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Searching for Political Fiscal Cycles in Hungary

Endrit Lami^{1,2}, Drini Imami³

ABSTRACT

Hungary has had a remarkably high public debt throughout the transition, and it has continued to increase during recent years, exceeding 80% of the GDP. Its debt and fiscal deficit were the highest among the Visegrád countries during the transition. One factor triggering the debt increase may be elections-related fiscal policies. By analyzing quarterly data for Hungary, we found clear empirical evidence of fiscal expansion before elections and contractions afterwards. These events are widely known as political fiscal cycles. We observed statistically significant incremental increases in fiscal deficits as elections approach, both in nominal and in GDP ratios, followed by contractions after elections. Thus, it can be concluded that incumbents in Hungary are engaged in opportunistic political fiscal cycles by embracing expansionary fiscal policy before parliamentary elections. Our findings also suggest that political fiscal cycles in Hungary may be an underlying factor contributing to the accumulation of public debt.

KEY WORDS:

political fiscal cycles; deficit; Hungary

JEL Classification: O12; L20; M21; J24

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1. Introduction

According to the opportunistic political business cycles (PBC) theory that was originally developed by Nordhaus (1975), the incumbent engages in expansionary economic policies and behaves in an opportunistic manner before an election to increase the likelihood of winning. The Nordhaus political business cycle theory asserts that governments stimulate economic growth before elections, thus benefiting from the short-run Philips curve and price rigidities in the short term. Inflation increases after an election because of the pre-election economic expansion. After elections, incum-

bents revert to tight economic policies to stabilize or reduce inflation.

An alternative view is the partisan PBC theory, which substantially differs from the opportunistic PBC theory because the former is based upon an ideological approach rather than on an opportunistic approach focused only on the incumbent's re-election. Hibbs (1977) assumes that, in general, political parties in most industrialized countries are distinguished, to a large extent, by class, income and related socioeconomic characteristics. According to Hibbs, left wing, labor oriented governments pursue different policies than right wing governments because they have different preferences towards macroeconomic variables, including unemployment and inflation. Within both the opportunistic and the partisan frameworks, rational expectations were later introduced by several authors

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such as Cukierman & Meltzer (1986), Rogoff and Sibert (1988), and Person and Tabellini (1990) for rational opportunistic models and Alesina (1987), Alesina and Rosenthal (1995) for rational partisan models.¹ However, voters' rational behaviors can be questioned for new democracies due to a lack of voter experience with respect to competitive elections. The opportunistic and partisan PBC models, however, despite the differences, are not mutually exclusive, as it is rational for the incumbent to be motivated by both ideological differences and opportunistic behavior simultaneously.

Over the last two decades, this field of political economy has been enriched by a significant amount of empirical research. While initially the focus of PBC related empirical research was on Western countries, over the last decade, there has been a growing interest in PBC – with a special focus on economic policy rather than economic outcomes – on developing and/or transition countries whose institutions, economies and societies differ significantly from those of developed Western countries (Shi & Svensson, 2003). Shi and Svensson (2002) find evidence of significant pre-electoral decreases in the fiscal balance in developing and developed countries, while Hallenberg, de Souza and Clark (2002) prove the existence of PBC, both fiscal and monetary instruments, in EU accession countries. Asutay (2004) provides evidence for the presence of opportunistic PBC in Turkey, while Imami & Lami (2006) show clear evidence of PBC in Albania with the expansion of several main public budgetary expenditures as well as decreases in unemployment before elections and normalization or contractions afterwards. On the other hand, Block (2002) analyzes rational opportunistic PBC theory and the fiscal expansion before elections in African countries. Brender and Dazen (2005) empirically show that new democracies are particularly vulnerable to political budgetary cycles, while Alt and Lassen (2006) claim that electoral cycles in fiscal balance are more a feature related to the level of fiscal transparency and the level of political polarization rather than the state of the democracy. Meanwhile, Shi and Svensson (2006) identify the aspect of information asymmetry among voters and the incumbents' rents of staying in power to be relevant factors in explaining political budget cycles.

The framework of an opportunistic PBC is considered relevant not only for developing/transition

countries but also for developed countries – the opportunistic cycle theory regarding government spending inclinations has been observed in Germany (Galli & Rossi, 2002), and with respect to lower fiscal balance, it has been observed in several OECD developed countries with weaker fiscal transparency (Alt & Lassen, 2006).

Hungary has had remarkably high debt throughout the transition, and it had the largest fiscal deficit during the transition of all Visegrád group countries. The Hungarian debt has continued to increase during the last several years, exceeding 80% of the GDP and prompting the European Union to suspend funds of 495 m euros (\$655 m; £417 m) due to the country's budget deficit. This is the first case of the EU taking action over the budget deficit of any of its members (BBC, 2012). Despite the recent attempt by the government to curb public spending, debt is still high and remains a major concern for the Hungarian economy. Furthermore, there are concerns that the government may follow expansionary economic policies prior to the 2014 elections (Than & Szakacs, 2012), which may trigger increasing of debt.

The Hungarian political system provides a basis for a strong government that can more easily persuade fiscal expansionary policies. The Hungarian parliament is unicameral, meaning it does not have an upper chamber. Furthermore, the President does not have veto power over legislative proposals. Therefore, as long as the government holds the majority in the parliament, it can easily pursue its fiscal policies (Haggard, Kaufman, & Shugart, 2001). In the last two elections, the winning party received the necessary majority in the parliament to establish a government with its own votes; thus, there was no need for a coalition, a situation that may be favorable political ground for conducting PFC (see Streb, Lema, & Torrens, 2009). The lack of strict and practically enforced fiscal rules in Hungary may have also been a supporting factor for PFC, as was the case for a panel of American states according to Rose (2005).

The objective of our work is to identify the possible existence of political fiscal (or budget) cycles (PFC) in Hungary based on an opportunistic PBC framework. Given Hungary's political and economic history, its institutional organization, its macroeconomic developments during the last two decades of democracy and its

market economy, we hypothesize that and empirically test whether incumbents' behavior in Hungary toward fiscal policy is considerably similar to the implications of an opportunistic PBC framework. The high deficit policy of Hungarian incumbents (shown above) can be explained, to some extent, by its institutional and political systems, while one factor underlying the debt increase could be elections-related fiscal policies.

Testing for PFC in Hungary is conducted by analyzing the dynamics of the public (fiscal) deficit. We statistically test the hypothesis that the governments may engage in opportunistic behaviors following an expansionary fiscal policy by increasing the deficit to reduce unemployment and increase output before/ during elections.

There is a wider consideration of contractionary post-election effects in theoretical works regarding PBC, which has not been considered as frequently by empirical research and has only been supported occasionally by empirical evidence. Few studies find evidence of expected post-election effects on different fiscal variables (e.g., Ames, 1987; Persson & Tabellini, 2003; Streb et al., 2009), while Streb, Lema and Garofalo (2012) find significant fiscal contractions in Latin America but not in OECD countries. Atusay (2004) also found some marginally significant evidence of post-election contractions in some categories of budgetary expenditures in Turkey. However, Schuknecht's (2000) tests fiscal balance, expenditure and revenue and finds no distinct post-electoral effects, while Alt and Lassen (2006) only find some weak evidence of post-electoral effects for OECD countries with low fiscal transparency. These results are somewhat supported by Akhmedov and Zhuravskaya (2004), who could find almost no evidence of opportunistic post-electoral effects in a panel-data study on different regions in Russia. Consistent with the rationale of the Nordhaus (1975) theory, which brings up post-election contractions of economic policy to combat inflation, we also econometrically investigate the post-electoral effects on deficit and provide a more complete picture of the cycles.²

Furthermore, given the relatively high debt level in Hungary, we analyze the net effects that such possible electorally driven fiscal cycles may have on the accumulation of public debt. This aspect of PBC is rarely analyzed in empirical research. In a cross-country

study, Streb et al. (2009) could not reject the null hypothesis that post-electoral contractions of fiscal balance are of the same size as pre-election expansions. In a recent study, Streb et al. (2012) found that political budget (fiscal) cycles contribute to public debt build-up in OECD countries but not in Latin America.

The remainder of this paper continues with an explanation of the methodology in Section 2, where the data, variables and empirical approach are presented. Section 3 presents the empirical (econometrical) findings of this study, and Section 4 provides the conclusions of the study. The Appendix contains detailed information on each estimated econometrical model.

2. Empirical methods

2.1. Data and variables of interest

Consistent with the opportunistic PBC model, we expect that the government may follow an expansionary fiscal policy before/during elections and return to the long-term path or tighten fiscal policy after the elections as constrained by the necessity to sustain public finance and/or reduce inflation. In this regard, the variable of interest we analyze in this article is the fiscal balance of the government. We statistically test the hypothesis of fiscal deficit expansion before elections and normalization or contractions post elections.

We analyze the time series data on net lending (+)/ net borrowing (-) of the general government of Hungary, generally referred to as the overall fiscal balance, which is sourced from the EUROSTAT database.³ We base our analysis on quarterly data, which, in addition to providing more robust statistical results due to a higher number of observations (compared to a yearly based analysis), most importantly allows inclusion of any inter-annual election effects. Empirical analysis based on annual data has been one serious drawback of many empirical studies analyzing several aspects of PBC, both in developed and developing countries. Streb et al. (2012) argue that the failure of many studies to show econometrically important opportunistic PBC is due to their reliance on annual data. Streb et al. (2012) conduct econometric analyses on both quarterly and annual panel data for a group of Latin American and OECD countries and conclude that the annual data strongly underestimates the presence of political budgetary cycles, particularly when pre-electoral expansion is followed by post-electoral contrac-

tion. Based on their results, Streb et al. (2012) argue that temporal aggregation, which is inherent in annual data, is a strong underlying factor that accounts for the non-evidence of PBC in most of the existing empirical research on developed countries. Opposite-sign shifts in fiscal policy within less than a year of elections offset each other, and consequently, PBC is underestimated if annual data are used. Akhmedov and Zhuravskaya (2004) are even more critical of the inter-annual frequency of the time series. In their monthly panel data study that investigated opportunistic PBC in a set of regions in Russia, they argue that even analyses based on quarterly data tend to underestimate the PBC. They find that with respect to Russia, only with monthly frequency data is it possible to correctly estimate the magnitude and timing of generally short-lived but sizeable election-related cycles.

In addition to overcoming this potential deficiency of temporal aggregation that is inherent in annual data, we could analyze election effects on the fiscal policy through two different time perspectives by utilizing quarterly time series. First, we could adopt the common approach of analyzing possible opportunistic electoral effects on fiscal deficit during different quarterly cumulative time intervals around elections, ranging from one quarter to eight cumulative quarters (two years) before and after elections. Second, we could adopt another approach, which, to the best of our knowledge, has not been used in the existing empirical research on PFC. This second approach aims to analyze possible electorally driven shifts of fiscal policy (fiscal deficit) during different yearly time windows before and after elections. We do this by creating yearly political dummy variables (*PDy*) (to be explained in the next sub-section). On the one hand, this new approach avoids the potential problem of temporal aggregation, given that the specification of yearly time intervals around elections is not constrained by the calendar year reference of the data (the case of annual time series) because now the reference is to the election itself. On the other hand, this new approach still allows us to analyze and derive conclusions based on the more intuitive yearly time perspective of possible existing PFCs in Hungary.

The available quarterly time series we employ spans from the first quarter of 1999 to the second quarter of 2012, for 54 observations. The data are denominated

in billions of Hungarian Forint (HUF). All observations of general government fiscal balance in Hungary result in an fiscal deficit (negative balance), except for Q1-2011. The fiscal balance experienced a high surplus in the first quarter of 2011 due to one-off revenues received from transferring mandatory private pension fund assets and employee contributions from the private pillar of the pension system back to the government ownership. Therefore, we omitted the outlier observation for Q1-2011 from the statistical analysis. In addition to nominal values (in HUF billions), we also analyzed the fiscal deficit measured as a percentage ratio of nominal GDP, which allows us to control for nominal effects of economic growth and inflation.

Three parliamentary elections took place during the aforementioned time series span and were fully captured by the empirical methodology applied. Specifically, the elections were held on the *4th of April, 2002* with a second round on the *21st of April*; on the *9th of April, 2006* with a second round on the *23rd of April* and on the *11th of April, 2010* with a second round on the *25th of April*. Another parliamentary election partially captured in our analysis is that of the *10th of May, 1998* with a second round on the *24th of May*.

There are two other parliamentary elections held earlier during the pluralist history of Hungary. The first was held in March 1990 and the second in May 1994. Neither of these elections was covered in our analysis as there are no available quarterly fiscal data before 1999 in any of the public sources.

2.2. Econometrical approach

Following the standard approach in this area of research, we apply the intervention analysis based on Box and Tiao (1975), which is known as the Box-Tiao approach. This approach has been applied in several similar works on this subject, such as McCallum (1978), Hibbs (1987), Alesina and Sachs (1988), and Alesina and Roubini (1992). Basically, the test proceeds by subjecting the time series of interest variables to a Box-Tiao intervention analysis by modeling them through the most appropriate autoregressive-moving average (ARMA) and an intervention variable where the intervention variable models the time distance to the election day and captures the effect of the elections on the variable of interest. The intervention variable can also be a *V-shaped* dummy variable

designed to mimic the cyclical behavior of the variable of interest throughout a full incumbent electoral tenure. A simple formal representation of the variable of interest (z_t) that is subject to the intervention analysis is the following:

$$z_t = \mu + I_t + N_t \quad (1)$$

where μ denotes the mean level of the variable time series, the term I_t denotes the intervention effect due to a specific event (parliamentary elections) and N_t denotes the noise of the time series. The last term (N_t) is modeled using a suitable ARMA (p, q) model:

$$N_t = \phi_1 N_{t-1} + \dots + \phi_p N_{t-p} + E_t - \theta_1 E_{t-1} + \dots + \theta_q E_{t-q} \quad (2)$$

where E_t denotes an independent error sequence. The simplest term, which corresponds to the t -test in a non-time series setting, is the intervention term/variable. In this case, the intervention variable takes the form of a pulse intervention, meaning an abrupt jump in the series followed by a gradual decline at the normal level of the series. The pulse intervention term can be formally expressed as:

$$I_t = \omega_0 P_t^{(r)} \quad (3)$$

where $P_t^{(r)}$ is a pulse function,

$$P_t^{(r)} = \begin{cases} 0 & t \neq T \\ 1 & t = T \end{cases} \quad (4)$$

The parameter ω_0 measures the change caused by the intervention and is estimated with the ARMA time series components. The estimation procedure provides an estimate of ω_0 and a confidence interval for the parameter. The intervention variable I_t is expressed as a dummy variable indicating either a specific time prior/after the election or an approximate shape of the cyclical behavior during the incumbency.

We establish four sets of different political dummy variables (I_t) to analyze the impact of the election on the fiscal deficit as well as the implied contribution on the accumulation of public debt.

Note: For convenience, we denote $P_t^{(r)}$ by PD representing the political dummy variable.

The first set consists of sixteen cumulative pre-election and post-election political dummy variables defined as:

$$PDcum_e = \begin{cases} 1 - \text{the calendric quarter when elections} \\ \text{take place, Elections Quarter (EQ)} \\ 0 - \text{otherwise} \end{cases} \quad (5)$$

$$PDcum_{-i} = \begin{cases} 1: \text{for } (i) \text{ cumulative} \\ \text{quarters prior to the EQ, } i \in [1;7] \\ 0: \text{otherwise} \end{cases} \quad (6)$$

$$PDcum_i = \begin{cases} 1: \text{for } (i) \text{ cumulative} \\ \text{quarters after the EQ, } i \in [1;8] \\ 0: \text{otherwise} \end{cases} \quad (7)$$

These PDs, which are individually incorporated into the specified models, aim to separately capture the election impact toward fiscal deficit before or after the election, throughout the different cumulative periods of time preceding or succeeding the EQ as well as during the EQ. The second set consists of four yearly political dummy variables (PDy_t) defined as:

$$PDy_{-1} = \begin{cases} 1 - \text{from the EQ up to the 3}^{rd} \\ \text{quarter before the EQ} \\ 0 - \text{otherwise} \end{cases} \quad (8)$$

$$PDy_{-2} = \begin{cases} 1 - \text{from the 4}^{th} \text{ up to the 7}^{th} \\ \text{quarter before the EQ} \\ 0 - \text{otherwise} \end{cases} \quad (9)$$

$$PDy_1 = \begin{cases} 1 - \text{from the 1}^{st} \text{ up to the 4}^{th} \\ \text{quarter after the EQ} \\ 0 - \text{otherwise} \end{cases} \quad (10)$$

$$PDy_2 = \begin{cases} 1 - \text{from the 5}^{th} \text{ up to the 8}^{th} \\ \text{quarter the EQ} \\ 0 - \text{otherwise} \end{cases} \quad (11)$$

These variables allow us to analyze the incumbent behavior during each specific yearly time window before and after elections, while at the same time avoiding the potential problem of the temporal aggregation that is present in annual data (see Streb et al., 2012), as explained in the previous sub-section. The third set includes seven couplets of political dummy variables, which are time-symmetric to elections ($PDsym_t$). Each couplet of these dummy variables covers a symmetric time surrounding elections and is defined as:

$$\text{Couplet}(i) = \begin{cases} PDsym_{-i} = \begin{cases} 1 - \text{for } (i) \text{ cumulative quarters} \\ \text{before EQ, including EQ} \\ 0 - \text{otherwise} \end{cases} \\ PDsym_i = \begin{cases} 1 - \text{for } (i) \text{ cumulative quarters} \\ \text{after EQ} \\ 0 - \text{otherwise} \end{cases} \end{cases} \quad (12)$$

where $i \in [1; 7]$. *Note:* In this case, $PDsym_{-i}$ indicates the election quarter (EQ).

Both PDs from each couplet are incorporated and estimated simultaneously in the statistical models. The main scope of these variables is to indicate the magnitude of the possible fiscal deficit expansion relative to the contraction in exactly the same time interval surrounding the election, which permits inferring any net effect of PFC on the accumulation of public debt. The fourth set of political dummy variables we design contains twelve *V-shaped* variables. These are certain ordinal variables intended to mimic the possible shape of the political cycle, which may be a significant determinant in the evolution of the fiscal deficit during an incumbent's full electoral tenure.⁴ The empirical technique with these variables was originally used by McCallun (1978) and later by Grier (1987; 1989; 2008), Beck (1987) and Krause (2005). The statistical significance of any of these variables influences the existence of PBC in the evolution of the interest variable between two consecutive parliamentary elections. Using such variables could also indicate the most likely pattern of the hypothesized somewhat *V-shaped* political cycle. Nevertheless, this technique could only provide statistical evidence that a specific somewhat *V-shaped* variable could Granger-cause fiscal deficit, implying the existence of a political cycle with a pattern similar to the *V-shaped* variable.

The exact magnitude, form or timing of the cycle is not provided by the empirical technique. We designed four of the *V-shaped* variables to be fully symmetrical relative to respective troughs. They differ among each other with respect to the steepness of the expansion and contraction as well as the trough duration ($PDcycle_i$ to $PDcycle_e$). The next four political *V-shaped* dummy variables model different tendencies toward the expansion phase of the cycle. Variables $PDcycle_e$ to $PDcycle_7$ model the case in which the expansion of the fiscal deficit occurs before the election (or around the

second half of incumbency) and has a greater magnitude and/or lasts longer than the contraction, which occurs after the election (or around the first half of incumbency). Therefore, if statistically significant, the expansion-biased *V-shape* variables could provide statistical evidence that, in addition to the existence of PBC, the fiscal consolidation that occurs after the election is not enough to fully offset the pre-electoral fiscal expansion, thus contributing to the further accumulation of public debt. While the last four variables, $PDcycle_{10}$ to $PDcycle_{12}$, model the opposite case, an expansion of deficit, which is more than offset by a stronger contraction after the election, and implies an overall reductive effect on public debt stock. Figure 1 shows the specific designed form of each *V-shaped* dummy variable during an incumbent's full tenure (or during the time interval between two consecutive parliamentary elections). Note that some of the PD variables from different sets are identical, such as $PDcum_4$ and PDy_1 , $PDcum_e$ and $PDsym_{-1}$, as well as $PDcum_i$ and $PDsym_i$ for all (i) .

2.3. Specification and estimation of the statistical models

In the first stage, we precisely followed the Box-Jenkins methodology (Box & Jenkins, 1970), specifying the most appropriate ARMA model for the fiscal deficit denominated both in nominal terms and as a ratio of the GDP.⁵ We investigated both time series on the presence of any seasonal pattern as well as on the stationarity.⁶ In the event of a non-stationary time series, we transformed the data into a stationary times series by applying the appropriate transformation approach. We employed an iterative process of identification, estimation and diagnostic checking of several ARMA models until we finally settled on the most plausible model – the one considered the “best” model for each time series. Modeling through ARMA makes it possible to statistically determine whether elections can explain any changes in the fiscal deficit or the natural pattern of the variable and its random error term.

Fiscal deficit denominated both in nominal and percent-to-GDP terms were unit root processes. The first difference in the natural logarithm of the fiscal deficit ($DLNNETDEF$) as well as the first difference in the fiscal deficit as a ratio of the GDP ($DNETDEF_GDP$) were stationary processes based on all conventional

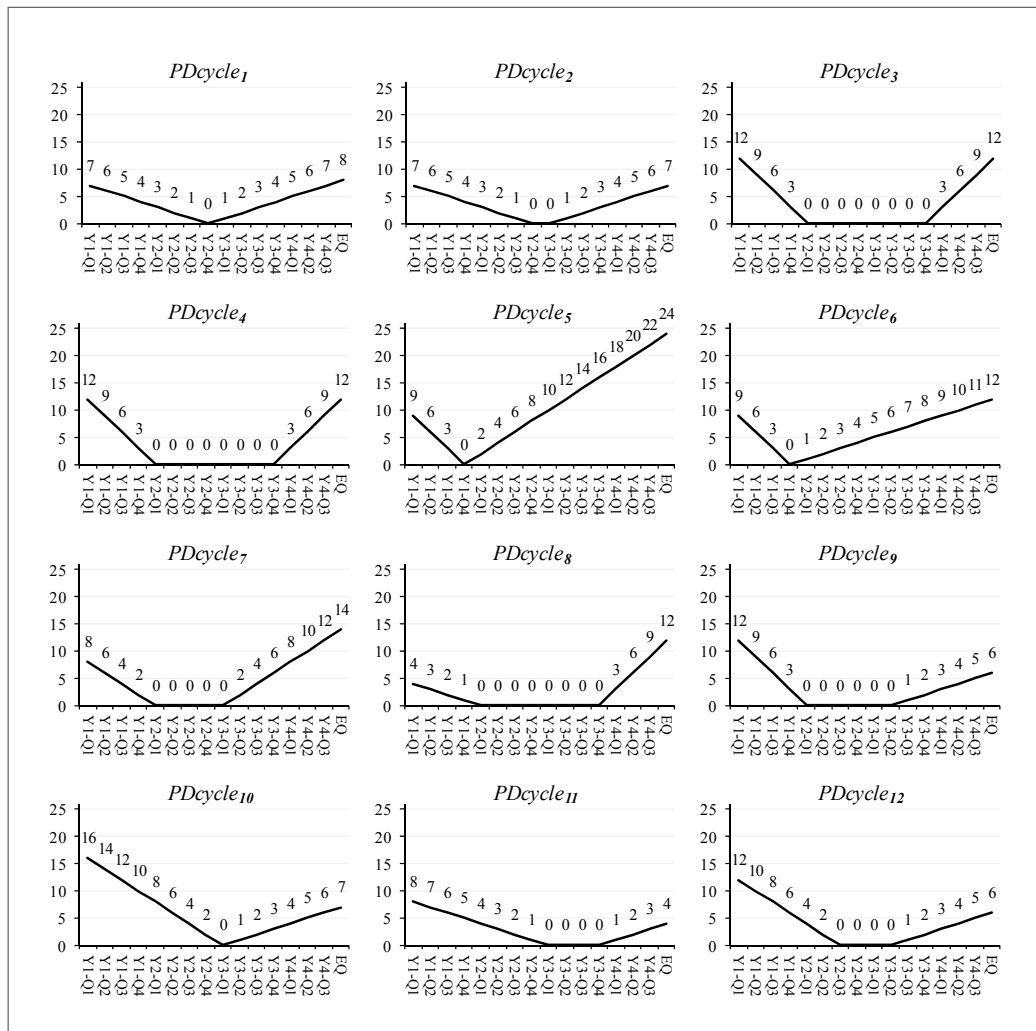


Figure 1. V-Shaped Political Dummy Variables

tests. Therefore, the final variables of interest (dependent variables) subject to our econometric modeling and analysis are as follows:

DLNNETDEF = the first order difference of the natural logarithm of fiscal deficit

DNETDEF_GDP = the first order difference of fiscal deficit as a percentage ratio to GDP After omitting the outlier observations from the respective time series of first order differences, the effective final number of observations used in the empirical analysis was

51.⁷ Among all competing possible models we estimated and diagnosed, the “best” model for *DLNNETDEF* was determined to be the ARMA with two autoregressive terms of lag two AR(2) and four AR(4) and two moving average terms of lags one MA(1) and two MA(2). The “best” model for *DNETDEF_GDP* was an ARMA with a moving average term of lag one MA(1) and an autoregressive term of lag four AR(4).⁸

In the second stage, based on the Box-Tiao intervention analysis, we incorporated one defined political

dummy variable at a time (or in pairs in the case of $PDsym_t$) into the “best” tentatively found ARMA model and re-estimated all parameters of each final model. The statistical significance of the political dummy variables, tested using a t -test, reveals any possible impact of the elections on the fiscal deficit.⁹ The obtained results are discussed in the following section.

3. Empirical Results

The empirical analysis revealed clear evidence of election-related cycles in the fiscal deficit, both in nominal and GDP terms. The estimated coefficients of all types of PD used in the statistical analyses indicated that there is a statistically significant increase in the fiscal deficit during different time-intervals before elections followed by contractions after the elections, thus supporting the hypothesis of opportunistic behavior by incumbents in Hungary. Tables 1 and 2 of this section contain only the most relevant results regarding coefficient estimates for all PD variables used in the analysis, respectively, for the fiscal deficit in nominal terms and the deficit in terms of the GDP, whereas the tables in Appendix A contain the full statistical results for each estimated model.

In the case of a nominal deficit, the parameter estimates for all $PDcum_{-i}$ and $PDcum_e$ variables have a positive sign and are statistically significant at a less than 5% level of significance, while in the event of a deficit denominated as a ratio to GDP, all but $PDcum_e$ are statistically positive at less than 5%, strongly implying an election-related expansionary fiscal policy.

The increase in both measures of the deficit before elections intensifies as election day approaches, as indicated by the increase in the magnitude of several consecutive $PDcum_{-i}$ ($PDcum_{-5} < PDcum_{-4} < PDcum_{-3} < PDcum_{-2} < PDcum_{-1}$). The nominal level of fiscal deficit spikes by almost 80% one quarter before the election quarter (EQ) as indicated by $PDcum_{-1}$, and almost 70% in the EQ ($PDcum_e$) compared to its natural long-term pattern modeled by the ARMA components. The average nominal expansion of the deficit during other cumulative periods before the EQ ranged from approximately 18% to 40% more than its natural pattern, as indicated by estimated coefficients of $PDcum_{-2}$ to $PDcum_{-7}$ and was significant at less than 5%.

Fiscal deficit measured as a ratio of the nominal GDP increases by approximately 3.2 percentage points

of the GDP one quarter before the EQ ($PDcum_{-1}$), while it is approximately 1 to 1.8 percentage points of the GDP higher during different cumulative periods before the EQ ($PDcum_{-2}$ to $PDcum_{-7}$), the vast majority of which are statistically significant at a 1% level of significance.

Empirical results indicate that this loosening fiscal behavior vanished immediately after elections. Furthermore, statistically significant fiscal consolidation occurs within a cumulative period of three quarters up to two years after the EQ. The coefficients of $PDcum_1$ and $PDcum_2$ are not significant for either measurement of deficit or for the $PDcum_3$ for the ratio of deficit to the GDP, implying a discontinuation of the expansionary fiscal policy immediately after an election. The $PDcum_3$ ($PDcum_4$ in the case of the deficit to the GDP ratio) to the $PDcum_8$ results are significantly negative at a less than 5% level of significance, indicating a reduction in the fiscal deficit from approximately 22% to 29% less than the long-term pattern in nominal terms and approximately 1 percentage point in terms of the GDP.

When we analyze the effects of elections in “yearly time windows” surrounding the event, we can infer that fiscal policy was opportunistically manipulated only during the first yearly time windows before or after elections, while there was no econometrically important alteration of the fiscal deficit in the second yearly time windows. The estimated parameters of PDy_{-1} were significantly positive and those of PDy_1 were significantly negative at the conventional level of significance for both measurements of the fiscal deficit, while the coefficients of PDy_{-2} and PDy_2 , although with the expected sign, were not statistically significant at conventional levels. When first considered, the non-significance of PDy_{-2} and PDy_2 may seem to contradict the implications derived, respectively, from statistically significant $PDcum_{-5}$ to $PDcum_{-7}$ and $PDcum_3$ to $PDcum_8$. Nonetheless, it should be noted that, by definition, these two types of variables capture election effects on the deficit for different periods of time, and therefore, the variables reveal different implications. When we use $PDcum$ variables, we consider the time around the election as a continuum time-interval; therefore, any significant election effects captured by these variables is interpreted as the cumulative effect during that specific continuous time-interval around the election considered as a whole, modeled by each

Table 1. Election effects on the nominal fiscal deficit (DLNNETDEF)

<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>
<i>Pdcum_e</i> **	0.689	0.025	<i>PDy₋₁</i> ***	0.255	0.001	<i>PDsym₋₇</i>	0.174	0.186
<i>PDcum₋₁</i> ***	0.788	0.000	<i>PDy₋₂</i>	0.126	0.375	<i>PDsym₇</i>	-0.081	0.550
<i>PDcum₋₂</i> ***	0.404	0.001	<i>PDy₁</i> **	-0.233	0.010	<i>PDcycle₁</i>	0.023	0.321
<i>PDcum₋₃</i> ***	0.266	0.004	<i>PDy₂</i>	-0.150	0.197	<i>PDcycle₂</i>	0.006	0.833
<i>PDcum₋₄</i> **	0.205	0.012	<i>PDsym₋₁</i> ***	1.276	0.000	<i>PDcycle₃</i>	0.010	0.824
<i>PDcum₋₅</i> **	0.183	0.020	<i>PDsym₁</i> ***	-0.996	0.000	<i>PDcycle₄</i>	0.003	0.824
<i>PDcum₋₆</i> **	0.212	0.021	<i>PDsym₋₂</i> ***	0.545	0.000	<i>PDcycle₅</i> ***	0.016	0.001
<i>PDcum₋₇</i> **	0.210	0.022	<i>PDsym₂</i> ***	-0.331	0.003	<i>PDcycle₆</i> **	0.027	0.018
<i>PDcum₁</i>	-0.449	0.227	<i>PDsym₋₃</i> ***	0.329	0.002	<i>PDcycle₇</i> *	0.018	0.061
<i>PDcum₂</i>	-0.302	0.130	<i>PDsym₃</i> ***	-0.293	0.009	<i>PDcycle₈</i> **	0.027	0.046
<i>PDcum₃</i> ***	-0.289	0.009	<i>PDsym₋₄</i> **	0.196	0.019	<i>PDcycle₉</i>	-0.009	0.650
<i>PDcum₄</i> **	-0.233	0.010	<i>PDsym₄</i>	-0.144	0.107	<i>PDcycle₁₀</i>	-0.016	0.170
<i>PDcum₅</i> **	-0.208	0.014	<i>PDsym₋₅</i> **	0.171	0.035	<i>PDcycle₁₁</i>	-0.026	0.190
<i>PDcum₆</i> **	-0.227	0.016	<i>PDsym₅</i>	-0.122	0.169	<i>PDcycle₁₂</i>	-0.009	0.541
<i>PDcum₇</i> ***	-0.255	0.005	<i>PDsym₋₆</i> *	0.170	0.061			
<i>PDcum₈</i> ***	-0.258	0.002	<i>PDsym₆</i>	-0.103	0.283			

(***) significant at 1% level

(**) significant at 5% level

(*) significant at 10% level

Table 2. Election effects on the fiscal deficit to GDP ratio (DNETDEF_GDP)

<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Variable</i>	<i>Coeff.</i>	<i>Sig.</i>
<i>PDcum_e</i>	0.975	0.492	<i>PDy₋₁</i> **	1.010	0.018	<i>PDsym₋₇</i>	0.121	0.851
<i>PDcum₋₁</i> **	3.179	0.014	<i>PDy₋₂</i>	0.574	0.199	<i>PDsym₇</i>	-1.030	0.134
<i>PDcum₋₂</i> **	1.812	0.010	<i>PDy₁</i> *	-0.954	0.066	<i>PDcycle₁</i>	0.062	0.417
<i>PDcum₋₃</i> ***	1.325	0.009	<i>PDy₂</i>	-0.508	0.291	<i>PDcycle₂</i>	0.024	0.763
<i>PDcum₋₄</i> **	1.050	0.012	<i>PDsym₋₁</i>	2.740	0.118	<i>PDcycle₃</i>	0.051	0.691
<i>PDcum₋₅</i> ***	0.994	0.007	<i>PDsym₁</i>	-2.639	0.135	<i>PDcycle₄</i>	0.017	0.691
<i>PDcum₋₆</i> ***	0.975	0.005	<i>PDsym₋₂</i> **	1.896	0.012	<i>PDcycle₅</i> ***	0.070	0.002
<i>PDcum₋₇</i> ***	0.991	0.003	<i>PDsym₂</i> **	-1.521	0.050	<i>PDcycle₆</i> ***	0.122	0.009
<i>PDcum₁</i>	-0.828	0.568	<i>PDsym₋₃</i> **	1.204	0.013	<i>PDcycle₇</i> *	0.066	0.081
<i>PDcum₂</i>	-0.649	0.431	<i>PDsym₃</i> *	-1.025	0.054	<i>PDcycle₈</i>	0.073	0.172
<i>PDcum₃</i>	-0.882	0.165	<i>PDsym₋₄</i> **	0.886	0.026	<i>PDcycle₉</i>	0.001	0.983
<i>PDcum₄</i> *	-0.967	0.061	<i>PDsym₄</i> *	-0.814	0.064	<i>PDcycle₁₀</i>	-0.065	0.136
<i>PDcum₅</i> **	-1.032	0.019	<i>PDsym₋₅</i> *	0.665	0.078	<i>PDcycle₁₁</i>	-0.120	0.108
<i>PDcum₆</i> ***	-1.095	0.004	<i>PDsym₅</i> *	-0.745	0.077	<i>PDcycle₁₂</i>	-0.037	0.501
<i>PDcum₇</i> ***	-1.142	0.001	<i>PDsym₋₆</i>	0.529	0.198			
<i>PDcum₈</i> ***	-1.059	0.001	<i>PDsym₆</i>	-0.730	0.108			

(***) significant at 1% level

(**) significant at 5% level

(*) significant at 10% level

specific *PDcum*, and relative to the rest of the time subject to our analysis. With respect to the *PDy* variables, possible election effects are tested and interpreted only for a separate time window of four quarters (one year) somewhere around the election, relative to the entire time span considered in the study.

In addition to enhancing the implications given thus far, the analysis based on the other two sets of defined political dummies, *PDsym* and *PDcycle*, provides some inconclusive indications for another hypothetical characteristic of PFCs in Hungary, that of proactive public debt accumulation. Almost all couplets of *PDsym* used in the analyses indicate that the fiscal expansion occurring before elections is somewhat higher than that of the post-election fiscal consolidation for each symmetrical time interval. More specifically, the increase in the fiscal deficit during different cumulative periods of time before elections, as captured by the significantly positive coefficients of *PDsym_(-i)*, is not fully offset by deficit contractions during the symmetrical periods of time after the elections, as captured by the significantly negative (or insignificant in some cases) coefficients of *PDsym_(i)*. This was valid for both measurements of the fiscal deficit, except for *Couplet₍₅₎* in the case of the deficit to the GDP ratio, which showed slightly stronger consolidation after elections than the respective preceding expansion and was significant at 10%. Based only on an intuitive calculation of the PFCs' net effects, the expansion during different time-intervals before the election ranged from approximately 3.6 to 28 percentage points higher than the respective contraction afterwards, in the case of the nominal deficit.¹⁰ In the case of the deficit to GDP ratio, the incline toward pre-electoral fiscal expansion ranged from approximately 0.07 to 0.37 percentage points of the GDP, except for the *PDsym₋₅* and *PDsym₅*, where the difference between the two favored post-election contractions by 0.08 percentage point of the GDP. Nevertheless, these results from the *PDsym* variables could only be considered indicative and were not statistically conclusive. Based on the results of the *Walt* test, we could not reject the null hypothesis that the sum of the estimated parameters for each *Couplet_(i)* is equal to zero for both measurements of the GDP.¹¹ This means that the empirical evidence from this sample of observations that are subject to this particular analysis is not sufficient to assert with a conventional degree of statistical confidence that fis-

cal expansions before elections are significantly higher than their respective time-symmetric contractions after elections. Therefore, by implication, we cannot conclude with statistical certainty that evident PFCs in Hungary also have an impact on the accumulation of public debt. However, the above-mentioned differences in the estimated coefficients are indicative of the hypothesized PFCs' effects on the accumulation of debt, a finding that is also supported by the results obtained when using *PDcycle_i* dummy variables. Among all three sub-sets of these variables – the first sub-set with dummy variables models a symmetrical fiscal cycle along a full incumbency, the second models a stronger expansion versus contraction phase of the fiscal cycle and the third models a stronger contraction phase – only the second type of *PDcycle* variables were statistically significant at conventional levels. With respect to the nominal deficit, *PDcycle₅* was significant at the 1% level, *PDcycle₆* and *PDcycle₈* were significant at the 5% level, and *PDcycle₇* was significant at the 10% level. While in the case of the deficit denominated as a percentage of the GDP, *PDcycle₅* and *PDcycle₆* were significant at the 1% level, the *PDcycle₇* at the 10% level and the *PDcycle₈* was not significant. Based on the *AIC* and *BIC* criteria, the best models for both measurements of fiscal deficit were those with *PDcycle₅* variables, as they entailed the closest resemblance to true fiscal cycle among all *PDcycle* variables employed in the study. It should be noted that among all variables, as designed, *PDcycle₅* is the one that emphasizes the greatest tendency toward the expansion versus contraction phase of the assumed fiscal cycle, either in the magnitude or time span. Again, these results with *PDcycle* variables are only indicative and do not infer statistically significant conclusions with regards to the hypothesized PFC effects on public debt. Further empirical analysis is needed to reach such conclusions.

4. Conclusions

In our search for political fiscal (budget) cycles in Hungary, we found clear evidence of fiscal expansion before elections and contractions after elections. Furthermore, the fiscal deficit in both nominal and GDP terms increased significantly during different cumulative time-intervals before elections, and the increase became incremental as election day approached. The increase in the deficit was not only statistically signifi-

cant but was substantial in size as the deficit increase ranged from approximately 18% above its natural long-term pattern in the cumulative terms two years before elections to approximately 70% closer to the time of the election. Fiscal expansion ceased immediately after elections, and fiscal consolidation took place at the range of 22% to 29% during four to eight cumulative quarters after the elections, completing the next phase of PFCs in Hungary. When the elections' effects on the fiscal deficit were considered in yearly time-windows around elections, we found those effects to be econometrically important only in the first yearly time-windows before and after the event.

In addition to the presence of a PFC in Hungary and consistent with the common knowledge in the field of political business cycles, we also found some evidence that such politically motivated fiscal cycles may contribute to the accumulation of public debt stock. The fiscal deficit increases prior to elections and is followed by contractions after elections, a phenomenon that leans toward the expansionary side. Nevertheless, we could not conclusively confirm with conventional statistical certainty that existing PFCs in Hungary are also an underlying factor causing the accumulation of public debt in Hungary. Further analysis, however, could reveal a statistically conclusive answer to this hypothesis.

These empirical findings support the hypothesis regarding the existence of politically motivated fiscal policy cycles in Hungary. We found indications, although not statistically significant, that PFCs may contribute to the accumulation of public debt. Therefore, the existence of a PFC can be inefficient for the economy of Hungary in medium- and long-term time-horizons.

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Endnotes

- 1 In their book "Political Cycles and Macroeconomy", Alesina, Roubini and Cohen (1997) provide a comprehensive review of the main theoretical approaches on the issue of PBC.
- 2 Nordhaus (1975) assumes that governments can control the level of unemployment by choosing the appropriate mix of economic policy (monetary and/or fiscal policy).
- 3 Net lending (+)/net borrowing(-) of the general government is the difference between total revenue and total expenditures of the general government, which is generally referred to as the overall fiscal balance (fiscal surplus or deficit) of the general government. The data used in this study were downloaded from the public source EUROSTAT, on November 2012 (<http://appsso.eurostat.ec.europa.eu/nui/settingModifyTableLayout.do>).
- 4 In Hungary, a full incumbency is 16 quarters (4 years)

- 5 *Enders (2004) provides a practical introduction to BJ methodology and intervention analysis.*
- 6 *There was no persistent seasonality in either of the two series. The inclusion of the AR(4) term in both tentatively found models accounted for slight signs of seasonality in the autocorrelation function of lag four. The augmented Dickey-Fuller test, Philips-Perron test and Kwiatkowski-Phillips-Schmidt-Shin test were employed to assess the stationarity of each time series as well as the autocorrelation and partial autocorrelation functions plots.*
- 7 *Due to the reasons explained in section 2.1, observations omitted from the analysis are 2011-Q1 and 2011-Q2. Omission was performed by employing two specific dummy variables representing these observations.*
- 8 *The selection between competing ARMA models fitting each time series was based on three formal criteria, the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and Hannan-Quinn Information Criterion (HQC). We did not encounter any case of conflicting selection guidance among these criteria. Several diagnostic formal tests and judgment means were used throughout the Box-Jenkins iterative procedure to determine the "best" ARMA model, such as the Durbin-Watson test, F-test, t-test, ACF and PACF plots, Jarque-Bera test, Q-test and residuals distribution plots.*
- 9 *Empirical results remained generally robust when other competing, "second-best" ARMA models were used.*
- 10 *Calculated as the sum of $PDsym_{i-1}$ and $PDsym_i$ when both were statistically significant or just the magnitude of $PDsym_{i-1}$ when it was significant at conventional levels.*
- 11 *ull hypothesis: Coefficient of $PDsym_{(i)}$ + Coefficient of $PDsym_{(i-1)}$ = 0; $i = (1, 2, ..., 7)$*

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APPENDIX A

TABLE A1
Nominal Fiscal Deficit (DLNNETDEF) - with "PDcum" variables (before Election)

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6		Model 7		Model 8	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.043	0.422	-0.043	0.314	-0.041	0.313	-0.037	0.357	-0.036	0.384	-0.041	0.347	-0.068	0.195	-0.081	0.156
DUM_2011Q1	-0.124	0.818	0.293	0.482	0.317	0.457	0.214	0.629	0.071	0.876	-0.057	0.899	-0.141	0.785	-0.116	0.823
DUM_2011Q2	1.240	0.028	0.585	0.154	0.397	0.344	0.380	0.385	0.463	0.302	0.596	0.186	0.901	0.093	0.926	0.084
AR(2)	-1.172	0.000	-0.739	0.000	-0.795	0.000	-0.857	0.000	-0.907	0.000	-0.934	0.000	-1.002	0.000	-0.983	0.000
AR(4)	-0.373	0.003	-0.067	0.596	-0.166	0.184	-0.248	0.047	-0.294	0.021	-0.311	0.017	-0.290	0.075	-0.262	0.115
MA(1)	-0.483	0.000	-1.014	0.000	-1.023	0.000	-1.024	0.000	-1.016	0.000	-1.003	0.000	-0.659	0.000	-0.656	0.000
MA(2)	0.934	0.000	0.940	0.000	0.938	0.000	0.936	0.000	0.933	0.000	0.931	0.000	0.688	0.000	0.682	0.000
Pdcume	0.6894	0.025														
PDcum ₁			0.788	0.000												
PDcum ₂					0.404	0.001										
PDcum ₃							0.266	0.004								
PDcum ₄									0.205	0.012						
PDcum ₅											0.183	0.020				
PDcum ₆													0.212	0.021		
PDcum ₇															0.210	0.022
Diagnostic tests																
R-squared		0.632		0.680		0.683		0.665		0.648		0.643		0.640		0.641
Adjusted R-squared		0.569		0.626		0.629		0.607		0.588		0.582		0.579		0.579
S.E. of regression		0.582		0.542		0.540		0.555		0.569		0.573		0.575		0.575
Sum squared resid		13.874		12.063		11.950		12.651		13.264		13.466		13.574		13.552
Log likelihood		-38.615		-35.187		-34.956		-36.353		-37.511		-37.883		-38.077		-38.038
F-statistic		10.068		12.459		12.632		11.608		10.801		10.550		10.421		10.447
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		0.013		0.013		0.013		0.013		0.013		0.013		0.013		0.013
S.D. dependent var		0.887		0.887		0.887		0.887		0.887		0.887		0.887		0.887
Akaike info criterion		1.903		1.763		1.753		1.810		1.858		1.873		1.881		1.879
Schwarz criterion		2.212		2.072		2.062		2.119		2.166		2.182		2.190		2.188
Hannan-Quinn criter.		2.020		1.880		1.870		1.928		1.975		1.990		1.998		1.996
Durbin-Watson stat		1.928		1.436		1.439		1.467		1.469		1.467		1.876		1.902

TABLE A2
Nominal Fiscal Deficit (DLNNETDEF) - with "PDcum" variables (after Election)

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 9		Model 10		Model 11		Model 12		Model 13		Model 14		Model 15		Model 16	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	0.043	0.521	0.047	0.358	0.062	0.154	0.064	0.121	0.074	0.073	0.091	0.059	0.118	0.023	0.141	0.007
DUM_2011Q1	0.277	0.641	-0.061	0.915	0.454	0.338	0.435	0.379	0.343	0.497	0.120	0.818	0.014	0.978	-0.121	0.791
DUM_2011Q2	0.334	0.575	0.769	0.179	0.320	0.486	0.456	0.322	0.556	0.228	0.942	0.076	1.041	0.046	0.982	0.047
AR(2)	-1.145	0.000	-0.897	0.000	-0.815	0.000	-0.895	0.000	-1.009	0.000	-0.951	0.000	-0.984	0.000	-1.016	0.000
AR(4)	-0.264	0.059	-0.153	0.372	-0.136	0.370	-0.219	0.128	-0.330	0.029	-0.212	0.212	-0.237	0.163	-0.341	0.022
MA(1)	-0.215	0.000	-0.623	0.000	-1.005	0.000	-1.004	0.000	-0.982	0.000	-0.701	0.000	-0.683	0.000	-0.897	0.000
MA(2)	0.936	0.000	0.692	0.000	0.931	0.000	0.926	0.000	0.919	0.000	0.627	0.000	0.671	0.000	0.900	0.000
PDcum ₁	-0.4489	0.227														
PDcum ₂			-0.302	0.130												
PDcum ₃					-0.289	0.009										
PDcum ₄							-0.233	0.010								
PDcum ₅									-0.208	0.014						
PDcum ₆											-0.227	0.016				
PDcum ₇													-0.255	0.005		
PDcum ₈															-0.258	0.002
Diagnostic tests																
R-squared		0.623		0.616		0.654		0.650		0.644		0.637		0.659		0.678
Adjusted R-squared		0.558		0.550		0.595		0.590		0.583		0.576		0.601		0.624
S.E. of regression		0.589		0.594		0.564		0.568		0.573		0.578		0.560		0.544
Sumsquared resid		14.234		14.489		13.039		13.222		13.446		13.675		12.846		12.131
Log likelihood		-39.242		-39.676		-37.093		-37.434		-37.846		-38.260		-36.728		-35.324
F-statistic		9.665		9.393		11.088		10.854		10.575		10.300		11.342		12.357
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		0.013		0.013		0.013		0.013		0.013		0.013		0.013		0.013
S.D. dependent var		0.887		0.887		0.887		0.887		0.887		0.887		0.887		0.887
Akaike info criterion		1.928		1.946		1.841		1.854		1.871		1.888		1.826		1.768
Schwarz criterion		2.237		2.255		2.149		2.163		2.180		2.197		2.135		2.077
Hannan-Quinn criter.		2.045		2.063		1.958		1.972		1.988		2.005		1.943		1.886
Durbin-Watson stat		2.292		1.651		1.300		1.356		1.439		1.761		1.825		1.686

TABLE A3
Nominal Fiscal Deficit (DLNNETDEF) - with "PDy" variables

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 17		Model 18		Model 19		Model 20	
<i>Explanatory variables</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Coeff.</i>	<i>Sig.</i>	<i>Coeff.</i>	<i>Sig.</i>
C	-0.036	0.384	-0.031	0.680	0.064	0.121	0.047	0.367
DUM_2011Q1	0.071	0.876	0.286	0.636	0.429	0.389	-0.375	0.506
DUM_2011Q2	0.463	0.302	0.500	0.407	0.460	0.320	0.907	0.114
AR(2)	-0.907	0.000	-1.142	0.000	-0.900	0.000	-0.955	0.000
AR(4)	-0.294	0.021	-0.267	0.053	-0.222	0.127	-0.227	0.183
MA(1)	-1.016	0.000	-0.220	0.000	-1.001	0.000	-0.566	0.000
MA(2)	0.933	0.000	0.938	0.000	0.925	0.000	0.663	0.000
PDy ₋₁	0.2048	0.012						
PDy ₋₂			0.178	0.280				
PDy ₁					-0.233	0.010		
PDy ₂							-0.150	0.197

Diagnostic tests

R-squared	0.648	0.620	0.650	0.608
Adjusted R-squared	0.588	0.555	0.590	0.541
S.E. of regression	0.569	0.592	0.568	0.600
Sumsquared resid	13.264	14.353	13.218	14.781
Log likelihood	-37.511	-39.445	-37.427	-40.166
F-statistic	10.801	9.537	10.859	9.091
Prob(F-statistic)	0.000	0.000	0.000	0.000
Mean dependent var	0.013	0.013	0.013	0.013
S.D. dependent var	0.887	0.887	0.887	0.887
Akaike info criterion	1.858	1.937	1.854	1.966
Schwarz criterion	2.166	2.245	2.163	2.275
Hannan-Quinn criter.	1.975	2.054	1.971	2.083
Durbin-Watson stat	1.469	2.349	1.359	1.896

TABLE A4
Nominal Fiscal Deficit (DLNNETDEF) - with "PDsym" variables

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 21		Model 22		Model 23		Model 24		Model 25		Model 26		Model 27	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.022	0.653	-0.029	0.556	-0.004	0.930	-0.005	0.919	-0.006	0.907	-0.015	0.825	-0.028	0.807
DUM_2011Q1	0.073	0.875	0.217	0.634	0.241	0.632	0.459	0.321	0.348	0.461	0.156	0.730	-0.036	0.935
DUM_2011Q2	1.003	0.033	0.865	0.050	0.774	0.093	0.429	0.318	0.513	0.240	0.685	0.115	0.869	0.052
AR(2)	-0.787	0.000	-0.819	0.000	-0.885	0.000	-0.887	0.000	-0.943	0.000	-0.940	0.000	-0.983	0.000
AR(4)	-0.015	0.910	-0.042	0.757	-0.149	0.286	-0.219	0.108	-0.288	0.035	-0.289	0.034	-0.317	0.034
MA(1)	-0.805	0.000	-0.806	0.000	-0.809	0.000	-1.011	0.000	-1.015	0.000	-1.013	0.000	-0.972	0.000
MA(2)	0.940	0.000	0.937	0.000	0.920	0.000	0.929	0.000	0.928	0.000	0.932	0.000	0.922	0.000
PDsym ₁	1.2756	0.000												
PDsym ₁	-0.996	0.000												
PDsym ₂			0.545	0.000										
PDsym ₂			-0.331	0.003										
PDsym ₃					0.329	0.002								
PDsym ₃					-0.293	0.009								
PDsym ₄							0.196	0.019						
PDsym ₄							-0.144	0.107						
PDsym ₅									0.171	0.035				
PDsym ₅									-0.122	0.169				
PDsym ₆											0.170	0.061		
PDsym ₆											-0.103	0.283		
PDsym ₇													0.174	0.186
PDsym ₇													-0.081	0.550

Diagnostic tests

R-squared	0.729	0.748	0.717	0.696	0.683	0.677	0.680
Adjusted R-squared	0.674	0.698	0.660	0.636	0.619	0.613	0.616
S.E. of regression	0.506	0.487	0.517	0.535	0.547	0.552	0.550
Sum squared resid	10.240	9.489	10.685	11.450	11.966	12.168	12.079
Log likelihood	-31.173	-29.308	-32.216	-33.909	-34.989	-35.399	-35.219
F-statistic	13.419	14.876	12.651	11.473	10.763	10.501	10.615
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mean dependent var	0.013	0.013	0.013	0.013	0.013	0.013	0.013
S.D. dependent var	0.887	0.887	0.887	0.887	0.887	0.887	0.887
Akaike info criterion	1.640	1.564	1.682	1.751	1.795	1.812	1.805
Schwarz criterion	1.987	1.911	2.030	2.099	2.143	2.160	2.152
Hannan-Quinn criter.	1.772	1.695	1.814	1.883	1.927	1.944	1.937
Durbin-Watson stat	1.914	1.749	1.702	1.493	1.520	1.518	1.521

TABLE A5
Nominal Fiscal Deficit (DLNNETDEF) - with "PDcycle" variables

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 28		Model 29		Model 30		Model 31		Model 32		Model 33	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.085	0.416	-0.005	0.965	0.003	0.970	0.003	0.970	-0.166	0.011	-0.150	0.057
DUM_2011Q1	-0.164	0.789	0.194	0.753	0.194	0.753	0.194	0.753	0.068	0.876	-0.267	0.594
DUM_2011Q2	0.802	0.185	0.418	0.491	0.428	0.479	0.428	0.479	0.858	0.051	1.113	0.039
AR(2)	-1.095	0.000	-1.157	0.000	-1.157	0.000	-1.157	0.000	-0.969	0.000	-1.009	0.000
AR(4)	-0.308	0.055	-0.281	0.043	-0.281	0.043	-0.281	0.043	-0.306	0.024	-0.299	0.062
MA(1)	-0.375	0.001	-0.218	0.000	-0.218	0.000	-0.218	0.000	-0.995	0.000	-0.707	0.000
MA(2)	0.811	0.000	0.938	0.000	0.938	0.000	0.938	0.000	0.927	0.000	0.695	0.000
PDcycle ₁	0.0233	0.321										
PDcycle ₂			0.006	0.833								
PDcycle ₃					0.010	0.824						
PDcycle ₄							0.003	0.824				
PDcycle ₅									0.016	0.001		
PDcycle ₆											0.027	0.018

Diagnostic tests

R-squared	0.605	0.609	0.609	0.609	0.680	0.638
Adjusted R-squared	0.538	0.542	0.542	0.542	0.626	0.576
S.E. of regression	0.603	0.600	0.600	0.600	0.542	0.577
Sum squared resid	14.895	14.760	14.758	14.758	12.065	13.663
Log likelihood	-40.354	-40.130	-40.127	-40.127	-35.191	-38.238
F-statistic	8.976	9.113	9.114	9.114	12.456	10.314
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000
Mean dependent var	0.013	0.013	0.013	0.013	0.013	0.013
S.D. dependent var	0.887	0.887	0.887	0.887	0.887	0.887
Akaike info criterion	1.974	1.964	1.964	1.964	1.763	1.887
Schwarz criterion	2.283	2.273	2.273	2.273	2.072	2.196
Hannan-Quinn criter.	2.091	2.082	2.082	2.082	1.880	2.004
Durbin-Watson stat	2.130	2.357	2.357	2.357	1.514	1.819

TABLE A6
Nominal Fiscal Deficit (DLNNETDEF) - with "PDcycle" variables

ARMA model: $DLNNETDEF = 0.015 + 0.210 \cdot DUM_2011Q1 + 0.425 \cdot DUM_2011Q2 + [AR(2)=-1.154, AR(4)=-0.279, MA(1)=-0.218, MA(2)=0.938]$

Estimated model	Model 34		Model 35		Model 36		Model 37		Model 38		Model 39	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.072	0.240	-0.056	0.310	0.042	0.628	0.104	0.193	0.081	0.232	0.043	0.544
DUM_2011Q1	-0.333	0.533	-0.317	0.559	0.267	0.668	-0.002	0.997	-0.030	0.958	-0.126	0.833
DUM_2011Q2	0.987	0.075	1.058	0.058	0.424	0.483	0.857	0.131	0.834	0.142	0.823	0.157
AR(2)	-0.977	0.000	-0.943	0.000	-1.144	0.000	-0.922	0.000	-0.939	0.000	-0.939	0.000
AR(4)	-0.253	0.131	-0.204	0.220	-0.268	0.055	-0.182	0.303	-0.202	0.250	-0.198	0.268
MA(1)	-0.630	0.000	-0.605	0.000	-0.218	0.000	-0.588	0.000	-0.582	0.001	-0.529	0.001
MA(2)	0.679	0.000	0.703	0.000	0.938	0.000	0.640	0.000	0.636	0.000	0.645	0.000
PDcycle ₇	0.018	0.061										
PDcycle ₈			0.027	0.046								
PDcycle ₉					-0.009	0.650						
PDcycle ₁₀							-0.016	0.170				
PDcycle ₁₁									-0.026	0.190		
PDcycle ₁₂											-0.009	0.541

Diagnostic tests

R-squared	0.623	0.626	0.610	0.610	0.608	0.595
Adjusted R-squared	0.559	0.562	0.544	0.544	0.541	0.526
S.E. of regression	0.589	0.587	0.599	0.599	0.600	0.610
Sum squared resid	14.215	14.112	14.699	14.705	14.777	15.273
Log likelihood	-39.209	-39.030	-40.029	-40.039	-40.159	-40.968
F-statistic	9.686	9.800	9.174	9.168	9.095	8.609
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000
Mean dependent var	0.013	0.013	0.013	0.013	0.013	0.013
S.D. dependent var	0.887	0.887	0.887	0.887	0.887	0.887
Akaike info criterion	1.927	1.920	1.960	1.961	1.966	1.999
Schwarz criterion	2.236	2.228	2.269	2.270	2.275	2.308
Hannan-Quinn criter.	2.044	2.037	2.078	2.078	2.083	2.116
Durbin-Watson stat	1.813	1.773	2.332	1.741	1.772	1.799

TABLE A7
Fiscal Deficit to GDP (DNETDEF_GDP) - with "PDcum" variables (before Election)

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 \cdot DUM_2011Q1 + 0.8794 \cdot DUM_2011Q2 + [AR(4) = 0.5765, MA(1) = -0.9545]$

Estimated model	Model 40		Model 41		Model 42		Model 43		Model 44		Model 45		Model 46		Model 47	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.182	0.256	-0.373	0.034	-0.392	0.025	-0.413	0.021	-0.424	0.022	-0.474	0.015	-0.523	0.010	-0.585	0.006
DUM_2011Q1	-0.141	0.963	0.764	0.779	0.784	0.773	0.838	0.758	0.874	0.750	0.994	0.713	1.099	0.683	1.246	0.640
DUM_2011Q2	1.432	0.634	1.534	0.570	1.559	0.564	1.612	0.551	1.643	0.546	1.770	0.511	1.882	0.482	2.037	0.443
AR(4)	0.591	0.000	0.638	0.000	0.622	0.000	0.623	0.000	0.626	0.000	0.634	0.000	0.633	0.000	0.642	0.000
MA(1)	-0.956	0.000	-0.959	0.000	-0.959	0.000	-0.960	0.000	-0.961	0.000	-0.962	0.000	-0.963	0.000	-0.965	0.000
PDcum ₂	0.975	0.491														
PDcum ₁			3.179	0.014												
PDcum ₂					1.8117	0.010										
PDcum ₃							1.325	0.009								
PDcum ₄									1.050	0.012						
PDcum ₅											0.994	0.007				
PDcum ₆													0.975	0.005		
PDcum ₇															0.991	0.003
Diagnostic tests																
R-squared		0.575		0.628		0.633		0.634		0.628		0.635		0.641		0.647
Adjusted R-squared		0.525		0.585		0.590		0.591		0.585		0.593		0.599		0.606
S.E. of regression		3.211		3.003		2.984		2.981		3.002		2.974		2.950		2.924
Sumsquared resid		443.283		387.711		382.859		382.049		387.490		380.312		374.232		367.526
Log likelihood		-123.487		-120.205		-119.896		-119.844		-120.191		-119.733		-119.338		-118.895
F-statistic		11.625		14.523		14.816		14.866		14.537		14.973		15.356		15.793
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006
S.D. dependent var		4.660		4.660		4.660		4.660		4.660		4.660		4.660		4.660
Akaike info criterion		5.285		5.151		5.139		5.137		5.151		5.132		5.116		5.098
Schwarz criterion		5.517		5.383		5.370		5.368		5.382		5.364		5.347		5.329
Hannan-Quinn criter.		5.373		5.239		5.227		5.224		5.239		5.220		5.204		5.186
Durbin-Watson stat		1.666		1.722		1.804		1.816		1.852		1.858		1.890		1.920

TABLE A8
Fiscal Deficit to GDP (DNETDEF_GDP) - with "PDcum" variables (after Election)

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 \cdot DUM_2011Q1 + 0.8794 \cdot DUM_2011Q2 + [AR(4) = 0.5765, MA(1) = -0.9545]$

Estimated model	Model 48		Model 49		Model 50		Model 51		Model 52		Model 53		Model 54		Model 55	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.051	0.739	-0.027	0.868	0.046	0.787	0.113	0.535	0.181	0.351	0.250	0.225	0.321	0.126	0.345	0.109
DUM_2011Q1	0.663	0.830	1.026	0.745	2.083	0.520	2.139	0.481	2.015	0.481	1.726	0.520	1.190	0.639	0.958	0.710
DUM_2011Q2	0.553	0.853	0.465	0.875	0.216	0.940	1.005	0.716	1.782	0.513	2.502	0.348	3.077	0.235	2.758	0.292
AR(4)	0.582	0.000	0.593	0.000	0.614	0.000	0.631	0.000	0.654	0.000	0.681	0.000	0.693	0.000	0.669	0.000
MA(1)	-0.953	0.000	-0.952	0.000	-0.950	0.000	-0.947	0.000	-0.949	0.000	-0.954	0.000	-0.961	0.000	-0.970	0.000
PDcum ₁	-0.828	0.568														
PDcum ₂			-0.649	0.431												
PDcum ₃					-0.8824	0.165										
PDcum ₄							-0.967	0.061								
PDcum ₅									-1.032	0.019						
PDcum ₆											-1.095	0.004				
PDcum ₇													-1.142	0.001		
PDcum ₈															-1.059	0.001
Diagnostic tests																
R-squared		0.573		0.577		0.593		0.610		0.626		0.645		0.665		0.659
Adjusted R-squared		0.524		0.528		0.545		0.565		0.583		0.604		0.626		0.619
S.E. of regression		3.216		3.203		3.142		3.075		3.009		2.933		2.849		2.876
Sum squared resid		444.776		441.140		424.517		406.562		389.408		369.832		349.118		355.748
Log likelihood		-123.569		-123.368		-122.427		-121.368		-120.312		-119.048		-117.636		-118.097
F-statistic		11.557		11.723		12.519		13.451		14.423		15.641		17.080		16.601
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006
S.D. dependent var		4.660		4.660		4.660		4.660		4.660		4.660		4.660		4.660
Akaike info criterion		5.289		5.280		5.242		5.199		5.156		5.104		5.046		5.065
Schwarz criterion		5.520		5.512		5.474		5.430		5.387		5.336		5.278		5.297
Hannan-Quinn criter.		5.376		5.368		5.330		5.287		5.243		5.192		5.134		5.153
Durbin-Watson stat		1.611		1.649		1.680		1.739		1.844		1.948		1.984		2.004

TABLE A9
Fiscal Deficit to GDP (DNETDEF_GDP) - with "PDy" variables

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 * DUM_2011Q1 + 0.8794 * DUM_2011Q2 + [AR(4)=0.5765, MA(1)=-0.9545]$

Estimated model	Model 56		Model 57		Model 58		Model 59	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.421	0.022	-0.248	0.180	0.111	0.000	0.032	0.879
DUM_2011Q1	0.323	0.906	0.529	0.856	2.107	0.000	-0.563	0.855
DUM_2011Q2	2.025	0.462	1.227	0.673	0.999	0.545	1.588	0.598
AR(4)	0.627	0.000	0.588	0.000	0.629	0.489	0.567	0.000
MA(1)	-0.961	0.000	-0.957	0.000	-0.947	0.718	-0.962	0.000
PDy ₋₁	1.010	0.018						
PDy ₋₂			0.574	0.199				
PDy ₁					-0.954	0.066		
PDy ₂							-0.508	0.291

Diagnostic tests

R-squared	0.624	0.587	0.609	0.581
Adjusted R-squared	0.580	0.538	0.563	0.532
S.E. of regression	3.020	3.166	3.079	3.187
Sum squared resid	392.134	430.989	407.674	436.820
Log likelihood	-120.483	-122.797	-121.435	-123.127
F-statistic	14.263	12.201	13.391	11.924
Prob(F-statistic)	0.000	0.000	0.000	0.000
Mean dependent var	-0.006	-0.006	-0.006	-0.006
S.D. dependent var	4.660	4.660	4.660	4.660
Akaike info criterion	5.163	5.257	5.201	5.270
Schwarz criterion	5.394	5.489	5.433	5.502
Hannan-Quinn criter.	5.250	5.345	5.289	5.358
Durbin-Watson stat	1.808	1.702	1.734	1.687

TABLE A10
Fiscal Deficit to GDP (DNETDEF_GDP) - with "PDsym" variables

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 * DUM_2011Q1 + 0.8794 * DUM_2011Q2 + [AR(4)=0.5765, MA(1)=-0.9545]$

Estimated model	Model 60		Model 61		Model 62		Model 63		Model 64		Model 65		Model 66	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.150	0.401	-0.244	0.253	-0.230	0.313	-0.212	0.391	-0.166	0.554	-0.119	0.736	0.216	0.721
DUM_2011Q1	0.652	0.826	1.813	0.524	2.401	0.410	1.999	0.474	1.741	0.522	1.479	0.575	1.166	0.650
DUM_2011Q2	1.412	0.629	1.426	0.600	1.306	0.626	2.036	0.442	2.443	0.357	2.779	0.291	3.063	0.243
AR(4)	0.634	0.000	0.681	0.000	0.675	0.000	0.676	0.000	0.682	0.000	0.692	0.000	0.692	0.000
MA(1)	-0.955	0.000	-0.956	0.000	-0.954	0.000	-0.954	0.000	-0.956	0.000	-0.960	0.000	-0.962	0.000
PDsym ₁	2.740	0.118												
PDsym ₁	-2.639	0.135												
PDsym ₂			1.896	0.012										
PDsym ₂			-1.521	0.050										
PDsym ₃					1.204	0.013								
PDsym ₃					-1.025	0.054								
PDsym ₄							0.886	0.026						
PDsym ₄							-0.814	0.064						
PDsym ₅									0.665	0.078				
PDsym ₅									-0.745	0.077				
PDsym ₆											0.529	0.198		
PDsym ₆											-0.730	0.108		
PDsym ₇													0.121	0.851
PDsym ₇													-1.030	0.134
Diagnostic tests														
R-squared		0.597		0.633		0.647		0.653		0.653		0.659		0.665
Adjusted R-squared		0.539		0.581		0.596		0.603		0.603		0.610		0.618
S.E. of regression		3.164		3.017		2.961		2.936		2.936		2.911		2.882
Sum squared resid		420.524		382.249		368.206		361.999		362.062		355.792		348.835
Log likelihood		-122.195		-119.857		-118.940		-118.524		-118.528		-118.100		-117.616
F-statistic		10.353		12.090		12.818		13.158		13.155		13.510		13.919
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006
S.D. dependent var		4.660		4.660		4.660		4.660		4.660		4.660		4.660
Akaike info criterion		5.273		5.178		5.140		5.123		5.124		5.106		5.086
Schwarz criterion		5.544		5.448		5.411		5.394		5.394		5.376		5.357
Hannan-Quinn criter.		5.376		5.280		5.243		5.226		5.226		5.209		5.189
Durbin-Watson stat		1.807		1.878		1.914		1.936		1.992		2.008		1.990

TABLE A11
Fiscal Deficit to GDP (DNETDEF GDP) - with "PDcycle" variables

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 * DUM_2011Q1 + 0.8794 * DUM_2011Q2 + [AR(4)=0.5765, MA(1)=-0.9545]$

Estimated model	Model 67		Model 68		Model 69		Model 70		Model 71		Model 72	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.367	0.237	-0.195	0.497	-0.175	0.355	-0.175	0.355	-0.969	0.001	-0.908	0.003
DUM_2011Q1	-0.302	0.921	0.000	1.000	-0.106	0.973	-0.106	0.973	0.450	0.862	-0.333	0.902
DUM_2011Q2	1.300	0.661	1.003	0.736	1.131	0.706	1.131	0.706	3.277	0.218	3.245	0.246
AR(4)	0.577	0.000	0.575	0.000	0.576	0.000	0.576	0.000	0.675	0.000	0.642	0.000
MA(1)	-0.959	0.000	-0.956	0.000	-0.956	0.000	-0.956	0.000	-0.965	0.000	-0.966	0.000
PDcycle ₁	0.062	0.417										
PDcycle ₂			0.024	0.763								
PDcycle ₃					0.0505	0.691						
PDcycle ₄							0.017	0.691				
PDcycle ₅									0.070	0.002		
PDcycle ₆											0.122	0.009

Diagnostic tests

R-squared	0.578	0.571	0.572	0.572	0.655	0.635
Adjusted R-squared	0.528	0.521	0.522	0.522	0.615	0.592
S.E. of regression	3.200	3.226	3.223	3.223	2.891	2.975
Sum squared resid	440.399	447.510	446.638	446.638	359.336	380.562
Log likelihood	-123.327	-123.719	-123.671	-123.671	-118.343	-119.749
F-statistic	11.757	11.433	11.473	11.473	16.349	14.958
Prob(F-statistic)	0.000	0.000	0.000	0.000	0.000	0.000
Mean dependent var	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
S.D. dependent var	4.660	4.660	4.660	4.660	4.660	4.660
Akaike info criterion	5.279	5.295	5.293	5.293	5.075	5.133
Schwarz criterion	5.510	5.526	5.524	5.524	5.307	5.364
Hannan-Quinn criter.	5.367	5.383	5.381	5.381	5.163	5.220
Durbin-Watson stat	1.657	1.629	1.632	1.632	1.982	1.897

TABLE A12
Fiscal Deficit to GDP (DNETDEF_GDP) - with "PDcycle" variables

ARMA model: $DNETDEF_GDP = -0.1061 + 0.2176 \cdot DUM_2011Q1 + 0.8794 \cdot DUM_2011Q2 + [AR(4) = 0.5765, MA(1) = -0.9545]$

Estimated model	Model 73		Model 74		Model 75		Model 76		Model 77		Model 78	
Explanatory variables	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.	Coeff.	Sig.
C	-0.462	0.031	-0.321	0.080	-0.110	0.586	0.294	0.281	0.232	0.311	0.044	0.847
DUM_2011Q1	-0.481	0.868	-0.338	0.909	0.196	0.951	1.510	0.618	1.518	0.612	0.873	0.782
DUM_2011Q2	2.121	0.463	1.747	0.550	0.893	0.766	0.926	0.743	0.978	0.728	0.698	0.812
AR(4)	0.603	0.000	0.596	0.000	0.576	0.000	0.613	0.000	0.614	0.000	0.588	0.000
MA(1)	-0.963	0.000	-0.959	0.000	-0.955	0.000	-0.950	0.000	-0.951	0.000	-0.952	0.000
PDcycle ₇	0.066	0.081										
PDcycle ₈			0.073	0.172								
PDcycle ₉					0.0012	0.983						
PDcycle ₁₀							-0.065	0.136				
PDcycle ₁₁									-0.120	0.108		
PDcycle ₁₂											-0.037	0.501
Diagnostic tests												
R-squared		0.602		0.590		0.570		0.596		0.599		0.575
Adjusted R-squared		0.556		0.543		0.520		0.549		0.553		0.526
S.E. of regression		3.105		3.152		3.230		3.130		3.117		3.209
Sumsquared resid		414.581		427.104		448.665		421.330		417.886		442.704
Log likelihood		-121.847		-122.576		-123.782		-122.242		-122.041		-123.455
F-statistic		13.025		12.391		11.382		12.678		12.854		11.651
Prob(F-statistic)		0.000		0.000		0.000		0.000		0.000		0.000
Mean dependent var		-0.006		-0.006		-0.006		-0.006		-0.006		-0.006
S.D. dependent var		4.660		4.660		4.660		4.660		4.660		4.660
Akaike info criterion		5.218		5.248		5.297		5.234		5.226		5.284
Schwarz criterion		5.450		5.480		5.529		5.466		5.458		5.516
Hannan-Quinn criter.		5.306		5.336		5.385		5.322		5.314		5.372
Durbin-Watson stat		1.749		1.692		1.623		1.698		1.716		1.634

