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Measuring effective taxation
of housing: Building the
foundations for policy reform

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OECD Taxation Working Papers

Measuring Effective Taxation of Housing

Building the Foundations for Policy Reform



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Abstract

This paper measures the effective taxation of housing investments in 40 OECD member and partner countries. The paper derives both Marginal Effective Tax Rates (METRs) and Average Effective Tax Rates (AETRs), which incorporate the stream of income and taxes over the life of the housing investment. The methodology is applied to owner-occupied and rented residential property for investments that are financed with debt or equity. The paper finds that the level and components of housing taxation depend greatly on the investment scenario. Effective tax rates vary substantially depending on the holding period, rate of return, tenure (owner-occupied or rented), financing scenario, and the inflation rate. Effective tax rates do not vary much with the taxpayer's income and wealth or with the rate of return. The paper finds there is scope to reduce the tax differential between different investment scenarios and strengthen progressivity and horizontal equity.

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1 Introduction

1. The tax treatment of housing has important implications for tax and the wider economy and is a key component of housing policy. Several macroeconomic implications arise from the tax treatment of housing, including for incentives to invest in housing, the consumption of housing relative to other forms of consumption, the financing of housing, land use, house prices, and macroeconomic stability. Investment in and access to housing may also have important equity consequences; housing wealth has traditionally been the key savings vehicle for the majority of households, but more recently young households and households with low or unstable incomes have been finding access to housing increasingly unaffordable. Rising house prices have contributed to increasing levels of regional inequalities in many developed economies.

2. This paper examines the tax treatment of housing across 40 OECD and partner economies¹ and discusses the implications of housing taxation for efficiency and equity goals. It presents Effective Tax Rates (ETRs) on housing assets, extending the methodology developed in OECD (2018^[1]). It also examines variation in these ETRs across countries, income levels, rates and forms of return, financing sources, holding periods and tenure types. In doing so, it provides new evidence on the tax treatment of housing across OECD and partner economies.

3. Previous studies have suggested that housing taxation departs from principles of neutrality in a variety of ways (OECD, 2018^[2]; Fatica and Prammer, 2017^[3]). Different tax treatment applies to different tenure types (owner-occupied or rental property) and different financing sources (debt or equity). This paper extends the earlier frameworks and identifies the differences in the tax treatment across tenure types, financing sources, holding periods, rates of return, and inflation and risk levels. By identifying the differences in the tax treatment, the analysis presented in this paper can be used to evaluate whether the differential treatment corresponds to a deliberate policy rationale.

4. The paper also evaluates how tax burdens vary across income levels and asset values. Higher income households tend to hold more or higher value assets, including housing, that are tax-favoured and may derive greater benefit from tax relief. In some countries, higher income households face lower effective tax rates than middle- and low-income households. Raising effective tax rates for high-income households, or lowering them for low-income and low-wealth households, can strengthen equity in the housing market.

5. In spite of the importance of housing taxation, few countries have undertaken significant reforms to improve the design of housing taxation in recent years.² In many countries, recurrent taxes on immovable property remain underutilised, despite their revenue raising and efficiency properties, and transaction taxes continue to be levied on housing purchases in many countries at relatively high rates, even though they are recognised to be highly distortive taxes that may reduce housing market efficiency and hinder worker mobility ((Institute for Fiscal Studies, 2010^[4]), (Hilber and Lyytikäinen, 2017^[5])).

¹ The paper examines 37 OECD member countries and Argentina, Bulgaria, and South Africa. Costa Rica was not an OECD member country at the time of data collection and has not been included in the paper.

² Personal income taxes have been subject to substantial reforms; however, the stated aim is often to reduce distortions in the labour market and not to address distortions in savings taxation (see OECD (2019^[14]; 2018^[17]; 2017^[15]; 2016^[18])).

6. Analysis of housing tax policy requires indicators that consider the full range of housing-related tax policy instruments. Taxpayers are subject to several taxes over the life of an investment in residential property, but may also benefit from multiple sources of tax relief, all of which should be considered by policymakers. To measure the effect of many aspects of the tax system on a particular housing asset, this paper presents estimates of Marginal Effective Tax Rates (METRs) and Average Effective Tax Rates (AETRs), which are comparable across housing investment scenarios and across countries. These indicators incorporate the income and asset bases upon which housing taxes apply, the deductions that apply to gross income and assets and the exemptions that are available to taxpayers, the rate of return, the form of the return (e.g., rental income or capital gains), the tax treatment of different types of finance and the effect of tax-deferred returns. ETRs also capture the effect of inflation, which is particularly important as a majority of countries tax nominal returns on housing.

7. This paper contributes to the literature on the taxation of housing and effective tax rate models. The paper builds on recent OECD work that finds that owner-occupied housing is tax-favoured (OECD, 2018^[11]). By examining the key tax drivers of differential taxation of housing across housing types, including financing types, rates of return and holding periods, the paper allows policymakers to understand which tax levers are driving housing taxation overall.

8. The paper also contributes to the literature on the tax treatment of debt-financed housing investments (OECD, 2018^[11], (Fatica and Prammer, 2017^[6])). Previous OECD work in this area assumed that the correct comparison was between a taxpayer choosing to invest their currency unit in bank deposits (the opportunity return) and obtaining debt-finance for the housing investment. This improved comparability between equity- and debt-financed scenarios, as the taxpayer invested some savings in both cases, but the assumption led housing ETRs to be a function of the tax rate on bank interest. This paper departs from this assumption and assumes that the opportunity return is consumed by the household, rather than invested in an alternative asset. The discount rate is assumed to be a fixed pre-tax rate equal to inflation plus the risk-free return.

9. This paper presents a novel extension to the tax literature by calculating AETRs on housing, which capture the tax impact on investments earning above normal returns. As AETRs can be used to analyse housing investments that earn higher returns, they are particularly important to understanding the differential impact of the tax system across households that earn different returns; for example, across regions with different house price dynamics over time.

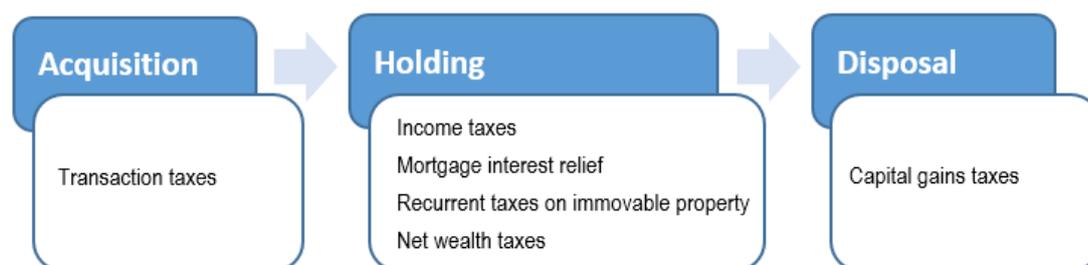
10. The paper proceeds as follows. Section 2 outlines some key features of how countries tax housing. Section 3 presents the ETR methodology and key assumptions. Section 4 discusses the ETRs from an efficiency perspective and Section 5 discusses them from an equity perspective. Further information about how countries tax housing can be found in Annex A and the full methodology for calculating METRs and AETRs can be found in Annex B.

2 How countries tax housing

11. Numerous commonalities can be found among the range of approaches that countries adopt to tax residential housing. Many of the countries examined in this study levy one-off taxes on housing transactions and recurrent taxes on the value of housing; however, few countries regularly update the cadastral value that typically forms the basis for recurrent taxes on immovable property. The income generated from rented property is often taxed, but less common is the taxation of imputed rent on owner-occupied property. Imputed rent is the in-kind income earned by owner-occupiers living in their homes and is equivalent to the rental income they would receive if the property were rented. The taxation of capital gains is typically tied to the tenure status of the housing; rented housing may be subject to capital gains taxes, but owner-occupied properties are often exempt. While net wealth taxes have received a lot of media attention in recent years, they remain rare among the countries examined.

12. As shown in Figure 1, taxes are levied at different points in the life of a housing investment. Transaction taxes can be levied when the asset is acquired; income taxes, recurrent taxes on immovable property and net wealth taxes can be levied during the holding period; and capital gains taxes can be levied upon disposal of the asset. Mortgage interest relief, which can apply during the holding period, is one example of the range of deductions, credits and exemptions that apply to housing investments. Detailed tables outlining countries' tax treatment of housing assets as at 1 July 2016 can be found in Annex A.

Figure 1. Taxes and tax relief over the life of the investment



13. Inheritance and gift taxes may also apply on disposal (OECD, 2021^[7]). Twenty-four OECD countries levy inheritance or estate taxes on transfers of wealth at the donor's death and 25 OECD countries tax transfers of wealth during the donor's life, although some countries apply preferential tax treatment to transfers of housing under certain conditions. The ETRs assume that the taxpayer disposes of the housing in an open market for a fair price. A future extension of the model could consider a scenario where the housing is disposed of on the taxpayer's death or as a gift. In addition to incorporating inheritance and gift tax rules and any preferential tax treatment for housing, such an extension would need to consider the taxpayer's total wealth, the relationship between the donor and the beneficiary, previous wealth transfers, how unrealised capital gains are taxed upon the donor's death, and any cross-border implications that arise when the housing, the donor, and/or the beneficiary are not located in the same country.

14. In order to explore how taxation of housing differs across tenure types and financing sources, this paper examines four housing investment scenarios:

- Owner-occupied, debt-financed residential property
- Owner-occupied, equity-financed residential property
- Rented, debt-financed residential property
- Rented, equity-financed residential property

15. The paper examines 40 OECD and key partner countries.³ ETR calculations are based on rules in place as at 1 July 2016, described in questionnaire responses completed by country delegates to Working Party No. 2 on Tax Policy Analysis and Tax Statistics of the OECD's Committee on Fiscal Affairs. While some countries have enacted reforms on housing taxation since that time, the broad characteristics of housing taxation have remained unchanged. The remainder of this section describes the range of approaches to taxing housing. Taxes that do not relate directly to housing investments, such as inheritance or estate taxes, are not examined. The paper considers that the housing consists of the housing structure and the land that it is located on.

16. Broader structural features, such as fiscal autonomy, will influence housing taxation. Some countries rely more heavily on taxes levied by sub-central governments to fund local services. In around half of OECD countries, sub-central governments rely most heavily on recurrent property taxes and in all OECD countries, recurrent property taxes contribute a greater portion of revenue at the sub-central level than at the national level. In certain countries, therefore, greater fiscal autonomy may be associated with higher taxation of residential property.

2.1. Taxes on acquisition of housing assets

17. Transaction taxes are levied on owner-occupied and rented housing in 30 out of the 40 countries considered. They are generally applied at flat rates, but occasionally can depend on the value of the asset (e.g., in Canada and South Korea). Transaction taxes are typically levied on the purchase of an existing housing asset, and not on the sale of the asset. New residential housing may be exempt from transaction taxes, but some countries levy Value Added Taxes (VAT) when a new property is sold for the first time.

2.2. Taxes on holding of housing assets

18. Different tax treatment of income typically applies to owner-occupied and rented housing. The return generated by owner-occupied housing in the form of imputed rent (that is, the in-kind rent that homeowners pay to themselves) is typically tax exempt. Only four countries (Denmark, Greece, the Netherlands and Switzerland) tax imputed rental income, though this is generally at low rates and, in the case of the Netherlands, only when at least partially debt-financed. In contrast, 34 out of 40 countries tax actual rental income, while two (Belgium and the Netherlands) apply a tax on deemed rental income rather than actual rental income. Rental income is typically taxed at progressive rates. However, four countries tax rental income at flat rates (Denmark, Iceland, Italy and Slovenia). In some cases, tax rates on rental income are applied at concessionary levels, or on a reduced base (e.g. Latvia, Spain, Iceland and Italy). There are also income-based exemptions applied to the taxation of rental income in Korea and the Slovak Republic.

19. Mortgage interest relief is widely available in the countries considered. Of the 40 countries studied, 20 provide tax relief (via either a deduction or a tax credit) for mortgage interest on owner-occupied

³ Argentina, Australia, Austria, Belgium, Bulgaria, Canada, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States.

property. One country (Japan) provides a tax credit for 1% of the remaining mortgage balance at the end of each year. In 17 countries, this tax relief takes the form of an income tax deduction for mortgage interest. The total value of the deduction is capped in three countries (Estonia, Finland and Luxembourg), while two countries restrict eligibility for mortgage interest relief to taxpayers who earn below an income threshold (Chile) or to taxpayers whose housing asset falls below a value threshold (Korea). Mexico limits total personal deductions, mortgage interest relief included, and restricts eligibility for mortgage interest relief to properties where total associated loans fall below a threshold. Three countries provide a capped tax credit for mortgage interest (Belgium, Italy and Spain). Japan provides a capped tax credit for 1% of the remaining balance of the mortgage at the end of each year. Out of the 40 countries, 27 also provide mortgage interest relief for rented property. The majority of these 27 countries provide an uncapped tax deduction for mortgage interest on rented property, though interest is not deductible in Chile if taxpayer income exceeds a threshold and tax relief is capped in Estonia. Some regions in Belgium provide a capped tax credit for mortgage principal repayments (but not for interest payments) for loans entered into before 2015.

20. The use of recurrent taxes on immovable property is widespread. Recurrent taxes on immovable property are imposed on owner-occupied and rented housing in all countries considered in the paper. They are typically implemented at a sub-central level and consequently can vary substantially within a country.⁴ In the majority of countries considered, they are levied on a tax base closely linked to the value of the property, though in many cases these valuations remain significantly out of date, lagging behind the real value of the property (Questionnaire on the Taxation of Household Savings). The tax base in a small number of countries is based on characteristics of the property, such as size of property or location, rather than value. In some countries, certain sub-central areas do not apply a recurrent tax on immovable property (e.g. Hungary and Switzerland) and in a minority of countries, income tax relief is available for taxes paid on property (e.g. the United States).

21. The few countries that impose a net wealth tax have special treatment for owner-occupied housing. In all six countries with net wealth taxes in 2016, owner-occupied and rented property are included in the tax base (Argentina, Colombia, France, Norway, Spain and Switzerland). However, all six countries have a considerable minimum wealth threshold before a positive rate or rates apply and several provide special treatment for residential property. A 30% rate reduction applies for owner-occupied housing in France and Spain applies an exemption threshold to the main residence of up to EUR 300 000, which is in addition to the EUR 700 000 general net wealth tax exemption threshold. Only 25% of the owner-occupied property value is subject to the tax in Norway, which rises to 80% in the case of rented property.

2.3. Taxes on disposal of housing assets

22. Capital gains taxes differ substantially between owner-occupied and rented housing. Countries tax capital gains at a mix of progressive and flat rates and capital gains are typically taxed on a realisation rather than an accrual basis, but concessionary rates or exemptions are often applied to capital gains on owner-occupied property. Of the 40 countries considered, only 14 countries tax capital gains on owner-occupied housing. These taxes are often imposed at concessionary rates and in many cases are subject to a minimum holding period test.⁵ At least some capital gains for rented housing are taxed in 34 out of 40

⁴ Where recurrent taxes on immovable property vary across sub-central governments, the ETR models use a representative region or a nation-wide average to obtain the tax rate and tax base.

⁵ Many countries seek to tax capital gains on housing held for short periods, but exempt or tax at concessionary rates housing held for longer periods. For example, in the Czech Republic, gains on owner-occupied residential property are taxable if held for five years or less; or two years or less if the property is the taxpayer's main residence (unless the gains are used to finance a new residence in which case they are not taxable even if held for two years or less). In Germany, no gains are taxable on owner-occupied residential property if the asset is held more than 10 years.

countries. However, concessionary (or zero) rates are often applicable and, as is the case for owner-occupied housing, these concessionary rates are generally subject to a minimum holding period test.

3 Effective Tax Rates (ETRs) on investment in residential housing

23. Effective Tax Rates (ETRs) are an important tool for measuring the overall impact of the tax system on housing investments. Statutory tax rates reflect only one aspect of the tax system out of the many that may apply to a single housing investment. By contrast, ETRs combine in one indicator the impact of a wide range of taxes and tax design features under different scenarios to provide a more complete picture of how the tax system affects prospective housing investments. ETRs can account for the effect of multiple taxes and for tax rules such as thresholds and deductions, which may alter the overall impact of the tax system on an investment. ETRs can also facilitate the examination of non-tax factors such as inflation and different rates of return on investments, as these can alter the overall impact of the tax system.

24. Marginal Effective Tax Rates (METRs) measure tax incentives to invest in different asset classes. The margin considered is one additional unit of investment (e.g. extra dollar, euro, yen etc.) in the chosen asset type, financed either through savings (equity-finance) or debt (debt-finance). The investment is also marginal with respect to the return; it is assumed to generate a net return that is just sufficient to make the investment worthwhile. The METRs measure how the marginal return on the additional unit of investment is taxed (if wealth taxes apply, the METRs incorporate the taxation of the unit of investment, as well as the return). This shows the incentives faced by the taxpayer at the margin; for example, measuring the incentive to undertake one type of investment over another and how incentives change for taxpayers with different levels of income and wealth.

25. Average Effective Tax Rates (AETRs) measure the tax impact on higher-than-breakeven returns. The scenario is still a marginal investment, in the sense that the taxpayer invests one additional unit, but the return can be above the return needed to break even. AETRs measure the tax paid (that is, the difference between a non-taxed and a taxed return) as a share of the net present value of the pre-tax return. This shows, for example, whether the tax system captures the higher (risk-adjusted) rates of return that are associated with higher wealth (Fagereng et al., 2020^[8]).

Box 1. Interpreting Effective Tax Rates (ETRs)

Forward-looking ETRs measure the tax impact on a marginal investment, illustrating the departure from a world in which no tax is levied.

In the model, a taxpayer invests one additional currency unit (dollar, euro, yen etc.) and earns a post-tax return that incorporates the stream of income earned (e.g. rent, capital gains) and taxes paid (e.g. transaction taxes) over the life of the investment. In this sense, the ETRs measure the tax-related investment incentives, not the actual tax liability paid by an investor.

METRs measure the difference between the pre-tax and post-tax return, as a share of the pre-tax return. This means measuring the difference between what the taxpayer would retain in a world with no taxes and what the taxpayer actually keeps, divided by the first term (the return in a no-tax world). The model

fixes the pre-tax return and then finds the breakeven post-tax return, which is the return that is just sufficient to make the investment worthwhile.

AETRs measure the difference between the net present value of an investment with and without taxes, expressed as a share of the net present value of the before-tax total return stream. As AETRs are a measure of taxes levied on cash flows, they show the tax impact on an investment that earns a higher-than breakeven return.

Annex B outlines the full methodology for the METRs and AETRs.

26. The METRs and AETRs presented in this paper are comparable across countries and across housing investment scenarios, due to a uniform set of assumptions. The analysis throughout considers a single individual without children who invests in owner-occupied or rented housing, financed with their own savings or debt. Owner-occupied housing is assumed to be the taxpayer's primary residence. Unless otherwise specified, the ETRs assume inflation is equal to the average across the OECD (1.6%), with a 20-year expected holding period of the housing asset and a pre-tax return equal to a real return of 3% plus the inflation rate of 1.6%. Given this pre-set and fixed discount rate, the METR methodology derives the post-tax return, that is, the minimum required rate of return the investor needs to earn in order to break even. The AETR methodology, on the other hand, assumes that the household earns a fixed return that can exceed the nominal interest rate. The ETR methodology assumes that the return on the housing investment accrues to the investor in different ways; either through capital gains realised at the time of the sale of the property, or through rents or imputed rents over the period of time that the property is held. The baseline assumption is that 50% of the returns accrue in the form of capital gains and 50% in the form of a rent or imputed rent. Annex B sets out the full ETR methodology.

27. The ETRs presented in this paper rely on simplifying assumptions. In order to present results that are representative of the countries examined, it is assumed that taxpayers are subject to standard tax treatment. While many countries offer schemes to encourage private investment in housing, including special deductions and tax-favoured first homeowner savings accounts, the paper models the most common tax treatment. The focus of the ETRs is to highlight the major features of the tax systems of each country, bearing in mind that individual taxpayers may be subject to a different ETR depending on their specific circumstances. The model considers only the statutory incidence of applicable taxes, though it is possible that the economic incidence falls on different parties; for example, the owner may pass some of the cost of taxes to the renter.

28. As housing taxation depends on the characteristics of the taxpayer and the housing investment, the paper examines the variation in ETRs for four housing investment types (see paragraph 14) under a range of scenarios. It explores aspects of the tax system that impact overall ETRs, including special treatment for long holding periods and the effect of high rates of return. This is crucial to understanding how countries tax savings in housing assets, as heterogeneous taxpayers and housing investments are unlikely to experience identical treatment from the tax system. The remainder of this section outlines the specific assumptions that contribute to building these heterogeneous taxpayers and housing investments and then summarises preliminary findings.

29. A taxpayer's income and wealth are determining factors in the tax system. The paper considers three taxpayer types, with different income and wealth levels. Varying the income and wealth of the taxpayer allows examining features of the tax system that vary with income or wealth, such as progressive taxes on rental income, wealth taxes, or deductions for mortgage interest at the taxpayer's marginal income tax rate. In most cases, the model assumes the taxpayer's wealth is a function of their income, however, in some cases this led to very low wealth that did not align with property prices. Such unrealistic levels of housing wealth failed to capture progressive tax treatment. In these cases, the assumed level of housing wealth was adjusted in consultation with country delegates to reflect the value of housing that would be held by different income groups in that country. In some countries, the tax treatment depends on the

amount of capital income derived from the asset in question, rather than the taxpayer's total income. In these cases, the marginal rate is set exogenously by applying a 3% real return on the wealth held in the asset and selecting the marginal rate that applies to that level of capital income. While it would be possible to adjust the rate that determines capital income when modelling scenarios with higher or lower total return, it is preferable to fix the assumed return and set the marginal rate in a consistent and transparent manner that does not vary across scenarios.⁶ The assumptions about net wealth are based on analysis of the Household Finance and Consumption Survey (see OECD (2018) for further details). The three taxpayer types are:

- Low-income taxpayer: a single individual earning annual combined (labour plus capital) income equal to 67% of the average wage. It is assumed that this taxpayer holds no or minimal net wealth such that their marginal currency unit of savings always benefits from a tax deduction or tax credit, if one is provided.
- Average-income taxpayer: a single individual earning annual combined (labour plus capital) income equal to 100% of the average wage. It is assumed that this taxpayer holds net wealth equal to six times the average wage, of which three-quarters is held in the housing asset being considered.
- High-income taxpayer: a single individual earning annual combined (labour plus capital) income equal to 500% of the average wage. It is assumed that this individual holds net wealth equal to twenty times the average wage, of which half is held in the housing asset being considered.

30. Some countries provide taxpayers with a tax deduction or credit on the cost of mortgage interest or on a share of the remaining mortgage balance. Figure 9 assesses METRs with and without this tax relief and Figure 20 assesses different risk premia paid on mortgage loans, which affect the value of mortgage interest relief. Some countries offer taxpayers the choice to deduct expenses related to the housing investment or to claim a standard deduction. As a standard deduction would implicitly compensate for the expenses incurred in the housing investment, as well as expenses unrelated to saving, the paper assumes that taxpayers choose to deduct actual expenses. This assumption captures policy choices made in direct relation to housing investment, rather than policies that also aim to minimise paperwork or to support the cost of living.

31. Characteristics of the housing asset affect its tax treatment. In addition to tenure and finance type, tax treatment may depend on the value and type of housing. Transaction taxes may increase with respect to the value of the housing asset and recurrent taxes on immovable property may depend on the value or whether the housing asset is an apartment or a house. In scenarios where characteristics of the housing asset determine its tax treatment, assumptions have been made in consultation with country delegates to reflect country-specific housing patterns. Where transaction taxes or recurrent immovable property taxes depend on house price, the ETRs presented assume that higher income taxpayers purchase more expensive properties. This means that in some instances these taxes rise with income in the results.

32. The taxes levied on a housing investment may depend on the length of time a taxpayer holds the housing asset. To address this, the paper applies a fixed probability of sale to each period. This allows the ETRs to account for the effect of taxes that depend on the holding period. The holding period is equal to the reciprocal of the fixed probability of sale in each period.⁷ This endogenous holding period approach allows for the impact of deferral of taxes that are paid only when the asset is sold.⁸ It also allows for the modelling of different holding periods while avoiding the presence of time-related variables in the analytical

⁶ This assumption could be relaxed in future versions of the paper.

⁷ For example, the standard assumption of a 20-year holding period leads to a fixed probability of sale $\lambda = 1/20 = 0.05$

⁸ The details of this approach are discussed further in Annex A and in Annex B of OECD (2018).

solution. The results presented in the paper assume a 20-year holding period as a baseline, but Figure 10 presents results for other holding periods.

33. Housing assets can generate a recurrent return and a capital gain or loss. The rent, generated by rented housing, and the imputed rent, generated by owner-occupied housing, may be taxed directly or taxed as a deemed return (e.g., the Netherlands). It is possible to assume that owner-occupied housing does not generate a recurrent return, in which case there would be no imputed rental income and the full return would take the form of a capital gain. The ETR methodology assumes that the recurrent actual or imputed rents increase as the value of the property increases over the life of the investment. The higher the value of the property, the higher the rent that the housing investment can generate. The paper also assumes that the return on the investment is accrued 50% in the form of a recurrent return and 50% in the form of a capital gain. If the return on the investment were entirely recurrent, the investment would either be financed with debt or with equity. If part of the return came in the form of a capital gain, the initial investment would be financed with debt or equity, but the increase in the value of the house over time would imply that the investment is also financed with retained earnings. Figure 11 explores different return scenarios and Figure 22 and Figure 23 explores different rates of return.

34. As it is common practice to tax nominal returns, both inflationary gains and real gains are typically subject to taxation. A higher rate of inflation will lead to higher METRs and AETRs, all else being equal, unless countries allow taxpayers to index returns for inflation. To ensure comparability across countries, results are shown for the OECD average inflation, averaging across the five-year period from Q3 2011 to Q2 2016. Figure 18 explores the impact of inflation, but more could be done in this area in future work.

4 Housing taxation, distortions, and economic efficiency

35. Variation in taxation across housing investment scenarios can affect investment decisions. While the tax system remains just one of many factors that investors consider, the non-neutrality of housing taxation has the potential to distort savings, investment and financing decisions. There are many margins to consider in this regard, including the tenure status, the source of financing the investment, and the timing of sale. This section uses the ETR methodology to illustrate the policy-driven distortions arising from housing taxation within and between the countries in the study.

36. The section proceeds as follows. Section 4.1 discusses the headline METRs across countries and across tenure and financing types. Section 4.2 decomposes these METRs into their constituent tax components to understand which taxes are driving the METRs. Sections 4.3, 4.4, and 4.5 discuss how METRs vary by tenure type, financing method, and holding period. Section 4.6 discusses how METRs vary depending on whether the returns are primarily earned on a recurrent basis or as a capital gain.

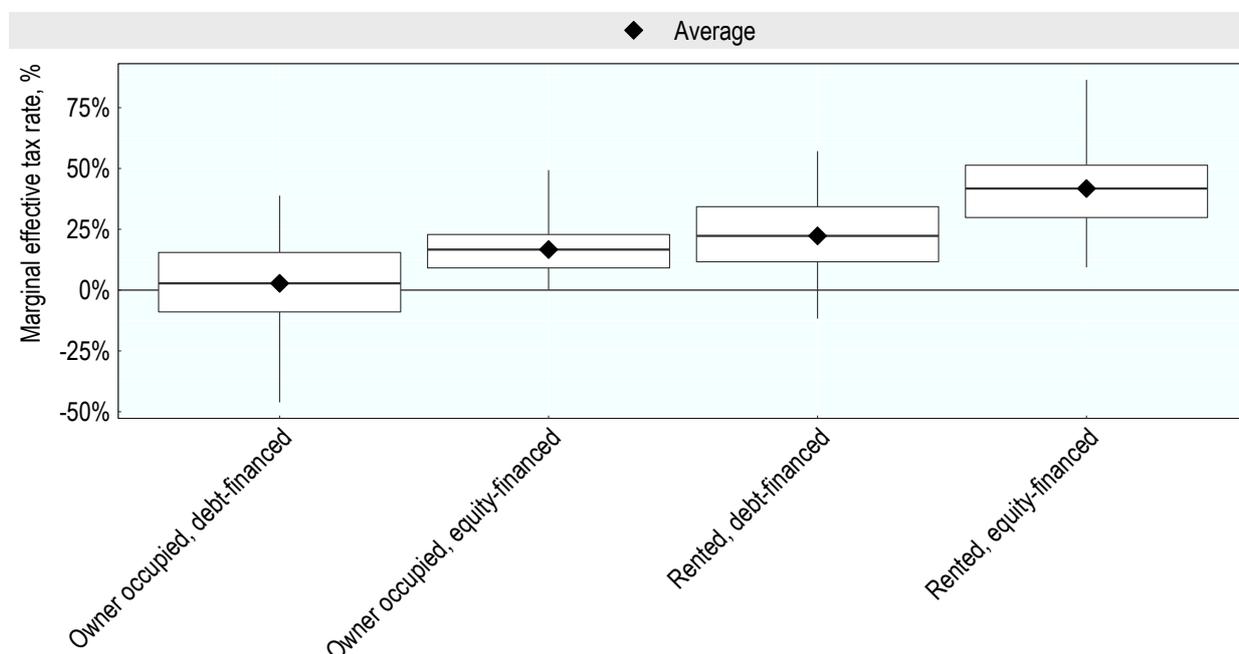
4.1. Marginal Effective Tax Rates across countries

37. Owner-occupied housing is typically tax-favoured compared to rented residential property. Figure 2, which shows average METRs across countries for a taxpayer earning the average wage, illustrates that many countries treat owner-occupied housing differently from other assets and provide exemptions and preferential rates that result in low METRs. Where taxpayers purchase their home with their own savings (equity), the average METR on owner-occupied housing is 16.7% across the countries included in the METR analysis. This is substantially lower than where taxpayers purchase rented housing assets with own savings (41.8% on average). Figure 2 also shows that there are substantial differences in the tax treatment of housing depending on how the housing is financed. Where taxpayers use debt finance, the METR for owner-occupied housing is 2.8% on average across the 40 countries considered; the lowest rate of any investment scenario. The METR for debt-financed rented housing is 22.3% on average.

38. Investment in housing is subsidised by the tax system in some countries. METRs are negative where the deductions and credits applied to investments in property outweigh the taxes levied over the life of the investment. Figure 2 shows that a portion of the countries considered in the study have negative METRs in the two debt-financed investment scenarios. This is further discussed in section 4.4.

Figure 2. Marginal effective tax rates, all housing investment scenarios, average across 40 countries, 2016

Average, first, and third quartiles



Note: Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. The line in the middle of the box represents the average, not the median. The top and bottom lines of the box represents the third and first quartiles, respectively, and the vertical lines represent values outside the third and first quartiles.

39. Figure 3 shows METRs for each country in more detail. The extent of within-country variation in the taxation of different housing investment scenarios varies across countries. METRs on housing assets in Colombia suggest broadly neutral taxation across housing investment scenarios, as the METR for an average-income taxpayer for an investment in owner-occupied housing is only 0.3 percentage points (pp) more than the METR for rented property, and where equity-financed and debt-financed investments receive the same tax treatment. No other country approaches neutrality across all housing investment scenarios, but some countries do impose the same rate across debt- and equity-financed investments, or across rented and owner-occupied housing. Fourteen countries have negative METRs on owner-occupied, debt-financed housing, ranging from -5.2% in Japan to -46.1% in the Netherlands, while two countries apply negative METRs to rented, debt-financed housing, at -5.6% in Luxembourg and -11.7% in Sweden. All countries tax equity-financed property at positive rates, which indicates that tax treatment of debt is an important driver of low and negative METRs.⁹

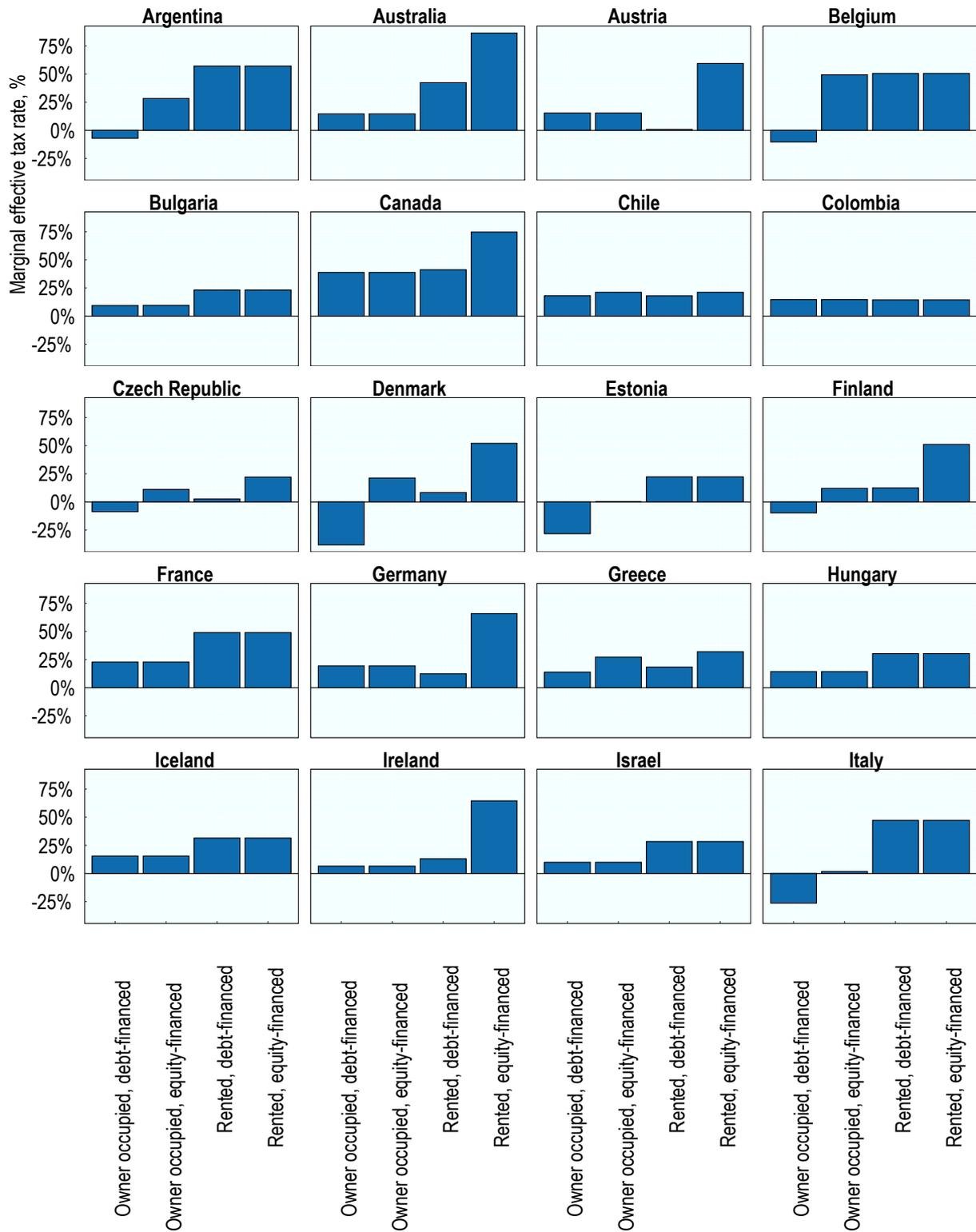
40. It is possible to distinguish four approaches to neutrality across housing investment scenarios in Figure 3. In the first group, METRs align across different forms of financing but owner-occupied and rented housing are taxed at different rates. In the second category, METRs align across forms of financing for either owner-occupied or rented housing. In the third category, METRs align across tenure type but equity-

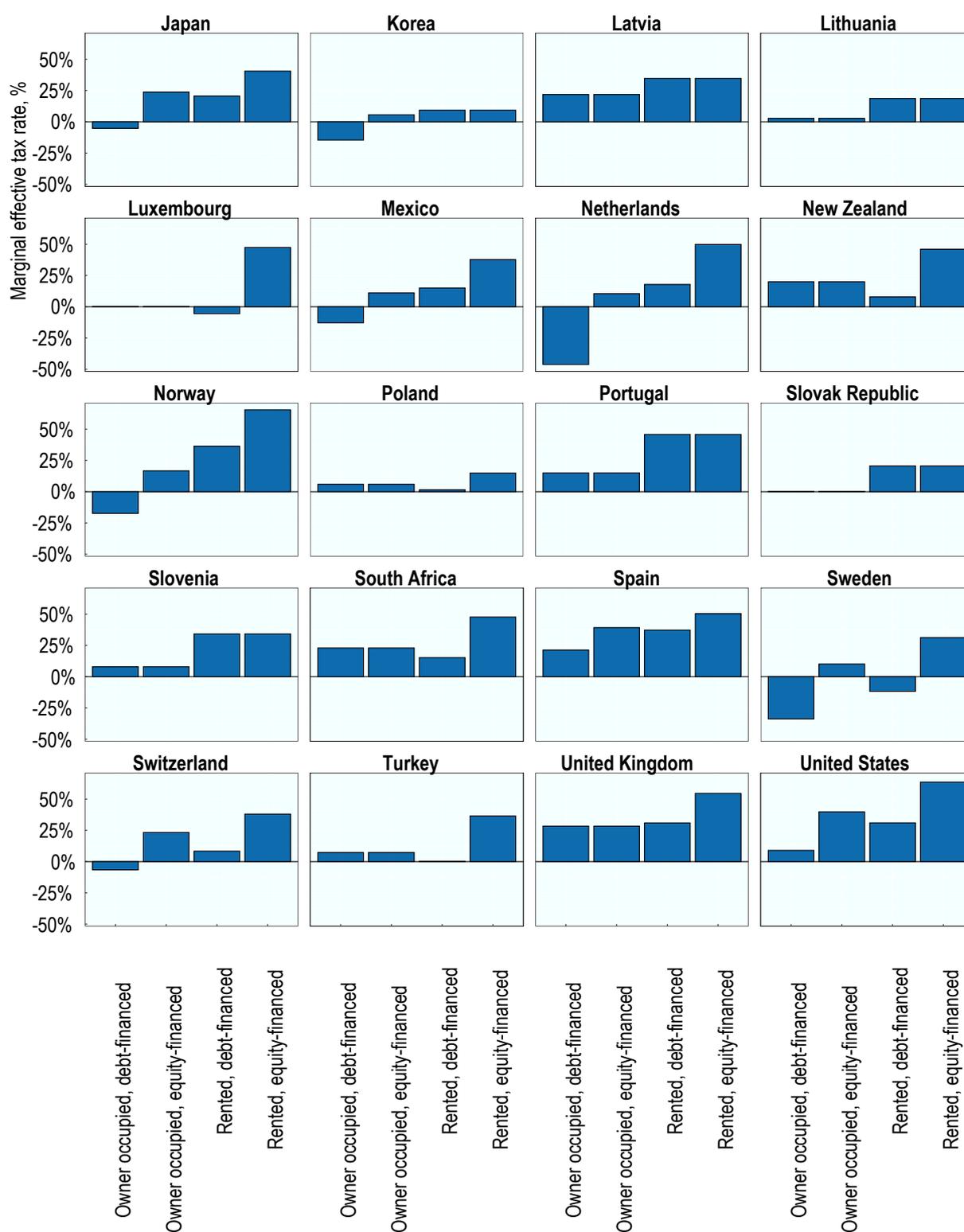
⁹ The tax treatment of debt-financed housing is discussed in more detail in Section 4.4

financed and debt-financed investments are taxed at different rates. In the fourth category, METRs do not align across any tenure or finance type. These categories describe the differences in effective taxation between finance and tenure scenarios in all 40 countries considered in the paper, except for Colombia where METRs are broadly neutral across all forms of tenure and financing.

- **Category 1: METRs align across equity and debt financing but owner-occupied and rented housing are taxed at different rates.** Nine countries fall into this category, where METRs are the same whether the taxpayer uses debt-finance or equity-finance (France, Hungary, Iceland, Israel, Latvia, Lithuania, Portugal, Slovak Republic and Slovenia). In all countries, owner-occupied property is taxed at a lower rate than rented housing. Most of these countries do not allow taxpayers to deduct mortgage interest, regardless of tenure, but do tax recurrent income and capital gains on rented housing.
- **Category 2: METRs align across equity and debt financing for one of the two forms of tenure and do not align for the second tenure type.** Six countries tax rented housing at the same effective rate whether taxpayers use equity- or debt-finance (Argentina, Belgium, Bulgaria, Estonia, Italy and Korea), but the METRs on owner-occupied housing differ. In these countries, owner-occupied housing is always taxed at lower rates when financed with debt than when the investment is financed with equity. In a further 11 countries, METRs on owner-occupied housing are the same whether taxpayers use equity- or debt-finance (Australia, Austria, Canada, Germany, Ireland, Luxembourg, New Zealand, Poland, South Africa, Turkey and the United Kingdom). METRs on debt-financed rented housing in these countries are consistently lower than those on equity-financed rented housing.
- **Category 3: METRs align across owner-occupied and rented housing, but debt-financed and equity-financed housing are taxed at different rates.** Only one country, Chile, imposes the same METRs whether the housing is rented or owner-occupied, but debt-financed investments face lower METRs than equity-financed investments. Neither rent nor imputed rent are taxed in Chile, but taxpayers may deduct the cost of mortgage finance.
- **Category 4: METRs do not align across any tenure or finance type.** METRs did not align across any finance or tenure type in 12 countries (Czech Republic, Denmark, Finland, Greece, Japan, Mexico, Netherlands, Norway, Spain, Sweden, Switzerland and the United States), but debt-financed owner-occupied housing is consistently the most tax-favoured asset. In these countries, debt-financed rented housing is always taxed at lower rates than equity-financed rented housing.

Figure 3. Marginal effective tax rates, all housing investment scenarios, all countries, 2016





Note: Results are presented for a taxpayer earning 100% of average wage; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

4.2. Tax policies driving variation in Marginal Effective Tax Rates

41. The range of taxes that are levied on housing and the tax relief provided for housing investments typically depend on the tenure and finance type. Figure 4 shows the contribution of each tax category to the four key housing investment scenarios considered in this study for a taxpayer earning the average wage. Income taxes, recurrent taxes on immovable property, transaction taxes, capital gains taxes and net wealth taxes can increase METRs, while tax relief for mortgage interest or a share of the outstanding mortgage balance can lower METRs. A breakdown of METRs on equity-financed housing for all 40 countries in the paper is shown in Figure 5 and a breakdown for debt-financed housing for all 40 countries is shown in Figure 6.

42. Mortgage interest relief drives the lower METRs for debt-financed property compared to equity-financed property¹⁰. Tax relief for mortgage interest can significantly reduce the tax liability generated by a housing investment by reducing the financing cost, usually at the taxpayer's marginal income tax rate. On average across all countries, the reduction in tax liability on owner-occupied housing due to mortgage interest relief nearly outweighs the combined effect of all other taxes. Mortgage interest relief reduces the METR by 14.2 pp in the debt-financed owner-occupied case (Figure 4). This is close to the average tax liability due to transaction taxes, recurrent property taxes, income taxes, capital gains taxes and net wealth taxes combined (17.0 pp). Mortgage interest relief reduces the METR on rented housing by 19.0 pp on average, which is slightly smaller than the combined value of net wealth taxes, capital gains taxes, transaction taxes and recurrent property taxes combined (21.4 pp), to which income taxes on rental income (20.4 pp) are added to result in a positive average METR on rented housing. Mortgage interest relief is discussed further in Section 4.3.

43. The taxation of rental income and the non-taxation of imputed rents of owner-occupied housing is an important driver of the differences in METRs between rented and owner-occupied housing, respectively. On average, taxes on rental income contribute 20.5 pp to rented property METRs, while taxes on imputed income on owner-occupied housing contribute 0.7 pp to METRs. This reflects the widespread practice of taxing income from rented property, which occurs in 35 countries, and of the non-taxation of imputed income from owner-occupied property, which occurs in 38 countries.

44. After mortgage interest relief and income taxation, recurrent taxes on immovable property are the most significant component of METRs on housing. On average, recurrent property taxes contribute 9.5 pp to the tax liability on owner-occupied property and 10.2 pp for rented property. This is followed by transaction taxes on property, which make up 5.0 pp (owner-occupied property) to 5.5 pp (rented property) of the total METR. While transaction taxes are a significant element of housing taxation, these one-off taxes decrease as a share of METRs over time. Given the standard assumption of a 20-year holding period, transaction taxes appear to be a smaller component of METRs than recurrent taxes on immovable property, typically levied on an annual or quarterly basis. Section 4.5 explores this in more detail.

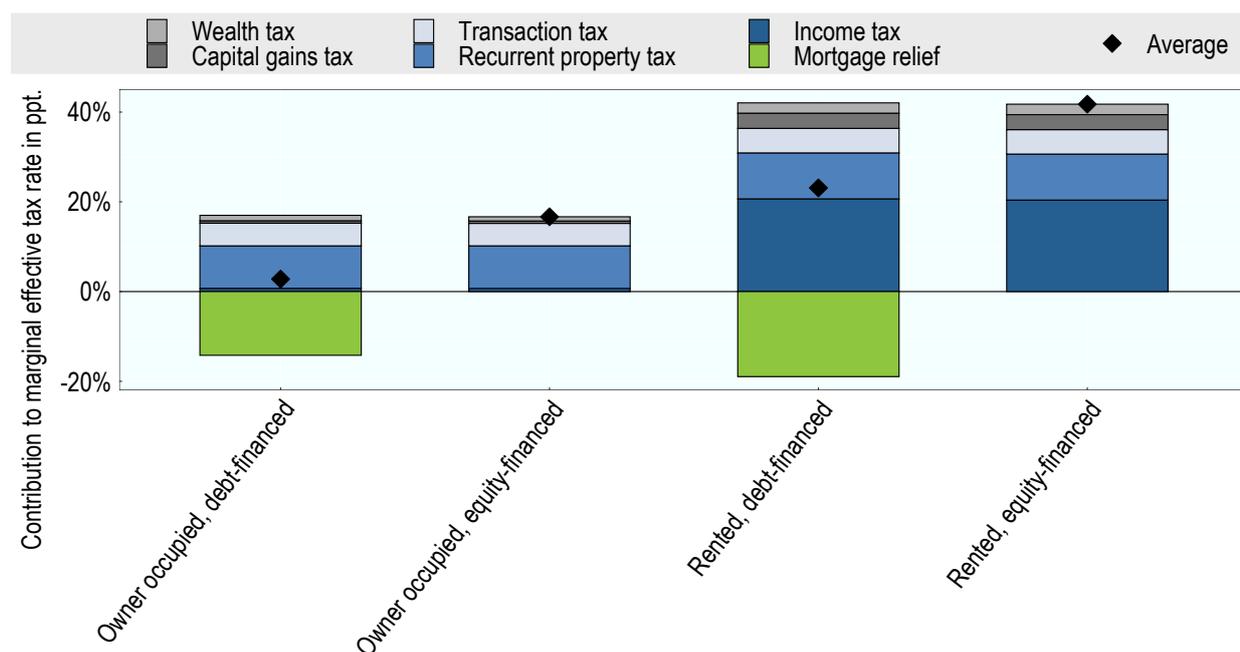
45. While many countries provide tax exemptions for capital gains on owner-occupied housing, capital gains on rented housing are typically subject to taxation, in some instances at standard marginal income tax rates. Capital gains taxes contribute 3.4 pp to the average METR on rented housing and 0.5 pp to the average METR on owner-occupied property. The modest effect of capital gains taxes on METRs for owner-

¹⁰ In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment. All other countries providing mortgage interest relief provide a tax credit or deduction for mortgage interest.

occupied housing can be explained by the fact that 28 countries exempt capital gains on the primary residence.¹¹

46. Few countries in the sample levy net wealth taxes, which is reflected in the small role that these taxes play in average METRs across all housing types. Net wealth taxes, levied in only six countries considered in the paper, contribute 2.3 pp to the average METR for rented housing and around one percentage point for owner-occupied housing.

Figure 4. The composition of marginal effective tax rates, all housing investment scenarios, average across 40 countries, 2016



Note: Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

47. In most countries, the composition of METRs on equity-financed owner-occupied housing is similar to the average shown in Figure 4. Figure 5 shows that recurrent taxes on immovable property, levied in 35 countries, and transaction taxes, levied in 29 countries, are major drivers of METRs on owner-occupied property. Recurrent property taxes are a larger component of the average METRs than transaction taxes (note that the 20-year holding period reduces the importance of one-off transaction taxes; see Figure 10) and are levied in more countries than transaction taxes. Despite this, transaction taxes are a larger component of the METRs in 14 of the 26 countries where they are levied in conjunction with recurrent property taxes on owner-occupied property. Capital gains taxes, net wealth taxes, and income taxes are relatively small elements of the average METRs on owner-occupied equity-financed housing. This is in part because they are levied in only a small number of the countries. Capital gains taxes are levied on owner-occupied property in just five countries and are usually a small component of their METRs. Net

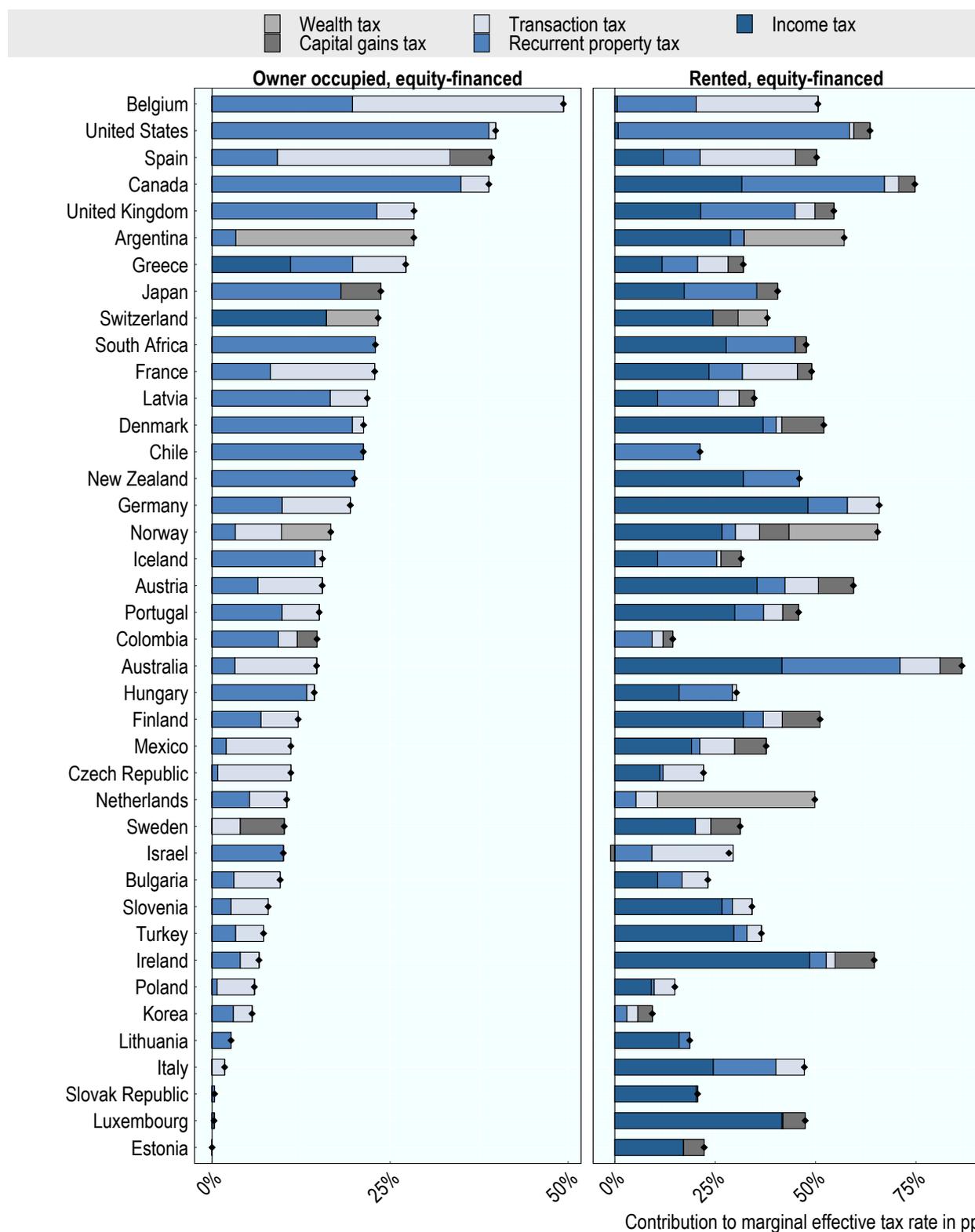
¹¹ It is assumed throughout this study that the owner-occupied housing category is the taxpayer's primary residence, and as such benefits from all the tax benefits that may accrue to the primary residence. See Section 3 for further details on all assumptions.

wealth taxes are levied in six countries, but apply to average income taxpayers in only three countries. In addition to income taxes, levied in two countries, net wealth taxes can be significant in the countries that levy them, although they are small components when an average is taken across the entire group of countries.

48. Most countries levy income taxes and recurrent property taxes on equity-financed rented residential property. Figure 5 shows that income taxes are the largest component of the METRs in 27 of the 36 countries that tax rental income, and are larger than all other taxes combined in 22 countries. While recurrent property taxes are rarely the largest component of the METRs, they are levied on rented residential property in 36 countries. Transaction taxes are levied in 30 countries and are a small component of the METRs in most countries (due in part to the long holding period), however, they are significant in a minority of countries. Capital gains taxes, levied in 26 countries, are more widespread and a larger component of the METRs for rented residential property than for owner-occupied housing. The smallest tax component of the METRs on rented housing, as for owner-occupied housing, is net wealth taxes. These are a significant component of the METRs on rented housing in the three countries where they apply to average income taxpayers.

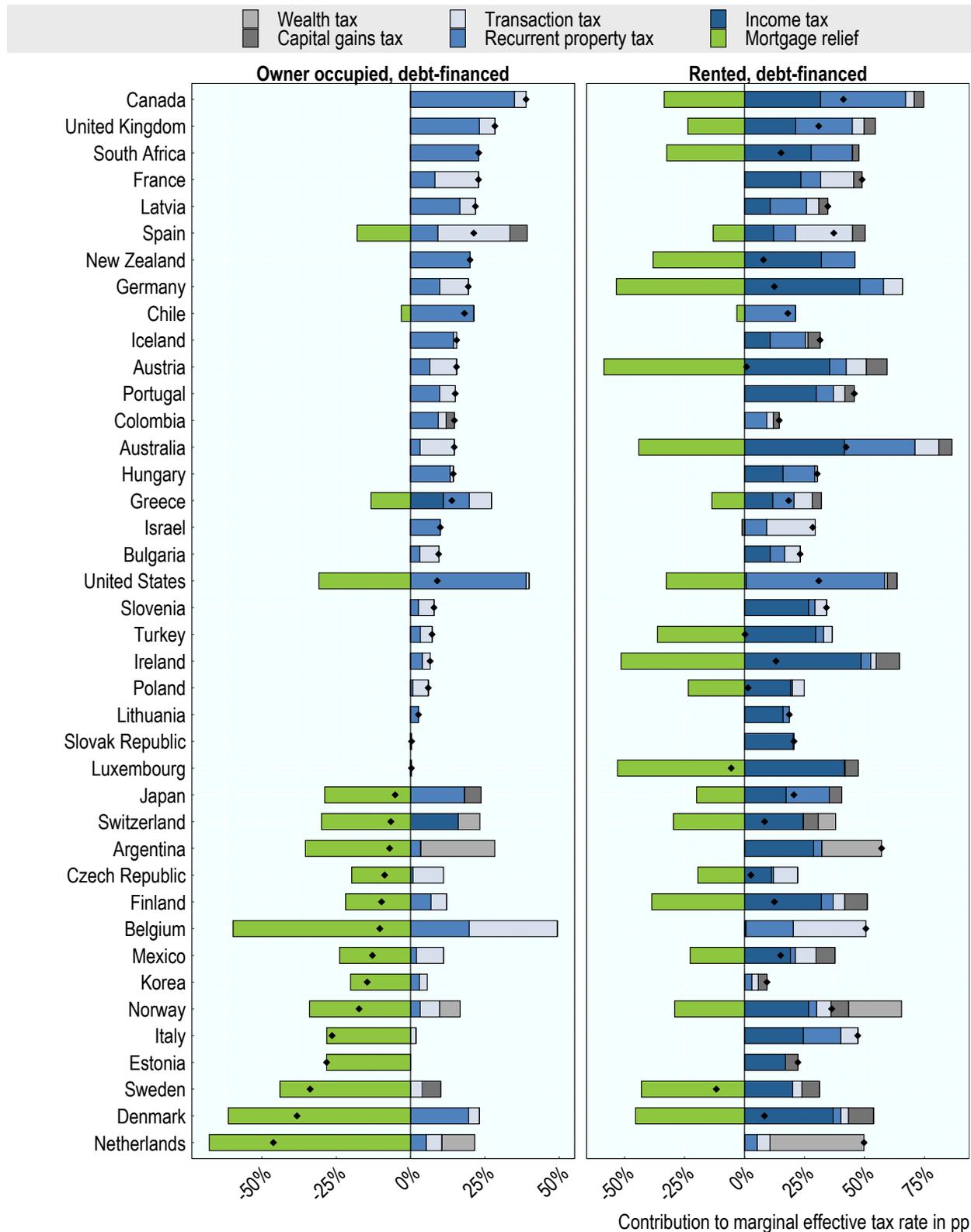
49. Figure 6 shows mortgage interest relief is a significant component of the METRs on debt-financed housing, whose composition is otherwise similar to the composition of equity-financed housing METRs. Mortgage interest relief is a large share of the METRs in a number of countries for both owner-occupied and rented housing. This tax relief is the largest component of the METRs on owner-occupied housing in 15 of the 21 countries with this relief and is the largest component of the METRs on rented housing in 19 of the 27 countries that provide this relief. The value of mortgage interest relief is greater than all taxes on owner-occupied property in 14 countries and on rented property in two countries.

Figure 5. The composition of marginal effective tax rates, equity financed housing, all countries, 2016



Note: Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

Figure 6. The composition of marginal effective tax rates, debt-financed housing, by country, 2016

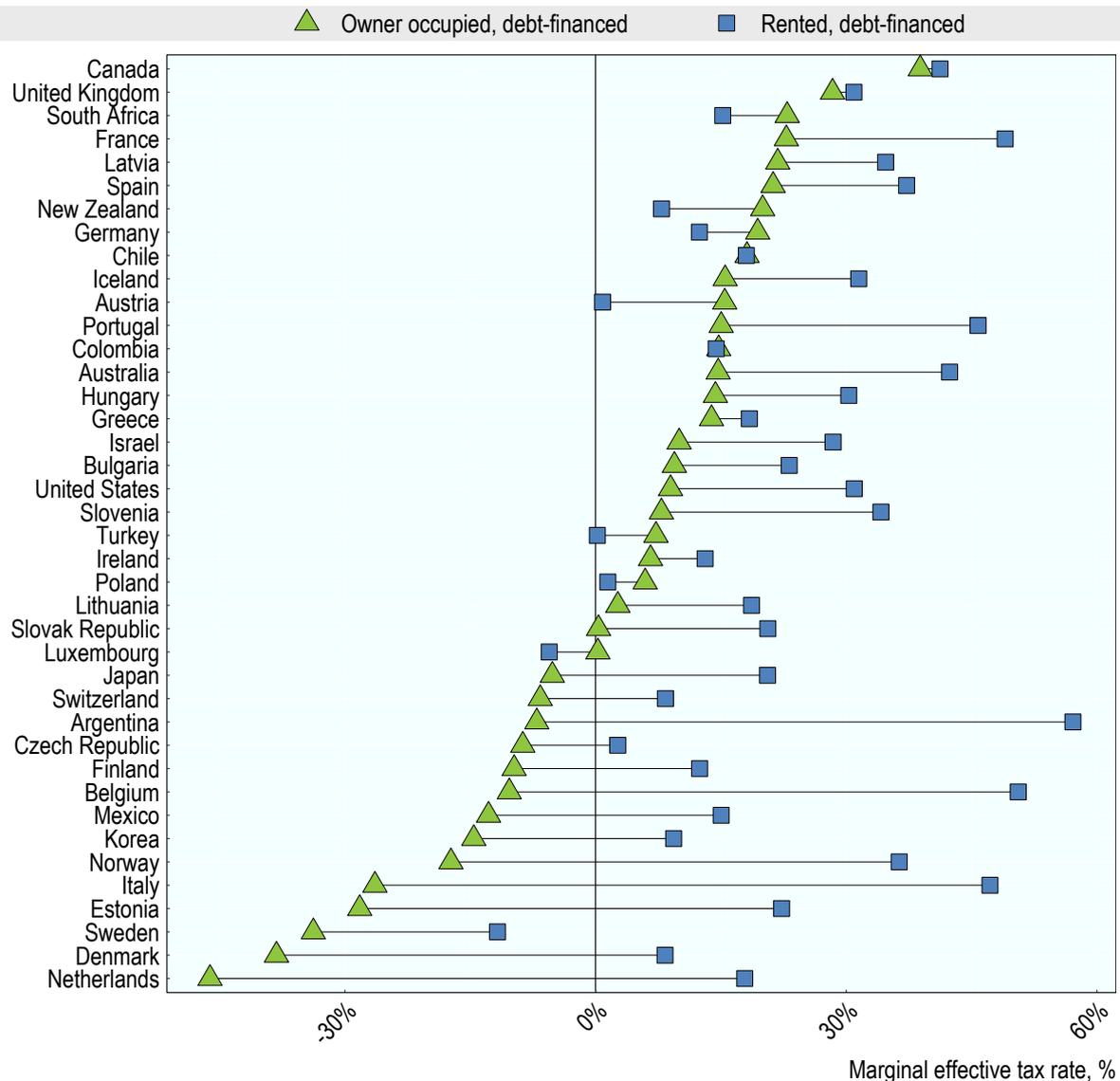


Note: Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

4.3. Marginal Effective Tax Rates by tenure type

50. Figure 7 shows that the difference in tax treatment between debt-financed owner-occupied and rented housing varies substantially across countries. The largest differences owing to tenure type occur in Italy, where METRs on owner-occupied housing are -26.4% and METRs on rented housing are 47.2%, a difference of 73.6 pp. The smallest difference is in Chile, where there is only 0.1 percentage point difference between tenure types. Across countries, rented housing has a smaller range of METRs than owner-occupied housing. The difference between the highest and lowest METRs on owner-occupied debt-financed housing (38.9% in Canada and -46.1% in the Netherlands) is 85.0 pp. In comparison, the difference between the highest and lowest METRs on rented debt-financed housing (57.1% in Argentina and 11.7% in Sweden) is 45.4 pp. Most countries tax owner-occupied debt-financed housing at lower rates than rented debt-financed housing. However, in one country owner-occupied and rented housing is taxed at the same rate (Chile) and in eight countries rented housing receives more favourable tax treatment (Austria, Colombia, Germany, Luxembourg, New Zealand, Poland, South Africa and Turkey). Most of these countries provide mortgage interest relief on rented housing but not on owner-occupied housing.

Figure 7. Marginal effective tax rates, debt-financed housing, by country, 2016

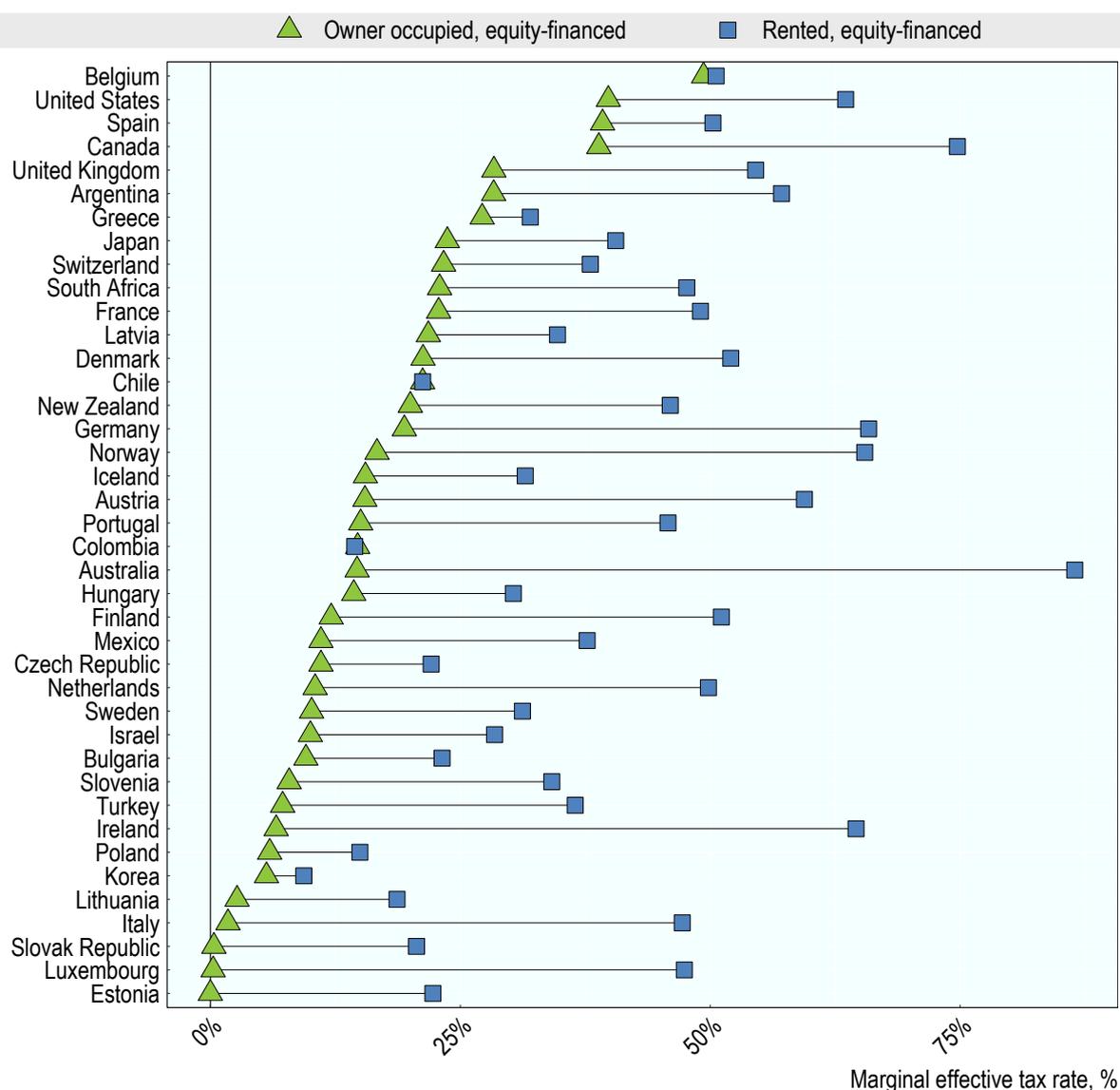


Note: Results are presented for a taxpayer earning 100% of average wage; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

51. Figure 8 shows a similar pattern for equity-financed housing, where owner-occupied and rented housing typically face different METRs within countries. While the debt-finance scenario is likely to be more common, it is important to examine equity-financed housing investments as some taxpayers will still use equity finance; for example, a taxpayer with a high level of wealth but whose income is too low to service debt. The largest difference owing to tenure type occurs in Australia, where METRs on owner-occupied housing are 14.7% and METRs on rented housing are 86.5%; a difference of 71.8 pp. The smallest difference between tenure types occurs again in Chile. Nearly all countries impose lower METRs on equity-financed owner-occupied property than on equity-financed rented property. However, in Colombia rented housing has slightly lower METRs than owner-occupied property (14.4% compared to 14.7%) due to the slightly higher rates of depreciation for rented property. Unlike in the debt-financing case, the METRs on equity-financed rented housing have a larger range across countries than METRs on owner-occupied

housing. The difference between the highest and lowest METRs on rented equity-financed housing (86.5% in Australia compared to 9.3% in Korea) is 77.2 pp. In comparison, the difference between the highest and lowest METRs on equity-financed owner-occupied housing (49.3% in Belgium and 0% in Estonia) is 49.3 pp.

Figure 8. Marginal effective tax rates, equity-financed housing, by country, 2016



Note: 100% of average wage case; Inflation: OECD average; Holding period: 20 years; Return: 50% capital gain and 50% recurrent

4.4. Marginal Effective Tax Rates by financing type

52. Debt-financed housing investments typically face lower METRs than those financed with equity, because mortgage interest relief offsets the cost of mortgage finance through deductions or credits. Mortgage interest relief is widespread among the 40 countries considered; 21 countries provide it in some form for owner-occupied housing and 27 countries provide it in some form for rented housing. Mortgage interest relief for rented housing allows taxpayers to deduct costs associated with generating taxable rental

income, however, as imputed rental income from owner-occupied housing is rarely taxed, provision of mortgage interest deductibility in this case may be intended to fulfil other policy objectives. In some countries, mortgage interest deductibility results in negative METRs (that is, a tax subsidy) as the tax savings generated from mortgage interest relief outweigh the tax liability on the investment that arises from other tax provisions.

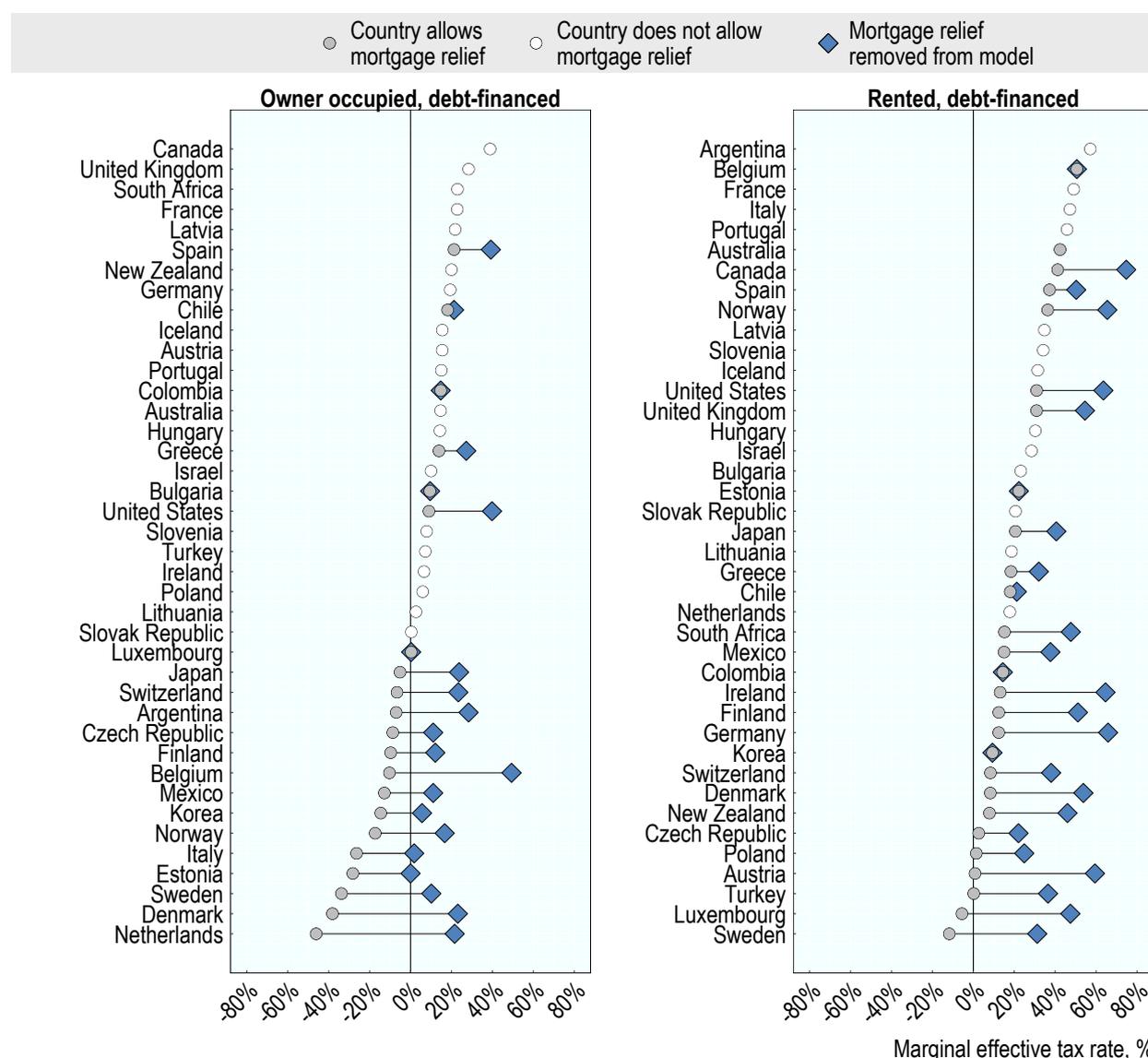
53. Figure 9 shows that many of the lowest METRs on debt-financed owner-occupied housing are levied in countries that have mortgage interest relief and that negative METRs occur in 14 countries. Figure 9 also shows the effect of removing mortgage interest relief from the METRs. When mortgage interest deductions and credits are removed from the model, METRs increase in 19 of the 21 countries that provide this relief for owner-occupied housing. Removing mortgage interest relief increases METRs on debt-financed owner-occupied housing by 27.1 pp on average, to an average METR of 18.6%. The greatest increase occurs in the Netherlands (67.7 pp) and the smallest increase occurs in Bulgaria (0.1 pp). In two countries, the METRs do not vary when mortgage interest relief is removed from the model. In Colombia, this is because for individuals earning the average wage, which is the case that Figure 9 depicts, the marginal income tax rate for housing (and consequently, the rate at which mortgage interest is deducted) is zero. In Luxembourg, mortgage interest relief does not affect the METR as the model assumes that the taxpayer has exceeded the maximum deduction threshold.¹² Without mortgage interest relief, no countries provide a tax subsidy on owner-occupied debt-financed housing.

54. More countries provide mortgage interest relief for rented housing than for owner-occupied housing, although the former is often taxed at higher effective rates, as shown in Figure 9. Of the 27 countries that provide mortgage interest relief for rented housing, 25 countries tax rental income. When mortgage interest relief is removed from the model, METRs increase in 23 of the 27 countries that provide this treatment for rented housing, by 28.1 pp on average. The largest increase is in Austria (58.6 pp) and the lowest in Chile (3.2 pp). When included, mortgage interest relief generates a tax subsidy in only two countries. Although mortgage interest relief generates a significant tax saving, in most countries it is not sufficient to reduce the METRs below 0% because the tax savings are outweighed by several taxes, the most important of which are taxes on rental income.

55. When mortgage interest relief is removed from the model, METRs are higher on average in countries that provide these deductions and credits than in countries that do not. Countries that provide mortgage interest relief have an average METR of 18.6% on debt-financed owner-occupied housing when mortgage interest relief is removed from the model, compared to 15.3% in countries that do not provide this tax relief. A similar pattern occurs with respect to rented housing. Countries that allow mortgage interest relief have an average METR of 44.9% when that relief is removed from the model, which is higher than the average METR for countries that do not have this relief (33.7%). This may indicate that countries target tax relief to homeowners to offset higher taxation of property due to other aspects of the tax system.

¹² Mortgage interest is deductible in Luxembourg up to a maximum amount, which depends on the period of occupation: after five years, the maximum that can be deducted is EUR 750 per year.

Figure 9. Marginal effective tax rates on debt-financed housing, including and excluding mortgage relief, 2016



Note: Results are presented for a taxpayer earning 100% of average wage; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

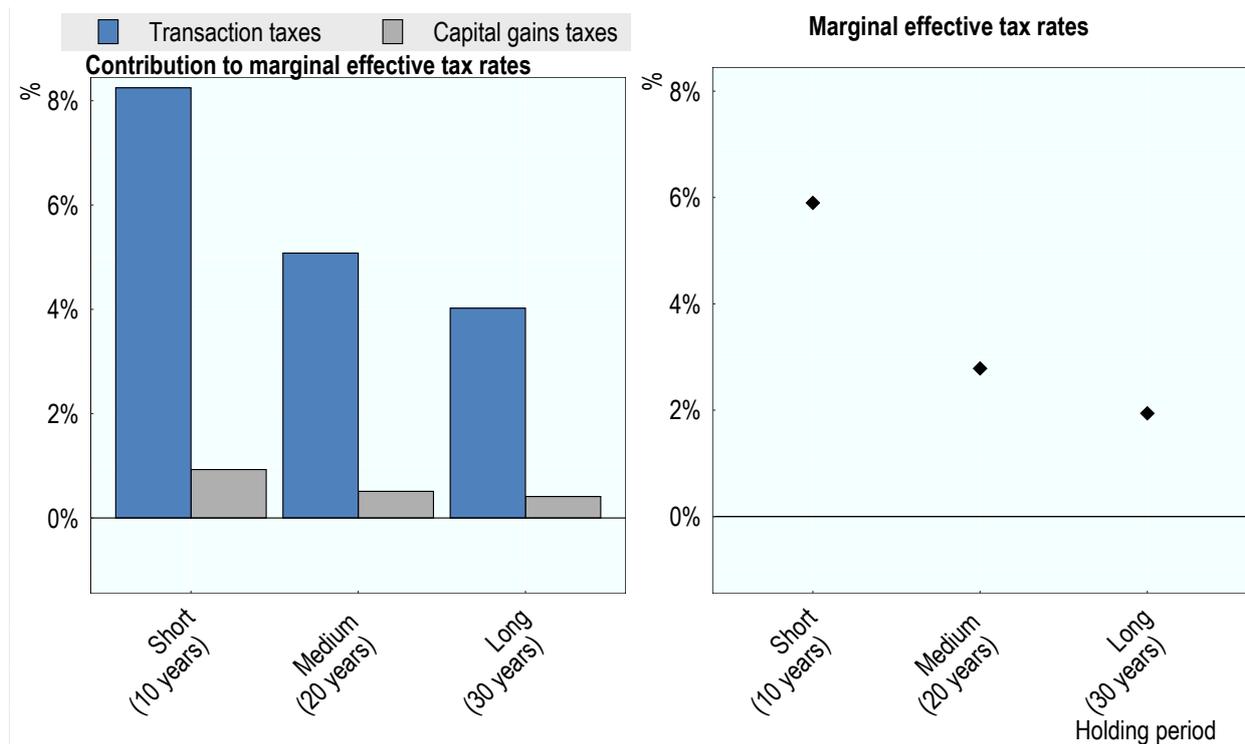
4.5. Marginal Effective Tax Rates by holding period

56. The METR on housing decreases as the taxpayer holds the asset for longer, assuming other factors remain constant. There are three main drivers of this effect. First, the overall METR falls as the cost of transaction taxes are spread over time. Second, many countries offer concessionary treatment with respect to capital gains taxes for housing that is held for long periods, meaning that lower tax rates apply to long-term capital gains in many countries. Third, the deferral effect, as capital gains taxes are levied on realisation instead of accrual, decreases METRs given lengthy holding periods. This section explores these effects through a focus on transaction and capital gains taxes.

4.5.1. Transaction Taxes

57. Transaction taxes decrease in importance as a component of the METRs as the holding period increases. By spreading these up-front transaction taxes over a greater number of years, they fall as a portion of the annual return on investment, lowering the overall METR. As shown in the left panel of Figure 10, the contribution of transaction taxes to the METRs on debt-financed owner-occupied housing decreases as the holding period increases from 10 to 30 years. This is the main driver of the decrease in the METRs over the same holding periods, shown in the right panel of Figure 10.

Figure 10. Marginal effective tax rates and components, varying holding periods, debt-financed owner-occupied housing, average across 40 countries, 2016



Note: Results are presented for owner-occupied debt financed housing. Results are presented for a taxpayer earning 100% of the average wage ; assuming inflation at the OECD average level; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. These results incorporate lower tax rates on long-held assets where these exist.

4.5.2. Capital Gains Taxes

58. The taxation of capital gains on owner-occupied housing may depend on the length of time that the taxpayer holds the asset. Figure 10 shows that taxes on capital gains decrease as a portion of the total return on investment as that return increases over time. There are two reasons for this, the impact of deferral on the net present value of capital gains taxes, and reduced capital gains tax rates on long-held assets.

59. Capital gains taxes are lower for longer-held assets, as taxpayers can defer a capital gains tax liability until they dispose of the asset. Although capital gains accrue over the life of the investment, capital gains taxes are levied on realisation instead of accrual. The deferral effect reduces the net present value of the tax liability in real terms, even though the total return will be greater as the taxpayer holds the asset for longer. This means that in the model, capital gains tax liabilities fall with increased holding periods even

in the absence of any concessionary policies and despite the higher capital gain that taxpayers may earn due to a longer-term investment.

60. In addition to the effect of deferral, capital gains on long-term investments are often subject to concessionary tax treatment in many countries' tax systems. Owner-occupied housing benefits from concessionary treatment in the form of lower rates, deductions and exemptions from capital gains taxes in many countries considered in this study. However, this treatment is often conditional on a long holding period or on whether a housing investment is used as a main residence. For example, owner-occupied housing is exempt from capital gains after ten years in Germany, while Lithuania exempts capital gains on the condition that the housing was used as the main residence for at least two years. Some countries also provide concessionary treatment of capital gains on rented housing, conditional on a long holding period. For example, four countries exempt capital gains on rented housing after five years (Belgium, Czech Republic, Hungary and Italy).

61. Where capital gains are taxed at the taxpayer's marginal income tax rate, taxpayers may time the disposal of housing assets to coincide with periods of lower income, such as during retirement. As labour income may drop upon retirement, and because pension income is often exempt from income tax, taxpayers may have an incentive to delay disposal of housing until their marginal income tax rate has dropped.

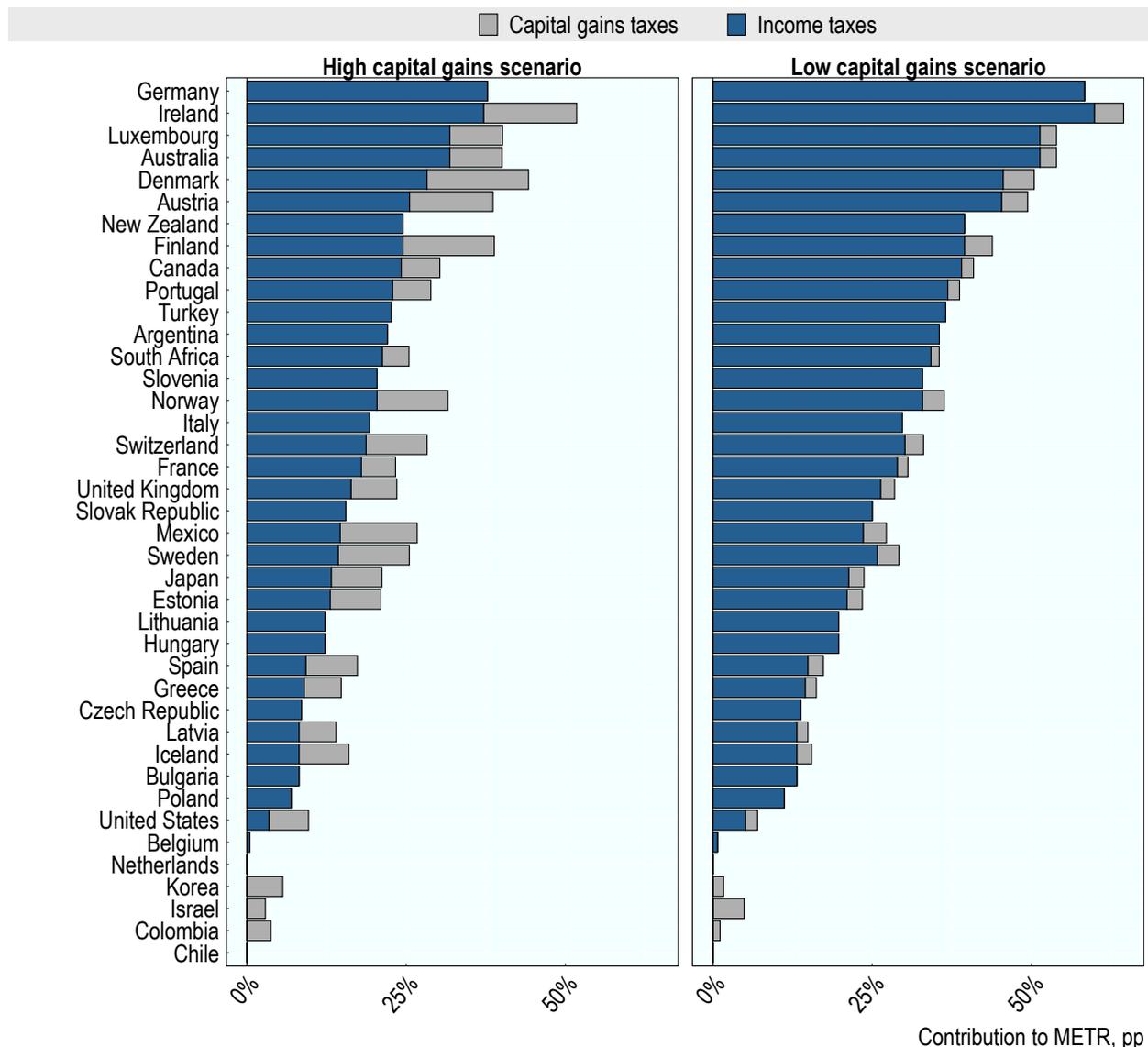
4.6. Marginal Effective Tax Rates by capital gains versus recurrent returns

62. The balance between recurrent returns and capital gains depends in part on market conditions. Where housing prices are increasing, capital gains may be a larger portion of the return than actual or imputed rent. Where a housing asset experiences a capital gain in one period, the model assumes that the taxpayer retains the unrealised capital gain in their housing. That is, the household retains the more valuable housing, rather than selling part of the housing asset to return to the original value. As a result, the total value of the housing asset increases. The recurrent return is a function of the new, higher housing value, which reflects that a more expensive property can yield a higher market rent. This section considers different combinations of recurrent and capital gain return for equity-financed housing investment scenarios.

63. METRs are lower in housing markets where property values are increasing. Figure 11 shows METRs with two different return scenarios; a high capital gains scenario (75% of total return) and a low capital gains scenario (25% of total return),¹³ with recurrent returns making up the remainder (25% and 75% of the return, respectively). METRs are lower in the high capital gains scenario; as a greater share of the return is taxed at lower capital gains tax rates and a smaller share of the return is taxed at higher income tax rates. In markets where more of the return is earned in the form of a capital gain due to increasing housing values, METRs will be lower than in markets when housing values remain stable and a larger portion of the return is recurrent.

¹³ The return scenario for all other figures in the paper is 50% capital gains and 50% recurrent returns.

Figure 11. Contribution of capital gains taxes and income taxes to marginal effective tax rates, varying forms of return, rented equity-financed housing, all countries, 2016

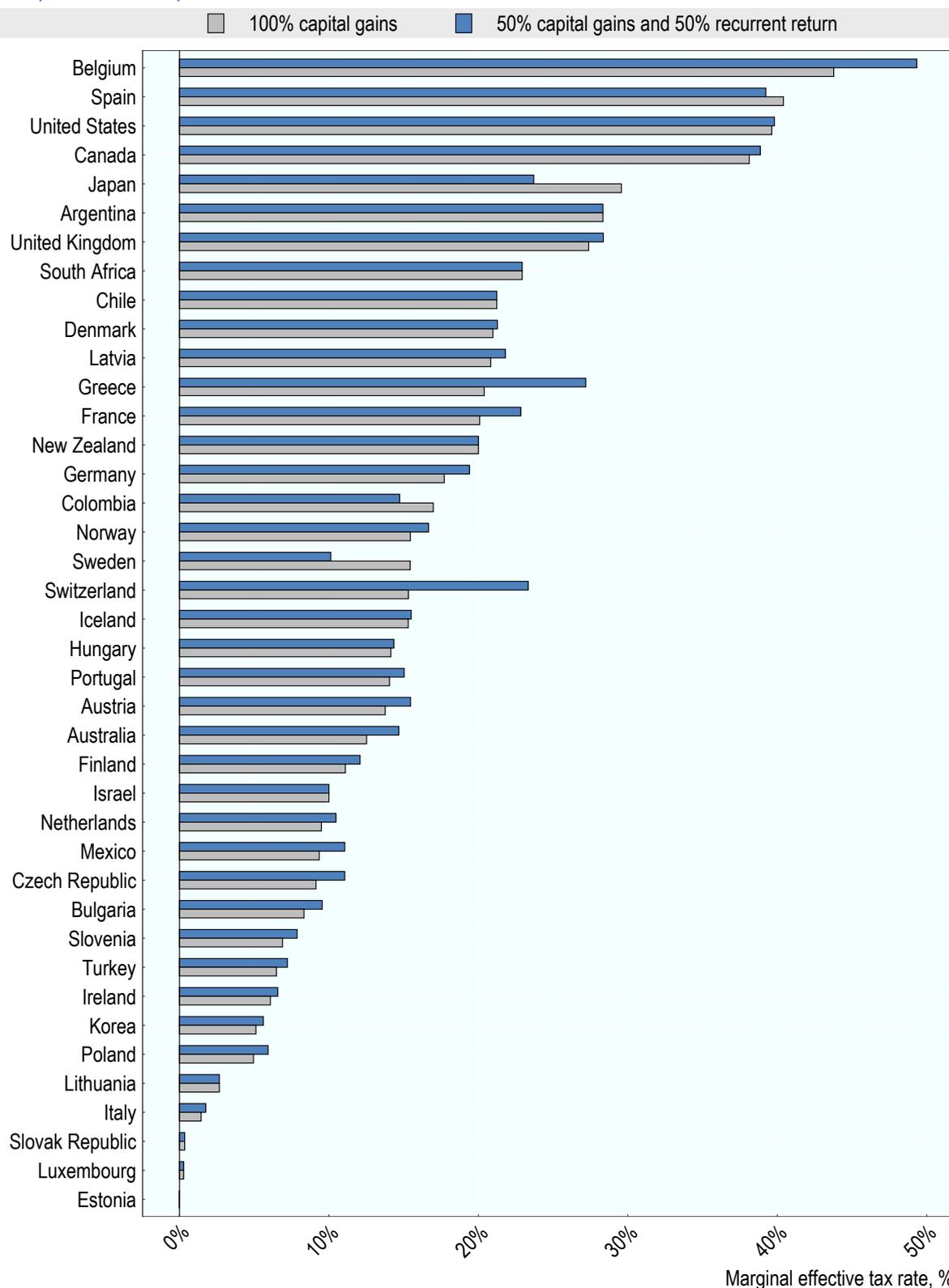


Note: Results are presented for rented debt-financed housing. Results are presented for a taxpayer earning 100% of average wage; assuming inflation at the OECD average level; with a 20-year holding period. In the high capital gain scenario, the return is set to be 75% capital gains and 25% rent. In the low capital gains scenario, the return is set to be 25% capital gains and 75% rent.

64. The METRs are remarkably similar when considering different return scenarios for owner-occupied housing. Figure 12 shows a scenario where the return is evenly split between capital gains and recurrent return (the assumption made throughout this paper) and a scenario with only a capital gain and no recurrent return. The figure shows that METRs are typically lower in the full capital gains scenario but that the difference is small. Removing the recurrent return does not have a significant impact on the METRs because few countries tax the recurrent return on owner-occupied housing (as discussed in section 2.2). These results should be interpreted with caution for countries that do tax the recurrent return on equity-financed housing (Denmark, Greece, and Switzerland).¹⁴

¹⁴ Note that the Netherlands only taxes the recurrent return when the housing investment is at least partially debt-financed. Figure 12 shows equity-financed owner-occupied housing.

Figure 12. Marginal effective tax rates on equity-financed owner-occupied housing, varying forms of return, all countries, 2016



Note: Results are presented for owner-occupied equity-financed housing. Results are presented for a taxpayer earning 100% of average wage; assuming inflation at the OECD average level; with a 20-year holding period.

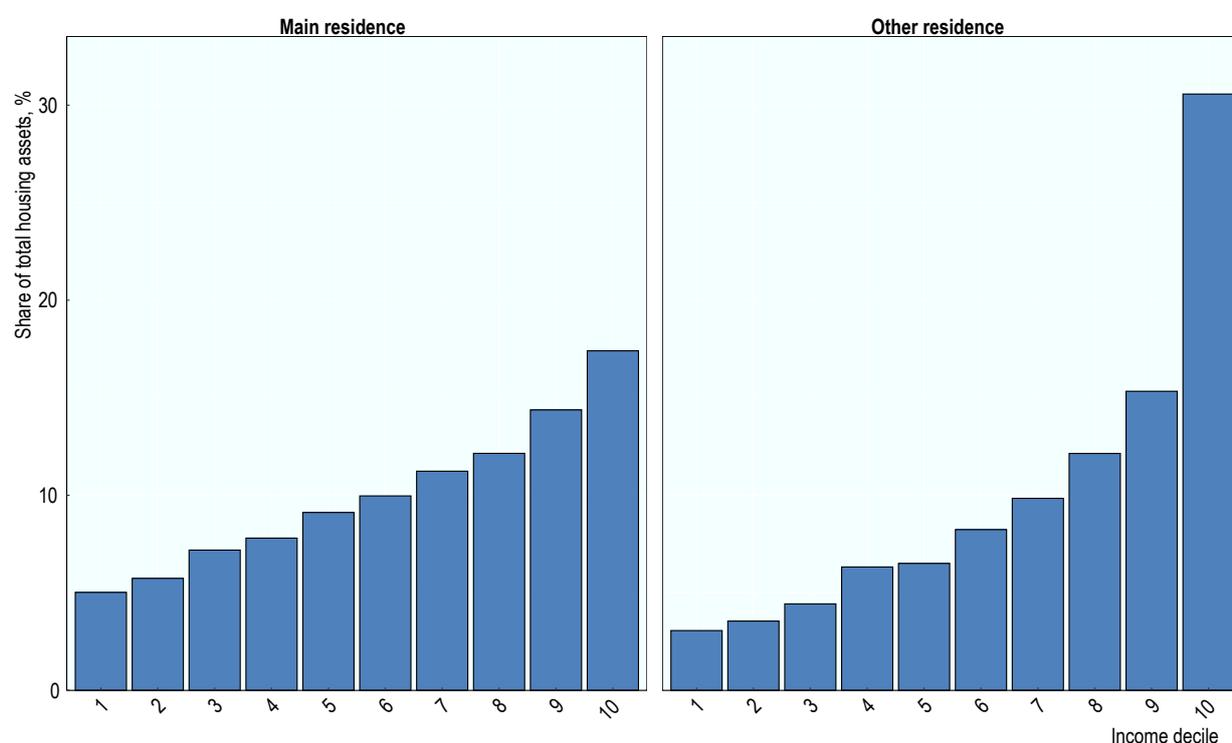
5 Housing taxation and equity

65. This section explores some of the main equity dimensions of housing taxation; in particular how housing taxation varies across the property owner's level of income as well as across the return on housing investment. The discussion focuses on debt-financed housing, on the basis that many taxpayers are unlikely to possess the necessary savings to purchase housing outright and that taxpayers would take advantage of the favourable treatment of debt-financing discussed in the previous section. This section proceeds as follows. Section 5.1 provides some background on the link between homeownership and income levels. Section 5.2 discusses the METR rates across countries and across income levels. Section 5.3 decomposes the METRs to examine the tax policies driving the METRs. Section 5.4 examines the METRs in different macroeconomic contexts and section 5.5 presents average effective tax rates (AETRs) on housing investments across different rates of return.

5.1. Housing ownership and income levels

66. High-income households own a greater share of housing assets. Using data from the European Central Bank's Household Finance and Consumption Survey (HFCS, 2016), Figure 13 shows that the share of total housing wealth rises with income on average across 18 European countries. Households in the top income decile own close to a fifth of all wealth held in the form of main residences (17.4%), while the share for households in the bottom income decile is just 5.0%. The share of wealth held in other residences is more skewed than the share of wealth in main residences. Top earners own nearly a third of all wealth held in other residences (30.6%), compared to just 3.1% for the lowest-income households. Although the HFCS data do not show whether other residences are rented properties, it is clear that high earners have a greater propensity to earn income from another residence. These broad trends hold in all 18 European countries measured in the HFCS, though housing wealth is more concentrated around upper middle-income households in some countries (OECD, 2018^[9]).

Figure 13. Share of total housing assets by income deciles, unweighted average of 18 European countries, 2013-14



Note: Data are for 2013-2014. Average for 18 European countries: Austria, Belgium, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Slovenia and Spain.

Source: Authors' calculations based on Household Finance and Consumption Survey

67. The asymmetric propensity to hold housing wealth means that housing taxation has significant distributional consequences. Higher-income households hold more wealth in main residences and can derive greater benefit from the favourable taxation of owner-occupied housing.¹⁵ In countries where rented housing is taxed at low rates, this may provide greater benefit to high-income households who are better placed to invest in rental property. In addition, tax deductions that allow taxpayers to reduce their taxable income at their marginal personal income tax rate provide a greater benefit to high-income earners. On the other hand, high-income earners may not benefit from exemptions that lower the tax burden for low and average earners.

5.2. Marginal Effective Tax Rates across income levels

68. Looking at METRs across income level groups on average across all countries, the average-income taxpayer investing in debt-financed owner-occupied housing faces the lowest METRs on residential property. This is compared to the low-income taxpayer (earning 67% of the average wage) and the high-income taxpayer (earning 500% of the average wage) and across the four housing scenarios

¹⁵ OECD (2018) finds that the main residence is a greater share of household wealth for lower-income European households, but some countries exhibit a U-shaped pattern where the main residence is the largest component for middle-class households. Given the importance of housing for household wealth of lower- and middle-income households, they may derive greater relative benefit from favourable taxation of housing, even if higher-income households may derive greater absolute benefit.

(rented or owner-occupied; debt- or equity-financed). Figure 14 shows that for owner-occupied property, the METR on average-income taxpayers (earning 100% of the average wage) is 2.8%, which is below the 2.9% METR levied on low-income taxpayers and the 6.6% METR levied on high-income taxpayers.

69. Average METRs on owner-occupied housing mask substantial heterogeneity across countries. Across countries, METRs are commonly the same for low-income and average-income taxpayers (Figure 15). In 11 countries, METRs are highest for the high-income taxpayer. In these countries, the METRs applying to low-income and average-income taxpayers are the same and are lower than the METR applying to the high-income taxpayer (Belgium, Canada, Estonia, Finland, France, Greece, Israel, Korea, Lithuania, South Africa, Spain). However, in two countries, METRs are instead lowest for the high-income taxpayers and highest for the low- and average-income taxpayers, who are taxed at the same rate (Colombia, Netherlands). The METRs are the same across all income levels (flat rates) in 20 countries, while the METRs in two countries are progressive (Latvia, Portugal). Progressive rates apply for recurrent property taxes in Latvia and for transaction taxes and capital gains taxes in Portugal. The METRs are regressive in two countries (Mexico, United States). Deductions rise with income as they apply at progressive marginal PIT rates in Mexico (mortgage interest deduction) and the United States (mortgage interest deduction and recurrent property tax deduction). In contrast to the average, the METRs on average-income taxpayers are higher than the METRs on low- and high-income taxpayers in two countries (Chile and Switzerland).

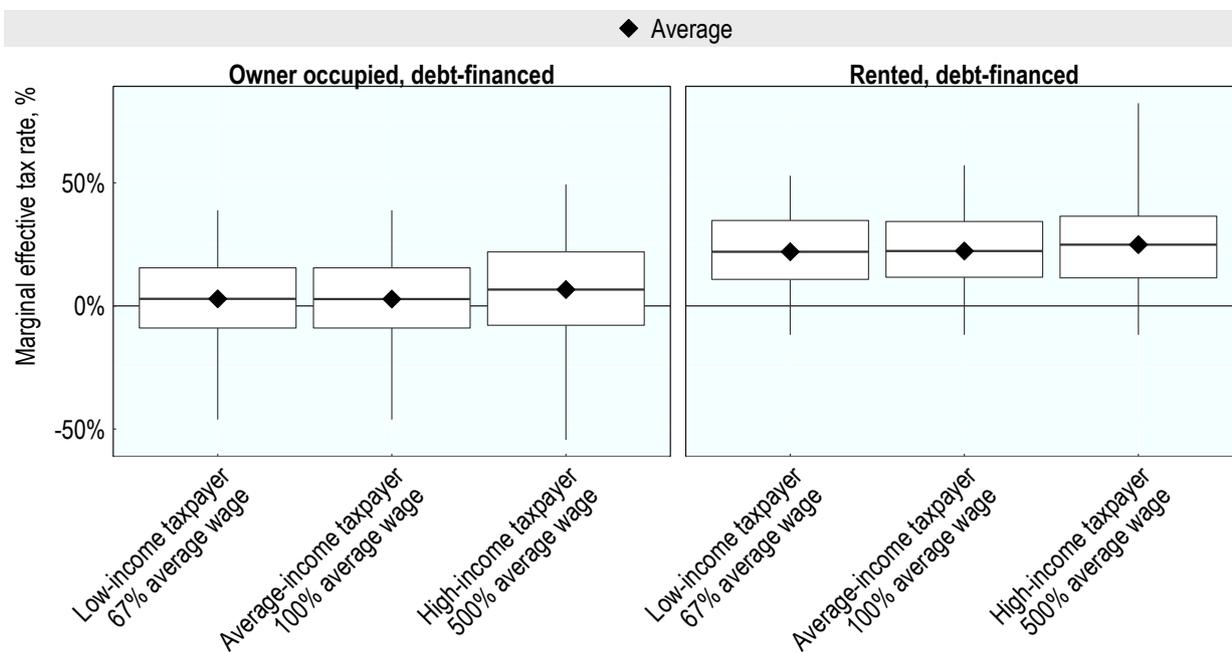
70. Figure 14 and Figure 15 show that METRs on low-income taxpayers range from -46.1% (the Netherlands) to 38.9% (Canada). The same range (-46.1% in the Netherlands to 38.9% in Canada) applies to average-income taxpayers. METRs on high-income taxpayers have a greater range than for lower income levels, from -54.4% (the Netherlands) to 49.3% (Belgium). Fifteen countries provide a tax subsidy on owner-occupied housing for low-income taxpayers, more than the number of countries that provide this treatment for average-income taxpayers (14 countries) and high-income taxpayers (12 countries).

71. Figure 14 shows that on average across 40 countries, METRs on rented housing are lowest for low-income taxpayers (22.0%) and increase for average-income taxpayers (22.3%) and high-income taxpayers (24.9%). Figure 16 shows ten countries mirroring the average result with progressive METRs on rented housing (Argentina, Australia, Canada, Denmark, Finland, France, Latvia, Mexico, Portugal, Switzerland), but the METRs in almost the same number of countries are regressive (Austria, Germany, Japan, Luxembourg, New Zealand, Spain, Turkey United States). In six countries, METRs show a degree of progressivity, with the same METR for low-income and average-income taxpayers and a higher METR for high-income taxpayers (Belgium, Estonia, Greece, Korea, Lithuania, Slovak Republic), while three countries instead have the lowest METRs for high-income taxpayers and the highest METRs for low-income and average-income taxpayers (Colombia, Poland, United Kingdom). Ten countries have flat METRs (Bulgaria, Czech Republic, Hungary, Iceland, Israel, Italy, the Netherlands, Norway, Slovenia and Sweden).

72. METRs on rented housing, though less dispersed than on owner-occupied housing, range from negative to positive rates (Figure 14 and Figure 16). METRs range from -11.7% (Sweden) for all taxpayer types to 52.9% (low-income), 57.1% (average-income) and 82.3% (high-income) in Argentina. In three countries tax provisions result in negative METRs (that is, a tax subsidy) for high-income taxpayers only (Austria, Poland and Turkey) and two countries have negative METRs for all three taxpayer profiles (Luxembourg and Sweden).

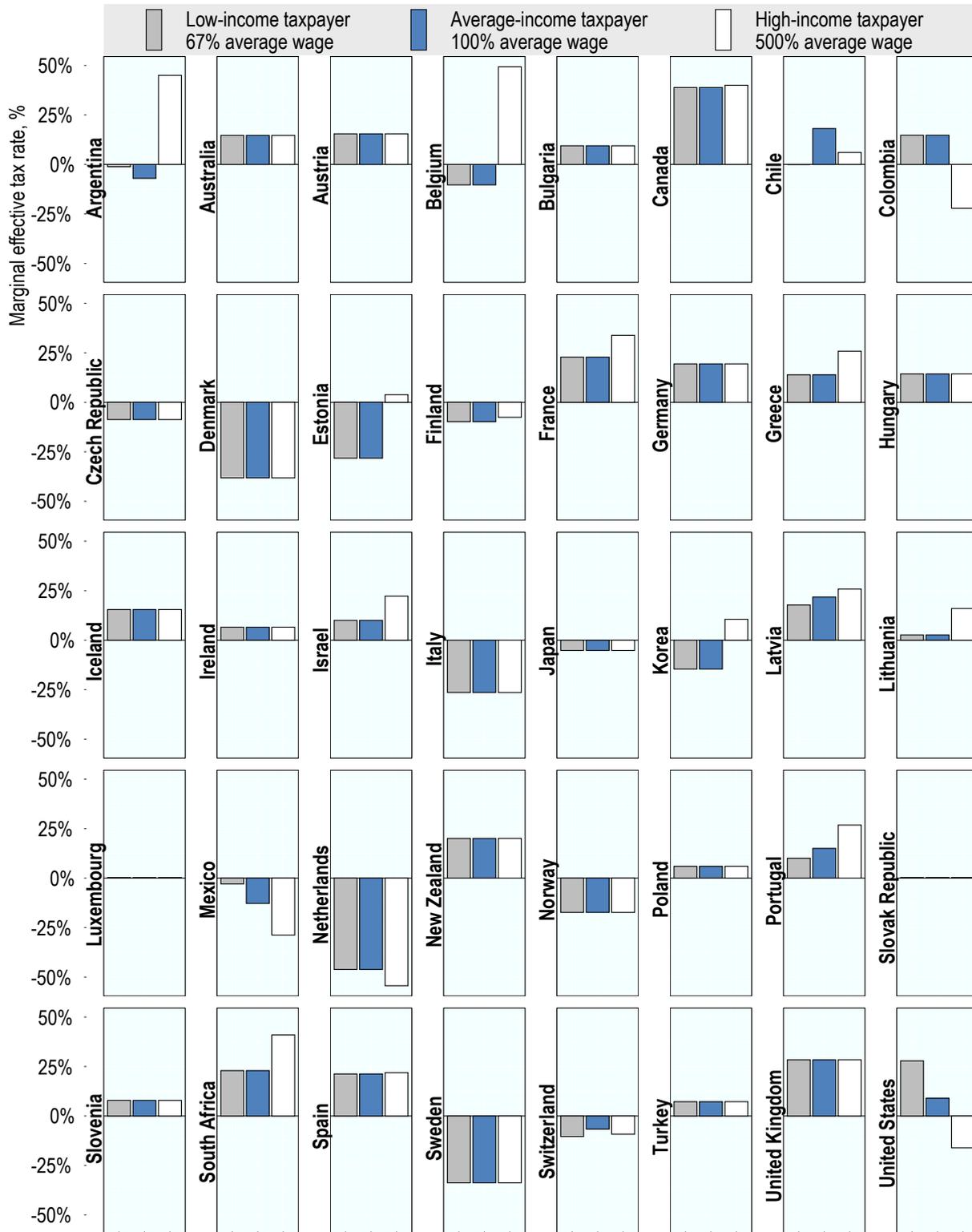
Figure 14. Marginal effective tax rates, debt-financed residential property, different income levels, average across 40 countries, 2016

Average, first, and third quartiles



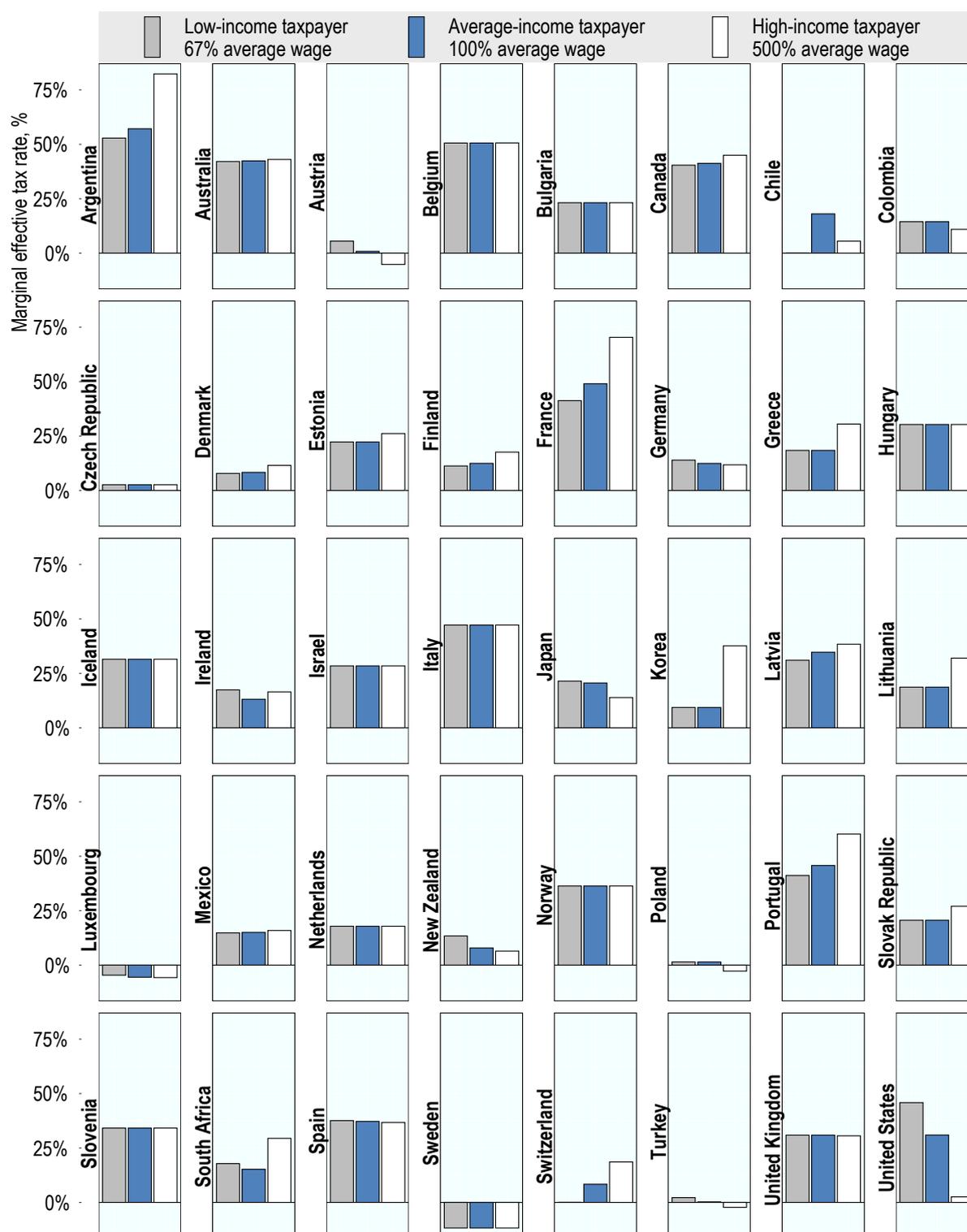
Note: The line in the middle of the box represents the average, not the median. The top and bottom lines of the box represents the third and first quartiles, respectively, and the vertical lines represent values outside the third and first quartiles. Results are presented for owner-occupied and rented debt financed housing. Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

Figure 15. Marginal effective tax rates on owner-occupied debt-financed housing, all countries, different income levels, 2016



Note: Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

Figure 16. Marginal effective tax rates on rented debt-financed housing, all countries, all income levels, 2016



Note: Results are presented for rented, debt-financed housing. Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

5.3. Tax policies driving variation in Marginal Effective Tax Rates

73. On average across OECD countries, the composition of METRs is broadly similar across income levels. Some taxes, such as transaction taxes and net wealth taxes, are relatively more important for higher-income levels, but generally the composition of the METRs is close for the different taxpayer profiles. One major difference occurs between countries that provide mortgage interest relief and countries that do not. Figure 17 divides countries into two groups, according to whether mortgage interest relief for owner-occupied housing applies in the country concerned.¹⁶ While the progressivity of the METRs is broadly similar between the two groups – taxpayers at 67% and 100% of the average wage are taxed at similar rates and taxpayers at 500% of the average wage are taxed at higher rates – the level and composition of the METRs are different. Mortgage interest relief has a significant impact on the METRs recorded in countries providing this tax treatment, resulting in negative METRs on average. Recurrent property taxes and transaction taxes are the largest components of the METRs for both groups and other tax categories are relatively minor in countries without mortgage interest relief. The average METRs for countries that do not provide mortgage interest relief range from 14.8% for low- and average-income taxpayers to 19.0% for high-income taxpayers. Countries that provide mortgage interest relief effectively provide a tax subsidy that ranges from -4.6% for high-income taxpayers to -7.9% for low-income taxpayers on average.

74. Mortgage interest relief provides greater benefit to taxpayers with higher incomes. Mortgage interest relief reduces METRs by 28 pp for high-income and average-income taxpayers, compared to 26 pp for low-income taxpayers on average for countries that provide this tax treatment. Higher-income taxpayers derive a greater benefit from mortgage interest relief because many countries provide a deduction at the taxpayer's marginal income tax rate, which increases with income in progressive tax systems. Some countries limit these regressive effects by capping the value of the mortgage interest relief or restricting eligibility for the deduction based on taxpayer income or the value of the housing asset. However, these limits apply in a small number of countries and mortgage interest relief remains the main regressive component of METRs on housing.

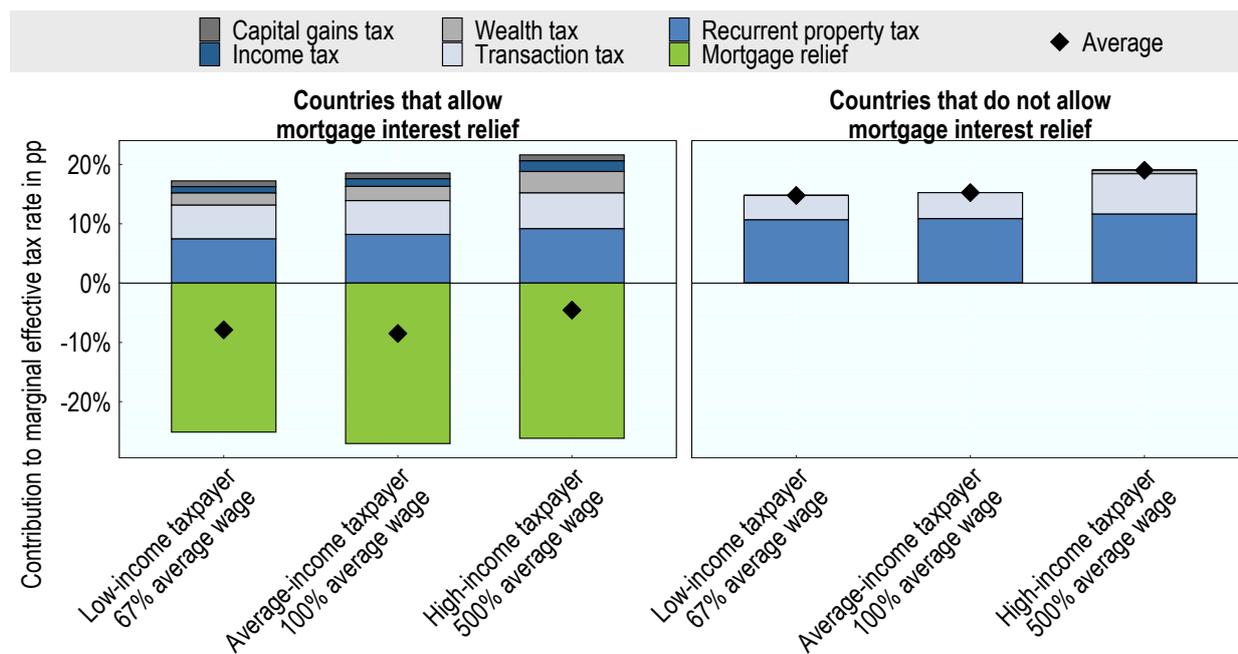
75. Recurrent taxes on immovable property and transaction taxes are slightly progressive on average. As shown in Figure 17, recurrent taxes on immovable property account for 7.4 pp (low income), 8.2 pp (average income), and 9.2 pp (high income) of METRs among countries that offer mortgage interest relief (left panel), and 10.7 pp (low income), 10.9 pp (average income), and 11.6 pp (high income) of METRs among countries that do not (right panel). Recurrent taxes on immovable property, which are the main tax component of METRs on owner-occupied housing, are progressive on average because a minority of countries apply higher taxes to higher-income taxpayers who are assumed to hold more housing wealth. Transaction taxes account for 5.7 pp (low and middle income) and 6.0 pp (high income) of the average METR for countries with mortgage interest relief (left panel) and 4.1 pp (low-income), 4.4 pp (average income), and 6.8 pp (high-income) of the average METR for countries without (right panel). Transaction taxes are progressive on average because a small number of countries levy transaction taxes that increase with income or with the value of the property and because the model assumes that higher-income taxpayers purchase more expensive properties.

76. Taxes on income, capital gains, and net wealth are less important for owner-occupied property. A small fraction of the average METRs for countries without mortgage interest relief is due to progressive

¹⁶ Countries that allow mortgage interest relief on owner-occupied housing (left panel of Figure 17) are: Argentina, Belgium, Bulgaria, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, Greece, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, Norway, Spain, Sweden, Switzerland and the United States. Countries that do not allow mortgage interest relief on owner-occupied housing (right panel of Figure 17) are: Australia, Austria, Canada, France, Germany, Hungary, Iceland, Ireland, Israel, Latvia, Lithuania, New Zealand, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Turkey and the United Kingdom.

net wealth taxes (0.6 pp for high-income taxpayers only). Progressive net wealth taxes are a larger component of the METRs for countries in the left panel of Figure 17 (2.1 pp to 3.6 pp), and capital gains taxes account for a flat 1.0 pp. Countries that do not provide mortgage interest relief also do not tax income on owner-occupied housing, but for countries with mortgage interest relief, progressive income taxes are levied in Greece and Switzerland and account for 1.1 pp to 1.8 pp of the average METRs.

Figure 17. Marginal effective tax rates and component taxes, owner-occupied debt-financed housing, average for countries with and without mortgage relief, 2016



Note: Countries that allow mortgage relief on owner-occupied housing are: Argentina, Belgium, Bulgaria, Chile, Colombia, Czech Republic, Denmark, Estonia, Finland, Greece, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, Norway, Spain, Sweden, Switzerland, and the United States. Countries that do not allow mortgage relief on owner-occupied housing are: Australia, Austria, Canada, France, Germany, Hungary, Iceland, Ireland, Israel, Latvia, Lithuania, New Zealand, Poland, Portugal, Slovak Republic, Slovenia, South Africa, Turkey, and the United Kingdom. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment. Results are presented for owner-occupied debt financed housing. Results are presented for inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

5.4. The impact of inflation and risk on Marginal Effective Tax Rates

77. The tax system interacts with the elements of the broader economy, such as inflation and interest rates and may affect horizontal equity. Examining the impact of inflation and interest rates represents a step away from the analysis above, whose focus was centred on the tax system; however, it is important to understand how the design of housing taxation interacts with certain macroeconomic parameters. It is also important to understand how these variables impact horizontal equity. Two taxpayers may invest in housing in otherwise identical scenarios, but, as this section demonstrates, could face different METRs depending on the prevailing interest and inflation rates.

78. Higher interest rates raise the financing cost of a debt-financed investment and higher inflation rates raise the nominal return, which is subject to taxation. In countries that allow taxpayers to deduct

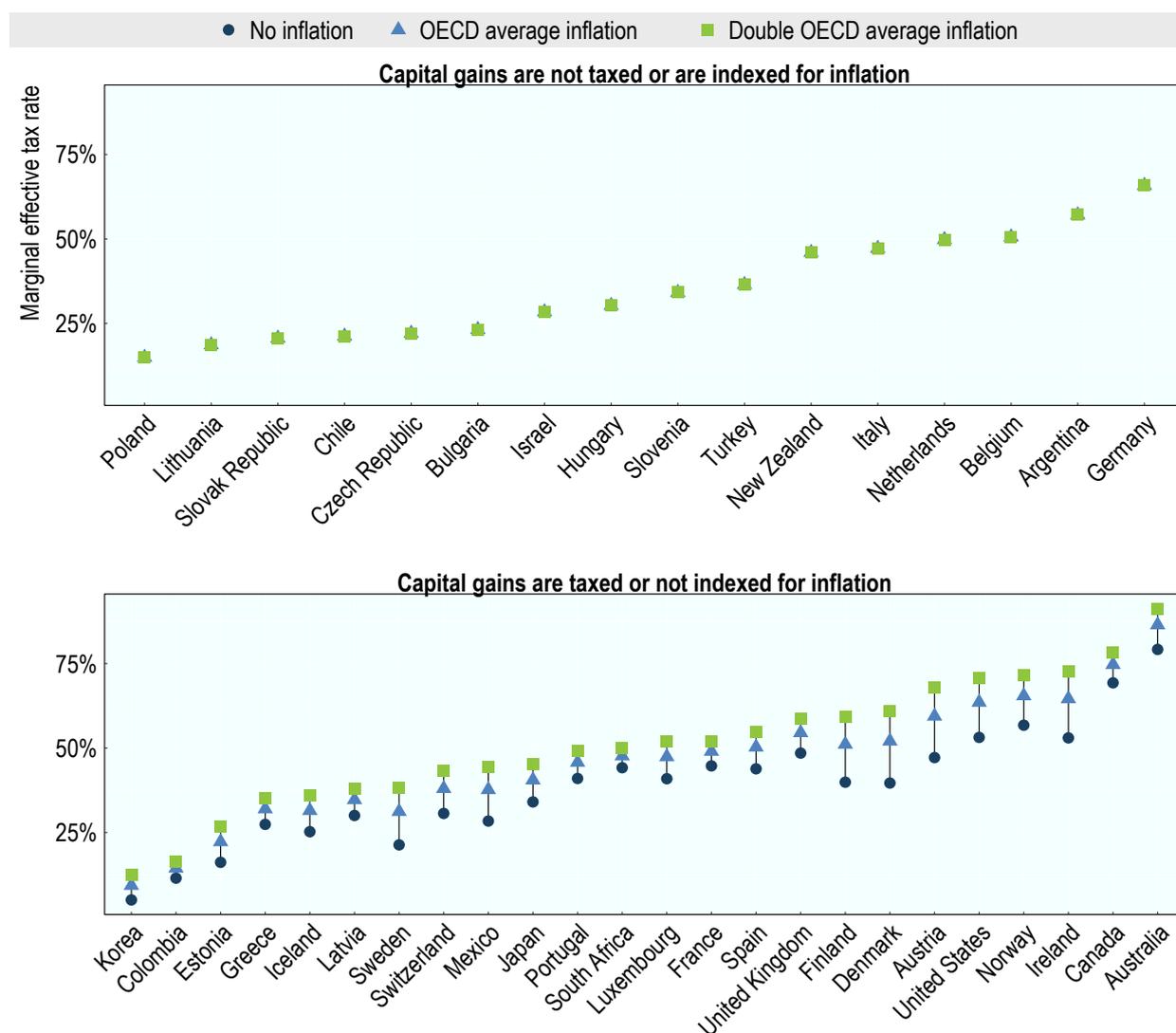
mortgage interest, the interest rate that homeowners pay – composed of a risk-free rate and a risk premium – will affect the value of the tax deduction. In countries that tax the nominal return, higher rates of inflation lead to higher METRs, all else being equal. The impact of interest rates, risk premiums and inflation rates is complex and interacts in multiple ways with the tax system. This section presents a selection of analysis that could be developed in future work.

5.4.1. Inflation

79. METRs on equity-financed property increase with inflation in countries that tax nominal capital gains. Figure 18 divides countries into two groups – those that tax nominal capital gains and those that do not tax capital gains or allow taxpayers to index capital gains for inflation. The figure presents METRs where there is no inflation, where inflation is equal to the OECD average (1.59%, as used in all other results in this paper), and where inflation is double the OECD average (3.18%). Among countries that do not tax capital gains, or who do not tax the inflationary component of capital gains, the different rates of inflation make no difference to the METRs. However, among countries that tax nominal capital gains, the METRs rise steadily with inflation. For these countries, the average METRs increase by 7.2 pp, from 38.8% to 46.0%, when the rate of inflation moves from zero to the OECD average. Doubling the rate of inflation, to 3.18%, increases the average METRs from 46.0% to 51.0%; a total increase of 5.0 pp.

80. This implies that METRs on housing rise in inflationary environments in countries that tax the nominal capital gain. Where inflation is low, the total return may primarily be a real gain and the tax burden is more closely aligned with the actual benefit that the taxpayer receives. However, where inflation is high, countries may primarily be taxing the inflationary gain. Indexing capital gains for inflation allows governments to tax real returns only, but Israel is the only country to do this for rented housing. Some countries allowed indexing in the past, but have found that indexation is difficult to administer and have opted to apply preferential treatment to long-term capital gains in part to compensate for taxing inflationary returns (e.g. Australia).

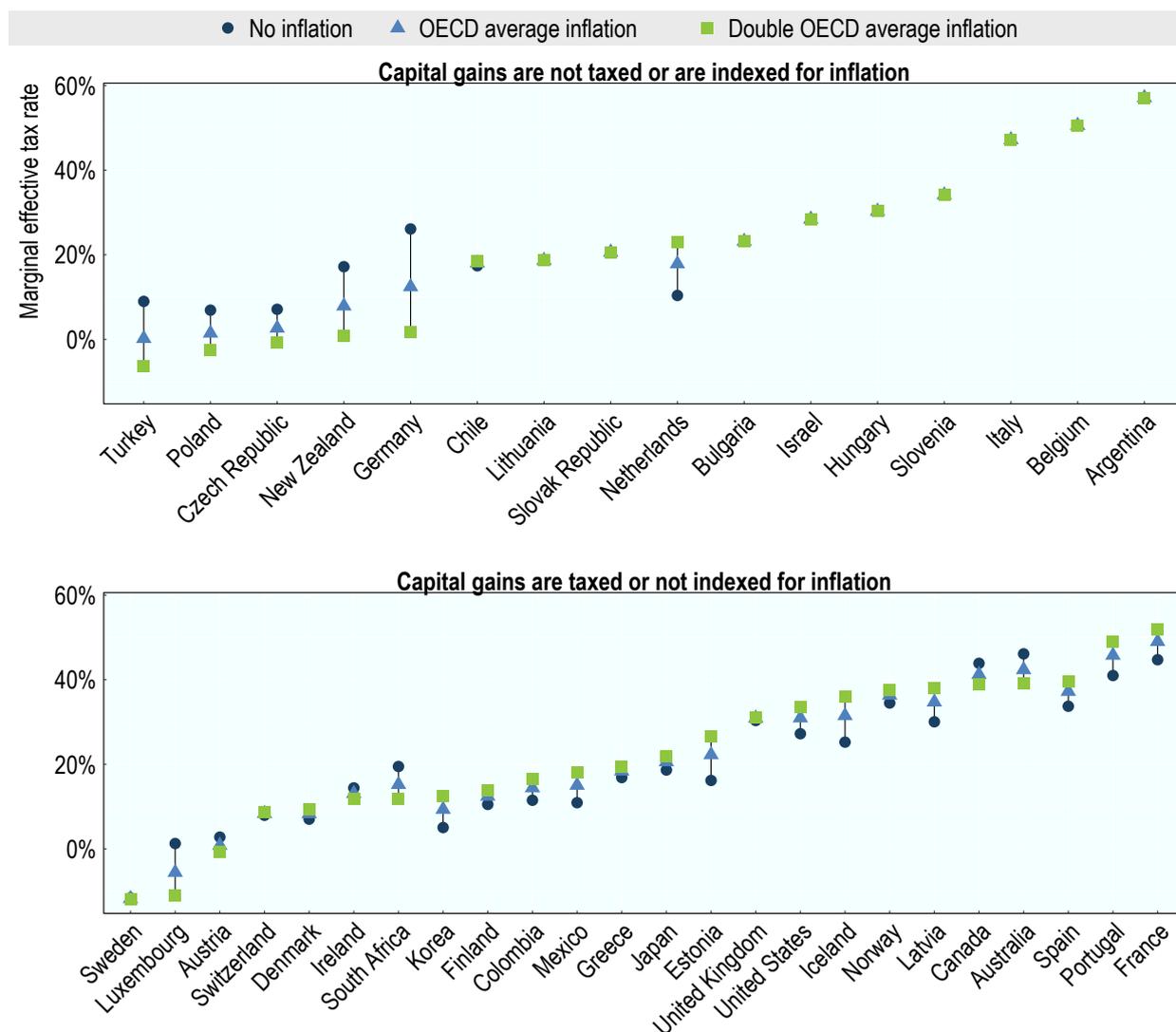
Figure 18. Marginal effective tax rates, by rate of inflation, rented debt-financed housing, 2016



Note: Results are presented for the average income taxpayer for rented, debt-financed housing. Results assume no inflation (0%), inflation at the OECD average (1.59%), and inflation at double the OECD average (3.18%); with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

81. The impact of inflation is more complex in the case of a debt-financed housing investment. As the borrowing cost is a function of the risk-free rate, the risk premium, and inflation (see Annex B) the value of mortgage interest relief rises with inflation. Among countries in the top panel of Figure 19, several countries allow taxpayers to claim mortgage interest relief but do not tax capital gains. Higher inflation pushes up the value of mortgage interest relief, but there is no corresponding increase in the capital gains tax liability. Among countries in the bottom panel, the capital gains tax and mortgage interest relief (where applicable) will both rise with inflation, but one will increase more than the other and determine whether the METR ultimately rises or falls with inflation.

Figure 19. Marginal effective tax rates, by rate of inflation, rented debt-financed housing, 2016



Note: Results are presented for the average income taxpayer for rented, debt-financed housing. Results assume no inflation (0%), inflation at the OECD average (1.59%), and inflation at double the OECD average (3.18%); with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

5.4.2. Borrower risk premium

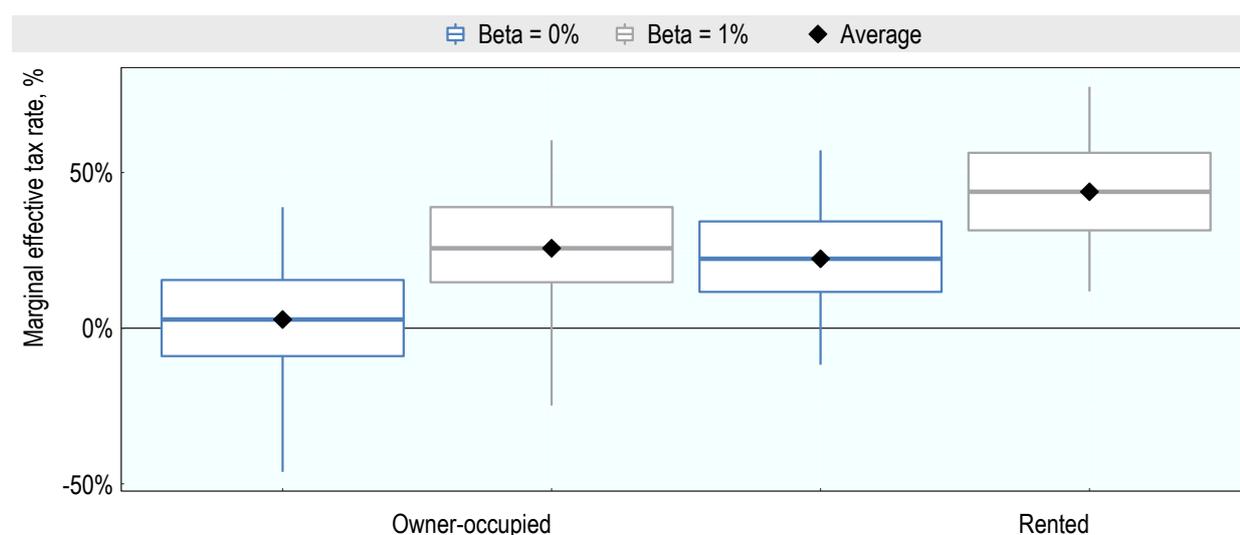
82. Taxpayers that borrow to finance a housing purchase are likely to pay a higher rate of interest on their mortgage than they would receive from a risk-free return. The difference between the mortgage interest rate and the risk-free return that taxpayers may earn on, for example, a bank deposit, is the risk-premium. As shown in Annex B, mortgage interest deductibility is a function of the real risk premium (β), as well as the real risk-free rate (r) and inflation (π). Higher interest rates can raise the cost of financing housing investments with debt, and thereby increase debt-financed housing METRs.

83. METRs on debt-financed housing rise with the borrower risk premium, beta (β). Figure 20 compares two scenarios; one where the taxpayer borrows at the risk-free rate (r) and one where the

taxpayer borrows with an additional 1% risk premium ($r + \beta$). Note that there is no risk premium in all other results in this paper ($\beta = 0$). Figure 20 shows that debt-financed METRs increase substantially where taxpayers pay a risk premium on their mortgage borrowings. The average METR on owner-occupied housing increases from 2.8%, without a risk premium, to 25.7%, when paying a 1% risk premium. Similarly, METRs on rented housing increase from 22.3% to 43.8% when a 1% risk premium is added.

Figure 20. Marginal effective tax rates, with and without borrower risk premium, debt-financed housing, average across 40 countries, 2016

Average, first, and third quartiles



Note: Results are presented for the average wage taxpayer for debt-financed housing. Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

Source:

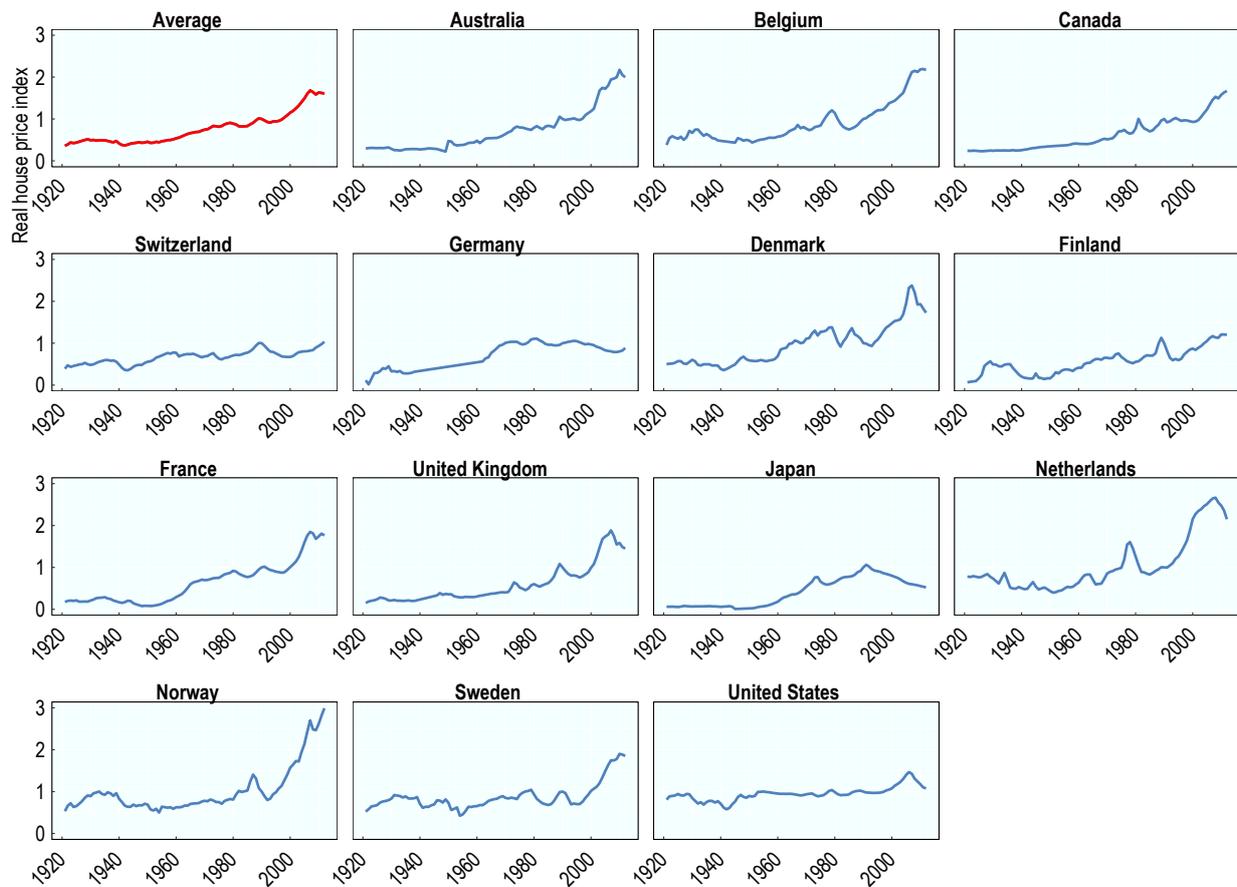
84. Taxpayers may find it more beneficial to use debt- or equity-financing, depending in part on the borrower risk premium and mortgage interest deductibility. The two interact to lower (mortgage interest relief) or raise (borrower risk premium) the METRs on housing investments, meaning that there is a point at which equity-financed investments face a lower METR than debt-financed investments. As illustrated above, equity-finance (METR of 16.7%) is less attractive for investment in owner-occupied housing than debt-finance with no risk premium (METR of 2.8%), but is more attractive than debt-finance with a risk premium (METR of 25.7%). Mortgage interest relief reduces to some extent the impact of the risk premium on the cost of finance and, therefore, the METR. This implies that the rationale for mortgage interest relief may be stronger in high interest rate and high-risk environments, but weaker when interest rates on debt-finance are low. A thorough investigation of the tipping point between debt- and equity-finance with different risk premia is beyond the scope of this paper, however, future research could examine the implications for tax policy under different macroeconomic settings.

5.5. Average Effective Tax Rates by rate of return

85. AETRs highlight how the impact of the tax system can differ across rates of return, as they measure the impact of the tax system on a marginal investment in housing where the investment earns a higher-than-breakeven return. This has implications for vertical equity, as risk-adjusted returns have been shown to rise with wealth (Fagereng et al., 2020^[8]).

86. As AETRs measure the impact of the tax system on investments earning different rates of return, they can illustrate how the tax system interacts with house price dynamics. Figure 21 shows a real house price index over 90 years on average across 14 developed economies and for each individual country. This graph suggests that while house prices fluctuate, in many countries they have sustained large increases over long periods. In addition, returns on housing investments are higher in urban areas than in rural and regional areas in some countries, driven by macro trends in regional development and urbanisation, as well as factors including easy access to credit and restricted supply of housing. The tax treatment of supernormal returns on housing investments is crucial to ensure the equitable treatment of investors.

Figure 21. Real house price index, 1920-2012

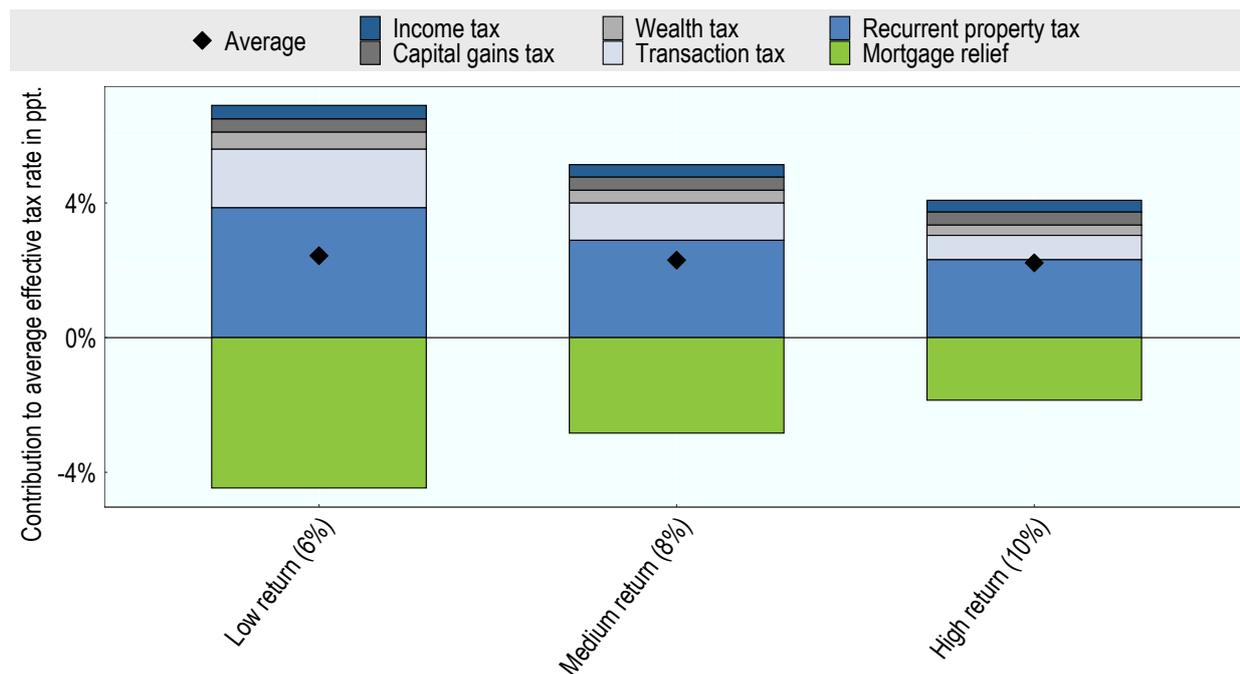


Source: Knoll, K., Moritz S., and Thomas S. 2017. 'No Price Like Home: Global House Prices, 1870-2012.' *American Economic Review*, 107 (2):331-53.

87. Housing assets that generate a higher return are taxed more favourably on average. Figure 22 shows AETRs for an average income taxpayer with a fixed discount rate of 3% and three rates of return: low (6%), medium (8%), and high (10%). The return is split between capital gains (50%) and a recurrent return (50%). The AETR in the low-return scenario is 3.0%, which decreases to 2.9% in the medium-return scenario and again to 2.8% in the high-return scenario. This suggests that on average, the tax levied on housing does not rise with the return on housing investments and fails to tax above normal returns or windfall gains.

88. The decline in AETRs as rates of return increase is driven by all categories of taxes levied on housing assets. As transaction and recurrent property taxes are the largest components of the ETRs, most of the decline in AETRs can be attributed to these taxes. When the return increases from 6% to 10%, transaction taxes drop by 1.3 pp and recurrent property taxes drop by 1.9 pp. Income taxes and net wealth taxes also decline in importance as the return increases, though by smaller amounts. When the return scenario increases from 6% to 10%, income taxes drop by 0.1 pp and net wealth taxes drop by 0.3 pp.

Figure 22. Composition of average effective tax rates by rate of return, owner-occupied debt-financed property, average, 2016



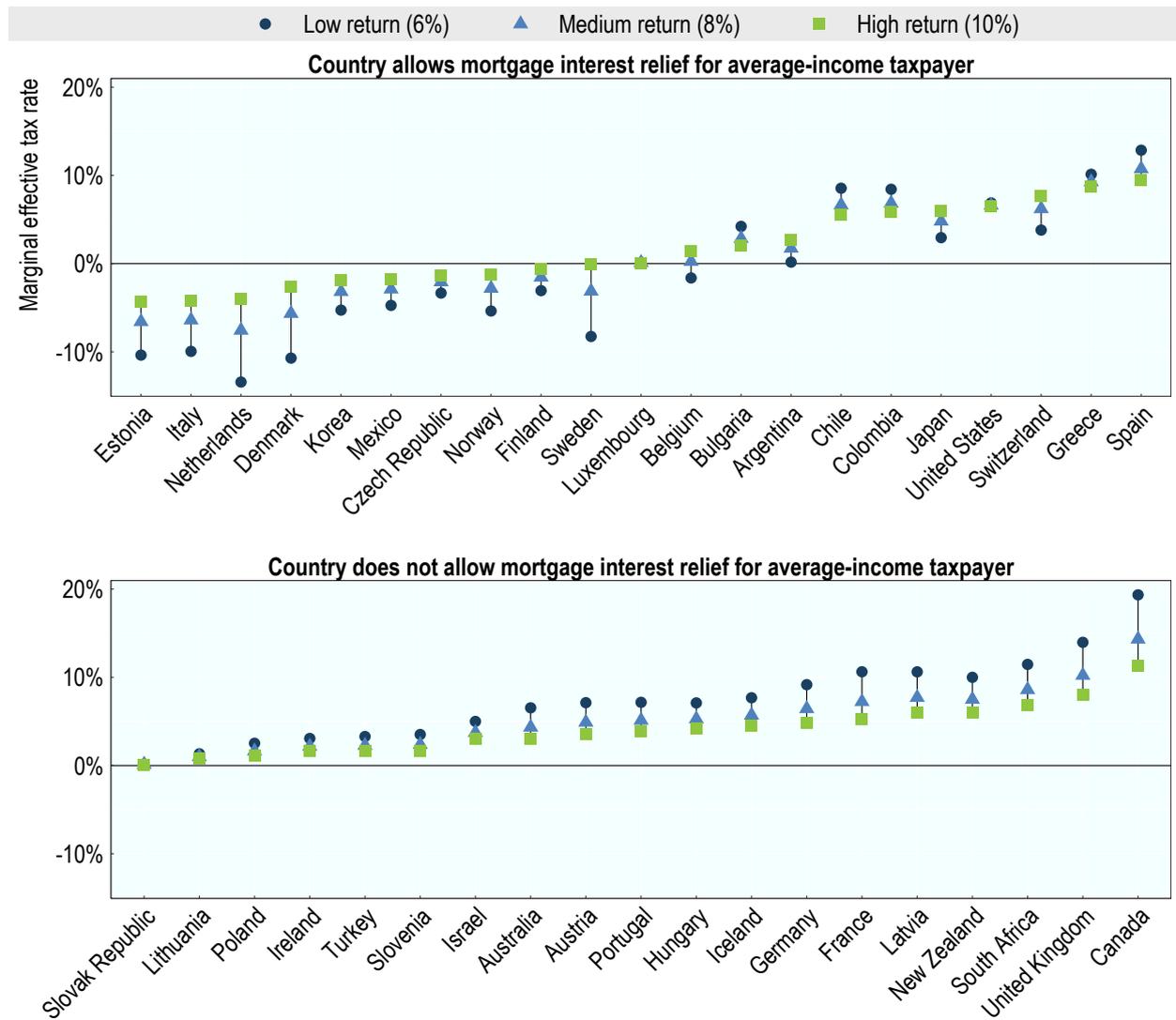
Note: Results are presented for owner-occupied debt financed housing. Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent.

89. AETRs can increase in countries that provide mortgage interest tax relief on owner-occupied housing, as the declining importance of mortgage interest relief outweighs the decrease in the importance of other taxes. Figure 23 shows AETRs by country and by rate of return for an average-income taxpayer. Countries are divided into two groups, depending on whether they provide taxpayers with mortgage interest relief. In 14 of the 21 countries that provide mortgage interest relief on owner-occupied housing, METRs increase with the return on investment (top panel). In these countries, the decrease in taxes levied on housing is offset by a larger decrease in the value of mortgage interest relief, because the relief decreases as a portion of the total return. In the remaining seven countries that provide mortgage interest relief, Figure 23 shows that the percentage point contribution of mortgage interest relief is zero or among the lowest of all countries (Bulgaria, Chile, Colombia, Greece, Luxembourg, Spain, United States).

90. In the majority of countries, however, AETRs decrease with return (Figure 23). This is apparent among countries that do not provide mortgage interest relief; the declining AETRs show the decreasing importance of taxes as return rises. The gap between different rates of return is highest in Canada, where

the AETRs drop 8.0 pp, from 19.3% (low return) to 11.3% (high return). The gap is lowest in Luxembourg, as the AETRs are composed of a small property tax that is less than 0.2 pp in all scenarios.

Figure 23. Average effective tax rates, by level of return, 2016



Note: Results are presented for owner-occupied debt financed housing. Results are presented for a taxpayer earning 100% of average wage case; assuming inflation at the OECD average level; with a 20-year holding period. In Japan, taxpayers can benefit from a tax credit for 1% of the remaining mortgage balance at the end of each year, but cannot deduct the mortgage interest payment.

6 Conclusion

91. The ETRs presented above provide valuable insights into the impact of tax systems on the efficiency and equity of housing taxation. The results demonstrate there is significant scope to improve the design of housing taxes and to strengthen progressivity of housing taxation. However, in some cases, a departure from the principles of neutrality may be warranted.

92. This paper finds that METRs are sensitive to the particular housing investment scenario. The results differ substantially depending on, for example, whether the housing investment is made over a long or short time, whether it is owner-occupied or rented, and whether it is financed with debt or equity. METRs do not vary much with the income of the owner (or the value of the property, where relevant), although METRs on rented housing are slightly more progressive than METRs on owner-occupied housing in some countries, due to the taxation of rental income. As mortgage interest relief is an important driver of the METRs and provides a larger benefit to high-income taxpayers, METRs on debt-financed housing are very low and regressive in some countries. Taxpayers that move more frequently will face a higher tax burden than taxpayers that are less mobile, as one-off transaction taxes can be spread over the life of the investment. The capital gains component is generally taxed at very low rates, due to the deferral effect, low tax rates on long-term capital gains, and exemptions for owner-occupied housing.

93. Countries could identify opportunities to reduce the tax differential between different investment scenarios and strengthen progressivity and horizontal equity. This could include, for example, more neutral taxation of investments of different lengths or revisiting the tax advantage that arises when using debt finance. Reforms could also improve neutrality with respect to the type of return, given the favourable tax treatment of capital gains compared to a recurrent return. Housing taxation could take greater account of taxpayers' income and wealth. Countries could reform tax reliefs that provide the greatest benefit to the highest-income taxpayers and consider how different taxes capture higher rates of return and how they vary with respect to income and wealth. Such reforms could have potential positive spill overs on issues such as wealth inequality, labour market mobility, and housing affordability. Further policy research would be important to properly explore the policy implications of these results and to formulate recommendations.

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Annex A. Tax treatment of housing

Table A.1. Tax treatment of owner-occupied residential property, 2016

As at July 2016

Country	Acquisition of asset			Holding of asset			Disposal of asset		
	PIT treatment		Transaction tax	PIT	Other taxes		PIT or CGT		
	Interest expense deductible	Amount of acquisition deductible			Income from asset	Income from asset	Value of asset	Realised income from asset	Original value of asset
Australia	N	N	Y	N	N	Y	N	N	N
Austria	N	N	Y	N	N	Y	N	N	N
Belgium	Y ¹	N	Y	N	N	Y	N	N	N
Canada	N	N	Y	N	N	Y	N	N	N
Chile	Y ²	N	N	N	N	Y ³	N	N	N
Czech Republic	Y	N	Y	N	N	Y	N	N	Y ⁴
Denmark	Y	N	Y	N	Y ⁵	Y	N	N	N
Estonia	Y ⁶	N	N	N	N	Y	N	N	N
Finland	Y ⁷	N	Y	N	N	Y	N	N	N
France	N	N	Y	N	N	Y ⁸	N	N	N
Germany	N	N	Y	N	N	Y	N	N	Y ⁹
Greece	Y	N	Y ¹⁰	N	Y ⁵	Y	N	N	N
Hungary	N	N	Y ¹⁰	N	N	Y ¹¹	N	N	Y ¹²
Iceland	N	N	Y	N	N	Y	N	N	N
Ireland	N	N	Y	N	N	Y	N	N	N
Israel	N	N	Y	N	N	Y	N	N	Y ¹³
Italy	Y ¹⁴	N	Y	N	N	Y ¹⁵	N	N	N
Japan	Y ¹⁶	N	N	N	N	Y	N	N	Y
Korea	Y ¹⁷	N	Y	N	N	Y	N	N	Y ¹⁸
Latvia	N	N	Y	N	N	Y	N	N	N ¹⁹
Luxembourg	Y ²⁰	N	N	N	N	Y	N	N	N
Mexico	Y	N	Y	N	N	Y	N	N	N ²¹
Netherlands	Y	N	Y	Y ⁵	N	Y ²²	N	N	N
New Zealand	N	N	N	N	N	Y	N	N	N
Norway	Y	N	Y	N	N	Y ²³	N	N	N
Poland	N	N	Y	N	N	Y ²⁴	N	N	N ²⁵
Portugal	N	N	Y	N	N	Y	N	N	N
Slovak Republic	N	N	N	N	N	Y	N	N	N
Slovenia	N	N	Y	N	N	Y	N	N	Y ²⁶
Spain	N ²⁷	N	Y	N	N	Y ²⁸	N	N	Y ²⁹
Sweden	Y	N	Y	N	N	Y ³⁰	N	N	Y ³¹
Switzerland	Y	N	Y ³²	Y ⁵	N	Y ^{32,33}	N	N	N
Turkey	N	N	Y	N	N	Y	N	N	N
United Kingdom	N	N	Y	N	N	Y	N	N	N
United States	Y	N	Y	N	N	Y	N	N	Y ³⁴
Argentina	Y	N	N	N	N	Y ³³	N	N	N
Bulgaria	Y ³²	N	Y	N	N	Y	N	N	N

Colombia	Y	N	N	N	N	Y ³³	N	N	Y
Lithuania	N	N	N	N	N	Y	N	N	Y ³⁶
South Africa	N	N	Y	N	N	Y	N	N	Y ³⁷

Source: Taxation of Household Savings, 2018

Notes

- 1 Tax credit received equals EUR 0.45 for every euro of interest paid. Cap of EUR 2 300 tax credit amount.
- 2 Interest not deductible if taxpayer earns above CLP 83 129 400 (in 2016).
- 3 Recurrent property tax applies if house value of CLP 21 934 249 or greater.
- 4 Gains are taxable if held for five years or less; or two years or less if the taxpayer's main residence (unless the gains are used to finance a new residence in which case not taxable even if held for two years or less).
- 5 Tax on imputed rental income.
- 6 Mortgage interest is deductible up to EUR 1 200 per year.
- 7 55% of mortgage interest is deductible against capital income. Remaining interest is deductible against earned income up to EUR 1 400 per year.
- 8 Recurrent property tax plus net wealth tax. The taxable threshold for the net wealth tax is set at EUR 1.3 million, but once this threshold has been achieved, the assets are taxed as of EUR 800 000.
- 9 No CGT if held more than 10 years.
- 10 First-time house buyers are exempt from the transaction tax.
- 11 Recurrent property tax (building tax on dwellings) due in only some municipalities. In 2017 only 548 municipalities out of 3 178 levied building tax on dwellings.
- 12 The taxable capital gain is reduced by an increasing percentage each year and is exempt after five years.
- 13 CGT only applies on gains above a sale price of ILS 4.5 million.
- 14 A tax credit of 19% of mortgage interest is provided up to a max of EUR 4 000 of interest payment
- 15 Only luxury homes subject to recurrent property tax
- 16 Tax credit equal to 1% of the remaining mortgage balance at the end of each year. Only available when the taxable income of the year is less than or equal to JPY 30 million. The tax credit is capped at JPY 400,000 per year if the taxpayer started living in the house between 2014 and 2019, and acquired the housing after the consumption tax hike in 2014. In other cases, the tax credit is capped at JPY 200,000 per year.
- 17 Deductible at taxpayer's marginal rate unless house cost more than KRW 400 million and up to a limit depending on years being paid off.
- 18 40% tax rate for short-term holdings of less than 1 year. No CGT if held for 2 years or more. CGT is however still applicable if house is worth more than KRW 900 million.
- 19 Capital gains from the alienation of the real estate were not taxable, if the following criteria were fulfilled:
 - ownership ≥ 60 months and the declared place of residence for at least 12 months until entering into the alienation contract;
 - ownership ≥ 60 months and the only real estate owned for the last 60 months before the alienation.
- 20 Mortgage interest is deductible below a threshold (EUR 1 500 years 1-5; EUR 1 125 years 5-10; then EUR 750).
- 21 Unless gain exceeds 700 thousand investment units, or have sold a house within the previous five years.
- 22 Recurrent property tax
- 23 Recurrent property tax and net wealth tax. The tax-free allowance for the net wealth tax is NOK 1 400 000.
- 24 Recurrent property tax is not levied on the value of the real property. The tax base is area in case of land and usable area in case of buildings.
- 25 Realised income from disposal of real property is subject to taxation, if disposal takes place less than five years after acquisition or construction of the asset.
- 26 The tax rate for capital gains depends on the holding period: 25% for up to 5 years; 15% from 5 to 10 years; 10% from 10 to 15 years; 5% from 15 to 20 years; and non-taxation for greater than 20 years.
- 27 A tax credit (which covered interest and amount of acquisition) was repealed in 2013. However, it can still be applied as a temporary regime by taxpayers who were applying the credit prior to 2013. According to their legal competences, the majority of regional governments (Comunidades Autónomas) apply the tax credit.
- 28 Recurrent property tax and net wealth tax. For net wealth tax, an exemption threshold of EUR 300 000 applies for the main residence.
- 29 However, full rollover relief applies in respect of capital gains from disposals by any taxpayer of his primary residence. The exemption requires that the entire proceeds be reinvested within a 2-year period in the acquisition of another primary residence. Full exemption applies for taxpayers over 65 years old (see above).
- 30 Recurrent property tax has a maximum amount of SEK 7 412 for a house and SEK 1 268 for an apartment.

- 31 Only a proportion (22/30) of the capital gain is taxable.
- 32 Transaction taxes and recurrent property taxes are applied in many, but not all cantons. Neither are applied in Zurich, which is used as the representative canton in the ETR modelling.
- 33 Recurrent property tax plus net wealth tax.
- 34 Untaxed if capital gain of less than USD 250 000 (or USD 500 000 for married filing jointly) and held for at least 2 of the last 5 years. Otherwise taxed at marginal PIT rates for short-term gains, and at preferential long-term rates for long-term gains.
- 35 Mortgage interest is deductible (for a married investor only) if either the investor or the spouse was under 35 years of age (and they were already married) at the start of the mortgage.
- 36 Taxable unless place of residence for at least 2 years; or if less than 2 years and income is used within one year to purchase a new place of residence.
- 37 Exempt if capital gain of less than SAR 2 million. Otherwise, subject to marginal rates after 40% exclusion.

Table A.2. Tax treatment of rented residential property, 2016

As at July 2016Country	Acquisition of asset			Holding of asset			Disposal of asset		
	PIT treatment		Transaction tax	PIT	Other taxes		PIT or CGT		
	Interest expense deductible	Amount of acquisition deductible		Income from asset	Income from asset	Value of asset	Realised income from asset	Original value of asset	Capital gains
Australia	Y	N ¹	Y	Y	N	Y	N	N	Y
Austria	Y	N	Y	Y	N	Y	N	N	Y
Belgium	Y ²	N	Y	Y ³	N	Y	N	N	Y ⁴
Canada	Y	N	Y	Y	N	Y	N	N	Y
Chile	Y ⁵	N	N	N	N	Y ⁶	N	N	N
Czech Republic	Y	N	Y	Y	N	Y	N	N	Y ⁷
Denmark	Y	N	Y	N	Y ⁸	Y	N	N	Y ⁹
Estonia	Y ¹⁰	N	N	Y ¹¹	N	Y	N	N	Y
Finland	Y ¹²	N	Y	Y ¹³	N	Y	N	N	Y
France	N	N	Y	Y	N	Y ¹⁴	N	N	Y ¹⁵
Germany	Y	N	Y	Y	N	Y	N	N	Y ¹⁶
Greece	Y	N	Y ¹⁷	Y	N	Y	N	N	Y
Hungary	N	N	Y	Y	N	Y ¹⁸	N	N	Y ¹⁹
Iceland	N	N	Y	N	Y ²⁰	Y	N	N	Y
Ireland	Y	N	Y	Y	N	Y	N	N	Y
Israel	N	N	Y	Y ²¹	N	Y	N	N	Y
Italy	N	N	Y ²²	Y ²³	Y ²³	Y	N	N	Y ²⁴
Japan	Y	N	N	Y	N	Y	N	N	Y
Korea	Y ²⁵	N	Y	Y ²⁶	N	Y	N	N	Y ²⁷
Latvia	N	N	Y	Y ²⁸	N	Y	N	N	Y
Luxembourg	Y	N	N	Y	N	Y	N	N	Y
Mexico	Y	N	Y	Y	N	Y	N	N	Y
Netherlands	N	N	Y	N	Y ²⁹	Y	N	N	N
New Zealand	Y	N	N	Y	N	Y	N	N	N
Norway	Y	N	Y	Y	N	Y ³⁰	N	N	Y
Poland	Y	N	Y	Y	N	Y ³¹	N	N	Y ³²
Portugal	N	N	Y	Y	N	Y	N	N	Y ³³
Slovak Republic	N	N	N	Y ³⁴	N	Y	N	N	N
Slovenia	N	N	Y	N	Y ¹	Y	N	N	Y ³⁵
Spain	Y	N	Y	Y ³⁶	N	Y ³⁷	N	N	Y
Sweden	Y	N	Y	Y	N	Y ³⁸	N	N	Y ³⁹
Switzerland	Y	N	Y ⁴⁰	Y	N	Y ^{40,41}	N	N	Y
Turkey	Y	N	Y	Y	N	Y	N	N	N
United Kingdom	Y	N	Y	Y	N	Y	N	N	Y
United States	Y	N	Y	Y	N	Y	N	N	Y ⁴²
Argentina	N	N	N	Y	N	Y	N	N	N
Bulgaria	N	N	Y	Y	N	Y	N	N	Y ⁴³
Colombia	Y	N	N	Y	N	Y	N	N	Y
Lithuania	N	N	N	Y	N	Y	N	N	Y ⁴⁴
South Africa	Y	N	Y	Y	N	Y	N	N	Y ⁴⁵

Source: Taxation of Household Savings, 2018

Notes

- 1 No general depreciation deduction. But cost of depreciable assets in a rental property are deductible

- 2 While mortgage interest is not deductible, a tax credit is provided equal to EUR 0.45 for every euro of mortgage principle paid, limited to the first EUR 76 780 of the loan.
- 3 Imputed income is taxed at progressive PIT rates
- 4 If held less than five years.
- 5 Interest not deductible if taxpayer earns above CLP 83 129 400 (90 UTA).
- 6 Recurrent property tax applies if house value of CLP 21 934 249 or greater.
- 7 Taxable if held <5 years; or <2 years if taxpayer's main residence (unless used to finance new residence).
- 8 A splitting system applies.
- 9 Taxed at flat rate as "net capital income" under semi-dual system
- 10 Mortgage interest is deductible up to EUR 1 200 per year.
- 11 Income tax only applies to 80% of rental income
- 12 Deductible against capital income
- 13 Rental income is taxed as investment income, but at a flat 30% rate.
- 14 Recurrent property tax plus net wealth tax. The taxable threshold for the net wealth tax is set at EUR 1.3 million, but once this threshold has been achieved, the assets are taxed as of EUR 800 000.
- 15 Subject to flat withholding tax plus social taxes. A reduction is provided if held more than six years. Untaxed if held for more than 22 years (withholding tax) and 30 years (social taxes).
- 16 No CGT if held more than 10 years
- 17 First-time house buyers are exempt from the transaction tax.
- 18 Recurrent property tax (building tax on dwellings) due in only some municipalities. In 2017 only 548 municipalities of 3178 levied building tax on dwellings.
- 19 The taxable capital gain is reduced by an increasing percentage each year and is exempt after five years.
- 20 50% of rental income is exempt and 50% is subject to a flat 20% capital income tax rate
- 21 Taxpayer has three options: exemption of rental income up to a ceiling of ILS 5 030; 10% tax on gross rental income, with no deductions; or marginal tax rate (30% to 48%) on rental income net of expenses
- 22 Higher transaction tax rate for second homes than owner-occupied home
- 23 Actual rental income from residential property is taxed under ordinary PIT, with 95% of the annual rent included in the tax base. Alternatively, the taxpayer can choose to pay a 21% "coupon tax" on rental income (10% in the case of pre-agreed controlled rents).
- 24 Exempt from CGT if held at least five years
- 25 40% of interest and principle is deductible against salary and wage income.
- 26 Exempt if rental income does not exceed KRW 20 million income until 2016.
- 27 40% tax rate if held <1 year. For 5 years, taxable but get 15% reduction; if 10 years get 38% reduction
- 28 Special PIT rate applied at flat concessionary rate.
- 29 Deemed return on net asset value (value less debt) is taxed. First EUR 24 437 of total assets excluding pensions and owner-occupied housing is exempt.
- 30 Recurrent property tax and net wealth tax. The tax-free allowance for the net wealth tax is NOK 1 400 000.
- 31 Recurrent property tax is not levied on the value of the real property. The tax base is area in case of land and usable area in case of buildings.
- 32 Realised income from disposal of real property is subject to taxation, if disposal takes place less than five years after acquisition or construction of the asset.
- 33 Half of capital gains are indexed.
- 34 Rental income less than EUR 500 is untaxed.
- 35 The tax rate for capital gains depends on the holding period: 25% for up to 5 years; 15% from 5 to 10 years; 10% from 10 to 15 years; 5% from 15 to 20 years; and non-taxation for greater than 20 years.
- 36 60% reduction in tax on rental income
- 37 Recurrent property tax and net wealth tax. For net wealth tax, an exemption threshold of EUR 700 000 is applied in general for all assets, including rented residential property.
- 38 Recurrent property tax has a maximum amount of SEK 7 412 for a house and SEK 1 268 for an apartment.
- 39 Only 90% of the capital gain is taxable when used mainly for business
- 40 Transaction taxes and recurrent property taxes are applied in many, but not all cantons. Neither are applied in Zurich, which is used as the representative canton in the ETR modelling.
- 41 Recurrent property tax plus net wealth tax.
- 42 Lower rate schedule applies for long term gains of more than one year. Gain attributable to any accelerated depreciation is taxable at ordinary rates. Gain attributable to straight-line depreciation is taxed at ordinary rates up to 25%.
- 43 No CGT if held more than three years, but only for one house sold per year.
- 44 If held less than 10 years.
- 45 Subject to marginal PIT rates after 40% exclusion.

Annex B. Methodology for calculating Average Effective Tax Rates (AETR) and Marginal Effective Tax Rates (METRs)

1. This annex outlines the methodology for calculating the METRs and AETRs presented in the paper. The methodology builds the OECD's 2018 *Taxation of Household Savings* report, which itself drew on the methodology in King and Fullerton (1984_[10]).
2. The analysis considers a taxpayer who makes a marginal investment of one additional currency unit (dollar, euro, yen etc.). In the METRs scenario, the investment generates a return that is just sufficient to make it worthwhile, compared to an alternative investment, and in the AETRs scenario, the investment generates a return that exceeds that breakeven point. The METR and AETR equations differ but use common variable, which are outlined in the table below.

Table B.1. Glossary of terms used in the equations

Variable	Description
<i>Investment Parameters</i>	
V	The net present value of the investment
r	Before-tax rate of return on investment
c	Before-tax rate of capital gain of the investment
p	Share of total return in capital gains
F^{PF}	Net present value of financing and transaction costs of the investment.
F	Net present value of the financing costs of the investment.
t	Time
n	Number of periods of investment
λ	Probability of investment sale in each period
r^*	Risk-free real interest rate
β	Risk premium on mortgage interest
π	Inflation rate
δ	Depreciation rate
ρ_H	Real interest rate
ρ_H^*	Household discount rate
R	After tax nominal rate of return on investment
S	After tax real rate of return on investment
<i>Tax Parameters</i>	
t_p	Tax rate on purchase of asset
t_v	Tax rate on income from asset
x	Share of income from asset included in the income tax base
i	Dummy variable of whether capital gains tax is indexed for inflation
irv	Rate of imputed rent on asset

t_{irv}	Tax rate on imputed rent value
t_l	Property tax rate on value of the asset
t_w	Wealth tax rate on value of the asset
t_c	Capital gains tax rate
t_{ded}	Rate of mortgage interest deduction from income tax
ϕ	Share of mortgage interest that is deductible from income tax
t_{ded}^w	Rate of mortgage interest deduction from wealth tax
t_e	Effective marginal tax rate

Marginal effective tax rates

3. The starting point is the net present value (NPV) of the stream of returns and costs (including taxes) to an investment in residential property. The NPV, for which the parameter is V , is presented in equation (1) and the financing cost is calculated separately in equation (2):

$$V = -F^{PF} + A + \int_{n=0}^{\infty} \lambda e^{-\lambda n} \left[\int_{t=0}^n \left\{ \begin{aligned} & [x + (1-x)(1-t_y)](r-c+\delta) \\ & - (irv \cdot t_{irv} + t_l + t_w) \end{aligned} \right\} e^{-(\rho_H + \delta - \pi - c)t} dt \right. \\ \left. + e^{-(\rho_H + \delta - \pi - c)n} - t_c [e^{-(\delta - \pi - c)n} - e^{i\pi n}] \cdot e^{-\rho_H n} \right] dn \quad (1)$$

4. The taxpayer makes an investment in residential property; the house can be owner-occupied or let to another occupant. The taxpayer pays the finance and purchasing cost F^{PF} .¹⁷ The taxpayer immediately receives A , the present discounted value of any grants or tax allowances given. Details on the calculation of parameter A can be found in OECD 2018_[11]. It is assumed that the number of years that the investor owns the house follows a Pareto distribution. The probability that the investor will continue to own the property decreases over time at the rate λ . The expected holding period of the property is equal to $1/\lambda$ years.

5. The investment yields an annual before-tax return r , which is part capital gain (c) and part recurrent return ($r - c$). The parameter x captures the portion of the recurrent return that is not subject to income tax, while the rest of the recurrent return, $1 - x$, will be taxed at the rate t_y . This represents the tax treatment of the actual rent the owner receives when they let the property or, if the housing is owner-occupied, the taxation of imputed income when it is levied on the recurrent return. Countries may instead estimate imputed rents as a portion of the value of the housing and this is captured by $irv \cdot t_{irv}$. The model includes imputed rent in order to reflect its tax treatment in the countries examined, but the paper makes no statement about the economic nature of imputed rent. Recurrent taxes on immovable property are captured by t_l and net wealth taxes are captured by t_w .

6. The housing increases in value annually, which contrasts with other ETR methodologies where the value of the housing is static over time. Capital gains c and inflation π will push up the value of the housing, while the housing will decrease in value with depreciation δ at a rate of 1.5% to 1.7% per year. The recurrent return therefore increases with the value of the house. The taxpayer discounts the stream of returns at the nominal rate ρ_H , which is assumed equal to a risk-free real rate of return r plus an inflation rate π ($\rho_H = r + \pi$).¹⁸

¹⁷ The nomenclature of F for the NPV of financing costs follows Klemm (2008_[21]).

¹⁸ In order for the integral in (1) to have a bounded solution, it is required to assume that $(\rho_H + \delta - \pi - C) > 0$.

7. When the house is sold, the taxpayer will recover the value of the housing. As described above, the sale price will be different from the original purchase price in three respects; the property could have decreased in value because of depreciation δ , or it could have increased in value because of inflation π or the capital gain c . The investor will pay a tax on the realised capital gains, which will be indexed for inflation when the parameter i is set to 1. In addition, the taxpayer earns a return δ to pay for the depreciation of the asset. As above, the taxpayer discounts the stream of returns at the nominal rate ρ_H^* , which is assumed equal to a real rate of return r plus an inflation rate π , yielding ($\rho_H^* = r + \pi$).

8. The transaction and financing costs (F^{PF}) in equation (1) are equal to:

$$F^{PF} = (1 + t_p) \cdot \int_{n=0}^{\infty} \lambda e^{-\lambda n} \left[\int_{t=0}^n ((1 - \phi t_{ded})(r + \beta + \pi) - t_{ded}^w) e^{-\rho_H^* t} dt + e^{-\rho_H^* n} \right] dn \quad (2)$$

9. The taxpayer invests $(1 + t_p)$ currency units to finance the unitary purchase of the asset, plus the transaction tax t_p . If the taxpayer takes a loan to make the investment (debt-financed), interest is due on the loan and these interest payments may be deductible. ϕ is the share of the interest payments that are deductible at the tax rate t_{ded} ; β is the risk-premium that the borrower needs to pay in addition to the nominal interest rate $r + \pi$. The debt may also be deducted from the household's taxable wealth, which reduces the yearly cost by t_{ded}^w . In the absence of debt-finance, the cost of the investment in equation (2) simplifies to $(1 + t_p)$; the unitary investment cost augmented with the transaction tax t_p . In this case, the investment is financed with own savings (new equity). It is possible to distinguish the risk free borrowing rate r^* from the return r , however in practice the same value is used for both parameters.

10. Solving equation (2) allows the transaction and financing costs F^{PF} to be expressed as follows:

$$F^{PF} = (1 + t_p) (1 - F) \quad \text{where} \quad F = \frac{\rho_H^* - ((1 - \phi t_{ded})(r^* + \beta + \pi) - t_{ded}^w)}{\lambda + \rho_H^*} \quad (3)$$

11. As $\rho_H^* = r^* + \pi$, the value of F simplifies to:

$$F = \frac{-\beta + \phi t_{ded}(r^* + \beta + \pi) + t_{ded}^w}{\lambda + r^* + \pi} \quad (4)$$

12. F can thus be thought of as the net present value of the financing cost of the investment. The financing cost is increasing in any mortgage premium β and is decreasing in the rate of mortgage interest deductibility ϕt_{ded} . The taxpayer will face a financial incentive to finance the investment with debt ($F < 0$) if the tax deductibility outweighs the risk premium that needs to be paid:

$$F > 0 \Leftrightarrow \phi t_{ded}(r + \beta + \pi) + t_{ded}^w > \beta \quad (5)$$

13. As discussed above, it is assumed that part of the return comes in the form of a capital gain, where the value of the house will increase annually with the return c . As the total return of the investment will be increasing in the value of the house, equation (1) can be interpreted as the NPV of an investment that is partly financed with debt or newly issued equity (if $F = 0$) and partly with the retained earnings from capital gains. If $c = 0$, there is no capital gain return and the investment is entirely financed with debt or newly issued equity (where $F = 0$). The degree to which the investment is financed with retained earnings arising from the capital gain is decreasing in the parameter α .

14. When V is set to 0, equation (1) can be solved for the marginal after tax real return ρ_H that makes the investor indifferent between investing another dollar in the asset or consuming the dollar. Under the assumption that the return c is fixed and is not related to the value of r , the ρ_H of a marginal investment in housing, which is partly financed with debt and partly with retained earnings, equals:

$$\rho_H = \frac{\left\{ \begin{array}{l} (r - c + \delta)[x + (1 - x)(1 - t_y)] \\ - [irv \cdot t_{irv} + t_l + t_w] \\ + c \left[1 - \frac{\lambda t_c}{\lambda + r + \pi - i\pi} \right] \\ + c[1 - (1 + t_p)(1 - F)] \\ + \left(\frac{\lambda t_c}{\lambda + r + \pi - i\pi} \right) (i\pi + \delta - \pi) \\ + \lambda[1 - (1 + t_p)(1 - F)] \end{array} \right\}}{(1 + t_p)(1 - F)} - \delta + \pi \quad (6)$$

If c is set to 0 in equation (6), the breakeven after tax real return ρ_H of a fully debt-financed marginal investment becomes:

$$\rho_H = \frac{\left\{ \begin{array}{l} (r + \delta)[x + (1 - x)(1 - t_y)] \\ - [irv \cdot t_{irv} + t_l + t_w] \\ + \lambda[1 - (1 + t_p)(1 - F)] \\ - \left(\frac{\lambda t_c}{\lambda + r + \pi - i\pi} \right) (\pi - \delta - i\pi) \end{array} \right\}}{(1 + t_p)(1 - F)} - \delta + \pi \quad (7)$$

15. The interpretation of this result is more straightforward than it may appear.

- The first term in the numerator captures the recurrent return that the investment needs to earn after depreciation ($R + \delta$) and taxes on the income earned from the investment $[x + (1 - x)(1 - t_y)]$.
- The second term in the numerator reflects the taxes levied on the value of the investment in the house, such as property or wealth taxes, or taxes on the imputed rental values of the house.
- The third term in the numerator reflects that the difference between the unit value of the investment and the actual financial cost of the investment for the taxpayer is spread over the expected holding period (λ). These costs include the transaction taxes (t_p) such as stamp duties (which in net present value terms is spread over the life of the investment). This term also includes the net present value of the financing term ($1 - F$). Increasing financing costs increases the value of this term ($1 - F$), which reduces the after-tax return ρ_H .
- The last term of the numerator reflects the tax on the capital gain realised when the taxpayer sells the housing, which may be indexed for inflation. In the absence of explicit capital gains c this term simply reflects changes in the value of the house that results from depreciation or inflation, with an additional term $i\pi$ that denotes whether or not the capital gains tax is indexed for inflation. The numerator of this term shows that capital gains taxes t_c , are spread over the life of the investment (indexed by the expected holding period (λ)). If the value of the house has decreased, this last term is negative. In this case the tax rate t_c would be set to 0 as no country would compensate the investor through the tax system for a drop in housing equity.
- The denominator of the return ρ_H scales the return of the investment to the amount actually invested, noting that the cost of the investment is not the unitary investment cost 1 but instead $(1 + t_p)(1 - F)$.
- Finally, the depreciation rate is deducted.

16. However, if it is assumed that c equals a fixed percentage of the return r . This implies that $c = (1 - p)r$, where $0 \leq p \leq 1$.¹⁹ Under this assumption the breakeven after tax real return ρ_H , of a marginal investment that is partly financed with debt and partly with retained earnings arising from the capital gain, equation (6) becomes:

$$\rho_H = \frac{\left\{ \begin{array}{l} (rp + \delta)[x + (1 - x)(1 - t_y)] \\ - [irv \cdot t_{irv} + t_l + t_w] \\ + \lambda[1 - (1 + t_p)(1 - F)] \\ - \left(\frac{\lambda t_c}{\lambda + r + \pi - i\pi} \right) [r(1 - p) + \pi - i\pi - \delta] \end{array} \right\}}{(1 + t_p)(1 - F)} + r(1 - p) - \delta + \pi \quad (8)$$

17. Equation (8) simplifies to equation (7) when $p = 1$. Again, the after tax return on the investment for the investor has several parts. Again, the four terms in the numerator represent different parts of the ETR. The first term is the after tax recurrent return after depreciation. The second term are reflects the taxes levied on the value of the investment in the house as above. The third term is the financing and purchasing costs. Note also that these costs which are expressed in NPV terms are spread over the lifetime of the investment λ . The fourth term includes taxation on capital gains as before, where these gains again include inflation and depreciation, but also now include $r(1 - p)$, the portion of the total returns that comes in the form of capital gains, which is taxable (even with inflation indexation is it is the real return). The after-tax real rate of return of investing in a particular savings vehicle, s , given an inflation rate of π , is then $s = \rho_H - \pi$.

18. Subject to these cost of capital equations, the marginal effective tax rate is calculated as:

$$t_e = \frac{r - s}{r} \quad (9)$$

Average effective tax rate

19. It is also useful to consider average effective tax rates (AETRs) as well as marginal effective tax rates (METRs). While METRs provide a measure of the tax impact on a breakeven investment, AETRs provide a measure of the tax impact on an investment that earns a higher-than breakeven returns.

20. AETRs measure the ratio of observed taxes to income from savings; that is the difference between the net present value of an investment with and without taxes, expressed as a share of the net present value of the before-tax total return stream. As AETRs are a measure of taxes levied on cash flows, they capture the impact of the tax system when the returns from investments are higher than breakeven.

21. The NPV in equation (1) is repurposed for the AETRs. To extract the observed taxes on housing, it is necessary to calculate the NPV of the investment with and without taxes and then take the difference between the two values. The value of V in equation (1), with taxes included, can be written as follows:

$$V_{tax} = -F_{tax}^{PF} + A + \left(\frac{[x + (1 - x)(1 - t_y)](r - c + \delta) - irv \cdot t_{irv} - t_l - t_w}{\lambda + \rho_H + \delta - \pi - c} \right) + \left(\frac{\lambda(1 - t_c)}{\lambda + \rho_H + \delta - \pi - c} \right) + \left(\frac{\lambda t_c}{\lambda + \rho_H - i\pi} \right) \quad (10)$$

¹⁹ This follows the approach taken in OECD (2018_[11]).

22. The financing cost F_{tax}^{PF} is expressed as:

$$F_{tax}^{PF} = (1 + t_p) \left(\frac{\lambda + ((1 - \phi t_{ded})(r^* + \beta + \pi) - t_{ded}^w)}{\lambda + \rho_H^*} \right) \quad \text{and} \quad \rho_H^* = r^* + \pi \quad (11)$$

23. In the absence of taxes, these expressions simplify to:

$$V_{no\ tax} = -F_{no\ tax}^{PF} + \left(\frac{r - c + \delta + \lambda}{\lambda + \rho_H^* + \delta - \pi - c} \right) \quad (12)$$

24. The financing cost $F_{no\ tax}^{PF}$ is expressed as:

$$F_{no\ tax}^{PF} = \left(\frac{\lambda + r^* + \beta + \pi}{\lambda + \rho_H^*} \right) \quad \text{and} \quad \rho_H^* = r^* + \pi \quad (11)$$

25. The denominator of the AETR equals the net present value of the before-tax total return stream r , and is equal to:

$$NPV\ return = \int_{n=0}^{\infty} \lambda e^{-\lambda n} \left[\int_{t=0}^n r e^{-(\rho_H + \delta - \pi - c)t} dt \right] dn \quad (13)$$

26. The solution of equation (13) equals $\frac{r}{\lambda + \rho_H + \delta - \pi - c}$, which assuming that $c = (1 - \alpha)r$ simplifies to:

$$NPV\ return = \frac{r}{\lambda + r + \delta - (1 - \alpha)r} \quad (14)$$

27. The AETR then follows from equations (10), (12), and (14):

$$AETR = \frac{V_{no\ tax} - V_{tax}}{NPV\ of\ return} \quad (15)$$

28. The AETR in equation (15) for an investment that is partly financed with debt and partly with retained earnings then equals (using that $c = (1 - \alpha)r$ and that $\rho_H = r + \pi$):

$$AETR = \left\{ \begin{array}{l} \left[\frac{\lambda t_p + (r + \beta + \pi) \cdot (t_p - \phi t_{ded}(1 + t_p)) - t_{ded}^w}{\lambda + r + \pi} \right] \\ + \left[\frac{(1 - x)t_y \cdot (\alpha r + \delta) + irv \cdot t_{irv} + t_l + t_w}{\lambda + r + \delta - (1 - p)r} \right] \\ + \lambda t_c \left[\frac{(1 - p)r + \pi - i\pi - \delta}{(\lambda + r + \delta - (1 - p)r)(\lambda + r + \pi - i\pi)} \right] \end{array} \right\} \cdot \left\{ \frac{r}{\lambda + r + \delta - (1 - p)r} \right\} \quad (16)$$

29. The AETR in equation (16) will equal the METR when r equals the return on housing that has been fixed in the marginal case. When the return r becomes infinitely large, the AETR converges to its limit value T :

²⁰ In order for Equation 14 to be positive, it is necessary to assume that $\lambda + r + \delta > (1 - \alpha)r$, which can also written as $r < \frac{\lambda + r + \delta}{(1 - \alpha)}$

$$T = \left\{ \begin{array}{l} \left[\alpha(1-x)t_y + (1-p) \left(\frac{\lambda t_c}{(\lambda + r + \pi - i\pi)} \right) \right] \\ - (1-p) \left[\frac{\lambda t_p + (r + \beta + \pi) \cdot (t_p - \phi t_{ded}(1 + t_p)) - t_{ded}^w}{\lambda + r + \pi} \right] \\ + (1 - \alpha)A \end{array} \right\} \quad (17)$$

30. Similar results could be derived for average investments that are entirely financed with debt, where $c = 0$. In this case, the values of V_{tax} and $V_{no\ tax}$ would have to be derived from equations (10) and (12) by putting $c = 0$ in these equations and by recalculating the numerator of equation (13). The denominator would become $\frac{r}{\lambda + \rho_H + \delta - \pi}$. The corresponding AETR is, however, not presented nor calculated, as it is not realistic to assume that for large values of R the entire return comes in the form of a recurrent return and not, at least partly, in the form of a capital gain.

Extension

31. The current approach assumes that part of the return on investment is received in each period and part of the return is received through a capital gain c . This capital gain increases the value of the house and will increase the recurrent return the investor will want to earn. Indeed, the more expensive the house, the higher the imputed income or the rent that can be earned when the investment is let. Put differently, the investor will not only want to earn a return on the initial debt-financed or new equity-financed investment, but also on the return that is retained and reinvested.

32. An alternative modelling approach would have to be followed if the goal was to focus on exogenous house price increases. This type of analysis could be appropriate, for example, where there is a housing price bubble or a windfall gain because of location specific rents. In this case, the model could be adjusted to have two inflation rates; the first inflation rate would be part of the household's nominal discount rate ρ_H . The second inflation rate (which could be set at a higher or lower rate) would account for the increase in the value of the house and included in the discount rate in equation (1). This extension could then assume that $\alpha = 1$ so that the full return of the investment is received each period, while the capital gain as a result of housing price increases is incorporated only when the house is sold. This extension is left for further work.

Annex C. Headline Effective Tax Rates

Table C.1. Marginal Effective Tax Rates by investment scenario, 67% average wage taxpayer, 2016

Country	Equity-financed, owner-occupied housing	Equity-financed, rented housing	Debt-financed, owner-occupied housing	Debt-financed, rented housing
Argentina	28.3%	52.9%	-1.1%	52.9%
Australia	14.7%	81.0%	14.7%	42.1%
Austria	15.5%	53.2%	15.5%	5.5%
Belgium	49.3%	50.6%	-10.3%	50.6%
Bulgaria	9.6%	23.2%	9.4%	23.2%
Canada	38.9%	63.0%	38.9%	40.4%
Chile	0.0%	0.0%	0.0%	0.0%
Colombia	14.7%	14.4%	14.7%	14.4%
Czech Republic	11.1%	22.1%	-8.7%	2.7%
Denmark	21.3%	50.4%	-38.2%	7.8%
Estonia	0.0%	22.3%	-28.2%	22.3%
Finland	12.1%	49.9%	-9.7%	11.3%
France	22.8%	41.3%	22.8%	41.3%
Germany	19.4%	57.4%	19.4%	13.9%
Greece	27.2%	32.0%	13.9%	18.4%
Hungary	14.3%	30.3%	14.3%	30.3%
Iceland	15.5%	31.5%	15.5%	31.5%
Ireland	6.6%	42.7%	6.6%	17.4%
Israel	10.0%	28.4%	10.0%	28.4%
Italy	1.8%	47.2%	-26.4%	47.2%
Japan	23.7%	34.5%	-5.2%	21.4%
Korea	5.6%	9.3%	-14.6%	9.3%
Latvia	17.8%	31.0%	17.8%	31.0%
Lithuania	2.7%	18.7%	2.7%	18.7%
Luxembourg	0.3%	41.3%	0.3%	-4.6%
Mexico	11.0%	28.5%	-3.0%	14.8%
Netherlands	10.5%	49.8%	-46.1%	17.9%
New Zealand	20.0%	35.2%	20.0%	13.4%
Norway	16.7%	65.5%	-17.3%	36.3%
Poland	5.9%	15.0%	5.9%	1.5%
Portugal	10.0%	41.2%	10.0%	41.2%
Slovak Republic	0.4%	20.6%	0.3%	20.6%
Slovenia	7.9%	34.2%	7.9%	34.2%
South Africa	22.9%	40.0%	22.9%	17.8%
Spain	39.2%	48.3%	21.3%	37.6%
Sweden	10.1%	31.2%	-33.8%	-11.7%
Switzerland	11.6%	22.0%	-10.4%	0.0%
Turkey	7.2%	29.1%	7.2%	2.2%
United Kingdom	28.4%	54.5%	28.4%	30.9%
United States	45.0%	63.2%	27.8%	45.8%

Note: Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. The assumptions of taxpayer housing wealth follow the standard assumptions outlined in paragraph 29.

Table C.2. Marginal Effective Tax Rates by investment scenario, 100% average wage taxpayer, 2016

Country	Equity-financed, owner-occupied housing	Equity-financed, rented housing	Debt-financed, owner-occupied housing	Debt-financed, rented housing
Argentina	28.3%	57.1%	-7.0%	57.1%
Australia	14.7%	86.5%	14.7%	42.4%
Austria	15.5%	59.4%	15.5%	0.8%
Belgium	49.3%	50.6%	-10.3%	50.6%
Bulgaria	9.6%	23.2%	9.4%	23.2%
Canada	38.9%	74.7%	38.9%	41.2%
Chile	21.2%	21.2%	18.1%	18.0%
Colombia	14.7%	14.4%	14.7%	14.4%
Czech Republic	11.1%	22.1%	-8.7%	2.7%
Denmark	21.3%	52.1%	-38.2%	8.3%
Estonia	0.0%	22.3%	-28.2%	22.3%
Finland	12.1%	51.1%	-9.7%	12.4%
France	22.8%	49.0%	22.8%	49.0%
Germany	19.4%	65.8%	19.4%	12.4%
Greece	27.2%	32.0%	13.9%	18.4%
Hungary	14.3%	30.3%	14.3%	30.3%
Iceland	15.5%	31.5%	15.5%	31.5%
Ireland	6.6%	64.6%	6.6%	13.1%
Israel	10.0%	28.4%	10.0%	28.4%
Italy	1.8%	47.2%	-26.4%	47.2%
Japan	23.7%	40.5%	-5.2%	20.6%
Korea	5.6%	9.3%	-14.6%	9.3%
Latvia	21.8%	34.7%	21.8%	34.7%
Lithuania	2.7%	18.7%	2.7%	18.7%
Luxembourg	0.3%	47.4%	0.3%	-5.5%
Mexico	11.1%	37.7%	-12.8%	15.0%
Netherlands	10.5%	49.8%	-46.1%	17.9%
New Zealand	20.0%	46.0%	20.0%	7.9%
Norway	16.7%	65.5%	-17.3%	36.3%
Poland	5.9%	15.0%	5.9%	1.5%
Portugal	15.0%	45.8%	15.0%	45.8%
Slovak Republic	0.4%	20.6%	0.3%	20.6%
Slovenia	7.9%	34.2%	7.9%	34.2%
South Africa	22.9%	47.7%	22.9%	15.2%
Spain	39.2%	50.3%	21.3%	37.2%
Sweden	10.1%	31.2%	-33.8%	-11.7%
Switzerland	23.3%	38.0%	-6.6%	8.4%
Turkey	7.2%	36.5%	7.2%	0.2%
United Kingdom	28.4%	54.5%	28.4%	30.9%
United States	39.8%	63.5%	9.0%	31.0%

Note: Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. The assumptions of taxpayer housing wealth follow the standard assumptions outlined in paragraph 29.

Table C.3. Marginal Effective Tax Rates by investment scenario, 500% average wage taxpayer, 2016

Country	Equity-financed, owner-occupied housing	Equity-financed, rented housing	Debt-financed, owner-occupied housing	Debt-financed, rented housing
Argentina	45.0%	82.3%	45.0%	82.3%
Australia	14.7%	98.7%	14.7%	43.0%
Austria	15.5%	66.7%	15.5%	-5.2%
Belgium	49.3%	50.6%	49.3%	50.6%
Bulgaria	9.6%	23.2%	9.4%	23.2%
Canada	40.0%	100.0%	40.0%	44.9%
Chile	24.8%	24.8%	6.0%	5.5%
Colombia	16.9%	46.4%	-22.2%	10.9%
Czech Republic	11.1%	22.1%	-8.7%	2.7%
Denmark	21.3%	62.8%	-38.2%	11.5%
Estonia	3.8%	26.1%	3.8%	26.1%
Finland	17.0%	55.5%	-7.6%	17.6%
France	33.9%	70.3%	33.9%	70.3%
Germany	19.4%	69.3%	19.4%	11.8%
Greece	38.5%	43.5%	25.8%	30.5%
Hungary	14.3%	30.3%	14.3%	30.3%
Iceland	15.5%	31.5%	15.5%	31.5%
Ireland	6.6%	67.3%	6.6%	16.5%
Israel	22.2%	28.4%	22.2%	28.4%
Italy	1.8%	47.2%	-26.4%	47.2%
Japan	23.7%	78.3%	-5.2%	13.9%
Korea	10.6%	55.1%	10.6%	37.6%
Latvia	25.8%	38.4%	25.8%	38.4%
Lithuania	16.0%	32.0%	16.0%	32.0%
Luxembourg	0.3%	48.6%	0.3%	-5.7%
Mexico	13.6%	54.0%	-28.8%	15.9%
Netherlands	10.5%	49.8%	-54.4%	17.9%
New Zealand	20.0%	48.6%	20.0%	6.4%
Norway	16.7%	65.5%	-17.3%	36.3%
Poland	5.9%	15.0%	5.9%	-2.8%
Portugal	26.8%	60.2%	26.8%	60.2%
Slovak Republic	0.4%	27.0%	0.3%	27.0%
Slovenia	7.9%	34.2%	7.9%	34.2%
South Africa	41.0%	78.1%	41.0%	29.4%
Spain	39.8%	56.8%	21.8%	36.7%
Sweden	10.1%	31.2%	-33.8%	-11.7%
Switzerland	41.5%	67.3%	-9.2%	18.6%
Turkey	7.2%	44.9%	7.2%	-2.3%
United Kingdom	28.4%	84.6%	28.4%	30.6%
United States	33.7%	59.1%	-16.1%	2.5%

Note: Results assume inflation at the OECD average level; with a 20-year holding period; and the returns stemming 50% from capital gains and 50% from rent or imputed rent. The assumptions of taxpayer housing wealth follow the standard assumptions outlined in paragraph 29.