

**Volume 33, Issue 3****Assessing the variability of indirect tax elasticity in Greece**

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**Abstract**

This paper shows that the variability of indirect tax elasticity relative to GDP has increased significantly in recent years in Greece. Based on this finding we show that the budgetary sensitivity of indirect taxes following a 1% change in real GDP has increased dramatically since 2010. This finding has substantial policy implications; failure to account for these higher elasticities will lead to recurrent revenue shortfalls requiring new policy measure to meet previously set fiscal targets. This can lead to a downward spiral of continuously declining economic activity, new revenue shortfalls, and additional fiscal measures and so on.

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## 1. Introduction

The success of on-going fiscal consolidation effort is a prerequisite for the recovery of the Greek economy. This implies that all possible interactions between fiscal consolidation and economic activity have to be fully understood.

Recently, and driven by an IMF initiative, there has been a discussion on the size of fiscal multiplier, which is key determinant of the short term recessionary effects of fiscal consolidation. Driven by these discussions the average fiscal multiplier in Greece was revised to around 1 from a previously assumed value of 0.5.<sup>1</sup> Despite the progress on this front, there has been any discussion on the validity of the assumptions related to the opposite relationship, i.e. the effect of economic activity changes on the revenue and budget deficit performance.

For example, one of the recurrent themes of successive troika visits in Greece since the start of the implementation of the Economic Adjustment Programme (EAP) for Greece in May 2010 have been the revenue shortfalls, in particular as regards indirect taxes. Despite successive increases in VAT rates and excise taxes since the start of the EAP, indirect taxes are on a declining path along with the declining path of private consumption and economic activity (IMF, 2012a; 2013).

For example, according to recently released Ministry of Finance (MoF) data for the period January-February 2013 indirect tax revenues show a quite significant shortfall from targets of about 496 million euro or about 0,25% of GDP.<sup>2</sup> Substantial shortfalls were recorded also in 2012. According to the March 2012 IMF report on Greece the amount of indirect tax revenue to be collected in 2012 was projected at 26.9 billion euro (IMF, 2012a). The most recent IMF report (IMF, 2013, January) revised downward that figure by about 700 million euro, i.e., to about 26.2 billion euro.<sup>3</sup>

What lies behind these recurrent revenue shortfalls and why aren't successive EAP projections updated so that the revenue shortfall is minimized? Two possible explanations that have been put forward related to the continuous and dramatic decline in economic activity in Greece (from 2008 to 2012) and the inability of revenue administration to fight tax evasion.<sup>4</sup>

In this study, driven by the findings of earlier IMF studies, like Poghosyan (2011), Brondolo (2009), Sansak et al. (2010), we examine the variability of indirect tax elasticity to economic activity. As the aforementioned studies have shown, the variability of indirect tax elasticity to economic activity tends to increase in the course of the crisis. Hence, a continuously declining economic activity (as in the case of Greece) could be associated with higher indirect tax elasticity, which in turn translates into bigger revenue shortfalls and more pronounced budgetary implications than anticipated.<sup>5</sup>

<sup>1</sup> See IMF (2012b), World Economic Outlook, Autumn; Blanchard and Leigh, 2013.

<sup>2</sup> According to MoF data indirect tax receipts in January-February 2012 amounted to 3,966 million euro vis-à-vis a target of 4,462 million euro.

<sup>3</sup> Recently published MoF data revised the indirect tax receipts figure to 26,082 million euro, i.e., further below the recent IMF estimates.

<sup>4</sup> The IMF (2013) has criticized the slow progress in the area of revenue administration reforms. However, there has been recent evidence pointing to the effectiveness of tax audits in Greece in lowering VAT tax related offenses (Tagkalakis, 2013).

<sup>5</sup> On this point it should be mentioned the reference value for the indirect tax elasticity in Greece is set to 1 (constant along the cycle unitary elasticity) based on the influential OECD study of Girouard and Andre (2005) and a recent European Commission (2005) working document.

Our findings indicate that the elasticity of indirect taxes to real GDP has increased in the course of the crisis ranging from 1.23-1.84 in the recent years. This is due both to increased variability of the tax base to GDP (composition effects) and increased variability of indirect tax revenues to tax base. Based on these elasticities we calculated budgetary sensitivity parameters of indirect taxes which range from 0.15-0.23 percentage point of GDP, i.e. substantially higher than what is implied by the unitary elasticity assumption. This implies that the constant along the cycle unitary elasticity assumption has to be aborted, in order to better understand the interaction between fiscal consolidation and economic activity and to improve the design of economic policy making.

In the remainder we consider the following: Section 2 discusses data issues, methodology and presents the main findings. Section 3 summarizes and concludes.

## 2. Data, methodology and findings

We use quarterly data on indirect taxes (VAT and other indirect taxes), private consumption and GDP over the period 2000:Q1-2012:Q3. We use the GDP deflator to transform the data in real terms.<sup>6</sup> As stated before Girouard and Andre (2005) have estimated a constant along the cycle unitary elasticity of indirect taxes to economic activity. Along the lines of Girouard and Andre (2005) we calculate the elasticity of indirect taxes to GDP as the product of two elasticities:

$$\text{Elasticity of indirect taxes to real GDP} = \text{Elasticity of indirect taxes to real private consumption} * \text{Elasticity of real private consumption to real GDP}^7 \quad (1)$$

Following earlier IMF studies like Poghosyan (2011) we split indirect taxes to VAT and other indirect taxes. Using data over the period 2000:Q1 – 2012:Q3 we regress by means of OLS (with robust standard errors):<sup>8</sup>

$$\Delta \log(\text{VAT})_t = \alpha + \beta * \Delta \log(\text{Private consumption})_t + \sum_{i=1}^{N=4} \gamma_i * \Delta \log(\text{Private consumption})_{t-i} + \text{Elections}_t + \text{EAP}_t + \text{Changes in VAT rates}_t + \text{time trend}_t + \varepsilon_t \quad (2)$$

We focus on the year-on-year rather than on the quarter-on-quarter growth rate in order to avoid seasonal effects, i.e.,  $\Delta \log(\text{VAT})_t = \log \text{VAT}_t - \log \text{VAT}_{t-4}$ .<sup>9</sup> The “election” dummy captures election periods, there is anecdotal evidence that revenue collection and budgetary performance deteriorates in election periods. The “EAP” dummy captures the period that Greece is under joint EU-IMF surveillance (since May 2010); during that period Greece had to take several measures to improve revenue administration and to fight tax evasion. Alternatively, according to anecdotal evidence during the EAP years economic and credit conditions deteriorated sharply leading to increased tax evasion. The time trend captures time related effects that affect the relationship between VAT and private consumption (e.g. over the course of the recent years tax efforts to fight tax evasion have been intensified). Finally,

<sup>6</sup> Data are seasonally adjusted by means of the census X12 procedure.

<sup>7</sup> Girouard and Andre (2005) examine the elasticity of indirect taxes to output gap, however, we consider the elasticity of indirect taxes to the percentage change in real GDP (and real private consumption) because in the period since 2008-2009 Greece’s economic activity is continuously declining and in this case it would be extremely difficult to obtain reliable estimates of the potential GDP and consequently of the output gap.

<sup>8</sup> We have also considered OLS with Newey-West standard errors, i.e., the error structure is assumed to be heteroskedastic and auto-correlated up to lag one. Moreover, we have also considered a generalized least-squares method to estimate the parameters in a linear regression model in which the errors are assumed to follow a first-order autoregressive process.

<sup>9</sup> According to data reported by the General Secretariat of Information Systems (GSIS) of the Hellenic Ministry of Finance there is exceptional seasonality in VAT revenues; namely VAT revenues pick in January, April, July and October.

the variable “Changes in VAT rates” captures changes in VAT rates<sup>10</sup>.  $\varepsilon_t$  is a well behaved error term. The coefficient “ $\beta$ ” captures the elasticity of VAT to private consumption. The empirical estimates are presented in Table A.1 (column 1) in the Appendix.

Following Poghosyan (2011) we link other indirect taxes directly with real GDP.<sup>11</sup> Hence, we estimate by means of OLS (with robust standard errors):<sup>12</sup>

$$\Delta \log(\text{Other indirect taxes})_t = \alpha_1 + \beta_1 * \Delta \log(\text{GDP})_t + \sum_{i=1}^{N=4} \gamma_{1i} * \Delta \log(\text{GDP})_{t-i} + \text{Elections}_t + \text{EAP}_t + \text{time trend}_t + \text{EAP} * \text{time trend}_t + \text{EDP}_t + \varepsilon_t \quad (3)$$

Turning to the control variables, EDP captures the period that Greece was in excessive deficit procedure, i.e. 2004:Q3-2007:Q2 and from 2009: Q1 -2010:Q1, taking into account tax policy changes that occurred in that period. Greece continues to be in EDP in the post 2010:Q2 period, however, we differentiate between the pre- and post-EAP period because in the period that Greece receives EU-IMF funding (from 2010:Q2 onwards) surveillance procedures are stricter and much more intense relative to the pre-EAP EDP surveillance. Moreover, and the tougher consolidation measures were implemented in the more recent period. The time trend captures time related effects that affect the relationship between other indirect taxes and GDP. The interaction term “EAP\*time trend” captures the successive measures undertaken in the more recent years, as well as the efforts to tackle tax evasion by improving tax revenue administration.<sup>13</sup> The coefficient “ $\beta_1$ ” reflects the elasticity of other indirect taxes of real GDP. The empirical estimates are presented in Table A.1 (column 2) in the Appendix.

Building on the abovementioned studies we evaluate the relationship between the tax base and (real private consumption)  $\kappa\alpha$  and real GDP. Hence, we estimate by means of OLS (with robust standard errors):<sup>14</sup>

$$\Delta \log(\text{Private consumption})_t = \alpha_2 + \beta_2 * \Delta \log(\text{GDP})_t + \sum_{i=1}^{N=4} \gamma_{2i} * \Delta \log(\text{GDP})_{t-i} + \text{time trend}_t + \varepsilon_t \quad (4)$$

The coefficient “ $\beta_2$ ” is the elasticity of private consumption to GDP.<sup>15</sup> The empirical estimates are presented in Table A.1 (column 3) in the Appendix.

We estimate recursively equations (2)-(4). We estimate specification (2) and (3) over the period 2000:Q1-2008:Q1, and then we repeat the estimation adding one data point at a time until the end of the sample (2012:Q3). This way we get recursive estimates of “ $\beta$ ” and “ $\beta_1$ ”

<sup>10</sup> In Greece that have a series of VAT rate changes in particular in the period under EU-IMF surveillance, e.g. in 2010 Q1 the VAT rates increased to 21%, 10%, 5% from 19%, 9% and 4.5% in effect since 2005. In 2010 Q2 the rates were further increased to 21%, 11% and 5.5%. In 2010 Q3 the higher rate was further increased to 23%. In 2011 Q1 the middle and lower rates were increased to 13% and 6.5%, and from 2011 Q3 the higher rate of 23% was applied to a wider base of products, i.e. catering and restaurant services (food and drinks that were previously taxed at 13%); see Bank of Greece (2009-2013).

<sup>11</sup> In one of the alternative specifications of the model we do link other indirect taxes with real private consumption. The findings are presented in Table A.1.

<sup>12</sup> See footnote 8.

<sup>13</sup> In this setting we do not consider each specific tax policy changes related to other indirect taxes, however we do believe that these are reflected in the EDP, EAP and EAP\*time trend variables. Since the start of the implementation of the Economic Adjustment Programme of Greece (and just before that) there have been a series of excise tax increases in tobacco, alcohol, fuel ; see Bank of Greece (2009-2013). All these changes are reflected in the EDP, EAP and EAP\*time trend variables that are used to capture tax policy changes in the period under investigation. Tax policy changes were undertaken to abide by the requirements of the excessive deficit procedure and the Economic Adjustment Programme for Greece.

<sup>14</sup> See footnote 8.

<sup>15</sup> We have also examined an alternative specification that includes the EAP dummy; the findings are qualitatively similar.

over the period 2008:Q1-2012:Q3. The findings are depicted in Figures 1-2 and reveal that both VAT revenue and other indirect taxes showed increased variability in recent years. However, the results are particularly pronounced for VAT revenue (vis-à-vis changes in real private consumption). As regards specification (4) we repeat the above exercise, though we start our estimations using the sample 2000:Q1-2009:Q1 in order to get more reliable estimates of “ $\beta_2$ ” and then we add one data point at a time till the end of the sample. The results are shown in Figure 3.<sup>16</sup> In all cases we try to start the estimates of the recursive regressions either in early 2008 or in early 2009 in order to capture the period prior to the deepening of the economic recession in the more recent years. The findings reported in Figure 3 indicate that the variability of the tax base (private consumption) vis-à-vis real GDP increased substantially in recent years, highlighting the important role of composition effects in the decline of indirect tax revenues.

Figure 4 depicts the recursive estimates of the elasticity of indirect taxes to real GDP over the period 2009:Q1-2012:Q3, which is the outcome of the recursive estimates obtained from specifications (2)-(4) and definition (1). In more detail we calculate the recursive estimate of the elasticity of indirect taxes to real GDP as follows:

$$\begin{aligned} & \text{Elasticity of indirect taxes to real GDP} = \\ & (\text{Elasticity of VAT to real private consumption} * \text{Elasticity of real private consumption to} \\ & \text{real GDP}) * (\text{VAT/indirect taxes}) + \\ & \text{Elasticity of other indirect taxes to real GDP} * (\text{other indirect taxes/indirect taxes}) \end{aligned} \quad (5)$$

In Figure 4 we also present two alternative estimates of the elasticity of indirect taxes to GDP.<sup>17</sup> In the first one we calculate the elasticity of other indirect taxes to real GDP in the same way as the elasticity of VAT to private consumption, i.e., as the product of the estimated elasticity of other indirect taxes to real private consumption<sup>18</sup> times the estimated elasticity of real private consumption to real GDP. In the second case, we consider only the aggregate indirect tax series, i.e., we don't differentiate between VAT and other indirect taxes. In this case the elasticity of indirect taxes to real GDP is the product of the estimated elasticity of indirect taxes to real private consumption<sup>19</sup> times the estimated elasticity of real private consumption to real GDP.

According to the findings displayed in Figure 4 (see also Figures A.1-A.3 in the Appendix), the estimated elasticity of indirect taxes has shown great variability in recent years, a finding verified by all three specifications considered (the elasticity increased above 1 after 2010:Q3). According to the baseline and first alternative estimate the elasticity of indirect taxes to GDP (controlling for tax policy changes) reached as high as 2 at the end of 2010, oscillating around that level before gradually returning to around 1.8 by the end of the sample in 2012:Q3. The second alternative estimate based on the aggregate indirect tax series indicates that the elasticity of indirect taxes to GDP reached as high as 1.45 at the end of 2010, it remained close to that level until 2011:Q3 before falling to more regular levels

<sup>16</sup> As in Poghosyan (2011) we have also repeated the same exercise using rolling regression with fixed windows of 32 (and/or 36) quarters. The results are qualitatively similar.

<sup>17</sup> See also the supplementary material appendix for a more detailed presentation of the findings (including 95% confidence bands).

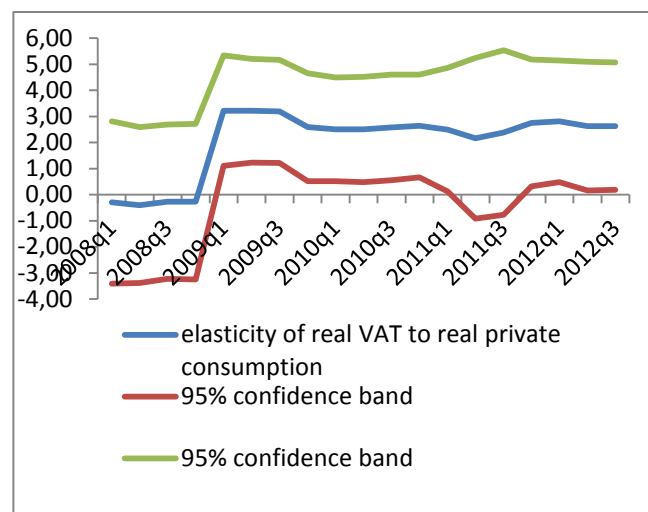
<sup>18</sup> The elasticity of other indirect taxes to private consumption resembles specifications (3), see Table A.1 (column 4).

<sup>19</sup> The elasticity of indirect taxes to private consumption blends features of both specifications (2) and (3), i.e., it includes changes in VAT rate, the EDP dummy and the interaction dummy “EAP\*time trend” that reflect among other things changes in other indirect taxes (see Table A.1, column 5).

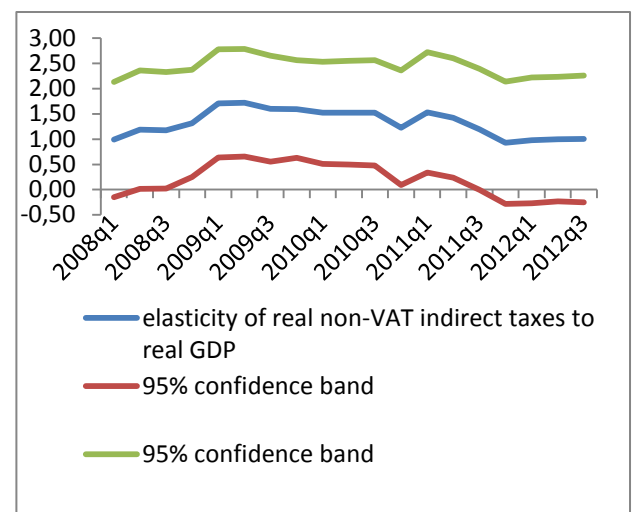
around 1,10 at the end of 2011. Thereafter, it started rebounding reaching close to 1.25 at the end of the sample.

Although we get a quite dispersed set to estimates our findings indicate that the elasticity of indirect taxes to GDP can be 25% up to 80% higher than the constant unitary elasticity assumed by Girouard and Andre (2005).

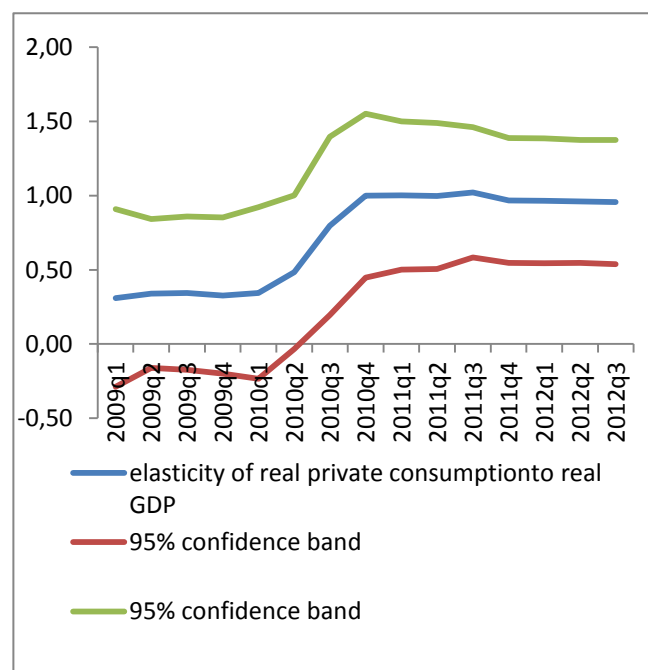
**Figure 1: The elasticity of VAT to private consumption**



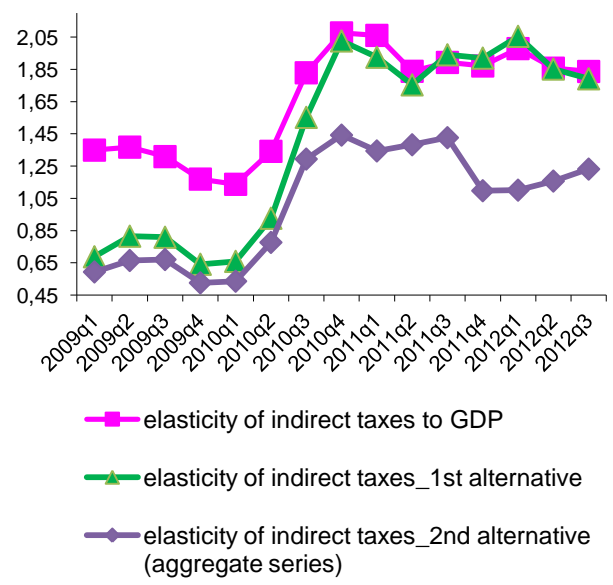
**Figure 2: The elasticity of other indirect taxes to real GDP**



**Figure 3: The elasticity of private consumption to real GDP**



**Figure 4: The elasticity of indirect taxes to real GDP (baseline and alternative estimates)**



Next we transform the estimated elasticities of indirect taxes to GDP to budgetary sensitivities (of indirect taxes). Following Girouard and Andre (2005) we multiply the estimated elasticities with the share of indirect taxes to GDP. The product of these two gives

us the estimated budgetary sensitivity of indirect taxes, i.e. the change in the budget deficit in p.p. of GDP (driven by indirect taxes) following a 1% change in GDP (see Figure 5). In Figure 5 we also budgetary sensitivities corresponding to the unitary elasticity assumption (which is merely the share of indirect taxes to GDP).

The baseline and first alternative estimate indicate that the budgetary sensitivity of indirect taxes has increased to as high as 0.24-0.26 pp of GDP at the end of 2010 and in early 2011, i.e., it is almost twice as large compared to that implied by the unitary elasticity assumption. In the following quarters it has marginally declined approaching 0.22-0.23 p.p. of GDP at the end of the sample. The second alternative estimate based on the aggregate indirect tax series points to a smaller maximum effect of about 0.17-0.18 p.p. of GDP from 2010:Q3-2011:Q3, which then falls to 0.14 and increases up to 0.15 pp of GDP at the end of the sample.

Based on a projected GDP of about 193,7 billion euro in 2012, the unitary elasticity assumption implies that a 1% fall in GDP will reduce indirect taxes and increase the budget deficit by about 239,9 million euro, whereas the second alternative elasticity estimate brings the deficit impact at 295.4 million euro and the first alternative and baseline estimates raise the deficit impact to as high as 429.8 to 440.6 million euro, i.e., the deficit impact can be 55.5-200.8 million euro higher than assumed by the unitary elasticity.

This revenue shortfall that will not be anticipated will have to be covered by additional measures to contain the impact on deficit.<sup>20</sup> These additional consolidation measures further reduce output leading to additional non anticipated revenue shortfalls, which require new measures and so on. A better assessment of the elasticity of indirect taxes to GDP and of its budgetary sensitivity will improve the contact of policy making and the design of fiscal consolidation measures.

### 3. Summary and conclusions

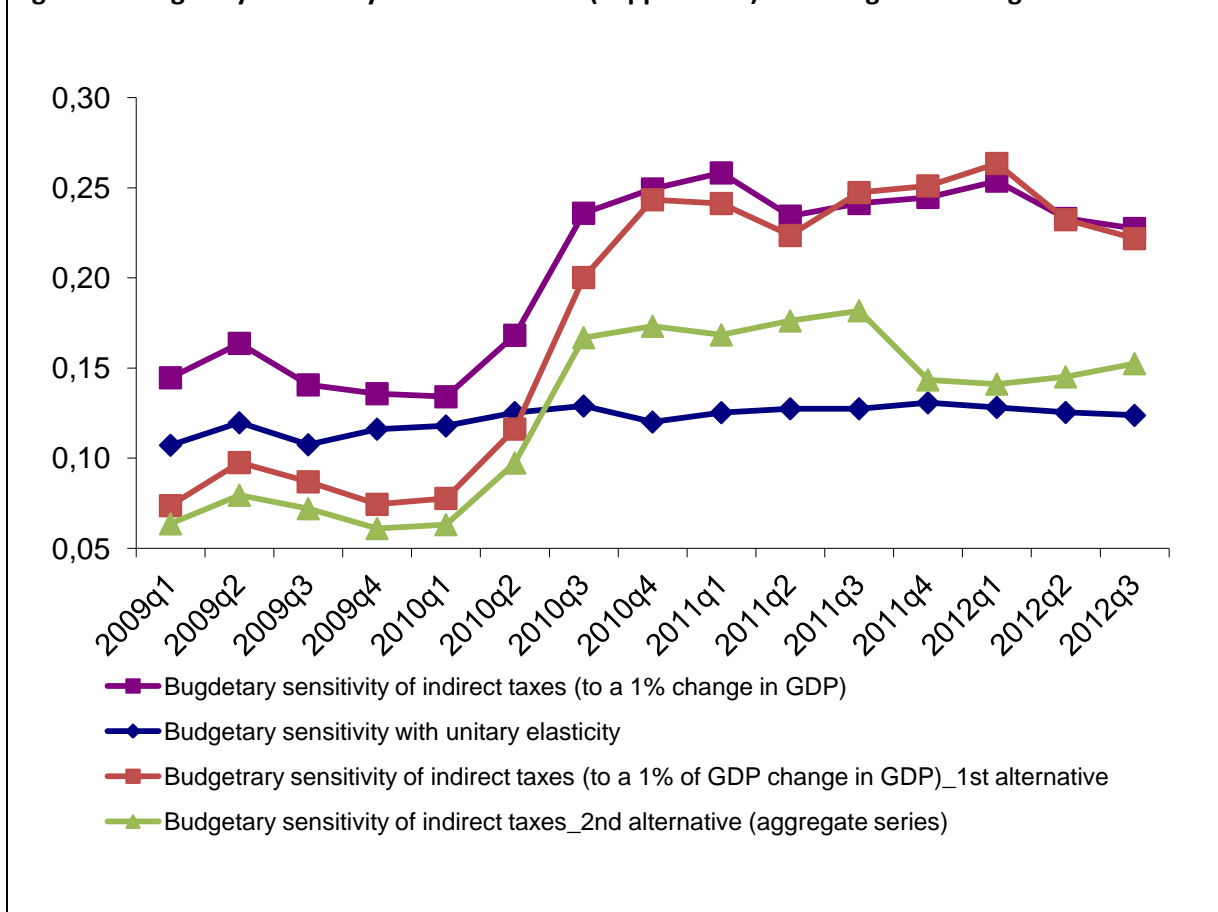
The above analysis provides empirical evidence on the variability of indirect tax elasticity in Greece. This is explained both by increased variability of tax base (private consumption) to GDP (composition effects) and by increased sensitivity of indirect tax revenues to their tax base. Composition related changes, if persist, could be associated with structural rather than temporary reduction in indirect tax revenue. The latter effect could possibly reflect tax compliance issues, i.e., as shown by Brondolo (2009) in times of economic stress the collection of VAT revenue declines because people have more incentives to tax evade or face tougher credit and financial constraints that induce them to evade taxes. Moreover according to Sancak et al. (2010) the efficiency of VAT collections tends to be lower in “bad” times (when the output gap is negative and informal economy is expanding).

In addition, our analysis shows that the dramatically contracting economic activity in Greece since 2010 had much bigger adverse budgetary implications (through declining indirect taxes) than anticipated based on the unitary elasticity assumption.

<sup>20</sup> In order to put these numbers into perspective they should be contrasted with some of the fiscal policy interventions detailed in the Medium Term Fiscal Strategy (MTFS) for 2013-2016 unveiled by the MoF in early 2013 (MoF, 2013). More specifically, the 10% reduction in temporary public employment contracts over the period 2013-2016 will yield expenditure saving of 49,1 million euro, the cuts in the salaries of special regimes (judges, military personnel, university staff etc) will yield 161,4 million euro in 2013, the new mobility scheme of public sector employees involving lay-offs is expected to yield expenditure saving of 106,8 million euro in 2013-2016. The rationalization and cuts in social benefits will yield 68,3 million euro in 2013-2016. Co-payment for hospital services will yield 115 million euro in 2014 and, finally, cuts in educational spending will yield 129,5 million in the period 2013-2016. Hence, the underestimation of the budgetary impact of indirect taxes due to lower economic activity can have substantial repercussions, requiring additional consolidation measures to fill the fiscal gap, something that would be hard to find given the small yield of some of the MTFS measures mentioned above.

The variability of indirect tax elasticity in the recent years has important policy implications, as it implies that if not taken into account in revenue projections revenue shortfalls will be materialized impairing the achievement of policy targets. Hence, requiring new measures to meet these fiscal targets, which in turn impact negatively on economic activity, further lower tax revenues, and so on (i.e. generating a downward spiral).

**Figure 5: Budgetary sensitivity of indirect taxes (in pp of GDP) following a 1% change in GDP.**



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### A. Appendix

In this appendix we report the OLS regression outcomes corresponding to specifications (2)-(4) in the main text of the paper. The regressions presented below (Table A.1) cover the whole sample, i.e. 2000 Q1-2012 Q3. The recursive estimation of specifications (2)-(4) provide us the elasticities presented in the main text of the paper.

**Table 1: Regressions of indirect taxes, VAT, other indirect taxes with respect to private consumption or real GDP and regression of private consumption with respect to real GDP**

|   | 1                               | 2  | 3                                       | 4  | 5                                  |
|---|---------------------------------|--|---|--|------------------------------------|
| Dependent variable:                           | Growth rate of real VAT revenue | Growth rate of real other indirect taxes | Growth rate of real private consumption | Growth rate of real other indirect taxes | Growth rate of real indirect taxes |
| Growth rate of real GDP (t)                   |                                 | 1.005<br>(1.57)                          | 0.957<br>(4.48)***                      |  |                                    |
| Growth rate of real GDP (t-1)                 |                                 | 1.139<br>(1.24)                          | 0.114<br>(0.48)                         |  |                                    |
| Growth rate of real GDP (t-2)                 |                                 | 0.172<br>(0.23)                          | -0.255<br>(-1.12)                       |  |                                    |
| Growth rate of real GDP (t-3)                 |                                 | 0.129<br>(0.23)                          | -0.056<br>(-0.24)                       |  |                                    |
| Growth rate of real GDP (t-4)                 |                                 | -0.209<br>(-0.34)                        | 0.445<br>(2.33)**                       |  |                                    |
| Growth rate of real private consumption (t)   | 2.629<br>(2.11)**               |  |   | 0.945<br>(1.46)                          | 1.410<br>(1.85)*                   |
| Growth rate of real private consumption (t-1) | -1.331<br>(-1.38)               |  |   | 0.013<br>(0.02)                          | -0.543<br>(-1.10)                  |
| Growth rate of real private consumption (t-2) | 1.744<br>(3.23)***              |  |   | 1.552<br>(3.13)***                       | 1.336<br>(3.83)***                 |
| Growth rate of real private consumption (t-3) | 0.462<br>(0.67)                 |  |   | -1.397<br>(-2.45)**                      | -0.054<br>(-0.18)                  |
| Growth rate of real private consumption (t-4) | -0.089<br>(-0.12)               |  |   | 1.298<br>(2.26)**                        | 0.273<br>(0.87)                    |
| Time trend                                    | -0.0003<br>(-0.11)              | 0.004<br>(2.82)***                       | 0.0003<br>(0.56)                        | 0.0004<br>(0.27)                         | -0.004<br>(-2.08)**                |
| Constant                                      | -0.071                          | -0.814                                   | -0.067                                  | -0.189                                   | 0.505                              |

|                  |                                 |                                  |                               |                               |                               |
|------------------|---------------------------------|----------------------------------|-------------------------------|-------------------------------|-------------------------------|
|                  | (-0.18)                         | (-3.01)***                       | (-0.58)                       | (-0.66)                       | (1.61)                        |
| Election         | 0.006<br>(0.14)                 | -0.059<br>(-2.25)**              | -                             | -0.036<br>(-0.84)             | 0.008<br>(0.45)               |
| EAP              | 0.288<br>(1.63)                 | 0.959<br>(0.39)                  | -                             | -0.611<br>(-0.30)             | 6.565<br>(3.44)***            |
| EAP*time trend   | -                               | -0.004<br>(-0.34)                | -                             | 0.004<br>(0.43)               | -0.032<br>(-3.30)***          |
| VAT rate         | 0.012<br>(0.32)                 | -                                | -                             | -                             | 0.095<br>(2.63)***            |
| EDP              | -                               | 0.039<br>(2.17)**                | -                             | 0.067<br>(2.52)**             | -                             |
| No of Obs.       | 43                              | 43                               | 43                            | 43                            | 43                            |
| F-test (p-value) | F( 9, 33)<br>= 4.73<br>(0.0004) | F( 10, 32)<br>= 3.51<br>(0.0033) | F( 6, 36) =<br>32.75 (0.0000) | F( 10, 32) =<br>4.42 (0.0006) | F( 10, 32) =<br>8.10 (0.0000) |
| R-square         | 0.4631                          | 0.4366                           | 0.8263                        | 0.3955                        | 0.6053                        |

Note: OLS regressions with robust standard errors; \*\*\*, \*\*, \* stand for statistically significant at 1%, 5% and 10%.

Figure A.1: Elasticity of indirect taxes to GDP

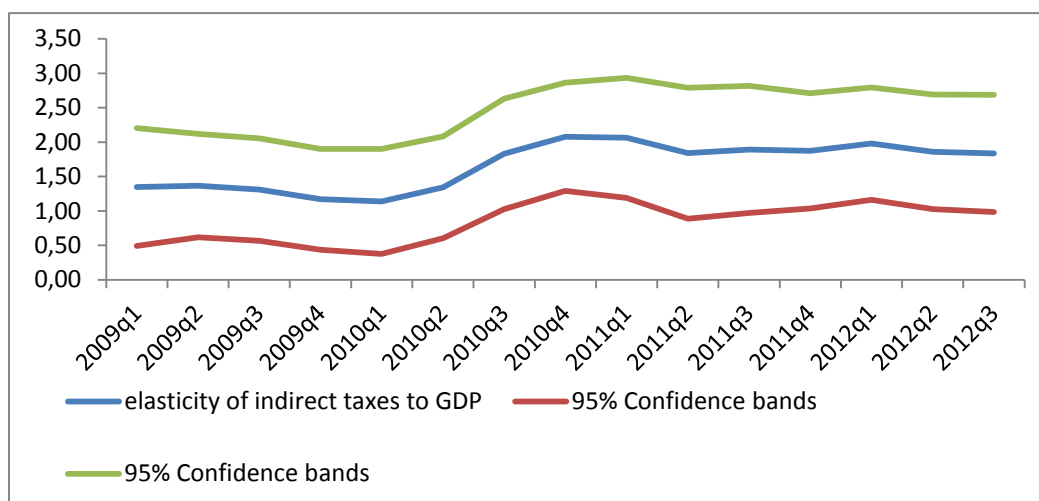


Figure A.2: Elasticity of indirect taxes to GDP\_1<sup>st</sup> alternative

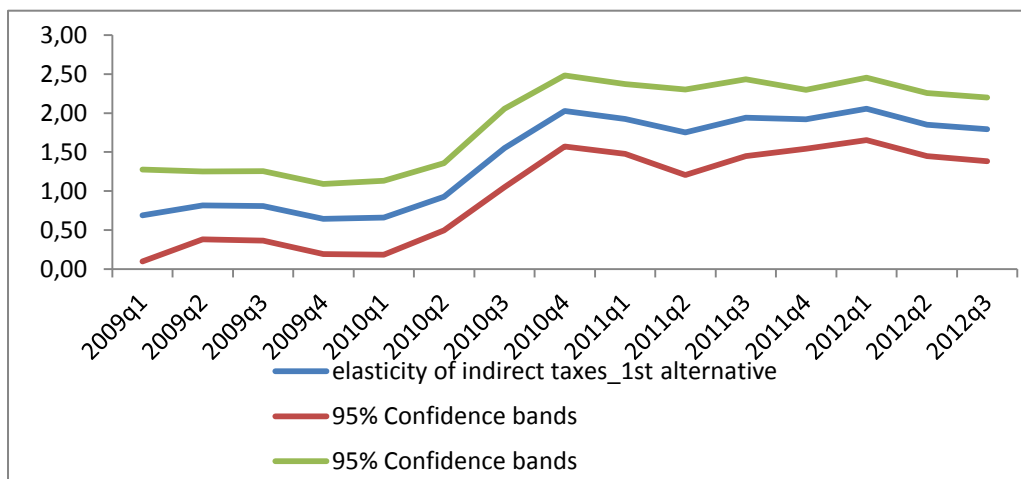


Figure A.3: Elasticity of indirect taxes to GDP\_2<sup>nd</sup> alternative (aggregate series)

