



JRC Scientific Information Systems and Databases Report

Housing Taxation Database (v4.0) Technical Annex

JRC.B.2-Housing Team

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Housing Taxation Database (v4.0)

Technical Annex

Updated: April 2023

Given the complexity of the exercise, the housing taxation database may potentially contain errors. If you happen to spot one, please let us know: JRC_B2_HOUSING@ec.europa.eu. Your comments and suggestions are also very welcome.

Any use of the Housing database should refer to the following papers as source of the data:
Barrios S., Denis C., Ivaškaitė-Tamošiūnė V., Reut A. and Vázquez Torres E. (2019), *Housing taxation: a new database for Europe*, JRC Working Papers on Taxation and Structural Reforms No 08/2019, European Commission, Joint Research Centre, Seville.
Thiemann, A., K. Grünberger, and B. Palma (2022), *Note on the revision of the user cost of housing indicator (UCOH)*, European Commission, Joint Research Centre, JRC129394.

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April 2023



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Introduction

The housing taxation database provides comparable time series on the main features of **housing taxation in EU countries**¹. The tax parameters covered include *transfer tax*, *capital gains tax*, information on *imputed rent taxation* and *mortgage interest tax relief* and *implicit recurrent property tax*.

The data covers the period **1995-2021**. We use it to estimate the **user cost of owner occupied housing (UCOH)** following the approach proposed by Poterba (1992) and Poterba and Sinai (2008). This provides a synthetic indicator for the distortions that the tax system causes to households' housing investment choices. We also provide additional data used to calculate the UCOH indicator, such as the *maximum loan-to-value (LTV) ratio* and *maximum loan duration*, *interest rates for long-term government bonds*, *mortgage interest rates*, *interest income tax* and *house prices*.

This Technical Annex consists of the following:

- Section 1 provides a general description of the housing taxation database indicators and related assumptions;
- Section 2 presents the new estimation methodology for the UCOH indicator;
- Two appendices with country-specific information.

¹ UK data are available in a previous version of the [Housing taxation database 1995-2019 v2.0](#) covering years 1995-2019.

1. Housing taxation database – indicators

Table 1 provides an **overview of the indicators** available in the database. National experts provided most of the historical information on the housing-related tax parameters such as transfer tax, capital gains tax, mortgage interest tax relief and imputed rent taxation. In addition, we collected information from international databases or publications on the LTV ratio, average loan duration, interest rates for long-term government bonds, mortgage interest rates (new business), consumer price index (CPI), net dwelling stock and tax revenues from the recurrent property tax collected from households. For countries with missing data points, we made imputations (see Appendix 1 for an explanation). Time series on nominal house prices come from the HouseLev dataset (Bricongne, Turrini and Pontuch, 2019).

Table 1. Housing taxation database – indicators

Indicator	Unit
Existence of mortgage interest tax relief	"Y" if yes
Limit for mortgage interest tax relief	Euro
Maximum rate for mortgage interest tax relief	Rate (between 0 and 1)
Marginal personal income tax rate (applied to mortgage interest tax relief if maximum rate is not specified)	Rate (between 0 and 1)
Loan to value ratio (maximum)	Rate (between 0 and 1)
Duration (maturity) of mortgage loan (maximum)	Years
Interest rate for long-term government bonds	Rate (between 0 and 1)
Mortgage interest rates (new business)	Rate (between 0 and 1)
Tax rate on transfer of property (minimum)	Rate (between 0 and 1)
Existence of imputed rent taxation	"Y" if yes
Existence of recurrent property tax on dwellings	"Y" if yes
Revenues from recurrent property tax	Millions of current national currency
Net stock of dwellings	Millions of current national currency
Implicit property tax rate	Rate (between 0 and 1)
Average size of property in 2012	Square metres
House price per square metre	Euro
House price	Euro
Capital gains tax on selling property (minimum)	Rate (between 0 and 1)
Tax rate on interest income	Rate (between 0 and 1)
Harmonised consumer price index	Rate (between 0 and 1)
Maintenance costs (m), beta (b) and economic depreciation (depr)	Rate (between 0 and 1)
User cost of housing indicator	Rate (between 0 and 1)

The descriptions below provide a general overview of each indicator. For country-specific information and assumptions made for different years, please consult the tables in *Appendix 1* and *Appendix 2* for the data sources.

1.1. Tax parameters

The information on *mortgage interest tax relief (MITR) rules* and *personal income tax (PIT) rates* comes from national experts (up to 2017), the International Bureau of Fiscal Documentation (IBFD) database² and from EUROMOD country reports³. Where several PIT rates were applicable, the top rate was used. For the countries that apply ceilings to mortgage interest deduction, we converted values expressed in national currencies into euro using AMECO currency exchange rates⁴ (as the house value is also expressed in euro). In some cases, we had to calculate the personal income tax liability. For this, we used a single person earning 167% of the gross average wage⁵.

Together with the information on tax rules, the calculation of mortgage interest tax relief includes a number of assumptions, which are explained in detail below:

*Loan = House price * LTV ratio*

Constant payment amount per period (A) (A = principal + interest):

$$A = P \frac{r(1+r)^n}{(1+r)^n - 1}$$

where A is the constant payment amount per period (capital and interest), P is the loan, r is the interest rate, and n is the total number of payments per period (i.e. n = 12 * loan duration = x payments)

*Monthly interest payment = [A * 12 * loan duration – loan] / (12 * loan duration)*

*Annual interest payment = Monthly interest payment * 12*

Mortgage finance variables such as the *LTV ratio* and *loan maturity* are taken from various sources as there is no comprehensive database covering all the countries and years of interest. Information collected from the European Systemic Risk Board reports is complemented by other sources⁶. The focus is on the maximum LTV limits and loan duration (where this information is available) – the assumption being that an individual interested in purchasing a dwelling would like to benefit from the biggest loan and longest loan duration possible.

We collected *interest rates for long-term government bonds* from Eurostat (EMU convergence criterion bond yields). Ideally, we should have used the information on the interest rates of long-term mortgages. However, due to data limitations (mainly due to limited geographical coverage), the 10-year government bond yield rates are used instead. The time series for Group I⁷ countries start in

² <https://www.ibfd.org/>

³ <https://euromod-web.jrc.ec.europa.eu/using-euromod/country-reports>

⁴ European Commission, Economic and Financial Affairs, AMECO:
http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

⁵ The assumption is that higher income individuals are more likely to take a loan or mortgage, so the calculated MITR would also be higher for that level of wages.

⁶ For historical information for some countries: Lunde J. and Whitehead C. (Eds.), 2016, 'Milestones in European Housing Financing', UK: Wiley Blackwell.

⁷ We distinguish between Group I and Group II countries. Group I countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and Sweden. The UCOH indicator is calculated for 1996-2021 (with the exception of the Netherlands and Belgium, for which

1995 and for Group II countries in 2001. For the missing data points, we used the average for the remaining Group II countries. The average rates for the Group II countries are constantly slightly higher than for Group I countries.

Mortgage interest rates were collected from the European Central Bank (ECB) database.⁸ We used loans to households for house purchase (new business) for 2000-2021. For the missing points (1995-2017) we applied a hierarchical backcasting following Zeugner (2021), which is based on data availability for loans to households for house purchase with different interest rate fixation (IRF) periods (new business).

National experts **provided transfer tax rates** (up to 2017) and later we collected this information from the IBFD database (from 2018). We used the most favourable transfer tax rate that applies to a homeowner of a main residence. When a progressive tax schedule is applied, the effective tax rate is calculated based on the house value. It is important to mention that some countries have a transfer tax, while others have a stamp duty, or both. Most, if not all, countries also have a registration tax, whose relative importance varies from country to country. The housing taxation database only records one tax rate – a transfer tax or a stamp duty (if there is no transfer tax). This is clearly a limitation, as in some cases the stamp duty or the registration tax can be as important as the transfer tax (e.g. in Bulgaria) or even more important than the transfer tax (e.g. in Malta)⁹.

National experts (up to 2017) and EUROMOD country reports (from 2018) provided the rules on **imputed rent taxation**.

Recurrent property tax is one of tax policy-related parameters that, because of the heterogeneity and complexity of the tax rules and numerous exceptions, is not taken from the tax code, but is a proxy calculated on the external aggregated data.

t_p is the implicit recurrent property tax rate

$$t_p = \frac{\text{revenues from property taxes}_{\text{households}}}{\text{net stock of dwellings}_{\text{households}}}$$

For the denominator, we use information on the **net stock of dwellings in the household sector** from the Eurostat database with the exception of Ireland, where this information is taken from the first and second waves of the Household Finance and Consumption Survey (HFCS)¹⁰ for 2013-2017.

UCOH starts in 1997 and 2005 respectively). Group II countries: Bulgaria, Croatia, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia. For Group II countries, data is available between 2001 and 2021.

⁸ <https://sdw.ecb.europa.eu/>.

⁹ For completeness, all substantial taxes paid when purchasing a property should be included under the 'transfer tax' label. The database currently lacks historical information on a stamp duty if it co-exists with a transfer tax.

¹⁰ We validated net dwelling stock (from households) estimates coming from the HFCS using Eurostat's data for the countries available in both databases. For both waves, the HFCS estimates were constantly higher than the ones from Eurostat. We therefore applied the correction coefficient 0.6 (which is the average difference between two datasets) to bring HFCS net dwelling values for Ireland closer to Eurostat's estimates. As the survey only had two waves, the net dwelling stock had to be updated for other years using the house price yearly change information calculated using the house price index (HPI).

Ideally, the numerator and denominator should cover only households¹¹. For the nominator, we use *revenues from recurrent taxes on immovable property collected from households*. This information is available in the OECD database, but not for all EU countries. For Denmark, Ireland and Portugal, national sources were used until 2016 (until 2021 for Ireland). For the remaining countries that had the recurrent property tax in place, we adjusted the information on the taxes collected for the whole economy from Eurostat using the share of taxes paid by households over total taxes¹².

National experts provided the *capital gains tax rates* on selling the main residential property (up to 2017) and later information was collected from the IBFD database (since 2018). The minimum capital gains tax rate is used as it is assumed that the owner occupied property was sold after the required legal period of time and/or money was later reinvested in a new property. When this allowance is applied, the effective tax rate is calculated based on the house value.

National experts provided the *interest income tax rates* (up to 2017) and later information was collected from the IBFD database (since 2018). When interest income is subject to a progressive schedule, the top rate is used. Where possible, we validated the information received from the experts with the information from the ZEW Institute in Germany (<https://www.zew.de/>)¹³.

1.2. Non-tax parameters

Nominal *house prices* differ considerably across Member States. Until very recently, there were no comprehensive time series on the house price levels for EU countries. In 2019, the ‘Houselev’ dataset was published (Bricongne J. C, A. Turrini and P. Pontuch, 2019). The database is further updated in the *ECFIN B1 House Price Database*¹⁴. This provides the time series for house price estimates per square metre, which we use in our calculations.

To calculate the house price per typical size dwelling, we used information from the Eurostat database on the *average dwelling size* bought with a loan or mortgage. As the information is available only for 2012, we assume that the dwelling size remains the same throughout the years. Exception are Malta, for which data comes from the second wave of the Household Financial and Consumption Survey, and Luxembourg, for which we use data from the Statistics Portal of Luxembourg. The house price is mainly used to calculate mortgage interest tax relief. In some cases,

¹¹ However, the revenues from the recurrent property taxes reported in the Eurostat database cover not only households. Given that the share of taxes collected from households and other entities vary across countries, this leads to an overestimation of the property tax rate for all countries – more so for countries where the actual share of taxes collected from households is very small. We therefore had to disregard this option even though it covers all countries of interest.

¹² The assumption about these shares was drawn from the OECD for the countries providing information both on the property taxes collected from the whole economy and only from households. The share of recurrent property taxes collected from households among the total taxes on property is 0.5 (1995-2004) and 0.6 (2005-2021) for the Group I countries and 0.3 (2001-2021) for the Group II countries. For Denmark and Portugal, country-specific coefficients (0.5 and 0.6 respectively) were used only to update to 2017-2021. As the shares remained stable across the years, these ratios were used to get a proxy of the recurrent property taxes paid by households for the countries where this information was missing from the OECD database.

¹³ See Spengel, C., D. Endres, K. Finke and J. Heckemeyer (2014), *Effective Tax Levels Using the Devereux/Griffith Methodology*. Final Report 2014 Project for the EU Commission TAXUD/2013/CC/120, pp. A-25 – A-28.

¹⁴ See <https://s-ecfin-web.net1.cec.eu.int/directorates/db/u1/data/housing/hp.html>.

it is also used to derive the effective tax rate (e.g. a transfer tax rate when a progressive schedule is used or when there is a constant component and a rate; imputed rent taxation).

The *harmonised consumer price index* is a country-specific indicator taken from the Eurostat database. The time series on the yearly change is available from 1996 for most EU Member States, except the Netherlands, where the index starts from 1997. It is sometimes used to update other indicators to align it with the year of interest (e.g. 2019 tax revenues from recurrent property tax for Poland).

Other parameters: In line with previous work by Poterba and Sinai (2008), we assume that the *maintenance cost (m)* is 0.015, the *pre-tax risk premium (β)* is 0.02 and the *economic depreciation rate (δ)* is 0.01 for all years and for all countries.

2. UCOH indicator – estimation methodology

The housing taxation database provides relevant information for the analysis of the distortionary effect of tax systems on housing ownership. The UCOH indicator we used in version v2.0 of the database relied on the UCOH indicator developed by Poterba (1992) and Poterba and Sinai (2008). A detailed description of the methodology followed in the previous version, and its intuition can be found in Barrios et al. (2019). Starting with version v3.0 the methodology was revised (Thiemann et al, 2022).

As home ownership is an investment decision, the theoretical framework assumes an equilibrium relationship between the homeowner’s return on housing investment and returns on other assets. This requires the marginal value of imputed rental income accruing to homeowners to be equal to the marginal user cost of purchasing additional housing capital. The following expression takes into account the specific tax rules that apply to owner occupied housing in order to calculate the UCOH indicator. This concerns recurrent property taxes, taxes on the flow of services from ownership (imputed rents), tax relief on debt-financed housing, transfer taxes on house sales and capital gains taxes. Also, and in order to allow for more flexibility and a more realistic representation of housing financing, it introduces a separate interest rate, being applied to new mortgages which is different from the interest rate for forgone capital income of alternative investments¹⁵. In particular, we follow the literature (Fatica and Prammer (2018); Himmelberg et al. (2005)) and model the UCOH indicator, taking into account these two different interest rates:

$$UCOH = [(1 - \{t_M \phi \lambda + t_y(1 - \lambda)\})i - t_M \phi \lambda(j - i) + t_p + \beta(1 - t_y) + m + \delta - \pi(1 - t_{cappain})](1 + t_{trans}) + t_{ir}$$

¹⁵ Differences between the current approach, which includes an interest rate differential, and the UCOH definition used up to version v2.0, can be found in Thiemann, A., K. Grünberger, and B. Palma (2022), “*Note on the revision of the user cost of housing indicator (UCOH)*”, European Commission, Joint Research Centre, JRC129394: https://joint-research-centre.ec.europa.eu/system/files/2022-05/Note_UCOH_May_2022.pdf.

Whereas:

i is the interest rate for foregone revenue on equity investment;

j represents the interest rate paid on the mortgage;

φ is the fraction of debt benefitting from mortgage interest tax relief;

t_M is the rate at which the tax relief on mortgage is granted;

λ denotes the maximum LTV ratio to reflect the requirement for a down payment;

t_p is the recurrent property tax rate;

β is the pre-tax risk premium term to reflect the different risk for housing relative to other (risk-free) assets;

t_y is the tax rate on interest income, i.e. the tax on risk-free saving investments;

m is the estimated annual maintenance cost;

δ is the economic depreciation rate;

$\pi(1 - t_{\text{cappgain}})$ is the after-tax revaluation term, with the tax rate on the capital gains $t_{\text{cappgains}}$ and π -consumer price index;

The fraction of the house purchase that is equity financed is $(1-\lambda)$ foregoes earned interest at the unit yield of i , which is taxed at a rate t_y ;

t_{trans} is the minimum statutory transfer tax rate;

t_{ir} is the tax on imputed rent.

The user cost of housing is a relatively simple measure of the size of the preferential tax treatment of owner occupied housing. This normalised measure estimates the annual tax-adjusted cost of owning and operating the main residence per additional euro invested in housing capital. Based on this methodological framework and using assumptions detailed in Sections 1 and 2, the UCOH indicator can be calculated for all EU countries from 2005 to 2021, and for almost half of them during the entire 1996-2021 period. Due to data limitations, the UCOH indicator has been calculated since 2001 for 13 countries, namely Bulgaria, Czechia, Estonia, Croatia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Romania, Slovenia and Slovakia, since 2005 for Belgium, and since 1997 for the Netherlands.

References

Andrews, D. (2010), “Real House Prices in OECD Countries: the Role of Demand Shocks and Structural and Policy Factors”, OECD: Economics Department Working Paper No. 831, ECO/WKP(2010)87.

Barrios S., Denis C., Ivaškaitė-Tamošiūnė V., Reut A. and Vázquez Torres E. (2019), “Housing taxation: a new database for Europe”, JRC Working Papers on Taxation and Structural Reforms No 08/2019, European Commission, Joint Research Centre, Seville.

Bricongne J.C., A. Turrini and P. Pontuch (2019), “Assessing house prices: insights from HouseLev, a new dataset of prices in levels”, European Economy Discussion paper 101, Directorate General for Economic and Financial Affairs, European Commission.

Cirman, A. and R. Sendi (2016), “Housing Market in Slovenia: From a National Housing Fund to a Bank-Driven System”, Milestones in European Housing Financing, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 341-357.

Elsinga, M., H. Priemus and P. Boelhouwer (2016), “Milestones in Housing Finance in the Netherlands, 1998-2013”, Milestones in European Housing Financing, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, p. 255-272.

Englund, P. (2016), “Milestones in Swedish Housing Finance”, Milestones in European Housing Financing, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 375-391.

European Central Bank (2009), “Housing Finance in the Euro Area”, Structural Issues Report, March 2009, p. 27.

European Commission (2014), “Tax Reforms in EU Member States”, 2014 European Economy 6|2014, Directorate General for Economic and Financial Affairs, European Commission.

European Systemic Risk Board (2014), “The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector”, ESRB Report, March 2014.

European Systemic Risk Board (2015), “Report on residential real estate and financial stability in the EU”, ESRB Report.

European Systemic Risk Board (2016), “Vulnerabilities in the EU residential real estate sector”, ESRB Report, November 2016.

European Systemic Risk Board (2018), “National measures of macroprudential interest in the EU/EEA”, ESRB Excel spreadsheet, 9 February 2018.

Fatica, S. and D. Prammer (2018), “Housing and the tax system: how large are the distortions in the euro area?”, *Fiscal Studies* 39 (2), 299–342.

Hegedus, J. and E. Somogyi (2016), “Moving from an Authoritarian State System to an Authoritarian Market System: Housing Financing Milestones in Hungary between 1979 and 2014”, *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 201-218.

Himmelberg, C., C. Mayer, and T. Sinai (2005), “Assessing high house prices: Bubbles, fundamentals and misperceptions”, *Journal of Economic Perspectives* 19 (4), 67–92.

European Mortgage Federation (2019), *Hypostat 2019. A Review of Europe’s Mortgage and Housing Markets*.

European Mortgage Federation (2020), *Hypostat 2020. A Review of Europe’s Mortgage and Housing Markets*.

European Mortgage Federation (2021), *Hypostat 2021. A Review of Europe’s Mortgage and Housing Markets*.

Jácome, L. I. and M. Srobona (2015), “LTV and DTI Limits—Going Granular”, IMF Working Paper, WP/15/154. IMF, July 2015.

Kenna, P. (2016), “Milestones in 25 Years of Housing Finance since in Ireland”, *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 239-254.

Lunde J. and C. Whitehead (Eds.) (2016), “Milestones in European Housing Financing”, Wiley Blackwell.

Lunde, J. (2016), “Milestones in Danish Housing Finance since 1990”, *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, p. 109-126.

Mundt, A. and E. Springler (2016), “Milestones in Housing Finance in Austria over the Last 25 years”, *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 55-74.

OECD (2005), “Housing Finance Markets in Transition Economies: Trends and Challenges”, OECD Publishing.

Philippot, N., and A. Turrini (2017), "Assessing House Price Developments in the EU", Discussion Paper 048/2017, European Commission.

Poterba, J. and T. Sinai (2008), "Tax expenditures for owner-occupied housing: deductions for property taxation and mortgage interest and exclusion of imputed rental income", *American Economic Review*, Vol. 98, No. 2, pp. 84-89.

Poterba, J. M. (1992), "Poterba, James M., Taxation and Housing: Old Questions, New Answers", *American Economic Review*, 82(2), pp.84-89.

Spengel, C., D. Endres, K. Finke and J. Heckemeyer (2014), "Effective Tax Levels Using the Devereux/Griffith Methodology", Final Report 2014 Project for the EU Commission TAXUD/2013/CC/120, pp. A-25 – A-28.

Sunega, P. and M. Lux (2016) "Milestones in Housing Finance in the Czech Republic since 1990", *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 93-108.

Tahtinen, T and T. Laanti (2016), "Milestones in Housing Finance in Finland", *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 147-163.

Thiemann, A., K. Grünberger, and B. Palma (2022), "Note on the revision of the user cost of housing indicator (UCOH)", European Commission, Joint Research Centre, JRC129394.

Winters, S. and K. Van den Broeck (2016) "Milestones in 25 Years of Housing Finance in Belgium", *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp.75-92.

Xerez, R. and J. R. S. Fronseca (2016), "The Housing Finance System in Portugal since the 1980s", *Milestones in European Housing Financing*, eds. Lunde J. and Whitehead C., UK: Wiley Blackwell, pp. 309-324.

Zeugner, S. (2021), "Backcasting average mortgage interest rates in EU countries" (mimeo), ECFIN, European Commission.

Appendix 1. Country-specific information and assumptions used

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Table 2. Mortgage interest tax relief (MITR)

Country	Country-specific comments
For all countries	'N' – does not exist, 'Y' – mortgage interest can be deducted, N* – only individuals between 18 and 35 whose average monthly income is up to 1.3 times the average monthly salary may deduct 50% of the interest paid on mortgage during five years. When there are several tax rates applicable, the top rate is used. As the house value is expressed in EUR, the MITR ceilings (if applicable) are also converted into EUR using AMECO currency exchange rates ¹⁶ .
AT	'N' all years.
BE	'Y' all years. Since 2005, the maximum amount is used for the MITR ceiling (a standard deduction plus an increase applied during the first 10 years of the mortgage). Until 2005, the MITR rules were quite complex as there were 4 types of tax relief that an owner could cumulatively apply for: (a) the normal interest deduction, (b) the housing deduction: ordinary and additional, (c) the additional interest deduction, and (d) tax credit for capital redemption payments. The mortgage deduction was restricted to the eligible loan amount and depended on the household composition. Given the complexity of the rules in place, it has not been possible to calculate a ceiling for that period. Due to this restriction, the user cost of housing investment indicator for BE only covers the period from 2005 to 2021.
BG	'N' all years. Even though MITR has been in place since 2009, it affects only a very small share of households with a mortgage because of the requirements: you have to be under 35 years old and married, and the mortgage has to be for the family's only house during the tax year. According to the expert, some 5,500 families used MITR in 2015. It was therefore decided not to include it in the calculations.
CZ	'Y' since 1998. The ceiling for all the years when MITR was in place is CZK 300,000, with an exception for 2006 (from 1.1.2006 until 7.3.2006 it was CZK 150,000). As it was valid for only 2 months, the previous ceiling is applied.
DK	'Y' all years. The rate for the negative capital income is used: the highest marginal tax rate until 1999 and after that the lowest tax bracket rate (as per experts' explanations).
DE	'N' all years.
EE	'Y' since 1996. Since 2002, MITR has been limited to a ceiling, but not more than 50% of taxable income. The latter is calculated based on the 167% of gross average wage for single person assumption and later compared to the statutory limit. The latter is used as the calculated ceiling is lower than the statutory limit provided for all years until 2016. Since 2017, the ceiling has been provided only for MITR (excluding other expenses) and is lower than 50% of assumed taxable income.
IE	'Y' until 2010. The MITR ceiling for a single person, non-first time buyer is used. The top personal income tax (PIT) rate is used for 1995-1996.
EL	'Y' until 2012. A deduction until 2002 (the top PIT rate is used) and a credit since 2003. Since 1999, interest repayments have been exempted in full for housing units of up to 120 square metres; for housing units above the limit, the exemption/credit is calculated on a pro rata basis. Since 2004, tax relief has been provided for mortgages up to EUR 200,000 (EUR 350,000 in 2009). The assumption is that a property fully satisfies eligibility conditions.
ES	'Y' in 1998-2012.
FR	'Y' in 1995 and 2007-2011.
HR	'Y' in 2003-mid-2010. MITR was in place until July 2010. Half of the nominal amount for the MITR ceiling is therefore used for 2010.
IT	'Y' all years.
CY	'Y' until 2003.

¹⁶ European Commission, Economic and Financial Affairs, AMECO: 13 Monetary variables: 13.1 Exchange rates and purchasing power parities: ECU-EUR exchange rates (annual averages): National currency per EUR/ECU (XNE); Conversion rates between euro and former euro-zone national currencies.
http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm

Country	Country-specific comments
	The top PIT rate is used.
LV	'N' all years.
LT	'Y' in 2003-2008. MITR was limited to 25% of taxable income. The tax liability is calculated based on the 167% of gross average wage for a single person assumption and by applying existing PIT rules.
LU	'Y' all years. The top PIT rate is used. The ceiling differs depending on the years: we use the highest ceiling to deduct interest for the first 1-5 years (based on the assumption that the reduction is applied immediately, for the year of purchase).
HU	'Y' until 2006.
MT	'N' all years.
NL	'Y' all years. The top PIT rate is used.
PL	'Y' in 2002-2006. The MITR ceiling is calculated based on the assumption that the maximum deductible amount provided is the same as the loan taken and then by using the interest rates applicable for households taking loans for a house purchase (+5 years; yearly averages ¹⁷). Information on interest rates was missing for 2002 and 2003, therefore the same rate as for 2004 is used. The top PIT rate is used.
PT	'Y' until 2006. The top PIT rate is used.
RO	'N' all years.
SI	'Y' in 2005-2006. The MITR ceiling is 2% of the annual tax liability. The tax liability is calculated based on the 167% of gross average wage for a single person assumption and by applying existing PIT rules.
SK	'N' all years. N* also for 2018-2021, as only individuals between 18 and 35 whose average monthly income is up to 1.3 times the average monthly salary could deduct 50% of the interest paid on the mortgage during 5 years (capped at EUR 400 a month and from a maximum base of EUR 50,000 per property). As this condition (restricted by age and income) affects a relatively small share of the population, it is not considered as general MITR in the database.
FI	'Y' all years. Since 2012, only a share of mortgage interest can be deducted. Therefore an effective tax rate is calculated using the maximum tax rate and taking into account the share of the loan for which the deduction can be applied: - 2012: 0.85 - 2013: 0.8 - 2014: 0.75 - 2015: 0.65 - 2016: 0.55 - 2017: 0.45 - 2018: 0.35 - 2019: 0.25 - 2020: 0.15 - The deduction is reduced further to 5% in 2021 and 2022, and abolished in 2023.
SE	'Y' all years. The ceiling is SEK 100,000 for all years.

¹⁷ The National Bank of Poland: http://www.nbp.pl/en/statystyka/oproc/mir_new/stopy_proc_en_srdW.xlsx and http://www.nbp.pl/en/statystyka/oproc/mir_new/sw_oprocentowanie_n_2004_en.xls

Table 3. Loan to value (LTV) ratio

Country	Country-specific comments
For all countries	Information comes from the European Systemic Risk Board (ESRB) reports ¹⁸ (mainly for 2004, 2008, 2015 and 2019 for most countries, except CY, IE, LV, LT, MT, NL, PL, RO, SE, where more data points are available), European Central Bank (ECB) ¹⁹ , Organisation for Economic Co-operation and Development (OECD) ²⁰ , International Monetary Fund (IMF) ²¹ , European Mortgage Federation ²² or a designated ESRB excel spreadsheet ²³ (information since 2013 or 2015 in most of the cases). Therefore, either information is complemented by information from Lunde J. and Whitehead C. (Eds.), 2016, Milestones in European Housing Financing or, if unavailable, we assume that up until the new change, the LTV ratio is kept the same. The latest available LTV ratio is also used for the most recent years. Country-specific information is provided below.
BE	Information on the maximum LTV ratio for the years 1995-1999 and 2013 is taken from Lunde J. and Whitehead C. (2016). Winters S., Van den Broeck K., 2016, Milestones in 25 Years of Housing Finance in Belgium. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp.75-92.
BG	Information is missing. The median (for all countries) is used.
CZ	Information on the maximum LTV ratio for the years 1995-2007 (it is mentioned that the LTV ratio was later lowered) is taken from Lunde J. and Whitehead C. (2016). Sunega P., Lux M., 2016, Milestones in Housing Finance in the Czech Republic since 1990. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 93-108.
DK	Information on the LTV ratio for the years 1995-2003 and 2008-2014 is taken from Lunde J. and Whitehead C. (2016). Lunde J., 2016, Milestones in Danish Housing Finance since 1990. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 109-126.
DE	No country-specific comments.
EE	No country-specific comments.
IE	Information on the maximum LTV ratio for the years 2004-2007 and 2014 is taken from Lunde J. and Whitehead C. (2016). Kenna P., 2016, Milestones in 25 Years of Housing Finance since in Ireland. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 239-254.

¹⁸ ESRB, 2014, The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector, March 2014.

ESRB, 2015, Report on residential real estate and financial stability in the EU. December 2015, p. 28, pp. 33-34, p. 50.

ESRB, 2016, A Review of Macroprudential Policy in the EU in 2015. May 2016, p. 11.

ESRB, 2016, Vulnerabilities in the EU residential real estate sector. November 2016, p. 33.

¹⁹ ECB, 2009, [Housing Finance in the Euro Area](#). March 2009, p. 27.

²⁰ OECD, 2005, Housing Finance Markets in Transition Economies: Trends and Challenges.

Andrews Dan, 2010, Real House Prices in OECD Countries: the Role of Demand Shocks and Structural and Policy Factors, OECD: Economics Department Working Paper No. 831, ECO/WKP(2010)87, p. 29.

²¹ Jácome Luis I. and Mitra Srobona (IMF), 2015, LTV and DTI Limits—Going Granular. WP/15/154. IMF, July 2015 (for Poland and Romania).

²² European Mortgage Federation (2019, 2020, 2021).

²³ ESRB, Barbara Jeanne Attinger, 2019, National measures of macroprudential interest in the EU/EEA (excel spreadsheet), 22 January 2019.

ESRB, 2021, [National measures of macroprudential interest in the EU/EEA \(excel spreadsheet\)](#), 8 December 2021.

Country	Country-specific comments
EL	No country-specific comments.
ES	No country-specific comments.
FR	No country-specific comments.
HR	No country-specific comments.
IT	No country-specific comments.
CY	No country-specific comments.
LV	No country-specific comments.
LT	No country-specific comments.
LU	In 2020, LTV limit of 100% for first-time buyers acquiring their primary residence. ²⁴ For 2018, the following information was available: "The usual maximal LTV ratio amounts to 80%." ²⁵
HU	Information on the LTV ratio for the years 1995-1998 is taken from Lunde J. and Whitehead C. (2016). Hegedus J., Somogyi E., 2016, Moving from an Authoritarian State System to an Authoritarian Market System: Housing Financing Milestones in Hungary between 1979 and 2014. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 201-218.
MT	No country-specific comments.
NL	Information on the LTV ratio for the years 1997-2018 is taken from Lunde J. and Whitehead C. (2016). Elsinga M., Priemus H., Boelhouwer P., 2016, Milestones in Housing Finance in the Netherlands, 1998-2013. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 255-272.
AT	Information on the maximum LTV ratio for the years 1998-2003 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Mundt A., Springler E., 2016, Milestones in Housing Finance in Austria over the Last 25 years. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, p. 55-74.
PL	No country-specific comments.
PT	Information on the maximum LTV ratio for the year 2012 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Xerez R., Fronseca J. R. S., 2016, The Housing Finance System in Portugal since the 1980s. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 309-324.
RO	No country-specific comments.
SI	No country-specific comments.
SK	No country-specific comments.
FI	Information on the maximum LTV ratio for the years 1995 and 2009-2015 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Tahtinen T, Laanti T., 2016, Milestones in Housing Finance in Finland. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 147-163.
SE	Information on the maximum LTV ratio for the years 2009-2014 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Englund P., 2016, Milestones in Swedish Housing Finance. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 375-391.

²⁴ European Systemic Risk Board (ESRB), 2021, [National measures of macroprudential interest in the EU/EEA \(excel spreadsheet\)](#), 8 December, 2021.

²⁵ European Mortgage Federation, 2019, Hypostat 2019. A Review of Europe's Mortgage and Housing Markets.

Table 4. Maximum or typical loan duration/maturity (in years)

Country	Country-specific comments
For all countries	Information comes from the ESRB reports ²⁶ (mostly available only for a few years: 2002, 2004, 2007, 2008 and 2018), ECB ²⁷ , OECD ²⁸ , IMF ²⁹ , European Mortgage Federation ³⁰ or a designated ESRB excel spreadsheet ³¹ (information since 2013 or 2015 in most of the cases). Therefore, either information is complemented by qualitative information from Lunde J. and Whitehead C. (Eds.), 2016, “Milestones in European Housing Financing” or, if unavailable, we assume that up until the new change, the loan duration is kept the same. The latest available loan duration is also used for the most recent years. Country-specific information is provided below.
BE	Information on the loan duration for the years 1995-2006 and 2013 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Winters S., Van den Broeck K., 2016, Milestones in 25 Years of Housing Finance in Belgium. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp.75-92.
BG	Information is available only for 2018 (from the European Mortgage Federation); the same value was used for other years.
CZ	Information on the loan duration for the years 1995-2008 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Sunega P., Lux M., 2016, Milestones in Housing Finance in the Czech Republic since 1990. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 93-108.
DK	Information on the loan duration for the years 1995-2003 and 2009-2015 is taken from Lunde J. and Whitehead C. (Eds.), 2016. Lunde J., 2016, Milestones in Danish Housing Finance since 1990. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 109-126.
DE	No country-specific comments.
EE	No country-specific comments.
IE	No country-specific comments.
EL	No country-specific comments.
ES	No country-specific comments.
FR	No country-specific comments.
HR	Information is available only for 2018 (from the European Mortgage Federation); the same value was used for other years.
IT	No country-specific comments.
CY	No country-specific comments.
LV	No country-specific comments.

²⁶ ESRB, 2014, The ESRB Handbook on Operationalising Macro-prudential Policy in the Banking Sector, March 2014.

ESRB, 2015, Report on residential real estate and financial stability in the EU. December 2015, p.28, pp. 33-34, p. 50.

ESRB, 2016, Vulnerabilities in the EU residential real estate sector. November 2016, p. 33.

²⁷ ECB, 2009, [Housing Finance in the Euro Area](#). March 2009, p. 27.

²⁸ OECD, 2005, Housing Finance Markets in Transition Economies: Trends and Challenges.

Andrews Dan, 2010, Real House Prices in OECD Countries: the Role of Demand Shocks and Structural and Policy Factors, OECD: Economics Department Working Paper No. 831, ECO/WKP(2010)87, p. 29.

²⁹ Jácome Luis I. and Mitra Srobona (IMF), 2015, LTV and DTI Limits—Going Granular. WP/15/154. IMF, July 2015 (for Poland and Romania).

³⁰ European Mortgage Federation, 2019, Hypostat 2019. A Review of Europe’s Mortgage and Housing Markets.

³¹ ESRB, Barbara Jeanne Attinger, 2019, [National measures of macroprudential interest in the EU/EEA \(excel spreadsheet\)](#), 22 January 2019.

Country	Country-specific comments
LT	No country-specific comments.
LU	No country-specific comments.
HU	Information on the loan duration for the years 1995-1998 is taken from Lunde J. and Whitehead C. (2016). Hegedus J., Somogyi E., 2016, Moving from an Authoritarian State System to an Authoritarian Market System: Housing Financing Milestones in Hungary between 1979 and 2014. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 201-218.
MT	No country-specific comments.
NL	No country-specific comments.
AT	Information on the loan duration for the years 1995-2012 is taken from Lunde J. and Whitehead C. (2016). Mundt A., Springler E., 2016, Milestones in Housing Finance in Austria over the last 25 years. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 55-74.
PL	No country-specific comments.
PT	Information on the loan duration for the years 1999-2003 and 2008 is taken from Lunde J. and Whitehead C. (2016). Xerez R., Fronseca J. R. S., 2016, The Housing Finance System in Portugal since the 1980s. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 309-324.
RO	No country-specific comments.
SI	Information on the loan duration for the years 2000-2006 and 2009-2013 is taken from Lunde J. and Whitehead C. (2016). Cirman A., Sendi R., 2016, Housing Market in Slovenia: From a National Housing Fund to a Bank-Driven System. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 341-357.
SK	No country-specific comments.
FI	Information on the loan duration for the years 1995, 1999, 2008, 2014 is taken from Lunde J. and Whitehead C. (2016). Tahtinen T, Laanti T., 2016, Milestones in Housing Finance in Finland. In Milestones in European Housing Financing, eds. Lunde J. and Whitehead C. UK: Wiley Blackwell, pp. 147-163.
SE	No country-specific comments.

Table 5. Interest rates for long-term government bonds

Country	Country-specific comments
For all countries	From Eurostat: EMU convergence criterion series – annual data [irt_lt_mcby_a]. For the missing data points, the average of the remaining Group II countries* is used. The average rates for the Group II countries are constantly slightly higher than for the Group I countries.
BE	No country-specific comments.
BG	The missing rates for 2001 and 2002 were replaced by the average for the Group II countries.
CZ	No country-specific comments.
DK	No country-specific comments.
DE	No country-specific comments.
EE	Information is missing for years 1995-2019. ECB has released data only for the year of 2020 and later. For previous years, ECB indicated that there were no Estonian sovereign debt securities that could comply with the definition of long-term interest rates for convergence purposes and no suitable proxy indicator was identified. The average for the Group II countries is used for 2001-2019.
IE	No country-specific comments.
EL	No country-specific comments.
ES	No country-specific comments.
FR	No country-specific comments.
HR	The missing rates for 2001-2004 were replaced by the average for the Group II countries.
IT	No country-specific comments.
CY	No country-specific comments.
LV	No country-specific comments.
LT	No country-specific comments.
LU	No country-specific comments.
HU	No country-specific comments.
MT	No country-specific comments.
NL	No country-specific comments.
AT	No country-specific comments.
PL	No country-specific comments.
PT	No country-specific comments.
RO	The missing rates for 2001-2004 were replaced by the average for the Group II countries.
SI	The missing rate for 2001 was replaced by the average for the Group II countries.
SK	No country-specific comments.
FI	No country-specific comments.
SE	No country-specific comments.

* Group I countries: AT, BE, DK, FI, FR, DE, EL, IE, IT, LU, NL, PT, ES, and SE.
 Group II countries: BG, CZ, EE, HR, CY, LV, LT, HU, MT, PL, RO, SI and SK.

Table 6. Mortgage interest rates

Country	Country-specific comments
For all countries	From ECB: Loans to households for house purchase (new business) [MIR.M.*.B.A2C.A.B.A.2250.EUR.N] (2000-2021). For the missing points (1995-2017), a back casting ³² of loans to households for house purchase with different IRF periods (new business) [MIR.M*.B.A2C.*.R.A.2250.EUR.N] was used.
BE	No country-specific comments.
BG	No country-specific comments.
CZ	No country-specific comments.
DK	No country-specific comments.
DE	No country-specific comments.
EE	Information is missing for 1995-1996.
IE	No country-specific comments.
EL	No country-specific comments.
ES	No country-specific comments.
FR	No country-specific comments.
HR	Information is missing for 1995-2004.
IT	No country-specific comments.
CY	Information is missing for 1995-2000.
LV	Information is missing for 1995-1998.
LT	Information is missing for 1995-1999.
LU	No country-specific comments.
HU	No country-specific comments.
MT	Information is missing for 1995-2001.
NL	No country-specific comments.
AT	No country-specific comments.
PL	No country-specific comments.
PT	No country-specific comments.
RO	No country-specific comments.
SI	Information is missing for 1995-2002.
SK	Information is missing for 1995, 1997-1999.
FI	No country-specific comments.
SE	No country-specific comments.

³² From Zeugner, S. (2021): "Backcasting average mortgage interest rates in EU countries" (mimeo), ECFIN, European Commission.

Table 7. Transfer tax rates

Country	Country-specific comments
For all countries	The most favourable transfer tax rate for owner occupied dwellings is used. If a progressive tax schedule is applied, the effective tax rate is calculated based on the house value ³³ .
BE	No country-specific comments.
BG	Registration fees (around 0.1%) are not included here.
CZ	Transfer tax abolished from 2020.
DK	The tax rate is calculated by applying the tax rules on the average house value (as the transfer tax consists of a constant part and a rate).
DE	Since 2007, the weighted average of the rates of the different <i>Länder</i> is calculated. Registration fees (0.8-1.2%) and notary fees (1.2-1.5%) are not included here.
EE	The tax rate is calculated by applying the tax rules (specific fee) on the average house value. Notary fees are not included here.
IE	The tax rate is calculated by applying the tax rules on the average house value.
EL	No country-specific comments.
ES	The rates differ depending on the region, therefore the general tax of 6% is used, as established in Article 11 of the Real Decreto Legislativo 1/1993 (Royal Legislative Decree).
FR	Since 2018, the average indicated rate in the IBFD database is used, which is slightly different from the rates provided by the experts.
HR	No country-specific comments.
IT	The rate for the first dwelling is used.
CY	The tax rate is calculated by applying the tax rules on the average house value. A stamp duty (0.15-0.2%) is not included here.
LV	In 1995, there were two different statutory minimum tax rates. As the rate was changed in the middle of the year, the average rate is used.
LT	No country-specific comments.
LU	No country-specific comments.
HU	In 1995, there were two different statutory minimum tax rates. As the rate was changed in the middle of the year, the average rate is used. Since 2010 there have been two rates, depending on the house value. Only the main rate is used for dwellings below HUF 1 billion.
MT	A stamp duty (3.5-5%) is not included here.
NL	No country-specific comments.
AT	A stamp duty (0.8-2%) is not included here.
PL	No country-specific comments.
PT	The tax rate is calculated by applying the tax rules on the average house value. A stamp duty (0.8%) is not included here.
RO	The tax rate is calculated by applying the tax rules on the average house value. For all years, it is the lower transfer tax rate: 2%. Registration fees (0.5%) and notary fees (1.1%) are not included here.
SI	No country-specific comments.
SK	The tax rate is calculated by applying the tax rules on the average house value. Since 2005, the tax has been abolished.
FI	No country-specific comments.
SE	No country-specific comments.

³³ Some countries have a transfer tax, while others have a stamp duty, or both. The database records only one tax rate – for a transfer tax or a stamp duty if a transfer tax does not exist. The information provided on taxes when purchasing a house is therefore not exhaustive for most countries.

Table 8. Taxation of imputed rent

Country	Country-specific comments
For all countries	'N' – does not exist, 'Y' – imputed rent is taxed. Imputed rent is taxed under personal income tax. To calculate the effective imputed rent tax rate in relation to the property value, the share of taxed imputed rent is then divided by the house value.
BE	'N' all years for owner occupied dwellings. Only imputed rent ('cadastral income') of properties rented to individuals or not rented was (is) taxed.
BG	'N'
CZ	'N'
DK	'Y' for 1995-1999. The imputed rent is calculated by applying the tax rules (for people under 65) on the house value and then the top PIT rate is applied.
DE	'N'
EE	'N'
IE	'N'
EL	'N'
ES	'N' all years for owner occupied dwellings. Tax on imputed rent does not include either the main residence of the individual or rented properties.
FR	'N'
HR	'N'
IT	'N' all years for owner occupied dwellings. Owner occupied dwellings are effectively not taxed (it was officially included in taxable income and then fully deducted).
CY	'N'
LV	'N'
LT	'N'
LU	'Y' until 2016. The imputed rent is calculated by applying the tax rules on the adjusted house value. The adjustment is needed as imputed rent is calculated on the 'unit value', which was set in 1941. According to estimations by Deloitte, it is generally less than 1-2% of the private dwelling market value. In our calculations, we use an adjustment of 1.5% in the house market value. The top PIT rate is applied to the imputed rent.
HU	'N'
MT	'N'
NL	'Y' for all years. As the average house price falls within the maximum rate band for most years, the imputed rent is calculated by applying the top rate to the total house value. The top PIT rate is applied to the imputed rent.
AT	'N'
PL	'N'
PT	'N'
RO	'N'
SI	'N'
SK	'N'
FI	'N'
SE	'N'

Table 9. Existence of recurrent property tax

Country	Country-specific comments
For all countries	'N' – recurrent property tax does not exist, 'Y' – property is taxed.
BE	'Y' all years
BG	'Y' all years
CZ	'Y' all years
DK	'Y' since 2000. Property taxes are divided into a <i>property value tax</i> levied by the state and <i>land taxes</i> levied by the county and municipal councils. Although the land tax has already been in place since 1995, the property value tax (which we are interested in) was introduced only in 2000.
DE	'Y' all years
EE	'N' all years. Property tax in Estonia is levied exclusively on land.
IE	'Y' all years, except 'N' for 1997-2012.
EL	'Y' all years
ES	'Y' all years
FR	'Y' all years
HR	'N' all years
IT	'Y' all years, except 'N' for 2008-2011, 2013, 2016-2021.
CY	'Y' until 2016
LV	'Y' since 2010
LT	'Y' since 2006
LU	'Y' all years
HU	'N' all years. There is no property tax levied. However, since 2015 the municipalities can decide whether to introduce a local tax (building or land tax). In 2016-2017, only around 17% of municipalities had a building tax, so the recurrent property tax is not calculated.
MT	'N' all years
NL	'Y' all years
AT	'Y' all years
PL	'Y' all years
PT	'Y' all years
RO	'Y' all years
SI	'Y' all years
SK	'Y' all years
FI	'Y' all years
SE	'Y' all years

Table 10. Revenues from the recurrent property tax collected from households (for calculation of the implicit recurrent property tax)

Country	Country-specific comments
For all countries	The main source is 'OECD: 4110 Households recurrent taxes on immovable property'. For other countries, either information collected by national sources is provided or Eurostat's data on 'Taxes on land, buildings and other structures for general government, institutions of the EU' [gov_10a_taxag] is used by applying the correction coefficients 0.5 (1995-2004) and 0.6 (2005-2021) for the Group I countries and the coefficient 0.3 (2001-2021) for the Group II countries. This coefficient should reflect the share of taxes paid only by households over the total taxes collected, in million units of national currency.
BE	OECD
BG	Eurostat, with the correction coefficient 0.3.
CZ	OECD
DK	Expert from national sources for 2000-2016 (property value tax introduced in 2000). Values updated to 2017-2021 using Eurostat data with the correction coefficient 0.5 (derived by comparing the Eurostat values and national statistics values for earlier years).
DE	OECD
EE	'N' all years (there is no recurrent property tax on buildings, only on land).
IE	Expert from national sources for 1995-1996, 2013-2016. Same source was used for 2017-2021: Irish Tax and Customs statistics on Local Property Tax – https://www.revenue.ie/en/corporate/information-about-revenue/statistics/local-property-tax/index.aspx
EL	OECD (1995-1997), Eurostat with the correction coefficients 0.5 (1998-2004) and 0.6 (2005-2021).
ES	Eurostat, with the correction coefficients 0.5 (1995-2004) and 0.6 (2005-2021).
FR	OECD
HR	'N' all years (there is no recurrent property tax).
IT	Eurostat, with the correction coefficients 0.5 (1995-2004) and 0.6 (2005-2007; 2012; 2014-2015; these are the years when the recurrent property tax was in place).
CY	Eurostat, with the correction coefficient 0.3 (2001-2016).
LV	OECD (although the tax was introduced in 2010, taxes have been collected since 2011).
LT	OECD
LU	Eurostat, with the correction coefficients 0.5 (1995-2004) and 0.6 (2005-2021).
HU	'N' all years (there is no recurrent property tax).
MT	'N' all years (there is no recurrent property tax).
NL	OECD
AT	OECD
PL	OECD. CPI to update to 2021.
PT	Expert from national sources (proxy: the values in this time series also include taxes other than the property taxes paid by households – e.g. taxes on vehicle circulation (IUC) – but most of the amount is attributed to property tax) for 1995-20016. Eurostat, with the correction coefficient 0.6 for 2017-2021 (that is derived by comparing the Eurostat values and the national statistics values for earlier years).
RO	Eurostat, with the correction coefficient 0.3 (2001-2021).
SI	OECD
SK	OECD
FI	OECD
SE	OECD

Table 11. Net dwelling stock (for calculation of the implicit recurrent property tax)

Country	Country-specific comments
For all countries	The main source is Eurostat: Dwellings (net): Households; non-profit institutions serving households [nama_10_nfa_bs], in million units of national currency. Exceptions: BG (experts), IE (Household Finance and Consumption Survey/HFCS) and ES (HFCS). The house price index (HPI; annual rate of change) is used to update net dwelling stock for some recent missing years for countries.
BE	No country-specific comments.
BG	The HPI is used to update to 2021.
CZ	No country-specific comments.
DK	No country-specific comments.
DE	No country-specific comments.
EE	HPI is used to update to 2021.
IE	Net dwelling stock from the second and third waves of the HFCS ³⁴ is used for 2013 and 2017. The values are corrected by applying the coefficient 0.6 (which is the average share between the net dwelling stock from the HFCS when compared to Eurostat information). Between the two waves, the incremental average change (linear interpolation) was used, and for the rest, the HPI was applied to update values to the years of interest.
EL	The HPI is used to update to 2021.
ES	The HPI is used to update to 2021.
FR	No country-specific comments.
HR	The HPI is used to update to 2017-2021.
IT	No country-specific comments.
CY	The HPI is used to update to 2021.
LV	The HPI is used to update to 2021.
LT	The HPI is used to update to 2021.
LU	No country-specific comments.
HU	The HPI is used to update to 2021.
MT	No country-specific comments.
NL	No country-specific comments.
AT	No country-specific comments.
PL	The HPI is used to update to 2021.
PT	The HPI is used to update to 2021.
RO	The HPI is used to update to 2021.
SI	No country-specific comments.
SK	No country-specific comments.
FI	The HPI is used to update to 2021.
SE	The HPI is used to update to 2021.

³⁴ https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html

Table 12. Capital gains tax rates

Country	Country-specific comments
For all countries	The minimum capital gains tax rate is used as it is assumed that the owner occupied property was sold after the required legal period of time and/or money was later reinvested in a new property.
BE	No country-specific comments.
BG	No country-specific comments.
CZ	No country-specific comments.
DK	No country-specific comments.
DE	No country-specific comments.
EE	No country-specific comments.
IE	No country-specific comments.
EL	The capital gains tax came into law in 2013 (law 4172/2013), but its application has been suspended several times and it has not been applied so far. 0% is therefore used for all years.
ES	The rates are missing for 1995-1997. Assumed to be 0% as for later years.
FR	No country-specific comments.
HR	No country-specific comments.
IT	No country-specific comments.
CY	We assume that individuals are eligible to the cumulative life time exemption (85,000 EUR in 2020), which implies no capital gains tax obligation.
LV	No country-specific comments.
LT	No country-specific comments.
LU	No country-specific comments.
HU	No country-specific comments.
MT	No country-specific comments.
NL	No country-specific comments.
AT	No country-specific comments.
PL	No country-specific comments.
PT	No country-specific comments.
RO	No country-specific comments.
SI	No country-specific comments.
SK	No country-specific comments.
FI	No country-specific comments.
SE	No country-specific comments.

Table 13. Interest income tax rates

Country	Country-specific comments
For all countries	When interest income is subject to a progressive schedule, the top rate is used. Where possible, the information received from the experts is compared to ZEW estimates ³⁵ .
AT	As of 2016, interest income from cash deposits and non-securitised assets is taxed at 25%. The tax rate on interest income from all other assets (shares, stocks, etc.) is taxed at 27.5%. The database uses 25%.
BE	No country-specific comments.
BG	No country-specific comments.
CZ	The top tax rate is used for when the progressive system was in place (1995-2007).
DK	The top tax rate for positive capital income is used (roughly in line with ZEW estimates).
DE	Until 2008, the top PIT rate is used (also in line with ZEW estimates).
EE	No country-specific comments.
IE	No country-specific comments.
EL	No country-specific comments.
ES	In 1995-2005, the top PIT rates are used (in line with ZEW estimates). In 2021, on top of already existing tax rates, an additional bracket of 26% above 200,000 EUR was introduced. Given that the average house price is below 200,000 EUR, the rate of 26% is neglected.
FR	Tax on interest income from bank saving accounts comprises three components (in line with ZEW estimates): - a 25% flat-rate withholding tax on fixed-rate interest income, operating as a levy in discharge until 2013 (<i>prélèvement forfaitaire libératoire</i>); - the CSG/CRDS rate; - the rate of other social contributions.
HR	No country-specific comments.
IT	The rate for loans, deposits and current accounts is used (and not for interest on Italian bonds and similar bonds).
CY	When there was a change in the tax rate in the course of the year, the weighted average was used (taking into account the number of months). For 1998, 2000, 2011 and 2013.
LV	No country-specific comments.
LT	No country-specific comments.
LU	Until 2005, the top PIT rate is used. Since 2006, taxpayers have the option to pay a withholding tax (e.g. when the annual interest rate is greater than 0.75%; annual interest exceeds 250 EUR; etc.) or to declare interest income under the PIT. The assumption is that annual interest income exceeds the limit, therefore the withholding tax rate is used (also in line with ZEW estimates).
HU	In 2006, there was a change in the tax rate, therefore the weighted average was used (taking into account the number of months).
MT	Taxpayers have the option to declare interest income in their income tax return (paying the tax rates found under the PIT) or at source (paying a final withholding tax rate of 15%). Therefore, taxpayers whose marginal tax rate is below 15% would generally declare interest income in their income tax return, with the lowest applicable tax rate being 0%, whereas taxpayers with a marginal tax rate above 15% would generally declare interest income at source and be taxed at the final withholding tax rate of 15%. As we are focusing on higher earners, we use the final withholding tax rate of 15%.
NL	Until 2000, income from investments was taxed progressively and deemed to be part of personal income: the top PIT rate for the years 1995-2000 (in line with ZEW estimates). Since 2001, income from investments (other than substantial shareholdings ³⁶), interest and

³⁵ ZEW (Christoph Spengel, Dieter Endres, Katharina Finke, Jost Heckemeyer), 2014. Effective Tax Levels Using the Devereux/Griffith Methodology. Final Report 2014 Project for the EU Commission TAXUD/2013/CC/120, pp. A-25 – A-28.

	royalties are not taxed directly – instead, the effective tax rate is calculated based on the assessment of the imputed returns/weighted notional yield on net assets (Box 3 of the tax code) ³⁷ .
PL	No country-specific comments.
PT	No country-specific comments.
RO	No country-specific comments.
SI	No country-specific comments.
SK	No country-specific comments.
FI	No country-specific comments.
SE	No country-specific comments.

³⁶ Dividends, other profit distributions, interest and capital gains in connection with a substantial shareholding are subject to tax at a flat rate of 25% (Box 2 of the tax code); however, it is out of our scope of analysis.

³⁷The effective tax rates provided by experts up to 2017 and later from the IBFD database:
<https://www.ibfd.org/>

Table 14. Nominal house price³⁸

Country	Country-specific comments
For all countries	The house price is derived by multiplying the price per square metre by the average dwelling size (bought with a mortgage or a loan). Time series expressed in price per square metre is taken from the DG ECFIN B1 House Price Database ³⁹ (national currencies are converted into EUR using AMECO currency exchange rates). Information on the dwelling size used is from Eurostat ⁴⁰ and available only for 2012. We assume that the property size remains constant throughout the years. The CPI is used for missing data points (specified below).
BE	No country-specific comments.
BG	No country-specific comments.
CZ	No country-specific comments.
DK	No country-specific comments.
DE	No country-specific comments.
EE	The price is updated using the CPI for 2001-2003.
IE	No country-specific comments.
EL	The price is updated using the CPI for 1996.
ES	No country-specific comments.
FR	No country-specific comments.
HR	No country-specific comments.
IT	No country-specific comments.
CY	The price is updated using the CPI for 2001.
LV	No country-specific comments.
LT	No country-specific comments.
LU	No country-specific comments.
HU	The price is updated using the CPI for 2001-2006.
MT	No country-specific comments.
NL	No country-specific comments.
AT	The price is updated using the CPI for 1996-1999.
PL	The price is updated using the CPI for 2001-2007.
PT	No country-specific comments.
RO	The price is updated using the CPI for 2001-2007.
SI	The price is updated using the CPI for 2001-2002.
SK	The price is updated using the CPI for 2001-2004.
FI	No country-specific comments.
SE	No country-specific comments.

³⁸ The house value is not used for all countries and is used mainly to calculate the mortgage interest tax relief and, sometimes, the effective transfer tax rate or imputed rent.

³⁹ <https://s-ecfin-web.net1.cec.eu.int/directorates/db/u1/data/housing/hp.html>. See also Bricongne et al., 2019; Philipponnet and Turrini, 2017.

⁴⁰ Average size of dwelling by income quintile and tenure status [ilc_hcmh01]: tenure: owner, with mortgage or loan.

Appendix 2. Data sources

Indicator	Sources
Mortgage interest tax relief (MITR)	Experts (up to 2017) and The IBFD (International Bureau of Fiscal Documentation) database: https://www.ibfd.org/ and EUROMOD country reports: https://euromod-web.jrc.ec.europa.eu/using-euromod/country-reports Complementary information: The National Bank of Poland: http://www.nbp.pl/en/statystyka/oproc/mir_new/stopy_proc_en_srdW.xlsx and http://www.nbp.pl/en/statystyka/oproc/mir_new/sw_oprocentowanie_n_2004_en.xls
Maximum loan-to-value (LTV) ratio	ESRB reports ⁴¹ , ECB ⁴² , OECD ⁴³ , IMF ⁴⁴ , European Mortgage Federation ⁴⁵ or a designated ESRB excel spreadsheet ⁴⁶ . Book: Eds. Lunde J. and Whitehead C., 2016, “Milestones in European Housing Financing” (for specific chapters for different countries, please consult the ‘Loan-to-value (LTV) ratio’ table in Annex 2).
Maximum or typical loan duration (maturity)	Same as above (for LTV ratio). Book: Eds. Lunde J. and Whitehead C., 2016, “Milestones in European Housing Financing” (for specific chapters for different countries, please consult the ‘Maximum or typical loan duration/maturity (in years)’ table in Annex 2).
Interest rates for long-term government bonds	<i>Eurostat: EMU convergence criterion series – annual data [irt_lt_mchy_a]</i> <i>EMU convergence criterion bond yields</i>
Transfer tax rates	Experts (up to 2017) and The IBFD database: https://www.ibfd.org/
Taxation of imputed rent	Experts (up to 2017) and The IBFD database https://www.ibfd.org/ and EUROMOD country reports: https://euromod-web.jrc.ec.europa.eu/using-euromod/country-reports
Existence of the recurrent property tax	Experts (up to 2017) and The IBFD database: https://www.ibfd.org/

⁴¹ ESRB, 2014, The ESRB Handbook on Operationalising Macro-Prudential Policy in the Banking Sector, March 2014.

ESRB, 2015, Report on residential real estate and financial stability in the EU. December 2015, p. 28, pp. 33-34, p. 50.

ESRB, 2016, Vulnerabilities in the EU residential real estate sector. November 2016, p. 33.

ESRB, 2019, [A Review of Macroprudential Policy in the EU in 2018](#). April 2019, p. 32, pp. 96-101.

ESRB, 2020, [A Review of Macroprudential Policy in the EU in 2019](#). April 2020, p. 50.

⁴² ECB, 2009, [Housing Finance in the Euro Area](#). March 2009, p. 27.

⁴³ OECD, 2005, Housing Finance Markets in Transition Economies: Trends and Challenges.

Andrews Dan, 2010, Real House Prices in OECD Countries: the Role of Demand Shocks and Structural and Policy Factors, OECD: Economics Department Working Paper No. 831, ECO/WKP(2010)87, p. 29.

⁴⁴ Jácome Luis I. and Mitra Srobona (IMF), 2015, LTV and DTI Limits—Going Granular. WP/15/154. IMF, July 2015 (for Poland and Romania).

⁴⁵ Hypostat reports (European Mortgage Federation, 2019, 2020, 2021).

⁴⁶ ESRB, [National measures of macroprudential interest in the EU/EEA \(excel spreadsheet\)](#), 9 February 2018.

Indicator	Sources
Revenues from the recurrent property tax collected from households	<p>OECD for AT, BE, CZ, FI, FR, DE, EL (1995-1997), LV, LT, NL, PL, SK, SI, SE, UK. LEVEL OF GOVERNMENT: Total TAX REVENUE: 4110 Households recurrent taxes on immovable property INDICATOR: Tax revenue in national currency</p> <p>Eurostat for BG, CY, DK (2017-2021), EL (since 1998), IT, LU, PT (2017-2021), RO, ES: Main national accounts tax aggregates [gov_10a_taxag], (applying correction coefficient) UNIT: Million units of national currency SECTOR: General government; institutions of the EU/ NA_ITEM: Taxes on land, buildings and other structures (D29A)</p> <p>Provided by experts up to 2016 from national sources for DK and PT.</p> <p>For IE: Irish Tax and Customs statistics on Local Property Tax – https://www.revenue.ie/en/corporate/information-about-revenue/statistics/local-property-tax/index.aspx</p>
Net dwelling stock	<p>Eurostat for all Member States except IE: Balance sheets for non-financial assets [nama_10_nfa_bs]. UNIT: Current prices, million units of national currency SECTOR: Households; non-profit institutions serving households ASSET10: Dwellings (net)</p> <p>HFCS for IE (applying correction coefficient): https://www.ecb.europa.eu/stats/ecb_surveys/hfcs/html/index.en.html</p>
Capital gains tax	<p>Experts (up to 2017) and The IBFD database: https://www.ibfd.org/</p>
Interest income tax	<p>Experts (up to 2017) and The IBFD database: https://www.ibfd.org/ and ZEW (Christoph Spengel, Dieter Endres, Katharina Finke, Jost Heckemeyer), 2014. Effective Tax Levels Using the Devereux/Griffith Methodology. Final Report 2014 Project for the EU Commission TAXUD/2013/CC/120, pp. A-25 – A-28.</p>
Nominal house price (per square metre)	<p>ECFIN B1 House Price Database: https://s-ecfin-web.net1.cec.eu.int/directorates/db/u1/data/housing/hp.html UNIT: Euro per square metre</p>
Average dwelling size (square metres)	<p>Eurostat: Average size of dwelling by income quintile and tenure status [ilc_hcmh01] UNIT: Average TENURE: Owner with mortgage or loan QUANTILE: Total YEAR: 2012</p> <p>For MT, provided by the expert from HFCS. For LU, provided by statistics portal of Luxembourg (value of the year 2014 is used) https://statistiques.public.lu/dam-assets/fr/donnees-autres-formats/indicateurs-court-terme/economie-totale-prix/D4011.xls</p>
Harmonised consumer price index (CPI)	<p>Eurostat: HICP - annual data (average index and rate of change)[prc_hicp_aind] UNIT: Annual average rate of change COICOP: All items HICP</p>
AMECO currency exchange rates	<p>European Commission, Economic and Financial Affairs, AMECO: 13 Monetary variables: 13.1 Exchange rates and purchasing power parities:</p>

Indicator	Sources
	<p><i>National currency units per ECU-EUR(XNE); Conversion rates between euro and former euro-zone national currencies (XNEF).</i></p> <p>http://ec.europa.eu/economy_finance/ameco/user/serie/SelectSerie.cfm</p>
167% of gross average earnings	<p><i>Eurostat: Annual net earnings [earn_nt_net]</i></p> <p><i>ESTRUCT: Gross earnings</i></p> <p><i>ECASE: Single person without children, 167% of gross average wage</i></p> <p><i>UNIT: EUR or national currency</i></p>

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