

**Fiscal adjustment in Greece under the financial rescue programme: the distributional effects on Greek households**

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The article examines the distributional effects of the fiscal adjustment programme in Greece agreed with the European Commission and the International Monetary Fund in 2010. It deals with adjustment measures that are front-loaded and directly related to the household welfare: an increase in value-added tax and excise rates and a reduction in wages and pensions. Analysing these two effects reveals that the programme decreases the welfare of all households in Greece but that the adverse effects of the adjustment are mitigated in favour of the poor.

## **I. Introduction**

On May 2, 2010, the European Commission (EC) and the International Monetary Fund (IMF) agreed to a financial rescue programme for Greece. The programme aims to help the government of Greece deal with economic difficulties the country has faced, but, under the agreement, the government is required to implement strong fiscal adjustment. The rescue package sets drastic fiscal measures in reducing expenditures and increasing revenues, which amounts for 11% of Gross Domestic Product over 3 years through 2013 (IMF, 2010a and b). Major adjustment measures are front-loaded and directly related to the living standard of the Greeks, and, therefore, assessing their impacts on the welfare of people in the country is a meaningful challenge. In so doing, this article decomposes the effects into ones stemming from revenue and expenditure measures. The measures considered are: (1) an increase in value-added tax (VAT) and excise rates and (2) wage bill cut in the public sector and the elimination of old-age pension bonus. This article uses household survey data to examine their distributional impacts. Section II explains the empirical methodology. Section III describes the data used in this article and then Section IV discusses the results. Finally, Section V concludes.

## **II. Methodology**

*Increase in VAT and excises*

The effect of an increase in VAT and excises is estimated with panel household survey data and aggregate tax revenue data. The equation estimated is

$$y_{j,t} = \alpha_j \cdot y_t + \beta_j \cdot T_t + \gamma \cdot Z_{j,t} + \mu_{j,t} + \varepsilon_{j,t} \quad (1)$$

where  $y_{j,t}$  is the log of nominal household income of household  $j$  in year  $t$ ,  $y_t$  is the log of country-wide average household income in year  $t$ ,  $T_t$  is the log of nominal VAT and excise revenue in year  $t$ ,  $Z_{j,t}$  contains a vector of household characteristics,  $\mu_{j,t}$  captures household-specific effects and  $\varepsilon_{j,t}$  is an error term.<sup>1</sup> The two regressors,  $y_t$  and  $T_t$ , are used as interactions, which can be rewritten as

$$\alpha_j \cdot y_t = \sum_{a \in A} \alpha_a y_t + \sum_{b \in B} \alpha_b y_t + \dots + \sum_{x \in X} \alpha_x y_t \quad (2)$$

$$\beta_j \cdot T_t = \sum_{a \in A} \beta_a T_t + \sum_{b \in B} \beta_b T_t + \dots + \sum_{x \in X} \beta_x T_t \quad (3)$$

where a series of coefficients,  $\alpha_a$  to  $\alpha_x$  and  $\beta_a$  to  $\beta_x$ , are the interactions of aggregated household income and VAT/excise revenue with characteristic  $a, b, \dots, x$  of head of household  $j$  in year  $t$ , respectively.

#### *Decrease in household income (wages and pensions)*

How wage and pension cuts affect the household welfare is estimated with cross-sectional survey data. It also considers a possible increase in unemployment rate.

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<sup>1</sup> As discussed in de Carvalho Filho and Chamon (2008), a variable on country-wide household income,  $y_t$ , acts as a deflator of the dependent variable. Sugawara and Zalduendo (2010) employ the same strategy to examine the possible impacts of exchange rate devaluation in the Baltic countries on their households.

Using individual-level information in the survey data, all individuals are categorized into salary workers in the public sector, old-age pensioners, salary workers in the private sector, the unemployed and others.<sup>2</sup> Then, the monthly values of wages in the public sector and old-age pensions are calculated for each of relevant individuals. Based on the computed amounts, flat bonuses are added to those who are qualified—€800 per year for those receiving less than €2500 of monthly pension, and €1000 per year for those working in the public sector and whose monthly salaries are less than €3000. The amounts corresponding to the 13th and 14th months are also calculated and subtracted.

The impact of an increase in the unemployed is simulated with the same survey data, and the magnitude of the impact is set as a 5 percentage-point increase.<sup>3</sup> For the sake of simplicity, this article assumes that everyone currently employed in the private sector has the same probability of losing their job and then randomly selects workers who are subject to the shock. Once chosen, their salaries and any other work-related receipts are converted to zero.

After three income components—net reduction in wages and pensions after considering flat bonuses and salary losses due to the rise in unemployment—are subtracted, new household income is computed. In the end, the new income data are compared to the original income and then the percentage difference between them is calculated for each household.

### *Estimation of distributional effects*

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<sup>2</sup> The last category includes economically inactive population excluding old-age pensioners. For simplicity, in case that a person reports both income from work and old-age pension but that the amount of the former is less than twice of that of the latter, the person is simply considered as a pensioner.

<sup>3</sup> This amount is almost the actual increase in unemployment rate from 2009Q1 to 2010Q4.

The effects of a VAT/excise increase and a decrease in household income at different income levels are estimated nonparametrically by locally weighted regressions with quartic kernel weights. The estimated equation is given as

$$\eta_j = \delta \cdot y_j + \varepsilon_j, \quad \varepsilon_j \sim N\left(0, \frac{\sigma^2}{K(z_j)}\right) \quad (4)$$

where  $\eta_j$  is the effect of either VAT/excise increase or decline in household income on household  $j$ ,  $y_j$  is the log of per capital income of household  $j$  and  $K(z_j)$  represents the quartic kernel weight for household  $j$ .<sup>4</sup> The total effect is then obtained as a sum of two distributional effects.

In order to calculate the error bands, the estimations are replicated 200 times with different samples. In the estimation of the VAT/excise effect, the survey data are bootstrapped and random samples of households are chosen. The locally weighted regression is then re-estimated with bootstrapped samples. In the case of the effect of a household income decrease, the sample selection and the calculation of error bands are based on the simulation of an increase in unemployment. This is because a reduction in wages in the public sector and old-age pensions always applies to all the individuals that are qualified.

### III. Data

This article uses the European Union Statistics on Income and Living Conditions (EU-SILC). The EU-SILC has two different versions—cross-sectional and

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<sup>4</sup> See Deaton (1997) for the calculation of the quartic kernel weights. The parameters used are the data points of 100 and the bandwidth of 2.

longitudinal—and both types are required in the VAT/excise effect estimation while only the cross-sectional EU-SILC is needed in the simulation of the household income effect. The cross-sectional EU-SILC for 2007 and the longitudinal one over the period 2003 to 2006 are used. The former surveys around 5600 Greek households, while the latter survey, which employs a 4-year rotational panel scheme, covers 4930 unique households in Greece.<sup>5</sup> The effect of a VAT/excise increase is estimated with the longitudinal EU-SILC and then the result is matched with the cross-sectional data set, using the information on characteristics of the household head. Therefore, households are classified into several groups. The groupings are based on educational level, age group and socioeconomic status of the household head as well as the place of residence.<sup>6</sup> This article considers: (i) three groups of educational level—primary, secondary and tertiary education— (ii) four categories of age group—less than 35 years old, aged 35-45, aged 46-60 and aged 61 and over— (iii) three types of socioeconomic status—employee, self-employed and not working—and (iv) five kinds of place of residence, based on the Nomenclature of Territorial Units for Statistics (regional level: NUTS2)—urban area in Attica, other urban areas, rural area in Voreia, rural area in Kentriki and rural area in Attica and Nisia Aigaiou, Kriti. These categories classify households into a total of 180 ( $= 3 \times 4 \times 3 \times 5$ ) groups. All the 13 000 and 5600 households in the longitudinal and cross-sectional surveys, respectively, belong to any one of these 180 groups, if the information is available. Finally, the annual data on VAT and excise revenue are taken from the IMF Government Finance Statistics.<sup>7</sup>

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<sup>5</sup> There are around 13 000 observations in the longitudinal data set.

<sup>6</sup> The household head is defined as a person who receives the most income (from any income sources) in a household.

<sup>7</sup> The revenue data are also obtained from the Eurostat, which employs a different recording system (ESA95). The results are quite similar to the one reported in Table 1.

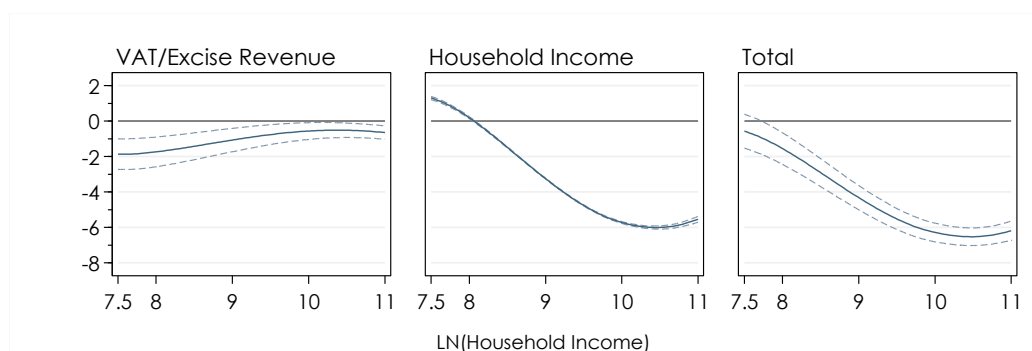
## IV. Results

Table 1 shows an estimation result on the effect of a VAT/excise increase on household income, using the longitudinal EU-SILC. There is a combination of characteristics, out of 180 patterns, that is excluded from the equation. It is treated as the base category and refers to households whose head has tertiary education, is aged less than 35 years old and is not working and who lives in an urban area in Attica. The coefficients in Table 1 can be, therefore, read as relative to households with those base characteristics. For instance, a 1% increase in VAT/excise revenue decreases the relative income of households headed by primary education holders by 0.12%, relative to households with similar age, residence and socioeconomic status but with tertiary education.

**Table 1. Effects of VAT/excise increase on household income**

|   | Coefficient | SE    |
|---|-------------|-------|
| <i>Interactions with VAT/excise revenue:</i>                      |             |       |
| Primary   | -0.123      | 0.087 |
| Secondary   | -0.144      | 0.078 |
| Age 35-45   | 0.118       | 0.097 |
| Age 46-60   | -0.197      | 0.092 |
| Age 61 and over   | -0.150      | 0.112 |
| Other urban   | 0.668       | 0.368 |
| Rural (Voreia)  | -0.120      | 0.360 |
| Rural (Kentriki)  | -0.356      | 0.398 |
| Rural (Attica/Nisia Aigaiou, Kriti)                               | -0.483      | 0.478 |
| Employee  | 0.029       | 0.095 |
| Self-employed   | -0.265      | 0.099 |
| <i>Household characteristics:</i>                                 |             |       |
| Household headed by female  | -0.400      | 0.038 |
| Household size  | 0.218       | 0.012 |
| Interactions with aggregated income<br>Dummies for each household | yes<br>yes  |       |
| Observations  | 12 926      |       |
| $R^2$   | 0.90        |       |
| Root Mean Squared Error   | 0.30        |       |

The left panel of Fig. 1 shows the distributional effect, as well as its 95% confidence interval, of a 6% increase in VAT and excise revenue.<sup>8</sup> It is found that the effort of the government of Greece to increase VAT and excise revenue by 6% is likely to reduce household income of all income levels but that poorer households are more severely affected. The result of the simulation on likely household income decline shows, as in the middle panel of Fig. 1, a pro-poor effect, and the impact is more pronounced than that of a VAT/excise increase. The last column of Fig. 1 shows a combined effect of an increase in VAT/excise and a household income decline. The combined effect shows a decrease in household income by 1% at the poorer-end of the distribution, while it is found to be a 6% decline for the rich.

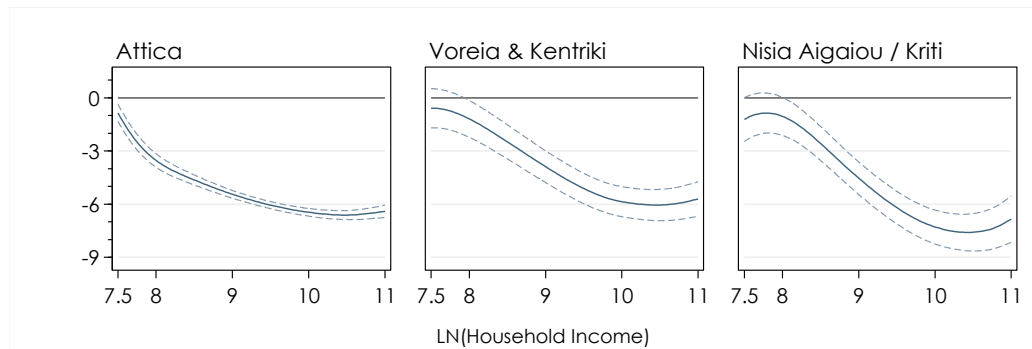


**Fig. 1. Distributional effects of the fiscal adjustment**

Fig. 2 shows a total effect (i.e., VAT/excise revenue and household income effects combined), by geographical region. The distributional effect is quite similar wherever households reside in the country, but the rich living in Nisia Aigaiou, Kriti are found to be more negatively affected.

<sup>8</sup> According to the Ministry of Finance of Greece, a targeted increase in net revenues in 2010 was 6%, though the actual increase was 5.5%.





**Fig. 2. Total distributional effects, by region**

## V. Concluding Remarks

This article tries to shed light on the distributional effects of the fiscal adjustment under the EC-IMF rescue programme on Greek households. It finds that the adjustment has a negative impact on the welfare of people in Greece but that the adverse effects are mitigated in favour of poorer households. It also assesses the impact by geographical region but does not find any fundamental differences that stem from places households live.

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