

COUNTRY REPORT: LATVIA

1. DESCRIPTION OF THE INDIRECT TAX SYSTEM

This section describes the indirect tax system for Latvia. 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

Value Added Tax (VAT) in Latvia is levied on all purchased goods and services, with the exception of certain categories of products and services (e.g. post services, certain medical services, education) that are stipulated in the law. Latvian companies do not have to register as VAT payers if their turnover in the previous 12 months is below 50 thousand euros. This rule does not apply to companies involved in imports of services – in this case, the companies are obliged to register as VAT payers regardless the turnover.

There are two VAT rates in Latvia – a standard rate and a reduced rate that is levied on certain goods and services. From 2002 to 2009, the standard VAT rate has been unchanged at 18% while reduced VAT rate declined from 9% in 2002 to 5% in 2004 and stayed constant up to 2009.

As the crisis unravelled in the end of 2008, the government increased both the standard and reduced VAT rates (effective of January 2009) by 3 and 5 percentage points, respectively, to 21% and 10% (see Table 1.1¹). By a further increase, effective of January 2011, the standard VAT rate reached 22% while the reduced rate – 12%. According to Eurostat, from 2008 to 2012 Latvia had the third fastest increase in the statutory VAT rates in the European Union (Eurostat, 2012). The rates were increased in order to secure additional revenues in government's budget and contribute to reducing the budget deficit (which amounted to 4.1% of GDP in 2008, 9.1% in 2009, 8.5% in 2010, 3.4% in 2011).

Effective of July 2012, the standard VAT rate was decreased by 1 percentage point in order to stimulate household consumption and promote regional competitiveness (the standard VAT rates were 21% in Lithuania and 20% in Estonia). The reduced rate remained at 12%.

¹ Table 1.1 shows the dates when changes in VAT rates came into force. In the model, we implement the rules that were in force on June 30th in each respective year.

Table 1.1: Overview of changes in VAT rates, % (2002-2016)

	2002	2004	2009	2011	2012
	Jan	May	Jan	Jan	Jul
Standard	18	18	21	22	21
Reduced	9	5	10	12	12

Source: Law On Value Added Tax

The VAT rates apply to specific product categories, which are listed in Table 1.2.

There were three changes concerning reduced VAT product categories that were implemented over the period 2011-2016. First, catering in educational institutions, which had been VAT exempt until 2012, became subject to a standard VAT rate in 2013. Second, delivery of new vehicles within the EU, which was taxed at a standard VAT rate up to 2012, became tax exempt as of 2013. Third, natural gas, which was subject to a reduced VAT rate until June 30, 2011, became subject to a standard VAT rate.

Table 1.2: Overview of reduced VAT product categories (2011-2016)

Reduced	Medicines, medical equipment, baby food, education and literary works, mass media, inland public transportation, delivery of heat energy, natural gas (2011), wood fuel, tourist accommodation
Exempted	Social care, pre-schooling, education services, culture services, medical services, gambling, insurance services, apartment rent and maintenance, scientific studies, financial services, consular services, cooperative society services, real estate sale, postal services, school transportation, royalties, dental services, tutoring, school catering (2011-2013), delivery of new vehicles (since 2013), exports.

Source: Law On Value Added Tax

Over the period 2008-2015, the relative importance of the VAT revenues in total government tax revenues has increased by 5.2 percentage points from 32.1% in 2008 to 37.3% in 2015. As a share of GDP, VAT revenues grew from 6.3% in 2008 to 7.7% in 2015.

In 2009 due to the crisis, VAT revenues declined by 27.9%; however, total tax revenues declined even more (by 29.9%) and, as a result, VAT revenue share in total tax revenues increased. The fall of nominal GDP in 2009 was smaller (22.6%), thus VAT revenues as a share of GDP fell (see Table 1.3).

In 2011, when the standard rate was increased to 22%, VAT revenues grew by 14.7% y-o-y. In 2012, the standard rate was reduced by 1 percentage point but y-o-y VAT revenue growth remained high, even exceeding the growth in 2011, due to stronger consumption during economic recovery.

Table 1.3: VAT revenue 2008-2015

	2008	2009	2010	2011	2012	2013	2014	2015
% of government tax revenues	32.1	33.0	35.0	35.7	36.4	37.1	37.0	37.3
% of GDP	6.3	5.9	6.7	6.8	7.3	7.4	7.6	7.7

Source: Eurostat, authors' calculations

1.2 Excise duties and prices

In Latvia, excise duties are levied upon alcoholic beverages, tobacco, oil products, non-alcoholic beverages, coffee and natural gas. All the duties are specific, except for tax on cigarettes. Cigarettes are taxed both on specific and ad valorem basis.

1.2.1 Alcoholic beverages

Since 2005, the duties on alcoholic beverages have been increased in all categories. By 2016, excise on beers have increased the most – it almost tripled. Excise duties on wine and other products, mainly spirits, have doubled (see Table 1.4).

Table 1.4: Excises on alcoholic beverages (euro per unit, 2005-2016)

	2005	2006	2009	2010	2011	2016	unit
	May	Jan	Feb	May	June	Mar	
<u>Beers</u>							
<i>Beer ≥0.5% alc.</i>	1.7	1.9	2.1	3.1	3.1	4.8	da/hl
<i>First 10 000 hl beer ≥0.5% alc. in small breweries</i>	0.9	0.9	1.0	1.6	1.6	2.4	da/hl
<i>Over 10 000 hl beer ≥0.5% alc. in small breweries</i>	1.7	1.9	2.1	3.1	3.1	4.8	da/hl
<i>Not less than per hl</i>	2.9	2.9	5.7	5.7	5.7	8.6	hl
<u>Wine</u>							
<i>Non-carbonated ≥1.2% and ≤18% alc.</i>	42.7	42.7	56.9	64.0	64.0	82.0	hl
<i>Sparkling ≥1.2% and ≤15% alc.</i>	42.7	42.7	56.9	64.0	64.0	82.0	hl
<u>Fermented products</u>							
<i>Non-carbonated ≥1.2% and ≤15% alc.</i>	42.7	42.7	56.9	64.0	64.0		hl
<i>Sparkling ≥1.2% and ≤15% alc.</i>	42.7	42.7	56.9	64.0	64.0		hl
<i>Products ≤6% alc.</i>						64.0	hl
<i>Products >6% alc.</i>						82.0	hl
<u>Intermediary products</u>							
<i>Products ≥1.2% and ≤15% alc.</i>	59.8	59.8	59.8	64.0	64.0	82.0	hl
<i>Products >15% and ≤22% alc.</i>	99.6	99.6	99.6	99.6	99.6	135.0	hl
<u>Other products</u>							
<i>Products</i>	782.6	896.4	1173.9	1266.4	1337.5	1500.0	pa/hl

Notes: da=degree alcohol, pa=pure alcohol.

Source: Law On Excise Duty

1.2.2 Tobacco

Specific excise duties on tobacco products have been increasing since 2009. By 2016, the duty on cigars and cigarillos has almost tripled, while the duty on cigarettes and smoking tobacco almost doubled. At the same time, ad valorem duty on cigarettes has decreased by 9.5 percentage points over this period, reaching 25% of the maximum retail price.

In 2015 and 2016, amendments to the Law on Excise Duty envisaged extending the duty on other tobacco products – tobacco leaves (in 2015) and vapour tobacco, including the one in electronic cigarettes (in 2016). Table 1.5 shows the changes in excise duties over the period 2009-2016.

Table 1.5: Excises on tobacco products (2009-2016)

	2009	2010	2011	2014	2015	2016
	Feb	May	June	Jan	May	Mar
<u>Cigars and cigarillos</u>						
<i>EUR, per 1 000 pcs</i>	15.7	15.7	45.5	45.0	45.0	45.0
<u>Cigarettes</u>						
<i>EUR, per 1 000 pcs</i>	32.0	32.0	45.5	60.0	60.0	60.0
<i>% of max retail price</i>	34.5	34.5	33.0	25.0	25.0	25.0
<i>Total amount paid not less than, EUR per 1000 pcs</i>		68.3	91.1	100.0	100.0	100.0
<u>Smoking tobacco</u>						
<i>EUR, fine-cut per 1 kg</i>	32.7	32.7	61.2	60.0	60.0	62.0
<i>EUR, other tobacco per 1 kg</i>	32.7	32.7	61.2	60.0	60.0	62.0
<u>Tobacco leaves</u>						
<i>EUR, per 1 kg</i>					60.0	62.0
<u>Vapour tobacco</u>						
<i>EUR, per 1 kg</i>						62.0
<u>Vapour tobacco in electronic cigarettes</u>						
<i>EUR, liquid per 1 ml</i>						0.01
<i>EUR, nicotine per 1 mg</i>						0.005

Source: Law On Excise Duty

1.2.3 Energy products

As of 2011, the Law on Excise Duty has been substantially modified with respect to provisions to qualify for reduced excise duty rates. Different requirements, e.g., share of rapeseed oil in other oil products and other requirements outlined in notes to Table 1.6, were included. In addition, excise duty was levied on waste oils.

Since 2011, excise duty on energy products has modestly increased in separate categories. Generally, products utilized for heating purposes and containing rapeseed oil or biofuel produced of rapeseed oil are subject to lower duties. Several modifications regarding diesel fuel products and natural gas have been introduced in the period 2011-2016 (see Table 1.6).

Table 1.6: Excises on energy products (euro per unit, 2011-2016)

	2011	2012	2014	2015	2016	unit
	June	Feb	Jan	May	Mar	
<u>Petrol</u>						
<i>Leaded petrol</i>	455.3	455.3	455.3	455.3	455.3	1 000 l
<i>Unleaded petrol</i>	411.2	411.2	411.2	411.2	436.0	1 000 l
<i>Unleaded petrol¹</i>	123.4	123.4	123.4	123.4	131.0	1 000 l
<u>Kerosene</u>						
<i>Kerosene</i>	333.0	333.0	333.0	333.0	341.0	1 000 l
<i>For heating (labelled)</i>	56.6	56.6	56.6	56.6	56.6	1 000 l
<i>For heating (labelled) with 5% rapeseed²</i>	21.3	21.3	21.3	21.3	21.3	1 000 l
<u>Diesel fuel</u>						
<i>Diesel fuel</i>	333.0	333.0	333.0	333.0	341.0	1 000 l
<i>For heating (labelled)</i>	56.9	56.9	56.9	56.9	56.9	1 000 l
<i>For heating (labelled) with 5% rapeseed²</i>	21.3	21.3	21.3	21.3	21.3	1 000 l
<i>With 30% rapeseed (labelled)²</i>	233.4	233.4	233.4			1 000 l
<i>With rapeseed³</i>				333.0		1 000 l
<i>For heating (labelled) in agriculture with rapeseed³</i>					50.0	1 000 l
<u>Gas oil</u>						
<i>Gas oil</i>	128.1	128.1	161.0	161.0	206.0	1 000 kg
<i>For heating</i>	0.0	0.0	0.0	0.0	0.0	1 000 kg
<u>Fuel oil</u>						
<i>Fuel oil⁴</i>	333.0	333.0	333.0	333.0	341.0	1 000 l
<i>Fuel oil⁵</i>	15.7	15.7	15.7	15.7	15.7	1 000 kg
<i>For heating (labelled)</i>	56.9	56.9	56.9	56.9	56.9	1 000 l
<i>For heating (labelled) with 5% rapeseed²</i>	21.3	21.3	21.3	21.3	21.3	1 000 l
<u>Rapeseed oil or biofuel⁶</u>	0.0	0.0	0.0	0.0	0.0	1 000 l
<u>Waste oil</u>	56.9	56.9	56.9	56.9	56.9	1 000 l
<u>Natural gas</u>						
<i>For heating</i>	22.2	17.1	17.1	17.1	17.1	1 000 m ³
<i>For fuel</i>	99.6	99.6	99.6	99.6	99.6	1 000 m ³
<i>For heating in manufacturing and agriculture</i>			5.7	5.7	5.7	1 000 m ³

Notes:

¹ If 70-85% of total volume consists of ethyl alcohol which is acquired from agricultural raw materials and dehydrated with at least 99.5% alcohol content, if one of the following requirements is met: ethyl alcohol added in excise warehouse in the Republic of Latvia or if the prepared mixture is imported from a member state.

² If rapeseed oil or biofuel produced of rapeseed oil is added.

³ If biofuel produced of rapeseed oil is added.

⁴ Colorimetric index less than 2.0 and kinematic viscosity at 50°C less than 25 mm²/s.

⁵ Colorimetric index equal or more than 2.0 and kinematic viscosity at 50°C equal or more than 25 mm²/s.

⁶ If used for heating or fuel, and if produced in Latvia or imported from a member state.

Source: Law on Excise Duty

1.2.4 Product and sector specific charges

Other products that are subject to excise duty in Latvia are non-alcoholic beverages and coffee. Both type of expenditures are included in the HBS. The government imposes excise duty on these additional products for financial reasons.

In the period 2004-2011, the duty on non-alcoholic beverages has increased 2.5 times while the duty on coffee – doubled. There were no changes after 2011 (see Table 1.7).

Table 1.7: Other excises (euro per unit, 2004-2016)

	2004	2009	2011	unit
	May	Feb	June	
Non-alcoholic beverages	2.85	5.69	7.40	100 l
Coffee	71.14	142.29	142.29	100 kg

Source: Law on Excise Duty

1.2.5 Tax revenue from excise duties

Revenues from excise duties were declining throughout the recession period of 2009-2010. The increase in the share of excises in total tax revenues and as a ratio to GDP in 2009 (see Table 1.8) was only due to the fact that the fall in other tax revenues and the fall in the nominal GDP was even stronger.

Since 2010 the share of excises in total revenues has continuously declined. In 2015, the share of tobacco products in total government revenues amounted to 3.5%, down from 3.8% in 2010. The reason for the decline is a rise of illegal market since 2009 (State Revenue Service of Latvia, 2010).

Table 1.8: Proceeds from excise duties (2008-2015)

		2008	2009	2010	2011	2012	2013	2014	2015
% of gov. revenues	Alcohol	3.0	4.2	4.0	3.7	3.3	3.3	3.1	3.1
	Tobacco	4.3	4.8	3.8	3.9	3.4	3.3	3.4	3.5
	Oil	8.6	12.0	10.9	9.8	8.7	8.6	8.3	8.5
	Other	0.2	0.3	0.4	0.6	0.8	0.8	0.7	0.7
	Total	16.1	21.4	19.2	17.9	16.2	16.0	15.5	15.8
% of GDP	Alcohol	0.6	0.7	0.8	0.7	0.7	0.7	0.6	0.6
	Tobacco	0.8	0.9	0.7	0.7	0.7	0.7	0.7	0.7
	Oil	1.7	2.1	2.1	1.9	1.7	1.7	1.7	1.8
	Other	0.0	0.1	0.1	0.1	0.2	0.2	0.1	0.1
	Total	3.2	3.8	3.6	3.4	3.2	3.2	3.2	3.3

Source: State Revenue Service

1.2.6 Prices

Table 1.9 lists consumer prices of goods subject to excises at the most detailed level of commodity groups available in HBS.

Table 1.9: Average consumer prices of items subject to excises (euro per unit, 2011-2016)

	2011	2012	2013	2014	2015	2016 ¹	unit
Ground coffee ²	13.60	13.86	12.49	11.46	13.05	13.08	kg
Soft drinks ³	0.70	0.72	0.72	0.71	0.71	0.71	l
Beer (< 5.5 da) ²	1.44	1.44	1.58	1.64	1.9	1.90	liter
Spirits ²	11.33	11.50	11.68	11.91	12.76	12.79	liter
Wine ³	4.16	4.17	4.32	4.40	4.31	4.32	0.75l
Cigarettes ³	2.86	3.04	2.73	2.90	3.00	3.00	20 pcs
Cigars ⁴	2.79	2.96	3.06	3.25	3.36	3.36	1 pcs
Tobacco ⁴	114.31	121.57	125.37	133.22	137.69	137.97	1 kg
Petrol ²	12.81	13.97	13.50	12.95	11.23	11.25	10 liters
Natural gas ²	456.96	590.48	590.48	504.57	554.18	555.29	1000 m ³
Liquefied hydrocarbons ⁵	997.96	1289.56	1289.56	1101.94	1592.36	1595.54	ton

Notes: (1) In 2016 prices of all listed goods are assumed to grow at HICP growth rate forecasted by the European Commission for 2016, which is 0.2% (European Commission, 2016); (2) Up to 2015 – data from Central Statistical bureau of Latvia; (3) Prices in 2012 and 2013 are obtained from Eurostat (prc_dap12). Prices in 2011, 2014 and 2015 are computed using the prices in 2012 and 2013 and the average change of prices in the respective category of HICP. (4) Authors' estimation, based on average retail price and HICP change in HICP product category "Tobacco products"; (5) Prices in 2011 and 2015 – data from Central Statistical Bureau of Latvia, in 2012-2014 prices are assumed to grow at the same rate as the price of the natural gas.

Source: Central Statistical Bureau, Eurostat, authors' calculations

1.3 Other indirect taxes

There are three other noticeable consumption taxes in Latvia. Lottery and gambling tax is levied upon different types of games (e.g., roulette, card games, betting, etc.). Taxes are both of specific and ad valorem types. Car and motorcycle tax is a one-time payment to register a vehicle if it is imported from abroad. This tax is charged as specific tax. Vehicle operation tax is a regular tax paid annually. Vehicle operation tax is a specific tax as well.

Table 1.10: Revenue from other indirect taxes (2011)

Tax	mIn €	% of gov. revenue
Lottery and gambling tax	19.6	0.5%
Car and motorcycle tax	7.8	0.2%
Vehicle operation tax	62.8	1.6%

Source: State Revenue Service

1.4 Scope of simulations in EUROMOD

Not all taxes described in the previous sections are simulated in EUROMOD. Some taxes, e.g., car and motorcycle tax and vehicle operation tax, are not possible to simulate due to lack of information on the tax base in the input data. Also, due to data limitations, we cannot accurately simulate the excise tax on all product categories: e.g., excise tax on beer depends on the degree of alcohol contained in the consumed beer, which we do not observe in the input database. Table 1.11 shows indirect taxes that are simulated in EUROMOD. The listed taxes are simulated in all policy years 2011-2016.

Table 1.11: Simulated indirect taxes in EUROMOD

	Tax	Simulated
	VAT	Yes
	Excise tax on non-alcoholic beverages	Yes
	Excise tax on alcoholic beverages	Yes
	Excise tax on tobacco	Yes
	Excise tax on gas	Yes
	Excise tax on fuel	Yes

Coded tax policy parameters in EUROMOD (with main assumptions) are presented in Table 6.2 in Appendix.

2. DATA

2.1 *Description of HBS*

HBS in Latvia was conducted every year since 1996, the only exception being year 2001. As of 2016, the survey will be held less frequently, however, the exact frequency has not yet been decided. The survey sample covers the whole territory of Latvia and consists of private households (collective households such as homes for elderly, hospitals, student hostels, and other types of collective households are not covered by the survey sample). Data is provided by the Central Statistical Bureau of Latvia.

Data on most non-durable expenditures is derived from diaries filled in by respondents over a period of two weeks. Data on other kinds of spending is collected through face-to-face interviews and cover longer periods: data on consumption of clothes and footwear covers the period of three months preceding the interview, but data on consumption of durables covers the period of the last 12 months. Data on income is also collected through interviews – data on regular income components refers to the last month, but data on other, non-regular, income components refer to the last 12 months. Household total disposable income covers both regular and non-regular income. All socio-demographic characteristics of households reflect the situation at the time of the interview.

2.2 *Sample descriptives*

The 2011 survey sample consists of 3,767 households and 8,997 individuals. Survey response rate is 40% (Central Statistical Bureau of Latvia, 2015).

Table 2.1 presents weighted descriptive statistics of the HBS 2011 sample and external data based on population register. Overall, the HBS database captures the gender, age and residence area composition of the population very precisely.

Table 2.1: HBS 2011 sample descriptives vs. external statistics based on population register

	HBS 2011	External statistics*
<i>Gender and age structure:</i>		
Size of population, thsd of individuals	2040.8	2040.8
Females, %	54.5	54.3
Aged 0-14, %	14.3	14.3
Aged 15-64, %	67.3	67.2
Aged 65+, %	18.3	18.6
<i>Region of residence:</i>		
Riga	31.8	31.8
Riga suburb (Pieriga)	18.1	18.1
Vidzeme	10.2	10.2
Kurzeme	13.1	13.0
Zemgale	12.2	12.3
Latgale	14.6	14.6

Note: External statistics refer to the beginning of 2012

Source: HBS 2011, Latvian population register

Below we present HBS 2011 sample descriptives, focusing on factors that are used as control variables in demand regressions: consumption patterns by regions, size and types of households, and consumption patterns by income level.

First, Table 2.2 and

Table 2.3 report expenditure levels and expenditure composition by the region of residence². Total household expenditure and expenditure per household member in Riga is about 30% higher than in other Latvian regions. Expenditure composition in Riga is also very different from the rest of the Latvian territory. To mention the most notable differences in consumption patterns – residents of Riga allocate a considerably smaller share of total expenditure to food and non-alcoholic beverages (by almost 7 percentage points), to home fuels, electricity and water supply (by 2 percentage points), as well as to private transport (by 2 percentage points). At the same time, residents of Riga spend relatively more on housing and rents (by 3.2 percentage points), restaurants, hotels and holidays (by 2.1 percentage points) and on health (by 1 percentage point).

Table 2.2: Total household expenditure and expenditure per household member by regions, euro per year

	Total (EUR per year)		Per household member (EUR per year)	
	Mean	Median	Mean	Median
Total	7781.9	6314.6	3558.5	2950.7
Riga	9092.3	7274.3	4299.3	3540.8
Other	7116.4	5764.6	3182.3	2676.1

Source: authors' calculations based on HBS 2011

² Here and in the regressions we use regional variable with just two categories – Riga and other territory. This level of aggregation is determined by data availability in the Latvian SILC.

Table 2.3: Annual expenditure shares by product categories by regions, %

	Entire Latvia	Riga	Other regions
Total	100.0	100.0	100.0
Food and non-alcoholic beverages	33.4	28.9	35.7
Alcohol	1.6	1.6	1.6
Tobacco	2.0	1.6	2.2
Clothing and footwear	3.8	4.3	3.6
Home fuels, electricity and water	16.0	14.6	16.8
Housing and rents	4.6	6.7	3.5
Household goods and services	1.3	1.2	1.3
Health	6.7	7.4	6.4
Private transport	6.5	5.4	7.0
Public transport	2.0	2.6	1.7
Communication	5.3	5.6	5.1
Recreation and culture	4.4	4.8	4.1
Education	1.1	1.4	1.0
Restaurants, hotels and holidays	3.7	5.1	3.0
Other goods and services	4.4	4.8	4.1
Durable goods	3.3	3.9	3.0

Source: authors' calculations based on HBS 2011

Error! Reference source not found., Error! Reference source not found. and Table 2.6 report household monthly disposable income, expenditure and expenditure structure by deciles of household equivalised disposable income. The share of expenditure on food and non-alcoholic beverages clearly declines with income, as well as the share of expenditure on home fuels, electricity and water. On the other hand, the share of expenditure on private transport in the top decile is almost two times as high as the share in the bottom decile. The share of expenditure on restaurants, hotels and holidays, as well as the share of expenditure on recreation and culture and expenditure on education is also much higher in the top deciles.

Table 2.4: Mean (unequalised) monthly household disposable income and total expenditure by income decile, HBS (2011)

Income decile	Income, EUR	Expenditure, EUR
1	216.7	342.9
2	324.3	389.2
3	351.5	413.9
4	407.4	448.6
5	510.4	525.7
6	601.1	582.7
7	727.3	698.3
8	896.9	841.3
9	1063.9	965.7
10	1557.8	1269.9
All	665.5	647.6

Source: authors' calculations based on HBS 2011

Table 2.5: Mean (unequalised) household expenditure by income decile and expenditure category, euro per month, HBS (2011)

Expenditure category*	Income decile										All
	1	2	3	4	5	6	7	8	9	10	
1	125.8	139.0	137.6	152.4	169.0	187.9	212.1	236.4	243.0	263.9	186.7
2	6.3	5.0	6.2	6.9	6.7	8.8	11.5	13.7	19.0	28.3	11.2
3	10.7	10.6	9.2	8.5	11.0	9.7	14.8	12.9	12.4	11.6	11.1
4	11.1	15.8	28.1	19.9	28.0	24.8	36.8	50.3	62.7	76.9	35.4
5	62.7	64.9	66.3	69.5	80.3	82.7	91.0	92.7	92.3	108.7	81.1
6	13.9	16.0	17.1	23.5	21.3	27.0	31.9	31.7	35.3	48.5	26.6
7	4.1	5.9	5.5	5.1	6.6	7.0	8.9	9.3	14.0	18.1	8.4
8	12.7	30.4	35.6	37.0	43.8	41.4	40.6	38.8	42.3	70.3	39.3
9	21.4	17.2	16.1	30.0	38.8	47.7	63.9	99.7	115.8	150.7	60.1
10	7.9	7.9	8.3	9.2	11.6	12.8	14.2	19.9	21.6	24.2	13.8
11	18.8	20.8	19.5	21.8	26.4	29.2	37.2	44.3	45.2	53.7	31.7
12	12.0	15.0	17.3	18.6	23.8	26.7	30.9	43.9	56.4	82.1	32.7
13	5.5	4.5	7.0	5.5	7.4	8.0	8.6	14.2	16.6	22.1	9.9
14	11.3	11.4	11.9	11.0	14.7	23.1	28.3	45.0	68.9	110.7	33.6
15	12.3	14.0	16.0	16.1	21.0	24.7	35.5	48.5	59.5	103.4	35.1
98	6.4	10.8	12.3	13.7	15.1	21.2	31.9	40.0	60.7	96.9	30.9

Notes: * 1 - Food and non-alcoholic beverages; 2 – Alcohol; 3 – Tobacco; 4 - Clothing and footwear; 5- Home fuels, electricity and water; 6 - Housing and rents; 7 - Household goods and services; 8 – Health; 9 - Private transport; 10 - Public transport; 11 – Communication; 12 - Recreation and culture; 13 – Education; 14 - Restaurants, hotels and holidays; 15 - Other goods and services; 98 - Durable goods. Source: authors' calculations based on HBS 2011

Table 2.6: Structure of (unequalised) household expenditure by income decile, %, HBS (2011)

Expenditure category*	Income decile										All
	1	2	3	4	5	6	7	8	9	10	
1	36.7	35.7	33.2	34.0	32.2	32.3	30.4	28.1	25.2	20.8	28.8
2	1.8	1.3	1.5	1.5	1.3	1.5	1.6	1.6	2.0	2.2	1.7
3	3.1	2.7	2.2	1.9	2.1	1.7	2.1	1.5	1.3	0.9	1.7
4	3.2	4.1	6.8	4.4	5.3	4.2	5.3	6.0	6.5	6.1	5.5
5	18.3	16.7	16.0	15.5	15.3	14.2	13.0	11.0	9.6	8.6	12.5
6	4.0	4.1	4.1	5.2	4.0	4.6	4.6	3.8	3.7	3.8	4.1
7	1.2	1.5	1.3	1.1	1.3	1.2	1.3	1.1	1.4	1.4	1.3
8	3.7	7.8	8.6	8.2	8.3	7.1	5.8	4.6	4.4	5.5	6.1
9	6.2	4.4	3.9	6.7	7.4	8.2	9.1	11.8	12.0	11.9	9.3
10	2.3	2.0	2.0	2.0	2.2	2.2	2.0	2.4	2.2	1.9	2.1
11	5.5	5.3	4.7	4.9	5.0	5.0	5.3	5.3	4.7	4.2	4.9
12	3.5	3.9	4.2	4.1	4.5	4.6	4.4	5.2	5.8	6.5	5.0
13	1.6	1.2	1.7	1.2	1.4	1.4	1.2	1.7	1.7	1.7	1.5
14	3.3	2.9	2.9	2.5	2.8	4.0	4.1	5.3	7.1	8.7	5.2
15	3.6	3.6	3.9	3.6	4.0	4.2	5.1	5.8	6.2	8.1	5.4
98	1.9	2.8	3.0	3.0	2.9	3.6	4.6	4.8	6.3	7.6	4.8
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Notes: * see previous table. Source: authors' calculations based on HBS 2011

There is no clear correlation between the share of food consumption and the number of children in the household (see Table 2.7). However, interestingly, the share of expenditure allocated to health goods and services clearly declines with the number of children below 17, and the same is true about spending on alcoholic beverages. At the same time, the share of spending on education is expectedly higher in households with more children, as well as the share of expenditure on clothing and footwear, and expenditure on restaurants, hotels and holidays.

Table 2.7: Annual household expenditure shares by product categories and by the number of children in the household, %

	Total	No children	1 child	2 children	3 children or more
Total	100	100	100	100	100
Food and non-alcoholic beverages	33.44	34.28	30.13	33.55	32.71
Alcohol	1.56	1.64	1.43	1.26	0.99
Tobacco	1.97	2.06	1.69	1.62	2.26
Clothing and footwear	3.84	3.32	5.36	4.28	6.34
Home fuels electricity and water	16.04	16.94	13.71	13.29	15
Housing and rents	4.56	4.98	3.74	2.99	3.33
Household goods and services	1.25	1.22	1.31	1.4	1.37
Health	6.71	7.81	4.33	3.32	2.66
Private transport	6.48	5.71	8.76	8.31	6.66
Public transport	2.03	1.96	2.14	2.48	1.9
Communication	5.27	5.12	5.75	5.76	4.7
Recreation and culture	4.36	4.29	4.49	4.62	4.61
Education	1.12	0.79	1.86	1.98	2.42
Restaurants, hotels and holidays	3.73	3.22	4.77	5.04	6.47
Other goods and services	4.35	3.67	6.24	5.56	6.47
Durable goods	3.3	2.98	4.29	4.54	2.12

Source: authors' calculations based on HBS 2011

2.3 Comparison of variable distributions in HBS 2011 and EUROMOD input data

To get unbiased imputations of household expenditure in SILC data, it is crucial that control variables that are used in regressions that are run on HBS data, have similar distributions in SILC. In this section we compare distributions of the key variables used in the estimated regressions.

First, as shown in

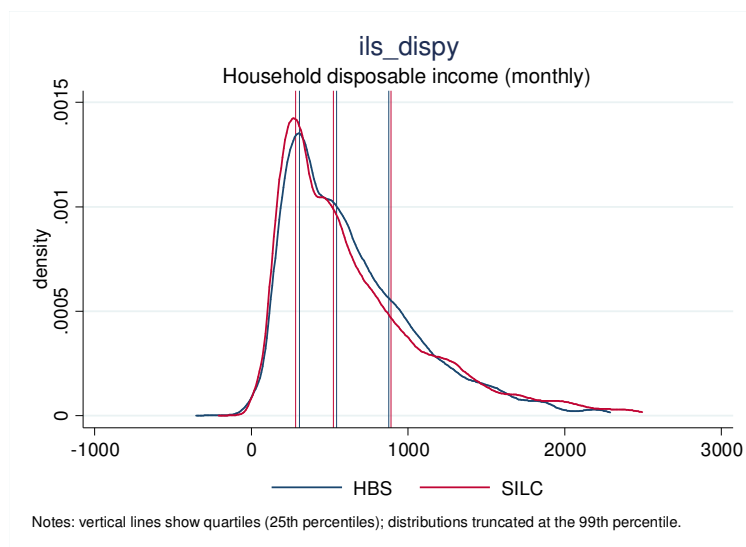
Table 2.8 and Figure 1, distributions of household disposable income are very close in both datasets. Mean household disposable income in SILC is just 0.3% higher than the mean income in HBS, while the median income is 2.7% lower. Income in HBS dataset is top-coded at 99th percentile and hence, in order to ensure a closer match between the distributions, we impose the same top-coding in SILC dataset (only when imputing expenditures).

Table 2.8: Sample descriptives – SILC 2012 and HBS 2011

	SILC 2012		HBS 2011	
	mean	median	mean	median
Household disposable monthly income, EUR ¹	665.5	527.2	663.8	542.1
Demographic characteristics of HH head (fraction) ²				
Male	41.0	-	33.1	-
Age 0 - 24	1.7	-	3.4	-
Age 25-29	5.9	-	7	-
Age 30-34	6.5	-	6.4	-
Age 35-39	8.5	-	8.2	-
Age 40-44	9.1	-	8.7	-
Age 45-49	9.8	-	10	-
Age 50-54	10.9	-	10.4	-
Age 55-59	9.8	-	9.2	-
Age 60-64	8.7	-	8.3	-
Age 65-69	7.6	-	8	-
Age 70-74	8.5	-	8.2	-
Age 75+	12.9	-	12.1	-
Employed ³	53.3	-	50.9	-
Pensioner ³	32.9	-	31.2	-
Unemployed ³	8.5	-	7	-
Primary or less education	2.7	-	2.8	-
Secondary education	61.3	-	62.4	-
Higher education	36.0	-	34.9	-
Household characteristics				
Number of HH members	2.4	2	2.4	2
Number of children in HH ⁴	0.4	0	0.4	0
Number of economically active HH members ⁵	1.2	1	1	1
Lives in Riga	33.9	-	33.7	-
Lives in a different region	66.1	-	66.3	-
HH owns a car	44.9	-	43.3	-
HH owns a computer	60.7	-	58.2	-
owner on a mortgage	7.6	-	8.5	-
Outright owner	72.3	-	75.1	-
Renter	13.6	-	16.2	-
Other	6.5	-	0.2	-

Notes: (1) Income in HBS 2011 is top-coded at 99% percentile. Similar top-coding was imposed on income in EUROMOD (only when imputing expenditures); (2) In SILC, the head of household is defined as the person responsible for accommodation. In HBS, we use self-reported head of household status; (3) Self-reported current economic status; (4) Children aged 17 or less; (5) In SILC - person receiving employment of self-employment income, in HBS – person receiving employment income, income from entrepreneurial or other activity.

Source: authors' calculations based on SILC 2012 (income reference year 2011) and HBS 2011

Figure 1: Distribution of household monthly disposable income (SILC 2012 vs. HBS 2011)

Notes: Income in HBS 2011 is top-coded at 99% percentile. Similar top-coding was imposed on income in EUROMOD to ensure better matching of income distributions.

The share of males among household heads is considerably higher in SILC (see

Table 2.8 and Figure 2). In SILC database, 41.0% of household heads are men, while in HBS the share of men is only 33.1%. The difference is due to different definitions of household heads in the two databases. With SILC data, we have chosen to define the head of household as the person responsible for accommodation. In HBS we do not have information on who is responsible for accommodation, hence we use self-defined head of household status³. Otherwise, gender structure of the two databases is identical – the share of male respondents (at individual level) is 45.5% in both SILC and HBS.

In terms of the age structure, we use age groups as shown in

³ Defined as “a household member, who is recognized as such by other members and who owns the decisive rights when solving common issues of the household” (Central Statistical Bureau of Latvia, 2012).

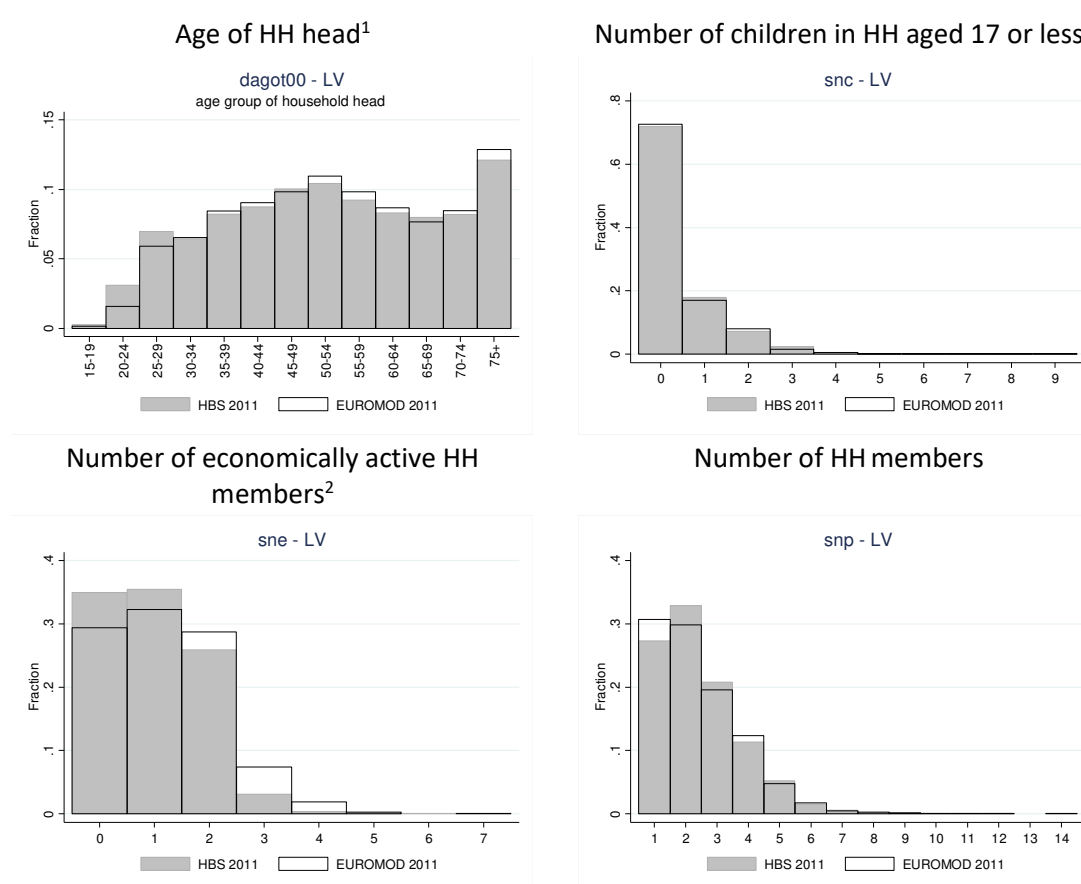
Table 2.8. The reason for using age groups is that a continuous age variable is not available in Latvian HBS. Age distribution in HBS is skewed to the left as compared to SILC, implying that young household heads are more frequent in HBS data. This difference is again due to discrepancy in definitions of the household heads, because age distributions of individuals in SILC and HBS match pretty well.

With respect to the economic status of the household head, we observe that the share of employed head of households is 2.4 percentage points higher in SILC, the share of retired head of households is 1.7 percentage points higher, and the share of unemployed head of households is 1.5 percentage points higher (see

Table 2.8). The differences are due to both inconsistency in the definition of the household head, and to the differences in the shares of individuals falling into one of the categories in SILC and HBS. The latter is probably at least partly due to the fact that we use current economic status in both SILC and HBS, hence the difference might result from different timing of the interviews. The share of unemployed individuals is higher in SILC (9.3% vs. 7.4% in HBS), as well as the share of pensioners (21.9% vs. 20.6% in HBS). The share of employed individuals (which includes employees, self-employed, employers and farmers), on the other hand, is slightly higher in HBS (42.5% vs. 41.6% in SILC).

Mean shares of highest achieved education level are pretty close in SILC and HBS. Also, mean size of households is 2.4 persons in both SILC and HSB, and the mean number of children is 0.4 in both datasets. The regional distribution of households is also quite similar.

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



Notes: (1) In SILC, the head of household is defined as the person responsible for accommodation. In HBS, we use self-reported head of household status; (2) In SILC - person receiving employment or self-employment income, in HBS - person receiving employment income, income from entrepreneurial or other activity.

3. VALIDATION OF ESTIMATED DEMAND SYSTEM AND EXPENDITURES IMPUTED INTO EUROMOD

In this section we compare expenditures observed in HBS 2011 with imputed expenditures into EUROMOD. First, Table 3.1 shows mean levels of total expenditure categories observed and predicted in HBS (2011), expenditures imputed in EUROMOD and national accounts aggregates. On the whole, the imputed expenditures are very close to the expenditures observed in HBS. Household expenditure imputed in EUROMOD amounts to 6438.8 mIn EUR, which is just 1.1%

lower than expenditure observed in HBS, imputed expenditure on non-durables is 0.6% lower. The difference in expenditure on durables is larger – imputed value is 11.3% lower than the value observed in HBS.

Table 3.1: Total annual expenditure by category: HBS 2011 (observed and predicted), EUROMOD (2011 system simulation) and OECD national account statistics (2011), mln EUR

Category	Observed in HBS	Predicted in HBS	Imputed in EUROMOD	OECD aggregate
Food and non-alcoholic beverages	1876.4	1948.7	1931.6	2472.7
Alcoholic beverages	112.8	118	114.9	811.4
Tobacco	112	106.1	112.6	279.9
Clothing and footwear	356.2	348.2	325.3	641.8
Home fuels, electricity and water	815.3	839.9	842.2	908.1
Housing and rents	267.5	260.8	262.2	156.6
Household goods and services	84.9	87.1	87	138.9
Health	394.9	369.6	347.7	437.7
Private transport	603.9	586.2	585.3	956.6
Public Transport	138.3	138.3	134.8	306.3
Communication	318.5	314.9	324.8	395.8
Recreation and culture	328.3	335.4	342.3	865.1
Education	99.9	103.9	96.6	260
Restaurants and hotels	337.8	351.8	335	644.4
Other goods and services	352.6	332	321.3	688.1
Durable goods	310.3	328.3	275.2	649.9
Total non-durables	6199.1	6240.8	6163.6	9963.4
Total expenditures	6509.3	6569.1	6438.8	10613.3

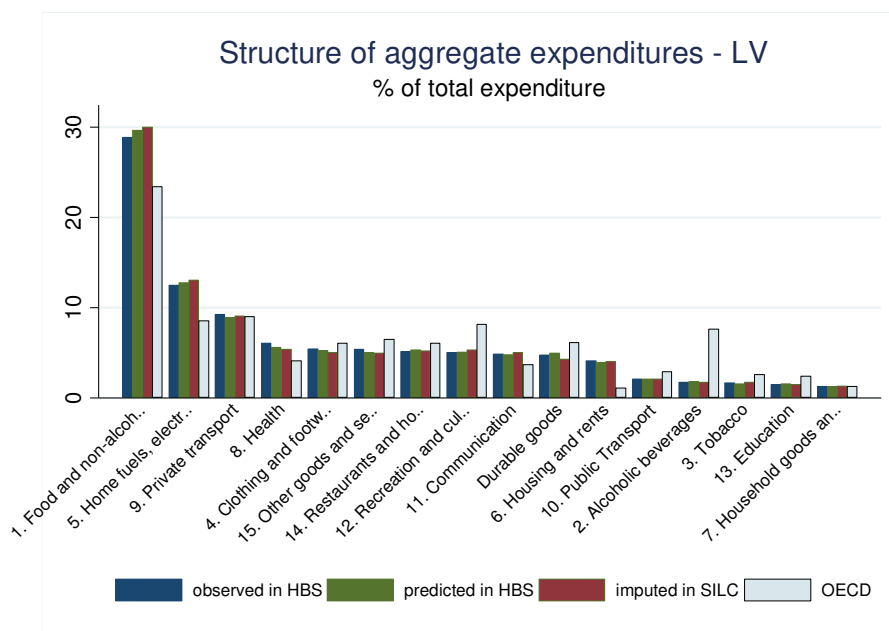
Source: authors' calculations based on EUROMOD G3.58, HBS 2011 and OECD

Expenditures observed and predicted in HBS, as well as the EUROMOD imputed expenditures are notably smaller than expenditures based on national account statistics from OECD (see Table 3.1 and Figure 3 -Figure 4). There are several differences in the underlying methodology of HBS and the national account data that should be kept in mind when making the comparison. First, HBS data covers only households - it excludes institutions such as hospitals, hotels and prisons. Second, since HBS data relies on self-reported information about expenditures, data accuracy can be questionable, especially what regards consumption of goods such as alcohol and tobacco. Third, national account aggregates include estimates for smuggled goods, which can distort comparison of consumption of some goods, especially alcohol and tobacco. These differences may affect both the absolute level of consumption by main categories and the consumption structure.

As shown in Figure 4, total expenditure in HBS (both observed and predicted) and expenditure imputed in SILC underestimates total expenditure from national account data by approximately 40%. Consumption of alcohol is the most underestimated category (by about 85%). Other strongly underestimated consumption categories are tobacco, recreation and

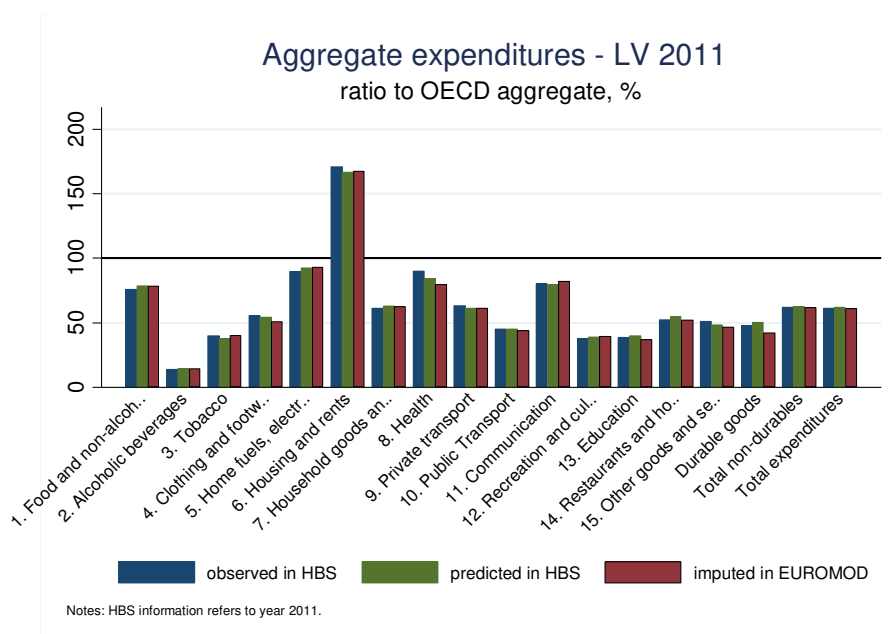
culture and education (by approximately 60%). At the same time, HBS data implies a much higher share of expenditure on housing and rents, which is possibly due to imperfect compatibility of expenditure classifications used in the national account statistics and in HBS.

Figure 3: Share of expenditures in HBS (2011), EUROMOD (2011 simulations) and OECD (2011) by expenditure category, % of total expenditure



Source: OECD, authors' calculations based on EUROMOD G3.58 and HBS 2011

Figure 4: Aggregate expenditure by category, ratio to the OECD total (%)



Source: OECD, authors' calculations based on EUROMOD G3.58 and HBS 2011

Figure 5: Observed, predicted and imputed expenditure shares by ventiles of household equivalised disposable income, % of non-durable/total expenditure

shows for each non-durable expenditure category its share in total non-durable expenditure and the share of durable expenditure in total expenditure by ventile of household equivalised disposable income, comparing observed and predicted values in HBS 2011 with imputed values in SILC. On the whole, we do capture pretty well the shape of expenditure distributions across the income ventiles for all expenditure categories (note the varying scale on vertical axis). For food and non-alcoholic beverages, we slightly oversimulate expenditure at the bottom end of income distribution, but the imputed share at the top end is very close to the actually observed share. Similarly, for alcohol consumption we capture the overall (positive) relationship between income and consumption, but expenditures at the bottom end of income distribution are simulated less precisely. For tobacco, we correctly simulate a negative relationship between income and consumption at the bottom end of income distribution and a convex negative relationship for higher ventiles. We also simulate quite precisely expenditure on the second biggest spending category – home fuels, electricity and water. We capture well the overall negative relationship between income and consumption of these goods, however we again slightly oversimulate expenditure for lower ventiles.

Figure 5: Observed, predicted and imputed expenditure shares by ventiles of household equivalised disposable income, % of non-durable/total expenditure

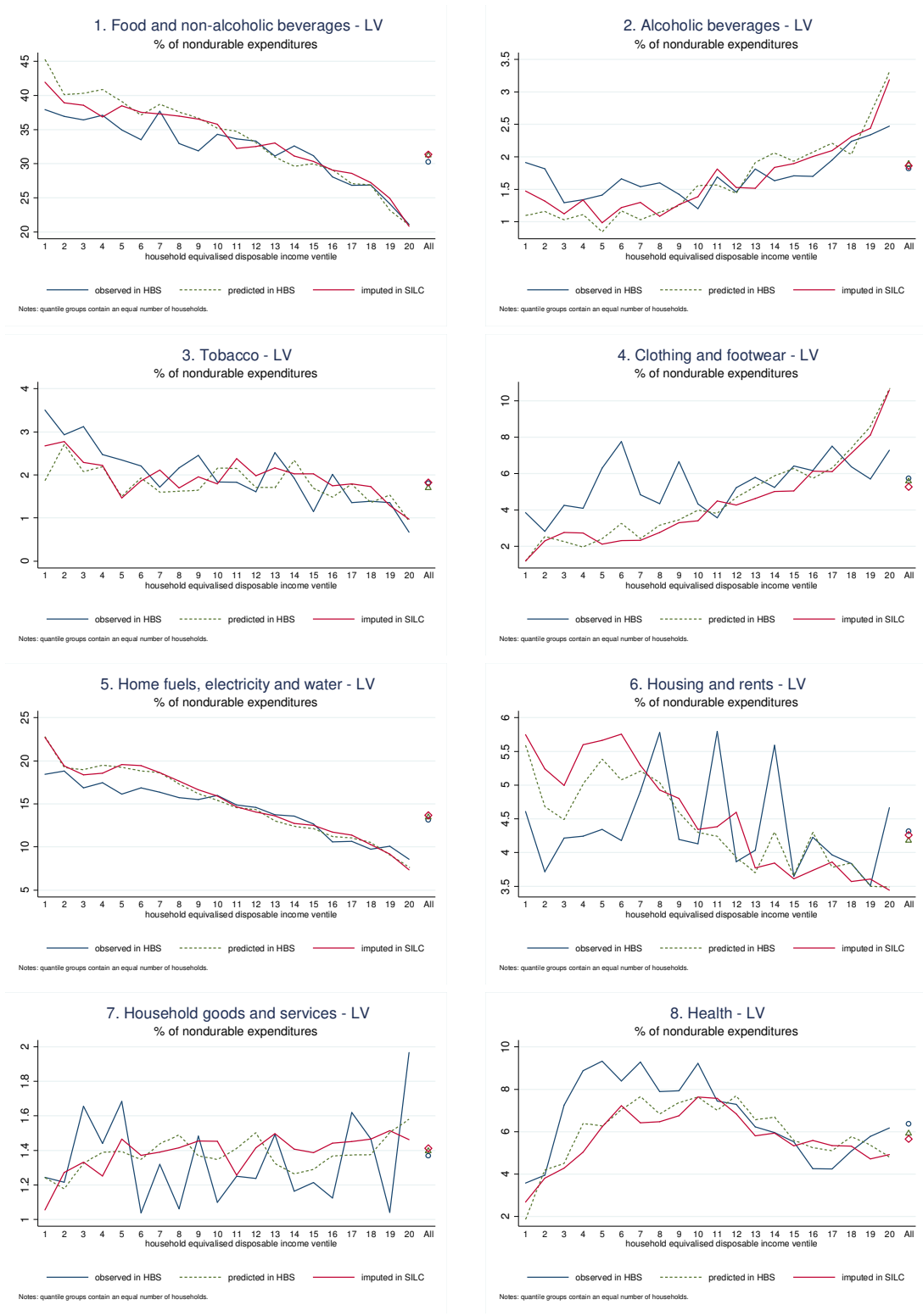
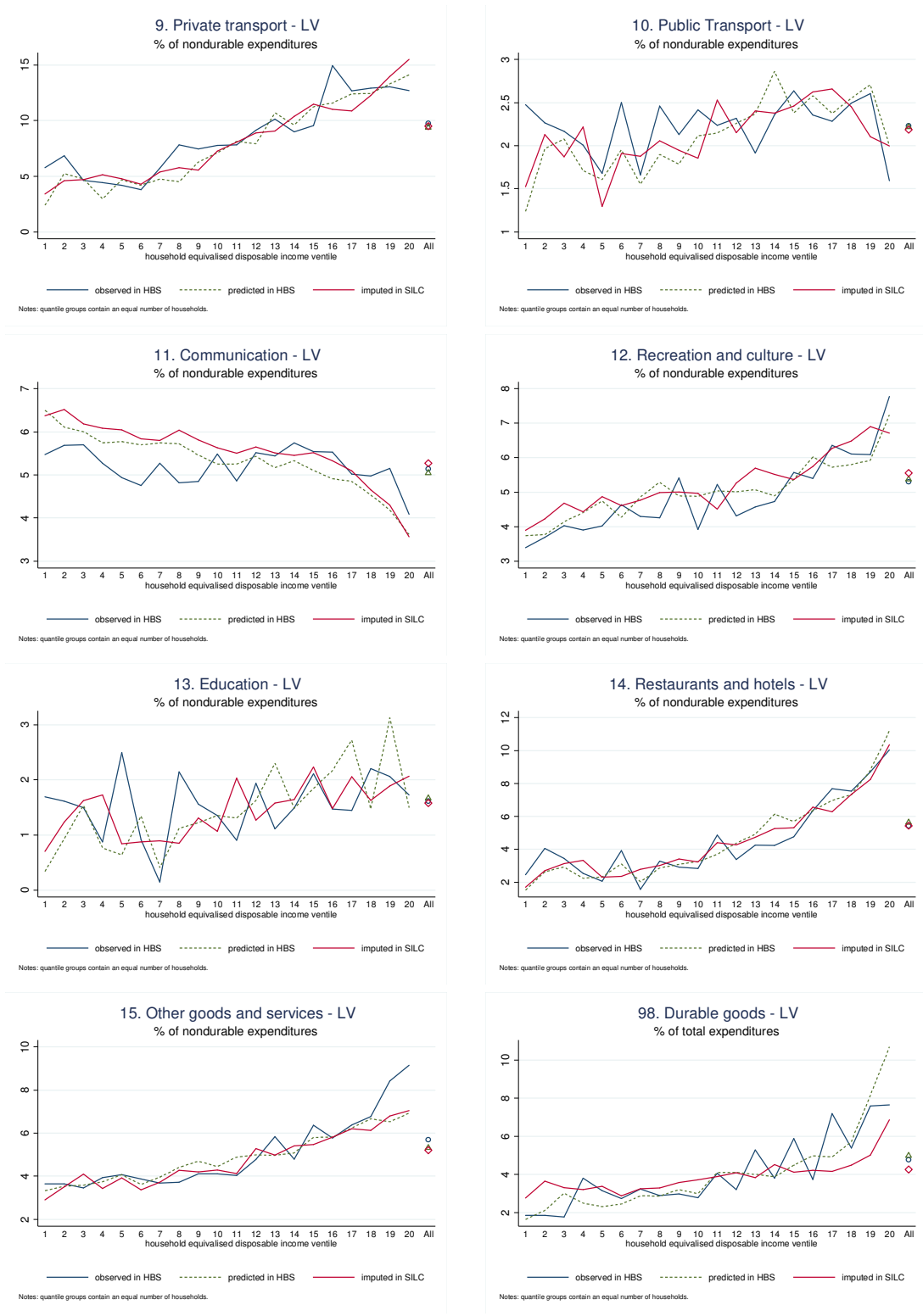


Figure 5: Observed, predicted and imputed expenditure shares by ventiles of household equivalised disposable income, % of non-durable/total expenditure



Notes: non-durable expenditure categories shown as a share of total non-durable expenditures and durable expenditures as a share of total expenditures; ventiles are constructed on the basis of household disposable income equivalised with the modified OECD scale, allocating the same number of households to each ventile.

Source: authors' calculations based on EUROMOD G3.58 and HBS 2011

4. VALIDATION OF INDIRECT TAX SIMULATIONS IN EUROMOD

In this section we compare the simulated indirect taxes with external data on tax revenues in 2011-2015 and analyse tax incidence across Latvian households in 2011.

Table 4.1: Year-on-year growth of expenditures (%), actual and EUROMOD simulated tax revenues in 2011-2016 (mln EUR)

	2011	2012	2013	2014	2015	2016
Total simulated expenditures, year-on-year growth, %	-	5.8	5.8	2.5	4.2	2.9
Indirect taxes - actual revenues	2052.7	2286.4	2424.3	2535.9	2672.6	n/a
Indirect taxes - simulated revenues	1265.8	1326.0	1373.1	1416.8	1492.3	1554.0
Ratio	0.62	0.58	0.57	0.56	0.56	-
VAT - actual revenues	1367.5	1582.6	1693.4	1787.3	1876.3	n/a
VAT - simulated revenues	1010.0	1073.1	1096.6	1123.7	1171.3	1205.7
Ratio	0.74	0.68	0.65	0.63	0.62	-
Excise tax - actual revenues	685.2	703.8	730.9	748.6	796.3	n/a
Excise tax - simulated revenues	255.8	252.9	276.5	293.2	321.0	348.3
Ratio	0.37	0.36	0.38	0.39	0.40	-
Of which:						
...on non-alcoholic beverages - actual revenues	n/a	n/a	n/a	n/a	n/a	n/a
...on non-alcoholic beverages - simulated revenues	8.5	8.8	10.1	11.2	10.5	10.7
Ratio	-	-	-	-	-	-
...on alcoholic beverages - actual revenues	140.1	143.6	152.3	149.0	155.8	n/a
...on alcoholic beverages - simulated revenues	29.6	31.0	31.9	31.9	31.1	38.0
Ratio	0.21	0.22	0.21	0.21	0.20	-
...on tobacco - actual revenues	149.0	148.5	151.0	166.2	177.3	n/a
...on tobacco - simulated revenues	72.8	75.2	83.9	86.0	87.7	90.4
Ratio	0.49	0.51	0.56	0.52	0.50	-
...on gas - actual revenues	n/a	n/a	n/a	n/a	n/a	n/a
...on gas - simulated revenues	17.4	14.2	15.0	19.1	17.0	18.5
Ratio	-	-	-	-	-	-
...on fuel - actual revenues	n/a	n/a	n/a	n/a	n/a	n/a
...on fuel - simulated revenues	127.4	123.7	135.6	145.1	174.7	190.7
Ratio	-	-	-	-	-	-

Source: authors' calculations based on EUROMOD G3.58, Eurostat, State Revenue Service of Latvia

Error! Reference source not found. Table 4.1 reports actual tax revenues from VAT and excise tax in 2011-2015 and the simulated amounts of taxes in 2011-2016. It should be noted that the external data on tax revenues include revenues derived from consumption by non-domestic households (e.g. foreign tourists, cross-border shopping), which we do not capture in our tax simulations, and therefore we unavoidably undersimulate the tax revenues. We also do not capture the VAT that is paid by companies but not passed to final consumers. In 2011 we simulate 74% of the actual VAT revenues. The ratio of simulated excise tax to the actual revenues is much lower and amounts to 37%, of which the ratio for the excise tax on alcohol is 21%, and the ratio of excise tax on tobacco consumption is 49%.

There are several likely reasons for underestimation of the excise tax on alcohol and tobacco, apart from consumption by non-domestic households. First, with respect to alcohol, HBS does not distinguish alcohol consumed outdoors – the respondents just record the total amount spent on outdoor meals. Second, as discussed in Section 3, expenditures on alcohol and tobacco are strongly underreported in HBS data. To get an idea of the extent to which discrepancy in the underlying consumption figures can explain the undersimulation of tax revenues, we use data from the Latvian State Revenue Service on consumption of selected alcoholic drinks and cigarettes on the territory of Latvia. According to our estimations, the share of consumed wine covered by HBS data is about 40%, the share of consumed spirits captured in HBS is only about 25%, and the share of consumed cigarettes is about 40%. This suggests that undersimulation of excise tax on alcohol and tobacco is to a large extent due to a small share of actual consumption of these goods that is captured by HBS.

Household expenditures for later years are simulated in real terms, i.e. on the basis of 2012-2016 incomes backrated to 2011. To obtain nominal expenditures and calculate indirect taxes for a given year, simulated real expenditures are then updated with the same index. The index is based on actual year-on-year nominal growth of household consumption in 2012-2015⁴ and forecasted nominal growth of GDP in 2016⁵(see Table 6.1 in Appendix).

In 2012, the simulated increase in VAT revenues is 6.2%, which is higher than the growth of total household expenditures. The reason for simulated VAT revenue growth outpacing expenditure growth is the fact that in 2012 natural gas became subject to standard VAT rate⁶. In 2013, simulated VAT revenues increased by 2.2%, while expenditures grew by 5.8%. The reason for VAT revenue growth being lower than expenditure growth is a reduction of the standard VAT rate from 22% to 21% - this change came into force in July 2012, but in the model this change is implemented in policy year 2013. In 2014 – 2016 there were no major changes in VAT rules and the simulated growth in VAT is equal to the growth of total household expenditures.

The ratio of simulated VAT revenues to the actual revenues gradually declines in 2012-2015, with an especially strong reduction in 2012. The reason for this is improved VAT collection: according to the available estimates of VAT revenue gap⁷ was declining gradually in 2012-2014, but there was a particularly strong reduction in 2012 – from 37% of VTTL in 2011 to 29% in 2012 (CASE, 2016).

Dynamics of the simulated revenues from the excise tax are mainly driven by changes in the excise rates and changes in the relative prices of goods that are subject to the excise tax, and to a lesser extent by changes in incomes (affecting structure of expenditures). Given that all goods that are subject to the excise tax in Latvia, except cigarettes, are taxed on specific basis, this leads to growth of excise tax revenues that is different from the growth rate of total expenditures.

⁴ OECD data on final consumption expenditure of households.

⁵ Ministry of Latvia's forecast of main macroeconomic indicators.

⁶ The natural gas was subject to a reduced rate until June 30th of 2011 and became subject to a standard VAT rate as of July 2011. In the model, this change is implemented in policy year 2012.

⁷ VAT gap is defined as the difference between the actually collected VAT revenues and VAT Total Tax Liability (VTTL), expressed in percent of VTTL.

Next, we analyse the distribution of tax revenues by 16 product categories. The category that contributes the biggest share to total revenues from indirect taxes is food and non-alcoholic beverages, as it is the biggest category in total consumption (see Table 4.2). The share of VAT revenues derived from this category is 34.3%, and the share of excises is 3.3% (collected from coffee and soft drinks). The second biggest contribution to revenues from indirect taxes comes from private transport (10.2% of VAT revenues and 49.8% of excise tax revenues). The third biggest category in total revenues from indirect taxes is home fuels, electricity and water – this category contributes 11.6% to VAT revenues and 6.8% to revenues from excises (mainly collected from town gas). Tobacco contributes 28.5% of total revenues from the excise tax.

Table 4.2: Tax revenues by product categories in 2011, simulated in EUROMOD

	Expenditure shares, % of total	VAT revenues, % of total	Excise tax revenues, % of total	Indirect taxes, % of total
Food and non-alcoholic beverages	30.0	34.3	3.3	28.1
Alcohol	1.8	2.1	11.6	4.0
Tobacco	1.7	2.0	28.5	7.4
Clothing and footwear	5.1	5.8	0.0	4.6
Home fuels, electricity and water	13.1	11.6	6.8	10.6
Housing and rents	4.1	3.2	0.0	2.6
Household goods and services	1.4	1.6	0.0	1.2
Health	5.4	2.5	0.0	2.0
Private transport	9.1	10.2	49.8	18.2
Public transport	2.1	1.7	0.0	1.3
Communication	5.0	5.8	0.0	4.6
Recreation and culture	5.3	5.3	0.0	4.2
Education	1.5	0.0	0.0	0.0
Restaurants, hotels and holidays	5.2	4.9	0.0	3.9
Other goods and services	5.0	4.1	0.0	3.3
Durables	4.3	4.9	0.0	3.9
Total	100.0	100.0	100.0	100.0

Source: authors' calculations based on EUROMOD G3.58

Table 4.3 shows the simulated implicit indirect tax rate by product categories in 2011-2016. The categories that are subject to the highest implicit tax rates are tobacco, alcohol and private transport (the latter due to the excise tax on fuel). In 2013, we simulate a reduction in the implicit tax rate on all expenditure categories where most goods and services are subject to VAT and are not subject to the excise tax, which is driven by a reduction in the standard VAT rate from 22% to 21%. Changes in the implicit tax rate on the expenditure categories where most constituent goods and services are subject to the excise tax are driven not only by tax policy changes, but also, similar to the tax revenues discussed above, by changes in prices, since most excise goods in Latvia are taxed on specific basis.

Table 4.3: Implicit indirect tax rate by expenditure category, %, 2011-2016

	2011	2012	2013	2014	2015	2016
Food and non-alcoholic beverages	22.6	22.5	21.6	21.6	21.6	21.6
Alcohol	78.0	77.0	72.8	71.3	66.9	79.7
Tobacco	479.8	422.4	507.6	508.2	461.1	461.4
Clothing and footwear	22.0	22.0	21.0	21.0	21.0	21.0
Home fuels, electricity and water	19.0	19.1	18.6	19.5	18.7	18.9
Housing and rents	14.1	14.1	13.5	13.5	13.5	13.5
Household goods and services	22.0	22.0	21.0	21.0	21.0	21.0
Health	7.8	7.8	7.8	7.8	7.8	7.8
Private transport	65.1	60.3	60.4	62.7	71.9	76.4
Public transport	14.4	14.4	14.2	14.2	14.2	14.2
Communication	21.8	21.8	20.8	20.8	20.8	20.8
Recreation and culture	18.5	18.5	17.8	17.8	17.8	17.8
Education	0.0	0.0	0.0	0.0	0.0	0.0
Restaurants, hotels and holidays	17.5	17.5	16.8	16.8	16.8	16.8
Other goods and services	14.9	14.9	14.3	14.3	14.3	14.3
Durables	22.0	22.0	21.0	21.0	21.0	21.0

Source: authors' calculations based on EUROMOD G3.58

Next we turn to the analysis of tax incidence and implicit indirect tax rate faced by households across income distribution (see

Table 4.4 and Table 4.5). Implicit indirect tax rate rises with income, with the exception of the bottom two deciles, where the implicit rate is higher than in the 3rd decile. Higher implicit rate in the bottom two deciles is mainly due to consumption of tobacco, which accounts for a larger share of total consumption in the first two deciles. In higher deciles, the main reason for the rising implicit tax rate is consumption of private transport, which is subject to 65.1% implicit tax rate and which contributes an increasingly large share of total consumption in higher deciles. 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 is almost four times as high as the share of taxes paid by the bottom decile.

Table 4.4: Mean (unequalised) monthly household disposable income, expenditures, tax liability and implicit tax rate by deciles of equalised disposable income, 2011

Decile of equalised disposable income	Mean (unequalised) household disposable income, EUR	Mean household expenditures, EUR	Mean total indirect taxes, EUR	Implicit indirect tax rate, %
1	194.9	355.4	69.1	24.1
2	308.0	435.9	82.7	23.4
3	318.6	402.1	73.9	22.5
4	381.8	450.2	84.6	23.2
5	500.9	531.8	100.8	23.4
6	592.1	610.2	118.9	24.2
7	751.0	696.4	138.3	24.8
8	911.4	785.8	157.4	25.0
9	1137.6	897.3	180.2	25.1
10	1711.6	1255.3	256.4	25.7
All	680.7	642.0	126.2	24.5

Source: authors' calculations based on EUROMOD G3.58

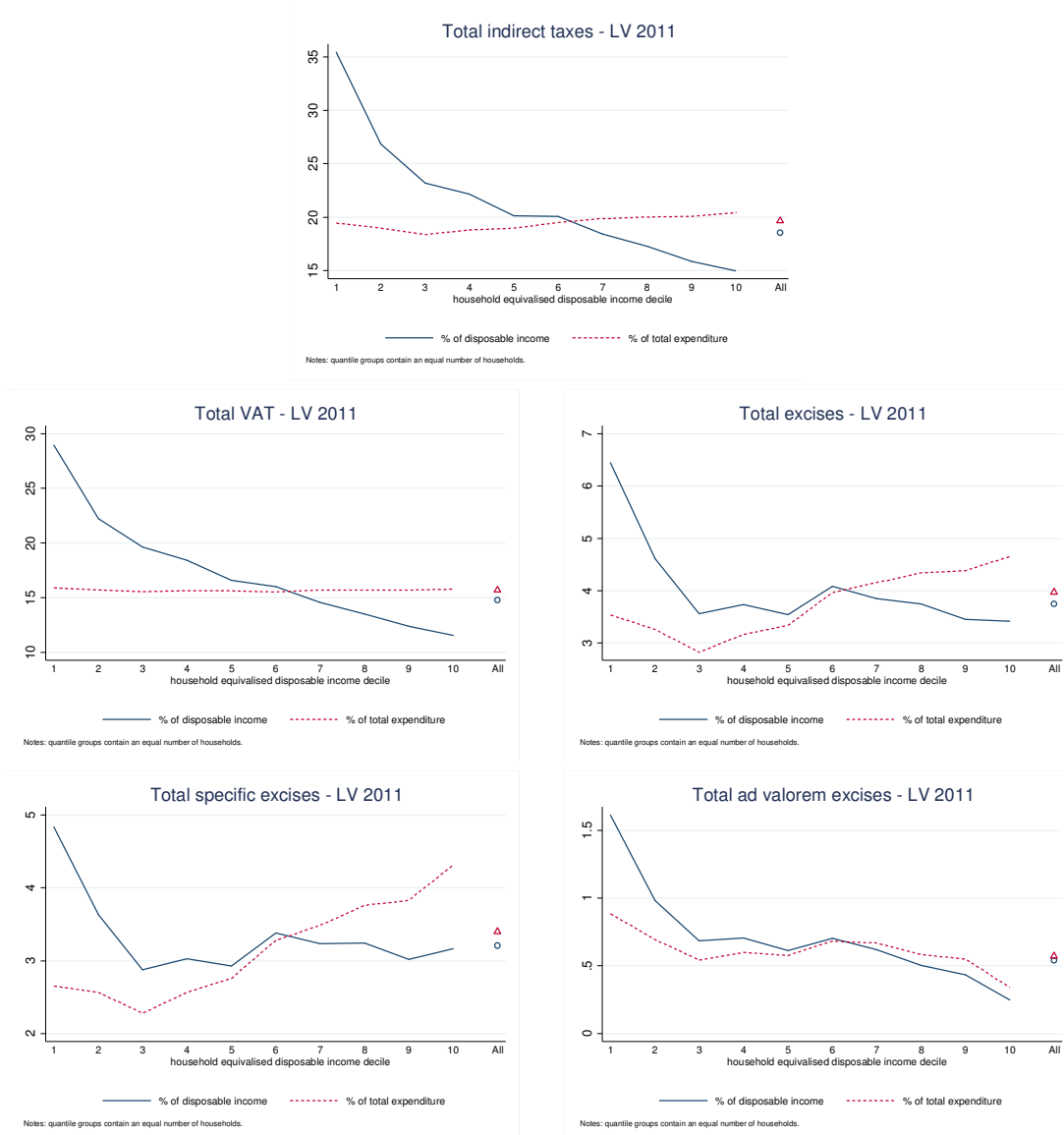
However, if one looks at the incidence of indirect taxes, indirect taxes are clearly regressive: tax liability in percent of disposable income declines about linearly from 35.4% in the 1st decile to 15.0% in the 10th decile of equalised household disposable income (see Table 4.5 and Figure 6). VAT is especially regressive, which reflects lower propensity to consume in the top income deciles. Incidence of excise tax is essentially the same across income distribution, with the exception of the bottom two deciles, where it is higher. This is mainly due to a higher share of tobacco in total consumption of low-income households.

Table 4.5: Incidence of (unequalised) indirect taxes by type (excises, VAT) and income decile, % of household disposable income, 2011

Decile of disposable income	Incidence of indirect taxes	Incidence of VAT	Incidence of excise tax	Incidence of specific indirect tax	Incidence of ad valorem excise tax
1	35.4	29.0	6.4	4.8	1.6
2	26.8	22.2	4.6	3.6	1.0
3	23.2	19.6	3.6	2.9	0.7
4	22.2	18.4	3.7	3.0	0.7
5	20.1	16.6	3.5	2.9	0.6
6	20.1	16.0	4.1	3.4	0.7
7	18.4	14.6	3.9	3.2	0.6
8	17.3	13.5	3.7	3.2	0.5
9	15.8	12.4	3.5	3.0	0.4
10	15.0	11.6	3.4	3.2	0.2
All	18.5	14.8	3.7	3.2	0.5

Source: authors' calculations based on EUROMOD G3.58

Figure 6: Incidence of indirect taxes by income decile, % of disposable income and expenditure, 2011



Source: authors' calculations based on EUROMOD G3.58

Table 4.6, Table 4.7 and

Figure 7: Incidence of indirect taxes by expenditure decile, % of disposable income and expenditure, 2011

show mean income, expenditure and tax incidence by deciles of expenditure. The ratio of indirect taxes to total expenditure varies around 19% in the bottom five deciles of household equivalised expenditures and is close to the ratio of indirect taxes to disposable income, reflecting the fact that lower income households tend to consume all of their income. In 6th-10th deciles of expenditures tax ratio to income sharply declines with households' declining propensity to consume, but the share of taxes to total expenditures slightly increases. This increase is driven solely by the excise tax (the share of VAT is virtually the same across all deciles at 15.6% - 15.9%). The increase in the share of the excise tax is due to a higher share of private transport and alcoholic beverages in consumption by high-income households.

Table 4.6: Mean (unequalised) monthly household disposable income, total expenditure and total indirect taxes by expenditure decile, 2011

Decile of expenditure	Mean (unequalised) household disposable income (EUR)	Total expenditure (EUR)	Total indirect taxes (EUR)
1	373.9	387.9	74.3
2	417.5	416.6	78.8
3	407.6	425.7	80.5
4	450.0	469.6	87.5
5	539.1	546.9	105.1
6	651.7	632.1	123.9
7	711.8	692.6	136.7
8	816.8	776.0	154.2
9	994.6	868.5	175.6
10	1444.7	1204.5	245.7
All	680.7	642.0	126.2

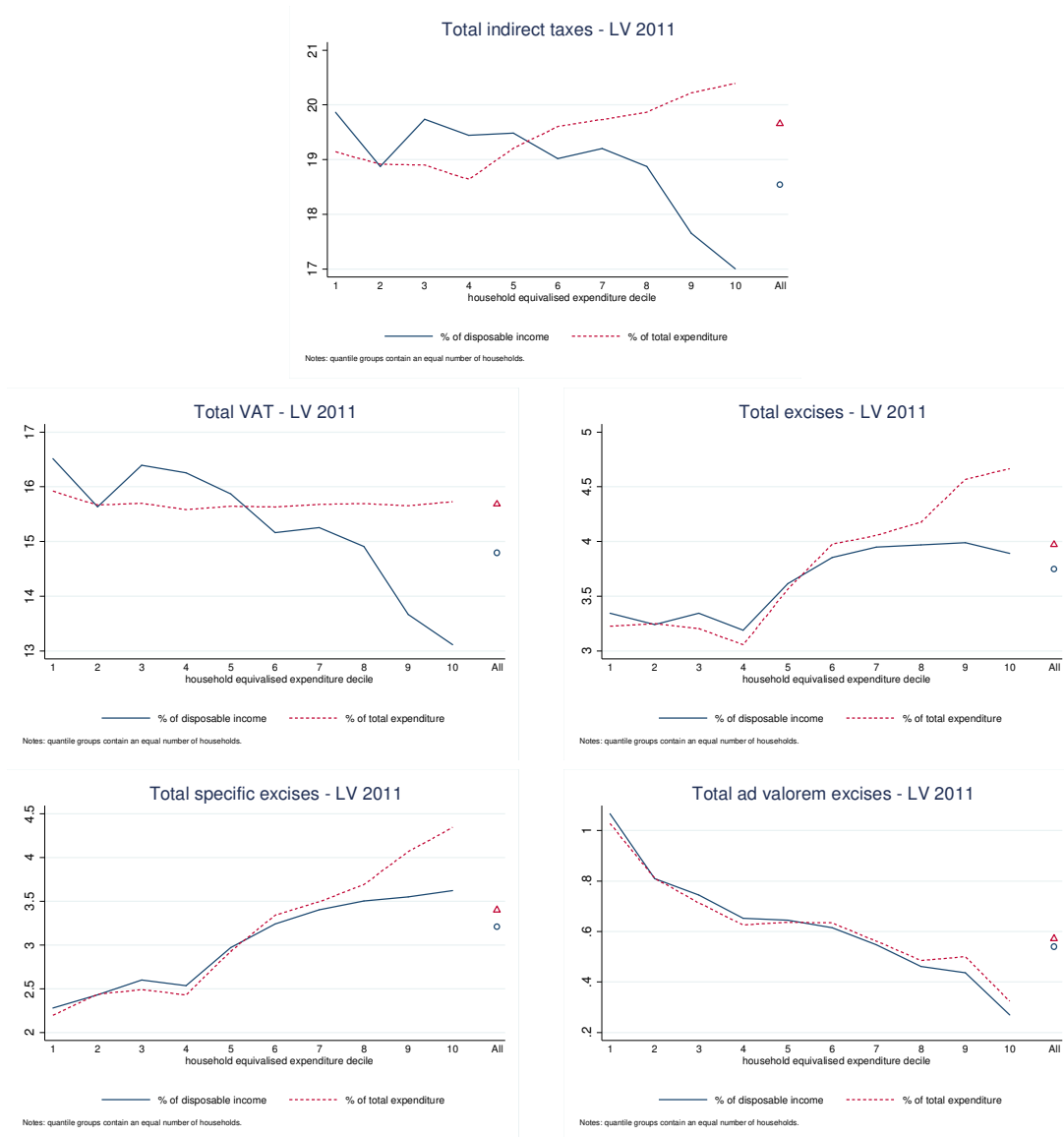
Source: authors' calculations based on EUROMOD G3.58

Table 4.7: Incidence of (unequalised) indirect taxes by type (excises, VAT) and expenditure decile, % of household total expenditure, 2011

Decile of expenditure	Incidence of indirect taxes	Incidence of VAT	Incidence of excise tax	Incidence of specific indirect tax	Incidence of ad valorem excise tax
1	19.1	15.9	3.2	2.2	1.0
2	18.9	15.7	3.2	2.4	0.8
3	18.9	15.7	3.2	2.5	0.7
4	18.6	15.6	3.1	2.4	0.6
5	19.2	15.6	3.6	2.9	0.6
6	19.6	15.6	4.0	3.3	0.6
7	19.7	15.7	4.1	3.5	0.6
8	19.9	15.7	4.2	3.7	0.5
9	20.2	15.7	4.6	4.1	0.5
10	20.4	15.7	4.7	4.3	0.3
All	19.7	15.7	4.0	3.4	0.6

Source: authors' calculations based on EUROMOD G3.58

Figure 7: Incidence of indirect taxes by expenditure decile, % of disposable income and expenditure, 2011



Source: authors' calculations based on EUROMOD G3.58

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6. APPENDIX

Table 6.1: Uprating index used for calculation of nominal expenditures in 2012-2016

	2012	2013	2014	2015	2016
Index (2011 = 1)	1.058	1.120	1.149	1.198	1.233

Note: in 2012-2015, the index is based on actual year-on-year nominal growth of household consumption; in 2016, the index is based on forecasted growth of nominal GDP.

Source: OECD, Ministry of Finance of Latvia and authors' calculations.

Table 6.2: Model parameters and assumptions

Model parameter	2011	2012	2013	2014	2015	2016	Comment
\$VAT_std	22%	22%	21%	21%	21%	21%	Standard VAT rate effective on June 30th in each respective year.
\$VAT_reduced1	12%	12%	12%	12%	12%	12%	Reduced VAT rate effective on June 30th in each respective year.
\$VAT_zero	0%	0%	0%	0%	0%	0%	Zero VAT rate
\$SPECIFIC_COFFEE	1.42	1.42	1.42	1.42	1.42	1.42	Specific tax on coffee, EUR per kg. In the Law on Excise Duty, the tax on coffee is stipulated in EUR per 100 kg. Here divided by 100.
\$PRICE_COFFEE	13.60	13.86	12.49	11.46	13.05	13.08	Price of coffee, EUR per kg.
\$SPECIFIC_SOFTDRINKS	0.07	0.07	0.07	0.07	0.07	0.07	Specific tax on non-alcoholic drinks, EUR per litre. In the Law on Excise Duty, the tax on soft drinks is stipulated in EUR per 100 litres. Here divided by 100.
\$PRICE_SOFTDRINKS	0.70	0.72	0.72	0.71	0.71	0.71	Price of soft drinks, EUR per litre.
\$SPECIFIC_SPIRITS	5.35	5.35	5.35	5.35	5.35	6.00	Specific tax on strong alcoholic drinks, EUR per litre. In the Law on Excise Duty, the tax on strong alcohol drinks is stipulated in EUR per hectaliter of pure alcohol. We assume 40% alcohol content (multiply by 0.4) and convert to EUR/l (divide by 100).
\$PRICE_SPIRITS	11.33	11.50	11.68	11.91	12.76	12.79	Price of strong alcohol drinks, EUR per litre. We use the average price of vodka.
\$SPECIFIC_WINE	0.48	0.48	0.48	0.48	0.48	0.62	Specific tax on wine, EUR per 0.75 litres. In the Law on Excise Duty, the tax on wine is stipulated in EUR per hectaliter. Here divided by 100 and multiplied by 0.75.
\$PRICE_WINE	4.16	4.17	4.32	4.40	4.31	4.32	Price of wine, EUR per 0.75 litres.
\$SPECIFIC_BEER	0.17	0.17	0.17	0.17	0.17	0.26	Specific tax on beer, EUR per litre. In the law, the tax on beer is stipulated in EUR per each percent of alcohol per 100 liters. We assume 5.5% alcohol content (multiply by 5.5) and convert to EUR/l (divide by 100).
\$PRICE_BEER	1.44	1.44	1.58	1.64	1.90	1.90	Price of beer, EUR per litre.
\$SPECIFIC_CIGARETTES	0.91	0.91	0.91	1.20	1.20	1.20	Specific tax on cigarettes, EUR per pack. In the law, the specific tax on cigarettes is stipulated in EUR per 1000 pieces. We convert to EUR

Model parameter	2011	2012	2013	2014	2015	2016	Comment
							per pack assuming that a pack contains 20 cigarettes.
\$VALOREM_CIGARETTES	0.33	0.33	0.33	0.25	0.25	0.25	Ad valorem tax on cigarettes, % of maximum retail price. In the model, we apply the statutory tax rate to the average price of a pack of cigarettes.
\$PRICE_CIGARETTES	2.86	3.04	2.73	2.90	3.00	3.00	Price of cigarettes, EUR per pack.
\$SPECIFIC_CIGARS	0.05	0.05	0.05	0.05	0.05	0.05	Specific tax on cigars, EUR per piece. In the law, the specific tax on cigars is stipulated in EUR per 1000 pieces. Here divided by 1000.
\$PRICE_CIGARS	2.79	2.96	3.06	3.25	3.36	3.36	Price of cigars, EUR per piece.
\$SPECIFIC_TOBACCO	61.20	61.20	61.20	60.00	60.00	62.00	Specific tax on tobacco, EUR per kilogram. Corresponds to the statutory tax on tobacco as stipulated in the law.
\$PRICE_TOBACCO	114.31	121.57	125.37	133.22	137.69	137.97	Price of tobacco, EUR per kilogram.
\$SPECIFIC_GAS	99.60	99.60	99.60	99.60	99.60	99.60	Specific tax on gas, EUR per 1000 m3. Corresponds to the statutory tax on the natural gas used as fuel, as stipulated in the law.
\$PRICE_GAS	456.96	590.48	590.48	504.57	554.18	555.29	Price of gas, EUR per 1000 m3.
\$SPECIFIC_GASLIQUID	128.06	128.06	128.06	161.00	161.00	206.00	Specific tax on liquefied hydrocarbons, EUR per 1000 kilograms. Corresponds to the statutory tax on gas oil, as stipulated in the law.
\$PRICE_GASLIQUID	997.96	1289.56	1289.56	1101.94	1592.36	1595.54	Price of liquefied hydrocarbons, EUR per 1000 kilograms.
\$SPECIFIC_FUELS	4.11	4.11	4.11	4.11	4.11	4.36	Specific tax on fuel, EUR per 10 litres. In the law, the specific tax on unleaded fuel is specified in EUR per 1000 litres. Here divided by 100.
\$PRICE_FUELS	12.81	13.97	13.50	12.95	11.23	11.25	Price of fuel, EUR per 10 litres.
\$SPECIFIC_FUELLIQUID	128.06	128.06	128.06	161.00	161.00	206.00	Specific tax on liquid fuel, EUR per 1000 kilograms. We assume that consumed liquid fuel are liquefied hydrocarbons and hence use the statutory tax on liquefied hydrocarbons.
\$PRICE_FUELLIQUID	997.96	1289.56	1289.56	1101.94	1592.36	1595.54	Price of liquid fuel, EUR per 1000 kilograms. We assume that consumed liquid fuel are liquefied hydrocarbons and hence use the price of liquefied hydrocarbons.

Note: In 2016 all prices are assumed to grow at HICP growth rate forecasted by the European Commission for 2016, which is 0.2% (European Commission, 2016).