COUNTRY REPORT: GREECE

1. DESCRIPTION OF THE INDIRECT TAX SYSTEM

This section describes the indirect tax system for Greece. First we explain the value added tax rates, which goods and services they apply on, and which exemptions there are to the standard rates. We then summarize excises for each product category. Finally we list the other notable indirect taxes besides VAT and excises. Information generally refers to June 30th in a given year, unless specified otherwise.

1.1 Value Added Tax

From the beginning of 2010 Greece has been in the throes of a severe financial and economic crisis. In an effort to bring public finances back under control, the government announced a first round of austerity measures in March 2010, followed by tax reform in April 2010. In May 2010 the government negotiated a €110 billion loan with the EU, the ECB and the IMF. In return for the loan, it signed up to a Memorandum of Economic and Financial Policies, which committed the Greek government to sweeping spending cuts and revenue increases. Under the terms of the Memorandum the standard rate of VAT was raised from 19% to 21% on 15 March 2010 and 23% on 1 July 2010. The other two VAT rates that exist in Greece, i.e. the so called reduced and super-reduced rates, were also increased from 9% to 10% and 11% and from 4.5% to 5% and 5.5% respectively. The reduced rate applies to food, other basic commodities (such as energy and water) and some services, whereas the super-reduced rate applies to books, print, drugs, vaccines, hotels and similar accommodation services. In January 2011 the reduced and super-reduced rates were further increased to 13% and 6.5% respectively.

In July 2015 the Greek parliament approved several changes to the VAT rules: the standard VAT rate was made applicable to standard and processed food, food services, transportation services, repair services, medical and dental services and entertainment tickets (with the exception of theatre tickets); the reduced VAT rate only remained applicable to fresh food and basic commodities and the super-reduced VAT rate was decreased from 6.5% to 6%. From October 2015, the reduced rate was applied to hotel and similar accommodation services. The VAT exemption on education and its related supplies of goods and services (including, services provided by tutorials schools of all educational levels and foreign languages and computers) was abolished and these goods were transferred to the standard VAT rate. These changes were also applied to Greek islands, which until now beneficiated from a VAT rate 30% lower than the general VAT rates.

On May 2016 the Greek government approved yet another increase to the standard VAT rate from 23% to 24%, effective June 1, 2016. The reduced and super-reduced VAT rates remained unchanged at 13% and 6% respectively.

Table 1: Overview of changes in VAT rates (2011-2016)

	2011	2012	2013	2014	2015	2016
Standard	23%	23%	23%	23%	23%	24%
Reduced	13%	13%	13%	13%	13%	13%
Super-reduced	6.5%	6.5%	6.5%	6.5%	6.5%	6%
Zero rate	0%	0%	0%	0%	0%	0%

Source: Ministry of Finance.

The VAT rates apply to specific product categories, which are listed in Table 2.

Table 2: Overview of reduced VAT product categories (2011)

Reduced	food, non-alcoholic beverages, materials and services for the maintenance and repair of the dwelling, water supply, refuse and sewerage collection, electricity, gas, liquefied hydrocarbons, liquid and solid fuels, hot water, steam and ice, repair of household appliances, pharmaceutical and other medical products, therapeutic appliances and equipment, medical services, dental services, services of medical analysis laboratories and X-ray centres, services of medical auxiliaries, other non-hospital services, hospital services, passenger transport by railway, road, air, sea and inland waterway, other purchased transport services, gardens, plants and flowers, pets and related products, veterinary and other services for pets, cinemas, concerts, museums, zoological gardens and the like, television, radio taxes and hire of relevant equipment, travel goods and other carriers, social protection services, crèches, nurseries
Super-reduced	books, newspapers and periodicals, miscellaneous printed matter, accommodation services
Exempted	postal services, games of chance, education services, insurance services, financial services

Source: Law On Value Added Tax

Over the period 2008-2012[1], the relative importance of the VAT revenues in total government tax revenues has decreased by 3.8 percentage points from 34.5% in 2008 to 30.7% in 2012. As a share of GDP, VAT revenues remained relatively stable around 7%.[2]

In 2009 VAT revenues declined by 12.5% and total tax revenues by 5.1% due to the crisis. In 2010, the significant increase in VAT rates resulted in an increase in VAT revenues by almost 10%. However, the continuing economic crisis in 2011 and 2012 led to a decline in VAT revenues by 7.9% and 8.5% respectively.

[1] 2012 is the latest year for which relevant Eurostat data is available.
[2] Note that GDP (at market prices) fell by 21 per cent during the same period.

Table 3: VAT revenue 2008-2012

	2008	2009	2010	2011	2012
% of government revenues	34.5	31.8	35.6	32.8	30.7
% of GDP	7.1	6.3	7.2	7.1	7.0

Source: Eurostat, author's calculations.

1.2 Excise duties and prices

In Greece excise duties are levied upon spirits and liqueurs, sparkling wine, beer, cigarettes, cigars, other tobacco, electricity, town gas and natural gas, liquid fuels, fuels and lubricants. Cigarettes are taxed on both a specific and an ad valorem basis.

1.2.1 Alcoholic beverages

Excises duties on alcoholic beverages remained stable over the period 2011-15. Excise duties on wine were first introduced in January 2016, whereas in the same year excise duties on beers almost doubled. Note that the excise duty on wine was considered as a major policy failure, as only 15% of wine producers have been able to comply with its preconditions.

Table 4: Excises on alcoholic beverages (euro per unit, 2011-2016)

	2011-15	2016	unit
Beers			
Small breweries (producing less than 200,000 hl)	1.3	2.5	hl/da
Large breweries (producing more than 200,000 hl)	2.6	5	hl/da
Wine			
Sparkling wine	0	20	hl
Other wine	0	20	hl
Intermediary products	102	102	hl of product
Spirits			
Ouzo, tsipouro	1,225	1,225	hl of pa
Other spirits	2,450	2,450	hl of pa

Notes: da=degree alcohol, pa=pure alcohol.
Source: Law on excise duties.

1.2.2 Tobacco

Table 5 shows the changes in excise duties on tobacco over the period 2011-2016. An important reform took place in 2013; the structure of excises on cigarettes was significantly altered, and much more weight was given to the ad valorem duty. At the same time, specific excises were introduced for the first time on fine-cut smoking tobacco and other tobacco products whereas ad valorem taxes were abolished.

Table 5: **Excises on tobacco products (2011-2016)**

	2011	2012	2013	2014	2015	2016
Specific excises						
Cigarettes (€ per 1,000 pcs)	19.7	19.7	80.0	82.5	82.5	82.5
Fine-cut smoking tobacco (€ per kg)	n/a	n/a	153.0	156.7	156.7	156.7
Cigars and cigarillos	n/a	n/a	n/a	n/a	n/a	n/a
Other tobacco products (€ per kg)	n/a	n/a	153.0	156.7	156.7	156.7
Ad valorem excises (% of retail price of 1,000 pcs)						
Cigarettes	52.4%	52.4%	20%	20%	20%	20%
Fine-cut smoking tobacco	67%	67%	n/a	n/a	n/a	n/a
Cigars and cigarillos	34%	34%	34%	35%	35%	35%
Other tobacco products	67%	67%	n/a	n/a	n/a	n/a
Total amount paid on cigarettes not less than (€ per 1,000 pcs)	76.4	105.3	115.0	117.5	117.5	117.5

Source: Law on excise duties.

1.2.3 Energy products

In the period 2011-2016, excise duties on energy products have changed considerably. Law 3986/2011 on 'Emergency Measures to Implement the Medium-Term Fiscal Strategy Framework' provided that '*excise duties on diesel and kerosene, used as heating oil, shall be set at eighty percent (80%) of the current rate of excise duties on diesel and kerosene used for transport'*. Hence, the most important change was the major (and highly unpopular) increase in the excise duty on gas oil and kerosene for non-business heating purposes from €21 per 1,000 lt in 2011 to €230 per 1,000 lt in 2016. Excise duty on natural gas was introduced in September 2011. The duties on liquefied petroleum gas and heavy fuel oil were also increased. On the other hand, excise duties on gas oil (diesel) and kerosene for industrial and transport purposes were reduced in 2013.

Table 6: Excises on energy products (euro per unit, 2011-2016)

	2011	2012	2013	2014	2015	2016	unit
Petrol							
Leaded petrol	681	681	681	681	681	681	1,000 liter
Unleaded petrol	670	670	670	670	670	670	1,000 liter
Gas oil							
Propellant	412	412	330	330	330	330	1,000 liter
Industrial/commercial use (except for agriculture)	412	412	330	330	330	330	1,000 liter
Heating: non-business use							
15 October - 30 April	21	60	330	230	230	230	1,000 liter
1 May – 14 October	412	412	330	330	330	330	1,000 liter
Heating: business use	412	412	330	330	330	330	1,000 liter
Kerosene							
Propellant	440	440	330	330	330	330	1,000 liter
Industrial/commercial use	440	440	330	330	330	330	1,000 liter
Heating: non-business use							
15 October - 30 April	21	60	330	230	230	230	1,000 liter
1 May – 14 October	440	440	330	330	330	330	1,000 kg
Heating: business use	440	440	330	330	330	330	1,000 kg
Heavy fuel oil							
Heating: business & non-business use	19	38	38	38	38	38	1,000 kg
Liquefied Petroleum Gas							
Propellant	125	200	330	330	330	330	1,000 kg
Industrial/commercial use (except for agriculture)	41	120	120	120	120	120	1,000 kg
Heating: business & non-business use	13	60	60	60	60	60	1,000 kg
Natural Gas							
Propellant	0.0	0.0	0.0	0.0	0.0	0.0	MWh
Industrial/commercial use (except for agriculture)	0.0	5.4	5.4	5.4	5.4	5.4	MWh
Heating: business & non-business use	0.0	5.4	5.4	5.4	5.4	5.4	MWh
Coal and Coke							
Heating: business & non-business use	0.3	0.3	0.3	0.3	0.3	0.3	Gigajoule
Electricity							
Non-business use							
Households	2.2	2.2	2.2	2.2	2.2	2.2	MWh
Rest non-business use	5.0	5.0	5.0	5.0	5.0	5.0	MWh
Business use							
Consumers of high voltage	2.5	2.5	2.5	2.5	2.5	2.5	MWh
Rest business use	5.0	5.0	5.0	5.0	5.0	5.0	MWh
White spirit	20.0	20.0	20.0	20.0	20.0	20.0	1,000 kg
Other light oils	12.0	12.0	12.0	12.0	12.0	12.0	1,000 kg

Notes: Electricity of solar, wind, wave, tidal or geothermal origin is exempted from taxation.

Source: Law on excise duties.

1.2.4 Product and sector specific charges

In 2011-2016 no other goods were subject to excise duties. From January 2017 excises will start applying to electronic cigarettes and coffee.

1.2.5 Tax revenue from excise duties

In the period of 2011-2015, the share of revenues from excise duties on alcohol and, especially, tobacco declined, whereas the respective share from energy slightly increased due to the increases in taxation.

As a share of GDP, revenues from tobacco products went down from 1.5% to 1.4%. The main reason for this decline is the sharp increase in excise duties levied on these products, which steered consumers toward the black market.

Table 7: Proceeds from excise duties (2011 -2015)

		2011	2012	2013	2014	2015
% of gov. revenue	alcohol	0.7	0.6	0.7	0.6	0.6
	tobacco	6.5	6.0	5.9	5.7	5.7
	energy	9.5	9.5	9.5	9.3	9.6
% of GDP	alcohol	0.2	0.2	0.2	0.2	0.2
	tobacco	1.5	1.5	1.5	1.4	1.4
	energy	2.2	2.3	2.3	2.3	2.4

Source: Eurostat, Greek Ministry of Finance, author's calculations.

1.2.6 Prices

Table 8 lists consumer prices at the most detailed level of commodity groups available in HBS.

Table 8: Average consumer prices of items subject to excises (euro per unit, 2011-2016)

	2011	2012	2013	2014	2015	2016	unit
Vodka	22.03	22.00	21.98	22.14	22.40	22.43	1 liter
Red wine	6.33	6.44	6.53	6.61	6.57	6.72	1 liter
White wine	5.68	5.77	5.85	5.93	5.89	6.03	1 liter
Beer	2.14	2.17	1.97	1.93	1.90	2.04	1 liter
Cigarettes	3.21	3.26	3.56	3.71	3.81	3.82	20 cigarettes
Tobacco	203.47	204.81	213.52	217.82	223.98	226.12	1 kg
Electricity	12.50	13.91	15.63	17.67	17.67	17.60	kWh
Natural gas	10.17	10.17	7.72	7.23	6.81	5.64	kWh
Diesel	14.71	15.35	13.92	13.51	11.77	10.66	10 liters
Petrol	10.98	12.74	12.83	12.15	8.91	7.78	10 liters

Source: Greek Foundation for Economic & Industrial Research – IOBE (cigarettes for all years and tobacco for 2013), Europe Economics (beer prices for 2013-2014; average consumer price in off-trade), Eurostat (all remaining prices apart from the note's).

Notes: Vodka prices for 2011 and 2013-2016 were obtained by using the CPI for alcoholic beverages.
Red and white wine prices for 2011 and 2013-2016 were obtained by using the CPI for wine.
Beer prices for 2011, 2015 and 2016 were obtained by using the CPI for beer.
Tobacco prices for 2011-2012 and 2014-2016 were obtained by using the CPI for tobacco.

1.3 Other indirect taxes

Besides VAT and excises, governments raise also revenues through different indirect tax instruments. Life, liability, motor, fire, health and accident insurances are subject to tax. Vehicle classification tax is a lump-sum payment to register a vehicle which is imported from abroad. This tax is charged as specific tax. Vehicle registration tax is a regular tax paid annually. Vehicle operation tax is a specific tax as well.

In June 2016 a 10% tax was imposed on subscription TV bills. From January 2017 a 5% duty will be imposed on fixed telephone line bills.

Table 9: Revenue from other indirect taxes (2011)

Tax	million €	% of gov. revenue
Taxes on insurance products	379	0.8
Vehicle classification tax	100	0.2
Vehicle operation tax	1,117	2.3

Source: Greek Ministry of Finance, author's calculations.

Table 11 summarises the scope of simulations in EUROMOD. Coded tax policy parameters in EUROMOD (with main assumptions) are presented in Table 20 in the Appendix.

Table 11. Indirect taxes simulated in EUROMOD

Indirect tax	Simulated
VAT	Yes
Alcohol excise	Yes
Tobacco excise	Yes
Energy excise	Yes

2. DATA

2.1 Description of HBS

The Greek Household Budget Survey (*Έρευνα Οικογενειακών Προϋπολογισμών - ΕΟΠ*) was the first sampling household survey ever conducted by the Greek National Statistical Institute. The first HBS was carried out in 1957, lasted one year and the sample size was about 2,500 households living in urban areas of the country. Until 1972 it was only conducted in municipalities with more than 30,000 inhabitants, but with smaller sample sizes.

In 1963, parallel to the survey in urban areas, another HBS was carried out in semi-urban and rural areas, namely municipalities with population less than 10,000 inhabitants. It sampled 3,755 households in these areas and it continued until 1972 but, again, with smaller sample sizes.

In the years 1974, 1981/82, 1987/88, 1993/94, 1998/99 and 2004/05 the Household Budget Survey covered all regions of the country. In 1974 the sample size was approximately 7,500 households; in the other five waves it was approximately 6,000 to 6,800 households.

Since 2008 the survey is conducted on an annual basis. It covers information on consumption, household expenditures (both in cash and in kind), household resources (individual wages, earned income, welfare benefits, transfers between households etc.), socio-demographic characteristics, living conditions and the possession of consumer durables. The study of household expenditures is the main purpose of the survey: all household expenditures are recorded and broken down using the COICOP classification. It is used to estimate the CPI in a more relable way as well as other National Accounts statistics. HBS 2011 contains information from 3,515 households consisting of 8,598 individuals

2.2 Sample descriptives

Table 12 presents the distribution of expenditure (in cash only) in the HBS data across income deciles. We can see from the table that households with lower income spend a bigger share of their income – the bottom four deciles spend on average more than they actually earn (decile 1 spends more than double of what it earns). Food and non-alcoholic beverages is the biggest expenditure category for every household in deciles 1-9 whereas durables are the biggest expenditure category in decile 10. The spending patterns of households are different at higher income levels. Spending on durables, restaurants and hotels, private transport and recreation and culture displays a strong income effect.

Table 12. Mean (unequivalised) household disposable income and expenditure by income decile and expenditure category, Euro/month

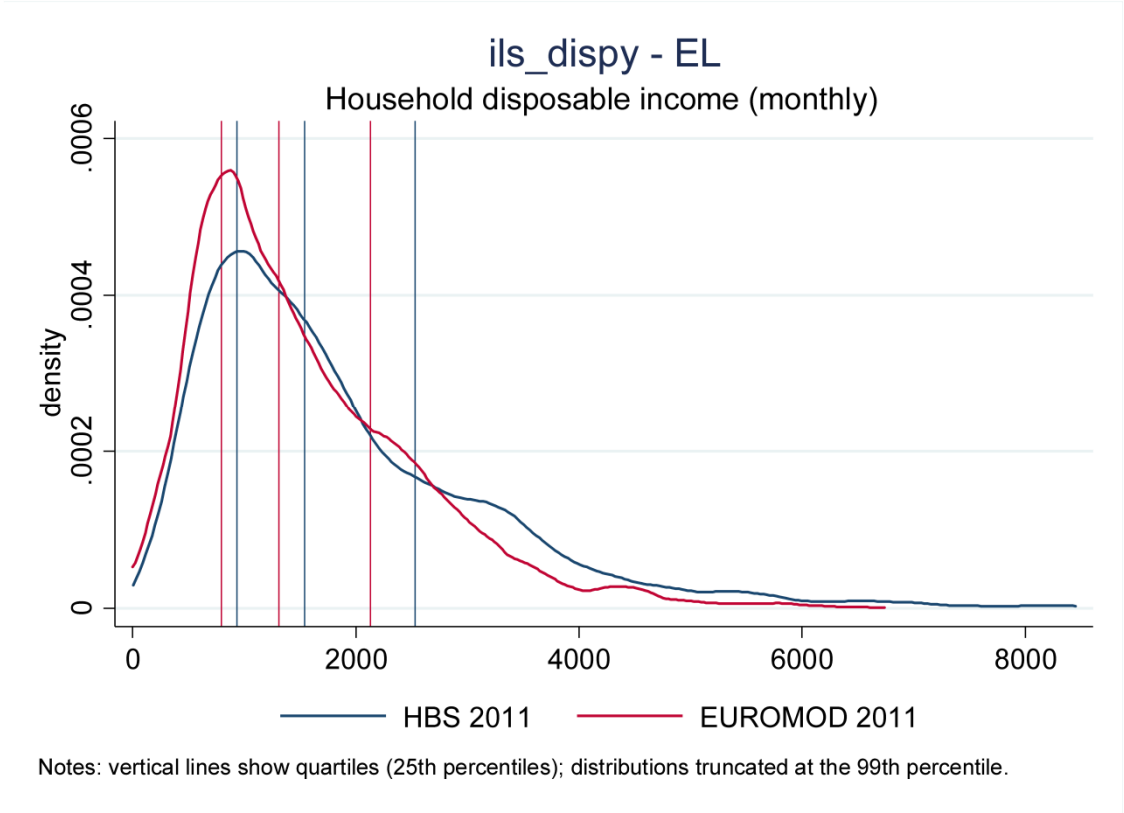
Expenditure category	1	2	3	4	5	6	7	8	9	10	All
Food and non-alcoholic beverages	297	290	319	311	330	357	348	386	431	482	355
Alcoholic beverages	12	10	13	10	13	16	18	23	27	37	18
Tobacco	41	43	42	40	40	53	51	54	64	58	49
Clothing and footwear	65	64	74	72	83	105	101	132	166	262	112
Home fuels, electricity and water	111	107	119	120	115	129	121	137	159	174	129
Housing and rents	114	105	75	89	107	80	94	81	105	144	99
Household goods and services	32	27	37	31	36	44	53	57	82	139	54
Health	65	63	90	81	75	115	107	116	167	267	115
Private transport	80	84	86	96	106	147	138	197	241	348	152
Public transport	15	13	14	18	16	16	18	21	21	22	18
Communication	52	49	54	57	61	71	69	92	106	125	74
Recreation and culture	29	25	37	37	39	58	52	74	113	159	62
Education	39	31	46	29	44	54	53	71	135	136	64
Restaurants and hotels	101	103	128	128	136	164	185	215	315	475	195
Other goods and services	74	67	87	85	91	123	128	159	207	332	135
Durables	48	43	78	60	57	121	65	128	189	495	128
Mean household income	549	816	1,077	1,253	1,426	1,747	1,998	2,522	3,159	5,276	1,981
Mean total expenditure	1,177	1,125	1,302	1,265	1,351	1,654	1,602	1,943	2,528	3,657	1,759

Notes: deciles are constructed on the basis of household disposable income equivalised with the modified OECD scale, allocating the same number of households to each decile.
Source: HBS 2011.

2.3 Comparison of variable distributions in HBS and EUROMOD input data

The following subsection gives an overview of the comparability of HBS and the EUROMOD input data.

Figure 1 Household disposable income, HBS vs SILC



Notes: vertical lines show quartiles (25th percentiles); distributions truncated at the 99th percentile.

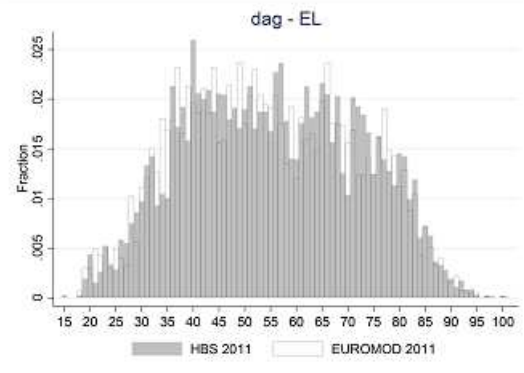
Figure 1 shows that household disposable income follows a similar pattern in HBS and EUROMOD/SILC data. Two main differences can be observed:

a. SILC data has slightly higher density of incomes around the 25th percentile;

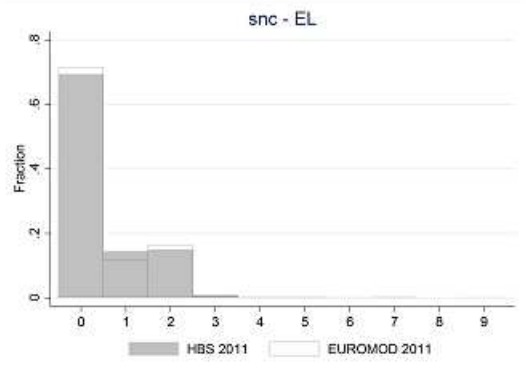
b. HBS data contains more households with disposable income higher than €7,000, i.e. incomes at the very top of the distribution.

Figure 2 Distribution of selected covariates in HBS (2011) and EUROMOD (2011 simulation)

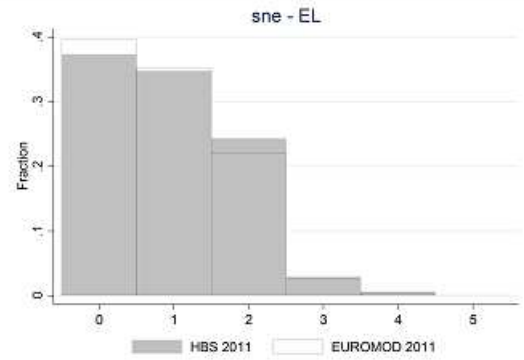
Age of household head



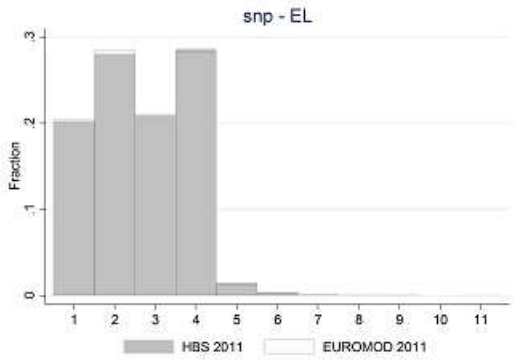
Number of children



Number of active people



Number of pensioners



In general, other variables used for imputing expenditures between HBS and EUROMOD-SILC such as number of children, active people, pensioners etc. match well (see Figure 2). The differences are not substantial enough to warrant disregarding the variable from the model. In other variables used there were only some minor differences.

3. VALIDATION OF ESTIMATED ENGEL CURVES AND EXPENDITURES IMPUTED INTO EUROMOD

Table 13 shows mean levels of total expenditure categories observed and predicted in HBS (2011), expenditures imputed in EUROMOD and national accounts aggregates. Table 14 and Figure 3 compare observed and predicted HBS aggregated expenditures with expenditures imputed into EUROMOD-SILC and figures provided by the OECD (national accounts). Total expenditure captured by the HBS makes up 69% of what we see in the OECD data. The lowest coverage is observed in expenditure on public transports and tobacco, which represent respectively 12.2% and 50.2% of OECD aggregate values.

The match between actual and predicted HBS expenditures is very good with small overestimation of expenditures on durable goods, public transport, home fuels and electricity, alcohol, other goods and services, tobacco, health and housing. Imputation into EUROMOD-SILC also matches well the predicted HBS expenditures data.[3] Total imputed aggregated expenditure covers 71.6% of OECD aggregated expenditure from National Accounts. The most important discrepancies can be seen in public transport (12%), tobacco (49.1%), other goods and services (55.9%), %), restaurants and hotels (56.1%), recreation and culture (56.6%) and communication (60.3%). A small overestimation is observable for private transport (106.8%).

[3] Note that, in the case of Greece, the derived aggregate savings rate is negative.

Table 13: Total 2011 expenditure (mln €) by category: HBS and EUROMOD

Category	Observed in HBS	Predicted in HBS	Imputed in EUROMOD	OECD aggregate
Food and non-alcoholic beverages	17,674	17,465	17,728	24,923
Alcoholic beverages	888	933	970	1,282
Tobacco	2,423	2,528	2,368	4,828
Clothing and footwear	5,596	5,436	5,596	5,667
Home fuels, electricity and water	6,432	6,823	6,836	7,188
Housing and rents	4,948	5,100	5,360	5,917
Household goods and services	2,683	2,565	2,743	2,783
Health	5,700	5,928	5,680	6,057
Private transport	7,581	7,264	7,653	7,167
Public Transport	876	936	862	7,187
Communication	3,668	3,577	3,814	6,321
Recreation and culture	3,109	3,023	3,148	5,558
Education	3,171	3,083	3,227	3,610
Restaurants and hotels	9,705	9,586	9,850	17,563
Other goods and services	6,734	7,029	7,150	12,786
Durable goods	6,387	6,842	8,007	8,200
Total non-durables	81,189	81,275	82,986	118,837
Total expenditures	87,575	88,117	90,993	127,037

Source: Author's calculations based on EUROMOD G4.2, HBS 2011 and OECD.

Table 14 Overview of HBS actual and EUROMOD imputed expenditure (2011)

	HBS		EUROMOD	
	Expenditure mln €	% to OECD expenditure	Expenditure mln €	% to OECD expenditure
Food and non-alcoholic beverages	17,674	70.9	17,728	71.1
Alcoholic beverages	888	69.3	970	75.6
Tobacco	2,423	50.2	2,368	49.1
Clothing and footwear	5,596	98.8	5,596	98.8
Home fuels, electricity and water	6,432	89.5	6,836	95.1
Housing and rents	4,948	83.6	5,360	90.6
Household goods and services	2,683	96.4	2,743	98.6
Health	5,700	94.1	5,680	93.8
Private transport	7,581	105.8	7,653	106.8
Public transport	876	12.2	862	12.0
Communication	3,668	58.0	3,814	60.3
Recreation and culture	3,109	55.9	3,148	56.6
Education	3,171	87.8	3,227	89.4
Restaurants and hotels	9,705	55.3	9,850	56.1
Other goods and services	6,734	52.7	7,150	55.9
Durables	6,387	77.9	8,007	97.6
Total	87,575	68.9	90,993	71.6

Source: Author's calculations based on EUROMOD G4.2, HBS 2011 and OECD.

Figure 3 Aggregate observed and imputed expenditures

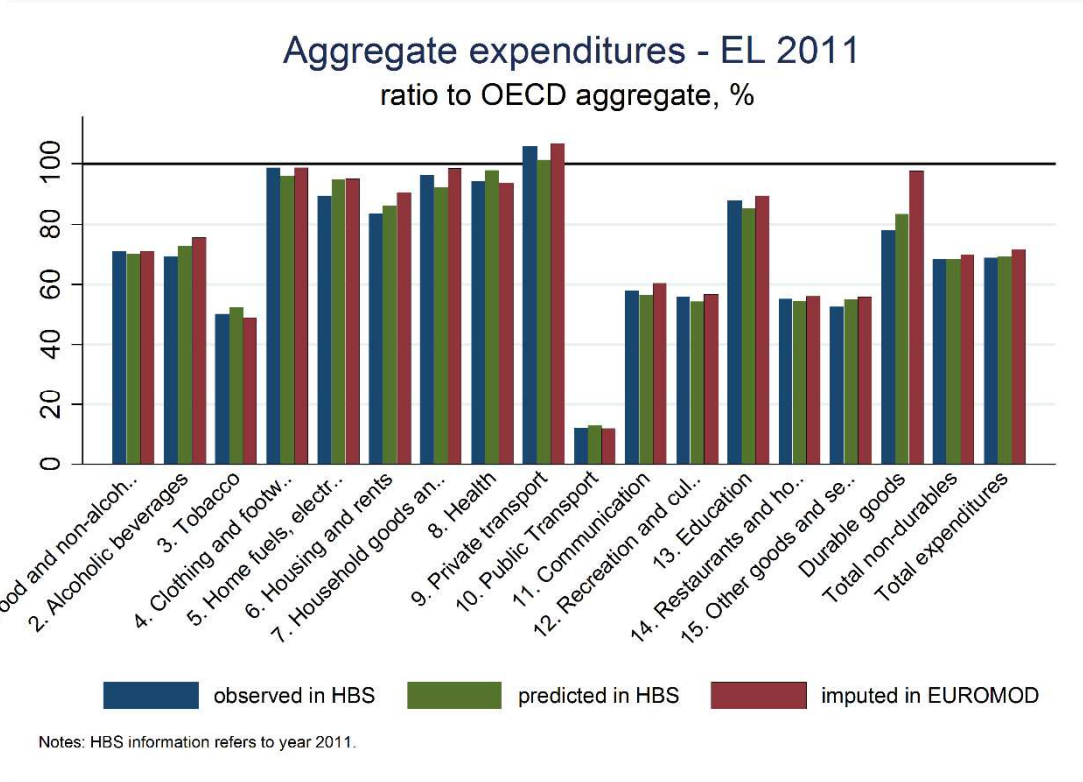
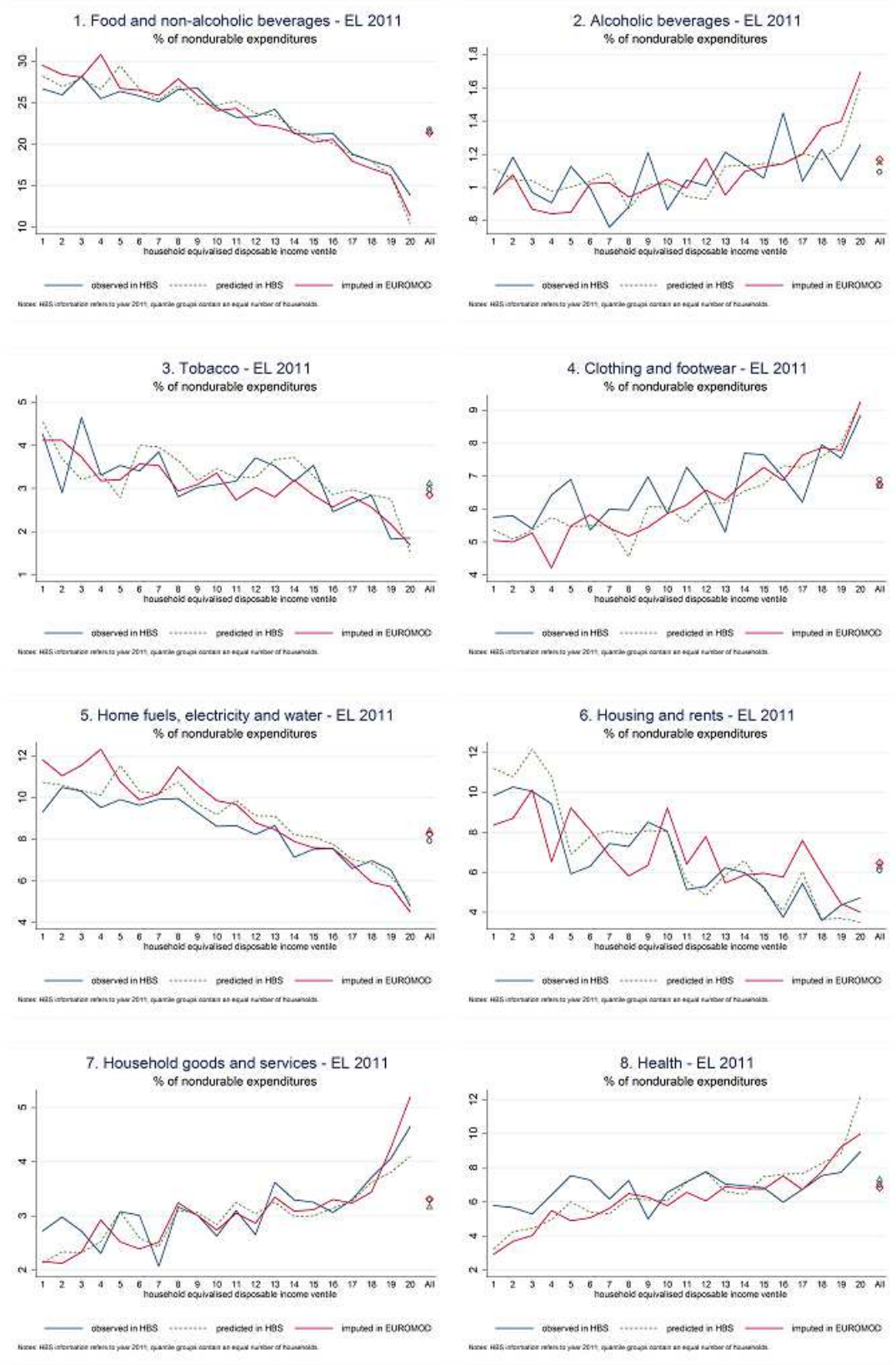
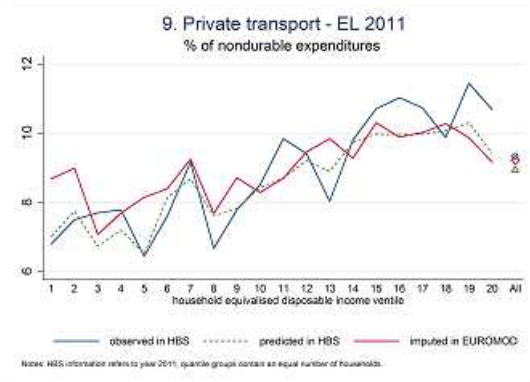
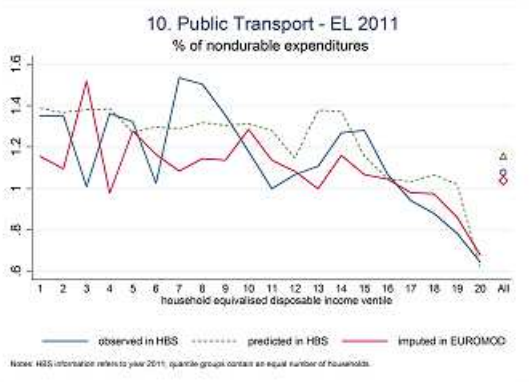


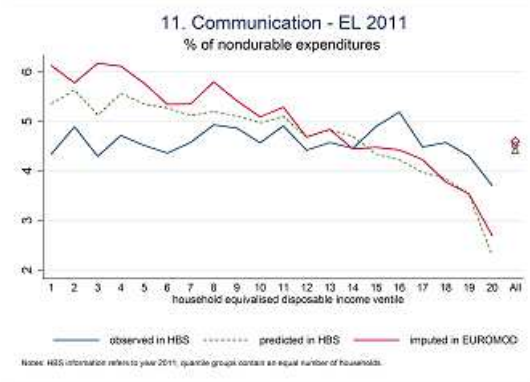
Figure 4 assesses the quality of estimation comparing the distribution of HBS in-sample prediction and EUROMOD-SILC imputed household share of expenditures per month with the distribution of average HBS observed share of expenditure for each of the 16 categories. Overall, imputed expenditures in SILC follow very similar patterns to the HBS across the income distribution for each of the commodities. The commodities for which the Engel curve imputation performs least good are communication and home fuels, electricity and water (for which the imputation over-predicts at the bottom of the income distribution) and durable goods (for which the imputation over-predicts at the top of the income distribution).

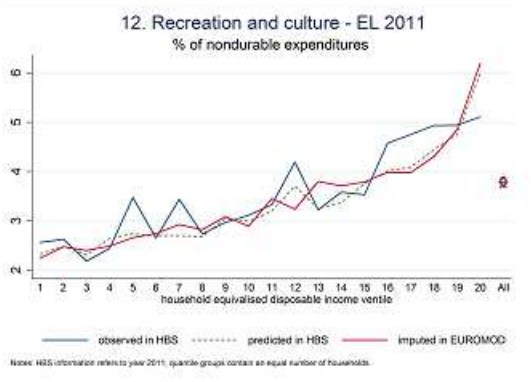
Figure 2: Observed, predicted and imputed expenditure shares by ventiles of household equivalised disposable income, %

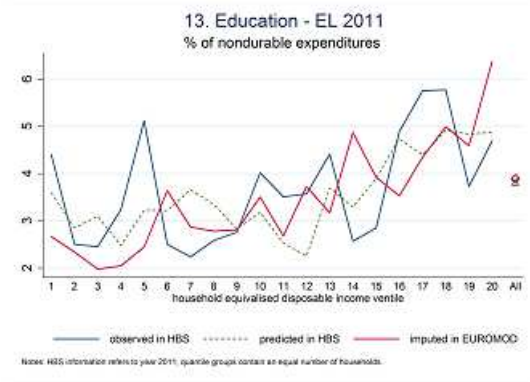



9. Private transport - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD

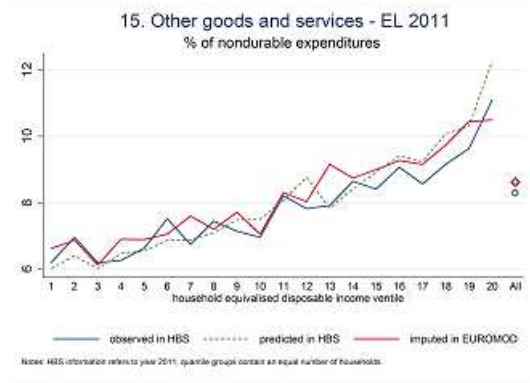

10. Public Transport - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD

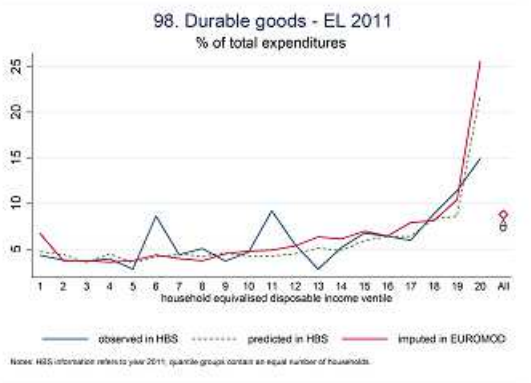

11. Communication - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD


12. Recreation and culture - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD


13. Education - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD


14. Restaurants and hotels - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD


15. Other goods and services - EL 2011
% of nondurable expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD


98. Durable goods - EL 2011
% of total expenditures
household equivalised disposable income ventile
observed in HBS
predicted in HBS
imputed in EUROMOD

4. VALIDATION OF INDIRECT TAX SIMULATIONS IN EUROMOD

Table 15 presents the implicit tax rates by expenditure category. The highest taxed commodity (by far) was tobacco, followed by private transport. The implicit tax rate for *tobacco* rose from 2011 to 2013 and came back to its 2011 level in 2016. The implicit tax rate for *home fuels, electricity & water* also rose significantly in 2013 (from 15.3% in 2012 to 27.1%) and remained approximately at this level ever since. In the period 2011-2016 there were also significant increases in the implicit tax rates of *private transport* (from 104.9% to 182.2%), *public transport* (from 13% to 24%), *alcoholic beverages* (from 74.3% to 90.3%) and *housing and rents* (from 3.8% to 5.1%). The implicit tax rate for *restaurants and hotels* fell from 21.8% in 2011 to 12.9% in 2014-15, to then increase again to 23.2% in 2016.

Table 15 Implicit indirect tax rate by expenditure category, %, 2011-2016

Expenditure category	2011	2012	2013	2014	2015	2016
1. Food & non-alcoholic beverages	13.0	13.0	13.0	13.0	13.0	15.9
2. Alcoholic beverages	74.3	74.3	75.4	75.2	74.6	90.3
3. Tobacco	472.4	466.9	510.5	496.6	456.4	472.3
4. Clothing & footwear	23.0	23.0	23.0	23.0	23.0	24.0
5. Home fuels, electricity & water	13.9	15.3	27.1	23.0	27.1	29.7
6. Housing & rents	3.8	3.8	3.8	3.8	3.8	5.1
7. Household goods & services	23.0	23.0	23.0	23.0	23.0	24.0
8. Health	13.0	13.0	13.0	13.0	13.0	13.0
9. Private transport	104.9	99.7	113.2	118.0	145.7	182.2
10. Public transport	13.0	13.0	13.0	13.0	13.0	24.0
11. Communication	22.7	22.7	22.7	22.7	22.7	23.7
12. Recreation & culture	11.5	11.5	11.5	11.5	11.5	12.7
13. Education	0.0	0.0	0.0	0.0	0.0	0.0
14. Restaurants & hotels	21.8	21.8	21.8	12.9	12.9	23.2
15. Other goods & services	13.7	13.7	13.7	13.7	13.7	14.2
Durable goods	23.0	23.0	23.0	23.0	23.0	24.0

Source: EUROMOD Version G4.2+.

Table 16 compares the total simulated VAT and excise revenues, with the official government revenues per tax instrument for the period 2011-2014 (i.e. the period for which OECD data are available). Modelled VAT revenues account for 83 to 89 % of total recorded VAT revenues in the period 2011-2014. The coverage rate is a bit lower for excises: between 56% and 67% over the same period. Coverage rates of indirect taxes, defined as the sum of VAT and excises, varies between 74% and 81%. Some factors that can explain the shortfall in revenues are the following: (1) it is not possible to break the official tax revenue statistics down into taxes paid by the household sector and those paid by other sectors (b) underreporting of some expenditure categories, such as alcohol and tobacco and (c) it is not possible to capture the expenditure made by foreigners and tourists.

Table 16: Indirect tax amounts 2011-2014, million EUR

		2011	2012	2013	2014
VAT	EUROMOD	12,508.5	11,444.4	11,145.3	10,922.2
	Actual	15,021.0	13,713.0	12,593.0	12,676.0
	Coverage	0.83	0.83	0.89	0.86
Excises	EUROMOD	4,309.7	3,919.8	4,579.1	4,539.3
	Actual	7,739.0	7,020.0	6,820.0	6,756.0
	Coverage	0.56	0.56	0.67	0.67
Total indirect taxes	EUROMOD	16,818.2	15,364.2	15,724.4	15,461.5
	Actual	22,760.0	20,733.0	19,413.0	19,432.0
	Coverage	0.74	0.74	0.81	0.80

Sources: EUROMOD Version G4.2+, OECD.

Tables 17 and 18 present simulations of indirect taxes for the baseline tax year (i.e. legislation in place in 2011). They show mean (unequivalised) household disposable income, total expenditure and total indirect taxes respectively by income decile and by expenditure decile. The amount of indirect taxes paid by each decile rises with income, reflecting the rising share in total consumption: the share of indirect taxes paid by top decile four times as high as the share of taxes paid by the bottom decile. However, the second part of Table 17 shows that indirect taxes are highly regressive: tax liability in percent of disposable income declines steeply from 48.5% in the first decile to 17.6% in the top decile of equivalised household disposable income. This is reflected mainly by the VAT which in percentage of income is 34.1% in the first decile as opposed to 14.0% in the top decile. The variation of incidence of excise tax is also significant ranging between 14.4% and 3.6%. These effects are also visualized graphically by the solid line in Figure 5.

Table 18 and Figure 6 (dash line) show similar results but ranking households by equivalised total household expenditure. Also in this case indirect taxes increase with expenditure in nominal terms, but the share of indirect taxes on total expenditures paid by top decile (17.6%) is now higher than the share of indirect taxes paid by the bottom decile (15.5%), reveling that indirect taxes are (weakly) progressive with respect to expenditure.

Table 17 Mean (unequivalised) household disposable income, total expenditure and total indirect taxes by income decile, 2011

				Incidence (% of income)				
	Household Income	Household Expenditure	Indirect taxes	VAT	Excises	Excises specific	Excises ad valorem	Total Indirect taxes
1	380.5	979.9	184.6	34.1	14.4	5.3	9.1	48.5
2	692.2	1,061.6	189.7	20.1	7.3	2.7	4.6	27.4
3	921.1	1,275.0	231.1	18.2	6.9	2.4	4.5	25.1
4	1,070.0	1,278.1	234.7	16.0	6.0	2.0	4.0	21.9
5	1,207.7	1,374.0	250.2	15.1	5.6	1.9	3.8	20.7
6	1,474.3	1,605.3	295.0	14.7	5.3	1.6	3.8	20.0
7	1,807.5	1,928.0	360.1	14.6	5.4	1.6	3.8	19.9
8	2,035.3	2,079.4	391.0	14.1	5.1	1.4	3.8	19.2
9	2,509.2	2,580.4	484.2	14.2	5.1	1.3	3.8	19.3
10	4,194.4	4,016.8	739.2	14.0	3.6	0.8	2.9	17.6

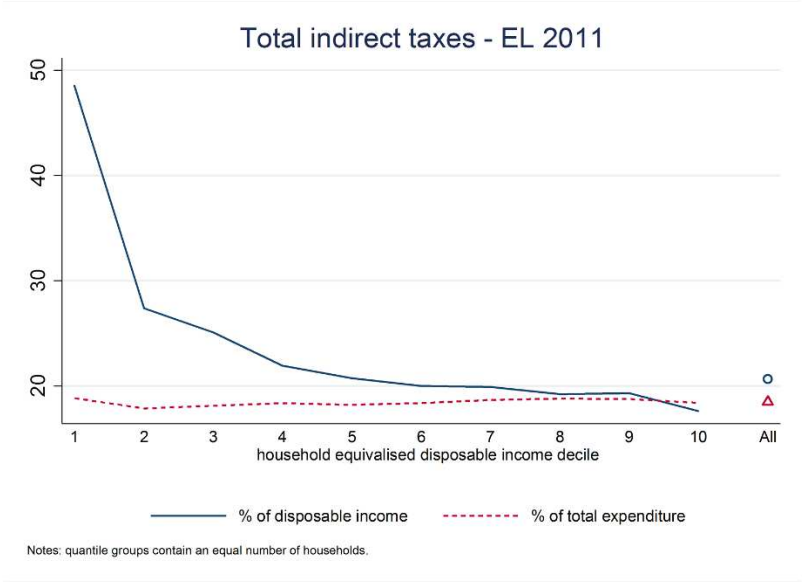
Source: authors' calculations based on EUROMOD G4.2+.

Table 18 Mean (unequivalised) household disposable income, total expenditure and total indirect taxes by expenditure decile, 2011

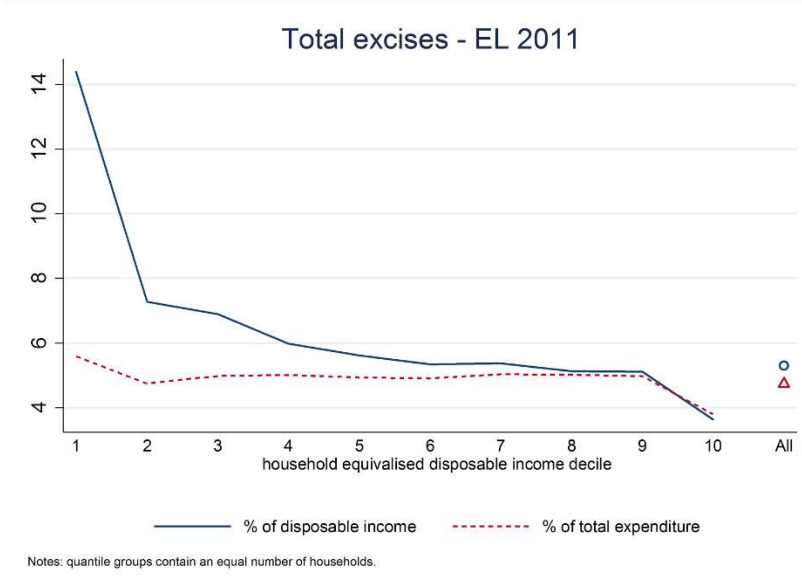
				Incidence (% of expenditure)				
	Household Income	Household Expenditure	Indirect taxes	VAT	Excises	Excises specific	Excises ad valorem	Total indirect taxes
1	649.1	510.0	79.1	12.8	2.7	1.5	1.1	15.5
2	821.1	817.1	137.0	13.1	3.6	1.5	2.1	16.8
3	954.1	1,080.7	201.6	13.5	5.2	2.0	3.2	18.7
4	1,102.1	1,299.5	243.3	13.5	5.3	1.7	3.5	18.7
5	1,295.8	1,549.3	297.3	13.6	5.6	1.9	3.7	19.2
6	1,511.5	1,763.2	335.3	13.6	5.4	1.7	3.7	19.0
7	1,751.7	2,042.0	385.9	13.6	5.3	1.7	3.7	18.9
8	1,980.0	2,303.0	432.3	13.7	5.1	1.3	3.7	18.8
9	2,366.9	2,644.8	491.2	13.8	4.8	1.1	3.7	18.6
10	3,856.6	4,167.4	756.5	14.3	3.8	0.8	3.0	18.2

Source: authors' calculations based on EUROMOD G4.2+

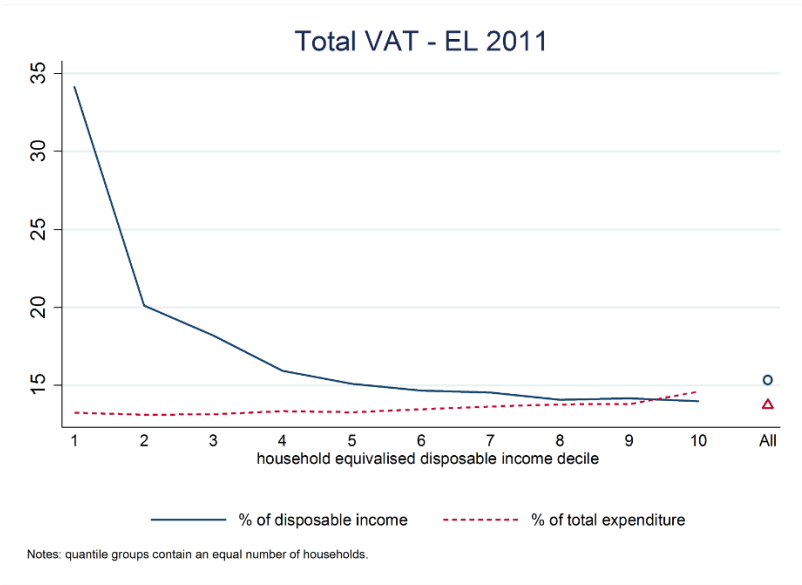
Figure 3: Incidence of indirect taxes by income decile, % of income and expenditure



Notes: quantile groups contain an equal number of households.

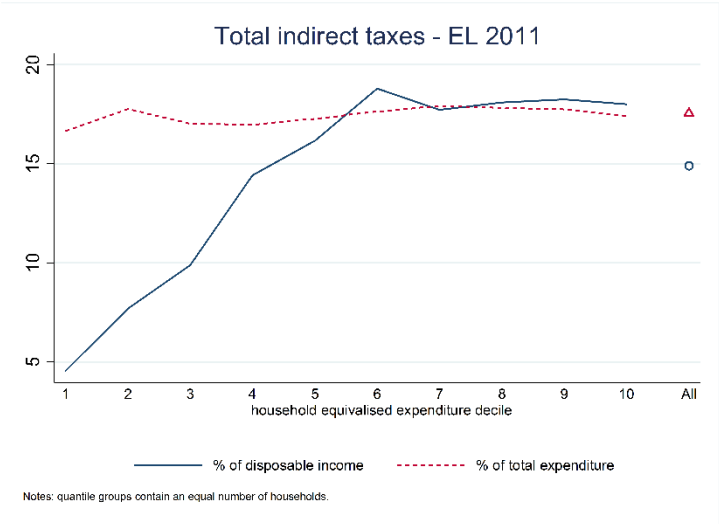


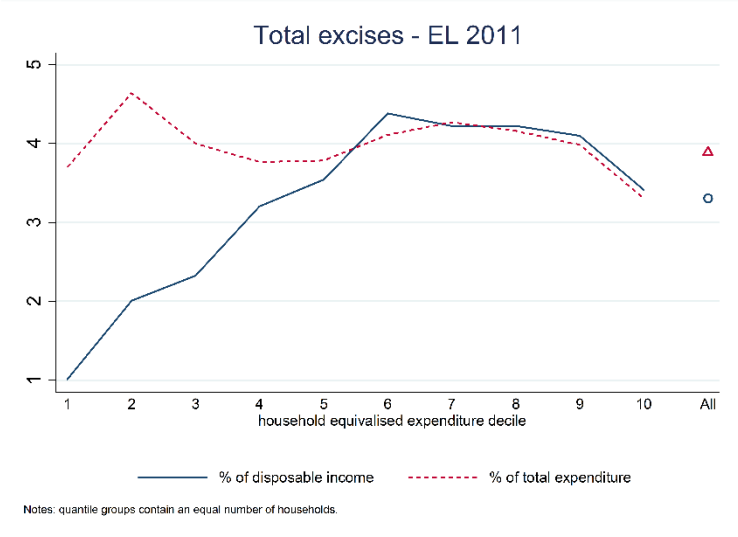
Notes: quantile groups contain an equal number of households.

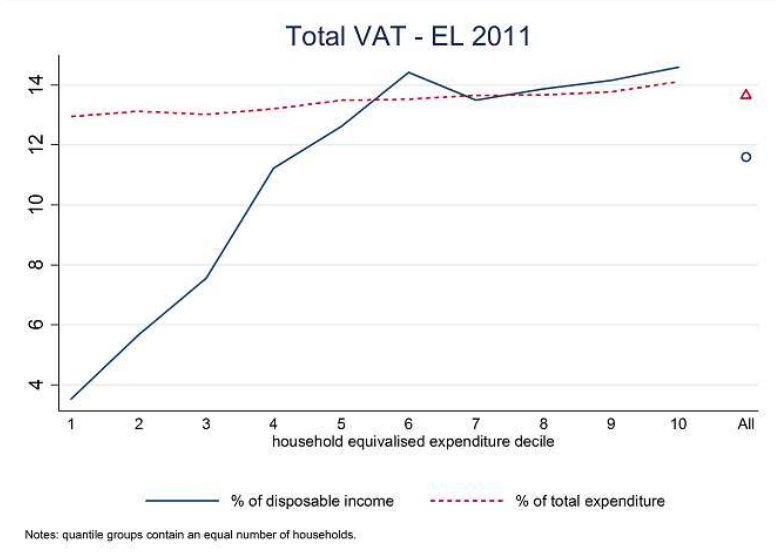


Notes: quantile groups contain an equal number of households.

Figure 6: Incidence of indirect taxes by expenditure decile, % of income and expenditure







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ANNEX

Table A1: Index factor used for imputing expenditures

Year	Index factor (2008=100)
2008	100.0
2009	97.4
2010	92.5
2011	84.7
2012	77.8
2013	75.8
2014	75.6
2015	75.4
2016	75.2

Note: in 2008-2014, the index is based on actual year-on-year nominal growth of household consumption (OECD data); in 2016, the index is based on forecasted growth of nominal GDP (see https://ec.europa.eu/info/business-economy-euro/economic-performance-and-forecasts/economic-performance-country/greece/economic-forecast-greece_en)

Source: OECD, EC and authors' calculations.

Table 0.1 Model parameters and assumptions

	2011	2012	2013	2014	2015	2016	
$VAT_zero	0%	0%	0%	0%	0%	0%	VAT zero rate
$VAT_std	23%	23%	23%	23%	23%	24%	Standard VAT rate
$VAT_reduced1	6.5%	6.5%	6.5%	6.5%	6.5%	6%	Super-reduced VAT rate
$VAT_reduced2	13%	13%	13%	13%	13%	13%	Reduced VAT rate
$VALOREM_CIGARETTES	52.4%	52.4%	20%	20%	20%	20%	Ad valorem tax on cigarettes,% of retail price of 1,000 pcs
$VALOREM_CIGARS	34%	34%	34%	35%	35%	35%	Ad valorem tax on cigars,% of retail price of 1,000 pcs
$VALOREM_TOBACCO	67%	67%	0%	0%	0%	0%	Ad valorem tax on tobacco, % of retail price of 1,000 pcs
$PRICE_SPIRITS	22.03	22.00	21.98	22.14	22.40	22.43	Average price of vodka, per lt
$SPECIFIC_SPIRITS	9.8	9.8	9.8	9.8	9.8	9.8	Tax on spirits, per lt (assume 40% strong drinks)
$PRICE_WINE	n/a	n/a	n/a	n/a	n/a	6.37	Average price of wine, per lt
$SPECIFIC_WINE	n/a	n/a	n/a	n/a	n/a	0.2	Tax on wine, per lt
$PRICE_WINE_SPARKLING	n/a	n/a	n/a	n/a	n/a	6.37	Average price of sparkling wine, per lt (assume same as wine)
$SPECIFIC_WINE_SPARKLING	n/a	n/a	n/a	n/a	n/a	0.2	Tax on sparkling wine, per lt
$PRICE_BEER	2.14	2.17	1.97	1.93	1.90	2.04	Average price of beer, per lt
$SPECIFIC_BEER	0.312	0.312	0.312	0.312	0.312	0.6	Tax on beer, per lt
$PRICE_CIGARETTES	3.21	3.26	3.56	3.71	3.81	3.82	Price of cigarettes, per 20 psc
$SPECIFIC_CIGARETTES	0.394	0.394	1.6	1.65	1.65	1.65	Specific tax on cigarettes, per 20 pieces
$PRICE_TOBACCO	203.47	204.81	213.52	217.82	223.98	226.12	Price of tobacco, per kg
$SPECIFIC_TOBACCO	0	0	153.0	156.7	156.7	156.7	Specific tax on tobacco, per kg
$PRICE_ELECTRICITY	12.50	13.91	15.63	17.67	17.67	17.60	Euro per kWh
$SPECIFIC_ELECTRICITY	0.0022	0.0022	0.0022	0.0022	0.0022	0.0022	Euro per kWh
$PRICE_GAS	n/a	10.17	7.72	7.23	6.81	5.64	Euro per kWh
$SPECIFIC_GAS	n/a	0.0054	0.0054	0.0054	0.0054	0.0054	Euro per kWh
$PRICE_HEATING_OIL	1.098	1.274	1.283	1.215	0.891	0.778	Euro per lt
$SPECIFIC_HEATING_OIL	0.021	0.06	0.33	0.23	0.23	0.23	Euro per lt
$PRICE_FUEL_LUBRICANTS	1.471	1.535	1.392	1.351	1.177	1.066	Euro per lt (unleaded petrol)
$SPECIFIC_FUEL_LUBRICANTS	0.67	0.67	0.67	0.67	0.67	0.67	Euro per lt (unleaded petrol)