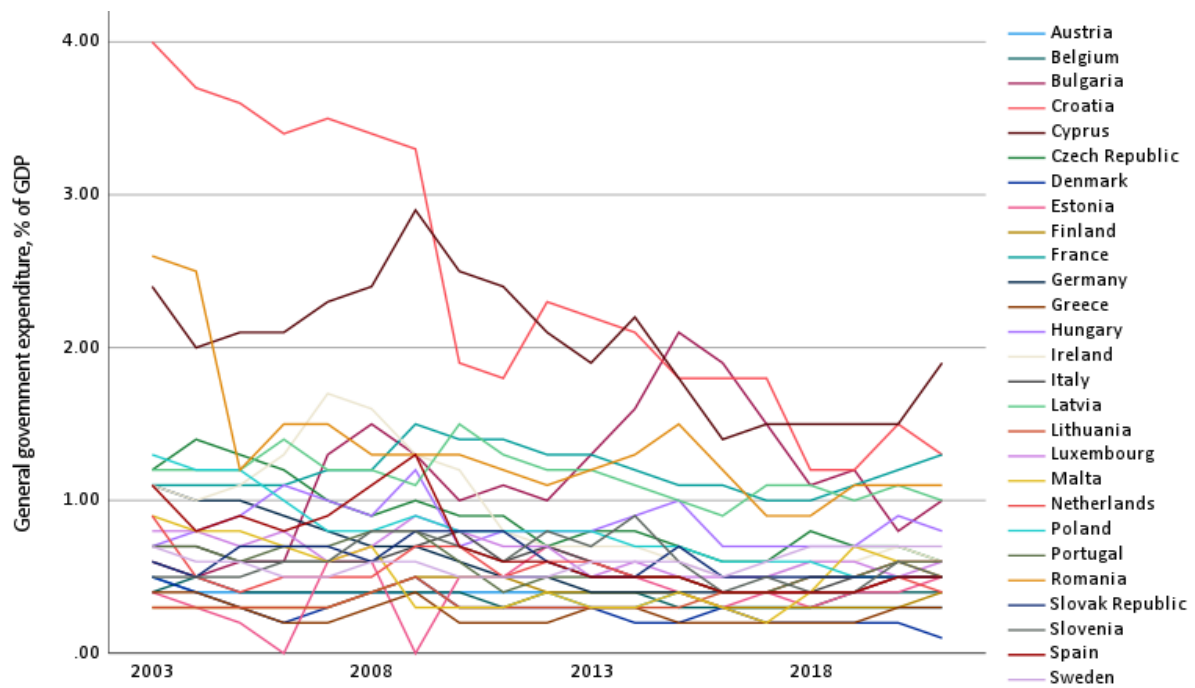


Supporting Information

Overview of housing indicators with their definitions and links to data sources

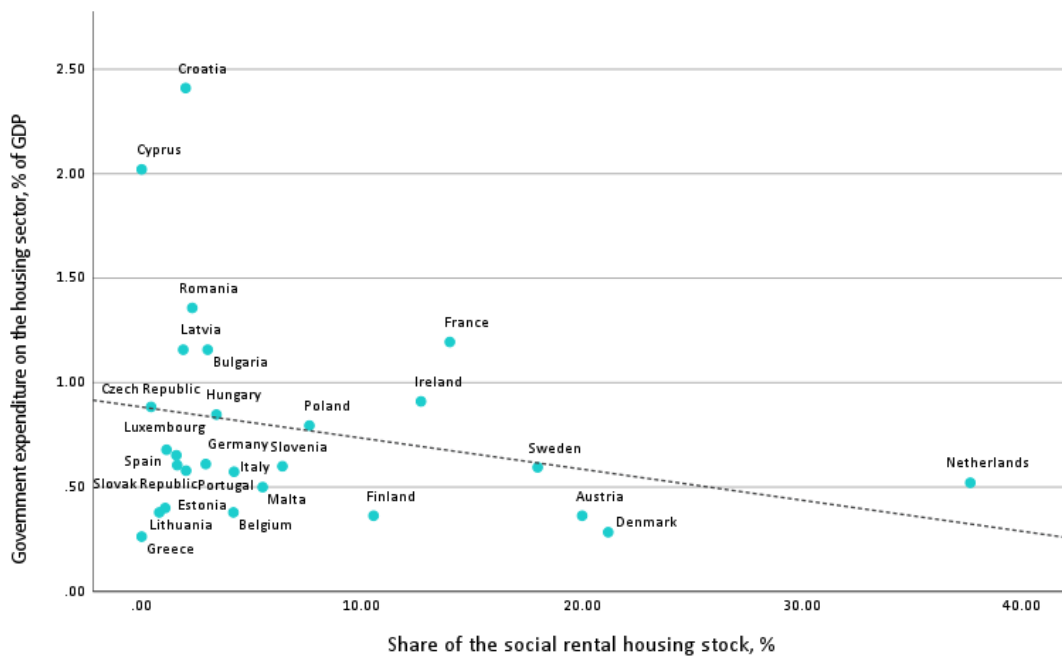
Indicator	Definition
<i>Government spending on housing and community amenities (% of GDP)</i>	These are expenditures on housing development (50% from total), community development (20% from total), water supply, street lighting, R&D related to housing and community amenities, housing and community amenities (Eurostat, 2025)
Data source: https://ec.europa.eu/eurostat/databrowser/view/gov_10a_exp/default/table?lang=en	
<i>Social rental dwelling stock (% of total housing stock)</i>	Social/public housing refers to housing units that are owned, managed, or subsidized by the government or other public entities, with the primary goal of providing affordable housing to low-income individuals or families. However, the definition and perception of social housing varies greatly from country to country.
Data collected from various sources	
<i>Overcrowding rate</i>	According to EU-SILC survey, “A person is considered as living in an overcrowded household if the household does not have at its disposal a minimum of rooms equal to: - one room for the household; - one room by couple in the household; - one room for each single person aged 18 and more; - one room by pair of single people of the same sex between 12 and 17 years of age; - one room for each single person between 12 and 17 years of age and not included in the previous category; - one room by pair of children under 12 years of age” (Eurostat dataset details, 2021a).
Data source: https://ec.europa.eu/eurostat/databrowser/view/tessi170/default/line?lang=en	
<i>Average age of young people leaving their parents' household</i>	-
Data source: https://ec.europa.eu/eurostat/databrowser/view/YTH_DEMO_030/default/table?lang=en	
<i>Net migration</i>	Net migration is a demographic term that refers to the difference between the number of people who move into a geographic region (in-migrants) and the number of people who move out of that region (out-migrants) over a specified period of time. In case of this study, it is migration between countries over the period of 2010-2021.
Data sources: https://ec.europa.eu/eurostat/databrowser/view/tps00176/default/table?lang=en https://ec.europa.eu/eurostat/databrowser/view/MIGR_EMI1CTZ/default/table?lang=en&category=migr.migr_cit.migr_emi	
<i>Construction of new housing</i>	To evaluate that we used indicator called “Number of building permits to dwellings, 2015 = 100%”. It is a Eurostat indicator that measures the number of building permits issued for residential dwellings in a given year, relative to the number of building permits issued for residential dwellings in the year 2015. The indicator is expressed as an index, with a value of 100% representing the number of building permits issued in 2015. Values above 100% indicate an increase in the number of building permits issued for residential dwellings compared to 2015, while values below 100% indicate a decrease. This indicator provides insight into the level of construction activity for residential

	dwelling and can be useful for assessing changes in demand for housing over time.
Data source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Building_permit_index_overview	
<i>Households' housing cost burden</i>	Share of disposable income spent on housing expenses like mortgage, rent, utilities, and property taxes
Data sources: https://www.oecd.org/els/family/HC1-2-Housing-costs-over-income.pdf https://www.oecd.org/els/family/HC1.2-Housing-costs-over-income.xlsx	
<i>Housing cost overburden rate</i>	Percentage of the population living in a household where total housing costs (net of housing allowances) represent more than 40% of the total disposable household income (net of housing allowances). (Eurostat definition)
Data source: https://ec.europa.eu/eurostat/databrowser/view/tespm140/default/table?lang=en	
<i>Household expenditure on housing, water, electricity, gas and other fuels</i>	Calculated as percentage of household disposable income.
Data source: https://ec.europa.eu/eurostat/databrowser/product/view/NAMA_10_CO3_P3	
<i>House price to income ratio</i>	According to OECD (2023), "The price to income ratio is the nominal house price index divided by the nominal disposable income per head and can be considered as a measure of affordability".
Data source: https://data.oecd.org/price/housing-prices.htm	
<i>Environmental conditions surrounding dwelling / Living environment</i>	Share of population encountering environmental problems in/around their dwelling (noise, pollution, grime, crime, violence or vandalism etc., %
Data source: https://ec.europa.eu/eurostat/databrowser/explore/all/popul?lang=en&subtheme=livcon.ilc&display=list&sort=category	
<i>Issues with a dwelling</i>	The indicator is defined as the percentage of the total population living in a dwelling with either a leaking roof, or damp walls/floors/foundation, or rot in window frames or floor.
Data source: https://ec.europa.eu/eurostat/databrowser/product/page/tessi292	



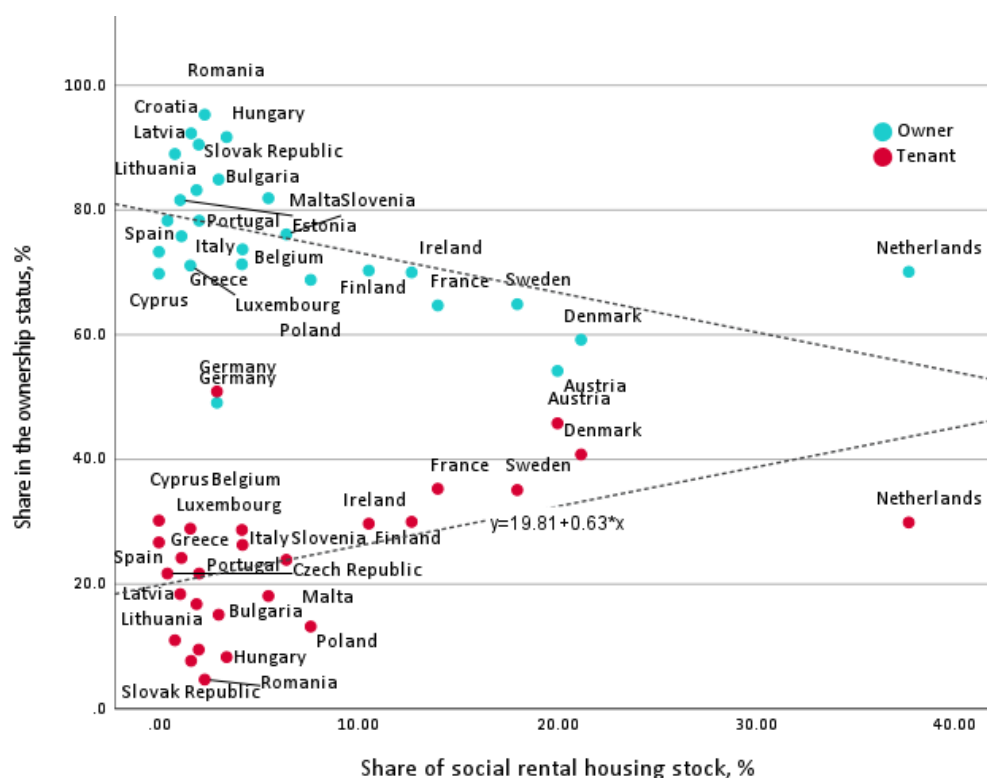
General government expenditure on housing and community amenities in EU, 2003–2021

Data: Eurostat



Relationship between government expenditure on the housing sector (average between 2010 and 2021) and the share of the social rental housing stock (in 2021)

Data: OECD and Eurostat



Relationship between ownership status and social rental housing stock (in 2021)

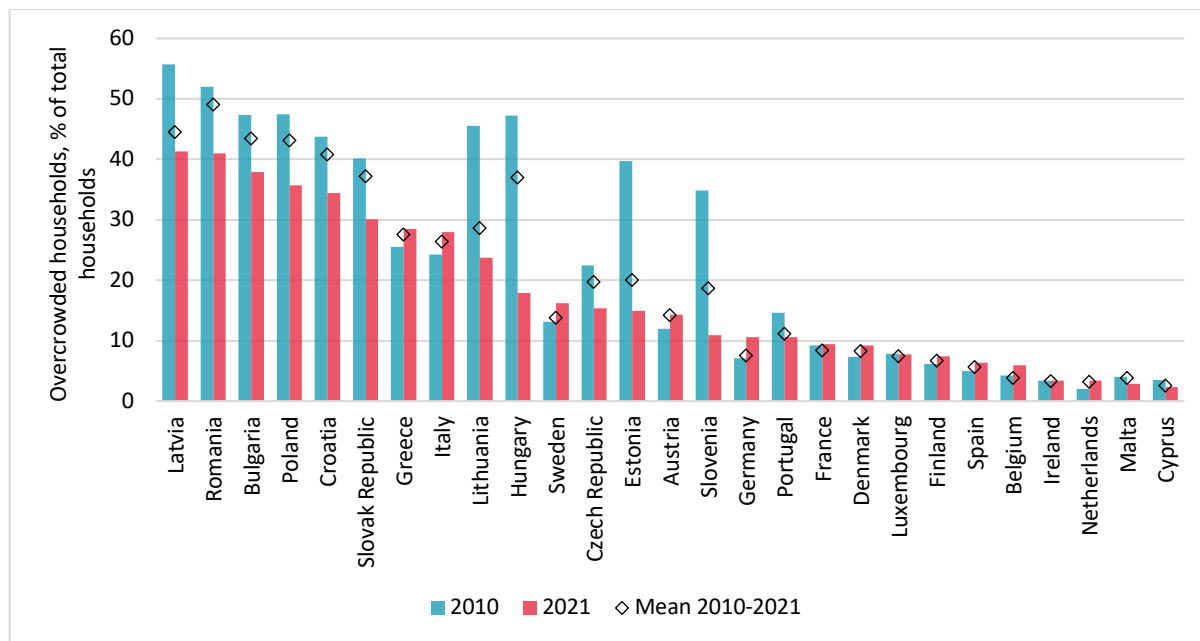
Data: OECD and Eurostat

The role of governments in housing provision. The results of the cluster analysis (authors' calculations)

	GOVERNMENT EXPENDITURE, % OF GDP (MEAN 2010-2021)	SOCIAL RENTAL HOUSING STOCK, % OF TOTAL HOUSING STOCK (2022 OR LATEST YEAR AVAILABLE)	MARKET REGULATION	CLUSTER
Bulgaria	1.27	2.5	1	1
Croatia	1.73	1.8	1	1
Cyprus	1.86	0.0	1	1
Latvia	1.11	1.9	1	1
Romania	1.18	1.5	1	1
Belgium	0.36	4.2	3	2
Czechia	0.73	3.6	1	2
Estonia	0.46	1.1	1	2
Finland	0.38	10.9	2	2
France	1.20	14.0	3	2
Germany	0.45	2.6	3	2
Greece	0.25	0.0	1	2
Hungary	0.79	2.6	1	2
Ireland	0.66	12.7	2	2

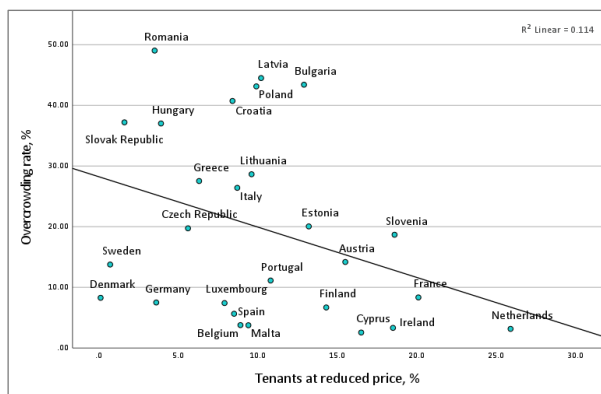
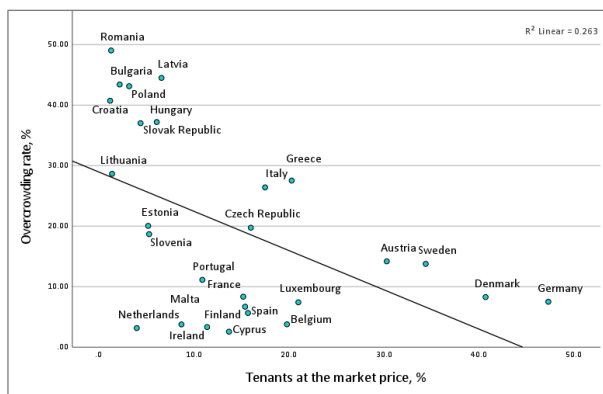
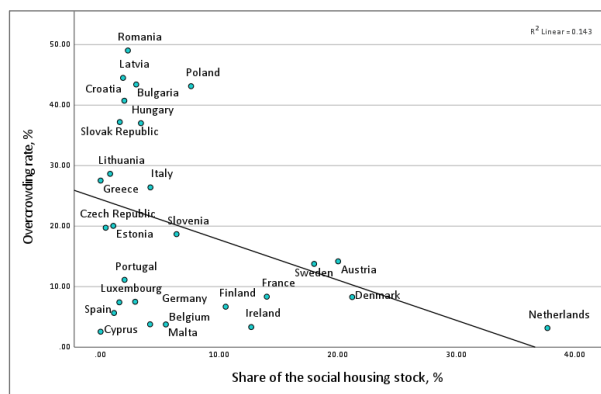
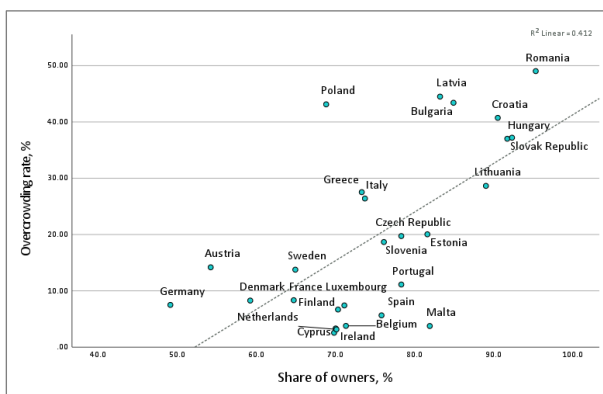
Italy	0.91	2.4	2	2
Lithuania	0.42	0.8	1	2
Luxembourg	0.56	2.0	2	2
Malta	0.48	5.5	2	2
Poland	0.65	6.6	2	2
Portugal	0.50	2.0	2	2
Slovakia	0.57	2.5	1	2
Slovenia	0.58	4.7	1	2
Spain	0.50	1.5	2	2
Austria	0.33	23.6	3	3
Denmark	0.23	21.3	3	3
Netherlands	0.50	34.1	3	3
Sweden	0.63	19.0	3	3

Data: OECD and Eurostat



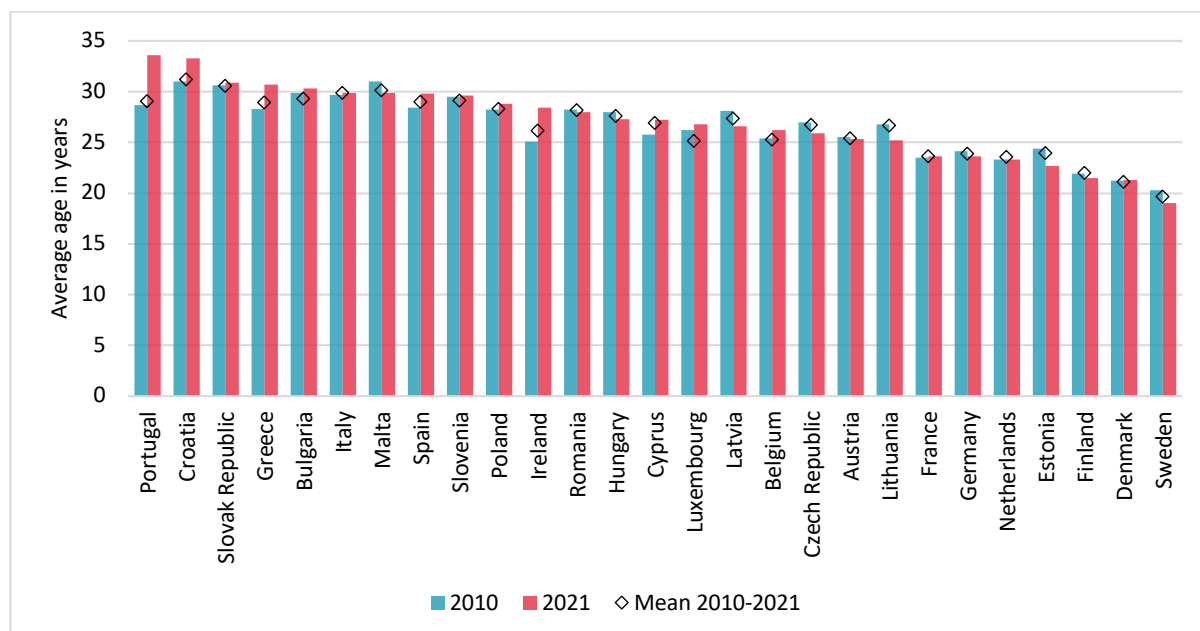
Overcrowding rate (%) in 2010 and 2021

Data: EU-SILC survey



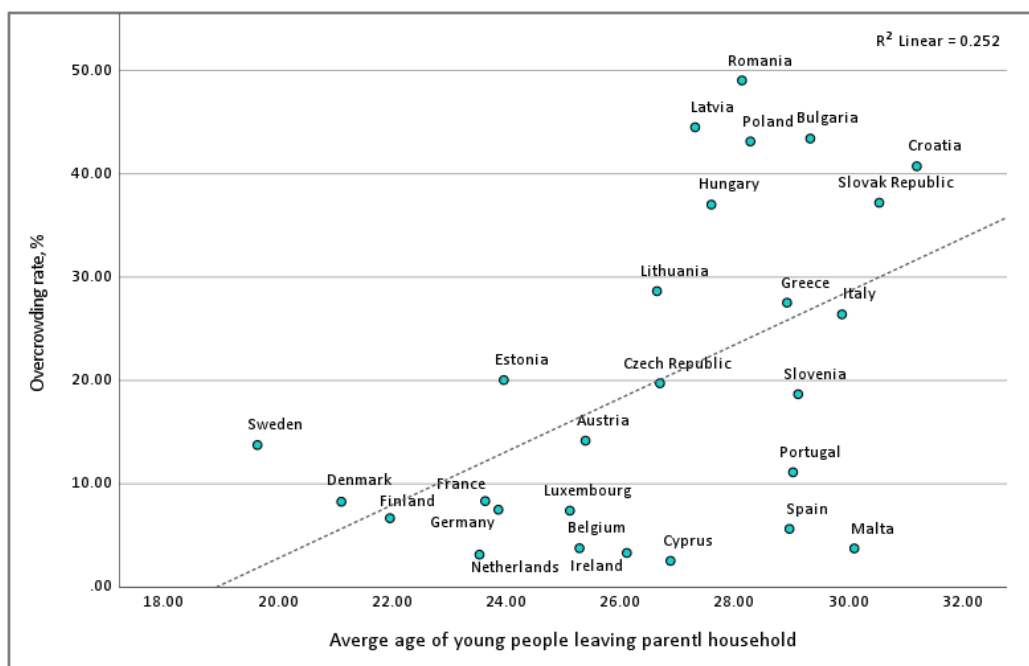
Relationship between the overcrowding rate and the distribution of the population by the tenure status in 2021

Data: EU-SILC survey



The average age of young people leaving the parental household in 2010 and 2021

Data: Eurostat



Relationship between the average age of young people leaving the parental household and the overcrowding rate in 2021

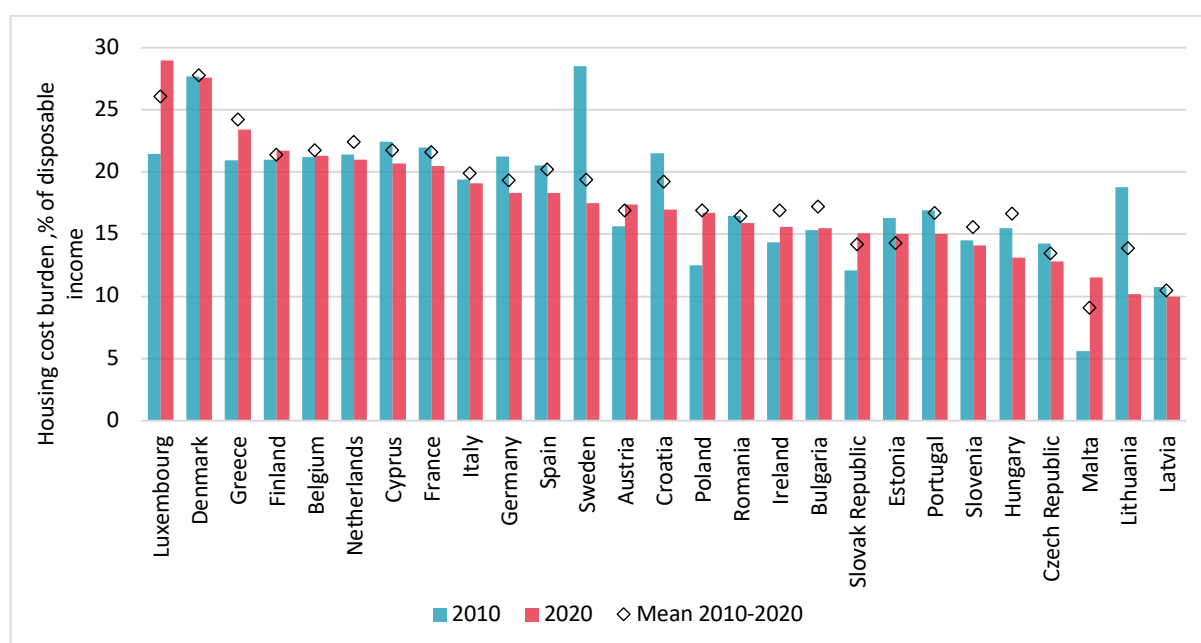
Data: EU-SILC survey, Eurostat

AVAILABILITY. The results of the cluster analysis (authors' calculations)

COUNTRY	OVERCROWDING RATE, % (MEAN 2010-2021)	AVG. AGE OF YOUNG PEOPLE LEAVING THE PARENTAL HOUSEHOLD (MEAN 2010-2021)	RESIDENTIAL CONSTRUCTIONS (MEAN 2010-2020, 2015=100)	NET MIGRATION (MEAN 2010-2021)	CLUSTER
Austria	14.19	25.39	92	42784	1
Bulgaria	43.41	29.33	153	1004	1
Croatia	40.73	31.2	222	-4284	1
Czechia	19.74	26.7	130	22168	1
Hungary	37.02	27.6	246	18631	1
Italy	26.41	29.89	292	253345	1
Poland	43.14	28.28	103	-20988	1
Romania	49.04	28.14	108	-52797	1
Slovakia	37.21	30.54	96	3663	1
Slovenia	18.68	29.12	179	6460	1
Sweden	13.76	19.65	79	58734	1
Belgium	3.78	25.29	114	43932	2
Estonia	20.05	23.96	112	393	2
France	8.34	23.64	116	79511	2
Germany	7.51	23.87	93	285961	2
Greece	27.54	28.93	820	-1330	2
Latvia	44.51	27.32	232	-12859	2
Lithuania	28.65	26.65	94	-21009	2
Malta	3.76	30.11	180	6514	2

Netherlands	3.16	23.54	120	46974	2
Portugal	11.13	29.03	393	5423	2
Spain	5.65	28.97	591	227018	2
Cyprus	2.56	26.88	337	6400	3
Denmark	8.28	21.12	102	12390	3
Finland	6.69	21.97	109	14108	3
Ireland	3.32	26.12	326	21078	3
Luxembourg	7.41	25.12	112	8502	3

Data: Eurostat and EU-SILC survey



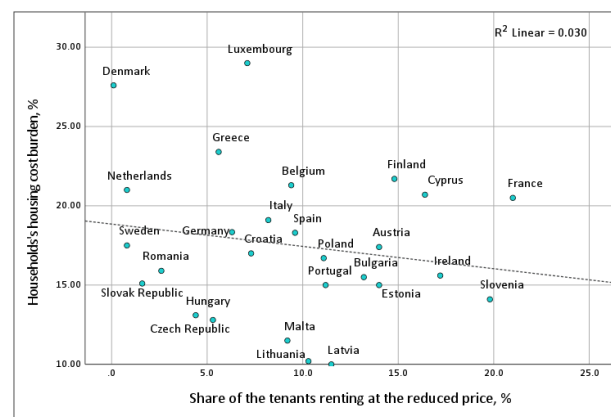
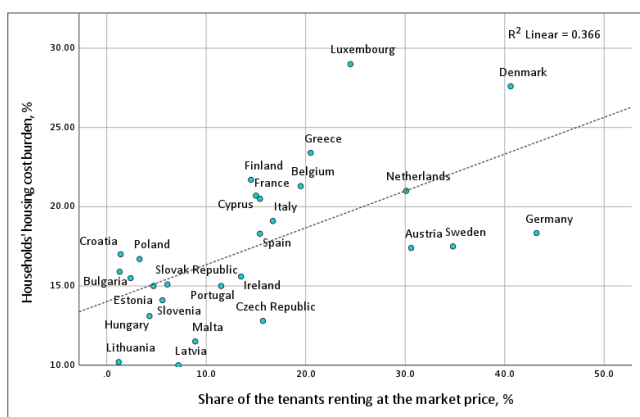
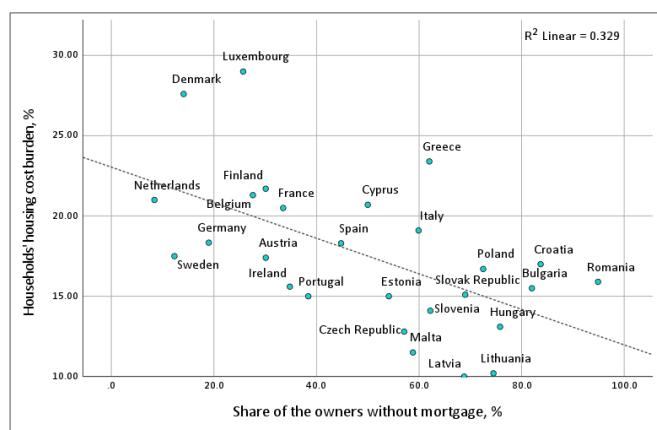
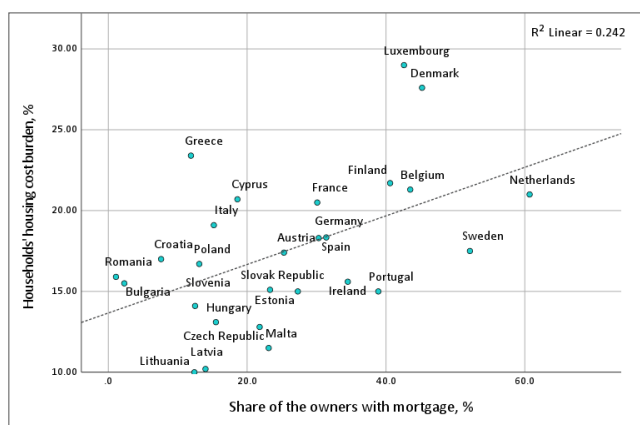
Households' housing cost burden (mortgage and rent cost) as a share of disposable income in 2010 and 2020. Note: some data from 2010 was missing, so we used the closest available data to that year.

Data: Eurostat

Person correlations between households' housing cost burden and tenure type, in 2020 (N=27)

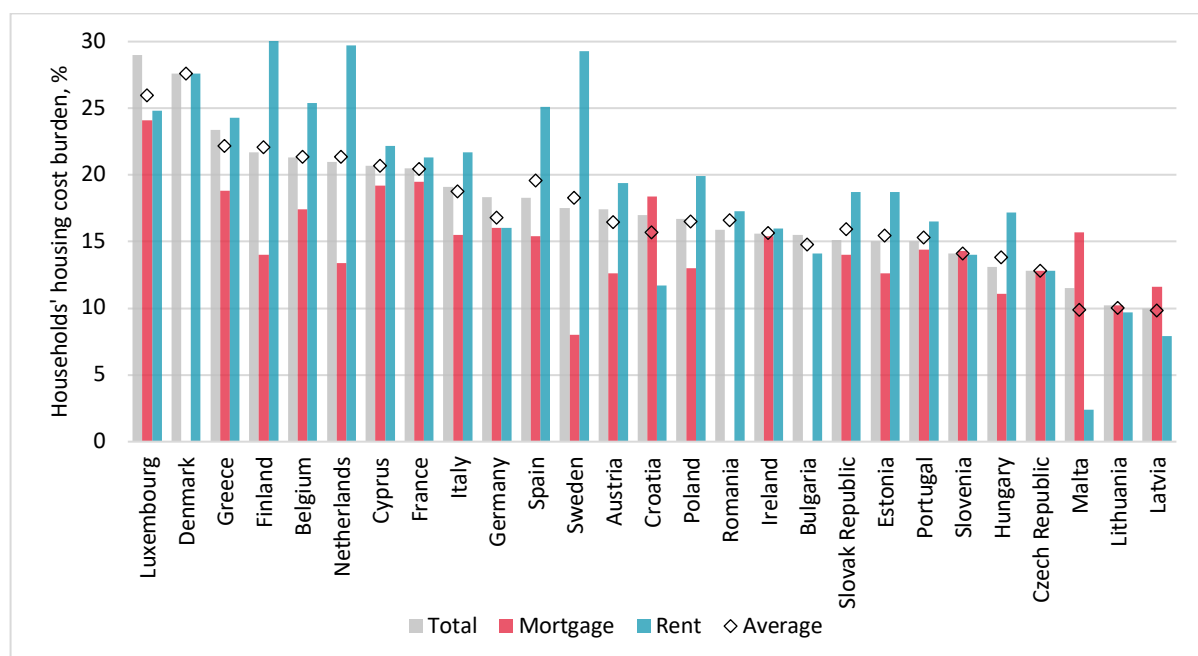
	OWNER	OWNER WITH MORTGAGE	OWNER NO MORTGAGE	TENANT	TENANT MARKET	TENANT REDUCED
Households' housing cost burden	-.547	.492	-.574	.548	.605	-.174
Sig. (2-tailed)	.003	.009	.002	.003	.001	.384

Data: OECD and Eurostat



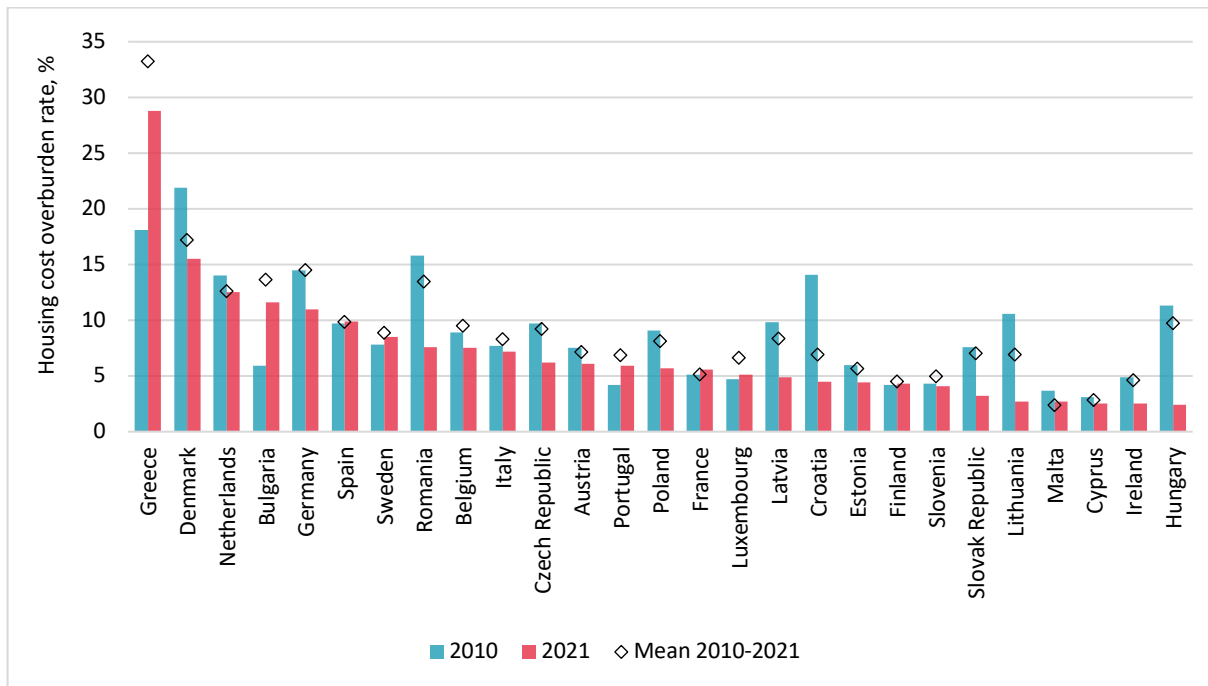
The relationships between households' housing cost burden and tenure type, in 2020

Data: OECD and Eurostat



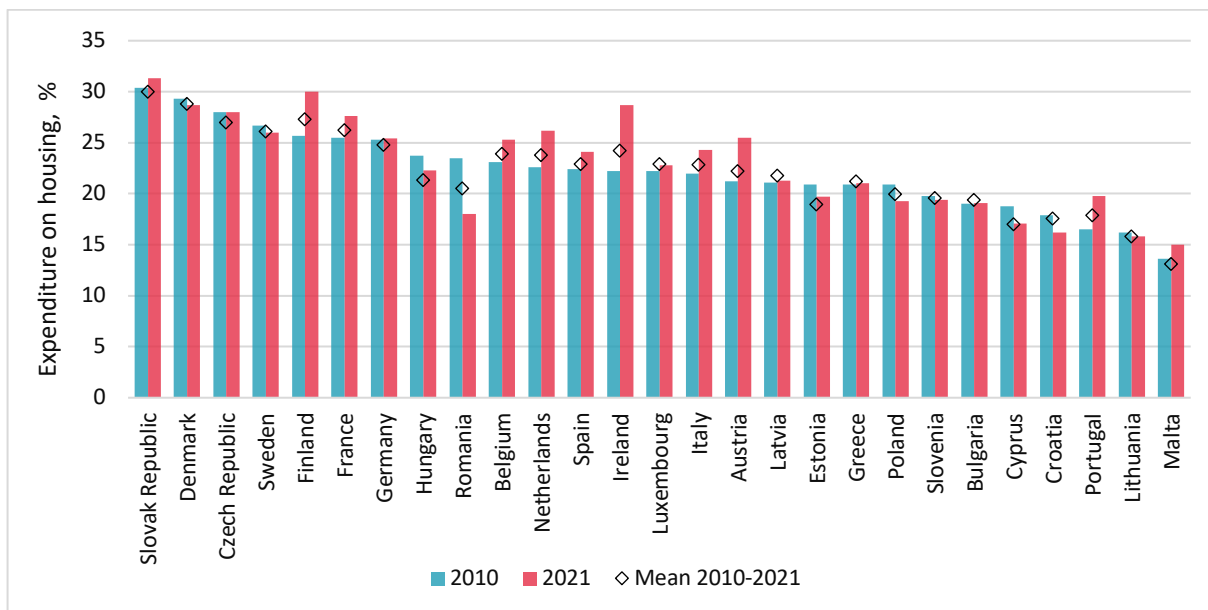
Households' housing cost burden; comparison between mortgage holders, renters and the total, in 2020

Data: Eurostat



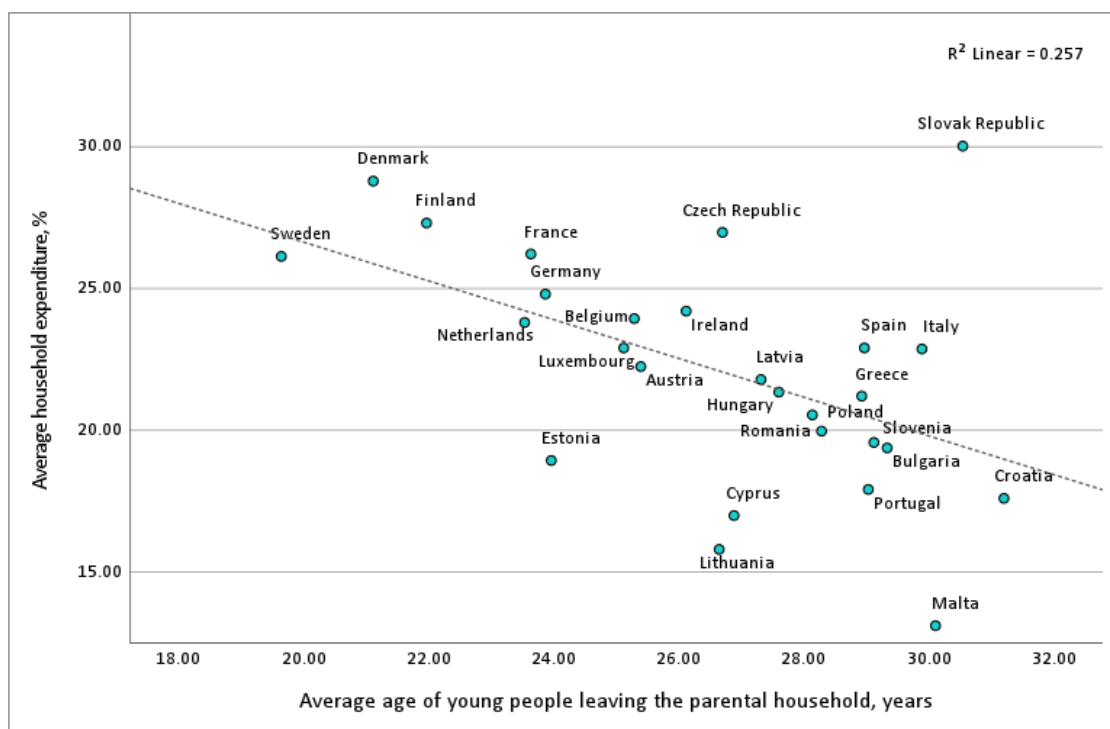
Housing cost overburden rate in 2010 and 2021

Data: Eurostat data



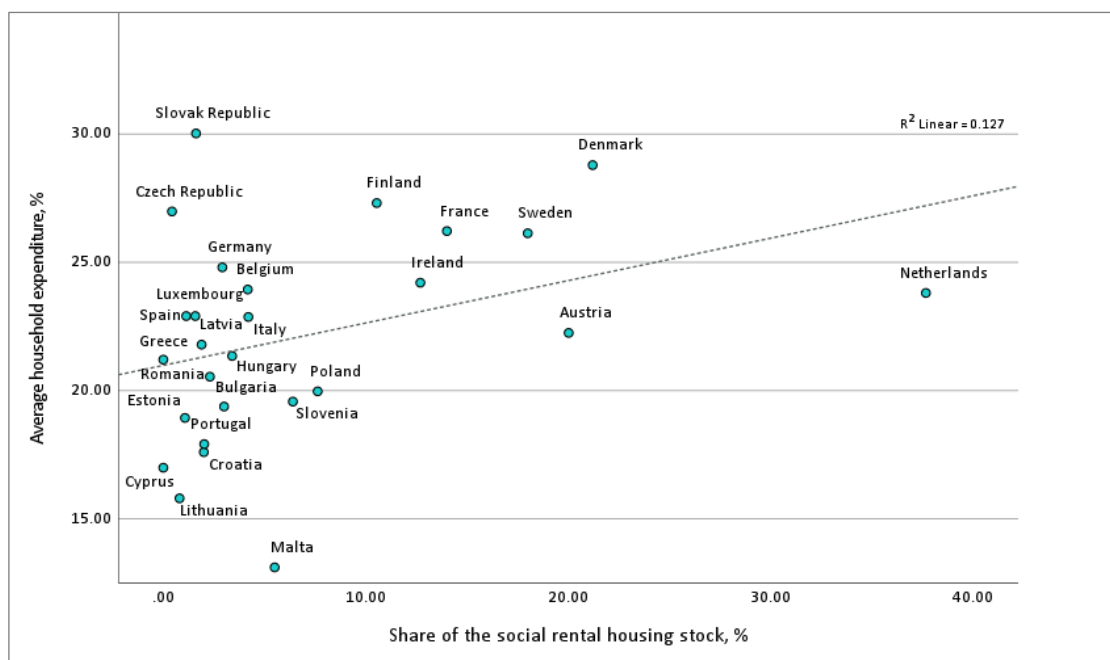
Household expenditure on housing, water, electricity, gas and other fuels, % of total household consumption expenditure in 2010 and 2021

Data: Eurostat



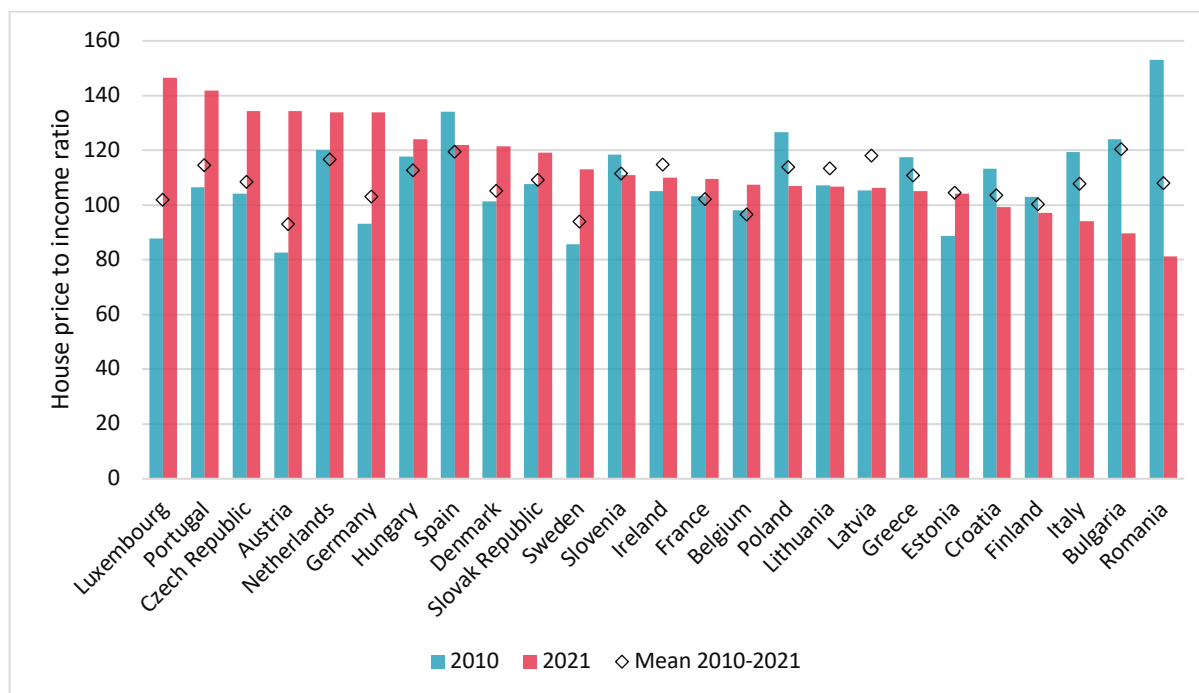
The relationship between the average household expenditure and the average age of young people leaving the parental household in 2021

Data: Eurostat



The relationship between the average household expenditure and the share of the social rental housing stock in 2021

Data: Eurostat and OECD



The house price to income ratio; 2015=100, annual rate of change

Note: no data for Cyprus and Malta

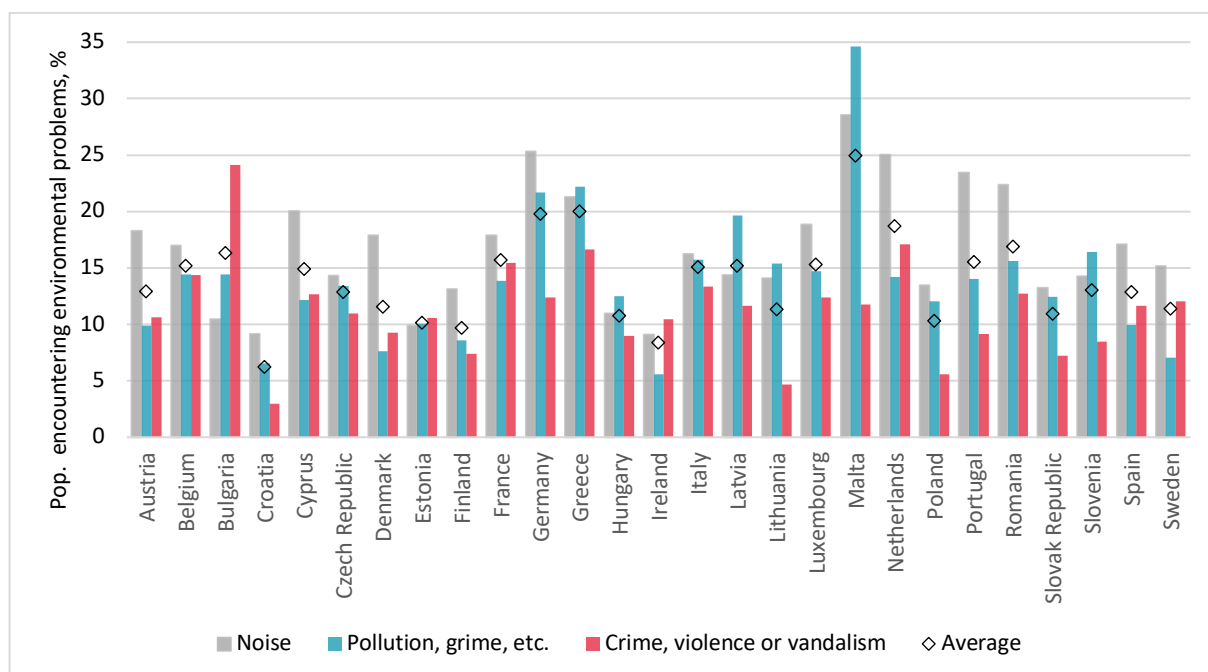
Data: OECD data

AFFORDABILITY. The results of the cluster analysis (authors' calculations)

	HOUSING COST BURDEN (MEAN 2010-2021)	OVERBURDEN RATE (MEAN 2010-2021)	EXPENDITURE ON HOUSING, WATER, ETC. (MEAN 2010-2021)	HOUSE PRICE TO INCOME RATIO (MEAN 2010-2021)	CLUSTER
Croatia	17.6	6.9	19.2	103.4	1
Estonia	18.9	5.6	14.3	104.5	1
Ireland	24.2	4.6	17.0	114.6	1
Latvia	21.8	8.3	10.5	117.9	1
Lithuania	15.8	6.9	13.9	113.2	1
Poland	20.0	8.1	16.9	113.7	1
Portugal	17.9	6.8	16.7	114.4	1
Slovenia	19.6	5.0	15.6	111.5	1
Austria	22.3	7.1	17.0	93.0	2
Belgium	23.9	9.5	21.8	96.5	2
Bulgaria	19.4	13.6	17.2	120.4	2
Czechia	27.0	9.2	13.5	108.5	2
Finland	27.3	4.5	21.4	100.1	2
France	26.2	5.1	21.6	102.0	2
Hungary	21.4	9.7	16.7	112.6	2
Italy	22.9	8.3	19.9	107.8	2
Luxembourg	22.9	6.6	26.1	101.9	2

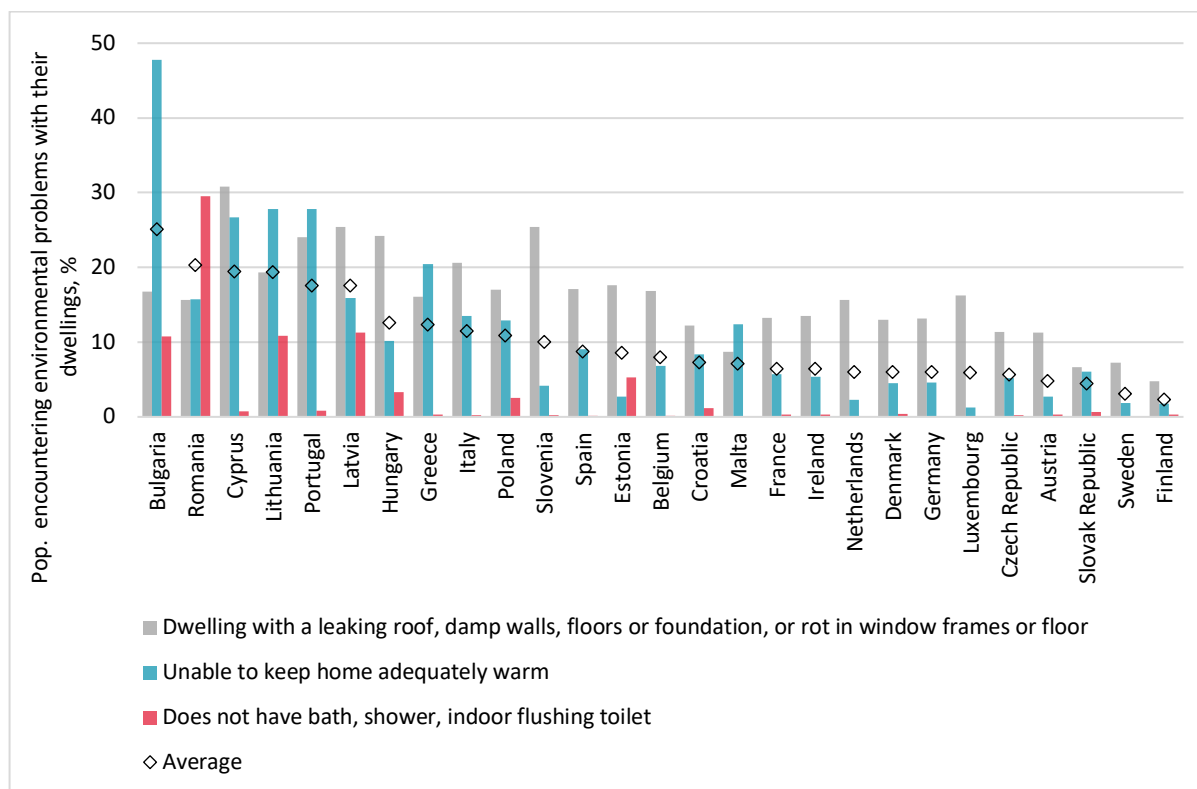
Romania	20.5	13.5	16.5	107.8	2
Slovakia	30.0	7.0	14.2	109.1	2
Spain	22.9	9.8	20.2	119.4	2
Denmark	28.8	17.2	27.8	105.1	3
Germany	24.8	14.5	19.3	103.0	3
Greece	21.2	33.2	24.2	110.8	3
Netherlands	23.8	12.6	22.4	116.6	3
Sweden	26.1	8.9	19.4	93.8	3
Cyprus	17.0	2.8	21.8	-	-
Malta	13.1	2.4	9.1	-	-

Data: OECD and Eurostat



Share of population encountering environmental problems in/around their dwelling, mean values for the period 2010-2021

Data: Eurostat



Share of population encountering problems with their dwellings, 2019

Data: Eurostat data

ADEQUACY. The results of the cluster analysis (authors' calculations)

	NOISE	POLLUTION, GRIME	CRIME, VIOLENCE, VANDALISM	CLUSTER
Bulgaria	10.44	14.41	24.13	1
Cyprus	20.03	12.17	12.67	1
Austria	18.28	9.87	10.63	1
Czech Rep.	14.33	13.38	10.99	1
Denmark	17.89	7.63	9.29	1
Sweden	15.19	7.06	12.06	1
Slovak Rep.	13.24	12.44	7.23	1
Hungary	10.98	12.48	8.98	1
Estonia	9.88	10.04	10.58	1
Finland	13.11	8.59	7.42	1
Ireland	9.11	5.59	10.48	1
Croatia	9.17	6.55	2.98	1
Germany	25.31	21.66	12.41	2
Romania	22.38	15.6	12.73	2
Portugal	23.47	14.02	9.15	2
Luxembourg	18.85	14.69	12.38	2

	LEAKING ROOF, ETC	NOT ADEQUATELY WARM	DOES NOT HAVE BATH, TOILET	CLUSTERS
Austria	11.24	2.71	0.31	1
Croatia	12.26	8.35	1.15	1
Czech Rep.	11.34	5.17	0.24	1
Denmark	12.95	4.55	0.41	1
Estonia	17.6	2.73	5.26	1
Finland	4.78	1.78	0.33	1
France	13.26	5.67	0.32	1
Germany	13.2	4.62	0.03	1
Ireland	13.47	5.35	0.33	1
Luxembourg	16.22	1.28	0.08	1
Malta	8.68	12.42	0.03	1
Netherlands	15.66	2.32	0.02	1
Slovak Rep.	6.61	6.03	0.65	1
Sweden	7.27	1.82	0	1
Belgium	16.88	6.85	0.18	2
Greece	16.11	20.45	0.35	2

Belgium	16.97	14.41	14.35	2
Latvia	14.39	19.64	11.66	2
Italy	16.26	15.74	13.35	2
Slovenia	14.28	16.39	8.45	2
Lithuania	14.08	15.4	4.67	2
Poland	13.48	12.03	5.56	2
Malta	28.56	34.63	11.76	3
Greece	21.31	22.18	16.62	3
Netherlands	25.03	14.18	17.07	3
France	17.91	13.84	15.42	3
Spain	17.1	9.92	11.64	3

Hungary	24.23	10.16	3.32	2
Italy	20.64	13.48	0.23	2
Poland	17.05	12.91	2.52	2
Slovenia	25.41	4.18	0.26	2
Spain	17.08	9.04	0.13	2
Bulgaria	16.75	47.74	10.78	3
Cyprus	30.84	26.72	0.74	3
Latvia	25.41	15.89	11.28	3
Lithuania	19.29	27.78	10.84	3
Portugal	24.01	27.81	0.82	3
Romania	15.64	15.69	29.49	3