BUDGET DEFICITS AND POLITICAL CYCLES:
THE CASE OF GREECE

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ABSTRACT

This paper studies whether the Greek budget deficit is systematically affected by the timing of elections and of changes of government. The period of study is 1970-2013, with a conservative and a socialist political party alternating in office. We use an unrestricted VAR model to test the impact of each of the two parties upon the budget deficit as a proportion of GDP during election and non-election years. We advance the existing literature by constructing a tax evasion variable specific to the Greek economy on the basis of Feige (1989) and incorporating it into our models. Our results assert that in all cases tax evasion significantly impacts the variation of the budget deficit over GDP in Greece over the period examined. While, political party conduct has a higher explanatory power in non-election years than in election years, we find that in both cases the conservative party accounts for a larger proportion of the variation in the deficit-to-GDP ratio than the socialist party.

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1.   INTRODUCTION

Since the seminal works of Nordhaus (1975) and Hibbs(1977)a substantial body of research hasbeen directed toexploringwhether macroeconomic policy is a potential causeof fluctuations in economic activity. In general, the study of so-called political cycles hascentered around two types of models: "Opportunistic" and "Partisan". The former assume that politicians irrespectively of ideology are only interested in their re-appointment, while the latter assume that politicians act in a partisan way, with socialist governments trying to reduce unemployment at the expense of higher inflation and vice versa for conservative governments.

In each of these strands of thought, the incorporation of rational expectations advances respective traditional analyses. For example, traditional opportunistic models consider non-rational adaptive expectations and retrospective behavior that create cycles entirely because of the opportunistic behavior of the incumbent, whereas rational opportunistic models consider a rationally formed inflation expectations framework and a forward-looking electorate, which generate cycles because of information asymmetries caused by timing assumptions. Similarly, traditional partisan models with adaptive inflation expectations imply that expectations take time to adjust and, therefore, yield long cycles. In contrast, rational partisan models assume forward looking voting behavior, with expectations adjusting immediately thus producing short cycles. Nevertheless, both partisan models generate some form of a cycle, be that because of different party preferences or because of the uncertainty in election outcomes.

In spite of its remarkable advances and refinements, the theory of political cycles has not yet fully captured the link between budget cycles and tax evasion. In the case of Greece, although the relationship between tax evasion and political cycles has been documented, this has only been in the context of the increasing misgovernance that prevails around election time (Skouras and Christodoulakis, 2011). However, it was obvious from the outset of the current crisis that there is a link between tax evasion and the budget deficit. For example, a recent study by Artavanis et al. (2012) estimates the foregone government revenues from tax evasion to 31 percent of the Greek budget deficit for 2009. Similarly, the Bank of Greece spotted the gap between what Greek taxpayers owed and what they paid in 2010 being about a third of total tax revenue, roughly the size of the country's budget deficit in that year[1].

With this motivation, we construct a tax evasion variable specific to the Greek economy on the basis of Feige (1989), aiming to fill this gap in political cycles research. The purpose of this paper is to investigate whether the Greek budget deficit is systematically affected by the timing of elections and changes of government. The period of study is 1970-2013, with a conservative and a socialist political party alternating in power. We employ an unrestricted VAR model to test the impact of each of the two parties upon the budget deficit as a proportion of GDP during election and non-election years. We extend the existing literature by constructing a tax evasion variable specific to the Greek economy on the basis of Feige (1989) and incorporate that index as an explanatory variable in each of the four different models that we test.

Overall our results assert that tax evasion significantly impacts the variation of the budget deficit over GDP in Greece over 1970-2013, accounting from about one-fifth of the variation

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[1]Reported in *The New Yorker* magazine, July 11, 2011.

in election years to about one-fourth in non-election years. Moreover, there appears to be no significant differentiation in the importance of tax evasion in either case of the political parties that alternated in power in Greece in the period considered. However, we observe that both in election and non-election periods the conservative party accounts for nearly 25% of the variability in the deficit-to-GDP ratio, while the socialist party accounts for a more moderate 17%. In general, it appears that political party conduct has a higher explanatory power in non-election years than in election years.

The rest of the paper is organized as follows: A brief survey of related literature is conducted in section 2. Section 3 outlines the hypotheses tested in the paper and describes the methodology employed. Section 4 presents the description of data and the selection of variables. Our empirical findings are discussed in section 5 and concluding remarks are made in section 6.

2.   LITERATURE REVIEW

Opportunistic models of political cycles follow the work of Nordhaus (1975), where the incumbent stimulates the economy before the election period so as to get re-elected. In general, opportunistic non-rational expectations models are consistent with expansion a year or two before the elections, as well as GDP growth higher than potential and unemployment below its natural rate duringthe election year. Inflation begins to escalate around election time and thereafter a recession follows with gradual decline in inflation. By and large there are no differences in policies and outcomes between different political parties in power, with incumbents being re-electedin election years, during which growth is high and unemployment is low.The main criticism against traditional opportunistic models is the assumption of naïve voters, who reward rather than punish an incumbent who engages in pre-electoral manipulation (Drazen, 2000).

This weakness prompted research in the direction of opportunistic models with rational voters. Subsequent work by Cukierman and Meltzer (1986), Rogoff and Sibert (1988), Rogoff (1990), and Persson and Tabellini (1990) sought to incorporate rational expectations into the opportunistic conceptual framework.Such models assume short-run manipulation of policy instruments immediately before elections. Specifically, expansionary policies are followed in the two to three quarters before each election, while tightening of monetary and fiscal policies is pursued after elections. In the context of a rationally formed inflation expectations framework and a forward-looking electorate, cycles are generated because of information asymmetries caused by timing assumptions and incumbents are reappointed when growth is high and unemployment is low in election years.

The second strand of thought in political cycles theory, namely partisan models was put forward by Hibbs (1977, 1992). Hibbs's approach identifies a political cycle in which different parties in office, motivated by different partisan ideologies, deliberatelyimplement two different policies: socialist parties tend to tackle unemployment, while conservative parties tend to combat inflation.Politicians are assumed to always act in a partisan way while in office, with socialist governments always adopting a lower target for unemployment and higher targets for growth and inflation than conservative governments.In addition, the adaptive expectations of voters assumed by Hibbs (1992) imply that expectations take time to adjust and, therefore, the model produces long-lasting cycles of economic activity.In contrast, in rational partisanmodels expectations adjust immediately after wage contracts are renewed,

thus yielding short-lived cycles. Incorporation of rational expectations in partisan political cycles models is largely attributed to Alesina (1987, 1988a, 1988b), who builds a rational expectations model in a partisan framework, wherevoterscannot be systematically fooled, implying that an incumbent's repeated opportunistic behavior is punished by the electorate. In rational partisan models short-run partisan effects are present after elections, with unemployment temporarily falling and correspondingly GDP growth temporarily shootinghigher for about two years after an electoral victory of a socialist party and growth temporarily lower for about two years after an electoral victory of a conservative party. In line with these findings, inflation is found to be permanently higher when socialists are in office compared to conservatives in office (Gauthier, 2002).

Both opportunistic and partisan models have been tested extensively, although results have been mixed. Chappell and Peel (1979) replicated the Nordhaus model to analyze if votes cast in elections are related to business cycles by identifying what economic policies would maximize votes vs. what economic policies would be used by the government if it were allowed to be in power for an indefinite period. They use as variables the rate of inflation and the rate of unemployment and assume the period between elections to be fixed. Their findings show that in general under a fixed period between elections, unemployment and inflation are not stable, the optimal period between elections rises with the natural rate of unemployment and inflation, while the optimal time between elections is longer than the timing observed in practice.

In a subsequent study Chappell (1990) focused on issues relating to data limitations.To improve data efficiency Chappell (1990) estimatedvote and political support functions for US respondents, assuming that they evaluate economic and political conditions in the same manner. His model comprisestwo equations, one for political approval and similar to the Gallup poll, and one for presidential voting. He hypothesizes that voters and poll respondents reward the existence of higher income and low unemployment rates. In the approval rating equation the study finds that coefficients for output, unemployment and inflation do indeed matter. Similar results were obtained for the voting equation, albeit of lower significance. An interesting finding was that for both poll respondents and voters, unemployment was rather insignificant, as both were concernedprimarily with inflation and to a lesser extent with output growth rates.

Alesina and Roubini (1992)analyzed the empirical evidence of the political business cycles models in 18 OECD countries during 1960-87. They used both the Nordhaus original traditional non-rational opportunistic model, as well as more recent rational models. Their results confirm that there is an increase in the inflation rate around elections. Moreover, they assert that there is a tendency of a rush toward early elections when a country is in good economic condition. However, they find no evidence of opportunistic cycles for output or unemployment in any OECD country except for Germany and New Zealand. Their findings imply that the behavior of growth, unemployment and inflation is not affected by the timing of elections or government changes in most OECD countries. Inflation generally tends to increase after elections as a result of expansionary monetary and fiscal policies pursued in pre-election time. Also, although left-wing parties tend to be more concerned with unemployment and right-wing parties tend to be more concerned with reducing inflation, no partisan theory effects are traced and no evidence of permanent differences in output and unemployment is found.

In a follow up study, Alesina et al. (1992) reexamined the evidence for the existence of political cycles in the OECD countries studied in Alesina and Rubini (1992). This time they tried to determine if governments manipulate economies at pre-election time through fiscal and monetary policies or act opportunistically. Existence of political monetary cycles was detected to occur frequently but not systematically. As a concluding remark on the paper's findings, they claim that evidence is more supportive for the rational model on political business cycles. In general, governments in pre-election periods avoid strict monetary and fiscal policies, while in some cases they might follow a mix of expansionary policies.

Collective international fiscal or monetary objectives also seem to dampen the prospects of the emergence of individual national political business cycles. Andrikopoulos, Loizides, andProdromidis (2003) in a study of incumbent governments of the then 14 member states of the European Union during the 1970-1978 period searched for electoral and partisan cycle regularities using three filtering procedures. They found that not only was there scant evidence for partisan political cycles in the fiscal instruments and the target variables, but instead individual EU governments pursued stabilization policies with political cycles aiming at curbing inflation and unemployment. The authors concluded that this facilitated the task of the European Commission to lay the groundwork for a federal-type fiscal policy and the introduction of the Euro.Similarly, in a study on political cycles in 10 Eastern European countries and EU candidates it was found that countries withdependent central banks and flexible exchange rates had loosermonetary policies in electoral periods than in non-electoralperiods. If a country operated in a fixed exchange rate regime, it manipulated its economy in election years by running larger budgets, rather than via more expansionary monetary policy (Halleberg and Vinhas de Souza, 2002).

Early models of political cycles, whether opportunistic or partisan, were based on monetary policy as the driving force. Expansionary monetary policy was thought to be leading to a temporary increase in economic activity followed, with a lag, by an increase in inflation. With the work of Drazen (2000) political business cycles theory turned to fiscal policy as the driving force, especially for opportunistic cycles. More recently, empirical work focused on developing countries, finding strong support forthe existence of political cyclesduring democratic transitions and nascent democracies (see, for example, Block, Ferree and Singh, 2003; Akhmedov and Zhuravskaya, 2004; Shi and Svensson, 2006; Barberia and Avelino, 2011).These studies indicate that the size of political budget cycles is much larger in developingcountries than in developed countries, whether elections are predetermined or not. More importantly, there is evidence that the size of political budget cycles depends on institutional features of the country.These results are echoed and extended by Hanusch and Keefer (2012), whose research suggests that political budget cycles –concentrated government expenditures around elections due to vote-buying – are greatest incuntries with weakly institutionalized parties.

3.   DATA AND METHODOLOGY

For the purposes of this study, we collected annual data for Greece for the1970 to 2013 period. The data was retrieved from annual publications of the European Union Commission and the Bank of Greece.Specifically, the tax evasion variable (*A*) was constructed according to (Feige etal., 2011) by collecting figures on cash and deposits. We assumed a value of $K_0=3$ in 1970, the year tax evasion is assumed to be minimum(junta period in Greece). Table

1provides the definition of all variables used in the analysis.Tables 2 and 3 present the descriptive statistics and the correlogram of our variables.

Table 1. Definitions of Endogenous and Predetermined Variables

Endogenous Variables	
G	Government Expenditure
T	Tax Revenues
D1	General Government Deficit,(G-T)/GDP
Y	Greek Growth Rate
YE	Euro Area Growth Rate
B	Debt/GDP
r	Interest Rate on Greek Bonds
γ	Growth Rate of Greek Debt
R	$1+(r-\gamma/1+\gamma)$
R1=R*B	Assuming values in non- election years when the conservative party is in power
R2=R*B	Assuming values in non- election years when the socialist party is in power
R3=R*B	Assuming values in election years when the conservative party is in power
R4=R*B	Assuming values in election years when the socialist party is in power
A	Tax Evasion Variable=$(cash-k_0*dept)/(k_0+1)dept$
$K_0=3$	Ratio cash/deposits in 1970 where tax evasion is assumed to be minimum
Predetermined Variables	
MA(Maastricht Treaty)	Binary Variable assuming the value of 1 since 2002 and the value 0 everywhere else
P(Political Party)	Binary Variable assuming the value of 1 when the socialist party is in power and the value of 0 when the conservative party is in power
E(Election Year)	Binary Variable assuming the value of 1 for election year and zero otherwise

Table 2.   Descriptive Statistics

	D1	DY	A	R1	R2	R3	R4
Mean	0.011614	-0.001273	0.049507	0.309068	0.422523	0.125477	0.108000
Median	0.008500	0.003000	0.011178	0.168000	0.000000	0.000000	0.000000
Maximum	0.088000	0.048000	0.956571	1.762000	1.703000	1.183000	1.569000
Minimum	-0.044000	-0.086000	-0.522414	0.000000	0.000000	0.000000	0.000000
Std.Dev	0.032304	0.027747	0.506632	0.443117	0.519282	0.315880	0.330698

Table 3.   Correlogram

	D1	A	DY	R1	R2	R3	R4
D1	1.000000	0.022261	-0.396856	0.128932	-0.124420	0.312590	-0.068438
A	0.022261	1.000000	0.123666	-0.271385	-0.481209	-0.224422	-0.166454
DY	-0.396856	0.123666	1.000000	0.096221	-0.411772	0.143080	-0.242286
R1	0.128932	-0.271385	0.096221	1.000000	-0.580720	0.544453	-0.233084
R2	-0.124420	-0.481209	-0.411772	-0.580720	1.000000	-0.330730	0.434431
R3	0.312590	-0.224422	0.143080	0.544453	-0.330730	1.000000	-0.132745
R4	-0.068438	-0.166454	-0.242286	-0.233084	0.434431	-0.132745	1.000000

In the best interest of our hypotheses testing, we employ a vector autoregression (VAR) to model the joint short- and long-term (if any) dynamics and causal relationships among the set of our variables. First introduced by Sims (1980), VAR is the generalization of the univariate autoregressive model to a vector of economic variables, when they are assumed to be endogenously determined.Suppose we have a model of the form:

$$A_0 x_t = A_1 x_{t-1} + u_t$$

In our case, x_t is a vector of 6 variables: x_t= (**D1$_t$, DYt, R1t, R2t, R3t, R4t**). This is the structural form of the model. The contemporaneous values of the variables are linked through the matrix A_0 and we assume that the innovations are uncorrelated.The reduced form of the model is:

$$x_t = A_0^{-1} A_1 x_{t-1} + A_0^{-1} u_t = B x_{t-1} + v_t$$

Although themodel can be estimated by OLS, the residuals would not beorthogonal.In the model

$$x_t = B x_{t-1} + v_t$$
$$V(v) = \Sigma$$

given that the variance matrix of the errors is positive, there exists a lower triangular matrix P such that

$$PP^T = \Sigma$$

It follows that pre-multiplying the model by the inverse of Pwill generate a model in which the errors are orthogonal since

$$P^{-1} \Sigma \left(P^{-1} \right)^T = I_k$$

Therefore, we define a VAR (p) model of order $p$as a system of 7 linear equations with each equation describing the dynamics of one variable as a linear function of the previous p lags of every variable in the system, including its own $p$lags.We select an optimal lag structure p for the vector of 6 variables:

$$x_t= (\textbf{D1}_t,\textbf{DYt, A, R1t, R2t, R3t, R4t}).$$

The *innovations* are assumed to be zero-mean random variables, $E(\mathcal{C}_{1t}) = E(\mathcal{C}_{2t}) = \ldots..=0$, with constant variance, possibly correlated, $cov(\mathcal{C}_{it}\mathcal{C}_{kt}) \neq 0$ for i≠k, and with normal *probability density functions*.

The joint dynamics are captured in two ways: in the first place, each variable is explained by the past history of every variable – $D1_t$ is a function of its own past and the past of the

other variables in the system $\{D1_{t-1}, D1_{t-2}, \ldots D1_{t-p}, DY_{t-2}, \ldots DY_{t-p}, \ldots\}$; secondly, the innovations may be contemporaneously correlated, that is, $\sigma_{12} \neq 0$.

Since every equation in the VAR has the same number of variables on the right-hand side, the coefficients $\{\alpha_1, \alpha_2, \ldots, \beta_{11}, \beta_{21}, \ldots, \gamma_{11}, \gamma_{21}, \ldots\}$ of the overall system are easily estimated by applying *ordinary least squares* (OLS) to each equation individually. The OLS estimator has the standard asymptotic properties. In large samples, the OLS estimator is *consistent* and *asymptotically normally* distributed.Since the OLS estimator has standard asymptotic properties, it is possible to test any linear restriction, either in one equation or across equations, with the standard *t* and *F* statistics.

The lag length *p* is chosen by statistical testing or by minimizing some *information criteria*. Testing is carried out by constructing either the *F*-statistic (based on the comparison of the sum of squared residuals for the restricted and unrestricted specifications) or an *asymptotic likelihood test* (based on the comparison of the value of the likelihood function for the restricted and unrestricted specifications).When choosing between alternative models there is alwaysa conflict between minimising the residual sum of squaresand keeping the number of estimated parameters to aminimum.The two criteria most often usedto decide between alternative models are the *Akaike* and the *Schwartz* information criteria.

It is of interest next to see if one or more variables have predictive content to forecast the other variables of interest. For instance, in our case we are interested to see if D*Y*(the growth rate of output) is helpful in predicting *D1*(the government budget deficit). The corresponding null hypothesis is that all the coefficients on the lags of *Y* are zero, or that

$$H_0: \gamma_{11} = \gamma_{12} = 0$$

If these coefficients are zero, D*Y* does not Granger-cause *D1* or, equivalently, *Y* does not have any predictive content to forecast *D1*. The null hypothesis can be tested with a standard *F*-statistic known as the Granger Causality Test.

An important use of a VAR is to quantify the effects of economic policyover time. Suppose that expansionary fiscal policy is implemented thus causing a shock on aggregate demand. The question then is when, for how long, and by how much does the shock to aggregate demand impactthe deficit as a proportion of GDP. An impulse-response function describes the response over time of each variable in the VAR to a one-time shock in any given variable, while keeping all other variables constant. For our system described above, one getsfourteen impulse-response functions: the impact and future effects on $D1_t$, DY_t, $R1_t$, $R2_t$, $R3_t$, and $R4_t$ of a unit shock to ε_1; the impact and future effects on $D1_t$, DY_t, $R1_t$, $R2_t$, $R3_t$, and $R4_t$ of a unit shock to ε_2 and so on. We are only interested in the first set of reactions of all other variables on D1. Closely related to the impulse-response function is the *variance decomposition*, which refers to the contribution of each innovation to the variance of the forecast error associated with the forecast of each variable in the VAR.

To obtain a deeper insight and a more constructive interpretation of our findings, we test four different models. Model 1 allows us to test the joint effect of *R1*, *R2* and *A* on the deficit as a proportion of GDP. Model 2 allows us to test the joint effect of *R3*, *R4* and *A* on the deficit as a proportion of GDP. Model 3 allows us to test the joint effect of *R1*, *R3* and *A* on the deficit as a proportion of GDP. Finally, model 4 allows us to test the joint effect of *R2*, *R4* and *A* on the deficit as a proportion of GDP.

Thus, we formulate the following hypotheses:

Hypothesis I: We assert that non-electorate periods when either party is in power, R1 for conservatives and R2 for socialists, as well as tax evasion, A, explain a significant part of the variation in the budget deficit as a proportion f the GDP. We expect that the socialist party, R2, will have a stronger influence.

Hypothesis II: We assert that election periods both the conservative party, R3, and the socialist party, R4, as well as tax evasion, A, explain a significant part of the variation in the budget deficit as a proportion f the GDP. We expect that the socialist party influence, R4, will be stronger.

Hypothesis III: We assert that the conservative party both in election and non-election periods together with tax evasion, A, explain a significant part of the variation in the budget deficit as a proportion f the GDP.

Hypothesis IV: We assert that the socialist party both in election and non-election periods together with tax evasion, A, explain a significant part, higher than the part under the conservative regime, of the variation in the budget deficit as a proportion f the GDP.

4. EMPIRICAL FINDINGS AND DISCUSSION

All variables are initially checked for stationarity through the Kwiatkowski et al. (1992, thereafter referred to as KPSS) test. Given the limited sample, the KPSS is more robust relative to other unit-root tests.Table 4 reports the results from the test for selected variables. All variables are *I(0)* as constructed and so we proceed with our estimation. Finally, all relevant variables were checked for cointegration but there was none. Thus, we proceed with the estimation of a VAR model.

Table 4.   Unit Root Testing

	KPSS
D1	0.0935
A	0.0996
DY	0.1628
R1	0.3765
R2	0.4574
R3	0.2808
R4	0.3247

Critical Values:0.739 at 1%; 0.463 at5%; 0.347at 10%.

Panels A,B,C and D of Table 5 present the variance decomposition results for each of the four tested models. Each model's optimal lag length was determined at 2 by all information criteria.

Panel Aresults indicate thatin non-election years the tax evasion variable (A), conservative party conduct (R1) and socialist party conduct (R2) together account for about 37% of the variation in the budget deficit (as a proportion of GDP, DI) six years after the initial shock.In contrast to non-election years, the results obtained for general election years

presented in Panel Bshow that none of the two parties has a significant influence on the variability of the budget deficit, while the tax evasion variable continues to explain a significant proportion of that variability. Indeed, in this case the importance of tax evasion increases slightly compared to panel A, from just over 19% to just under 21%.

When examining the impact of the tax evasion variable and conservative party conduct in non-election (R1) and election (R3) years (see Panel C), the explanatory power of the three variables together reaches nearly 49% of the variation in DI.About half of that is attributable to tax evasion.Finally, when examining the impact of A and socialist party conduct in non-election (R2) and election (R4) years, the explanatory power of the three variables together approaches 40% of the variation in the budget deficit. Again, the tax evasion variable accounts for more than half of the variation in the budget deficit.

These results assert that tax evasion is responsible for a significant part of the variation in the Greek budget deficit. During the period examined (1970-2013), tax evasion explains one-fifth to one-fourth of the deficit to GDP ratio fluctuation. Moreover, the explanatory power of the tax evasion variable increases slightly during election years, but is more pronounced when single political party conduct is considered (that is, 23.9% when the conservative party is in power and 23.1% when the socialist party is in power). However, there appears to be no significant differentiation in the importance of tax evasion in either political parties that alternated in office in Greece over the period examined.

In addition, for both election and non-election periods, we find that the conservative party accounts for a larger proportion of the variation in the deficit than the socialist party. Specifically, the conservative party accounts for about 25% of the fluctuations in the deficit, while the socialist party accounts for only about 17%.Political party conduct appears to be far more significant in explaining the variation in the Greek budget deficit in non-election years than in years when general elections were held. This is especially so in the case of the socialist party which exhibits explanatory power well above 10% in non-election years and below 1% in election years. Similarly, albeit with lower array, the conservative party influence on the budget deficit ranges from just over 7% in non-election years to just under 6% in election years.

Finally, in the individual political party analysis conducted (in Panels C and D), both conservatives and socialists appear to account for an insignificant (1.5% or less) proportion of the variation of the deficit in election years. By contrast, in non-election years, conservative party conduct explains 23.3% of the deficit fluctuation, while socialist party conduct is responsible for 15.5% of that fluctuation. Thus, the results obtained from the individual political party analysis confirm our general finding that political party conduct has a stronger explanatory power on the variation of the Greek budget deficit in non-election years than in years when general elections are held.

Table 5.   Variance decompositions

Panel A: Variance Decomposition of Model 1

Period	D1	DY	A	R1	R2
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	78.94834	0.072201	10.58703	8.175986	2.216439
3	68.70959	0.244597	22.07115	6.703444	2.271222
4	55.93900	9.442984	23.69220	5.709268	5.216549
5	46.65963	17.13934	22.76024	7.299318	6.141478
6	41.72831	22.02800	21.07915	7.108774	8.055766

7	41.09686	22.92668	20.78938	7.166387	8.020699
8	40.96257	22.85524	20.71940	7.285312	8.177485
9	39.98273	23.09003	20.03839	7.334569	9.554275
10	39.29935	23.28322	19.28964	7.318447	10.80935

Panel B: Variance Decomposition of Model 2

Period	D1	DY	A	R3	R4
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	94.18096	0.448415	5.287732	0.082417	0.000475
3	82.14676	2.317477	8.611450	6.840864	0.083446
4	72.27751	8.659986	12.45060	6.252138	0.359767
5	64.21542	12.90029	16.78188	5.501068	0.601333
6	60.33817	13.76654	19.82554	5.449857	0.619894
7	59.45161	13.69311	20.62761	5.559414	0.668257
8	59.24938	13.62728	20.69232	5.732465	0.698563
9	59.11199	13.75645	20.65302	5.781207	0.697338
10	58.99963	13.91807	20.61378	5.772347	0.696168

Panel C: Variance Decomposition of Model 3

Period	D1	DY	A	R1	R3
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	86.89643	0.167054	8.393412	4.351657	0.191446
3	73.91192	1.456023	17.77987	4.933696	1.918490
4	58.57415	7.746912	22.38887	9.807447	1.482621
5	46.14178	11.26027	25.20909	16.06428	1.324587
6	42.69348	12.26383	26.47013	17.30367	1.268889
7	42.19292	12.08598	27.22968	17.23910	1.252314
8	40.73508	12.04972	25.82593	20.18468	1.204593
9	39.77693	11.76532	24.18150	23.04599	1.230256
10	39.99646	11.48804	23.89173	23.34387	1.279908

Panel D: Variance Decomposition of Model 4

Period	D1	DY	A	R2	R4
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	82.86839	0.014103	11.59524	5.418002	0.104266
3	72.52715	0.716754	22.04910	4.566497	0.140506
4	61.41426	6.898361	24.40243	6.096148	1.188799
5	51.10679	13.21623	24.59163	9.554695	1.530658
6	47.70467	15.79377	24.95798	9.968829	1.574744
7	47.20329	15.92119	25.26356	9.993685	1.618270
8	45.97893	15.73631	24.61482	12.10224	1.567689
9	44.32281	16.05108	23.51202	14.55899	1.555100
10	43.76857	16.12988	23.08879	15.47488	1.537865

Our focus next is on the impulse response functions where we examine the impact of the tax evasion, the two political parties and the budget deficit variables' shocks on each other. We study these impacts in two ways, first by plotting the impulse responses, following a one-standard deviation shock on each variable, and then by computing the cumulative responses of each variable to such shocks. Figure 1 contains these two impulse response functions for the four models considered. We begin with the variables' reactions for Model 1 (where we test the joint effects of R1, R2, and A on D1 during non-election years).

In non-election years the conservative party's conduct (being in power) mostly negatively affects (that is, reduces) the budget deficit (see the graph of the responses of DI to R1), while the socialist party's conduct (when in power) mostly positively or increases it (see the graph with the responses of D1 to R2). This is also evident from the cumulative impulse responses with the additional observation that the socialist party behavior resulted in a greater

impact on the deficit than the conservative party. This result is confirmed by the variance decompositions as well.

Regarding Model 2 (where we test the joint effects of R3, R4 and A on the deficit, D1, during election years), we note the following. First, the budget deficit appears to negatively and weakly react to shocks from the conservative party's policies (when in power) but not at all to socialist party's (when in power) policy innovations. This is also clearly seen in the budget deficit's cumulative impulse graphs. Thus, it can be deduced that in election years the conservative party is mostly responsible for impacting the country's budget deficit (and this is also seen in the variance decompositions above).

A final comment can be made for the impact of tax evasion (A) on the budget deficit. Even when both parties are in power and regardless of election or non-election years, the deficit seems to augment (better seen in the cumulative impact graphs) because of tax evasion which implies that neither party was capable of combatting this activity. Compared to the absolute size of the impact of R1, R2, R3 or R4 on DI, A's impact appears to be stronger and more persistent! Thus, it can be inferred that tax evasion is pervasive in Greece and has not been effectively reduced by either political party over the forty-four year period studied.
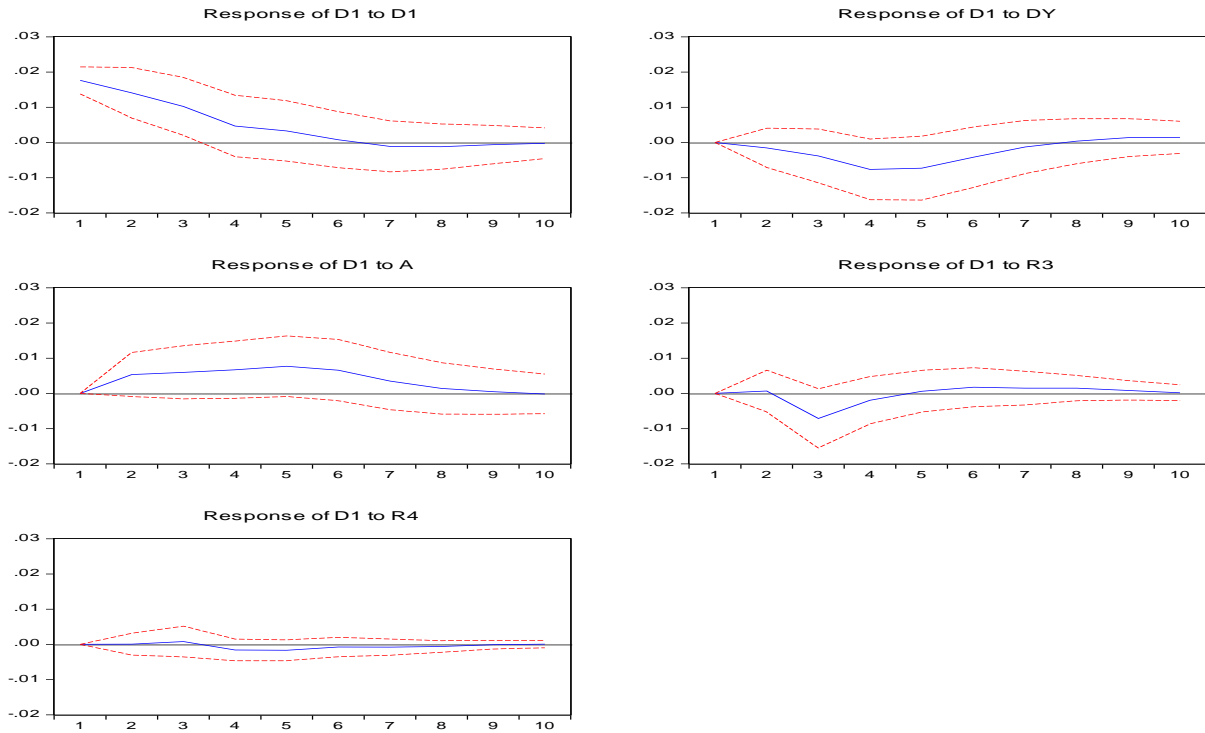
**Figure 1.   Impulse Response Functions**

Impulse Responses of Model 1
Response to Cholesky One S.D. Innovations ± 2 S.E.
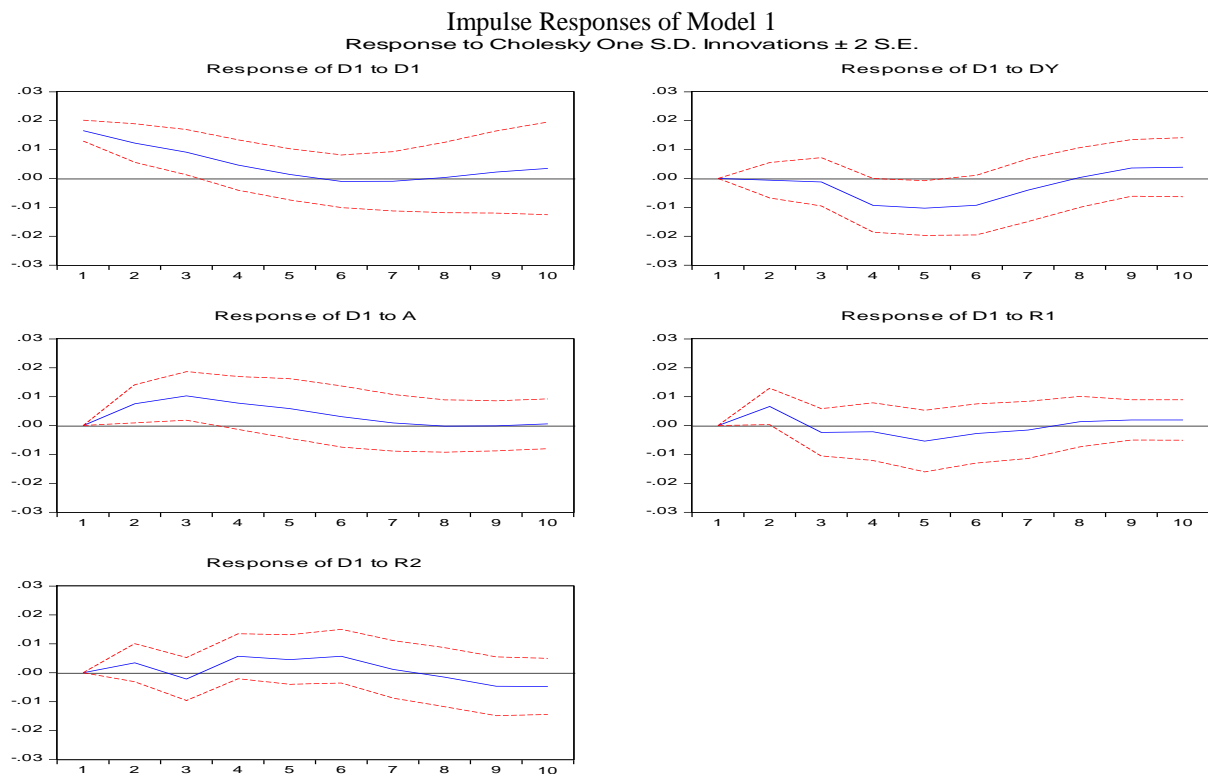
Cumulative Impulse Responses of Model 1
Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.

Accumulated Response of D1 to D1

Accumulated Response of D1 to DY

Accumulated Response of D1 to A

Accumulated Response of D1 to R1

Accumulated Response of D1 to R2
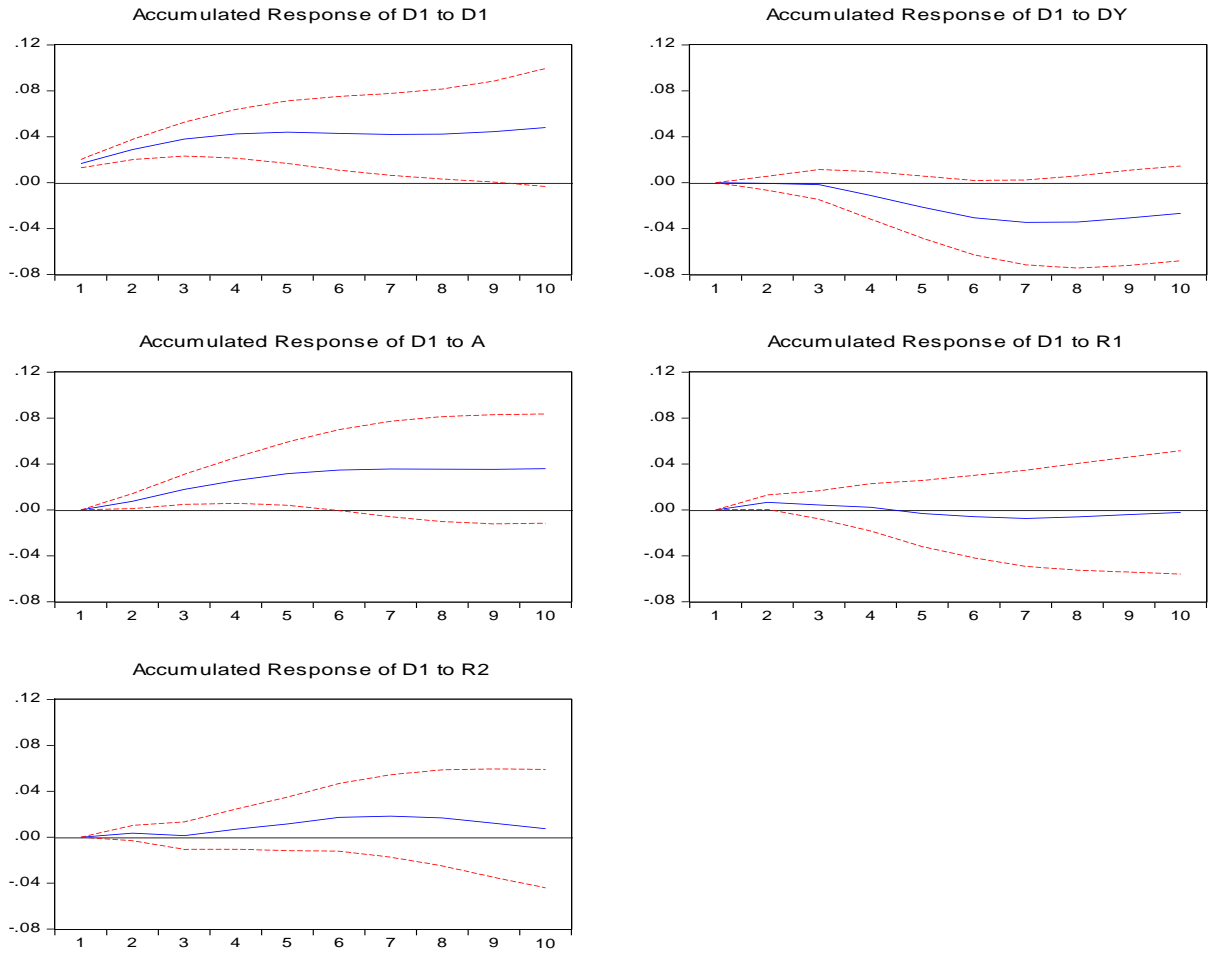
Impulse Response Functions for Model 2
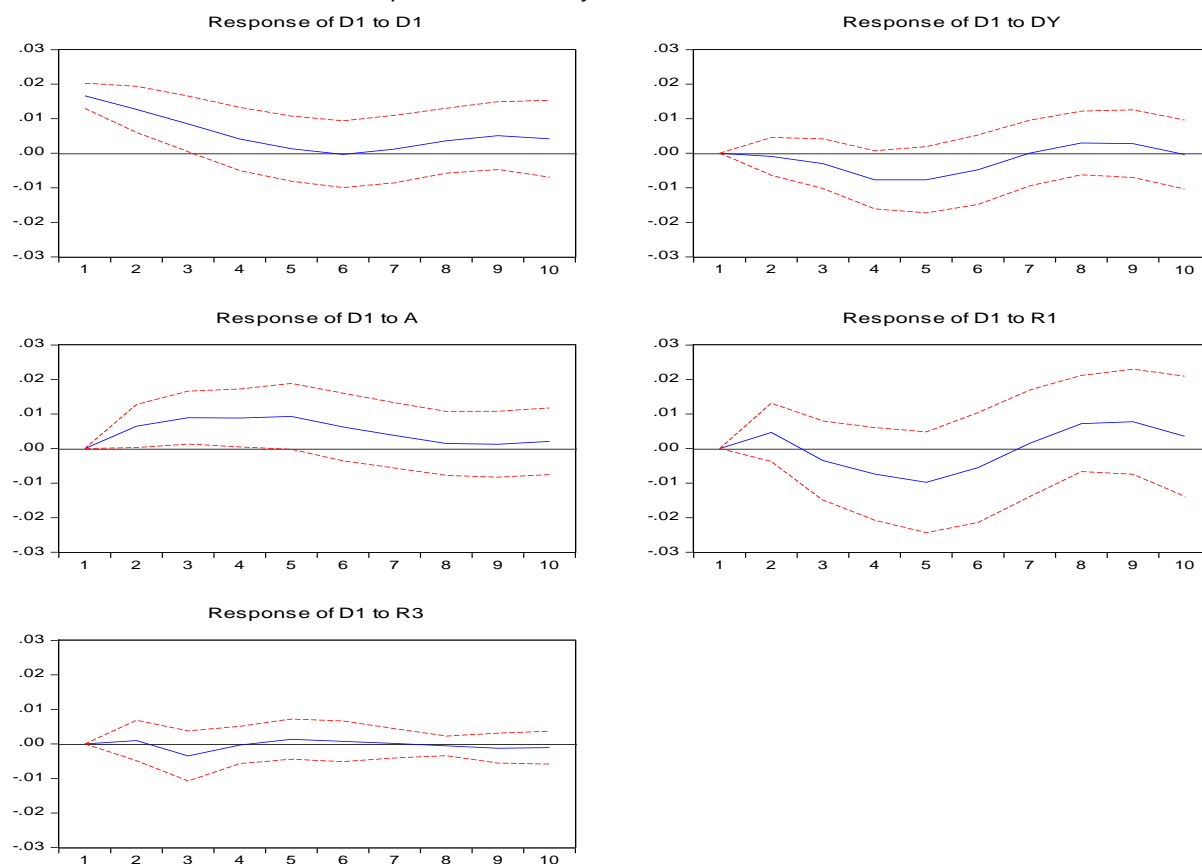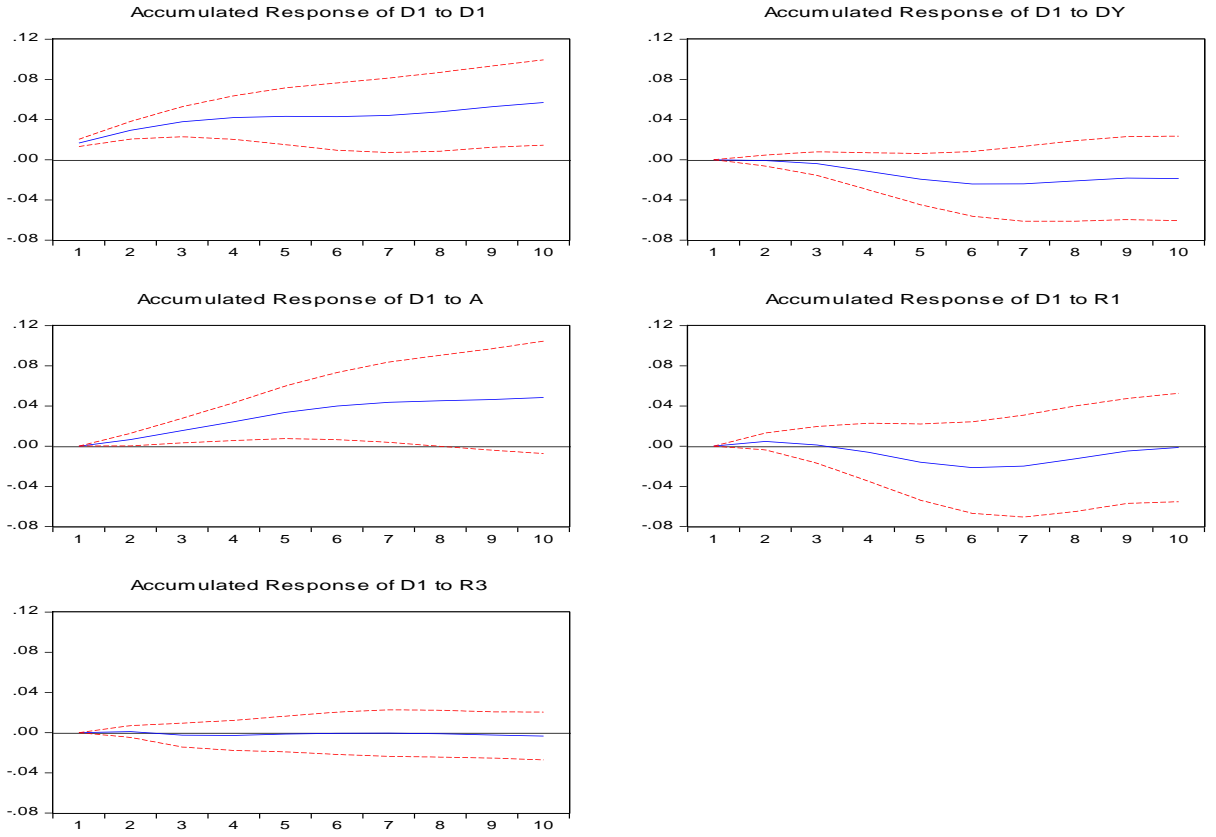## Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of D1 to D1

Response of D1 to DY

Response of D1 to A

Response of D1 to R3

Response of D1 to R4

Cumulative Impulse Responses for Model 2
Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.

Accumulated Response of D1 to D1

Accumulated Response of D1 to DY

Accumulated Response of D1 to A

Accumulated Response of D1 to R3

Accumulated Response of D1 to R4
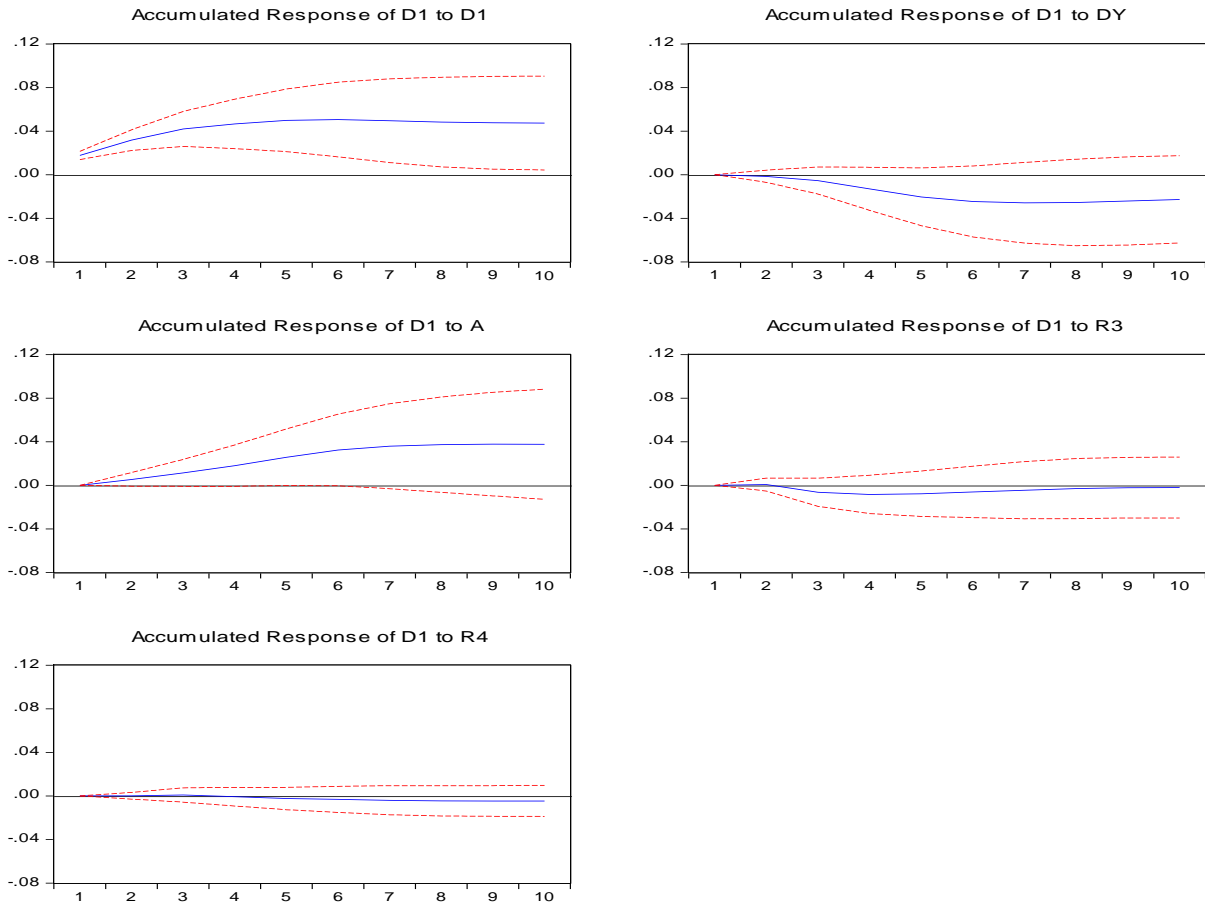
Continuing our discussion with Model 3 (where we examine the conservative party's joint impact during non-election, R1, election years, R3, and A on DI), we observe that the conservative party, when in power and during non-election years, appeared to negatively affect the budget deficit (i.e., reduceit further), but not at all when in power and during election years. The total impact of the conservative party's conduct during these subperiods on the budget deficitis clearly seen in the cumulative impulses of the deficit graphs. When considering the effects of the socialist party's conduct during non-election, R2, election years, R4, and A on the budget deficit (Model 4), we see that the socialist party's policies tended to positively influence the budget (that is, increase it), when in power and in non-election years, but not influence it much during election years and in power. Finally, tax evasion again surfaces as more important in affecting the budget deficit than either party's economic policies irrespective of being or not in power and during election or non-election periods.

Overall, we notice that while the conservative party reduces the deficit when in power and in non-election years, the socialist party increases the deficit but both parties, when in power in election years tend to leave it mostly unchanged. In addition, given the absolute sizeof the cumulative responses of the budget deficit, we note that the conservative party exerts a stronger influence on the deficit than the socialist party does. This is also true for non-election years compared to general election years.
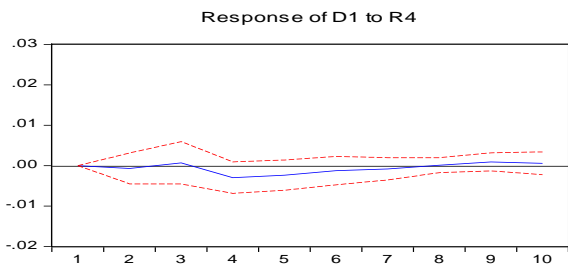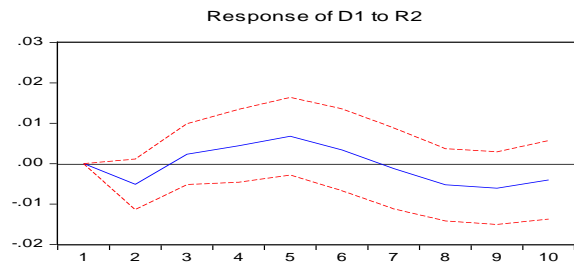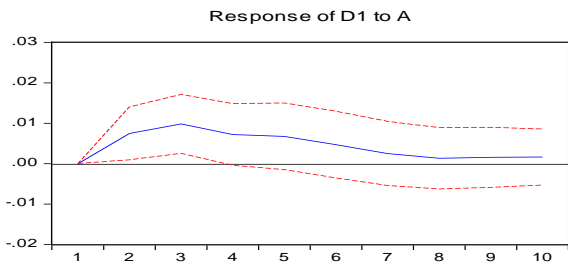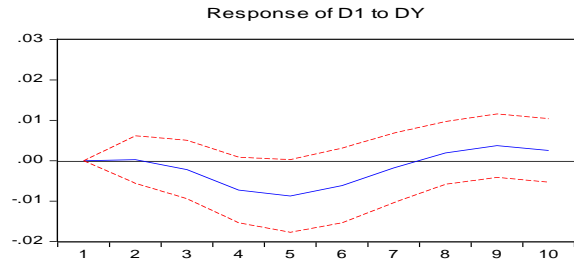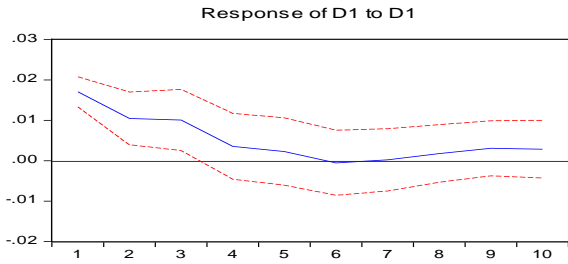
Impulse Response Functions for Model 3
Response to Cholesky One S.D. Innovations ± 2 S.E.

Cumulative Impulse Responses for Model 3

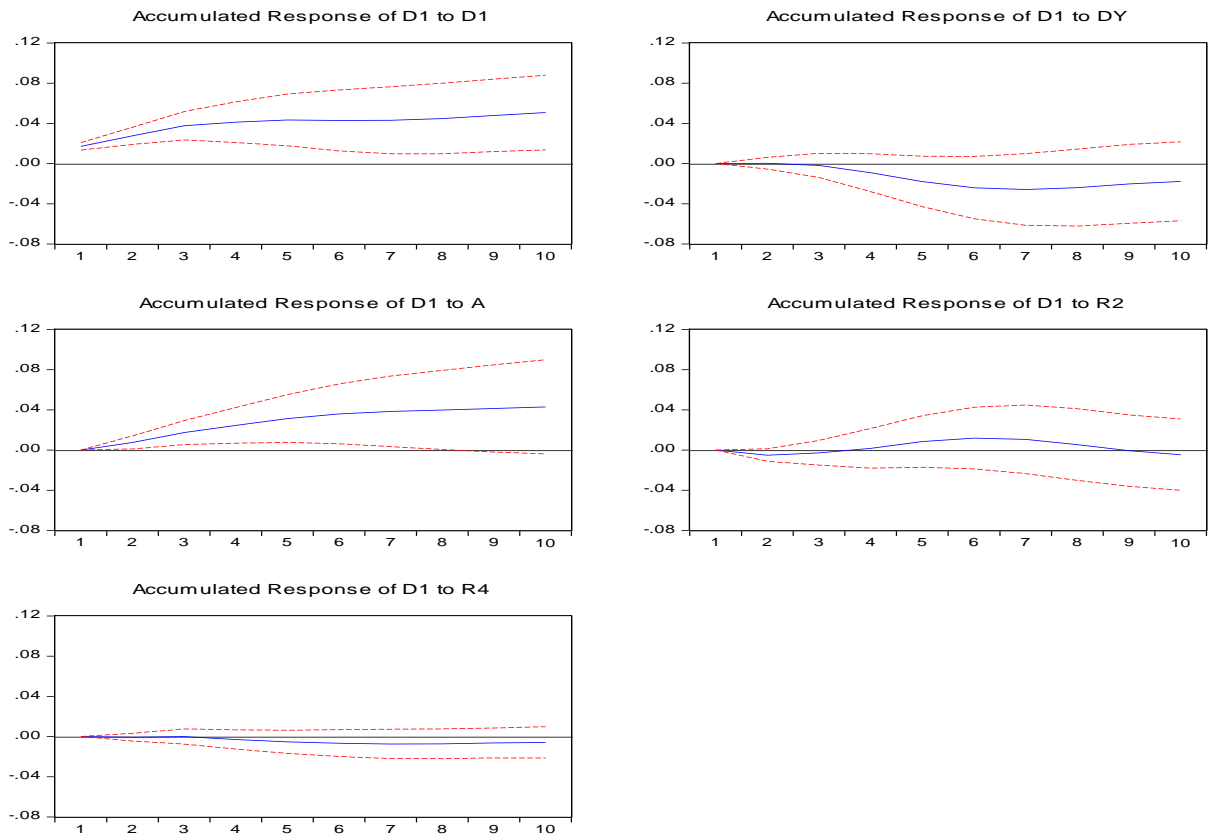## Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.

Accumulated Response of D1 to D1

Accumulated Response of D1 to DY

Accumulated Response of D1 to A

Accumulated Response of D1 to R1

Accumulated Response of D1 to R3

Impulse Response Functions for Model 4
Response to Cholesky One S.D. Innovations ± 2 S.E.

Response of D1 to D1

Response of D1 to DY

Response of D1 to A

Response of D1 to R2

Response of D1 to R4

Cumulative Impulse Response Functions for Model 4
Accumulated Response to Cholesky One S.D. Innovations ± 2 S.E.

Accumulated Response of D1 to D1

Accumulated Response of D1 to DY

Accumulated Response of D1 to A

Accumulated Response of D1 to R2

Accumulated Response of D1 to R4

6. CONCLUDING REMARKS

The purpose of this study has been to investigate whether the chronic budget deficit of the Greek government is subject to a political cycle. Using data for 1970-2013, a period during which the conservative and the socialist party alternated in office, we have explored the impact of different governments on the size and nature of deficit over GDP. Our methodology includes an unrestricted VAR model that tests the impact of each of the two parties upon the budget deficit-to-GDP ratio during election and non-election years. For this purpose, we are testing four different models. We extend the existing literature by constructing a tax evasion variable specific to the Greek economy on the basis of Feige (1989) and incorporate that index as an explanatory variable in each of the four models tested.

Overall our results assert that tax evasion significantly impacts the variation of the budget deficit over GDP in Greeceover 1970-2013, accounting from about one-fifth of the variation in election years to about one-fourth in non-election years. Moreover, there appears to be no significant differentiation in the importance of tax evasion in either case of the political parties that alternated in power in Greece in the period considered. However, we observe that both in election and non-election periodsthe conservative party accounts for nearly 25% of the variability in the deficit-to-GDP ratio, while the socialist party accounts for a more moderate 17%. In general, it appears that political party conduct has a higher explanatory power in non-election years than in election years.

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