{t+1}^a \\
=& max_{\delta_t^d} \mathrm{E}_t^a \{ u(c_t) + g_t + X_t \} \\
&+ \mathrm{E}_t^a \{ \underbrace{[1 - F[-\psi\ \alpha(\cdot)\ \delta_t^d\ \overline{D}]]}_{\text{Prob. wins}} [u(c_{t+1}^a) + g_{t+1}^a + X_{t+1}] \} \\
&+ \mathrm{E}_t^a \{ \underbrace{F[-\psi\ \alpha(\cdot)\ \delta_t^d\ \overline{D}]}_{\text{Prob. loses}} [u(c_{t+1}^b) + g_{t+1}^b] \} \qquad \text{(C.1)} \\
=& max_{\delta_t^d} u(c_t) + \tau y_t + \mu_{t-1}^a + \delta_t^d \overline{D} + X_t \\
&+ u(c_{t+1}) + \tau y_{t+1} - \lambda(1 + r_{t+1})\delta_t^d \overline{D} \\
&+ X_{t+1} \{ 1 - F[-\psi\ \alpha(\cdot)\ \delta_t^d\ \overline{D}] \}\,. \qquad \text{(C.2)}
\end{aligned}$$

The first order condition (FOC) is:

$$V_{\delta_t^d} = \overline{D} \{ 1 - \lambda(1 + r_{t+1}) - \lambda r'_{t+1}\delta_t^d + X_{t+1}F'[\bullet]\psi(\alpha(\cdot) + \alpha'(\cdot)\delta_t^d) \} = 0. \qquad \text{(C.3)}$$

Given that second order condition (C.4) below holds, it can be seen that the optimal manipulation of deficit, $(\delta_t^d)^\star$, depends on both the properties of repayment ($\lambda(1 + r_{t+1}) + \lambda r'_{t+1}\delta_t^d$ is the marginal cost of deficit) and the properties of the debt illusion parameter ($\alpha(\cdot) + \alpha'(\cdot)\delta_t^d$ is the marginal effect). This will be relevant when discussing Lemma 1 in the main text or here (below Eq. (C.4)).

The second order condition holds:

$$\begin{aligned}
V_{\delta_t^d \delta_t^d} =& \overline{D} \{ -2\lambda r'_{t+1} - \lambda r''_{t+1}\delta_t^d + X_{t+1}F'[\bullet]\psi(2\alpha'(\cdot) + \alpha''(\cdot)\delta_t^d) \\
&- X_{t+1}F''[\bullet]\psi^2\overline{D}(\alpha(\cdot) + \alpha'(\cdot)\delta_t^d)^2 \} < 0. \qquad \text{(C.4)}
\end{aligned}$$

A sufficient condition for the SOC to hold is: $2\alpha'(\cdot) + \alpha''(\cdot)(\delta_t^d)^\star \leqslant 0$. This is guaranteed for the relevant debt illusion range (above the debt illusion parameter maximum $\widehat{\delta_t}$ in Fig. 1), but even for points to the left of it (as long as the absolute value of the second derivative is larger than the first derivative).

Moreover, we can show that manipulation (a positive δ_t^d) always delivers higher utility to the incumbent. Eq. (C.2) shows the incumbent's utility over two period with manipulation ($\delta_t^d > 0$). The following equation is the incumbent's utility over two periods without manipulation ($\delta_t^d = 0$):

$$V_{\delta_t^d = 0} = u(c_t) + \tau y_t + \mu_{t-1}^a + X_t + u(c_{t+1}) + \tau y_{t+1} + X_{t+1}(1 - F[0]). \qquad \text{(C.5)}$$

The difference of the incumbent's utility between manipulation and no manipulation is Eq. (C.5) minus Eq. (C.2):

$$V_{\delta_t^d > 0} - V_{\delta_t^d = 0} = \delta_t^d \overline{D}\,[1 - \lambda(1 + r_{t+1})] + X_{t+1}(F[0] - F[\cdot]) > 0. \qquad \text{(C.6)}$$

Appendix D. Lemma and Proposition

Here is an extended version of Lemma 1 in the main text:

(a) The incumbent's expected utility is maximized at the winning chances maximization point $(\overline{\delta_t^s} + (\delta_t^d)^\star = \delta_t^W$, i.e. when $\alpha(\cdot) + \alpha'(\cdot)(\delta_t^d)^\star = 0)$ if and only if the cost of deficit satisfies $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star = 1$.
Otherwise, the optimal manipulation deviates from the winning probability maximization point.

(b) The optimal ratio of the total debt, $\overline{\delta_t^s} + (\delta_t^d)^\star$, goes beyond the value for the maximal winning probability, δ_t^W (a situation we call over-manipulation; $\alpha(\cdot) + \alpha'(\cdot)(\delta_t^d)^\star < 0$) if and only if the cost of deficit satisfies $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star < 1$.

(c) The optimal ratio of the total debt, $\overline{\delta_t^s} + (\delta_t^d)^\star$, is smaller than the value for the maximal winning probability, δ_t^W (a situation we call under-manipulation; $\alpha(\cdot) + \alpha'(\cdot)(\delta_t^d)^\star > 0$) if and only if the cost of deficit satisfies $\lambda(1 + r_{t+1}) + \lambda r'_{t+1}(\delta_t^d)^\star > 1$.

Proposition 1 is a perturbation result based on the Implicit Function Theorem:

At the equilibrium, a marginally higher ego rent brings the optimal manipulation closer to the winning probability maximization point.

$$V_{\delta_t^d X_{t+1}} = F'[\bullet]\psi\overline{D}(\alpha(\cdot) + \alpha'(\cdot)\delta_t^d) \lessgtr 0; \qquad \text{(D.1)}$$

$$\frac{\mathrm{d}(\delta_t^d)^\star}{\mathrm{d}X_{t+1}} = -\frac{V_{\delta_t^d X_{t+1}}}{V_{\delta_t^d \delta_t^d}} \lessgtr 0. \qquad \text{(D.2)}$$

Table E.1
Descriptive statistics.
Source: WEO, GFS, WDI, Polity 5, DPI and V-Dem. See Section 4.2 for details on how the variables are constructed.

Variables	Obs.	Mean	St. Dev.	Minimum	Maximum
Variables of the baseline model					
Opportunistic manipulation	301	0.41	2.65	−9.55	10.88
DebtIllusion1 (based on past median Debt/GDP)	301	0.17	0.16	−1.10	0.59
InterestPayments1 (1st lag - country median)	301	0.24	1.42	−3.21	12.74
Political corruption index	301	0.33	0.31	0.01	0.93
L.Log of GDP *per capita* (constant 2010 USD)	301	9.28	1.37	6.03	11.60
L.Real GDP growth	301	3.59	3.51	−10.89	25.38
L.Dependency ratio	301	56.20	13.27	34.85	99.91
Dummy for the 1980s	301	0.04	0.19	0.00	1.00
Dummy for the 1990s	301	0.22	0.41	0.00	1.00
Dummy for the 2000s	301	0.42	0.49	0.00	1.00
Alternative proxies of debt illusion					
DebtIllusion2 (DebtIllusion1/Freedom of the Press)	292	0.27	0.26	−1.69	1.11
DebtIllusion3 (DebtIllusion1/Freedom of Expression)	301	0.20	0.19	−1.22	0.63
DebtIllusion4 (Consumption/Debt)	301	89.37	99.14	11.08	733.93
Alternative proxies of the repayment obligation					
InterestPayments2 (1st lag)	301	2.57	2.25	0.00	15.33
InterestPayments3 (1st lag - country mean)	301	0.02	1.37	−3.92	9.52
InterestPayments4 (1st lag - country past median)	301	−0.27	1.52	−9.65	5.63
InterestPayments5 (1st lag - country past mean)	301	−0.35	1.46	−7.93	5.28
Alternative proxies of the ego rent					
Executive corruption index	301	0.31	0.30	0.01	0.95
Regime corruption index	301	0.32	0.31	0.01	0.94
Public sector corruption index	301	0.30	0.29	0.01	0.94
Clientelism Index	301	0.31	0.27	0.02	0.89
Political corruption index (top 1/3)	301	0.26	0.44	0.00	1.00
Executive corruption index (top 1/3)	301	0.26	0.44	0.00	1.00
Regime corruption index (top 1/3)	301	0.26	0.44	0.00	1.00
Clientelism index (top 1/3)	301	0.26	0.44	0.00	1.00

Note: *Opportunistic manipulation*, the dependent variable, is defined as the difference between the government's primary budget deficit (%GDP) in the election year and the average primary deficit in the previous years of the same electoral cycle.

Table E.2
Alternative democracy variable (from DPI).

Variables	(1) All elections	(2) Predetermined elections	(3) Predet. Elections fiscal year Adj.
DebtIllusion1 (based on past median Debt/GDP)	2.055**	2.655**	2.798**
	(2.075)	(2.009)	(2.022)
InterestPayments1 (1st lag - country median)	−0.414***	−0.480***	−0.443**
	(−3.627)	(−2.765)	(−2.533)
Political corruption index	4.031	5.012	4.683
	(1.458)	(1.151)	(1.083)
InterestPayments1 (1st lag - median) ∗ Political corruption index	0.707	0.914*	0.885*
	(1.457)	(1.882)	(1.893)
L.Log of GDP *per capita* (constant 2010 USD)	2.672***	2.196	1.972
	(2.865)	(1.408)	(1.194)
L.Real GDP growth	−0.157***	−0.165**	−0.155**
	(−3.610)	(−2.495)	(−2.289)
L.Dependency ratio	−0.010	0.000	0.002
	(−0.388)	(0.010)	(0.057)
Dummy for the 1980s	2.985***	2.026*	1.917*
	(4.677)	(1.962)	(1.745)
Dummy for the 1990s	2.091***	1.473**	1.531**
	(4.161)	(2.283)	(2.090)
Dummy for the 2000s	1.463***	1.110**	1.105**
	(3.598)	(2.296)	(2.161)
Constant	−25.962***	−22.056	−20.085
	(−2.754)	(−1.398)	(−1.209)

(*continued on next page*)

Table E.2 (*continued*).

Variables	(1) All elections	(2) Predetermined elections	(3) Predet. Elections fiscal year Adj.
Observations	509	359	345
Number of countries	116	102	101
Adjusted R^2	0.07	0.05	0.04

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under democracy ($EIEC \geqslant 6$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

Table E.3
Alternative (Stronger) democracy variable ($Polity2 \geqslant 6$).

Variables	(1) All elections	(2) Predetermined elections	(3) Predet. Elections fiscal year Adj.
Debt illusion (based on past median Debt/GDP)	1.920**	3.328**	3.554**
	(2.182)	(2.555)	(2.535)
L.Interest payments %GDP (current - country median)	−0.485***	−0.534***	−0.505***
	(−4.415)	(−3.071)	(−2.947)
Political corruption index	3.182	6.811	5.844
	(0.855)	(1.001)	(0.842)
L.Interest payments (current-median) ∗ Political corruption index	0.901*	1.055**	1.038**
	(1.962)	(2.206)	(2.280)
L.Log of GDP per capita (constant 2010 USD)	2.583**	1.656	1.302
	(2.377)	(0.882)	(0.645)
L.Real GDP growth	−0.182***	−0.191***	−0.177**
	(−4.064)	(−2.793)	(−2.547)
L.Dependency ratio	−0.020	−0.036	−0.034
	(−0.787)	(−1.054)	(−0.894)
Dummy for the 1980s	3.101***	1.871	1.728
	(4.054)	(1.446)	(1.240)
Dummy for the 1990s	2.381***	1.609**	1.680**
	(4.927)	(2.290)	(2.084)
Dummy for the 2000s	1.730***	1.307**	1.307**
	(4.356)	(2.427)	(2.265)
Constant	−24.933**	−16.035	−12.710
	(−2.286)	(−0.834)	(−0.620)
Observations	404	287	273
Number of countries	85	77	76
Adjusted R^2	0.08	0.07	0.06

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity, including the control variables shown in Table 1. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the predetermined election years (adjusted to the fiscal year), under a relatively strong democracy ($Polity2 \geqslant 6$), from 1980 to 2017. T-statistics are in parentheses.

*$p < 0.10$.

**$p < 0.05$.

***$p < 0.01$.

At the equilibrium, the sign of the effect of a higher ego rent on the optimal manipulation (Eq. (D.2)) depends on the sign of Eq. (D.1), which in turn depends on the sign of $(\alpha(\cdot)+\alpha'(\cdot)\delta_t^d)$ which according to Lemma 1 depends on the repayment obligation. If the winning probability and the incumbent's utility are both at a maximum, a higher ego rent has no effect on the budget cycle at the equilibrium. Otherwise, with an increase of the ego rent, the optimal manipulation gets closer to the winning probability maximization point. Specifically, it is optimal to reduce the deficit in the over-manipulation scenario and increase deficit under under-manipulation.

Appendix E. Descriptive statistics and robustness check

See Tables E.1–E.4.

Table E.4
Baseline model with the lagged corruption index.

Variables	(1) All elections	(2) Predetermined Elections	(3) Predet. Elections fiscal year Adj.
Debt illusion (based on past median Debt/GDP)	1.811**	2.655**	2.874**
	(2.131)	(2.053)	(2.055)
L.Interest payments %GDP (current - country median)	−0.497***	−0.602***	−0.560***
	(−4.423)	(−3.486)	(−3.309)
L.Political corruption index	2.389	8.172	8.408
	(0.945)	(1.324)	(1.373)
L.Interest payments (current-median) ∗ L.Political corruption index	0.850*	1.105**	1.066**
	(1.817)	(2.421)	(2.459)
L.Log of GDP per capita (constant 2010 USD)	2.733***	1.939	1.754
	(2.750)	(1.177)	(1.014)
L.Real GDP growth	−0.178***	−0.198***	−0.188***
	(−4.547)	(−3.095)	(−2.866)
L.Dependency ratio	−0.010	−0.023	−0.019
	(−0.433)	(−0.690)	(−0.543)
Dummy for the 1980s	3.215***	2.132*	2.032
	(4.428)	(1.782)	(1.607)
Dummy for the 1990s	2.478***	1.848***	1.937**
	(5.351)	(2.823)	(2.607)
Dummy for the 2000s	1.766***	1.398***	1.410**
	(4.627)	(2.720)	(2.590)
Constant	−26.324***	−19.740	−18.461
	(−2.672)	(−1.200)	(−1.074)
Observations	444	315	301
Number of countries	97	88	87
Adjusted R^2	0.09	0.08	0.08

Notes: Fixed effects estimations with standard errors clustered by country and robust to heteroskedasticity. The dependent variable is the general government's primary budget deficit (%GDP) in the election year minus its average over the previous years of the same electoral cycle. The observations included in each estimation are the election years indicated at the top of the respective column, under democracy ($Polity2 > 0$), from 1980 to 2017. T-statistics are in parentheses.
*$p < 0.10$.
**$p < 0.05$.
***$p < 0.01$.

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