Discussion Papers in Economics

Dynamics of Political Budget Cycle

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Discussion Paper 18-09

Centre for International Trade and Development

School of International Studies

Jawaharlal Nehru University

India

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Dynamics of Political Budget Cycle *

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November 12, 2018

Abstract

The strategic manipulation of fiscal variables in relation to elections is a hotly debated issue in economics and political economy. In this realm, the paper considers the case of an incumbent politician who derives utility from voting support and dis-utility from primary deficit. Using the method of optimal control, the paper derives the equilibrium time paths of both voting support and primary deficit in a dynamic model of finite time horizon under complete information. In case of both the variables, the opportunist and partisan budget cycles are found to follow a similar time pattern, albeit former is more pronounced than the latter just prior to the election time period. The citizen-voters vote for both – opportunist and partisan – incumbents; however, they reject the same when there is sufficiently strong anti-incumbency in the case of the opportunist incumbent. The level of voting support obtained in case of both – opportunist and partisan – incumbent is found to be positive and rising over time, but running the primary deficit higher than the threshold is costlier for the economy in the former case than in the latter. This implies that per unit votes garnered by raising the primary deficit in excess of the benchmark are lower when the incumbent is an opportunist than when she/ he is partisan.

JEL Classification: D72, P16, P35.

Keywords: Opportunist Incumbent, Partisan Incumbent, Primary Deficit, Political Budget Cycles, Anti-incumbency.

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* *Acknowledgement*:- We would like to thank participants of IGC-ISI Summer School Workshop Jul. 12-16, 2014, Winter School, Dec. 15-17, 2014 at Delhi of School of Economics, University of Delhi and conference on 'Papers in Public Economics and Policy at NIPFP, New Delhi' during Mar. 12-13, 2015. We also benefitted by comments from Prof. Chetan Ghate and Prof. Dilip Mookherjee at IGC-ISI workshop and Dr. Mausumi Das at the Winter School. We are grateful to Dr. Bodhisattva Sengupta and two anonymous referees for their insightful and valuable comments.

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1 Introduction

Within the realm of neuroscience Westen (2008) concludes from the brain scanning results that;

> *"....the political brain is an emotional brain. It is not a dispassionate calculating machine, objectively searching for the right facts, figures and policies to make a reasoned decision...."*

This statement is based on political advertisements on television, which, while banned in the United Kingdom (UK), are widely used in the United States (US), where political candidates spend millions of dollars on these budgetary items. Author claims that, Republicans understand this three centuries old idea of David Hume as; "reason is a slave to emotion, not the other way around". Politicians play the emotive psychological strategies based on caste, race, religion, economic policies etc to sway voters. The voters' preferences may be defined over some necessities, which are determined by incumbent's opportunism that voters may fail to comprehend or envisage. Among these, economic policy making with respect to budgetary heads is one of the most popularly used policy tool by the incumbent for political gains.

The concept of balanced budget was accepted well by economists in the earlier literature, but in recent Keynesian economies, fiscal deficit has been used as a driving force for higher economic growth.[1] However, sustained and persistent fiscal deficits run by a country point towards the possibility of opportunistic manipulation of fiscal deficit by the government (Alesina and Perotti, 1995b). Citizen-voters, in general, are unhappy about higher gross fiscal deficit, which may be either due to interest payments on past debt, or primary deficits, or both. However, in our case, the only component that assumed to be politically manipulated is primary deficit and not interest payments (Cafiso, 2012a,b).

In India, before the general election of 2009, the central government's primary deficit to GDP ratio was -4.32% and -4.96% in the years 2008 and 2009 respectively, which had reduced to -4.41% in 2010. The primary deficit in the year 2010 onward showed a downward trend, may be on account of FRBM Act. Consequently, a slightly lower deficit of -2.44% was obtained in 2013. But, this went up to -2.67% in 2014, which was a year of parliamentary elections. In fact, most of the countries in the world today display a tendency in favor of primary deficits. This can be seen in Figures 1 to 3 in the Appendix A, which depict that out of 101 countries in our sample, around 65.35%, and 70.30%

[1] In fact, 'some', deficit in the economy is claimed to be good if an economy is spending on productive investment activities. However, a large magnitude of expenditure entails future tax, which voters might not like and, hence, expenditure has to be contained below a certain threshold level. In India, for instance, it has been decided to maintain aggregate fiscal deficit at 3% of Gross Domestic Product (GDP) under the Fiscal Responsibility and Budget Management Act (FRBM Act-2003).

were running primary deficits in 2011 and 2012 respectively; the rest were running a primary surplus. The data for the year 2014, 2015, 2017 and 2018 also display a similar pattern. Moreover, most countries running primary deficit belong to the group of low income countries, emerging markets and middle income countries. Based on the data for these 101 countries for national level elections from 2011-2018 and primary deficits from 2006-2018, it is observed that countries running primary deficit were 69.31% of the total in the year of elections, and 67.33% in the year before the elections (IMF Fiscal Monitor-2017, 25.06.2018/2018 and Election Guide, 27.06.2018/2018).[2]

Figures 4 and 5 in the Appendix A show the election year and year before the election fluctuations in primary surplus/ deficit from the average primary surplus/ deficit (excluding, respectively, the year of the election and year before the election in calculation of average over the electoral term) during an electoral term.[3] In these figures, blue and red bars respectively refer to deviation in primary surplus/ deficit in the year of the election and year before the election. In Figure 4, sub Figures 4a and 4b respectively represent the budget cycle for low income countries and emerging market economies, and in Figure 5, sub Figures 5a and 5b respectively depict budget cycle for advanced economies and for all the countries put together. As can be seen, the deviation of primary deficit from the average in the year of the election and year before the election points toward fiscal manipulation by higher spending in the years close to the election year. On average, in both the election year and the year before it, emerging market and middle income countries, and low income countries are found to run a higher primary deficit as compared to advanced economies. Schuknecht, 1996; Block, 2002; Brender and Drazen, 2005; and Shi and Svensson, 2006 also confirm that the budget cycles are more pronounced in case of developing economies as compared to developed ones. Interestingly, the primary deficit also seems to exceed the average more in the year before the election than the election year itself. It is possible that targeted expenditure on public goods well before the election (year before the election), can deliver the service by the date of election and, could mobilize voting support in incumbent's favor in the year of election.

The objective of the paper is to theoretically characterize the optimal time path of fiscal policy decision of the incumbent over an electoral cycle, which is assumed to be driven by political motivations. We postulate (as is also done elsewhere; see Table 1) that the incumbent could be of two types: opportunistic or partisan, and when in the government, each type can opportunistically expand public

[2]The analysis in this paper refers to primary deficit throughout, where the positive and negative values represent primary surplus and primary deficit respectively.

[3]Figures refer to recent national level elections and, hence, the years of election are not necessarily the same across countries. The national level elections have been considered based on who controls fiscal policy – prime minister or president – in an electoral democracy depending on whether a parliamentary or presidential political system exists.

spending before the election to attract voters. The opportunistic incumbent/ politician do not have any strict policy preferences, and is driven by the goal to win elections alone rather than focus on citizens' welfare. Alternatively, the partisan politician is the one who has clear fiscal preferences, indicative of preferences of one group of voters or another. For example, one type of the partisan government could prefer reducing unemployment whereas another could be interested in reducing inflation.

As for the methodology, the paper solves the utility maximization problem of the incumbent who is electorally motivated, in that its utility is a weighted sum of utility from voting support and dis-utility from primary deficit. The latter is implied by a large enough government expenditure on (may be) populist economic policies. The economy consists of a continuum of rational citizen-voters, who vote for the incumbent government or the opponent party (which is also implicit here) based on the economic performance of the former, wherein voters are assumed to care about the incumbent's economic performance in terms of the level of primary deficit run in the economy. The citizen-voters are favorable toward the running of an acceptable level of primary deficit (below an exogenous threshold). If instead the primary deficit exceeds this threshold, it generates dis-utility for the incumbent in terms of loss of voting support, to the extent that voters might even vote her/ him out. The model is solved analytically and then the key findings are corroborated by using numerical simulations. Comparative dynamics with respect to the important parameters are also carried out.

The key findings of the paper are:

- The characterization of opportunism and partisan behavior is endogenously determined, in that it is interestingly linked to the regularity conditions that ensure that a well-defined solution to the utility maximization problem for the incumbent exists.
- The opportunist and partisan cycles follow a similar time path, albeit the former is more pronounced than the latter, especially closer to the election period.
- The voters render a positive voting support in case of both opportunist and partisan incumbent, but the presence of anti-incumbency would imply rejecting the same in the opportunistic case.
- An acceptable higher deficit is not as such bad, however, creating primary deficit above a threshold is costlier in the opportunistic case than the partisan one. That is, the deviation of primary deficit from the benchmark is more pronounced in the case of an opportunistic incumbent than a partisan one.

- The votes garnered per unit of deficit incurred would be less in the opportunistic case than in the partisan case. It implies that the opportunist incumbent will have to incur larger primary deficits to earn higher voting support per unit of the primary deficit.

The paper is organized as follows. Section 2 reviews the literature, and within it, places the key contributions of this research. Section 3 introduces the basic analytical model and derives the optimal path for voting support and primary deficit, based on the interaction between the incumbent and the citizen-voters. Section 4 characterizes the behavior of the opportunist incumbent, while Section 5 analyzes the case of the partisan incumbent, both analytically and through numerical simulations. The role of anti-incumbency (with opportunistic behavior) is also characterized in Section 4, whereas anti-incumbency in partisan case does not satisfy the regularity condition (as will be explained later), and hence, excluded. Section 6 concludes.

2 Review of Literature

One of the first generations models of political business cycle was propounded by Kalecki (1943) but it was re-invented by Nordhaus (1975) and Hibbs (1977). Nordhaus (1975) considered macroeconomic and voting models and found an opportunistic pre-electoral manipulation of economic policies (that is, politically determined policy choice having lower unemployment and higher inflation than what is optimal), whereas partisan policy led to a political business cycle with higher unemployment and lower inflation in the initial years of electoral term followed by lower unemployment and higher inflation close to the date of election. Hibbs (1977) explained the post-electoral cycles due to varied macroeconomic goals of policy makers, popularly known as partisan cycles. Both of these first-generation studies assumed an irrational behavior of the citizen-voters and relied on monetary policy as an anchor. Alongside, there was the emergence of several seminal empirical papers, such as those by Kramer (1971), Tufte (1975), and Fair (1978), which examined the economic determinants of US congressional voting.

In order to counter the conceptual criticisms meted out to this early strand of literature, there was the emergence of the second-generation models such as – Cukierman and Meltzer (1986), Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabellini (1990). These models utilized the notion of rational expectations that restricted the magnitude of opportunism toward exploiting the Phillips curve, and it was assumed that the incumbent cannot fool the voters time after time. Cukierman and Meltzer (1986) and Rogoff and Sibert (1988) proposed the model of competency with regard to the government

Table 1: Politico Economic Models of Business Cycles

Politicians' Behavior	Non-rational Behavior and Non-rational Expectation	Rational Behavior and Rational Expectation
"Opportunistic" Politicians	Nordhaus (1975), Lindbeck (1976)	Cukierman and Meltzer (1986), Rogoff and Sibert (1988), Rogoff (1990), Persson and Tabellini (1990)
"Partisan" Politicians	Hibbs (1977, 1989)	Alesina (1987), Alesina and Sachs (1988)

Source: Alesina (1988) and Alesina, Cohen, and Roubini (1993)

budget and not the Phillips Curve. The government expenditure was financed by lump-sum taxes and seigniorage revenue. The Cukierman and Meltzer (1986) competency-based model was consistent with pre-electoral policy distortion: due to asymmetry of information between the government and voters, the incumbent had an incentive to distort economic policy in the election period. Rogoff and Sibert (1988) derived that each type of policymaker, with the exception of the least competent one, tended to distort the pre-electoral fiscal policies to maximize consensus. Rogoff (1990) set up a model similar to Rogoff and Sibert (1988), where government expenditure and public investment were depicted as a function of lump-sum taxes and competency. The politician was assumed to have better information about his own level of competency than the voters. In this case, voters made an inference about the competency of the politicians by observing the government spending pattern and, consequently, the incumbent had the incentive to increase the spending on those goods that were more visible to voters before the election and get re-elected. Persson and Tabellini (1990) introduced the notion of competency in the Nordhaus (1975) version of the Phillips curve.[4] A competent policymaker expanded the economic activity (pre-electoral boom) immediately before the election, and voters observed this to re-elect the policymaker and hence, the political business cycle.

In the opportunistic framework under traditional (adaptive expectations) models, both monetary and fiscal policies were found to be more effective in creating the desired macroeconomic cycles as compared to the rational expectations framework because the first-generation model provided better room to exploit the Phillips curve under irrational citizen-voters.

The first generation partisan model under adaptive expectation was first proposed by Hibbs (1977, 1989), where the former stated that overall economic activity was higher in the left-wing government

[4]Authors focused on the competency of the candidate along with asymmetry of information on the observation of inflation and output. For instance, they stated that, "one candidate may be particularly able (or unable) to cope with a shock in the price of oil, or to enact the effective labor market legislation, or to negotiate with trade unions" (Persson and Tabellini, 1990. pp. 80).

than the right-wing in their respective administrative span. The second generation partisan model under rational expectations and price rigidities was introduced by Alesina (1987) after widespread criticism was meted out to the exploitable Phillips curve based monetary model of political business cycle. Alesina (1987) considered rational expectations with partisan post-electoral cycles and concluded that, in the first half of the elected term, unemployment would lower and inflation higher under the left-wing government than the right-wing government. Since, expectations were formed before the election in the first half term, after the election, the left-wing win implied higher inflation than anticipated while the right-wing victory means inflation would be lower than expected.

Interestingly, there exists select literature that examines the possibility of co-existence of both - opportunistic and partisan - versions of the model. Alesina and Rosenthal (1995) have made some effort in this direction to merge the concept of competency with partisan behavior of the government. These authors claim that a partisan and opportunist incumbent might be compatible with each other. Further, Frey and Schneider (1978) state that the partisan politician becomes opportunist when the election time approaches and she/ he is in danger of losing the election, whereas they go for partisan goals when they are electorally confident. Thus, one cannot ignore the possibility of a partisan politician playing a mixed role - being an opportunist when in the office, and being partisan when outside the office.[5]

Following various criticisms of the opportunistic and partisan models, Drazen (2000) proposed a new model of political budget cycle (PBC), based on Rogoff (1990). Drazen (2000) extended the model by including both monetary and fiscal policy with opportunistic and forward looking citizen-voters to capture the PBC, popularly known as "Active-Fiscal Passive-Monetary (AFPM)". In fact, most of the recent research tries to explain the economic cycles by including the fiscal policy in the model, to name a few are - Alesina and Perotti (1995a), Drazen (2000), Persson and Tabellini (2002), and more recently Aidt, Veiga, and Veiga (2011), Klomp and De Haan (2013a,b), and Chortareas, Logothetis, and Papandreou (2016). Drazen and Eslava (2010) and Brender and Drazen (2013) analyze the composition of government spending (rather than aggregate spending) pattern as an electoral tool. Their findings state that rational voters support the opportunist government, which, in fact, incurs the targeted expenditure in the economy prior to the election. Brender and Drazen (2013) find that an established democracy changes the composition more frequently than the new ones. Aidt, Veiga, and Veiga (2011) find that opportunistically motivated incumbent spend more on visible goods close

[5]The opportunistic behavior of different partisan politicians may be different. Adjusting the party's standing position toward the 'middle' might be the most effective opportunist policy for a partisan politician.

to the election whereas Klomp and De Haan (2013a,b) state that, in most of the countries, fiscal policy is not affected by elections. Chortareas, Logothetis, and Papandreou (2016) find that there is strong evidence of pre-electoral increased expenditure and excess borrowing in Greece's municipality.

It is within this body of literature that this paper extends the models of opportunistic and partisan politics by incorporating the time-dynamics of voting support and primary deficit during the entire electoral cycle, especially just prior and post the election period, orchestrated through changes in fiscal policy. The paper makes a significant contribution in terms of characterizing the two types of incumbents – opportunistic and partisan – through specific parametric combinations, which are determined endogenously as necessary conditions for the existence of a well-defined utility maximization solution of the incumbent. Further, the paper traces the optimal time path of primary deficit and voting support of each type of incumbent over the entire electoral cycle. The paper is also extended to include the possibility of anti-incumbency and understand its implications on voting support for the two types. To keep the analysis mathematically tractable, the case of anti-incumbency is also characterized by making assumptions on the values of select parameters. The other important contributions of the paper are: when the opportunist and partisan cycles coexists (as is the case here), the paper aims to find an answer to the question as to why should these be seen as different, particularly close to the election? Also, most of political budget cycle analyzes have been done in infinite time horizon and have focused on the voters' welfare, and not the incumbent's. In this respect, this research constitutes an important contribution with focus on a finite time horizon dynamic analysis of the behavior of the incumbent politician. To the best of our knowledge, all of these contributions are unique and significant.

3 The Model

We consider an economy with an incumbent politician and a continuum of citizen-voters. The incumbent incurs the budgetary expenditure on public goods as well as it strives to get back to power in the next election. That is, the incumbent is not benevolent and her/ his objective function is a weighted sum of utility from voting support and dis-utility from budgetary deficit (primary deficit). Often the deficit is run to provide for 'populist' or 'visible' expenditure as in Aidt, Veiga, and Veiga (2011). Accordingly, the optimization problem of the incumbent is defined over the finite time interval $[0, T]$, which runs through one election cycle ending in elections occurring at date T, and is mathematically expressed as:

$$\underset{\{D(t)\}}{Max} \int_0^T e^{-\rho t} \frac{[M(t) - \delta(D(t) - D^*)]^{1-\epsilon}}{1-\epsilon} dt, \tag{1}$$

subject to,

$$\dot{M}(t) = \alpha D(t) - \gamma M(t), \quad M(0) = M_0 > 0, \quad M(T) \quad \text{free}, \tag{2}$$

$$G(t) = \tau(t) + D^* + \eta(t) \Rightarrow D(t) - D^* = \eta(t), \tag{3}$$

where $\rho > 0$ in eq. (1) is the discount rate, $M(t)$ is the voting support by the citizen-voters that is treated as the state variable, and $D(t)$ is primary deficit incurred due to expenditure on public goods in the economy that constitutes the control variable, both at any time t during an election cycle. The parameters ϵ and δ respectively capture the intertemporal elasticity of substitution, and the weight on dis-utility from primary deficit relative to utility from voting support. The equation of motion of $M(t)$ in eq. (2) is positively related to the level of primary deficit run in the economy, and this positive relationship has been depicted by the parameter α. Moreover, it is negatively related to the existing level of voting support, $M(t)$, whose strength is captured by the parameter γ, also called the friction parameter.[6] Logically, we assume that $\alpha > \gamma$. $G(t)$ is the current government expenditure defined as the sum of $\tau(t)$, current government tax revenue, and $\eta(t)$, which is the deficit shock to the economy in eq. (3). Note that $\eta(t)$ impacts the economy positively or negatively depending on $D(t) - D^* \lesseqgtr 0$. That is, the citizen-voters are negatively affected by primary deficit exceeding the threshold because this would entail a future cost of higher taxation and, hence, a loss in their welfare.

The scrap value function can be written as (see also Chiang, 1992, pp. 181-183),

$$[M(T) - M^*]\lambda_M(T) = 0; \tag{4}$$

where, $\lambda_M(\cdot)$ is the costate variable associated with the state change equation in (2). That is, the scrap value condition at the terminal time period (or in the year of election) is, $\lambda_M(T) \geq 0$, which implies that $[M(T) - M_{min}]\lambda_M(T) = 0$. Notice that, from eq. (a6) (in Appendix A) at $t = T$ (or in the election year) we have, $\lambda_M(T) = Z_m > 0$, which further implies that $M(T) = M_{min}$, where, M_{min} is some minimum level of voting support incumbents get at the terminal time T, which denotes the

[6] Note that, as more and more voting support is rendered to the incumbent, there will be more withdrawal (friction) of the citizen-voters, which may also be due the presence of an alternative party in the political arena. It is this parameter of friction that captures the notion of anti-incumbency later in the analysis.

year of election.

Given a politically inclined incumbent, the possibility of primary deficit being very large near the election period, T, is not ruled out, as the government attempts to woo the voters by massive spending on visible public goods in the economy (which is not modeled explicitly) rather than being concerned about the consequent high primary deficit. However, the government tends to trade-off the utility from this deficit in terms of voting support garnered as against the dis-utility from excessive levels of primary deficit.

3.1 Optimal Time Path

The Hamiltonian for the optimization program described in the previous section can be expressed as:

$$H(t) = \frac{[M(t) - \delta(D(t) - D^*)]^{1-\epsilon}}{1-\epsilon} e^{-\rho t} + \lambda_M(t)[\alpha D(t) - \gamma M(t)]. \tag{5}$$

Solving the optimal control problem, we get that,

$$\begin{aligned} \frac{\partial H(t)}{\partial D(t)} &= 0, \\ \Leftrightarrow \delta[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t} &= \alpha \lambda_M(t), \qquad (6) \\ \text{and,} \quad \dot{\lambda}_M(t) &= -\frac{\partial H}{\partial M(t)} \Leftrightarrow \\ \Leftrightarrow \dot{\lambda}_M(t) - \gamma \lambda_M(t) &= -[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t}, \qquad (7) \end{aligned}$$

and the state variable, $M(t)$, must adhere to the time path defined by

$$\dot{M}(t) = \alpha D(t) - \gamma M(t). \tag{8}$$

The solution to this program yields the optimal time path of voting support rendered to the incumbent by the citizen-voters, that is, $M(t)$, and that of primary deficit incurred on account of government expenditure on public goods, captured by $D(t) - D^*$, at any time t during the election cycle.

Proposition 1: *The equilibrium level of voting support offered to the incumbent by the citizen-voters, $M(t)$, and the magnitude of excessive primary deficit run by the incumbent, $D(t) - D^*$, are found to* *be:*

$$
\begin{aligned}
M(t) &= \left[M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}\right] e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} \\
&\quad + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}} e^{-(\frac{\alpha-\delta\gamma}{\delta\epsilon})T}}{\frac{\epsilon-1}{\delta\epsilon}} \left[\frac{e^{(\frac{\alpha-\delta\gamma-\delta\rho}{\delta\epsilon})t} - e^{(\frac{\alpha-\delta\gamma}{\delta})t}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right] \qquad (9)\\
&= \underbrace{\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \Gamma_2}_{(+)} + \underbrace{\frac{\Gamma_3 e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{e^{-\frac{\rho}{\epsilon}t} - e^{(\frac{\epsilon-1}{\delta\epsilon})(\alpha-\delta\gamma)t}}{\Gamma_4}\right]}_{(+)/(-)} \gtrless 0; \qquad (10)\\
D(t) - D^* &= \frac{1}{\delta}M(t) - \delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}t + (\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)} \qquad (11)\\
&= \underbrace{\frac{\Gamma_1}{\delta} e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\Gamma_2}{\delta}}_{(+)} \\
&\quad + \underbrace{\frac{\frac{\Gamma_3}{\alpha} e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{\frac{\alpha}{\delta}(e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}) - \frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}t}}{\Gamma_4}\right]}_{(+)/(-)} \gtrless 0, \qquad (12)
\end{aligned}
$$

where $\Gamma_1 = M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}$, $\Gamma_2 = \frac{\alpha\delta D^*}{\alpha-\delta\gamma}$, $\Gamma_3 = (\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}$ and $\Gamma_4 = (\alpha-\delta\gamma) + \frac{\delta\rho}{\epsilon-1}$. The detailed derivations for the expressions in (10) and (12) can be found in Appendix A. In general, in eq. (10), the sum of the first two terms in the r.h.s. is non-negative, in view of $e^{\frac{(\alpha-\delta\gamma)}{\delta}t} - 1 \geq 0$, while the third term is ambiguous in sign, since ϵ in general can be $\gtrless 1$, and $e^{-\frac{\rho}{\epsilon}t} - e^{(\frac{\epsilon-1}{\delta\epsilon})(\alpha-\delta\gamma)t} \gtrless 0$ according as $(1-\epsilon) \gtrless \frac{\delta\rho}{(\alpha-\delta\gamma)}$. Following the same reasoning, in the r.h.s. of eq. (12) as well, the sum of the first two terms is positive, while the third term is ambiguous in sign. Thus, in general, both $M(t)$ and $D(t) - D^*$ are ambiguous in sign.

3.2 Regularity Conditions

Since, the optimal time paths defined in eqs. (10) and (12) are dependent on several parameters, namely, ρ, α, γ, δ, ϵ, and D^*, we need to derive the regularity condition(s) that would ensure that a well-defined solution to the cumulative discounted utility for the incumbent exists. By substituting the solutions for $M(t)$ and $D(t) - D^*$ in the welfare function in (1) we get,

$$
U = \int_0^T \frac{(\frac{\alpha Z_m}{\delta})^{\frac{\epsilon-1}{\epsilon}}}{1-\epsilon} e^{(1-\epsilon)(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T) - \frac{\rho}{\epsilon}t} dt, \qquad (13)
$$

a sufficient condition for which to be positive is

$$
\epsilon < 1 \quad \text{such that } \epsilon \geq 1 \text{ is ruled out.} \qquad (14)
$$

The expression in eq. (13) can be solved to yield

$$U = \frac{\left(\frac{\alpha Z_m}{\delta}\right)^{\frac{\epsilon-1}{\epsilon}}}{\frac{(\epsilon-1)^2}{\delta\epsilon}} \left[\frac{e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right], \tag{15}$$

which, if positive, implies that the ratio

$$\frac{e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}} > 0.$$

This entails the necessary conditions that

$$\text{either } e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T} > 0 \Rightarrow (\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1} > 0 \quad \Leftrightarrow 1-\epsilon > \tfrac{\rho\delta}{\alpha-\delta\gamma}, \tag{16}$$

$$\text{or } e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T} < 0 \Rightarrow (\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1} < 0 \quad \Leftrightarrow 1-\epsilon < \tfrac{\rho\delta}{\alpha-\delta\gamma}. \tag{17}$$

The two necessary conditions, eqs. (16) and (17), have an intuitive appeal for our analysis. An important feature of this research is the characterization of the role of opportunism and partisan behavior of the incumbent in terms of the implications for the time path of primary deficit and voting support during the election cycle, leading up to the election period, T. Since, an opportunistic incumbent is primarily interested in garnering votes, and manipulates primary deficit toward the end, she/ he is assumed to have the willingness to accept large fluctuations in utility from voting support, net of dis-utility from primary deficit. Parametrically, this is captured by a low enough value of ϵ and an assignment of a sufficiently low weight on utility loss from primary deficit, implied by a small enough value of δ. Notably, the regularity condition in eq. (16) satisfies these parametric restrictions. The opposite is true for a partisan incumbent, who has distinct preferences on economic policies. This implies a low willingness to tolerate fluctuations in utility over time and a high dis-utility from primary deficit, indicated by a high enough value of ϵ and δ. Crucially, the regularity condition in eq. (17) corresponds to this case. As will be seen, both eqs. (16) and (17) will play an important role in defining the time path of the incumbent depending on whether she/ he displays an opportunist or a partisan behavior.

4 Opportunist Incumbent

The opportunist incumbent government is assumed to be the one that is more likely to adopt populist policies in the time period closer to the election period, T, and accordingly runs a higher primary deficit than D^*. Generally, an opportunist incumbent is willing to accept sharp variations in marginal utility from voting support over time, and has a small enough marginal utility loss from excessive primary deficit. As discussed, the parametric configuration in this case is characterized by $1-\epsilon > \frac{\rho\delta}{\alpha-\delta\gamma}$.

4.1 Opportunist Incumbent in the Absence of Anti-incumbency

Given the parametric restriction in eq. (16),

Proposition 2: *In the case of an opportunist incumbent and no anti-incumbency, if $\alpha > \gamma$ such that $\alpha > \delta\gamma$, ϵ and δ are both positive but small enough (or even close to zero), $0 < \rho < 1$, and $1-\epsilon > \frac{\rho\delta}{\alpha-\delta\gamma}$, the optimal level of voting support from citizen-voters , $M(t)$, defined in eq. (10) will be strictly positive.*

The proof proceeds as follows. Since, this is the case of the incumbent politician, the initial level of voting support, $M_0 > 0$ and large enough. Moreover, in view of $\alpha > \gamma$ and $e^{(\frac{\alpha-\delta\gamma}{\delta})t} - 1 > 0$, the first term $\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})t}$ will tend to dominate the second term, Γ_2. Also, in the opportunistic case, the ratio $\left[\frac{e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}}{\Gamma_4}\right]$ in the third term of eq. (10) is positive (from eq. (16) both the numerator and denominator of this ratio are positive). However, δ and ϵ being very small make the values of both $e^{-\frac{\rho}{\epsilon}t}$ and $e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}$ in the third term rather small, implying that their difference will also be small enough. Further, the term in the denominator, that is, $\frac{\epsilon-1}{\delta\epsilon}$, will be large (again from δ and ϵ being small enough) and negative. Using the same reasoning, Γ_3 will be small enough and $e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}$, although rising, will also be very small. Thus, the entire third term will be small enough (in fact, in the special case of $\epsilon \to 0$, the entire third term will vanish). Overall, the first two terms will tend to dominate the third term, implying that the optimal level of voting support, $M(t)$, will be positive. Notably, these parametric restrictions satisfy the regularity condition in eq. (16).[7]

Proposition 3: *Given an opportunist incumbent, absent anti-incumbency, and the parametric restrictions as in Proposition 2, the government primary deficit that is run, in terms of $D(t) - D^*$, characterized by eq. (12) will also be positive.*

The proof proceeds as follows. Again, $M_0 > 0$ and large. Also, with opportunism, $e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t} > 0$ implies that $\Gamma_4 > 0$. Further, under the assumption that $\epsilon < 1$ and very

[7]The specific conditions on parameters are derived such that they satisfy the thresholds specified in section 2.2. Accordingly, these restrictions are also consistent with the necessary conditions in eqs. (16) and (17). We are thankful to an anonymous referee for pointing this out.

small in magnitude (since this is the case of opportunism), $\left[\frac{\alpha}{\delta}\left(e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}\right) - \frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}t}\right] > 0$ but very small. Since the values of δ and ϵ are very small (even close to zero, given opportunism), the denominator of the third term in eq. (12), which is $\frac{\epsilon-1}{\delta\epsilon}$, will be very large and negative. Similarly, $e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}$ is increasing albeit very small. Consequently, the third term of eq. (12) will be small enough. In fact, it would also tend to vanish as $\epsilon \to 0$. Thus, the third term would be dominated by the first two terms, where the first term is already larger than the second, implying that optimal deficit, $D(t) - D^*$, will be positive.[8]

It will be interesting to observe in the next proposition that in view of small enough values of δ (that captures the incumbent's opportunism) the time path of $D(t) - D^*$ will always lie above that of $M(t)$. This implies that the opportunist incumbent will have to spend more in terms of primary deficit for garnering each unit of voting support.

In the case of an opportunist incumbent, and absence of anti-incumbency, a higher primary deficit just prior to the election is likely to entail higher future taxation in the post-election period. In response to this, will the rational citizen-voters punish the government if the incumbent exceeds the deficit beyond a threshold level? The findings state that this is not true in this case. That is,

Proposition 4: *In case of an opportunist incumbent with $\alpha > \gamma$ such that $\alpha > \delta\gamma$, ϵ and δ being positive but very small (even close to zero), and $0 < \rho < 1$,*

(i) the pay-off to the incumbent in terms of voting support from citizen-voters steadily increases right up to the election time period, T. That is, $\frac{\partial M(t)}{\partial t} > 0$ and $\frac{\partial \eta(t)}{\partial t} > 0$;

(ii) in order to mobilize an additional unit of voting support, the opportunist government will have to run an incrementally higher level of primary deficit. Specifically, $\frac{\partial \eta(t)}{\partial t} > \frac{\partial M(t)}{\partial t}$.

The detailed proof of Proposition 4 is included in Appendix A. The proof of Proposition 4(i) proceeds as follows. We first look at the change in voting support over time, by substituting for $D(t)$ from eq. (12) into eq. (8). From the regularity condition in eq. (16), at any time $t < T$ (that is, during the election cycle, before the election period), we have (a) $\epsilon < 1$, and from the parametric restrictions imposed for the opportunist incumbent (from the condition eq. (16)), we have (b) $\frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T) - \frac{\rho}{\epsilon}t < 0$, which increases and approaches $-\frac{\rho}{\epsilon}.T$ as $t \to T$.[9] Further, in the last term in eq. (18), the value of $(Z_M)^{-\frac{1}{\epsilon}}$ will be very small as ϵ is also very small or even close to zero. For the same reason, the value of $(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}$ will also be very small. Thus, the magnitude of the last term in eq. (18) will be negligible,

[8] Again, the parametric restrictions utilized here are consistent with the necessary conditions in eqs. (16) and (17).

[9] From eq. (18), the part of the last term $e^{-\frac{\rho}{\epsilon}t + \frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T)}$ can be written as $e^{-\frac{\rho}{\epsilon}t}e^{\frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T)}$. That is, as $t \to T$ and small enough ϵ we have $e^{-\frac{\rho}{\epsilon}t} \to 0$ and $e^{\frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T)} \to 1$.

and the change in voting support over time will be determined by the sum of the first two terms, both of which are positive (from $\alpha > \delta\gamma$). That is,

$$\frac{\partial M(t)}{\partial t} = \left(\frac{\alpha - \delta\gamma}{\delta}\right) M(t) + \alpha D^* - \left(\frac{\alpha}{\delta}\right)^{\frac{\epsilon-1}{\epsilon}} (Z_M)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}t + \frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T)} > 0. \tag{18}$$

As for the voting support, the change in the path of the primary deficit will also be positive as $t \to T$. The change in deficit over time is derived by differentiating $D(t) - D^*$ in eq. (a7) (in the Appendix A) with respect to t to get the expression in eq. (19). In eq. (19), $\alpha^{(\frac{\epsilon-2}{\epsilon})}\delta^{(\frac{1-2\epsilon}{\epsilon})}$ can be re-expressed as $\alpha^{(-\frac{1}{\epsilon}-1)}(\frac{\delta}{\alpha})^{(\frac{1-2\epsilon}{\epsilon})}$. Note that, for ϵ very small (or close enough to zero, in view of opportunism), both $\alpha^{(-\frac{1}{\epsilon}-1)}$ and $(\frac{\delta}{\alpha})^{\frac{1-2\epsilon}{\epsilon}}$ will be very small or close to zero. Similarly, the value of $(Z_M)^{-\frac{1}{\epsilon}}$ will be very small in magnitude. Furthermore, as explained in the result for the change in voting support, from (b) the power of the exponential expression in the third term will be negative, and will approach $-\frac{\rho}{\epsilon}.T$ as $t \to T$. On account of this, the exponential term will rise, albeit to a small enough value since ϵ is very small, or even close to zero. On the whole, the third term will approach a small enough value. Hence, even in this case, the first two terms will be dominating, and the deficit will rise over time. That is,

$$\begin{aligned}\tfrac{\partial \eta(t)}{\partial t} &= \left(\frac{\alpha - \delta\gamma}{\delta^2}\right) M(t) + \frac{\alpha D^*}{\delta} \\ &-\alpha^{(\frac{\epsilon-2}{\epsilon})}\delta^{(\frac{1-2\epsilon}{\epsilon})} Z_M^{-\frac{1}{\epsilon}} \left[\frac{(1+\epsilon)\alpha - \delta(\gamma+\rho)}{\epsilon}\right] e^{-\frac{\rho}{\epsilon}t + \frac{\alpha-\delta\gamma}{\delta\epsilon}(t-T)} > 0,\end{aligned} \tag{19}$$

where, $\eta(t) = D(t) - D^*$. Hence, both $\frac{\partial M(t)}{\partial t} > 0$ and $\frac{\partial \eta(t)}{\partial t} > 0$.

We next turn to $4(ii)$. With $\delta < 1$, from eq. (11), we will have $\frac{\partial \eta(t)}{\partial M(t)} = \frac{1}{\delta} > 1$. Intuitively, in order to garner an additional unit of voting support, the opportunist government will have to spend incrementally more in the form of primary deficit.

Further, analyze the behavior of $M(t)$ and $\eta(t)$ in the initial time period, $t = 0$ and the terminal (election) time period, $t = T$.

Proposition 5: *In case of an opportunist incumbent, when $\alpha > \gamma$ such that $\alpha > \delta\gamma$, both ϵ and δ are positive but very small (even close to zero), and $0 < \rho < 1$,*

(i) the level of voting support at $t = 0$ will be $M(t) = M_0 > 0$ and the initial level of incumbent's primary deficit will be $D(t) - D^* > 0$;

(ii) the election (terminal) time period values of voting support and path of deficit are such that $M(t) < M(T)$ and $\eta(t) < \eta(T)$.

The proof of Proposition 5(i) proceeds as follows. As $t \to 0$, in eq. (10), the last term in the r.h.s. of the solution to $M(t)$ drops out. Furthermore, in the first term, $\left(\frac{\alpha\delta D^*}{\alpha-\delta\gamma}\right) e^{(\frac{\alpha-\delta\gamma}{\delta})t}$ is equivalent to $\left(\frac{\alpha\delta D^*}{\alpha-\delta\gamma}\right)$, which balances out with the third term. Thus, the level of voting support at $t=0$ is found to be:

$$M(t) = M_0 > 0. \tag{20}$$

As for the level of primary deficit at $t=0$, from eq. (12), given the parametric restrictions of the opportunist government, the second term in the r.h.s., $(\alpha Z_m)^{-\frac{1}{\epsilon}}$ will be very small for small enough values of ϵ. Similarly, $\delta^{\frac{1-\epsilon}{\epsilon}}$ will be small, as by assumption, δ is small enough in this case (given opportunism). Furthermore, since $\alpha > \delta\gamma$, where δ and ϵ are very small, $e^{-(\frac{\alpha-\delta\gamma}{\delta\epsilon})T}$ will also be very small, even when T is finite (election time period and electoral cycle being pre-defined). Consequently, $-(\alpha Z_m)^{-\frac{1}{\epsilon}}\delta^{(\frac{1-\epsilon}{\epsilon})}e^{-(\frac{\alpha-\delta\gamma}{\delta\epsilon})T}$ will be very small implying that

$$D(t) - D^* = \frac{M_0}{\delta} - (\alpha Z_m)^{-\frac{1}{\epsilon}}\delta^{(\frac{1-\epsilon}{\epsilon})}e^{-(\frac{\alpha-\delta\gamma}{\delta\epsilon})T} > 0. \tag{21}$$

For the proof of Proposition 5(ii), evaluating eqs. (10) and (12) at $t = T$, the levels of voting support and primary deficit in the terminal time can be expressed as:

$$\begin{aligned}
M(T) &= \left[M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}\right] e^{(\frac{\alpha-\delta\gamma}{\delta})T} \\
&\quad -\frac{\alpha\delta D^*}{\alpha-\delta\gamma} + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}} Z_m^{-\frac{1}{\epsilon}}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{e^{-\frac{\rho}{\epsilon}T} - e^{(\frac{\epsilon-1}{\epsilon})(\frac{\alpha-\delta\gamma}{\delta})T}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right] \qquad (22)\\
&= \Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})T} - \Gamma_2 + \frac{\Gamma_3}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{e^{-\frac{\rho}{\epsilon}T} - e^{(\frac{\epsilon-1}{\epsilon})(\frac{\alpha-\delta\gamma}{\delta})T}}{\Gamma_4}\right]; \qquad (23)\\
D(T) - D^* \equiv \eta(T) &= M(T) - \delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{\rho}{\epsilon}T} \\
&= \left[\frac{M_0}{\delta} + \frac{\alpha D^*}{\alpha-\delta\gamma}\right] e^{(\frac{\alpha-\delta\gamma}{\delta})T} - \frac{\alpha D^*}{\alpha-\delta\gamma} \qquad (24)\\
&\quad + \frac{(\alpha Z_m)^{-\frac{1}{\epsilon}}\delta^{\frac{1-\epsilon}{\epsilon}}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{\frac{\alpha}{\delta}(e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}) - \frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]e^{-\frac{\rho}{\epsilon}T}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right] \\
&= \frac{\Gamma_1}{\delta}e^{(\frac{\alpha-\delta\gamma}{\delta})T} - \frac{\Gamma_2}{\delta} + \frac{\frac{\Gamma_3}{\alpha}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{\frac{\alpha}{\delta}(e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}) - \frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}T}}{\Gamma_4}\right]. \qquad (25)
\end{aligned}$$

In view of the parametric restrictions for the opportunist incumbent's pay-off (in eq. (16)), the first terms, namely, $\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})T}$ and $\frac{\Gamma_1}{\delta}e^{(\frac{\alpha-\delta\gamma}{\delta})T}$ in eqs. (23) and (25) respectively, are positive. Also, in view of $\alpha > \delta\gamma$ and $e^{(\frac{\alpha-\delta\gamma}{\delta})T} - 1 > 0$, the first terms in both, eqs. (23) and (25), will tend to dominate the respective second terms $-\Gamma_2$ and $\frac{\Gamma_2}{\delta}$. We now focus on the respective third terms in eqs. (23) and (25). From the regularity condition in eq. (16), the ratio in eq. (23), which is $\left[\frac{e^{-\frac{\rho}{\epsilon}T}-e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}}{\Gamma_4}\right] \equiv \left[\frac{e^{-\frac{\rho}{\epsilon}T}-e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right]$, is positive. (The line of argument here follows the ones in Propositions 2 and 3.) As the value of ϵ and δ are sufficiently small, $\frac{\epsilon-1}{\delta\epsilon}$ in the denominator in both eqs. (23) and (25) will be very large. Also, in the numerator in eq. (23), we have $\Gamma_3 = (\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_M)^{-\frac{1}{\epsilon}}$, where ϵ being very small, both $(\frac{\alpha}{\delta})^{1-\frac{1}{\epsilon}}$ and $(Z_M)^{-\frac{1}{\epsilon}}$ will be close enough to zero.[10] Hence, in view of the denominator being very large and the numerator very small, the entire third term in both eqs. (23) and (25) will be sufficiently close to zero. Consequently, the sum of the first two terms (which is positive) will tend to dominate the third term implying that $M(T) > 0$ and $\eta(T) > 0$. Furthermore, $\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})T} > \Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})t}$ will imply that $M(T) > M(t)$. A similar argument applies for $\eta(T)$, such that $\eta(T) > \eta(t)$. Thus, these rankings will be true $\forall t < T$.

The outcomes in Propositions 2, 3, 4 and 5 are also corroborated by numerical simulations (using MATLAB-12), whose results are presented in the following section. The numerical simulations also help characterize the comparative dynamics of the key variables with respect to all the important parameters, which otherwise get unwieldy when done analytically. Importantly, the numerical values assigned to the parameters satisfy the regularity conditions for the opportunistic case, as stated in eq. (16).

4.1.1 Numerical Simulations

The parametric configurations for the opportunistic incumbent are compiled in Table 3. To begin with, some parameters are assigned fixed values in case of all the simulations done here. That is, $M_0 = 30$, $D^* = 5$ and $K_M = 20$. These fixed values imply that whenever election happens, the incumbent gets at least $M_0 = 30\%$ vote share, the primary deficit in the year of election is as high as $D^* = 5\%$, and $K_M = 20$ implies a fixed part of the shadow value (See eq. (a5) in Appendix A). As explained earlier, $M_0 > 0$ and high enough is plausible from the fact that this is a case of the incumbent politician. Next, by changing the other parameters, namely, α, γ, δ, ϵ and ρ, one at a time, we trace the time path of voting support and deficit in Figures 6 (6a, 6b), 7 (7a, 7b) and 8. Notably, $t = 0$ and $T = 1$ represent respectively the year after the last election and the year of next election. It is straightforward to observe that,

Proposition 6(s): *Under different numerical parametric configurations, all of which satisfy the*

[10] While no explicit thresholds on parameter are required, suffice is to say that the regularity condition in eq. (16) is met.

regularity condition in eq. (16), there is a continuous increase in voting support and primary deficit over time span $t = 0$ to $T = 1$.

In Figure 6 (6a), even when the value of α is increased from $\alpha = 0.05$, to $\alpha = 0.08, 0.12, 0.15,$ and 0.20, where α represents the relationship between change in voting support and level of deficit, the positive and rise in $M(t)$ and $\eta(t)$ over time persists. However, for every additional unit of voting support the incumbent wants to garner, she/ he will have to run an incrementally higher level of primary deficit in the economy. In Figure 6 (6b) the value of γ is changed from $\gamma = 0.001$, to $\gamma = 0.004, 0.008, 0.01,$ and 0.03, while keeping all the other parameters as $\alpha = 0.05$, $\delta = 0.3$, $\epsilon = 0.05$ and $\rho = 0.02$. The behavior of voting support path and deficit in Figure 6b shows the same pattern as in Figure 6a. Similarly, Figure 7 (7a) depicts a continuous rise in the level of deficit and voting support when we keep as constant the following parameters $\alpha = 0.05$, $\gamma = 0.03$, $\epsilon = 0.05$ and $\rho = 0.02$ and vary δ from $\delta = 0.10$ to $\delta = 0.15, 0.25, 0.30,$ and 0.45. In this case, δ denotes the relative weight on the deviation of actual primary deficit from the benchmark level, $D(t) - D^*$, relative to the voting support, $M(t)$. As discussed earlier, ϵ and ρ respectively denote the incumbent's intertemporal elasticity of substitution and the rate of time preference. Figure 7 (7b) also displays a continuous rise in the level of deficit and voting support, with fixed parameters, $\alpha = 0.05$, $\gamma = 0.03$, $\delta = 0.3$ and $\rho = 0.02$, while the level of incumbent's intertemporal elasticity of substitution is varied as follows: $\epsilon = 0.001, 0.004, 0.008, 0.01,$ and 0.03. Finally, in Figure 8, the rate of time preference parameter ρ changes as follows: from $\rho = 0.02$ it rises to $\rho = 0.03, 0.05, 0.08,$ and 0.10, while we maintain the values of the other parameters as $\alpha = 0.05$, $\gamma = 0.03$, $\delta = 0.3$,$\epsilon = 0.05$. The simulations support our earlier theoretical result that lower is the weight on the $D(t) - D^*$, as compared to the voting support $M(t)$, higher is the required incremental change in the deficit path for every unit change in the voting support over time.

4.2 Opportunist Incumbent in the Presence of Anti-Incumbency

While the incumbent government continues to be an opportunist, the response of the voters is not supportive on account of the presence of anti-incumbency. In general, anti-incumbency could be ascribed to a high enough friction amongst the citizen-voters against the incumbent, either due to the presence of a competent challenger as an alternative, or due to a very high cost of rendering support to the incumbent (both of which are not modeled explicitly here). Instead, for our analysis, the presence of anti-incumbency is captured by a high enough value of the friction parameter, γ, relative to α.

This helps retain mathematical tractability, while capturing the notion of anti-incumbency. Eqs. (10) and (12) now yield that,

Proposition 7: *In the case of an opportunist incumbent and the presence of anti-incumbency, captured by $\alpha < \gamma$, such that $\alpha < \delta\gamma$, ϵ and δ continue to be both positive but very small (even close to zero, in view of opportunism), $0 < \rho < 1$, and $1 - \epsilon > \frac{\rho\delta}{\alpha - \delta\gamma}$, the optimal level of voting support from citizen-voters, $M(t)$, defined in eq. (10) is found to be positive. Moreover, with anti-incumbency the voting support, $M(t)$, will be falling over the election cycle, up to the election time period, T.*

This can be proved as follows. In view of $\alpha < \gamma$ such that $\alpha < \delta\gamma$, we have the first term, $\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})t}$, as positive but smaller in magnitude than in case of no anti-incumbency. Moreover, the second term, Γ_2, in the r.h.s. of eq. (10) is negative, implying that the difference of the first two terms is positive, especially in view of $M_0 > 0$ and large. Furthermore, on account of opportunism, the numerator and denominator of the ratio in the second term of eq. (10), that is, $\frac{e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}$, will have the same (positive) sign, implying that the ratio will be positive. However, in view of both ϵ and δ small enough, the difference of the two terms in the numerator will be small. Further, in the third term again, Γ_3 is small enough in magnitude and $e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}$ will be larger than in case of no anti-incumbency (from $\alpha < \delta\gamma$ and $t \leq T$) albeit declining overtime and converging to 1 as $t \to T$. As $\epsilon < 1$ and both ϵ and δ are very small, the entire third term will be very small in magnitude and will be dominated by the sign of the first two terms. Thus, optimal voting support, $M(t)$, will be positive.

As for the change in voting support over time, from eq. (18) it is easy to infer that the effect of the first term, $\left(\frac{\alpha-\delta\gamma}{\delta}\right) M(t) < 0$ (from $\alpha < \delta\gamma$) will be the dominant one, while the second term remains positive. The third term is small enough in magnitude, on account of ϵ and δ being small (due to opportunism), and is dominated by the sign of the first term. Thus, in the presence of anti-incumbency we get, $\frac{\partial M(t)}{\partial t} < 0$.

Proposition 8: *When the incumbent is an opportunist and there is presence of anti-incumbency, which is captured by $\alpha < \gamma$, such that $\alpha < \delta\gamma$, ϵ and δ continue to be both positive but very small (even close to zero), $0 < \rho < 1$, and $1 - \epsilon > \frac{\rho\delta}{\alpha-\delta\gamma}$, the government primary deficit in terms of $D(t) - D^*$, defined in eq. (12), is also found to be positive but continuously declining over time.*

That optimal $D(t) - D^* > 0$ follows from $M(t) > 0$ and δ being small enough, both of which imply that the first term in eq. (12) will dominate the remaining terms that are small enough in magnitude on account of both ϵ and δ being small enough (or even close to zero). Similar to the change in voting support over time, from eq. (19), the change in primary deficit will also be determined by the sign of the first term, which is a scale up of the first two terms of eq. (18), namely, $\frac{1}{\delta}\left[\left(\frac{\alpha-\delta\gamma}{\delta}\right)M(t)+\alpha D^*\right]<0$ (from $\alpha<\delta\gamma$) and δ small enough, even close to zero, on account of opportunist incumbent. In comparison, the third term is again small in magnitude, which follows from both ϵ and δ being small in value.

Thus, in the presence of anti-incumbency we get that $\frac{\partial\eta(t)}{\partial t}<0$. The results in Propositions 7 and 8 can also be substantiated through numerical simulations, whose outcomes are discussed in the following section. These also help do comparative dynamics with respect to the key parameters of the model.

4.2.1 Numerical Simulations

Again, numerical simulations were carried out to find support for the level and change in the voting support, $M(t)$, and primary deficit, $D(t)-D^*$, over time in the presence of anti-incumbency. The following numerical parametric configurations capture the underlying notion of an opportunistic incumbent in the presence of anti-incumbency. We retain the values of all the parameters at the same level as in section 4.1.1, with the exception of the parameter γ, which is now assigned a high enough value to capture the notion of a large enough friction amongst the citizen-voters that results in anti-incumbency (see Table 4). Specifically, the parameters now satisfy the restrictions stated in Propositions 7 and 8.

Table 4 reports the parameters for simulations, where the trends in voting support and primary deficit have been captured by assigning fixed values for some, whereas the other parameters are allowed to change. The fixed parameters are: $M_0=30$, $D^*=5$ and $K_M=20$, with the explanation, as given earlier. It is found that, for high enough initial level of voting support, M_0, the time path of voting support and primary will be positive. That M_0 is large is plausible as we are modeling the case of the incumbent politician. The results of all the five simulation runs, depicted in Figures 9 (9a and 9b) to 11, capture the comparative dynamics with respect to change in parameters α, γ, δ, ϵ and ρ. As explained in Propositions 7 and 8, both $M(t)$ and $\eta(t)$ are found to be continuously falling in the presence of the anti-incumbency. Comparing these with those in section 4.1.1, the only parametric configuration that is now changing is $\gamma>\alpha$. Here again, the time periods $t=0$ and $T=1$ respectively denote the year immediately after the last election and the year of next election. Further, it is easy to see that,

Proposition 9(s): *Under different numerical parametric configurations that satisfy the regularity condition in eq. (16), and considering the case of anti-incumbency, where $\alpha < \delta\gamma$, there is a continuous decline in voting support and primary deficit over time.*

In Figure 9 (9a), we depict the results of comparative dynamics with respect to a change in α, from $\alpha = 0.05$ to $\alpha = 0.08, 0.12, 0.15,$ and 0.20, while the values of the other parameters are assumed to be fixed at $\gamma = 0.70$, $\delta = 0.3$, $\epsilon = 0.05$ and $\rho = 0.02$. In Figure 9 (9b), the value of γ is changing according to $\gamma = 0.35, 0.40, 0.50, 0.60, 0.70,$ with fixed values of $\alpha = 0.05$, $\delta = 0.3$, $\epsilon = 0.05$ and $\rho = 0.02$. Figure 9 (9a and 9b) trace a continuous decline in voting support and deficit over time. Additionally, Figure 10 (10a and 10b) capture the time path of voting support and deficit path with the respective changes in the parameters δ, from $\delta = 0.10, 0.15, 0.25, 0.30$ and 0.45, and ϵ according to $\epsilon = 0.01, 0.03, 0.05, 0.08$ and 0.12. With respect to the changes in δ and ϵ, the corresponding fixed values of other parameters are $\alpha = 0.05, \gamma = 0.70, \epsilon = 0.05$ and $\rho = 0.02$ in case of the former, and $\alpha = 0.05, \gamma = 0.70, \delta = 0.70$ and $\rho = 0.02$ in the latter case. Figure 11 captures the time path of voting support and deficit when the time preference parameter, ρ, is changing from $\rho = 0.02, 0.03, 0.05, 0.08$ and 0.10, while keeping the remaining parameters fixed as follows: $\alpha = 0.05, \gamma = 0.70, \delta = 0.3$ and $\epsilon = 0.05$. Notably, Figure 10a also depicts a falling trend in $M(t)$ and $\eta(t)$ over the election cycle, right up to the election period, T. Further, although Figures 10b and 11 show a similar pattern of fall in voting support and deficit path as in the last three cases (namely, 9a, 9b and 10a), the time paths of $M(t)$ and $\eta(t)$ are not varying with respect to the corresponding variation in the parametric configurations for both the Figures 10b and 11. This implies that, the time path of $M(t)$ and $\eta(t)$ are not very sensitive to changes in the parametric configurations. Moreover, in all five cases, in the presence of anti-incumbency, the fall in deficit is faster than the fall in the voting support, as $t \to T$.

In the case of opportunism with no anti-incumbency, with $\alpha > \gamma$ such that $\alpha > \delta\gamma$, we found that the time path of $\eta(t)$ always lay above the corresponding path of $M(t)$. Interestingly, this holds true even in the presence of anti-incumbency, where γ is high enough and $\alpha < \gamma$ such that $\alpha < \delta\gamma$. However, with anti-incumbency, the paths of both the deficit and the voting support are falling continuously, with the fall in the former sharper than the latter.

We next analyze the case of a partisan incumbent, who displays clear ideological preferences for specific economic policies, which is characterized using explicit preference parameters and configuration in eq. (17).

5 Partisan Government

Hibbs (1977) introduced the partisan behavior of the incumbent and Alesina (1987, 1988) incorporated rational expectations in the monetary approach of the political business cycle. Contrary to opportunistic behavior, partisan incumbents have clear economic policy preferences or ideologies, such as left-wing parties may prefer higher employment and output growth even at the cost of tolerating higher inflation, while the right-wing parties might target lower inflation. We now model the possibility of partisan behavior of the incumbent, assuming perfect information. By this, we imply that voters know the ideological bent of the incumbent and the actions that she/ he would take. In this case, to contain the extent of opportunistic behavior, the relative weight δ assigned to the deficit, $D(t) - D^*$, is assumed to be close enough to 1 (in the special case that we consider, $\delta = 1$), as the partisan incumbent assigns almost equal weight to both voting support, $M(t)$, and primary deficit, $D(t) - D^*$ in each time t during the election cycle. In addition, the partisan behavior may also be captured by a lower intertemporal elasticity of substitution (as the behavior of a partisan incumbent is more predictable and, thus, less variable (or less opportunistic) over time) implied by a higher value of ϵ (which may even be close to 1). To begin with, we discuss some analytical results for the partisan case.

5.1 Partisan Incumbent in the Absence of Anti-incumbency

The analysis in this part is analogous to the case of the opportunist incumbent in the absence of an anti-incumbency. Here, the only parameters whose values are changed are δ and ϵ. We consider higher values of δ and ϵ, even close to 1. However, we retain the assumption of $1 - \epsilon > 0$ for aggregate utility to be positive.

Proposition 10: *When $\alpha > \gamma$ such that $\alpha > \delta\gamma$, $0 < \rho < 1$, $\delta = 1$ and ϵ close to 1, the voting support, $M(t)$, and the level of primary deficit of the incumbent, $D(t) - D^*$, are both positive and continuously increasing over time.*

From an observation of the solutions in eqs. (10) and (12), and given the parametric restrictions for partisan behavior (in eq. (17)), the time paths of both $M(t)$ and $\eta(t)$ during the election cycle are positive and increasing up to the election period. For $M(t)$, this can be explained as follows. In view of $M_0 > 0$ and large, and $\alpha > \gamma$, it is implied that $\left(e^{(\frac{\alpha-\delta\gamma}{\delta})t} - 1\right) > 0$. Thus, the first term in eq. (10), that is, $\Gamma_1 e^{(\frac{\alpha-\delta\gamma}{\delta})t}$, will dominate the second term, Γ_2. In the partisan case, the numerator and denominator of the ratio in square brackets in the third term of eq. (10), that is, $\left[\frac{e^{-\frac{\rho}{\epsilon}t}-e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right]$, will have the same sign (each will be negative in this case) and the ratio will always be positive. However, despite $\delta = 1$ and ϵ sufficiently large (even close to 1), the values of $e^{-\frac{\rho}{\epsilon}t}$ and $e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}$ will tend to be very small, as the power of the exponential function is always negative, and the difference between the two exponential functions will also be small. Further, the value of $\frac{\epsilon-1}{\delta\epsilon}$ will be smaller than in the case of opportunism. However, using the same reasoning as in case of opportunism, Γ_3 and $e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}$ will be very small, and although the latter term will be rising over time, it will only approach the value of 1 from below as $t \to T$. Thus, the entire third term will be dominated by the sum of the first two terms, and $M(t)$ will be positive in each time period of the election cycle. Moreover, following the reasoning for the opportunistic case and absent anti-incumbency, $M(t)$ will be rising over time, right up to the election period, T.

We next turn our attention to primary deficit in eq. (12). We focus on the third term. From our earlier discussion, in the case of a partisan incumbent, we have $\left[e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}\right] < 0$ that implies $\Gamma_4 < 0$. Further, with $\epsilon < 1$ (and close enough to 1), and $\delta = 1$, $\left[\frac{\alpha}{\delta}\left(e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}\right) - \frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}t}\right] < 0$, and hence the ratio $\left[\frac{\frac{\alpha}{\delta}\left(e^{-\frac{\rho}{\epsilon}t}-e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}\right)-\frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}t}}{\Gamma_4}\right] > 0$. Also, since the values of both δ and ϵ are higher in the case of the partisan incumbent than in the opportunist case, the denominator of the third term, $\frac{\epsilon-1}{\delta\epsilon}$, in eq. (12) will be small and negative. However, $e^{(\frac{\alpha-\delta\gamma}{\delta\epsilon})(t-T)}$ will be small, albeit increasing, only to approach the value 1 from below as $t \to T$. Consequently, the third term of eq. (12) is small and will be dominated by the first term. In fact, the first term will dominate both the second and the third terms. Thus, $\eta(t)$ will be positive. Moreover, similar to the opportunistic case, this will also be rising over time. Again, the above restrictions are consistent with the regularity condition in (17).

The results of numerical simulations in Figure 5(a) and 5(b) support this claim. As earlier, these also help carry out comparative dynamics with respect to the important parameters. One can observe a continuous increase in voting support associated with an increase in primary deficit over time as stated in Proposition 11(s),

Proposition 11(s): *For a wide range of parametric configurations, all of which satisfy the restrictions stated in Proposition 10 and in eq. (17), voting support, $M(t)$, and primary deficit, $D(t) - D^*$, of the incumbent will be continuously increasing over time.*

Table 5 contains the parameter values that have been used to simulate the time path of voting support and deficit paths where, fixed values have been assigned to some parameters whereas, other are changed to capture comparative dynamics. The fixed parameters are the same as in the opportunistic case, namely, $M_0 = 30$, $D^* = 5$ and $K_M = 20$. It is found that, for a high enough initial level of voting support, M_0, the time path of voting support and primary deficit will be positive and increasing over time. Table 5 summarizes these.

The five simulations that capture the change in the paths of these variables are with respect to changes in the following parameters: α, γ, δ, ϵ, and ρ, respectively. Figure 12 (12a) captures this when α changes from $\alpha = 0.05$ to $\alpha = 0.08, 0.12, 0.15,$ and 0.20, while the values of the other parameters are assumed to be fixed at $\gamma = 0.03$, $\delta = 1$, $\epsilon = 0.90$ and $\rho = 0.02$. In Figure 12 (12b), the value of γ is changing according to $\gamma = 0.001, 0.004, 0.008, 0.01, 0.03,$ with fixed values of $\alpha = 0.05$, $\delta = 1$, $\epsilon = 0.90$ and $\rho = 0.02$. Similarly, Figures 13 (13a and 13b) capture the time path of voting support and primary deficit path with the respective changes in the parameters δ from $\delta = 0.80, 0.85, 0.90, 0.95$ and $\delta = 1$ and ϵ as $\epsilon = 0.85, 0.88, 0.92, 0.96$ and $\epsilon = 0.99$. Corresponding to the change in δ and ϵ, the fixed parametric values are $\alpha = 0.05, \gamma = 0.03, \epsilon = 0.90$ and $\rho = 0.02$ in the former case and $\alpha = 0.05, \gamma = 0.03, \delta = 1$ and $\rho = 0.02$ in the latter case. Figure 14 captures the time path of voting support and primary deficit when the time preference parameter ρ is changing from $\rho = 0.02, 0.03, 0.05, 0.08$ and $\rho = 0.10$, while keeping the remaining parameters fixed as $\alpha = 0.05, \gamma = 0.03, \delta = 1$ and $\epsilon = 0.90$.

In case of all the five simulations, the positive and rising trend in $M(t)$ and $\eta(t)$ holds. However, unlike the opportunistic case, now the path of primary deficit, $\eta(t)$, lies below the path of voting support, $M(t)$. This follows from the assumed value of δ being different in this case, which is explained below.

Proposition 12: *In case the incumbent is partisan, to garner an additional unit of voting support, $M(t)$, the change in the deviation of primary deficit from the benchmark will be equal to δ.*

From eq. (a13) in the Appendix A, we have the equation

$$D(t) - D^* = \frac{1}{\delta} M(t) - \delta^{\frac{1-\epsilon}{\epsilon}} (\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon} t + \frac{(\alpha - \delta\gamma)}{\delta\epsilon}(t-T)}. \tag{26}$$

The above equation can be re-expressed as,

$$M(t) = \delta[D(t) - D^*] + \delta^{\frac{1}{\epsilon}} (\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon} t + \frac{(\alpha - \delta\gamma)}{\delta\epsilon}(t-T)}. \tag{27}$$

We find that the marginal change,

$$\frac{\partial M(t)}{\partial[D(t) - D^*]} \quad = \quad \delta. \tag{28}$$

Since, in the opportunistic case, the value of δ is small (even close to zero), it implies that the additional voting support garnered due to an incremental increase in the deviation of budgetary spending from the benchmark, D^*, is very small (or even close to zero). Contrary to this, δ is large (even close to 1) in the case of a partisan incumbent, and hence, the incumbent is able to derive a much larger voting support (even 1:1) with an additional unit increase in current deficit above the benchmark level, D^*. Thus, notably, the incumbent will have to manipulate the primary deficit much more to get a unit of additional voting support in the opportunistic case than in case of a partisan behavior. Hence, the opportunist incumbent may end up running a larger deficit close enough to the election period, T, as compared to the partisan incumbent.

Finally, given our modeling structure, and the definition of anti-incumbency, the case of anti-incumbency is not found consistent with the regularity condition for a partisan incumbent. Recall that, the regularity condition for the partisan incumbent is $1 - \epsilon < \frac{\rho\delta}{\alpha - \delta\gamma}$ (see eq. (17)). To characterize a partisan incumbent with anti-incumbency, we need to have $\alpha < \gamma$ such that $\alpha < \delta\gamma$, $\epsilon < 1$ (close to 1). This violates the regularity condition, $1 - \epsilon < \frac{\rho\delta}{\alpha - \delta\gamma}$, since $(1 - \epsilon) > 0$ and $\frac{\rho\delta}{\alpha - \delta\gamma} < 0$.

6 Conclusion

Using the method of optimal control, under the assumption of an iso-elastic kind of the net utility function from voting support vis-à-vis primary deficit, the opportunist and partisan cycles follow a similar time path, although the former is found to be more pronounced than the latter. Moreover, the citizen-voters provide support to both the kinds of incumbent politicians, but reject the same when there is the presence of a very strong anti-incumbency in the opportunistic case. Given a large enough initial level of voting support (that is plausible for the incumbent politician in office), the time paths of both voting support and primary deficit are found to be positive and rising in the case of absence of anti-incumbency. Moreover, to garner additional voting support, the opportunist incumbent has to incur an incrementally higher level of primary deficit as compared to the partisan incumbent. Thus, an opportunist incumbent mobilizes votes at a much higher cost in terms of primary deficit to the economy than a partisan incumbent. While voting support is positive and increasing even in the partisan case, this case entails a lower cost in terms of primary deficit. Further, the time path of both voting support and primary deficit will be falling when anti-incumbency exists. All of these findings are also corroborated by numerical simulations.

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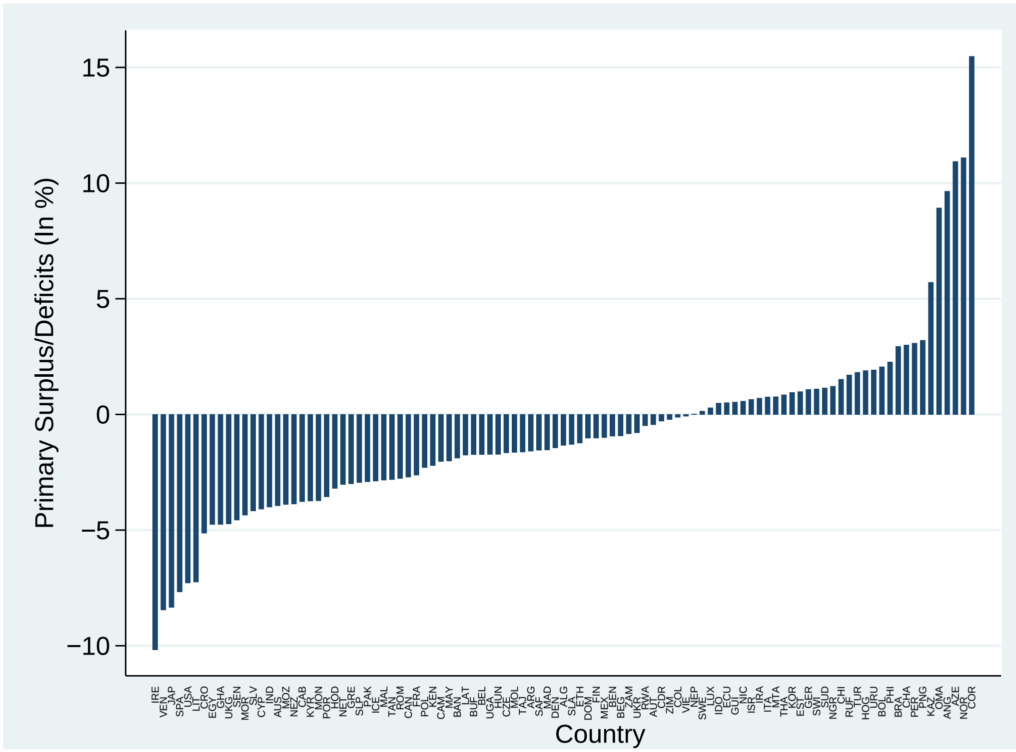
Appendix A

Table 2: **Nature of countries, abbreviation and year of the national level election.**

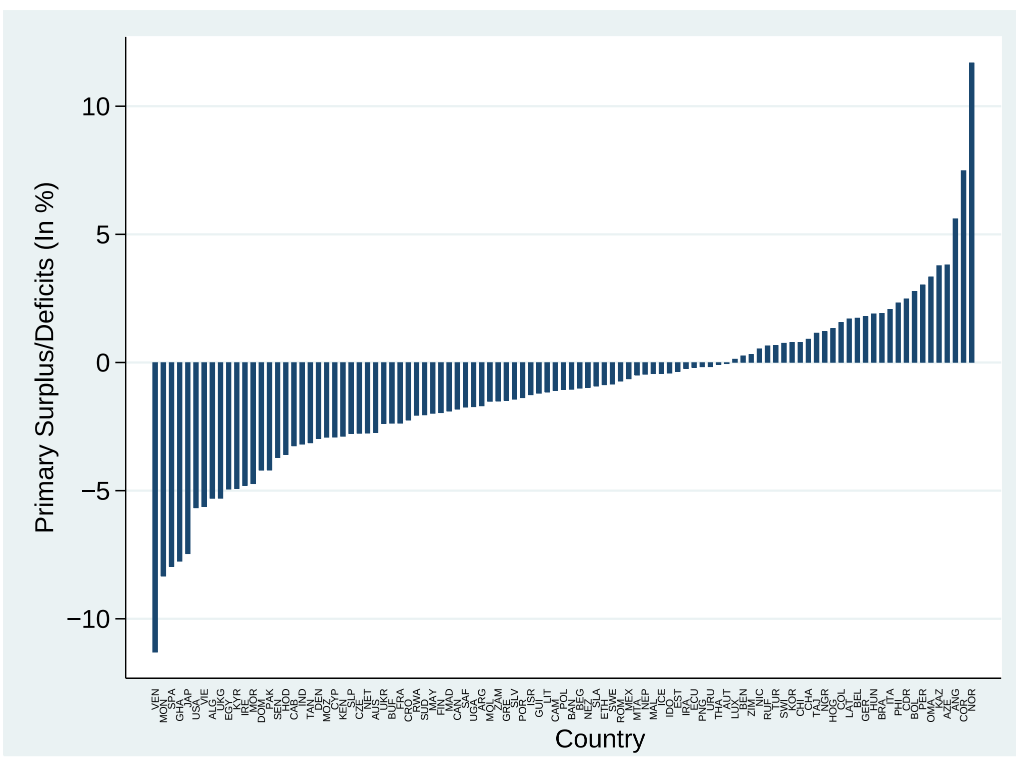
Low Income Economies	Abbr.	Year of Election	Emerging Market and Middle Income Countries	Abbr.	Year of Election	Advanced Economies	Abbr.	Year of Election
Bangladesh	BAN	2014	Algeria	ALG	2017	Australia	AUS	2016
Benin	Ben	2015	Angola	ANG	2017	Austria	AUT	2013
Bolivia	BOL	2014	Argentina	ARG	2015	Belgium	BEL	2014
Burkina Faso	BUF	2015	Azerbaijan	AZE	2018	Canada	CAN	2015
Cambodia	CAB	2013	Belarus	BEL	2015	Cyprus	CYP	2018
Cameroon	CAM	2018	Brazil	BRA	2014	Czech Republic	CZR	2017
Chad	CHA	2016	Chile	CHI	2017	Denmark	DEN	2015
Congo Dem.Rep.	CDR	2011	Colombia	COL	2018	Estonia	EST	2015
Congo Rep.	COR	2017	Croatia	CRO	2016	Finland	FIN	2015
Ethiopia	ETH	2015	Dominican Republic	DOM	2016	France	FRA	2015
Ghana	GHA	2016	Ecuador	ECU	2017	Germany	GER	2017
Guinea	GUI	2015	Egypt	EGY	2015	Greece	GRE	2015
Honduras	HON	2017	Hungary	HUN	2018	HongKong SAR	HOK	2016
Kenya	KEN	2017	India	IND	2014	Iceland	ICE	2016
Kyrgyz Republic	Kyr	2015	Indonesia	IDO	2014	Ireland	IRE	2016
Madagascar	MAD	2013	IRAN	IRA	2017	Israel	ISR	2015
Mali	MLI	2013	Kazakhstan	KAZ	2016	Italy	ITA	2018
Moldova	MOL	2014	Malaysia	MAY	2018	Japan	JAP	2017
Mongolia	MON	2017	Mexico	MEX	2012	SKorea	KOR	2016
Mozambique	MOZ	2013	MOROCCO	MOR	2016	Latvia	LAT	2014
Nepal	NEP	2013	OMAN	OMA	2015	Lithuania	LIT	2016
Nicaragua	NIC	2014	Pakistan	PAK	2013	Luxembourg	LUX	2013
Nigeria	NGR	2015	PERU	PER	2016	MALTA	MAL	2017
Papua NewGuinea	PNG	2017	Philippines	PHI	2016	Netherlands	NET	2017
Rwanda	RWA	2013	Poland	POL	2015	New Zealand	NZL	2017
Senegal	SEN	2012	Romania	ROM	2016	Norway	NOR	2017
Sudan	SUD	2015	Russia	RUF	2018	Portugal	POR	2015
Tajikistan	TAJ	2015	South Africa	SAF	2014	Slovak Republic	SLR	2016
Tanzania	TAN	2015	SriLanka	SLA	2015	Slovenia	SLO	2014
Uganda	UGA	2016	Thailand	THA	2014	Spain	SPA	2016
Vietnam	VIE	2016	Turkey	TUR	2014	Sweden	SWE	2014
Zambia	ZAM	2016	Ukraine	UKR	2014	Switzerland	SWI	2015
Zimbabwe	ZIM	2013	Uruguay	URU	2014	U. K.	UKG	2017
-	-	-	Venezuela	VEN	2018	United States	USA	2016

Figure 1: Primary Surplus (+)/ Deficit (-) in the World Economy

(a) 2011



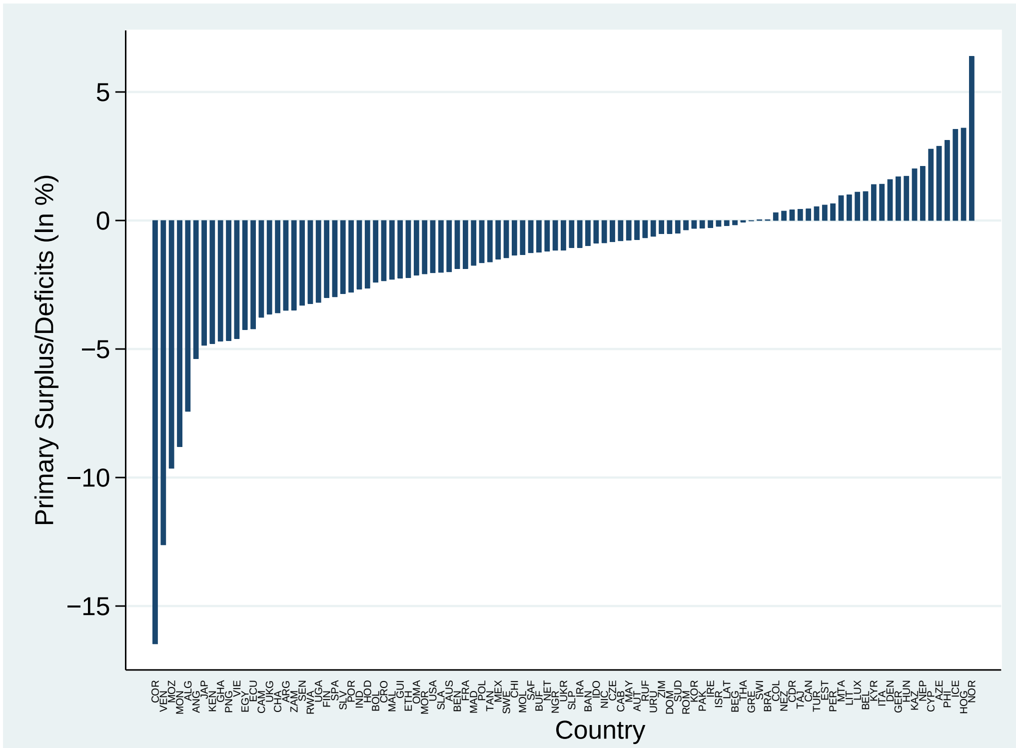
(b) 2012



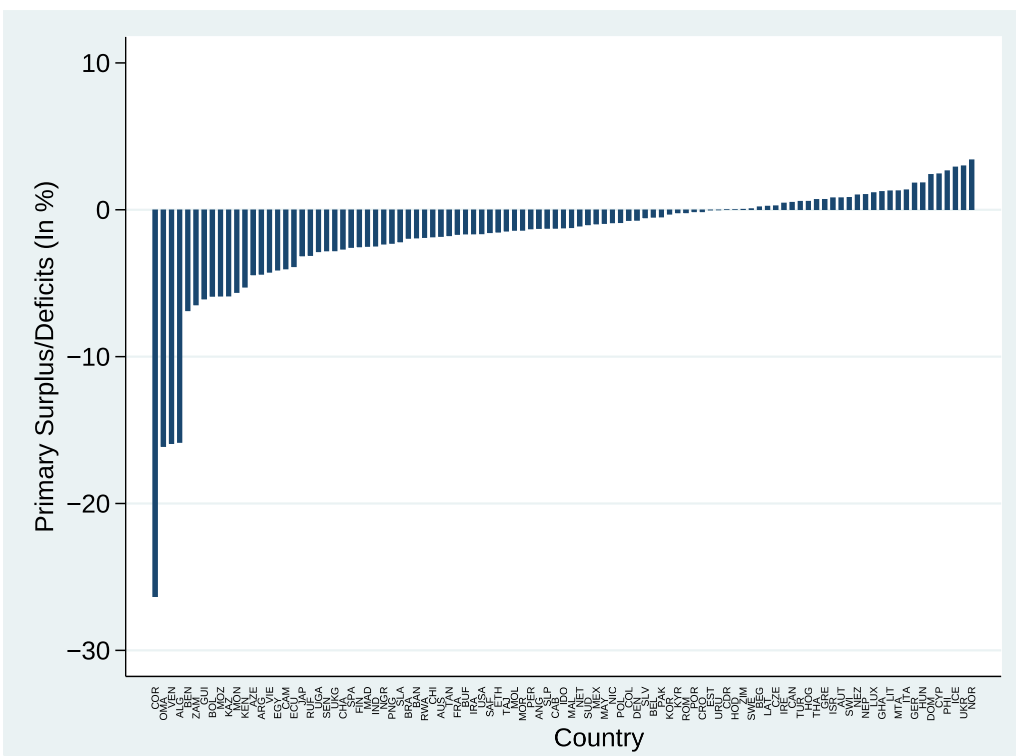
Source: IMF Fiscal Monitor-2017 (25.06.2018/2018) and Election Guide (27.06.2018/2018).

Figure 2: Primary Surplus (+)/ Deficit (-) in the World Economy

(a) 2014



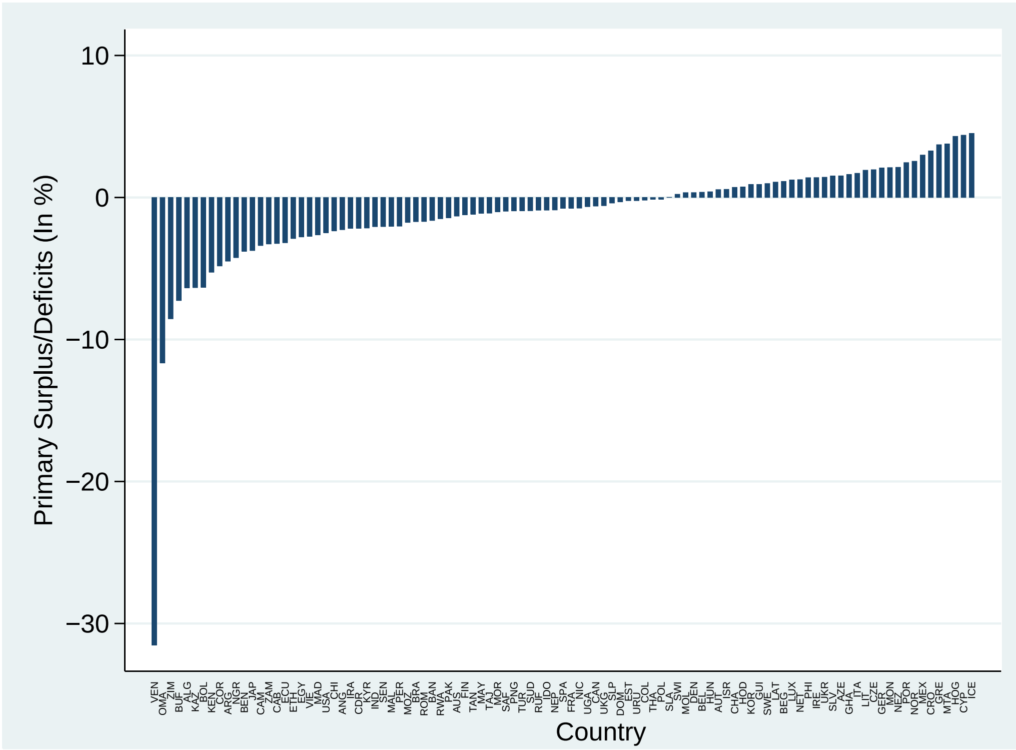
(b) 2015



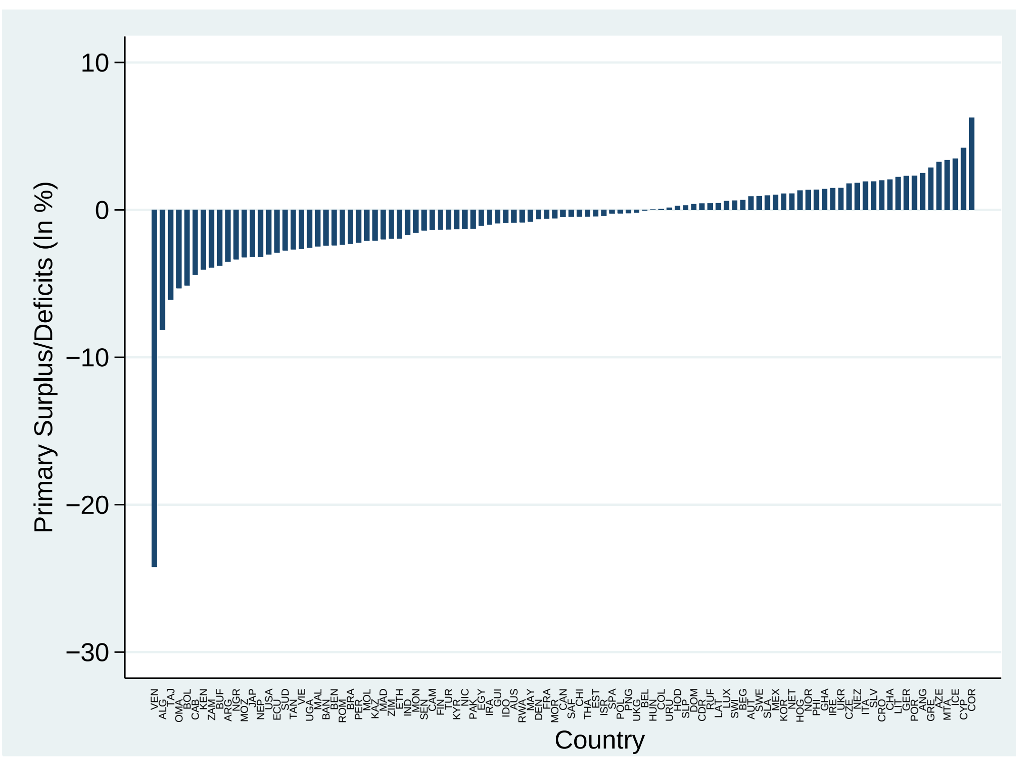
Source: IMF Fiscal Monitor-2017 (25.06.2018/2018) and Election Guide (27.06.2018/2018).

Figure 3: Primary Surplus (+)/ Deficit (-) in the World Economy

(a) 2017



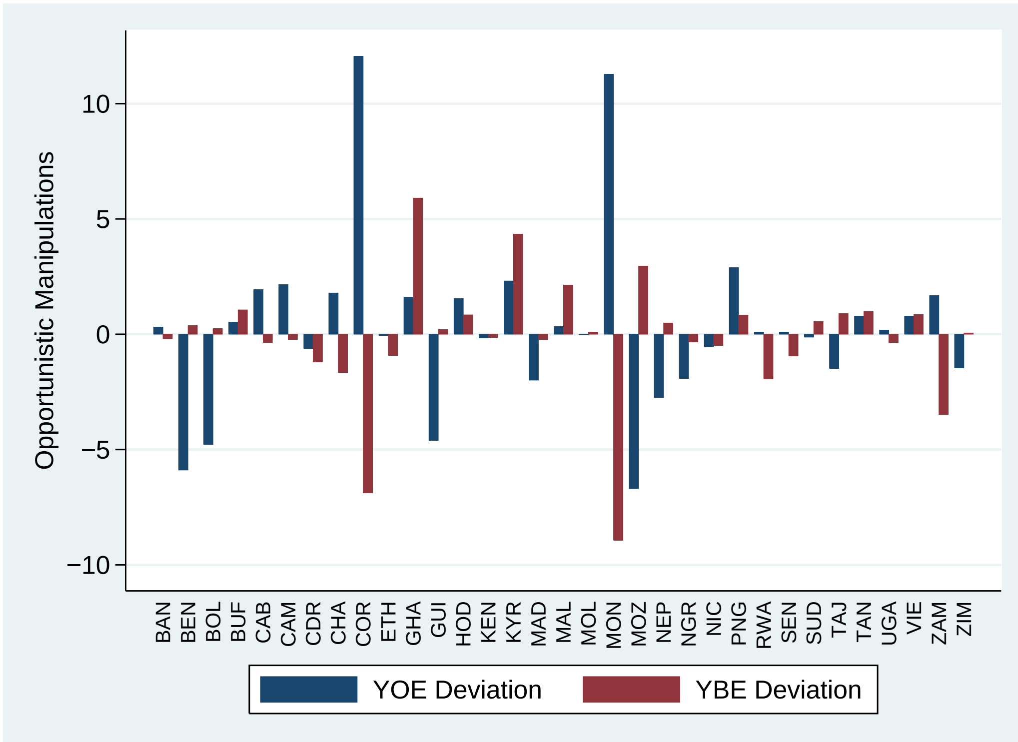
(b) 2018



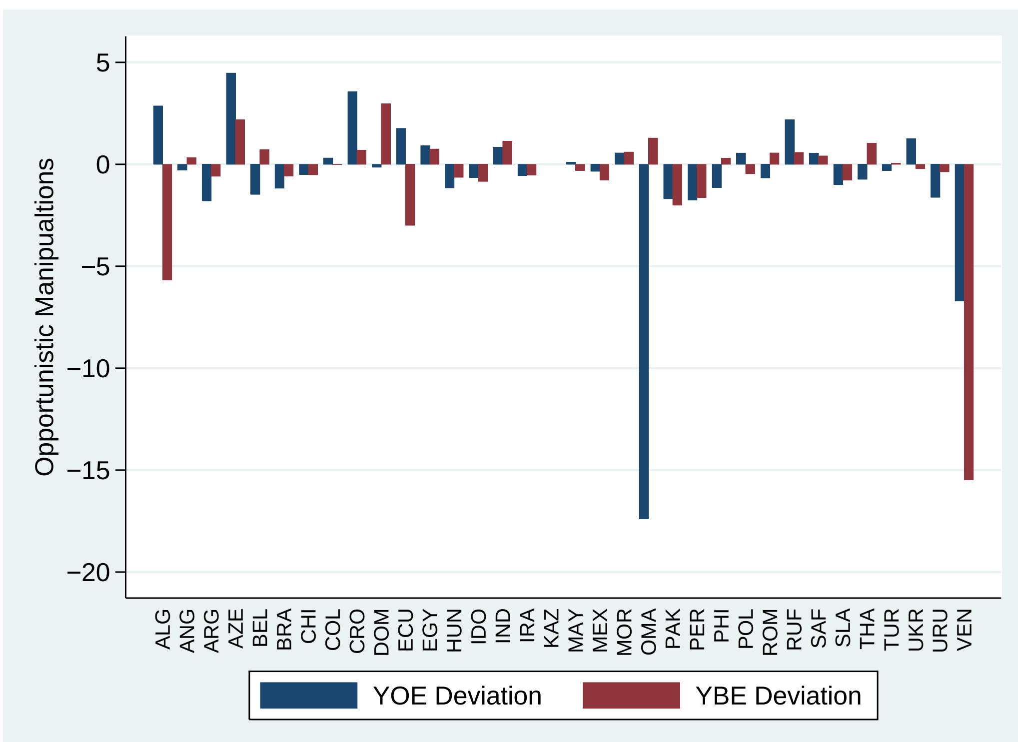
Source: IMF Fiscal Monitor-2017 (25.06.2018/2018).

Figure 4: Budget Cycles with Respect to the Recent Elections

(a) Budget Cycles in Low Income Countries



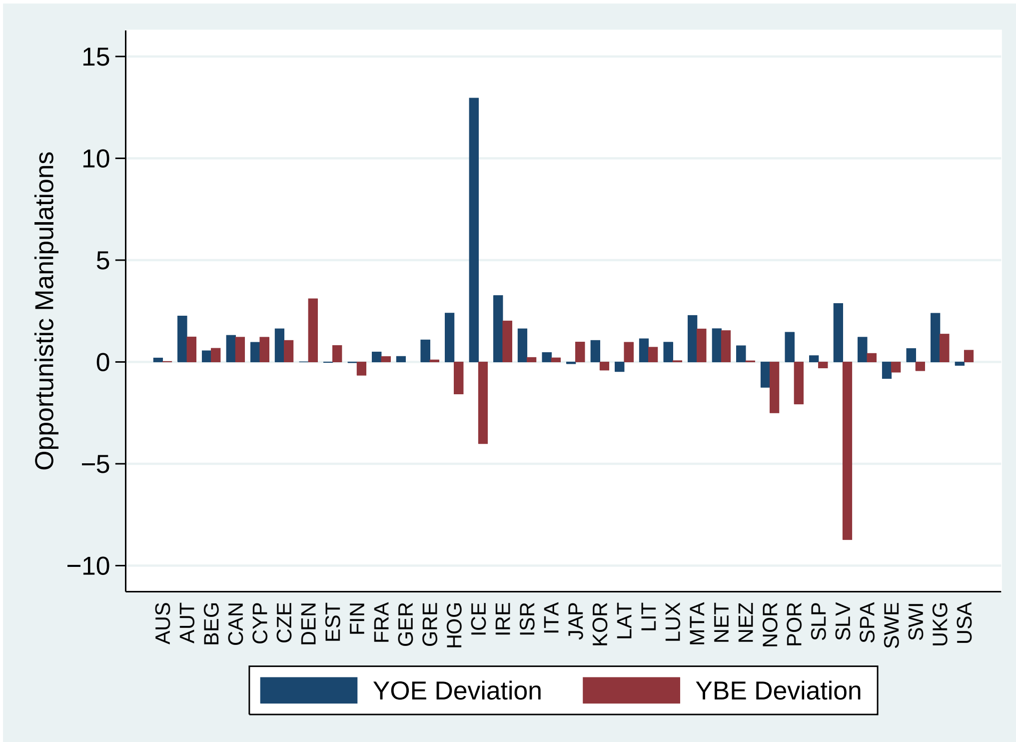
(b) Budget Cycles in Emerging Market and Middle Income Countries



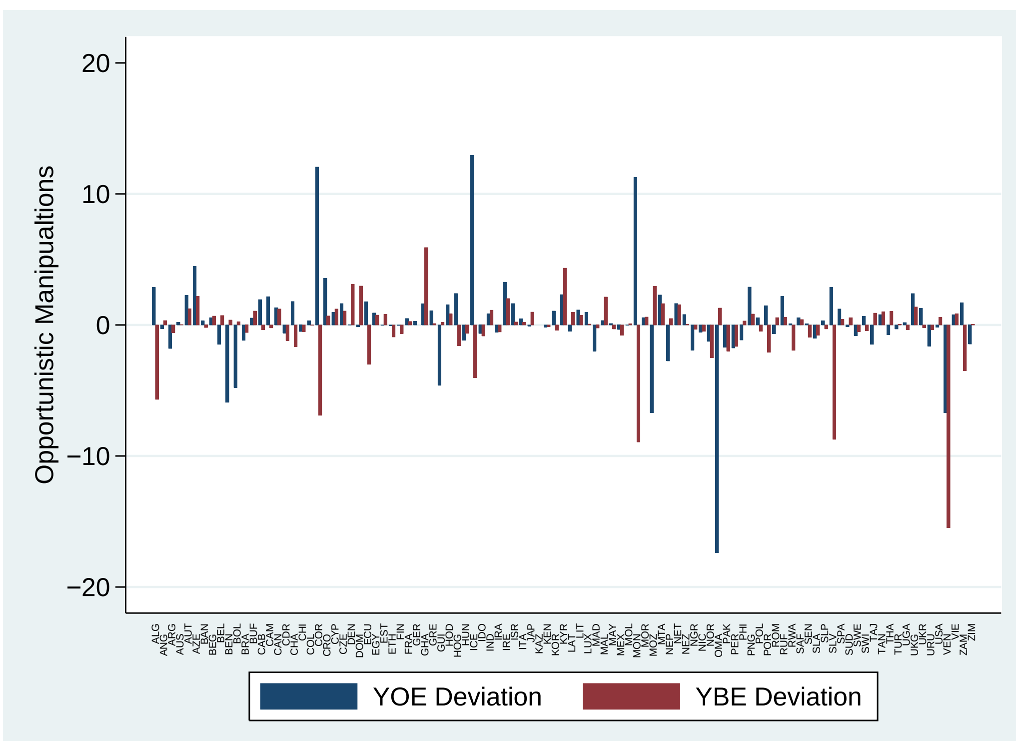
Source: Authors' calculation. YOE and YBE deviation are respectively year of election and year before the election deviations.

Figure 5: Budget Cycles with Respect to the Recent Elections

(a) Budget Cycles in Advanced Economies



(b) Budget Cycles in the World economy



Source: Authors' calculation. YOE and YBE deviation are respectively year of election and year before the election deviations.

Proof of Proposition 1: The Hamiltonian function is,

$$H = [\frac{[M(t) - \delta(D(t) - D^*)]^{1-\epsilon}}{(1-\epsilon)}]e^{-\rho t} + \lambda_M(t)[\alpha D(t) - \gamma M(t)] \quad \text{(a1)}$$

$$\begin{aligned} \frac{\partial H}{\partial D(t)} &= [M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t}(-\delta) + \alpha\lambda_M(t) = 0 \\ &\Leftrightarrow \delta[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t} = \alpha\lambda_M(t) \end{aligned} \quad \text{(a2)}$$

$$\begin{aligned} \dot{\lambda}_M(t) &= -\frac{\partial H}{\partial M(t)} \Leftrightarrow \dot{\lambda}_M(t) = -[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t} + \gamma\lambda_M(t) \\ &\Leftrightarrow \dot{\lambda}_M(t) - \gamma\lambda_M(t) = -[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t} \end{aligned} \quad \text{(a3)}$$

and

$$\dot{M}(t) = \alpha D(t) - \gamma M(t) \quad \text{(a4)}$$

Substituting eq.(a2) in eq. (a3)

$$\dot{\lambda}_M(t) + (\frac{\alpha}{\delta} - \gamma)\lambda_M(t) = 0 \Leftrightarrow \lambda_M(t) = K_M e^{-(\frac{\alpha}{\delta} - \gamma)t} \quad \text{(a5)}$$

at t=T and assuming $\lambda_M(T) = Z_m > 0$

$$\begin{aligned} \lambda_M(T) = K_M e^{-(\frac{\alpha}{\delta} - \gamma)T} \qquad &\Leftrightarrow K_M = Z_m e^{-(\frac{\alpha}{\delta} - \gamma)(t-T)} \\ &\Leftrightarrow \lambda_M(t) = Z_m e^{-(\frac{\alpha}{\delta} - \gamma)(t-T)} \end{aligned} \quad \text{(a6)}$$

The transversality condition is; $\lambda_M(T) \geq 0 \Rightarrow [M(T) - M_{min}]\lambda_M(T) = 0$. Since $\lambda_M(T) = Z_m > 0 \Rightarrow M(T) = M_{min}$. Substituting eq(A6) in eq(A2)gives,

$$[M(t) - \delta(D(t) - D^*)]^{-\epsilon} e^{-\rho t} = \frac{\alpha}{\delta}[Z_m e^{-(\frac{\alpha}{\delta} - \gamma)(t-T)}]$$

$$\Rightarrow \delta[D(t) - D^*] = M(t) - (\frac{\alpha Z_m}{\delta})^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}t + \frac{(\alpha - \delta\gamma)}{\delta\epsilon}(t-T)} \quad \text{(a7)}$$

$$\Rightarrow D(t) = \frac{1}{\delta}M(t) + D^* - \delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}t + \frac{(\alpha - \delta\gamma)}{\delta\epsilon}(t-T)} \quad \text{(a8)}$$

$$\Rightarrow M(t) = \delta[D(t) - D^*] + (\frac{\alpha Z_m}{\delta})^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}t + \frac{(\alpha - \delta\gamma)}{\delta\epsilon}(t-T)} \quad \text{(a9)}$$

Substituting eq.(a8) in eq. (a4)

$$\dot{M}(t) - (\frac{\alpha - \delta\gamma}{\delta})M(t) = -(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{\rho}{\epsilon}t+\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)} + \alpha D^* \tag{a10}$$

Solving the differential equation (a10) gives,

$$M(t) = \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{\rho}{\epsilon}t+\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)}}{\frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} + C_M e^{(\frac{\alpha-\delta\gamma}{\delta})t} \tag{a11}$$

We find solution for $M(t)$ and the values of constant of integration (C_M) at $t = 0$ gives,

$$\begin{aligned} M(t) &= [M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}]e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} \\ &\quad + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{(\alpha-\delta\gamma)}{\delta\epsilon}T}}{\frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]}[e^{\frac{(\alpha-\delta\gamma-\delta\rho)}{\delta\epsilon}t} - e^{(\frac{\alpha-\delta\gamma}{\delta})t}] \\ &= [M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}]e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} \\ &\quad + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{e^{-\frac{\rho}{\epsilon}t} - e^{(\frac{\epsilon-1}{\delta\epsilon})(\alpha-\delta\gamma)t}}{(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}}\right] \\ &\quad Where, [C_M = M_0 - \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{(\alpha-\delta\gamma)}{\delta\epsilon}T}}{\frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\rho}{\epsilon-1}]} + \frac{\alpha\delta D^*}{(\alpha-\delta\gamma)}] \end{aligned} \tag{a12}$$

substituting eq.(a12) in eq.(a7)

$$D(t) - D^* = \frac{1}{\delta}M(t) - \delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{\rho}{\epsilon}t+\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)} \tag{a13}$$

$$\begin{aligned} &= [M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}]e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}}(Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{(\alpha-\delta\gamma)}{\delta\epsilon}T}}{\frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]}[e^{\frac{(\alpha-\delta\gamma-\delta\rho)}{\delta\epsilon}t} - e^{(\frac{\alpha-\delta\gamma}{\delta})t}] \\ &-\delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}}e^{-\frac{\rho}{\epsilon}t+\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)} \end{aligned} \tag{a14}$$

$$\begin{aligned} &= [\frac{M_0}{\delta} + \frac{\alpha D^*}{\alpha-\delta\gamma}]e^{(\frac{\alpha-\delta\gamma}{\delta})t} - \frac{\alpha D^*}{\alpha-\delta\gamma} \\ &+ \frac{\alpha Z_m{}^{-\frac{1}{\epsilon}}\delta^{\frac{1-\epsilon}{\epsilon}}e^{\frac{(\alpha-\delta\gamma)}{\delta\epsilon}(t-T)}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{\frac{\alpha}{\delta}[e^{-\frac{\rho}{\epsilon}t} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)t}] - \frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]e^{-\frac{\rho}{\epsilon}}}{[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]}\right] \end{aligned} \tag{a15}$$

Proof of Proposition 4:

(i)The path of voting support and deficit at $t = 0$ is as follows,

$$M(t) = M_0 \tag{a16}$$

$$D(t) - D^* = M_0 - \delta^{\frac{1-\epsilon}{\epsilon}} (\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{(\alpha-\delta\gamma)}{\delta\epsilon}T} \tag{a17}$$

(ii)The path of voting support and deficit at $t = T$ is as follows,

$$\begin{aligned} M(T) &= [M_0 + \frac{\alpha\delta D^*}{\alpha-\delta\gamma}] e^{\frac{(\alpha-\delta\gamma)}{\delta}T} - \frac{\alpha\delta D^*}{\alpha-\delta\gamma} + \frac{(\frac{\alpha}{\delta})^{\frac{\epsilon-1}{\epsilon}} Z_m^{-\frac{1}{\epsilon}}}{\frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]}[e^{-\frac{\rho}{\epsilon}T} - e^{\frac{(\epsilon-1)}{\epsilon}\frac{(\alpha-\delta\gamma)}{\delta}T}] \\ &= \Gamma_1 e^{\frac{(\alpha-\delta\gamma)}{\delta}T} - \Gamma_2 + \frac{\Gamma_3}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{e^{-\frac{\rho}{\epsilon}T} - e^{\frac{(\epsilon-1)}{\epsilon}\frac{(\alpha-\delta\gamma)}{\delta}T}}{\Gamma_4}\right] \end{aligned} \tag{a18}$$

$$\begin{aligned} \eta(T) &= M(T) - \delta^{\frac{1-\epsilon}{\epsilon}}(\alpha Z_m)^{-\frac{1}{\epsilon}} e^{-\frac{\rho}{\epsilon}T} \\ &= [\frac{M_0}{\delta} + \frac{\alpha D^*}{\alpha-\delta\gamma}] e^{(\frac{\alpha-\delta\gamma}{\delta})T} - \frac{\alpha D^*}{\alpha-\delta\gamma} \\ &\quad + \frac{(\alpha Z_m)^{-\frac{1}{\epsilon}}\delta^{\frac{1-\epsilon}{\epsilon}}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{\frac{\alpha}{\delta}(e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T}) - \frac{\epsilon-1}{\delta\epsilon}[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]e^{-\frac{\rho}{\epsilon}T}}{[(\alpha-\delta\gamma)+\frac{\delta\rho}{\epsilon-1}]}\right] \\ &= \frac{\Gamma_1}{\delta} e^{(\frac{\alpha-\delta\gamma}{\delta})T} - \frac{\Gamma_2}{\delta} + \frac{\frac{\Gamma_3}{\alpha}}{\frac{\epsilon-1}{\delta\epsilon}}\left[\frac{[\frac{\alpha}{\delta}(e^{-\frac{\rho}{\epsilon}T} - e^{\frac{\epsilon-1}{\delta\epsilon}(\alpha-\delta\gamma)T})] - \frac{\epsilon-1}{\delta\epsilon}\Gamma_4 e^{-\frac{\rho}{\epsilon}T}}{\Gamma_4}\right] \end{aligned} \tag{a19}$$

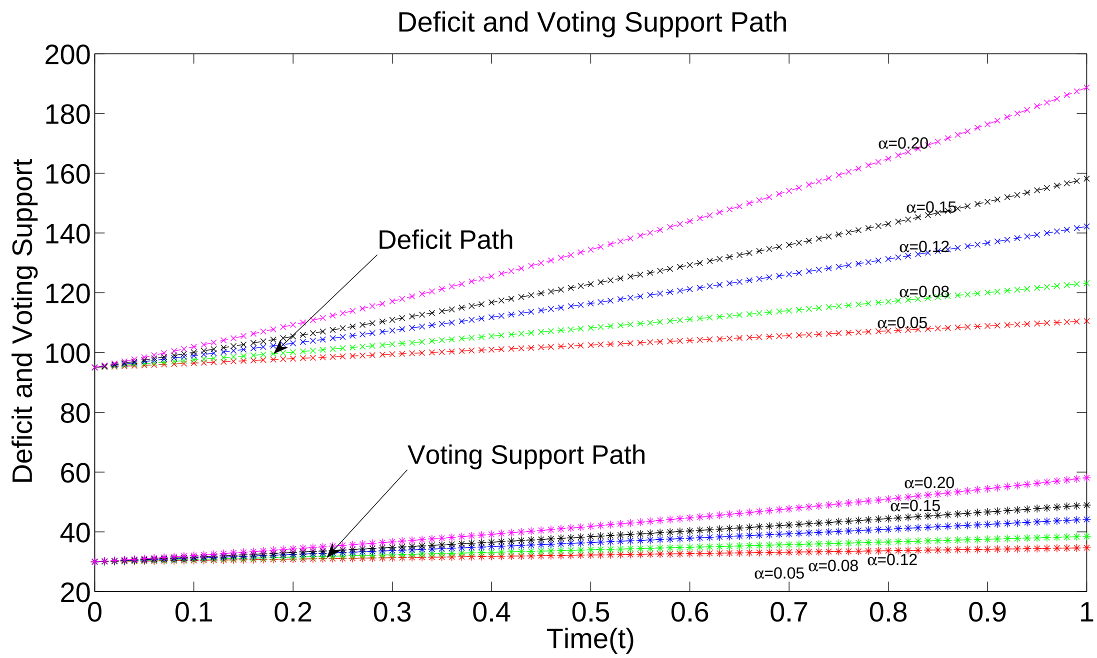
Numerical Simulation for Proposition 6(s):

Table 3: Parametric Configurations of the Opportunist Incumbent and No Anti-incumbency

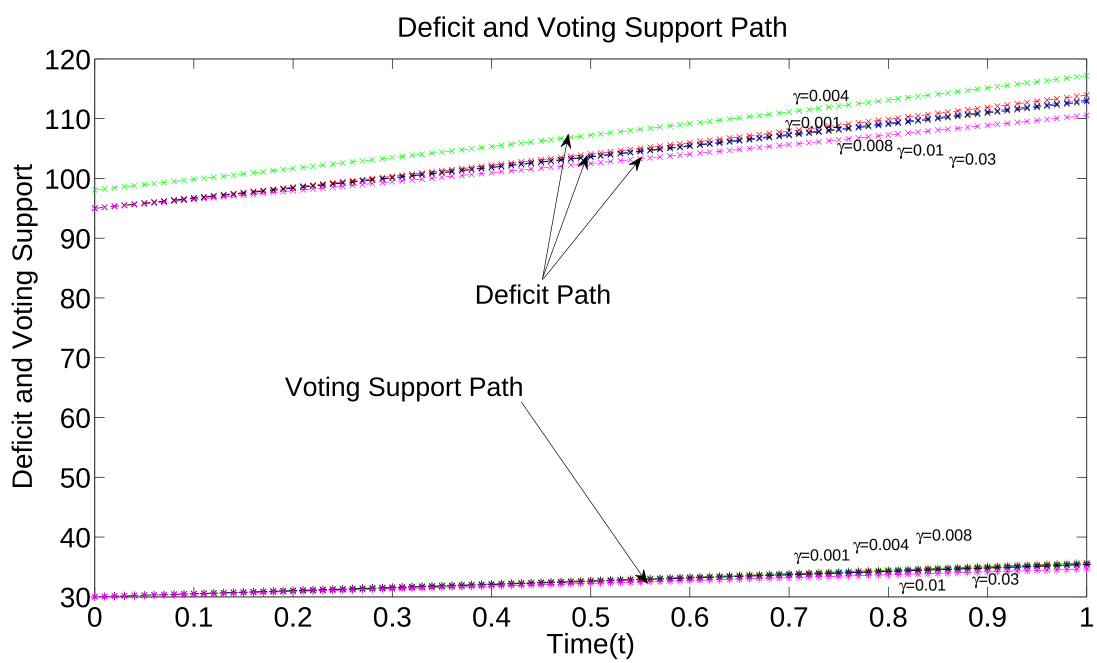
Name of the Parameters	Parameters	**Change in Parameters Values**	**Fixed Parameters**
Minimum Voting Support	M_0	-	30
Benchmark Deficit	D^*	-	5
Constant part of Shadow Value	K_M	-	20
Sensitivity of Deficit to Voting Support	α	0.05, 0.08, 0.12, 0.15, 0.25	$\gamma = 0.03$,$\delta = 0.3$,$\epsilon = 0.05$,$\rho = 0.02$
Friction Parameter Gamma	γ	0.001, 0.004, 0.008, 0.01, 0.03	$\alpha = 0.05$,$\delta = 0.3$,$\epsilon = 0.05$,$\rho = 0.02$
Weight to $D(t) - D^*$ verses $M(t)$	δ	0.10, 0.15, 0.25, 0.30, 0.45	$\alpha = 0.05$,$\gamma = 0.03$,$\epsilon = 0.05$,$\rho = 0.02$
Marginal Elasticity of Substitution	ϵ	0.01, 0.03, 0.05, 0.08, 0.12	$\alpha = 0.05$,$\gamma = 0.03$,$\delta = 0.3$,$\rho = 0.02$
Discount Factor	ρ	0.02, 0.03, 0.05, 0.08, 0.10	$\alpha = 0.05$,$\gamma = 0.03$,$\delta = 0.3$,$\epsilon = 0.05$

Figure 6: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent

(a) M(t) and $\eta(t)$ when α changes



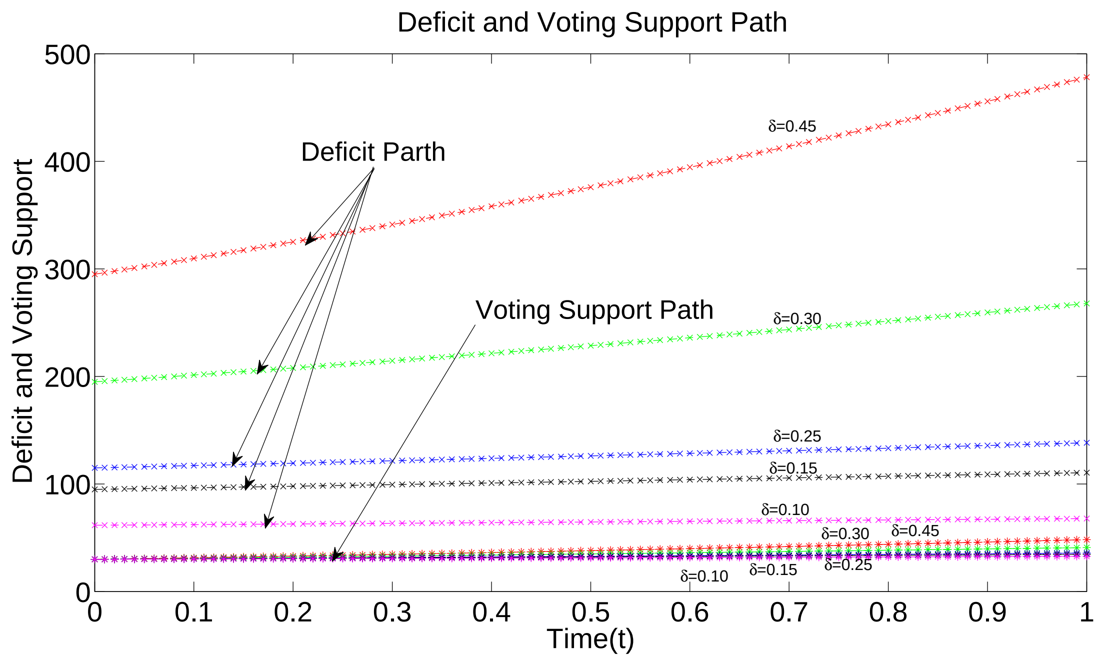
(b) M(t) and $\eta(t)$ when γ changes



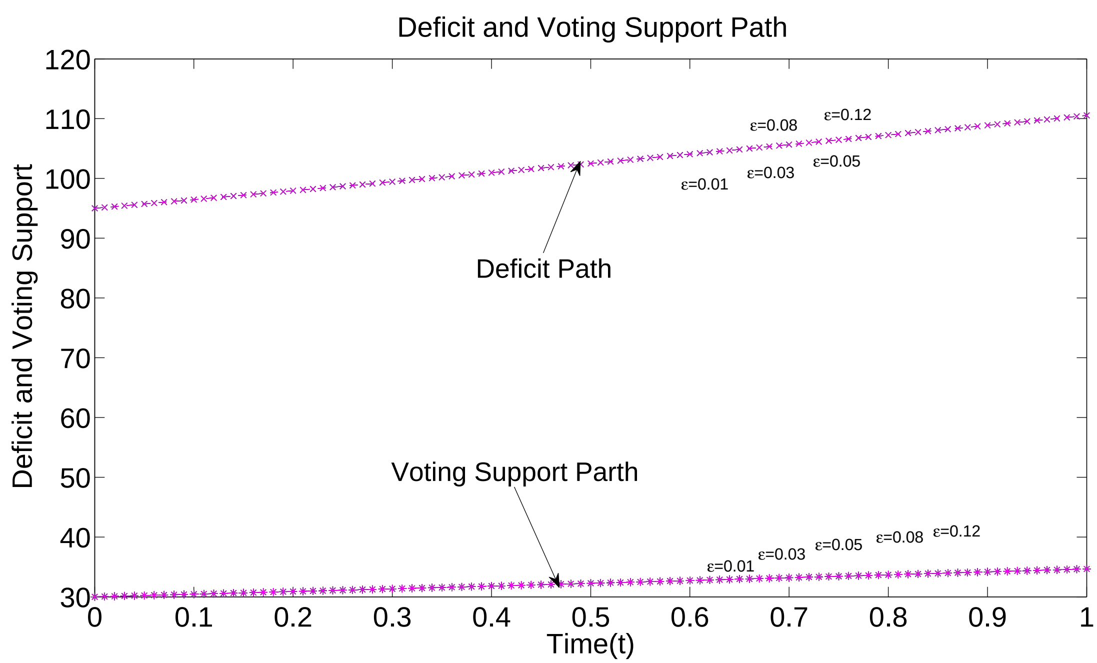
Source: Author's calculations

Figure 7: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent

(a) M(t) and $\eta(t)$ when δ changes

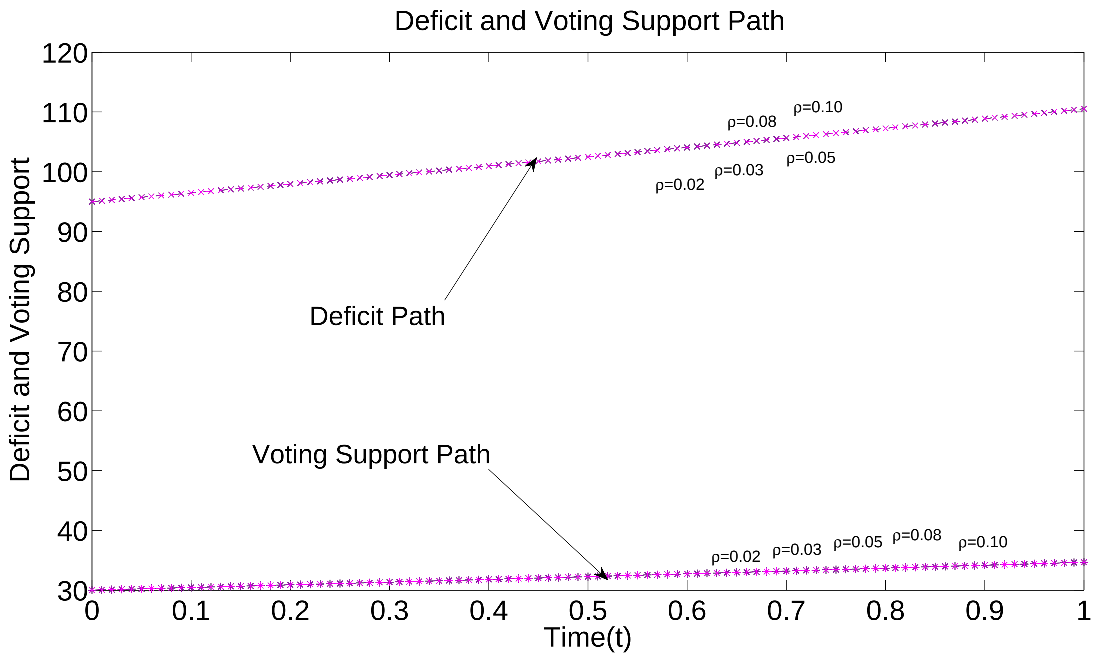


(b) M(t) and $\eta(t)$ when ϵ changes



Source: Author's calculations

Figure 8: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent when ρ Changes



Source: Author's calculations

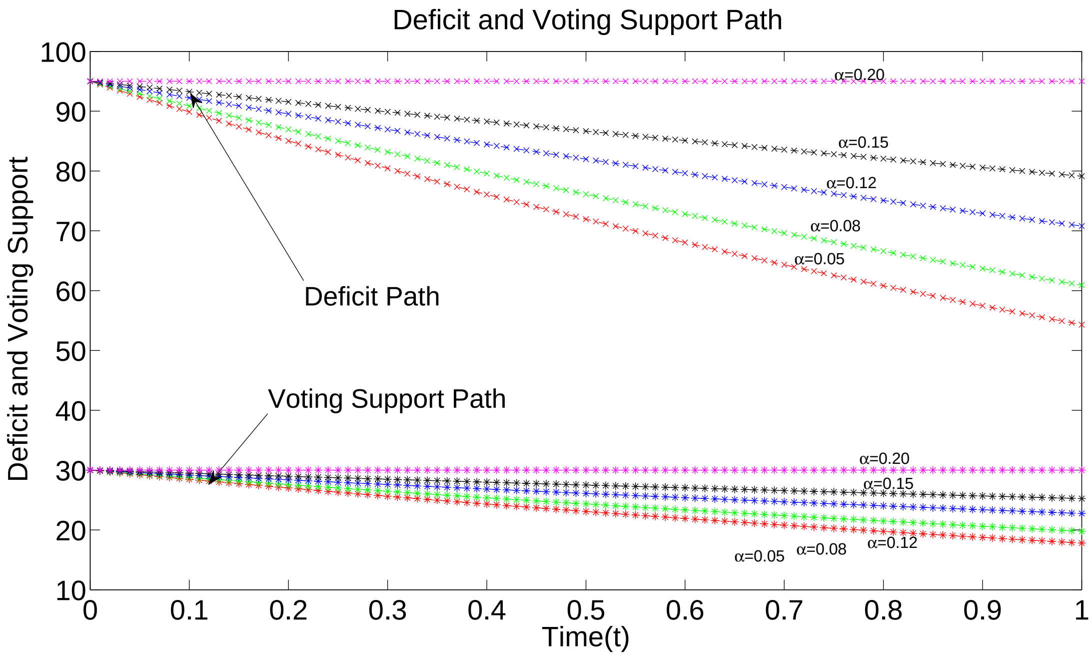
Numerical Simulation for Proposition 9(s):

Table 4: Parametric Configurations of the Opportunist Incumbent in the Presence of Anti-incumbency

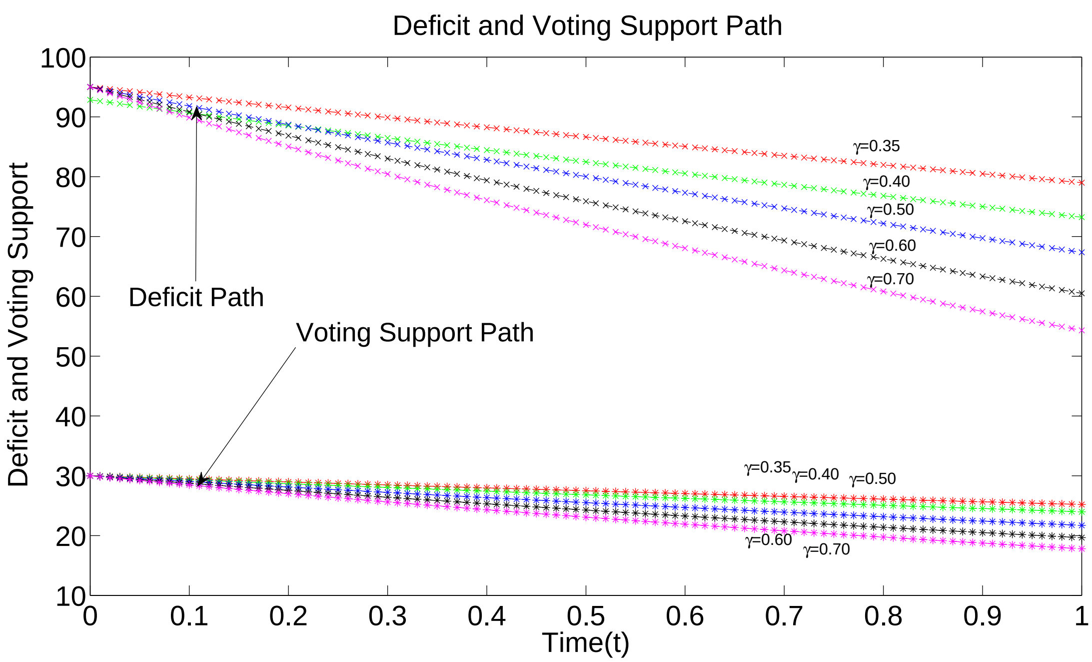
Name of the Parameters	Parameters	Change in Parameters Values	Fixed Parameters
Minimum Voting Support	M_0	-	30
Benchmark Deficit	D^*	-	5
Constant part of Shadow Value	K_M	-	20
Sensitivity of Deficit to Voting Support	α	0.05, 0.08, 0.12, 0.15, 0.20	$\gamma = 0.70$,$\delta = 0.3$,$\epsilon = 0.05$,$\rho = 0.02$
Friction Parameter Gamma	γ	0.35, 0.40, 0.50, 0.60, 0.70	$\alpha = 0.05$,$\delta = 0.3$,$\epsilon = 0.05$,$\rho = 0.02$
Weight to $D(t) - D^*$ verses $M(t)$	δ	0.10, 0.15, 0.25, 0.30, 0.45	$\alpha = 0.05$,$\gamma = 0.70$,$\epsilon = 0.05$,$\rho = 0.02$
Marginal Elasticity of Substitution	ϵ	0.01, 0.03, 0.05, 0.08, 0.12	$\alpha = 0.05$,$\gamma = 0.70$,$\delta = 0.3$,$\rho = 0.02$
Discount Factor	ρ	0.02, 0.03, 0.05, 0.08, 0.10	$\alpha = 0.05$,$\gamma = 0.70$,$\delta = 0.3$,$\epsilon = 0.05$

Figure 9: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent in the Presence of Anti-incumbency

(a) M(t) and $\eta(t)$ when α changes



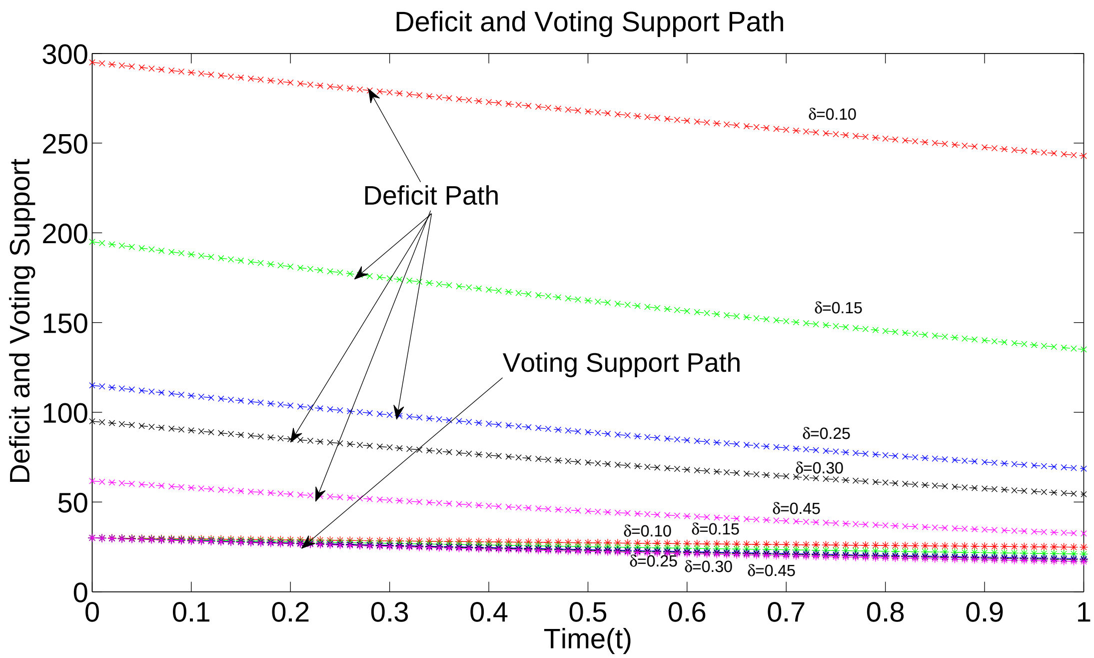
(b) M(t) and $\eta(t)$ when γ changes



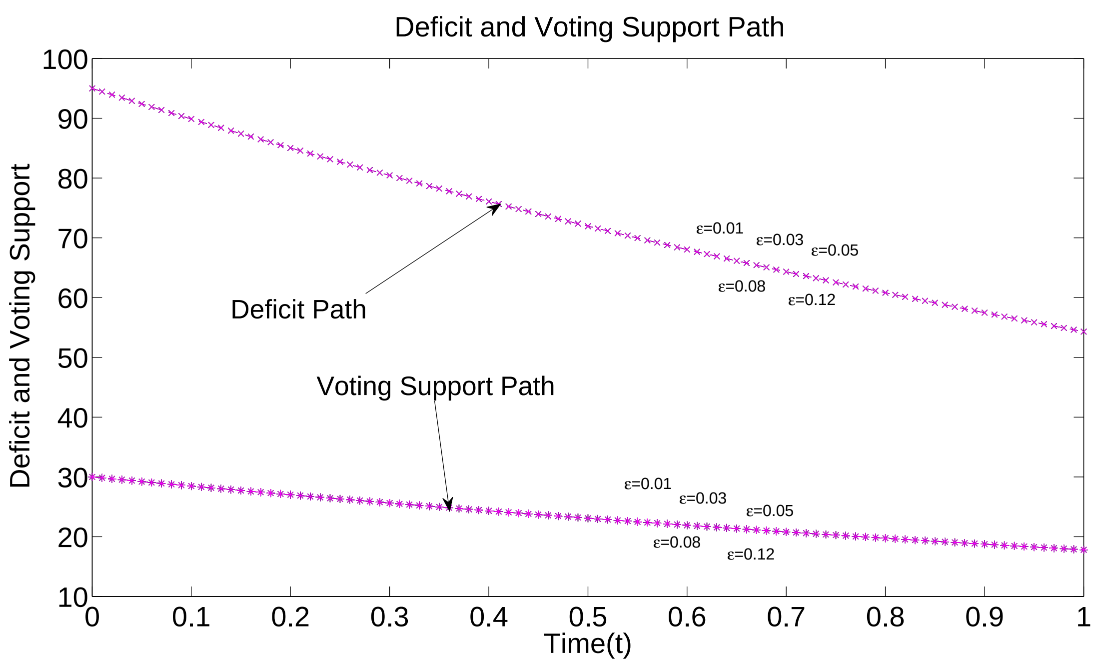
Source: Author's calculations

Figure 10: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent in the Presence of Anti-incumbency

(a) M(t) and $\eta(t)$ when δ changes

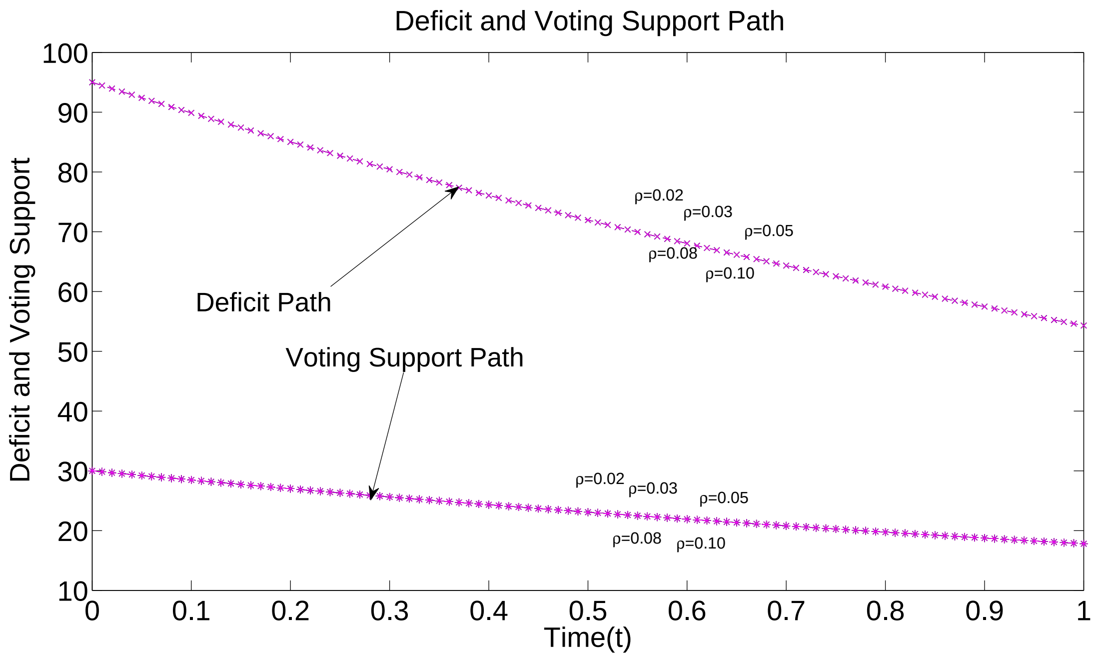


(b) M(t) and $\eta(t)$ when ϵ changes



Source: Author's calculations

Figure 11: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of the Opportunist Incumbent when ρ changes in the Presence of Anti-incumbency



Source: Author's calculations

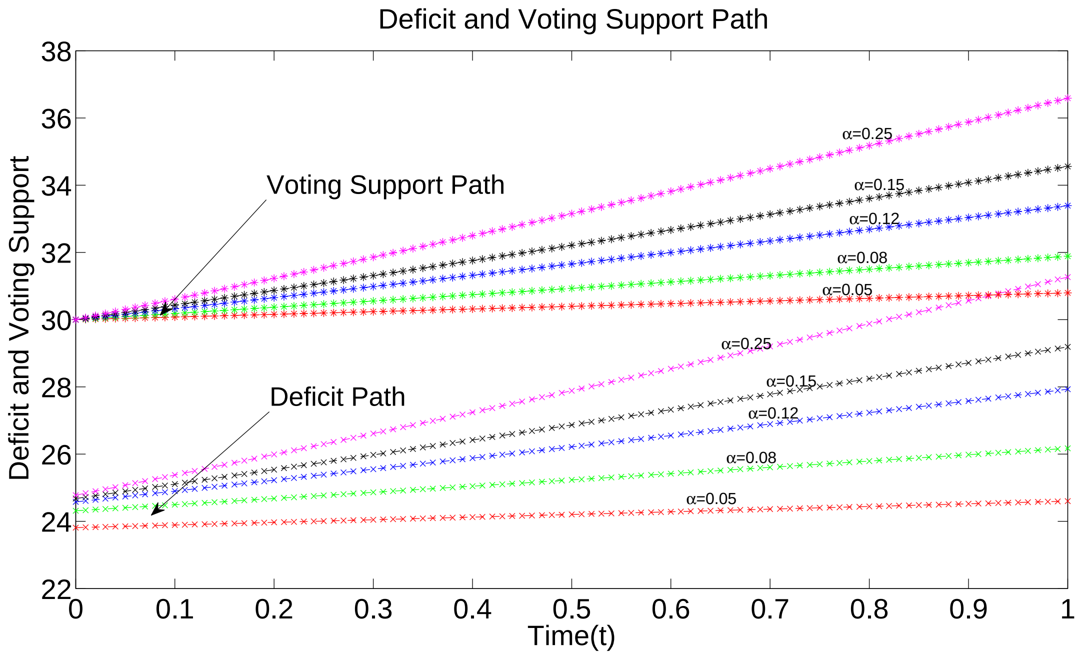
Numerical Simulation for Proposition 11(s):

Table 5: Parametric Configurations of the Partisan Incumbent and No Anti-incumbency

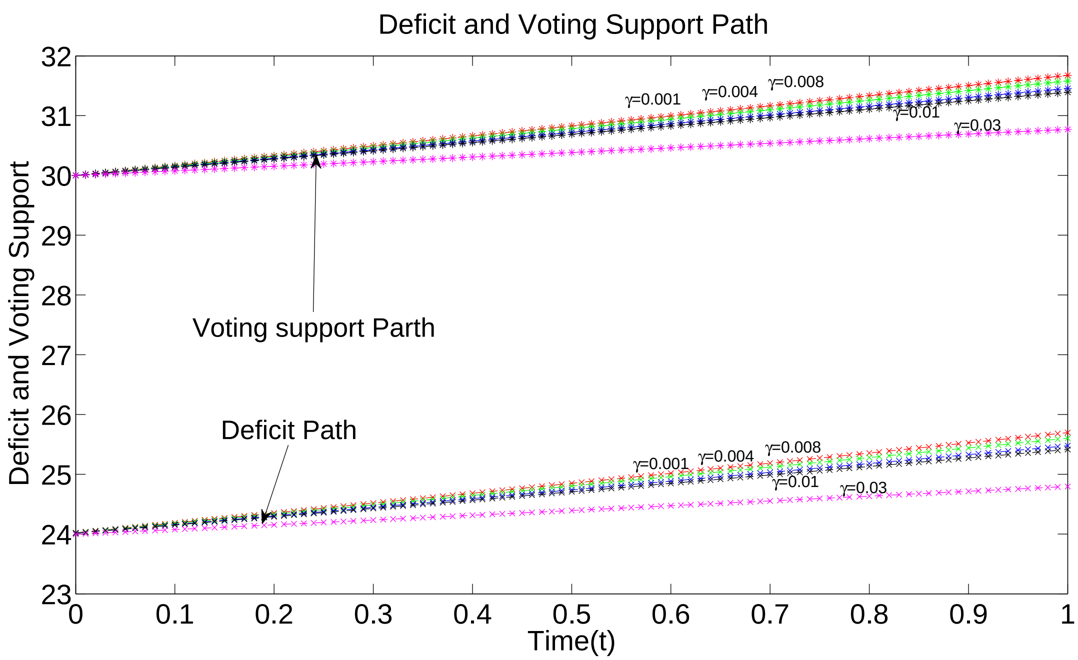
Name of the Parameters	Parameters	Change in Parameters Values	Fixed Parameters
Minimum Voting Support	M_0	-	30
Benchmark Deficit	D^*	-	5
Constant part of Shadow Value	K_M	-	20
Sensitivity of Deficit to Voting Support	α	0.05, 0.08, 0.12, 0.15, 0.25	$\gamma = 0.03$,$\delta = 1.00$,$\epsilon = 0.9$,$\rho = 0.02$
Friction Parameter Gamma	γ	0.001, 0.004, 0.008, 0.01, 0.03	$\alpha = 0.05$,$\delta = 1.00$,$\epsilon = 0.9$,$\rho = 0.02$
Weight to $D(t) - D^*$ verses $M(t)$	δ	0.80, 0.85, 0.90,0.95, 1.00	$\alpha = 0.05$,$\gamma = 0.03$,$\epsilon = 0.9$,$\rho = 0.02$
Marginal Elasticity of Substitution	ϵ	0.85, 0.88, 0.92, 0.96, 0.99	$\alpha = 0.05$,$\gamma = 0.03$,$\delta = 1.00$,$\rho = 0.02$
Discount Factor	ρ	0.02, 0.03, 0.05, 0.08, 0.12	$\alpha = 0.05$,$\gamma = 0.03$,$\delta = 1.00$,$\epsilon = 0.9$

Figure 12: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of a Partisan Incumbent

(a) M(t) and $\eta(t)$ when α changes



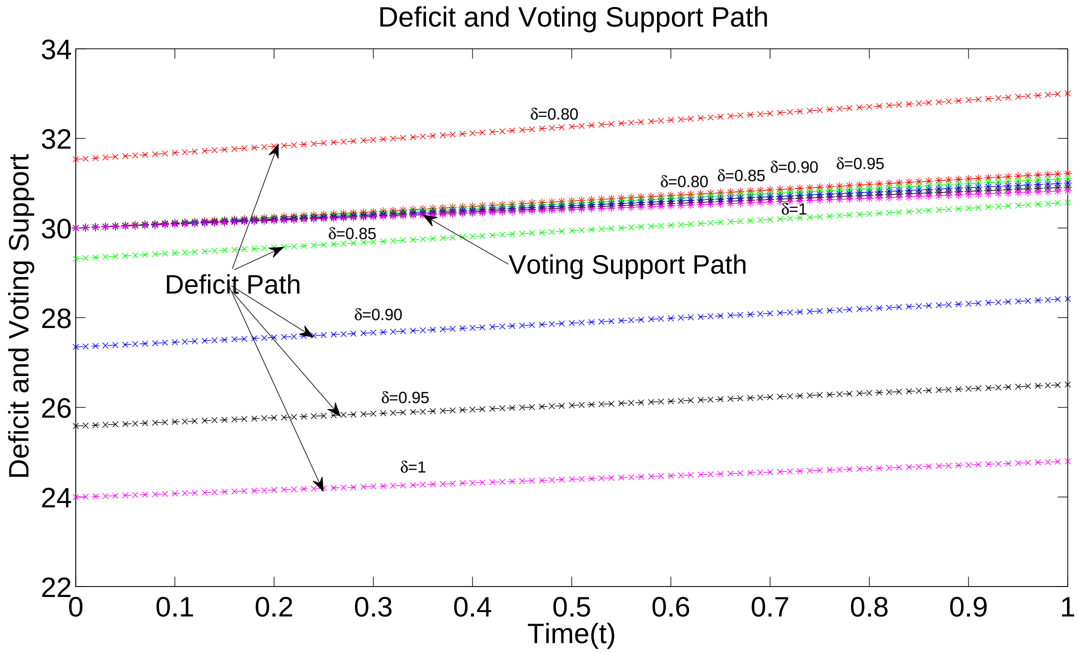
(b) M(t) and $\eta(t)$ when γ changes



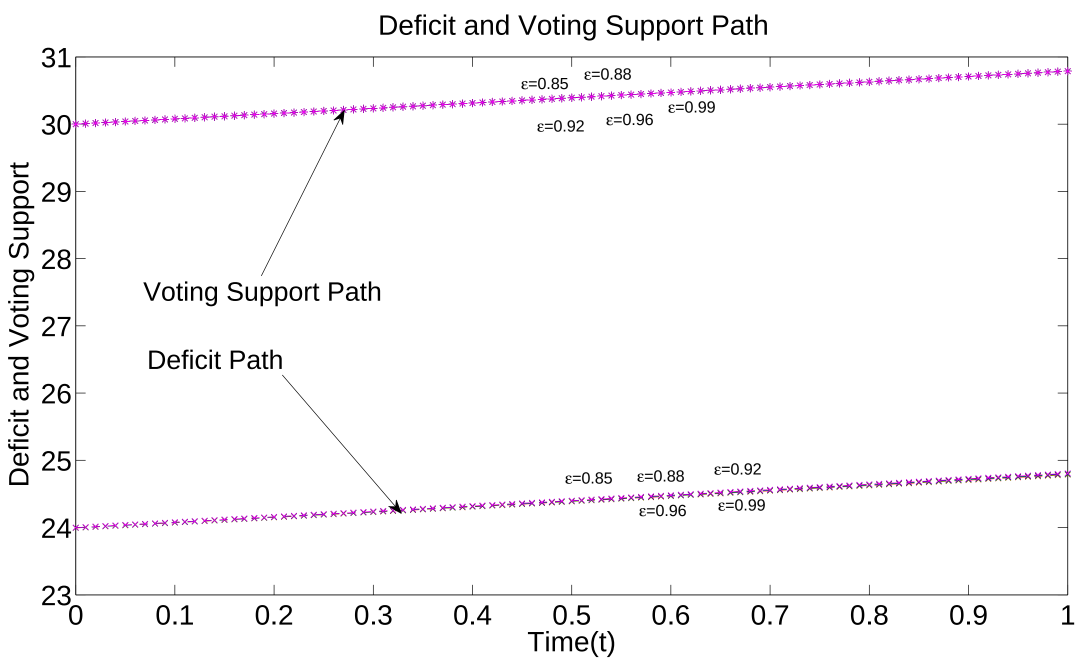
Source: Author's calculations

Figure 13: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of a Partisan Incumbent

(a) M(t) and $\eta(t)$ when δ changes

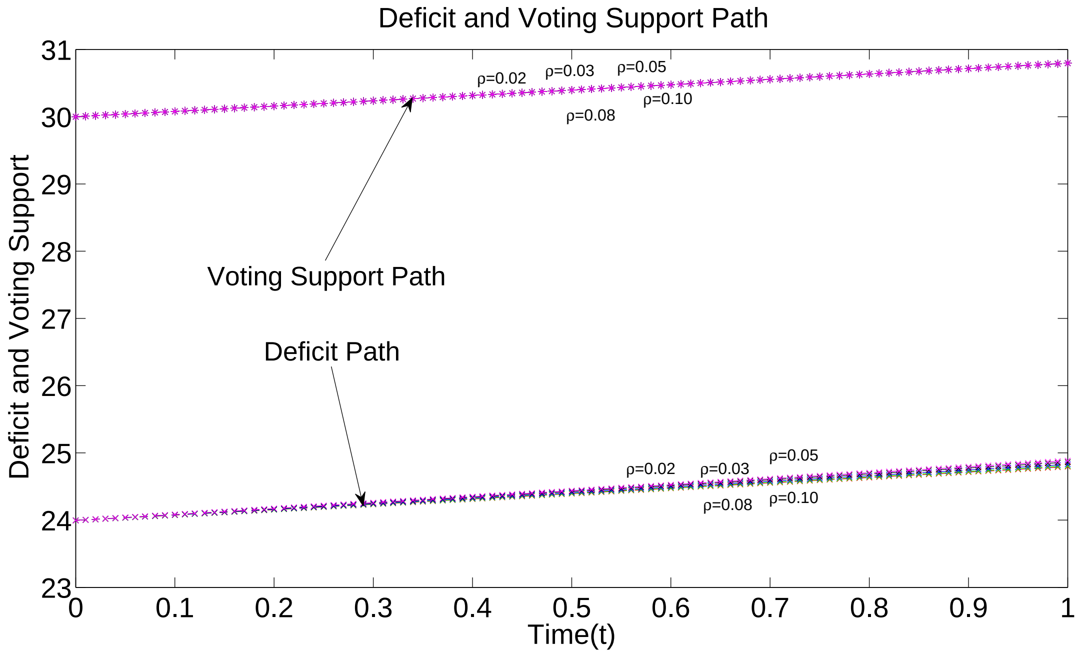


(b) M(t) and $\eta(t)$ when ϵ changes



Source: Author's calculations

Figure 14: Time Path of Voting Support M(t) and Primary Deficit $\eta(t)$ of a Partisan Incumbent when ρ Changes



Source: Author's calculations