The Geography of Income Inequalities in OECD Countries

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Evidence from national register data

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1. Introduction

1.   Geographic aspects are essential for understanding inequalities in people's living standards and economic opportunities. The level and distribution of household incomes, earnings and wealth varies substantially within countries – across regions, municipalities and neighbourhoods, and between urban and rural areas. These geographic disparities risk undermining inclusive growth and sustained well-being if they exclude people from job opportunities, and hence the benefits of economic growth, and prevent them from accessing good-quality infrastructure, such as education and child care, health care, transportation and digital services.

2.   Regional disparities – and notably the situation in lagging and economically declining regions – have been receiving growing public attention in many OECD countries. They have become a source of increasingly visible public discontent and a driver of political polarisation (OECD, 2019[1]). Research on the "Geography of EU Discontent" shows that local economic and industrial decline, combined with lower employment and a less educated workforce, are key drivers of differences in the anti-EU vote across electoral districts (Dijkstra, Poelman and Rodríguez-Pose, 2019[2]). In the 2016 "Brexit" referendum, voting outcomes strongly varied across regions, and those with a lower income per capita and greater shares of senior and low-educated citizens were more likely to vote for "Leave" (Arnorsson and Zoega, 2018[3]). And the 2020 U.S. Presidential Election saw a further polarisation of voting patterns by population density, with cities and suburbs voting even more strongly Democrat than four years ago, while rural areas became even more strongly Republican (The Economist, 2020[4]).

3.   The COVID-19 crisis is further accentuating geographic inequalities in living conditions and access to services, and may hence move the issue higher up on the policy agendas. While the scope of the crisis has been truly global, its impact on people's lives and livelihoods has often depended on regional and even local factors. People's exposure to the virus has varied across regions depending on population density, travel behaviour and local containment measures. Their vulnerability also depends on local-community characteristics, such as the age distribution and local access to healthcare, making socially deprived communities more vulnerable (Nicodemo et al., 2020[5]). Also the economic repercussions of the crisis, and the speed of the recovery, will depend on regional and local factors, such as industry structure (including the existence of a strong tourism industry), occupational structure and workforce characteristics (i.e. the share of workers working face-to-face, the potential for teleworking, and the capacity to adapt to structure change), and of course local policies (OECD, 2020[6]; 2020[7]).

4.   In spite of the topic's high policy relevance, international evidence on geographic disparities in incomes, labour market and social outcomes at granular level remains scarce for lack of suitable data. Household and labour force surveys, as the main sources of internationally comparable data on living conditions and labour market outcomes, have limited sample sizes and are typically not representative at disaggregated geographic level. Both the OECD and Eurostat therefore systematically collect data on the levels and inequality of household incomes only for large (TL2/NUTS2) regions (Eurostat, 2020[8]; OECD, 2021[9]).[1] Other OECD studies have tried to overcome the lack of granular income data by using micro-aggregated administrative data to assess income inequalities within metropolitan areas (Boulant, Brezzi and Veneri, 2016[10]). Still, there is a growing need for international comparative evidence on income inequalities at sufficient spatially granular level. Register-based data, notably from tax and social insurance records, can help fill this gap, because they usually contain population-level information, often with great

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[1]   The OECD classifies regions on two territorial levels reflecting the administrative organisation of countries (OECD, 2020[33]). For European countries this classification is largely consistent with the Eurostat NUTS 2016. Large (TL2) regions represent the first administrative tier of sub-national government, for example, Provinces in Canada, the *Régions* in France, and States in the United States. Small (TL3) regions correspond to lower-tier administrative regions, with the exception of Australia, Canada, and the United States.

accuracy.[2] The main challenge for exploiting such data to study economic inequalities is that access is often restricted for confidentiality reasons, and that these data are not standardised across countries.

5.   This report summarises initial results from a research project that exploits national administrative data from tax registers to shed light on the distribution of incomes within and across geographic areas in OECD and EU countries. In this first stage, the work focuses on levels and trends in median incomes and income distributions of small (TL3) regions in 11 European OECD countries: Austria, Belgium, Denmark, Finland, Hungary, Italy, Norway, Portugal, the Slovak Republic, Sweden, and Switzerland. A particular focus lies on urban-rural disparities in income levels and inequalities, as measured by the OECD metropolitan/non-metropolitan typology for small regions. This is, to the authors' knowledge, the first study producing results on regional income distributions at this level for a larger number of countries.

6.   The project's main findings at this initial stage are as follows:

- *Regional income levels can vary substantially within countries.* The ratio between the median disposable incomes in the highest- and lowest-income regions ranges from around 1.2 or 1.3 in some of the Nordic countries to 1.4 in Portugal and the Slovak Republic. Metropolitan regions tend to have somewhat higher income levels than non-metropolitan regions. However, income disparities *among* metropolitan and non-metropolitan regions are much greater than *between* the two groups.

- *Levels of income inequality also differ substantially across regions.* The ratio between the Gini indices in the most and least unequal regions ranges from around 1.2 in Portugal and the Slovak Republic, to 1.5 in Norway. Metropolitan regions tend to be more unequal than non-metropolitan regions, and inequality is usually highest in countries' capital regions.

- *There is no evidence of strong divergence in income levels across regions* in countries for which time series data are available**.** By contrast, income inequality within small regions has grown, and the disparities in income inequality across regions have become larger.

- *Income taxes and social transfers redistribute incomes from lower- to higher-income regions*, and consequently from metropolitan to non-metropolitan regions (tentative).

- *Cross-regional income differences account only for a very small fraction of overall income inequalities*. Instead, income occurring across households within the same small region account for at least 95% of overall, country-level inequalities across a small set of countries studied.

7.   An important disclaimer at this point is that the statistics shown in this report – while offering rich new insights into within-country disparities in income levels and inequality – *may, in their current form, not be used for cross-country comparisons of income levels or inequality*. This is, because the underlying administrative data sources differ in their coverage of different income sources and taxes and, in some cases, the unit of observation.

8.   The remainder of this report is structured as follows: Section 2. sets the scene by providing a first, short overview of the geography of economic disparities across OECD countries drawing on existing aggregate data from the OECD Regional Statistics database (OECD, 2021[9]). It summaries trends in cross-regional inequalities in GDP per capita, as a widely available indicator for regional economic prosperity, and describes some key trends in regional demographics. Section 3. gives an overview of the national administrative data used in the empirical analysis, discusses their potential and limitations. Section 4. then presents the initial results on regional disparities in income levels and inequalities, and in their time trends, across 11 European OECD countries. Section 5. discusses the results of a decomposition of overall, country-level inequalities into their *within-* and *between*-regional components for a selection of five

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[2]   Kennedy (2019[28]) discusses the potential and limitations of using tax micro-data for policy analysis.

countries. Section **Error! Reference source not found.** concludes by highlighting a few main lessons for the upcoming work on the topic and by giving an outlook onto the second project phase.

2. The geography of economic disparities

9.   Economic development is crucial to ensure people's well-being today and for future generations. Although well-being is multi-dimensional and goes beyond material conditions (OECD, 2014[11]), economic development – measured as GDP per capita – is fundamental to sustain many well-being areas that matter for people, such as health, education, housing and income. Highly developed regions tend to have more resources and better means to ensure higher incomes for people – for example, by providing more good-quality jobs, better access to public services, and more comprehensive social protection.

Regional disparities in economic activity across OECD countries are large and growing

10.   Yet, within OECD countries, economic activity across small (TL3) regions is highly unequal. In 2017-18, within the same country, the top 20% of regions (i.e. small regions with highest GDP per capita representing 20% of the national population) had on average 2.5 times the GDP per capita of the bottom 20% of regions (OECD, 2020[12]). Across OECD countries, economic development gaps between the top and bottom 20% of regions are highest in the United Kingdom, Hungary, Colombia and Turkey, where richest regions have three times or more the GDP per capita of the less developed regions.

11.   Regional economic disparities across small regions have increased during the past 15 years across the OECD as a whole. Although the gaps in GDP per capita between the regions representing the richest and poorest 20% of the population have remained relatively stable in the past decade, a closer look at the full distribution of GDP per capita across small regions shows an increase in regional economic disparities over the last 15 years. More precisely, the coefficient of variation of small regions' GDP per capita (i.e. standard deviation as a percentage of the mean) increased from 52% to 58% between 2003 and 2017, on average, for a sample of 27 OECD countries with available data (Figure 1). Regional disparities in GDP per capita give a first hint at likely differences in incomes and living standards. However, they are likely larger than disparities in household incomes, notably if economic activity of large, multi-plant firms is attributed to the headquarters' region ("headquarter bias").

Figure 1. Inequalities in economic activity have increased across the OECD on average

Coefficient of variation of GDP per capita, based on small regions (TL3) of OECD countries, 2003-17
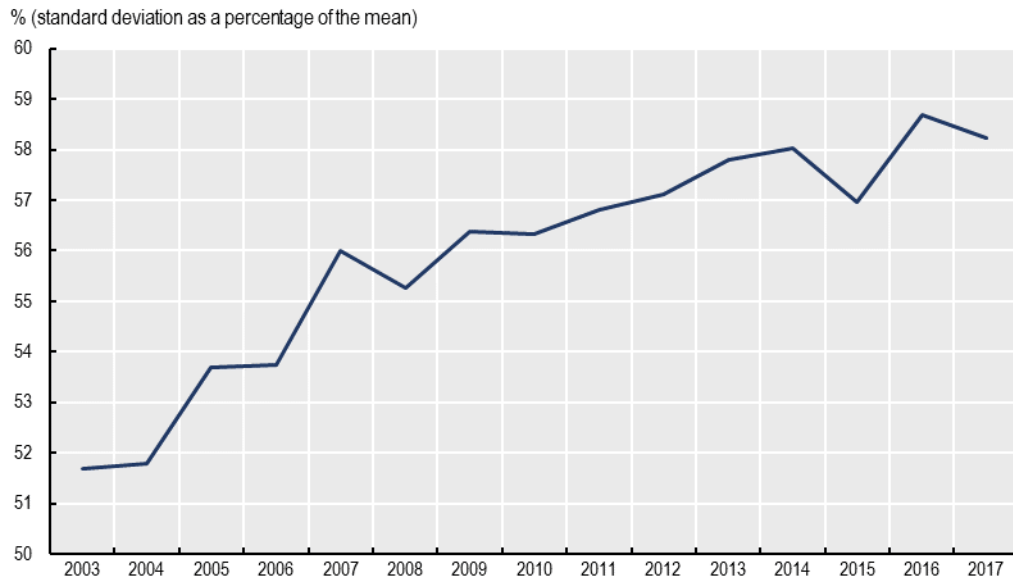
Note: The coefficient of variation is the standard deviation of small regions' GDP per capita as a percentage of the mean. Unweighted averages based on 1 503 small regions (TL3) from 27 OECD countries.
Source: OECD calculations based on the OECD Regional Statistics database (OECD, 2021[9]).

But not all countries experienced regional divergence in the level of economic activity

12.   However, regional economic disparities have evolved quite differently across countries. Half of OECD countries have experienced regional divergence in GDP per capita over the latest 15 years with available data, while only one fourth have seen clear patterns of convergence (Figure 2). More specifically, 13 OECD countries have experienced an increase in the coefficient of variation of GDP per capita of at least two percentage points from 2003 to 2017. In the United States, Denmark, France, the United Kingdom and Ireland, economic divergence across regions has been strongest – with increases in the coefficient of variation ranging from five to 30 percentage points. On the other side of the spectrum, only six OECD countries show a convergence pattern (i.e. a decrease in the coefficient of variation of GDP per capita of at least 2 percentage points), particularly Portugal, Austria, Latvia and Finland.

Figure 2. Regional inequalities in economic activity have increased in about half of all OECD countries

Change in the coefficient of variation of GDP / capita, based on small regions (TL3), 2003-17
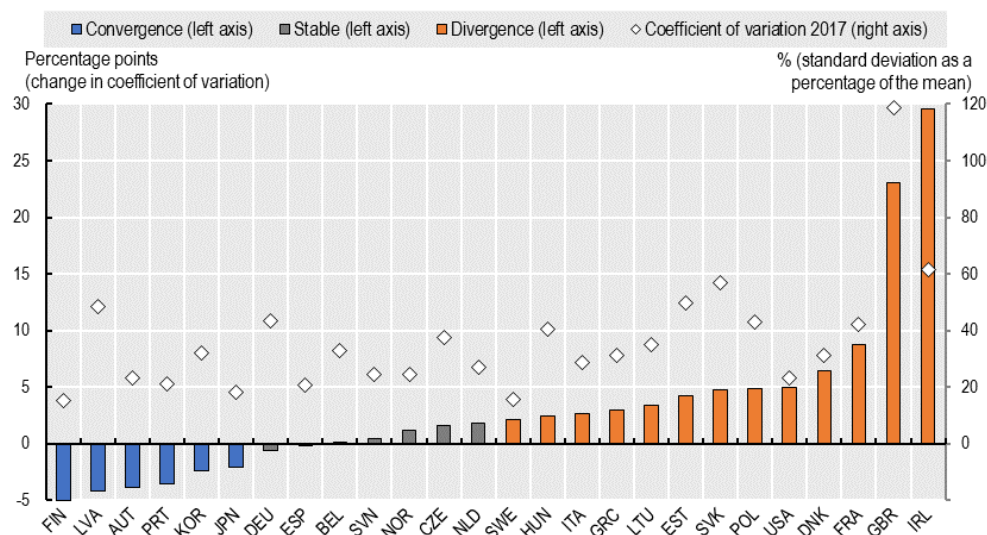
Note: The coefficient of variation is the standard deviation of small regions' GDP per capita as a percentage of the mean. Unweighted averages based on 1 502 small regions (TL3) from 26 OECD countries.
Source: OECD calculations based on the OECD Regional Statistics database (OECD, 2021[9]).

Growing disparities between metropolitan and non-metropolitan regions are an important part of the story

13.   Different degrees in the access to agglomerations for people, firms, and services provide a powerful interpretation of regional economic disparities. The OECD classification of small regions distinguishes regions based on their access to agglomerations based on data about the share of the regional population living within or near (up to a one-hour drive from) a metropolitan area (see Box 1). In OECD countries, metropolitan regions or regions with easy access to metropolitan areas tend to have higher GDP per capita than other regions. Meanwhile, regions far from metropolitan areas had an average GDP per capita of USD 35 000 (2015 PPP) in 2017, a level 8% lower than in regions close to a metropolitan area and 25% lower than in metropolitan regions (Figure 3).

14.   The gap in GDP per capita between metropolitan and non-metropolitan regions has been widening because of sluggish growth in regions far from metropolitan areas (Figure 4). Although annual GDP-per-capita growth in metropolitan regions has been low in the last 15 years (1.15%), remote regions and regions close to small or medium cities have been growing at an even-lower rate (0.9%). This reinforced already existing disparities in economic development: In 2003, GDP per capita of remote regions and regions close to small or medium cities represented, respectively, 78% and 75% of the GDP per capita in metropolitan regions. By 2017, those shares had dropped by a further 2 percentage points. Regions near metropolitan areas have been the only type of regions that kept pace with the growth in metropolitan areas.

Figure 3. Economic activity is greater in metropolitan regions

Average GDP per capita by type of small region (TL3), 2017
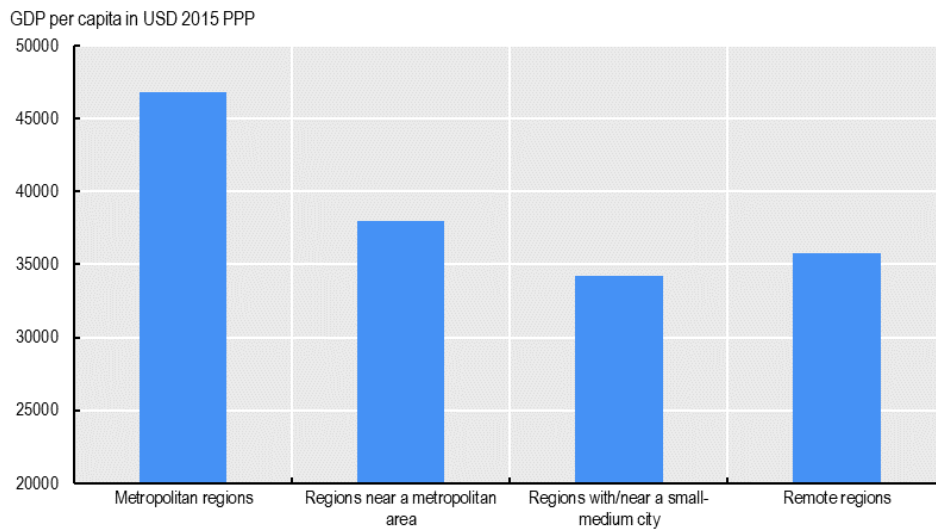
GDP per capita in USD 2015 PPP

Note: Unweighted averages based on 1 503 small regions (TL3) from 27 OECD countries.
Source: (OECD, 2021[9]).

Figure 4. Regions that are not near a metropolitan area have experienced a relative decline in economic activity

Evolution of GDP per capita by type of TL3 region, 2003-17
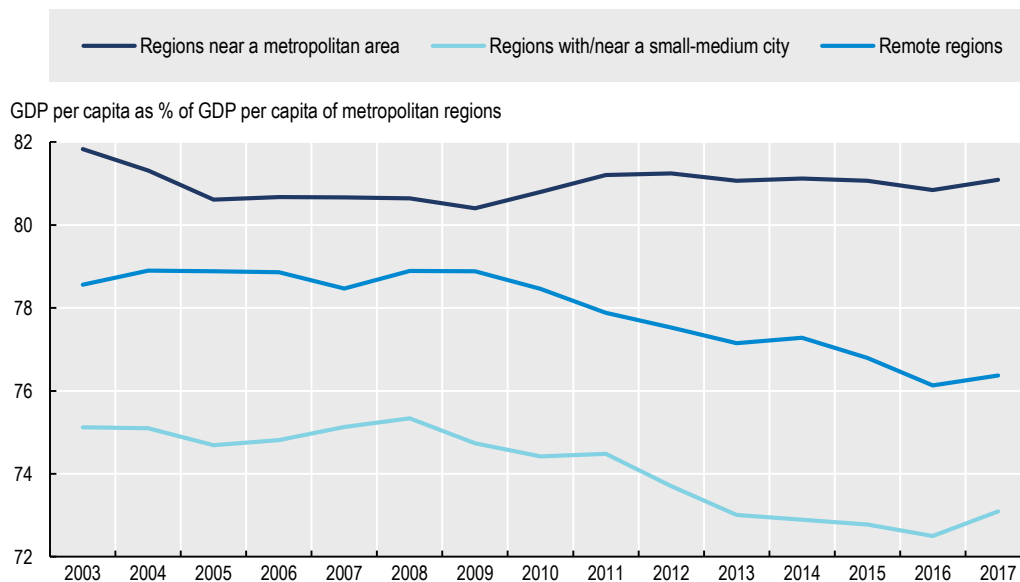
GDP per capita as % of GDP per capita of metropolitan regions

Note: Unweighted averages based on 1 503 small regions (TL3) from 27 OECD countries.
Source: (OECD, 2021[9]).

Demographic trends contribute to widening regional divides

15.   Inequalities in regional economic activity are likely to keep increasing because of long-term demographic trends, such as depopulation and ageing, which tend to hit stronger in remote regions. Agglomerations, i.e. the concentration of people and firms, fuels economic activity. Regions that experience long-term depopulation are therefore more likely to struggle to catch up with economically more active regions. In the last 18 years, only metropolitan regions have experienced a significant increase in population of around 12% – twice as large the increase in population in non-metropolitan regions. In addition, while only less than 20% of metropolitan regions have experienced decreasing population, at least 33% of non-metropolitan regions have been facing depopulation in the last two decades (Figure 5).

16.   Population ageing can further exacerbate inequalities in economic activity across regions mainly through its effect on the local labour supply, and it has been highly unequal across regions. In some regions in Japan, Spain and Germany, the over-65 year-olds already represent more than 30% of the population, while they account for less than 10%in many regions of Mexico, Canada and Chile. The elderly share can also vary significantly by type of region within the same country, and population ageing has been affecting remote regions more severely than other regions. In 2018, elderly dependency rates (i.e. elderly population as a % of the working age population) were around 31% in non-metropolitan regions of OECD countries, 3 percentage points higher than in metropolitan areas (OECD, 2021[9]).

Figure 5. Non-metropolitan regions have experienced a relative decline in their population shares

Population change by type of small (TL3) region, 2001-18
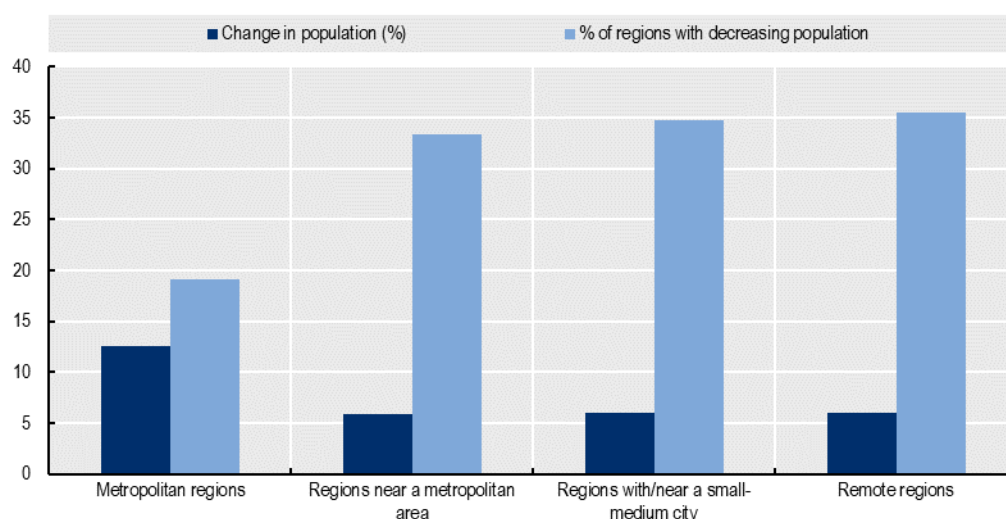
Note: Unweighted averages based on 2 151 small regions (TL3) from 33 OECD countries.
Source: (OECD, 2021[9]).

The regional differences in GDP per capita presented in this subsection have provided a first picture of the magnitude and persistence of economic disparities across space. Differences in access to metropolitan areas and in demographic trends tend to reflect such economic disparities. But while GDP per capita remains a standard indicator to assess differences in living standards, evidence suggests that this metric only poorly captures household incomes and their distribution across different geographies (OECD, 2014[11]). This underlines the importance of studying income disparities across space using household microdata, as in the remainder of this paper.

Box 1. Classification of small regions by access to metropolitan areas

The OECD metropolitan/non-metropolitan typology for small (TL3) regions helps to assess differences in socio-economic trends in regions, both within and across countries. It controls for the presence or absence of metropolitan areas, and the extent to which the latter are accessible by the population living in each region. According to such typology, small regions are classified as "metropolitan" if more than half of their population lives in a Functional Urban Area (FUA) of at least 250 000 inhabitants and as "non-metropolitan" otherwise.

The binary metropolitan/non-metropolitan distinction can be further broken down into five categories: Some metropolitan regions are described as a "large metropolitan region" if the FUA that accounts for more than half of the regional population has over 1.5 million inhabitants. Non-metropolitan regions are distinguished into three types based on the size of the FUA that is most accessible to the regional population: i) with access to a metropolitan area, if at least half of the regional population can reach an FUA of at least 250 000 inhabitants within a 60-minute car ride; ii) with access to a small/medium city, if at least half of the regional population can reach an FUA between 50 000 and 250 000 inhabitants within a 60-minute car ride; and iii) remote, if reaching the closest FUA by car takes more than 60 minutes for more than half of the regional population.

Sources: OECD (2020), OECD Regions and Cities at a Glance 2020, OECD Publishing, Paris, https://doi.org/10.1787/959d5ba0-en; Fadic, M, Garcilazo, J.E., Moreno Monroy, A., Veneri, P. (2019), "Classifying small (TL3) regions based on metropolitan population, low density and remoteness", OECD Regional Development Working Papers, No. 2019/06, OECD Publishing, https://doi.org/10.1787/b902cc00-en.

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3. Data sources – advantages and limitations

17.   Geographic inequalities in household or individual incomes within countries have so far been rarely the focus of international comparative research for lack of suitable data. Most comparative research on income inequalities over the last decades, including by the OECD, has relied on household survey data, including the EU-SILC and the Luxembourg Income Study. These surveys have an immense value for cross-country analysis, because they are easily accessible, highly standardised, and provide rich information on households' incomes and socio-economic background. By contrast they are usually not representative at more disaggregated geographic level because of their limited sample sizes. The few existing comparative studies of geographic inequalities across European countries have therefore not looked beyond large regions, i.e. the NUTS1 level (Ezcurra, Pascual and Rapún, 2007[13]; Hoffmeister, 2009[14]; Castells-Quintana, Ramos and Royuela, 2015[15]).[3] For a few countries, mainly outside of Europe, studies of geographic income inequalities exist that draw on data from large surveys, such as the Canadian Census (Breau and Saillant, 2016[16]), the Chilean CASEN (Paredes, Iturra and Lufin, 2014[17]) and the U.S. American Communities Survey (Florida and Mellander, 2014[18]). The most innovative recent advances in recent research on geographic inequalities have exploited large-scale data from administrative records. Most notably, Chetty et al. (2014[19]) used register-based data on the incomes of over 40 million parents and their children to study intergenerational mobility across different areas of the United States during a 30-year period.

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[3]   A whole strand of literature has looked at spatial inequalities and convergence patterns in GDP / capita (Ehrlich and Overman, 2020[29]), in analogy to some of the results presented in the previous section.

Register-based income data have a number of advantages for studying geographic income inequalities

18.   The analysis presented in this report draws on administrative income data on from tax records for eleven OECD countries, nine of which EU countries, as summarised in Table 1.[4] These data come with a number of advantages that make them well suited for analysing geographic income inequalities:

- *Large observation numbers and granular geographic information:* In most countries[5], the data cover the universe of income tax papers – individuals or larger tax units – and they contain information on taxpayers' correspondence address or registered location of residence. Therefore, they permit accurately describing income distributions at very granular geographic level.

- *Timeliness and long observation periods:* The most recent data currently available are usually for 2017 or 2018, in some cases already for 2019. The available observation periods differ across countries, but for half of the countries – Austria, Belgium, Finland, Hungary, Norway, and Switzerland – data are available for a decade or longer. This allows studying cross-regional convergence and divergence in incomes.

- *High accuracy:* Unlike survey-based income data, income data from tax records do not suffer from sample selection, attrition, or non-response. The quality of the reported income information should therefore generally be very high.

… but as they reflect the structure of national tax systems, they come with their own limitations and drawbacks

19.   However, the data also come with their limitations and drawbacks for studying income distributions. These usually reflect features of the national tax systems and administrations. In particular,

- The *observation unit* varies across countries, and it is usually not consistent with the household definition used in standard survey-based inequality statistics. In the Belgian data, for example, households are defined as all people sharing the same residence. The Portuguese income data are for tax households. In the Slovak Republic, data refer to the family regardless of living arrangements. In some countries, such as Denmark and the Slovak Republic, households in the data may not consist of more than two adults. In a few countries, such as Austria, Hungary, and Italy, the tax records of spouses cannot easily be matched, and information on the number of children in the household is not readily available. Here, the analysis is carried out at the individual level.

- Also the *reference population* varies across countries depending on the data structure. In some countries, income statistics have been calculated across all households (such as in the Slovak Republic), across all households with an adult household head (Sweden) or non-student head (Norway). In other countries, some few households without any registered source of income are not included (Switzerland). However, for a few countries, the reference population is much narrower: in Hungary and Italy, the statistics presented have been calculated only across all individuals with positive employment income. People who are not in gainful employment, including most seniors, are not represented in the data.

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[4]   For confidentiality reasons, the statistics used for the analysis presented in this report have been prepared directly by the national data providers. For Finland, Portugal, Sweden, and Switzerland, the results presented in this report were downloaded from the provider's webpage. In all other cases, the data providers prepared some, or all, of the required statistics upon request.

[5]   Data for Finland are based on a sample of approximately 10 000 households, for whom register-based income information are combined with survey data on households characteristics.

- The ***income sources*** covered: for most countries, the microdata permit approximating total household income, i.e. they include income from employment and self-employment, capital, and the main social transfers. Capital income typically includes rent, dividends, and realised capital gains, where those are taxable. However, in Belgium, capital income is only included if the withholding tax has not been deducted at the source, while income data for Denmark and Finland also include imputed rent. Data on social transfers cover various schemes including insurance-based transfers (such as unemployment and sickness benefits), universal non-contributory benefits (such as child benefits), and means-tested transfers (housing support, social assistance). However, for some countries, the coverage of social transfers in the data is only partial: the Portuguese data only include pension benefits. The Hungarian and Italian data provide information only on employment income.

- Information on ***taxes and contributions paid***: data for most countries include information on the taxes paid on employment and capital income, as well as on social-insurance contributions. However, the coverage is again partial for some countries. For Switzerland, for example, the data refer to incomes before taxation but after deduction of various tax allowances.[6] Meanwhile, the Danish statistics are also net of municipal tax.

- Some ***methodological differences***: for most countries where the income statistics have been calculated at the household level, incomes have been equivalised to adjust for households size. Household incomes have usually been equivalised by dividing by the square root of the household size. The Finnish, Norwegian and Swiss data were equivalised using the modified OECD scale. Sweden applied a national equivalence scale based on estimates using the Swedish household budget survey. The Portuguese income data have not been corrected for household size.

These register-based inequality figures are less comparable across countries and not necessarily consistent with standard inequality statistics

20.   The differences and limitations of national data sources have to be borne in mind when interpreting the income statistics in this report.

21.   In particular, the results presented in Section 4. and 5. cannot, in all cases, be interpreted as giving estimates of the distribution of disposable incomes. This certainly applies for Italy and Hungary (where the reported income statistics are for individual employment incomes) and for Switzerland and Belgium (where they are based on taxable income). But also in some of the other countries the results in this paper do not capture the full extent of redistribution, because certain forms of taxes and some social benefits are not included in the data. The empirical analysis presented in this paper may therefore suggest higher levels of regional inequality – and possibly greater cross-regional income differences – than would be obtained from household survey data, if such data were available at equally granular level.

22.   Indeed, national-level results from the administrative data used in this report differ – in some cases very substantially – from the standard, mostly survey-based, income inequality indicators published in the OECD Income Distribution Database (IDD, OECD (2020[20])). Only for three of the countries currently included in the analysis – Finland, Norway, and Portugal – the national-level Gini index for disposable household income obtained from the administrative data approximately matches the Gini published in the IDD – in each case with a deviation of about one Gini point. For two further countries – Denmark and Sweden – the deviation is around 3 to 4 Gini points. For the Slovak Republic, the Gini indices obtained from the administrative data deviate very far from those published in the IDD. For the remaining five countries – Austria, Belgium, Hungary, Italy, and Switzerland – the results presented in this paper are by

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[6]   The incomes observed in the data (referred to as *Reineinkommen*) are about 25-30% lower than the full gross incomes according to calculations by the national authority (Eidg. Steuerverwaltung, 2013[32]; 2017[31]).

construction not comparable to IDD statistics, because they have been calculated across the distribution of individuals and/or do not give disposable incomes.

23.   Figures presented in this report should therefore not be used for cross-country comparisons of income levels or inequality, or for producing any country rankings, and this report refrains from making any explicit comparisons of such type. To highlight this point, all figures in this report rank countries in alphabetical order; the individual-based statistics for Austria, Hungary, Italy, and gross incomes for Belgium and Switzerland are shown separately from those calculated across disposable household incomes. Regional median incomes are shown not in absolute terms, but expressed relative to the national median income.

Table 1. Overview of data sources

Country	Observation period	Income definition	Equivalisation	Income sources	Data provider	Weblink (*where available*)
Austria	2008-17	Individual disposable income	n/a	Income from employment, self-employment, capital, and many types of social benefits after taxes and social-insurance contributions	Statistik Austria	
Belgium	2005-2018	Household gross income	Square root	Income from employment, self-employment, certain types of capital, after employee social security contributions, professional expenses and deductible expenses	Statbel	
Denmark	2010-19	Household disposable income	Square root	Income from employment, self-employment, capital (incl. imputed rent), social benefits, private transfers	Statistics Denmark	https://www.statbank.dk/statbank5a/SelectVarVal/Define.asp?MainTable=INDKF101&PLanguage=1&PXSId=0&wsid=cftree
Finland	1995-2019	Household disposable income	Modified OECD scale	Income from employment, self-employment, capital (incl. imputed rent), social benefits, private transfers	Statistics Finland	https://pxnet2.stat.fi/PXWeb/pxweb/en/StatFin/StatFin__tjt__tjt__asuntokuntien/statfin_tjt_pxt_127m.px/
Hungary	2010-19	Individual employment income	n/a	Gross employment income	Ministry of Finance	
Italy	2007 and 2018	Individual employment income	n/a	Gross employment income	Ministry of Economy and Finance	
Norway	2006-18	Household disposable income	Modified OECD scale	Income from employment, self-employment, capital, social benefits	Statistics Norway	https://www.ssb.no/en/statbank/table/09114/
Portugal	2015-18	Household disposable income	Not equivalised	Income from employment, self-employment, capital, social benefits (pensions)	Statistics Portugal	https://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_indicadores&indOcorrCod=0009942&contexto=bd&selTab=tab2
Slovak Republic	2016-17	Household disposable income	Square root	Income from employment, self-employment, capital, social benefits	Institute for Financial Policy, Ministry of Finance	
Sweden	2011-18	Household disposable income	National scale assigning a	Income from employment,	Statistics Sweden	https://www.statistikdataba

			weight of 1 to the household head, 0.51 to the spouse/partner, 0.6 to each additional adult, 0.52 to the first child and 0.42 to additional children	self-employment, capital, social benefits		sen.scb.se/pxweb/en/ssd/START__HE__HE0110__HE0110F/Tab1DispInkN/
Switzerland	2001-17	Household gross income	Modified OECD scale	Income before taxes from all taxable sources after deduction of tax allowances (e.g. for professional expenditures, insurance contributions, child tax allowances)	Federal Tax Administration	https://www.estv.admin.ch/estv/de/home/allgemein/steuerstatistiken/fachinformationen/steuerstatistiken/direkte-bundessteuer.html

Note: n/a = not applicable.

4. Levels and trends in geographic income inequalities

24.   This section draws on the administrative data described in the previous section to present first results on cross-regional differences in income levels and inequality. The analysis presents evidence on the distribution of regional median incomes by plotting, for each country, the lowest and highest regional median income, and the 25th and 75th percentiles, *all expressed relative to the national median income*. Disparities in regional income inequality are presented as the Gini index in the regions with the lowest and highest regional income inequalities and those at the 25th and 75th percentile.

Median incomes vary substantially across regions

25.   The median incomes of small (TL3) regions in a country can vary substantially, suggesting large regional differences in living standards (Figure 6, top). In the countries included in the analysis so far,

- *Incomes in the highest-income regions* are up to 25% higher than the national median. The largest income disparities are measured for the Bratislava region in the Slovak Republic (25% above the national median) and the Danish region of North Zealand situated north of Copenhagen, at the border of Sweden (19% above the national median).

- *Incomes in the lowest-income regions* are up to 20% lower than the national median. The largest disparities are measured for the Alto Tâmega region in northern Portugal (19% below the national median) and the Bornholm and North Karelia regions of Denmark and Finland respectively (12% below the national median).

- *Income ratios between the highest- and lowest-income regions* vary from 1.2 and 1.3 in some of the Nordic countries (Finland, Norway, and Sweden) to 1.4 in Portugal, and the Slovak Republic.

26.   Results for most countries with different income measures – while not directly comparable – are largely of a similar scale. In Austria, where data are available on individual disposable household incomes, the income ratio between the highest- and lowest-income regions is 1.3 (Figure 6, bottom). In Switzerland, where data are for gross household incomes, and therefore largely do not account for redistribution through taxes and transfers, the regional income ratio is 1.6. In Hungary, where data are for individual employment incomes, the ratio between the highest and lowest income region is 1.3.

27.   By contrast, Belgium and Italy are outliers with very large measured regional income differences. Median incomes in highest-income Leuven are almost twice as high as in low-income Brussels. In Italy incomes in the highest-income region (Monza and Brianza in Lombardia) are more than twice as high as in the lowest-income region (Vibo Valentia in Calabria). The high cross-regional income ratio may indeed be indicative of large income differences between Italy's north and south. However, they certainly also reflects the use of data on individual gross employment incomes, which do not account for redistribution through taxes and social benefits. They may also be driven by cross-regional differences in employment rates and hours worked, including by women and seniors. Also, the number of small regions in Italy is much larger than in the other countries included in the analysis. The data on regional GDP per capita presented in Figure 2 do not suggest that cross-regional disparities in Italy are particularly large.

28.   Countries' capital regions are strongly represented in Figure 6 among regions with very high – but also very low – incomes. In Portugal, the Slovak Republic, and Sweden, the highest-income region is the capital region (Metropolitan area of Lisbon, Bratislava, Stockholm); in Austria, Belgium, Denmark and Norway, it is one of the regions in close geographic proximity to the capital region (Wiener Umland-Nord, Leuven, North Zealand, Akershus). In Belgium, however, the capital region itself (Arr. Brussels Capital) is the lowest-income region. This reflects the large income gradients in the larger capital regions as a result of socio-economic sorting (see the regional maps in 6. Annex B, notably for Austria, Denmark, and Norway

in Figure A B.1, Figure A B.**3**, and Figure A B.**7**). It also highlight the importance of looking beyond small (TL3) regions towards larger functional urban areas for analysing inequalities (see Box 1).

Figure 6. Regional income disparities can be large

Regional median incomes for high- and low-income regions, expressed relative to the national median income, small (TL3) regions, 2018/19 or latest year
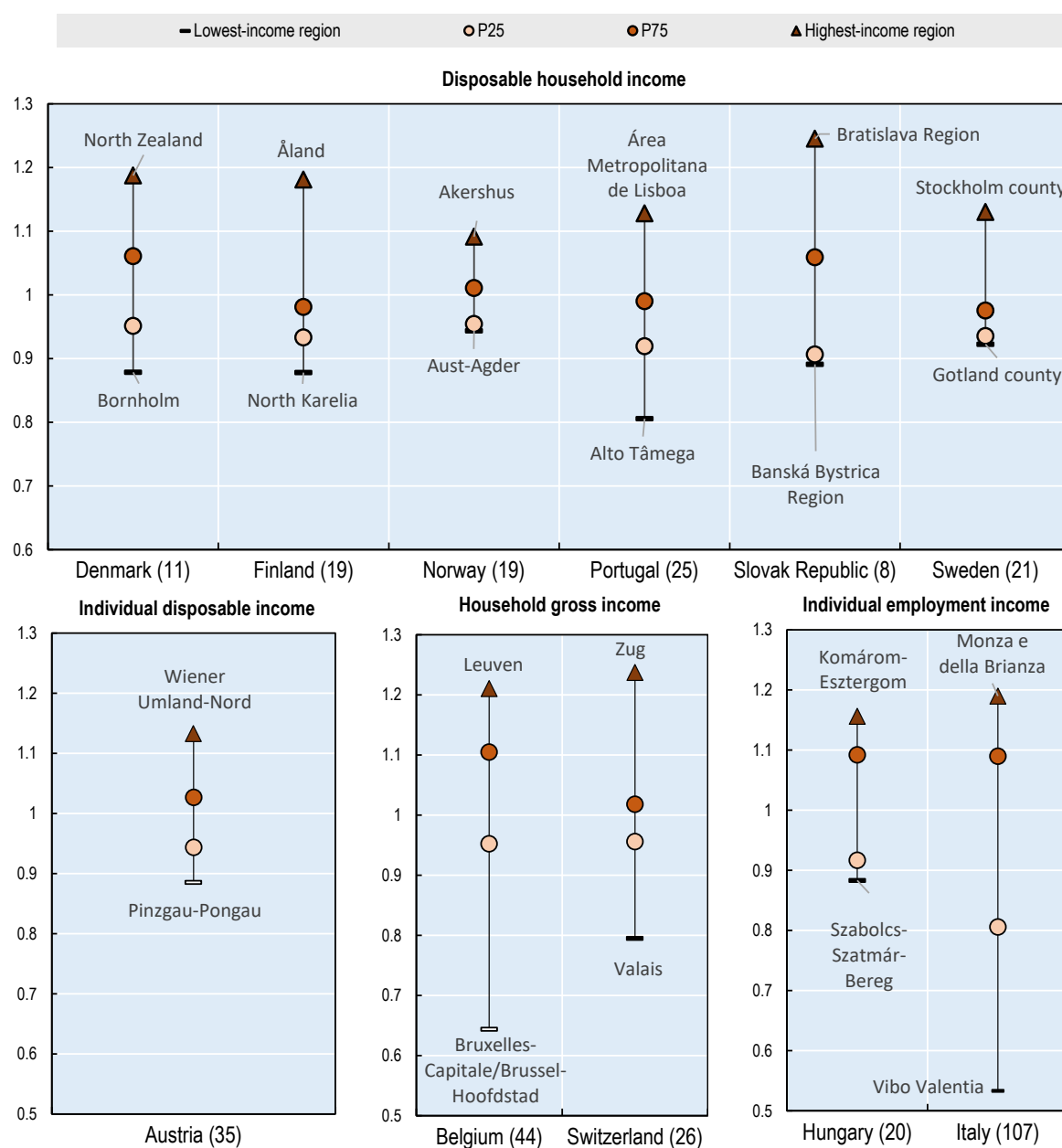
Note: "P25" and "P75" give the relative median incomes for the regions at the 25th and 75th percentile of the regional income distribution. Number of TL3 regions listed in brackets behind the country name.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

… and so do levels of within-regional income inequality

29.   Levels of income inequality between households also differ substantially across the small (TL3) regions of a country (Figure 8, top). Across the countries included in the analysis,

- *Income inequality in the most unequal region*, as measured by the Gini index, is usually around 10-25% higher than across the country as a whole, though the difference is nearly 30% in Norway (Gini of 0.32 for Oslo, compared to 0.25 for the whole country). In all countries, income inequality is highest in the capital region.

- *Income inequality in the least unequal region* is usually around 10-20% lower than in the country as a whole. The largest gap is measured for Sweden, with inequality in Norrbotten county being 19% lower than the national level (Gini of 0.25, compared to 0.31 for the whole country). In most countries, the large majority of small regions are less unequal than the country as a whole.

- *The ratio in income inequality between the most and least unequal regions* varies from 1.2 in Portugal and the Slovak Republic to 1.5 in Norway. These regional disparities in income inequality *within a given country* tend to be larger than the differences in overall inequality *across countries*, as measured by the country-level Ginis.

30.   Again, the patterns for countries with other income measures as broadly in line with two outliers. The measured ratio of income inequality between the most and least unequal region is relatively low for individual disposable household incomes in Austria (1.2), and again higher for gross employment incomes in Switzerland (1.5) and Belgium (1.7), where differences between regions with the lowest and highest inequalities are largest. Unlike for income *levels*, disparities in the inequality of gross employment income are comparatively low in Italy (1.3), while being somewhat higher in Hungary (1.4).

Regional income levels have not systematically diverged over the last decade

31.   There is no evidence of a systematic rise in cross-regional income disparities in countries for which longer time series data are available, i.e. of a broad divergence between higher- and lower-income regions. In four countries – Austria, Belgium, Hungary and Norway – cross-regional disparities in the median income, measured as in Figure 1 and Figure 2 by the coefficient of variation, have declined over the last decade or so (Figure 7). While they have increased in three other countries – Denmark, Sweden, and Switzerland – the magnitude of this trend is very modest. In Finland, where data reach back to the mid-1990s, a strong rise in cross-regional disparities leading up to the early-2000s was followed by a steady decline thereafter. Only Italy shows a clear rise in cross-regional disparities between 2007 and 2018, the only two years for which data are currently available. However, as above, it is not clear how this increase in disparities of gross individual employment incomes would transmit to disposable household incomes.

32.   The trends in cross-regional income disparities are largely consistent with those for cross-regional disparities in GDP per capita. Specifically, Figure 2 also reports GDP-per-capita convergence, relative to 2003, in Finland, Austria and Portugal, and a divergence in Denmark, Italy, and Sweden. Only for Hungary the trends shown in Figure 2 and Figure 7 do not coincide. This may again reflect the narrower income definition for Hungary. For Norway, Figure 2 reports a slight divergence, which, however, is not statistically significant.

Figure 7. Regional median incomes have not systematically diverged across countries

Coefficient of variation in median incomes across small (TL3) regions, by country, 1995-2019

Countries with declining disparity in regional median incomes

Countries with increasing disparity in regional median incomes
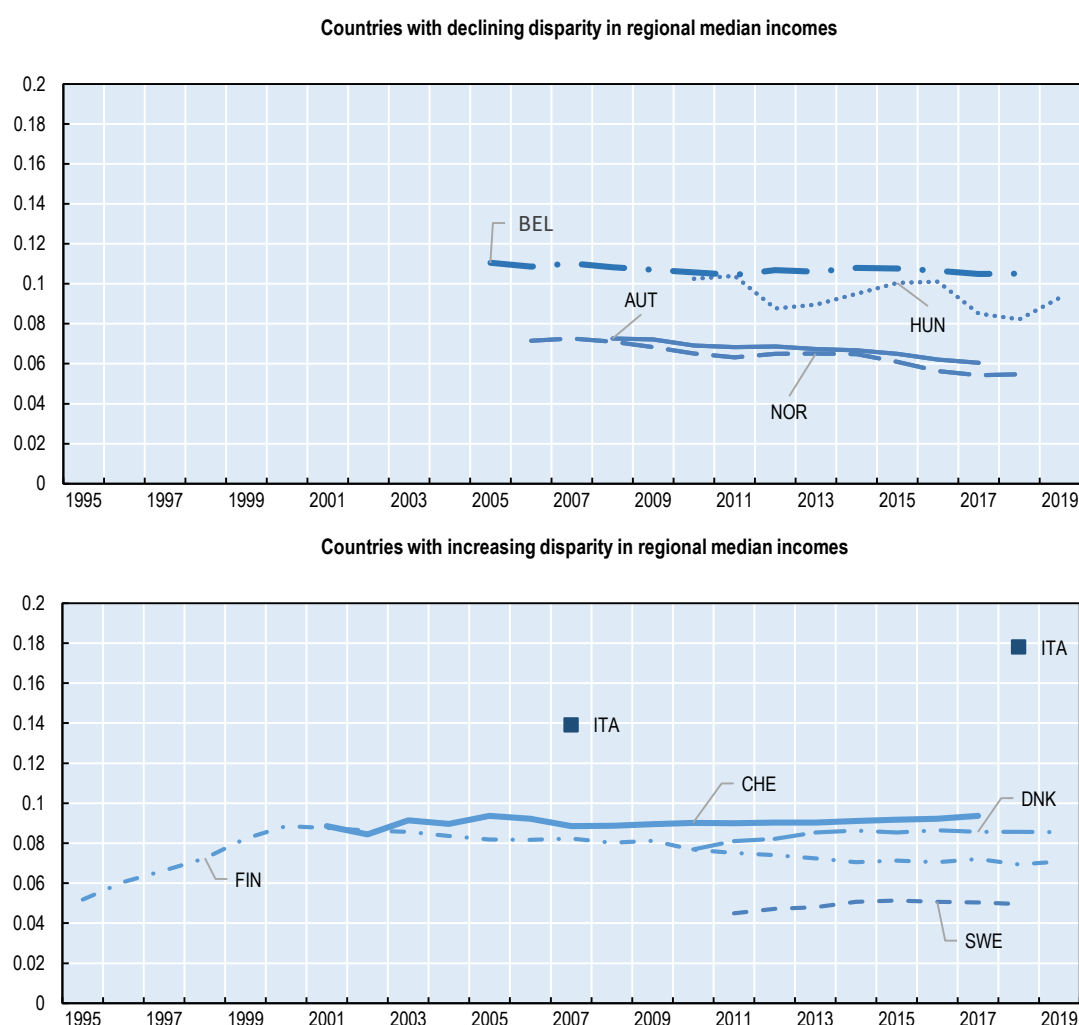
Note: The coefficient of variation is given by the standard deviation of median income across small (TL3) regions divided by the mean regional median income, see discussion to Figure 1. Structural break for Finland in 2011. The time trend for Norway gives non-equivalised incomes.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1

> ### …but income inequality within small regions has grown, and inequality levels have diverged across small regions

33.   By contrast, regional income inequality has grown in most countries for which longer time series data are available, both when looking at the median inequality level and at cross-regional disparities in equalities. Specifically, Figure 9 shows that

- ***Income inequality for the median region***, i.e. the region in the middle of the distribution of regional Ginis, has grown in six out of nine countries, always by about one to two Gini points. Only in Austria, measured income inequality notably declined, by about one Gini point.

- ***Disparities in the level of income inequality across regions***, measured by the Ginis in the most and least unequal region, have risen in seven out of nine countries. Most notably, in Hungary, the Gini declined by two points in the most unequal region while it declined by five points in the least

unequal region. In Denmark, the most unequal region experienced a rise in the Gini three times larger than that in the least unequal region. Only in Norway and Switzerland, the level of regional income inequalities converged, even while inequalities for the median region have become more pronounced.

Figure 8. Income inequality varies substantially across regions and is often highest in the capital region

Regional income Ginis by level of regional inequality, small (TL3) regions, 2018/19 or latest year
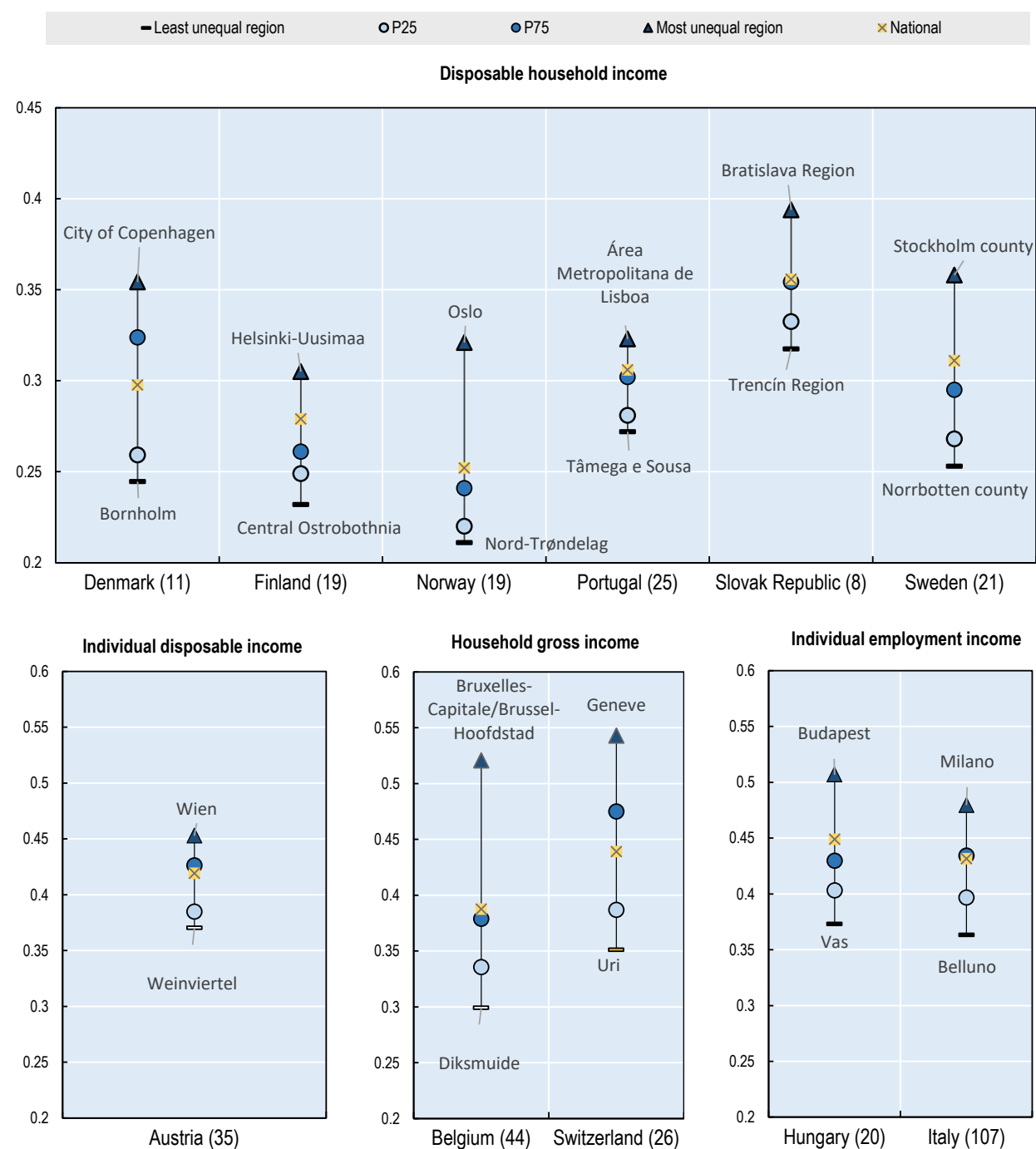
Note: "P25" and "P75" give the income Ginis for the regions at the 25th and 75th percentile of the distribution of regional inequality. "National" gives the Gini index for the whole country. Number of TL3 regions listed in brackets behind the country name.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure 9. Regional income inequality has grown, and more so in more highly unequal regions

Change in the Gini index for the median, least unequal and most unequal small (TL3) region, 2010 to most recent year
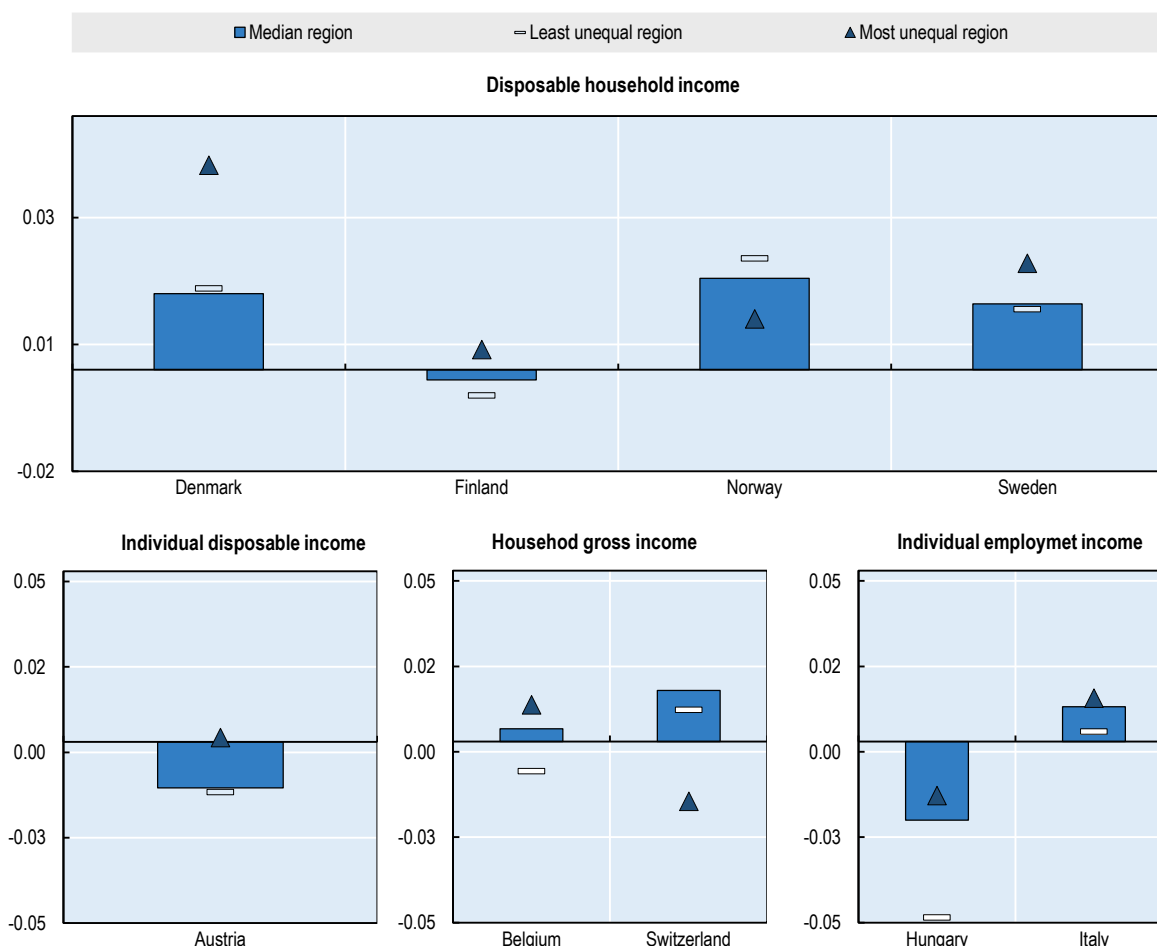
Note: Change in Ginis is over 2010-19 for Denmark, Finland, and Hungary, 2010-18 for Norway and Belgium, 2010-18 for Austria and Switzerland, 2011-18 for Sweden, and 2007-18 for Italy.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Incomes in metropolitan regions tend to be higher and more unequally distributed than in non-metropolitan regions

34.   The finding that the capital region is often, both, a county's highest-income region as well as its most unequal region, is indicative of the relationship between the income distribution of a region and its degree of urbanisation. One way of systematically studying this relationship is by classifying regions along the OECD's metropolitan/non-metropolitan typology for small (TL3) regions, which indicates the presence or absence of a metropolitan area in a region, and the extent to which that metropolitan area is accessible by the region's population. Specifically, such typology classifies small (TL3) regions as "metropolitan" if more than half of their population lives in a Functional Urban Area (FUA) of at least 250 000 inhabitants, and as "non-metropolitan" otherwise (see Box 1, Fadic et al. (2019[21]) and OECD (2020[12])).

35.   Income levels tend to be somewhat higher in metropolitan than in non-metropolitan small (TL3) regions (Figure 10). In all countries except Switzerland, the "median metropolitan region" has a higher median income than the "median non-metropolitan region". Here, the median metropolitan and

non-metropolitan regions are defined as those in the middle of the two distributions of median incomes across metropolitan and non-metropolitan regions.

Figure 10. Median incomes tend to be somewhat higher in metropolitan than in non-metropolitan regions, but the regional disparities *within* these two groups are much larger

Regional median incomes for high- and low-income regions by degree of urbanisation, expressed relative to the national median income, small (TL3) regions, 2018/19 or latest year
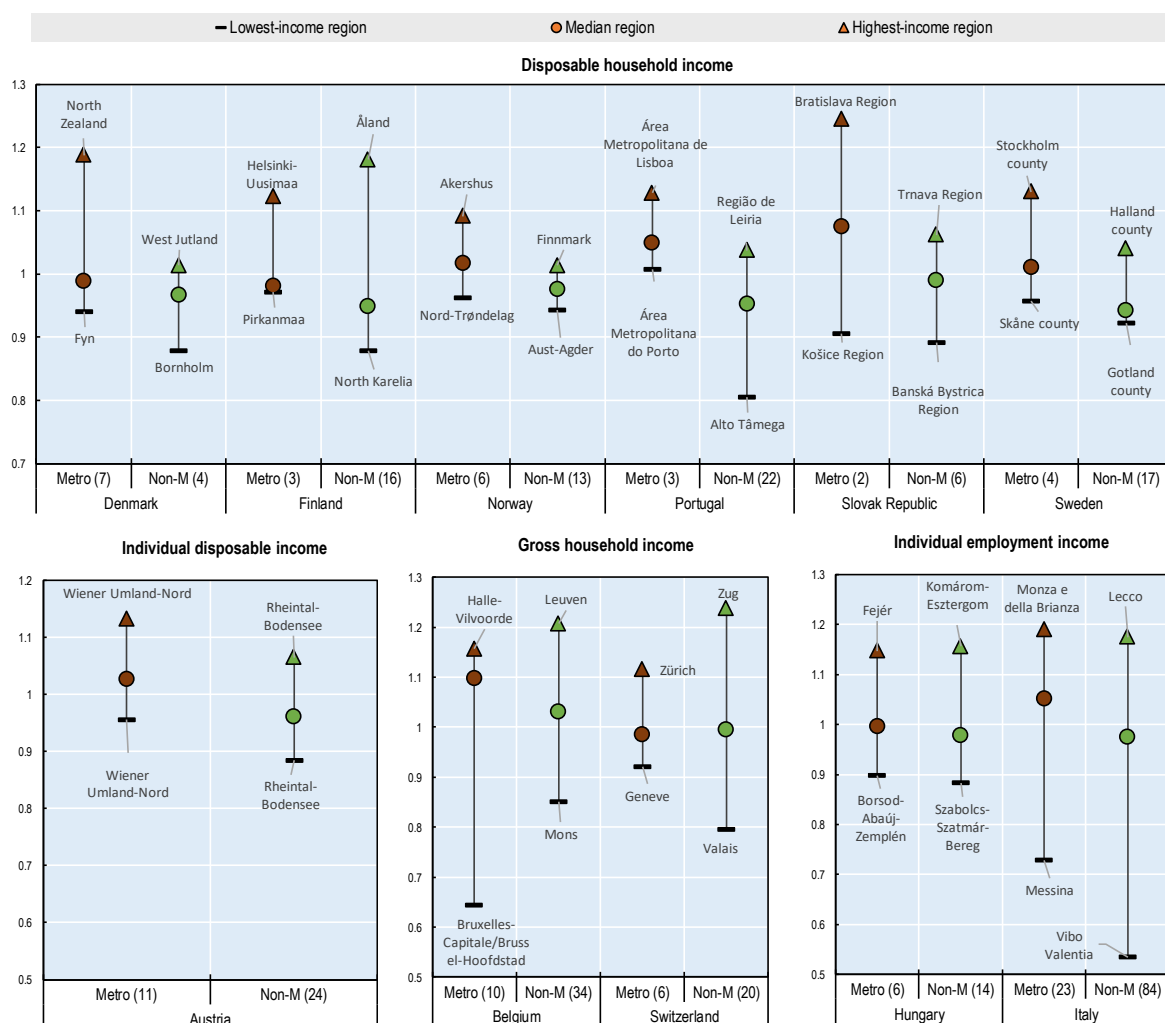
Note: Number of TL3 regions by degree of urbanisation listed in brackets behind the country name. TL3 regions are classified as metropolitan if more than half of their population lives in an FUA of at least 250 000 inhabitants, and as non-metropolitan otherwise (see Box 1).
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

36.   However, regional median incomes generally vary much *within the groups* of metropolitan and non-metropolitan regions than *between* those two groups. While the highest-income region in most countries is indeed metropolitan (notably in Austria, Denmark, Norway, Portugal, the Slovak Republic, and Sweden), this is not the case everywhere: the highest-income regions in Belgium, Finland, and Switzerland, for example, are the non-metropolitan Leuven, Åland, and Zug. While it is rarer that the lowest-income region in a country is metropolitan, this is the case in Belgium, with Arr. Brussels Capital, see also Figure 6.

37.   The degree of urbanisation relates more strongly to regional income *inequality*. In all countries studied, the Gini index is higher in the median metropolitan than the median non-metropolitan region (see Figure 11). Moreover, in nearly all countries, the most unequal region is metropolitan, while the least unequal region is non-metropolitan. Again, however, Gini indices generally vary much more *within the groups* of metropolitan and non-metropolitan regions than *between* those two groups.[7] In particular, disparities in regional inequality between metropolitan and non-metropolitan regions are minimal in Austria, Italy, and Portugal.

Figure 11. Metropolitan regions are more unequal than non-metropolitan regions

Regional incomes Ginis by level of regional inequality and degree of urbanisation, small (TL3) regions, 2018/19 or latest year

Note: Number of TL3 regions by degree of urbanisation listed in brackets behind the country name. TL3 regions are classified as metropolitan if more than half of their population lives in a Functional Urban Area of at least 250 000 inhabitants and as non-metropolitan otherwise (see Box 1).
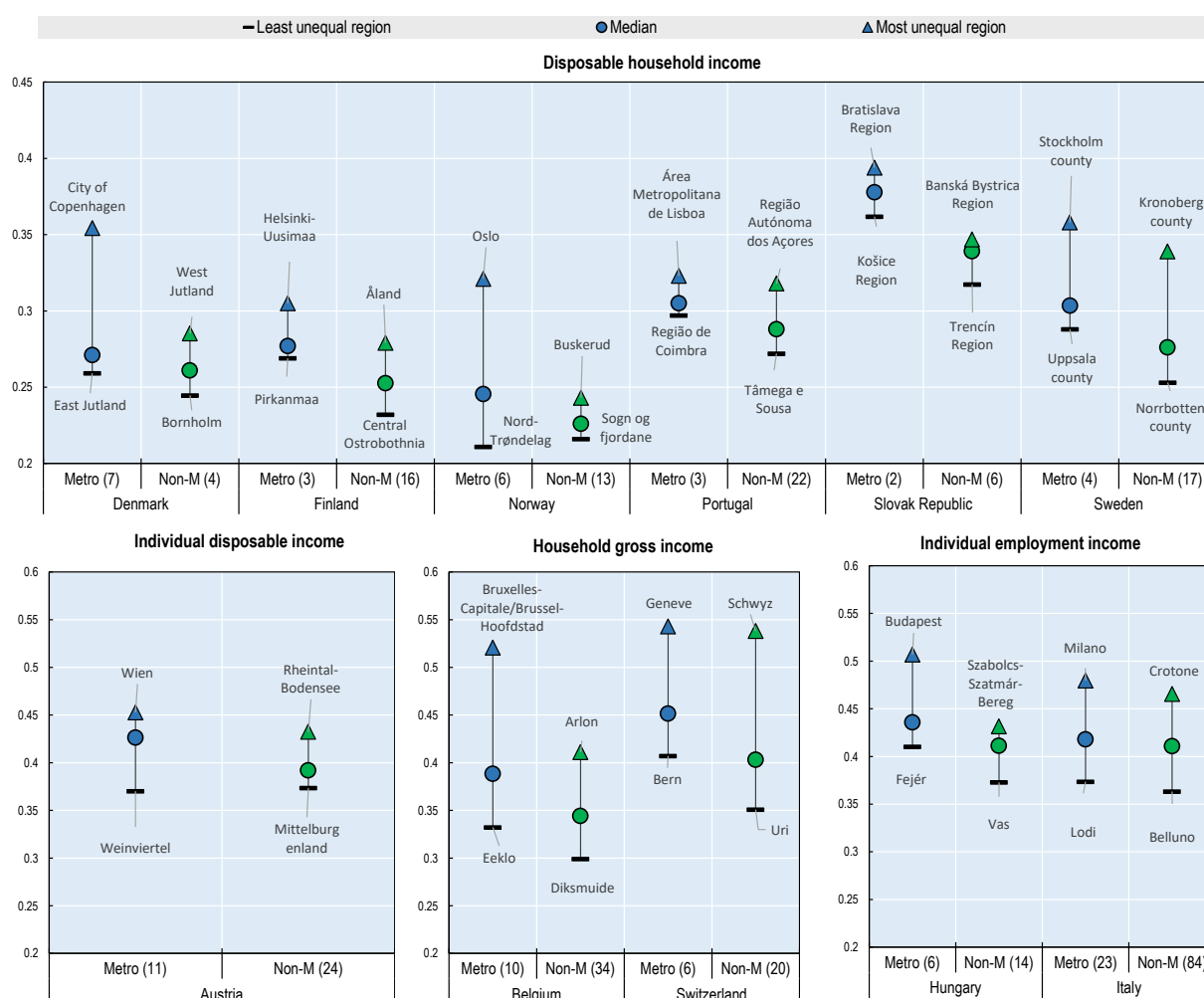Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

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7   Inequalities levels also tend to vary more among metropolitan regions than among non-metropolitan regions, even though only relatively few regions in a country are metropolitan.

Income taxes and social transfers redistribute incomes from (higher-income) metropolitan to (lower-income) non-metropolitan regions

38.   Taxes and transfers that redistribute incomes across households can also affect cross-regional income disparities if regional income distributions differ. Under progressive tax systems, households in high-income regions will on average face a greater income tax burden than those in low-income regions. National-level social transfers will also distribute incomes across regions, though the magnitude and direction of redistribution will depend on how progressive these systems are.[8]

39.   A first – still very tentative – comparison of cross-regional income distributions before and after taxes and social transfers for two countries provides some evidence that tax-benefit systems indeed redistribute incomes from higher- to lower-income regions. In Austria, median disposable incomes are higher than median incomes before taxes and transfers both in lower- and higher-income regions (top-left panel of Figure 12). This indicates that people at the median of the income distribution are net beneficiaries of the tax-benefit system. The relative gap between median disposable incomes and median incomes before taxes and transfers is larger in low-income regions than in high-income regions. This indicates that at least the median households in low-income regions benefit more from redistribution. A very similar pattern applies for Sweden, where data are available on median disposable and median gross employment incomes (bottom-left panel of Figure 12).

40.   Taxes and benefits consequently tend to redistribute incomes also from metropolitan to non-metropolitan regions. Metropolitan regions (shaded in red) are overrepresented among high-income regions, while non-metropolitan regions (shaded in green) are overrepresented among low-income regions (left panels of Figure 12). The gap between median disposable incomes and median incomes before taxes and transfers is greater (i.e. the positive effect of redistribution stronger) in the median metropolitan than in the median non-metropolitan regions (Figure 12, right panels). This holds, both, in absolute and relative terms.

41.   It is worth highlighting that these results are currently still tentative and call for further analysis. Specifically, a more rigorous analysis of the geographic impact of redistribution policy clearly requires looking beyond median incomes alone at households all across the income distribution. Also, while the analysis presented here considered the joint effects of taxes and transfers on regional incomes, it would be fascinating to look more specifically at the role of different types of benefits, taxes and social-insurance contributions. Such analysis requires working with micro-data on incomes with precise geographic information, which will follow for a selection of countries in the next phase of this project.

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[8]   Means-tested benefits, such as social assistance, should benefit a greater share of households in low-income regions. By contrast, some earnings-related benefits may be regressive. In some countries, including Italy, Greece, and Portugal, social benefits are heavily contribution-based and therefore weakly targeted, such that people in high-income households receive a greater share of total cash benefits than those in low-income households (OECD, 2020[30]). Also population structure will play a role: taxes and transfers should redistribute incomes from regions with a large active population toward those with higher share of seniors.

Figure 12. Taxes and transfers reduce income disparities between metropolitan and non-metropolitan regions

Relative median disposable incomes and incomes before taxes and benefits by degree of urbanisation, for the four lowest- and highest-income regions (left panel) and for the median metropolitan and non-metropolitan region (right panel), 2018/9 or latest
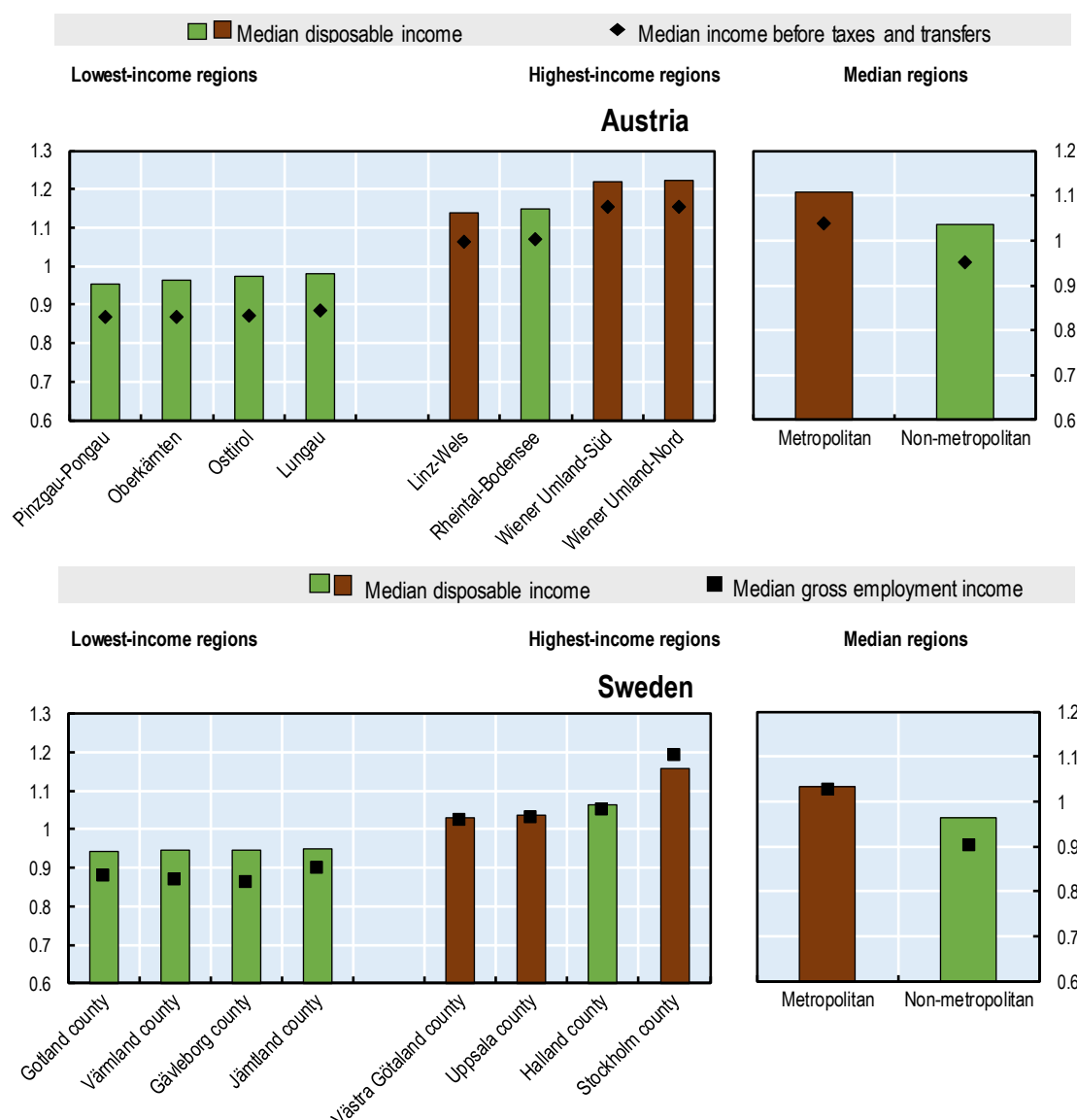
Note: Metropolitan regions are shaded in red, non-metropolitan regions are shaded in green. Median disposable incomes and median incomes before taxes and transfers / median gross employment incomes are both expressed relative to the national median income before taxes and transfers / national median gross employment income.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Income levels in cities are not systematically higher than across the country as a whole, but they can be substantially higher in some cities

42.   Statistics on income levels across cities (or, more technically: "Functional Urban Areas", FUAs) in a country are broadly in line with those across small (TL3) regions. However, as shown in Figure 13, a few distinct patterns seem to emerge based on first, tentative results for four European countries (Norway, Portugal, the Slovak Republic, and Sweden):

- ***Income levels in FUAs are generally not systematically higher than across the country overall.*** While in the Slovak Republic, three-in-four FUAs have median income levels *above* the national median, two-in-three FUAs in Norway and Sweden have median income levels *below* the national median. In Portugal, the median FUA has an income very close to the national median income.

- ***However, in the highest-income FUAs, income levels can lie substantially above the national median.*** The Bratislava FUA in the Slovak Republic has a median income 25% above the national median. In Norway, Portugal, and Sweden, the highest-income FUAs (Akershus, Coimbra, and Stockholm) have income levels 9% to 13% above the national median. The capital cities are the highest-income FUAs in two out of the four countries (the Slovak Republic and Sweden) and come as close second in the other two (Norway and Portugal).

- Income dispersion across FUAs is a little lower than across small (TL3) regions, because few FUAs have incomes much below the national median. Across the countries studied, median income ratios between the highest- and lowest-income FUAs are very similar, at 1.2 in Portugal, Sweden, and Norway, and 1.3 in the Slovak Republic. Even in the lowest-income FUAs, income levels are only little below the national median. The largest gap is measured in Portugal, for Póvoa do Varzim in Northern Portugal, at 9% below the national median.

Figure 13. Income levels in cities are not systematically higher than across the overall country

Median incomes of functional urban areas (FUA) for high- and low-income FUAs,
expressed relative to the national median income, 2018/19 or latest year
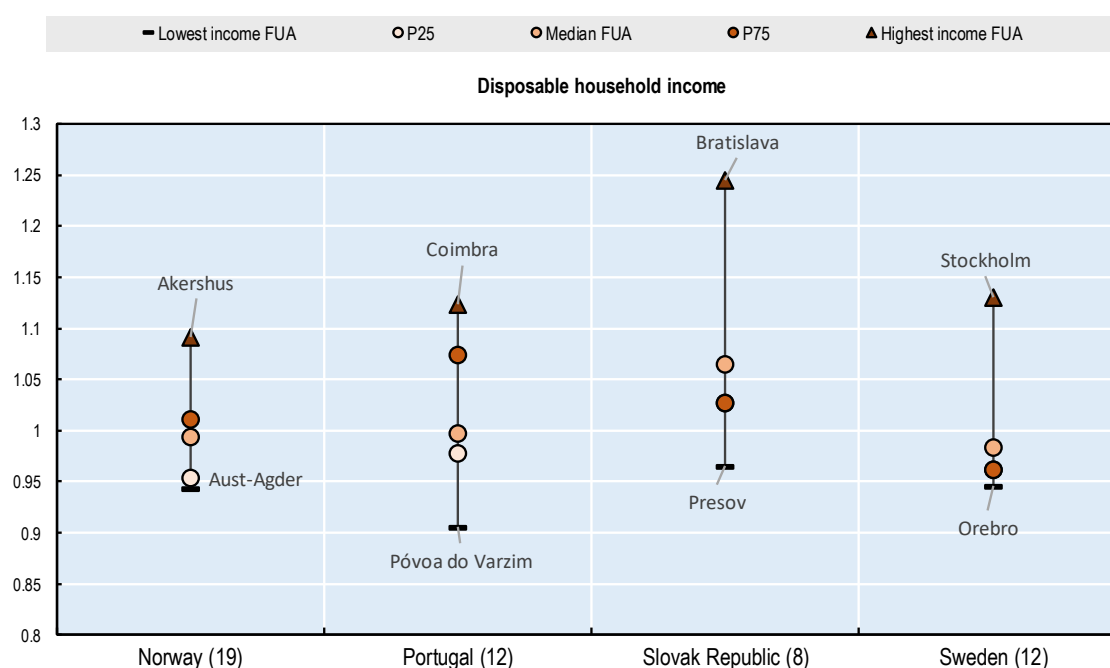
Note: "P25" and "P75" give the relative median incomes for the FUAs at the 25th and 75th percentile of the distribution across FUAs. Number of FUAs listed in brackets behind the country name.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Incomes are not distributed more unequally in cities, but income inequality can be much higher in the capital

43.   Results on income *inequality* in FUAs in the four countries lead to relatively similar conclusions (Figure 14):

- *Income inequality in FUAs is not systematically greater than across the country overall.* In Portugal, the Slovak Republic, and Sweden, the Gini index for income inequality in the median FUA is quite close to the countrywide Gini. In Norway, more than three-in-four cities have Gini indices that are lower than in the country overall.

- *However, the most unequal FUA – usually the capital –can be substantially more unequal than the country overall.* Incomes in Bratislava, Stockholm, and Oslo are distributed much more unequally than in their countries overall, with the FUA-specific Ginis being 4-7 points higher than the national values. In Portugal, the most unequal FUA, Ponta Delgada on the Azores, is only a little more unequal than the Portugal as a whole (+1.8 Gini points)

The least unequal FUAs are less unequal than the country as a whole, by around 3-4 Gini points.

Figure 14. Income inequality varies substantially across FUAs and is often highest in the capital

FUA-specific income Ginis by level of inequality, FUAs, 2018/19 or latest year
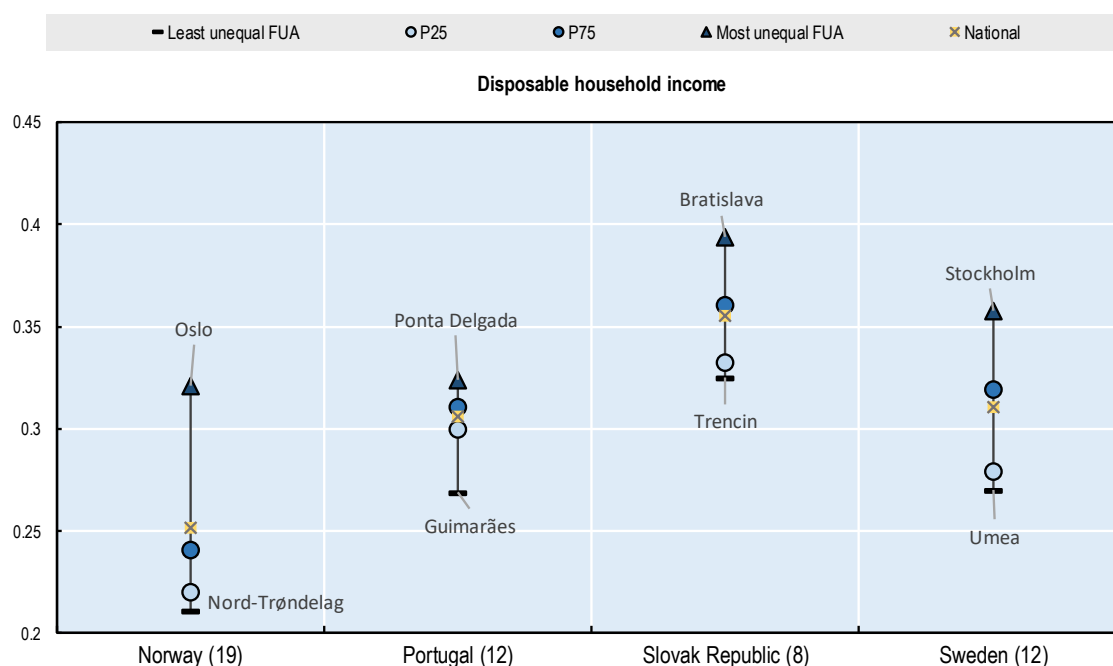
Note: "P25" and "P75" give the income Ginis for the FUAs at the 25th and 75th percentile of the distribution of inequality across FUAs. "National" gives the Gini index for the whole country. Number of FUAs listed in brackets behind the country name.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Box 2. Definition of Functional Urban Areas

The OECD, in collaboration with the EU (Eurostat and EC-DG Regio), has developed a harmonised definition of urban areas as "functional economic units", thus overcoming limitations of existing taxonomies based on administrative boundaries. According to this definition, an urban area comprises highly densely populated municipalities referred to as the "urban core", as well as any adjacent municipality that has high degree of social and economic integration with the urban core, measured by commuting to work.

The methodology uses population grid data at 1 km² to define urban cores in a way that is robust to cross-country differences in administrative borders. A minimum population threshold of around 50 000 is used, i.e. only functional urban areas above 50 000 people are identified in each country. According to this definition, on average around 66% of people in OECD countries live in urban areas with cores larger than 50 000 inhabitants, with the population shares ranging from less than 40% in the Slovak Republic to almost 90% in Luxembourg. Around 2 000 urban areas have been identified across the OECD.

In some cases, data on income levels and inequalities for metropolitan small regions may only give a partial picture if several such small regions may cluster into one single larger metropolis. To address this issue we also examine results for Functional Urban Areas (FUAs), i.e. clusters of small spatial areas below TL3 level (often municipalities). These FUAs can span several small (TL3s) regions, but equally some TL3s can consist multiple FUAs.

Source: OECD (2012), Redefining "Urban": A New Way to Measure Metropolitan Areas, OECD Publishing, doi: 10.1787/9789264174108-en.

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5. The contribution of regional income inequalities to overall income inequality

44.   In light of the substantial cross-regional disparities in income levels and inequalities documented in the previous section, an interesting question is how much these regional income inequalities contribute to *overall* income inequality. Indeed, one strand of the existing empirical work on geographic inequalities has been concerned with quantifying the regional component of aggregate inequality. The standard approach has been to decompose overall inequality – usually measured by an inequality index of the general entropy family, such as the Theil Index or the Mean Logarithmic Deviation – into a *between*-region and a *within*-region component.

Existing research suggests that between-regional inequalities are comparatively small

45.   Empirical studies that have decomposed inequality by geographic location have usually concluded that the *between*-group component is relatively small compared to *within*-group component. In an early survey of the spatial decomposition literature, Shorrocks and Wan (2005[22]) find that, averaged over a large number of studies, about 12% of overall inequality can attributed to between-group variation. Novotný (2007[23]) reaches a similar conclusion. However, only very few of the papers surveyed look at household incomes, for lack of suitable data. Many relate national income inequality to regional GDP per capita; others look at inequalities in consumption or earnings. In one of the few exceptions, Paredes, Iturra and Lufin (2014[17]) use Chilean household income data from CASEN for a three-way decomposition of inequalities into the between-regional, between-provincial, between-and within-county level.[9]

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9   Earlier OECD work (2018[27]) has used a simple Theil decomposition to document the decline in *between-*relative to *within*-country inequalities in GDP per capita at TL2 level.

A three-way nested Theil decomposition of income inequalities

46.   This paper applies a three-way Theil composition, similar to the one carried out by Paredes, Iturra and Lufin (2014[17]), and applies it to the register-based income data described in Section 3. . Specifically, the Theil Index is constructed as

$$T_i = \sum_R \sum_u \sum_r \sum_i \left(\frac{y_{Ruri}}{Y}\right) ln \left(\frac{y_{Ruri}/Y}{n_{Ruri}/N}\right),$$

where y_{Ruri} is the income of household (or individual) *i,* located in a small (TL3) region *r*, classified along the urban-rural spectrum into one of five groups *u*, inside a large (TL2) region *R*.[10] The ratios y_{Ruri}/Y and n_{Ruri}/N give the income and population shares for household *i* relative the national income and population.

47.   This overall Theil Index decomposes into

$$T_i = T_{Wr} + T_{Br} + T_{Bu} + T_{BR},$$

where T_{Wr} is the *within*-small-region component*,* and T_{Br}, T_{Bu}, and T_{BR} are the *between* components across small regions, along the urban-rural classification, and across large regions. Here, the *within*-small-region component T_{Wr} is calculated as the (income-weighted) sum of the Theil indices across households in each of the small regions. The *between* components are the (income-weighted) Theil indices of total income nested in the higher-up region, see 6. Annex A for further details.

48.   The decomposition was carried out for five countries (Austria, Belgium, Hungary, Italy, and the Slovak Republic), for which the national authorities were able to calculate the required Theil indices for each small (TL3) region from the microdata. To the authors' knowledge, this is the first time that a standard Theil decomposition is applied to study income inequalities simultaneously along a nested regional and urban-rural dimension.

Regional differences account only for a very small fraction of overall income inequalities

49.   The Theil decomposition confirms that cross-regional inequalities account only for a very small fraction of overall income inequalities, i.e. that country-level inequalities in household incomes primarily reflect inequalities occurring within small (TL3) regions (Table 2). In all five countries studied, the *within* small-region component (T_{Wr}, reported in column III) accounts for more than 95% of overall income inequality (T_i, reported in column II). In Austria, its share is higher than 99%. Intuitively, the within-regional income inequalities (as summarised by the Gini indices shown in Figure 8) are a much more important determinant of overall income inequality than inequalities in income levels across regions (as summarised by the medians shown in Figure 6).

50.   Of the between-regional components, variation in income levels between large (TL2) regions (T_{BR}, column VI) is greater than along the urban-rural dimension in each large region (T_{Bu}, column V) or than between the small (TL3) regions within a large region that share the same degree of urbanisation (T_{Wr}, column IV). However, this will largely reflect the relatively small number of small regions (and hence the low disparities in the degree of urbanisation) within each large region. Austria, for example, has nine large regions (the Federal *Länder*), which consist, on average, of fewer than four small regions each.

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10   Here, the analysis distinguishes the five degrees of urbanisation developed by Fadic et al. (2019[21]), as described in Box 1: i) metropolitan regions with a FUA of at least 1.5 million inhabitants; ii) metropolitan regions with a FUA of 250 000 to 1.5 million inhabitants; iii) non-metropolitan regions with access to a FUA; iv) non-metropolitan regions without access only to a small or medium city; and v) remote regions.

Table 2. The *within*-small-region component accounts for the bulk of total income inequality

Results from a Theil decomposition of income inequality, by country, 2018/19 or latest year

	National level (T_i)	*Within* small regions (T_{Wr})	*Between* small regions (T_{Br})	*Between* degrees of urbanisation nested in each large region (T_{Bu})	*Between* large regions (T_{BR})
Austria	0.345	0.343	0.001	0.001	0.001
Belgium	0.252	0.246	0.001	0.001	0.004
Hungary	0.379	0.366	0.001	0.000	0.012
Italy	0.376	0.362	0.001	0.002	0.010
Slovak Republic	0.245	0.234	0.001	0.000	0.010

Note: The national-level Theil (T_i) has been constructed as the sum of the *within* and *between* components, and slightly deviates from the figure calculated directly from the microdata because of rounding.
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

51.   One possible reason for the small contribution of between-regional variation to overall inequalities may hence be that even small (TL3) regions are still relatively large and heterogeneous. This hypothesis could be tested in the second phase of this project, which will "zoom in" to the municipal level, thus further exploiting the very granular administrative data.

6. First conclusions and next steps

52.   This report summarised results from the initial phase of the geospatial income inequalities project, highlighting the enormous potential – but also some limitations – of exploiting national-level administrative income data for studying income inequalities within and across regions. For a first selection of 11 European OECD countries, the report documented substantial disparities in median income levels and inequalities across small (TL3) regions. These regional differences partly reflect urban-rural disparities across regions, as captured by the OECD metropolitan/non-metropolitan typology. However, the analysis also showed that disparities among metropolitan regions, and among non-metropolitan regions, can be substantial, and indeed larger than between the two groups. The analysis provided mixed evidence on regional divergence: only in about half of the countries with time series data, disparities in regional median incomes have grown over the last decade or so; in the other half, they have declined. By contrast, income *inequality* within small regions seems to have increased in many countries, and *cross-regional disparities in income inequality* have become larger. The report highlighted that the register-based data used in the analysis are much less suited for cross-country comparisons of income levels or inequalities than survey data. This is mostly because of differences in the data structure, which reflect above all differences in the design and administration of countries' tax-benefit systems.

53.   A number of findings in the report call for further work:

54.   First, the geographic level of the empirical analysis certainly deserves further attention. Up until now, the project has focused on income levels and inequalities across small (TL3) regions. However, the results from this report show that there is a strong case for *zooming in further* to study income distributions at even more granular level. This appears promising in particular because most income inequalities arise *within* and not *between* small regions, as shown by the Theil decomposition in Section 5. . The next phase of this project could therefore look beyond small regions and study disparities in income levels and inequalities for "small spatial units", typically municipalities. Inequalities between small spatial units are, by definition, larger than between regions, and urban-rural disparities may become more apparent when studying more granular geographic results. But there is also a case for *zooming out a little* to study clusters of small regions. The empirical analysis has shown that neighbouring metropolitan regions can exhibit stark income disparities, as for instance between (low-income) Vienna and the surrounding (high-income) regions (see Figure A B.1). It may therefore be more meaningful to consider those regions jointly, i.e. to produce income statistics for larger Functional Urban Areas (FUAs) that can span several small regions. Both, *zooming in* to small spatial areas and *zooming out* to FUAs is generally feasible with the administrative data used for this report, even if it is admittedly more complex than the analysis of small regions carried out so far.

55.   Second, the empirical analysis in this report touched on a number of issues that are of great policy relevance but that were so far beyond the scope of this project. Studying these issues in detail may require more complex data that exist only in one or two of the countries studied, or data that are still only becoming available. However, in a next stage, country-specific empirical analysis could help shed light on some of these issues, thereby complementing the cross-country analysis presented in this report. A (non-exhaustive) list of possible topics includes studying:

- *The impact of the COVID-19 crisis on geographic income inequalities*: administrative income data can be timelier than survey-based data, and this report already includes 2019 data for three countries (Denmark, Finland, Hungary). The first 2020 income data, which will provide evidence on the initial crisis impact on national and regional income distributions, should hence become available at some point during 2021.

- *The (changing) contribution of employment and capital income to geographic inequalities*, and the *role of taxes and benefits for reducing geographic income disparities*: this report provided a first glimpse on income redistribution between regions though taxes and benefits,

however still focusing alone on regional median incomes. A more comprehensive analysis, based on administrative microdata that have recently become available for Estonia, France and the Netherlands, could look at the role of different income components, taxes and benefits for geographic inequalities.

- ***The role of socio-demographic trends for explaining geographic income disparities***: this analysis could focus on the role of changing demographic decomposition across regions, including the changing age structure in booming and lagging regions, as a driver of regional inequalities. For selected countries with available microdata, the analysis could also look more closely at the role of regional differences in educational attainment, household structure, and geographic mobility for geographic income disparities.

- ***The role of geographic differences in consumer prices, including the price of housing, as a potential mitigator of regional income disparities***. First exploratory work on this topic has been carried out in the first project phase using U.S. regional price data. This work could be extended to European countries, subject to the availability of regional CPIs, house price data, or minimum consumption baskets.

- ***The relationship between geographic inequalities in household incomes and wealth***. Dutch microdata on household income and wealth could be used to provide a more comprehensive picture of households' economic well-being, including by looking at urban-rural disparities in household wealth (and notably real-estate wealth), studying the joint distribution of household income and wealth, and by comparing geographic inequalities in income and wealth levels and inequality.

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Annex A. Technical details of the Theil decomposition

56.   Following the derivations in Paredes, Iturra and Lufin (2014, p. 776[17])[11], the four components of the Theil Index in Section 5. , $T_i = T_{Wr} + T_{Br} + T_{Bu} + T_{BR}$, can be spelled out as follows: the *within*-small-region component, T_{Wr}, is given as

$$T_{Wr} = \sum_R \sum_u \sum_r \left(\frac{Y_{Rur}}{Y}\right) T_{Rr},$$

where T_{Rr} is the Theil Index measuring *within*-small-region income inequality for region *r* in large region *R*, given as

$$T_{Rr} = \sum_i \left(\frac{y_{Ruri}}{Y_{Rur}}\right) ln \left(\frac{y_{Ruri}/Y_{Rur}}{n_{Ruri}/N_{Rur}}\right).$$

This indicator needs to be calculated from the micro data.

57.   The *between*-small-region component, T_{Br}, and along the urban-rural spectrum, T_{Bu}, are calculated as

$$T_{Br} = \sum_R \sum_u \left(\frac{Y_{Ru}}{Y}\right) T_{rR}$$

and

$$T_{Bu} = \sum_R \left(\frac{Y_R}{Y}\right) T_{uR},$$

where, T_{rR} is the Theil Index measuring income inequality across small regions *r* in large region *R*, and T_{rR} measures income inequality along the urban-rural classification *u* in large region *R*. The *between* component across large regions, T_{BR}, is given as

$$T_{BR} = \sum_R \left(\frac{Y_R}{Y}\right) ln \left(\frac{Y_R/Y}{n_R/N}\right).$$

All of those three *between* components can be calculated using only data on the total incomes and population shares of the respective nested regional units.

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[11]   The derivations in Paredes, Iturra and Lufin (2014[17]) contain a number of errors, which have been corrected here.
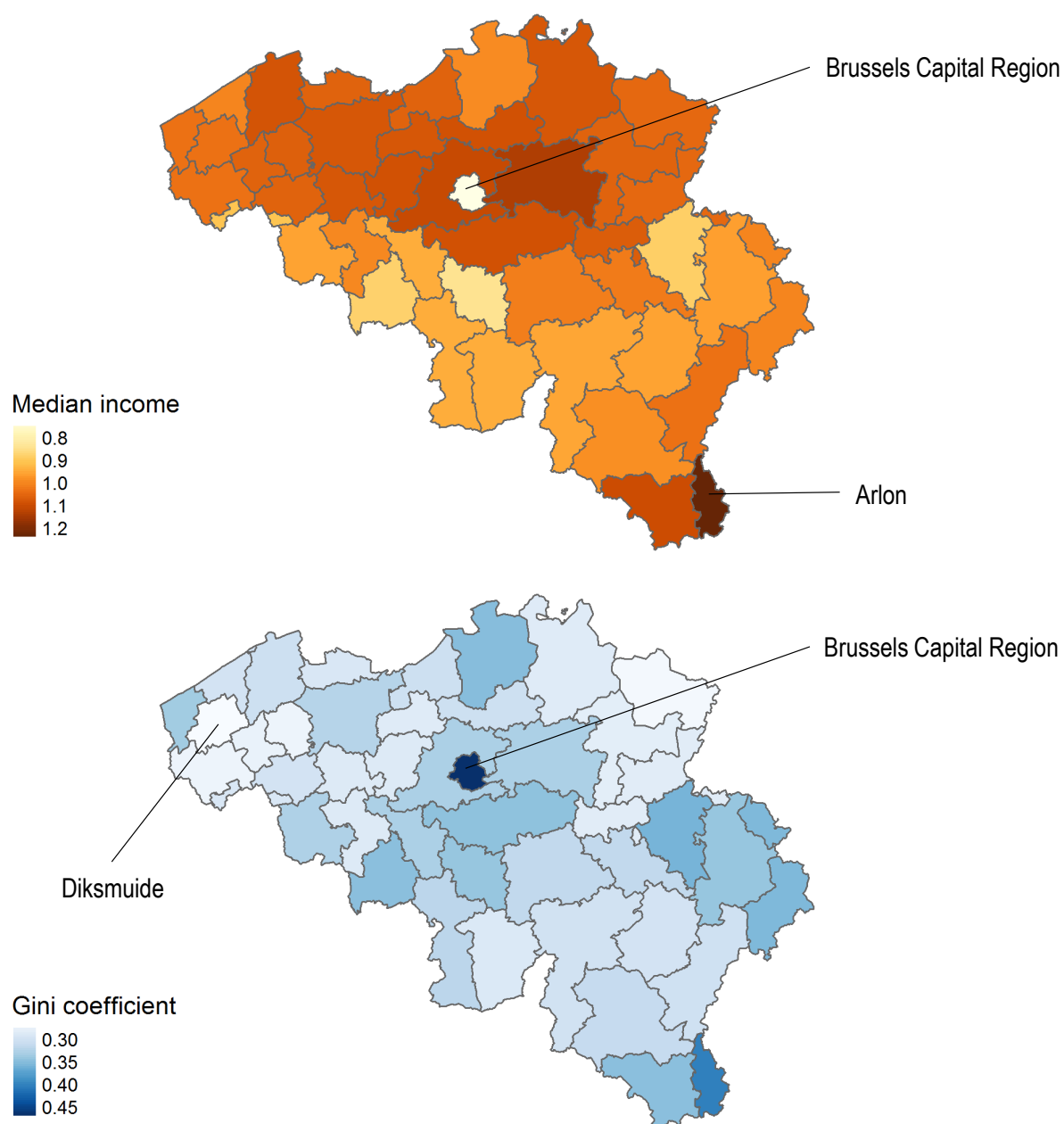
Annex B. Maps of regional income levels and inequality

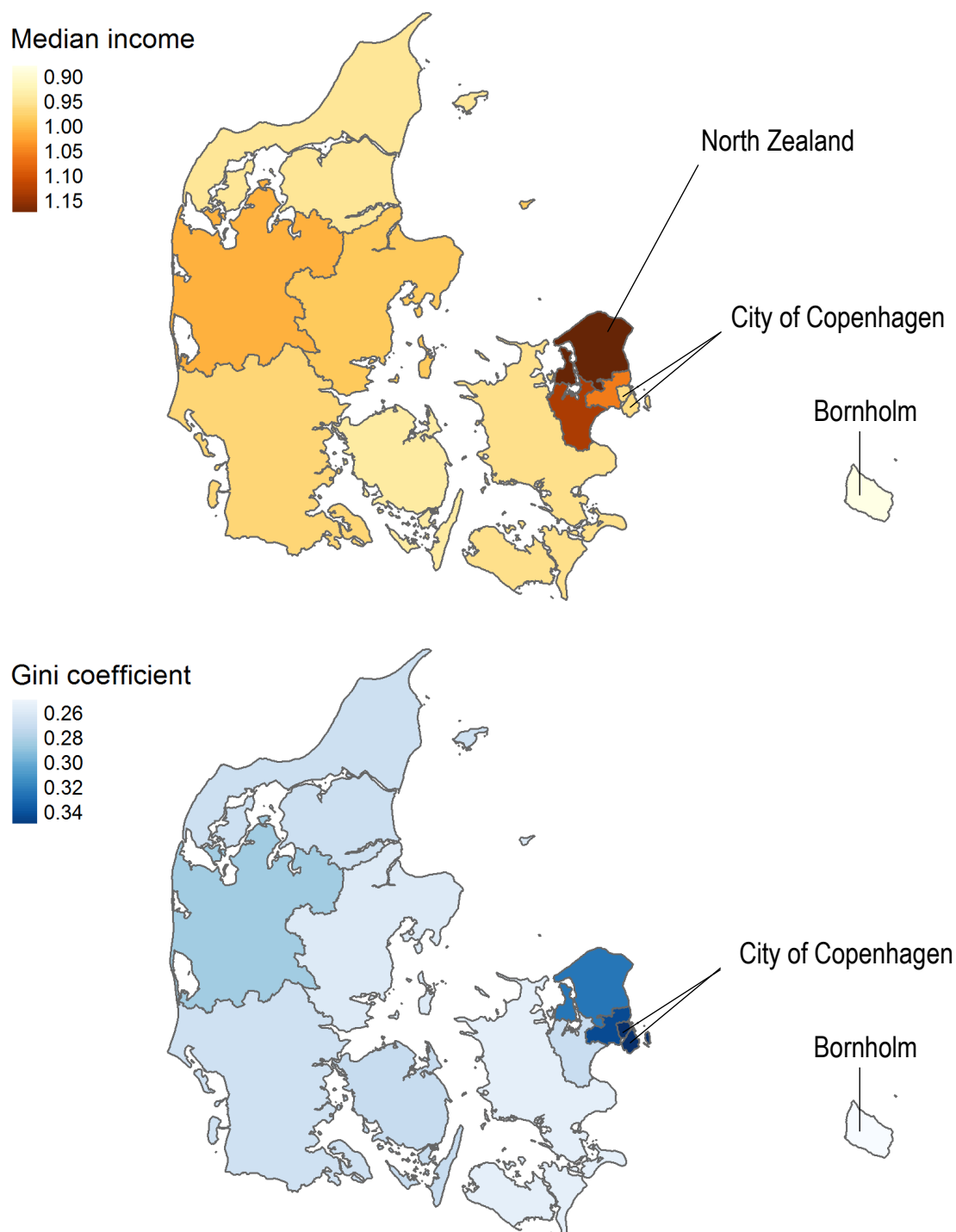**Figure A B.1. Regional map of income levels and inequality in Austria**
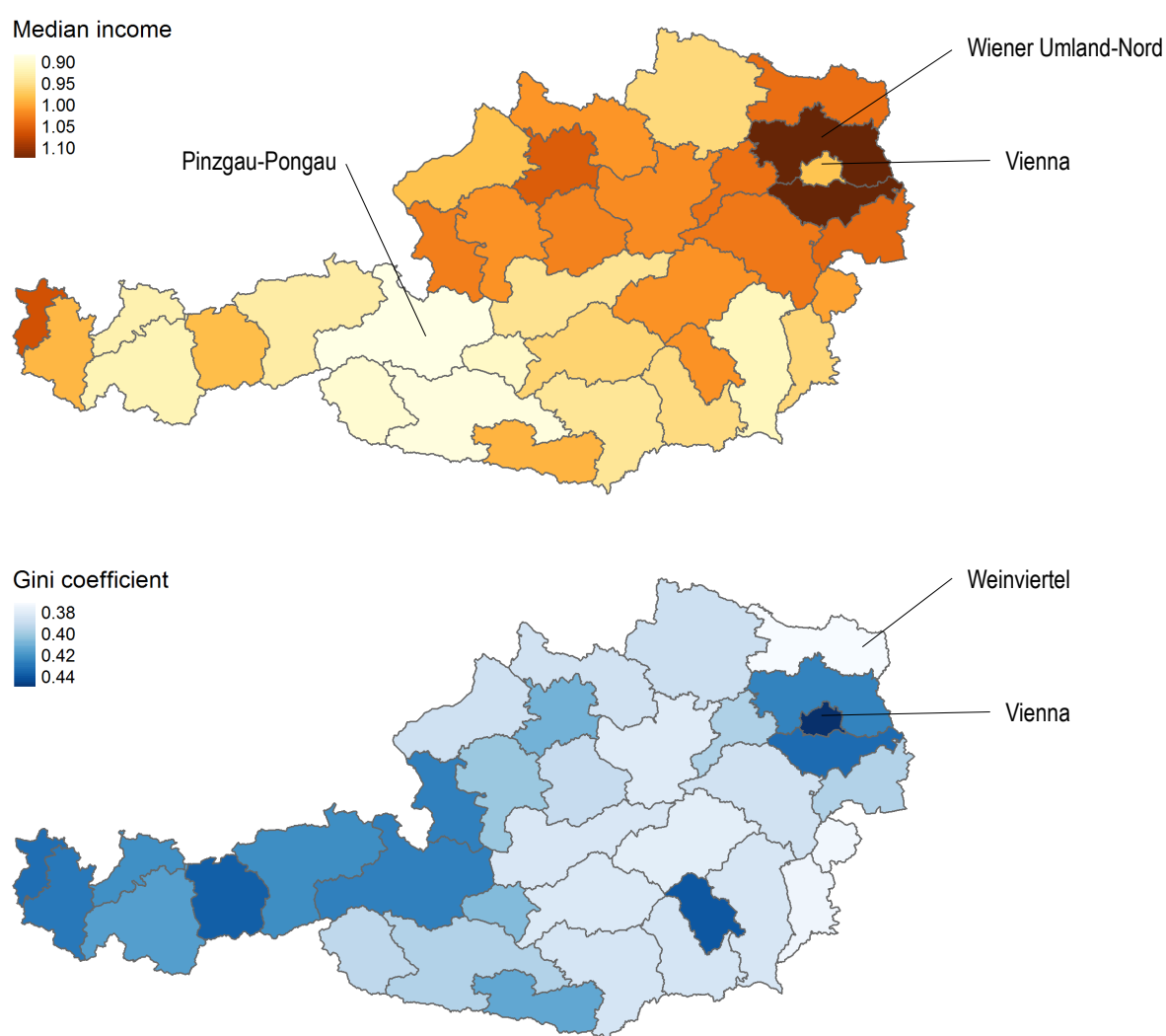
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

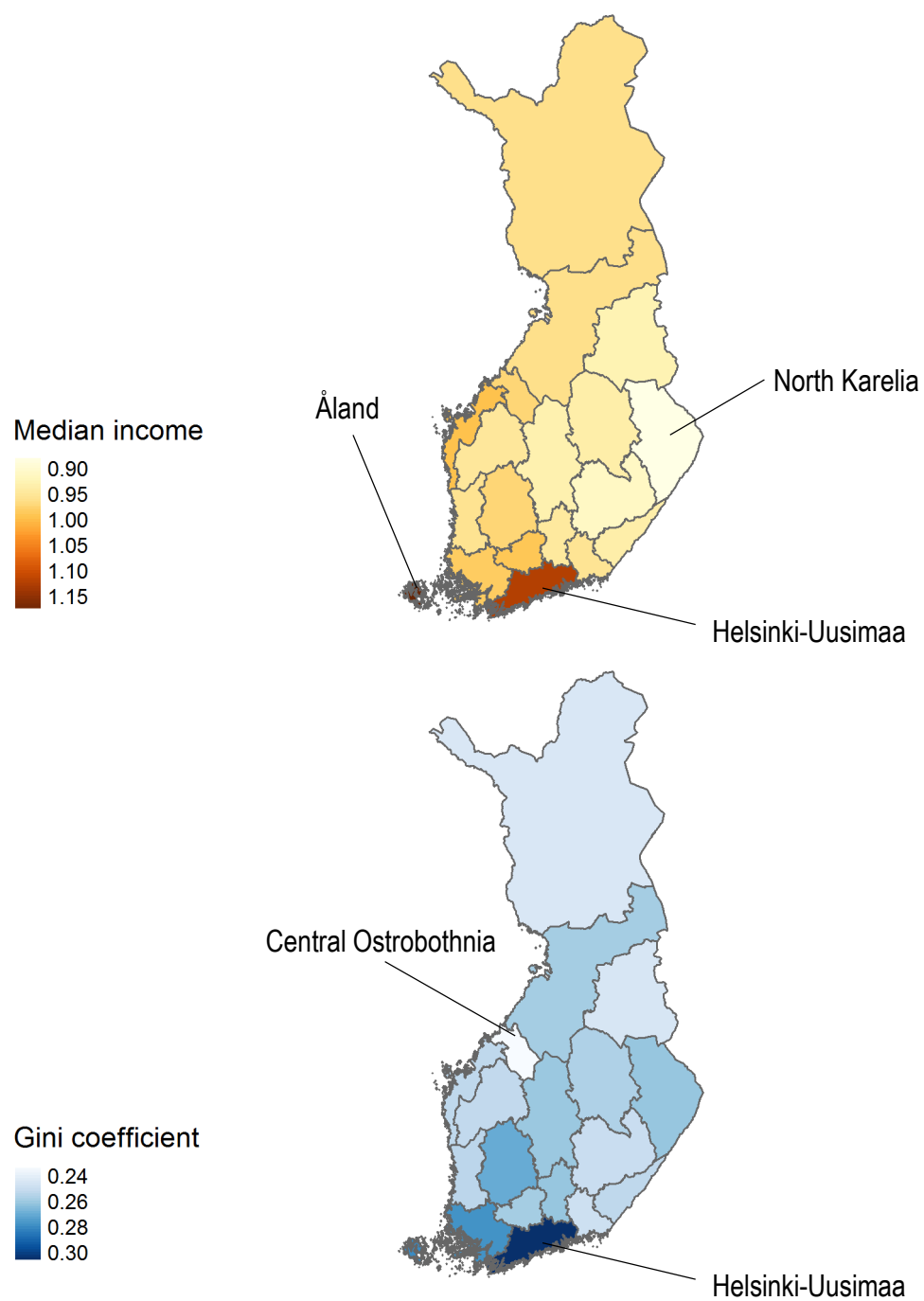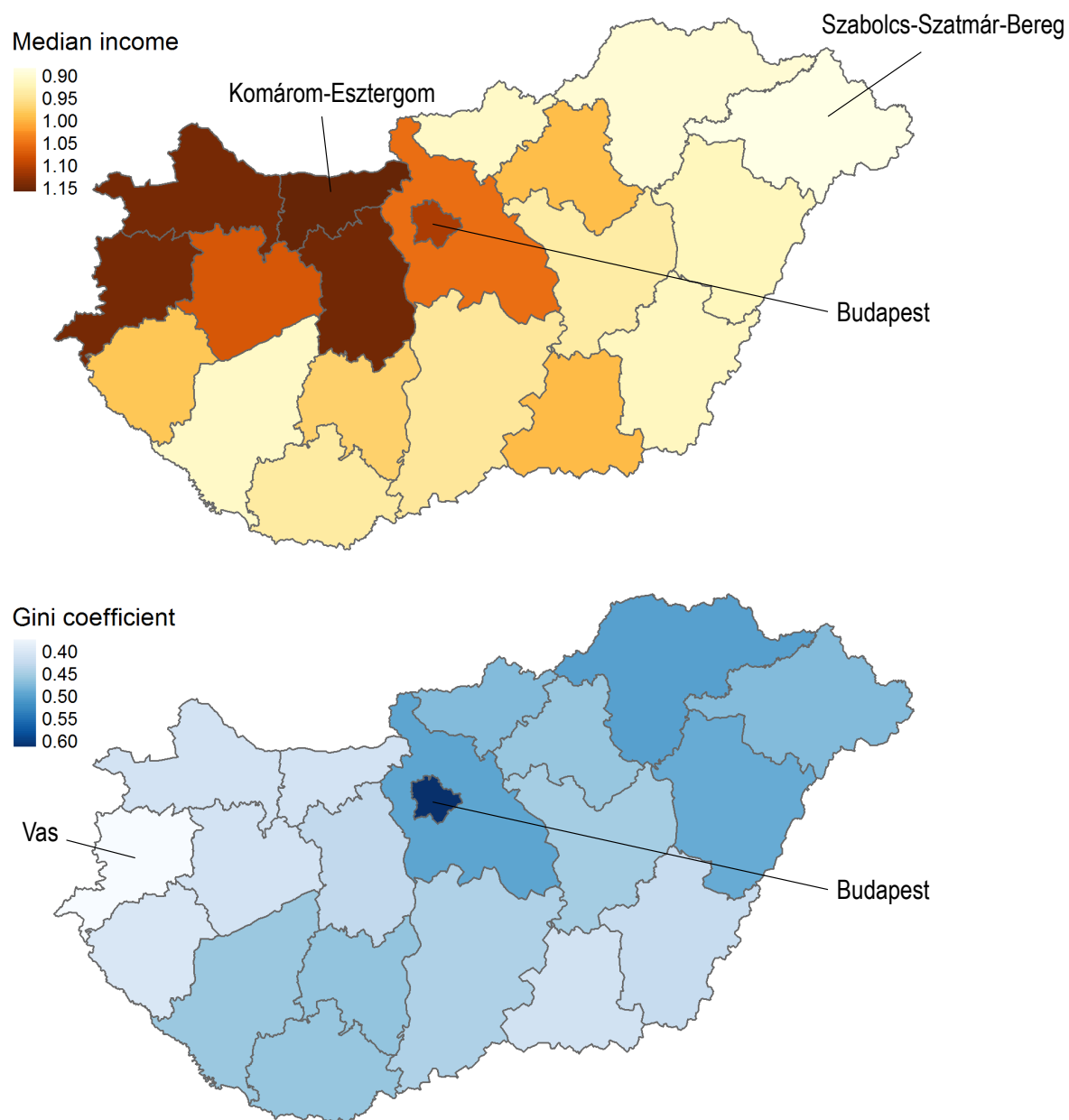**Figure A B.2. Regional map of income levels and inequality in Belgium**

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.3. Regional map of income levels and inequality in Denmark

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

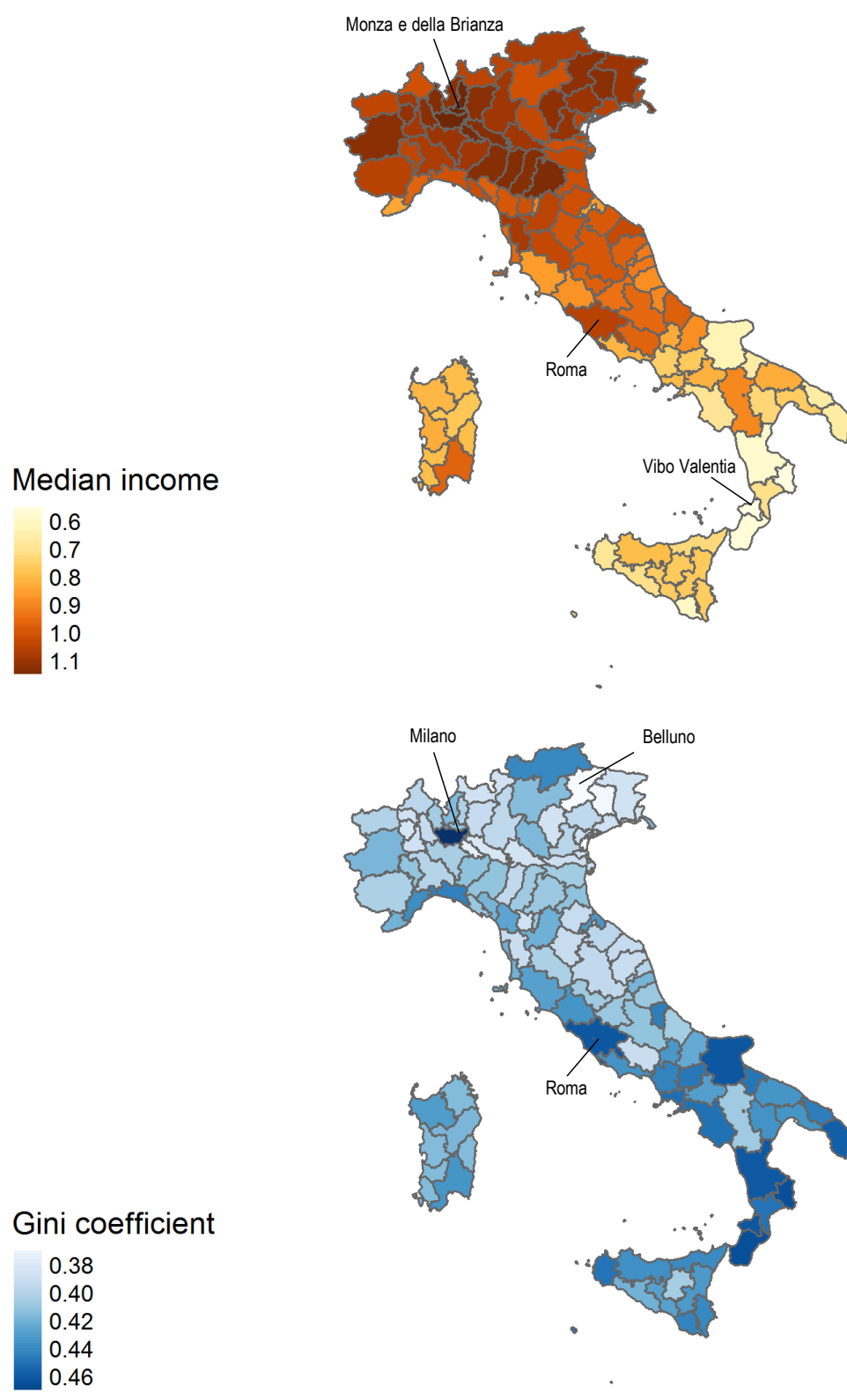**Figure A B.4. Regional map of income levels and inequality in Finland**

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.5. Regional map of income levels and inequality in Hungary
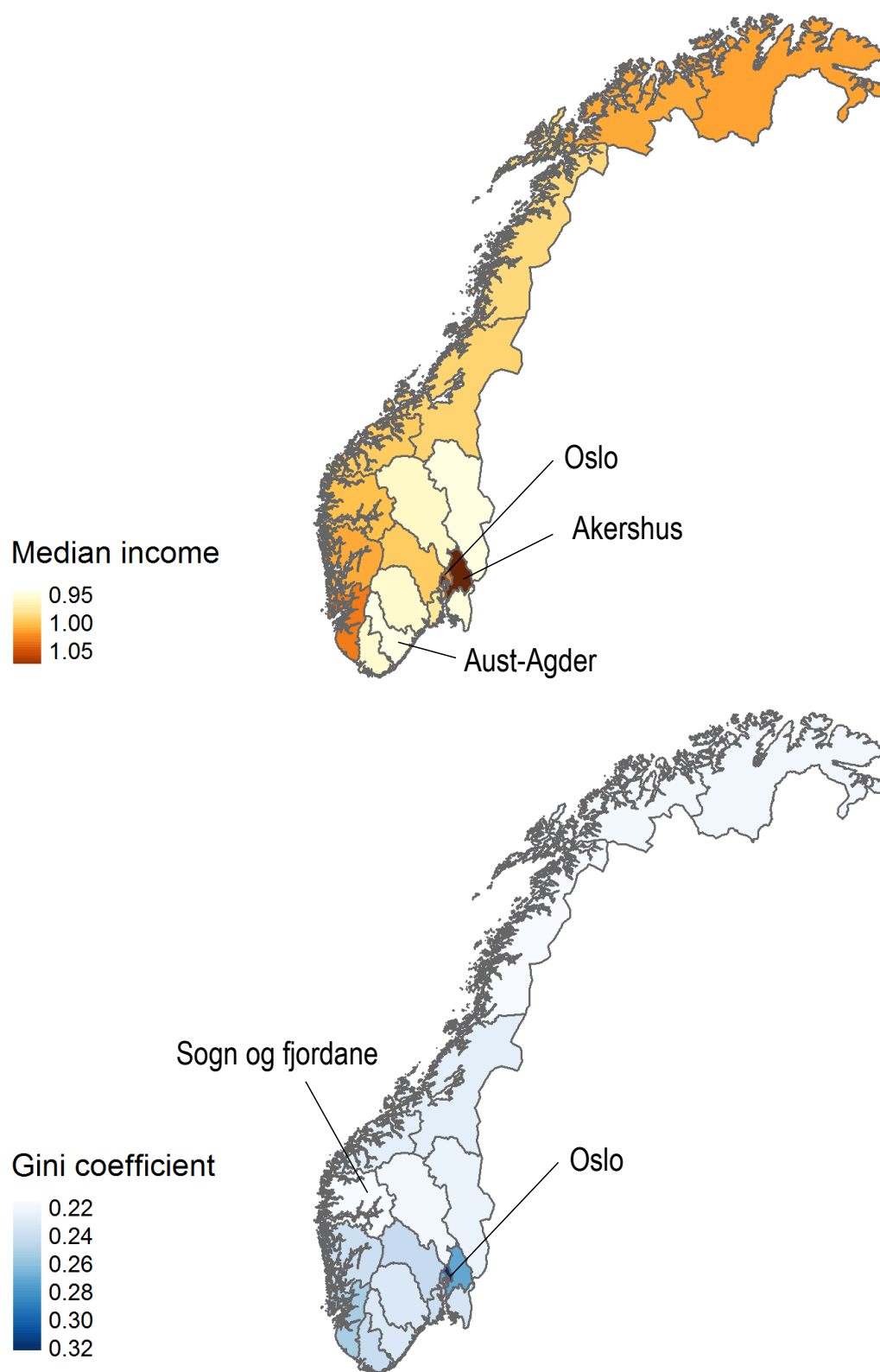

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.
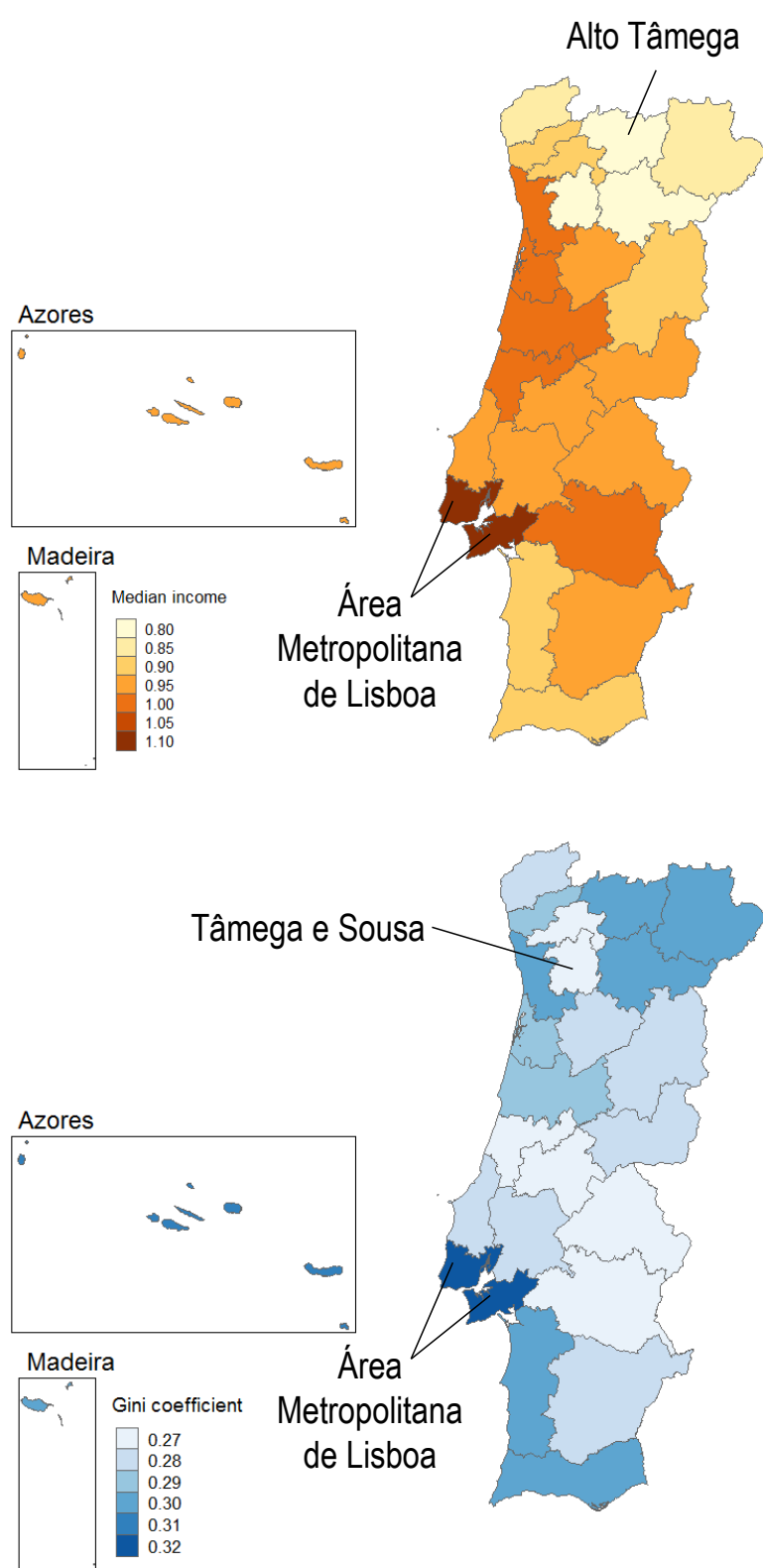
Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

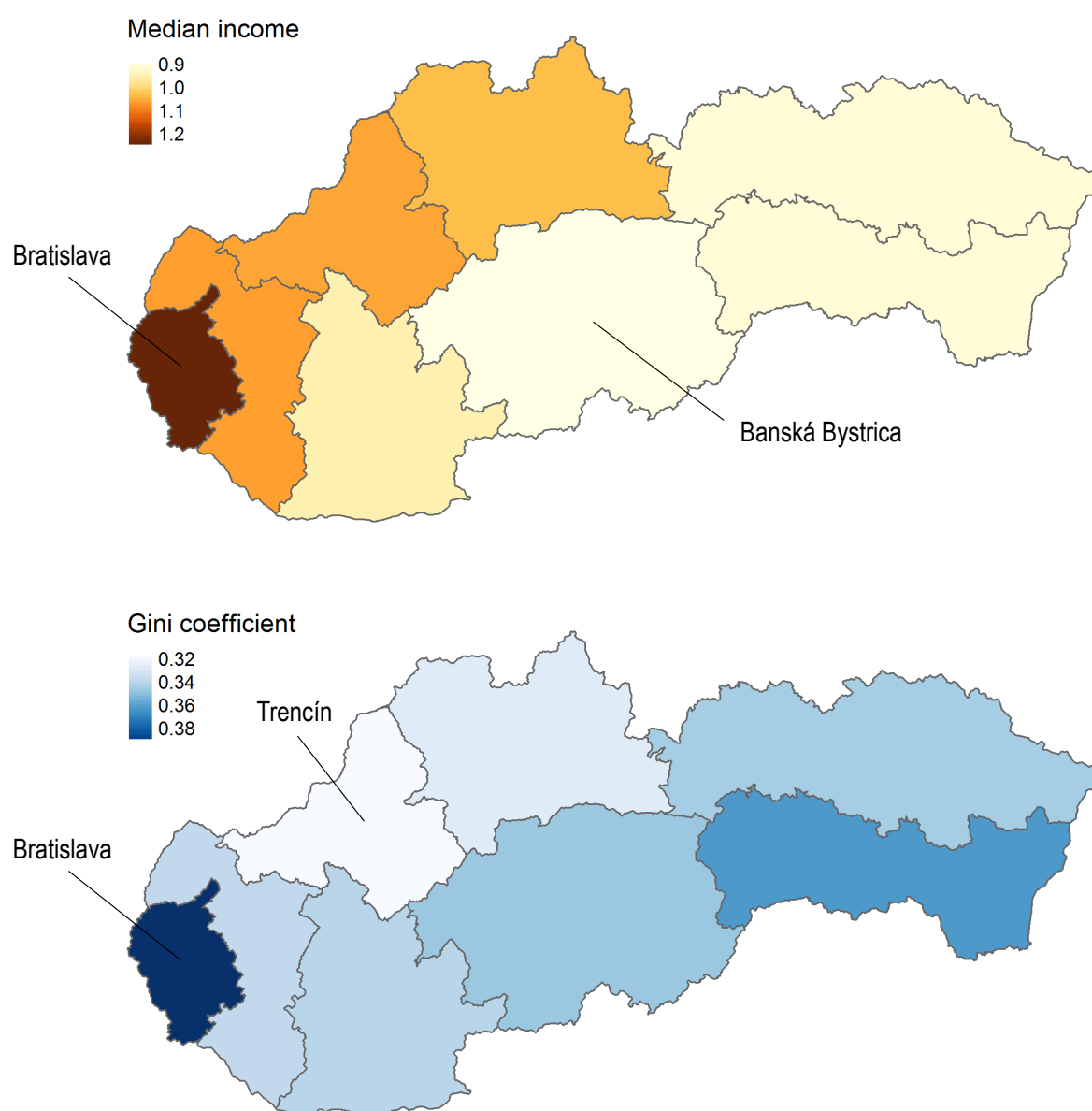**Figure A B.7. Regional map of income levels and inequality in Norway**

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.8. Regional map of income levels and inequality in Portugal

Alto Tâmega

Azores

Madeira

Median income
- 0.80
- 0.85
- 0.90
- 0.95
- 1.00
- 1.05
- 1.10

Área
Metropolitana
de Lisboa

Tâmega e Sousa

Azores

Madeira

Gini coefficient
- 0.27
- 0.28
- 0.29
- 0.30
- 0.31
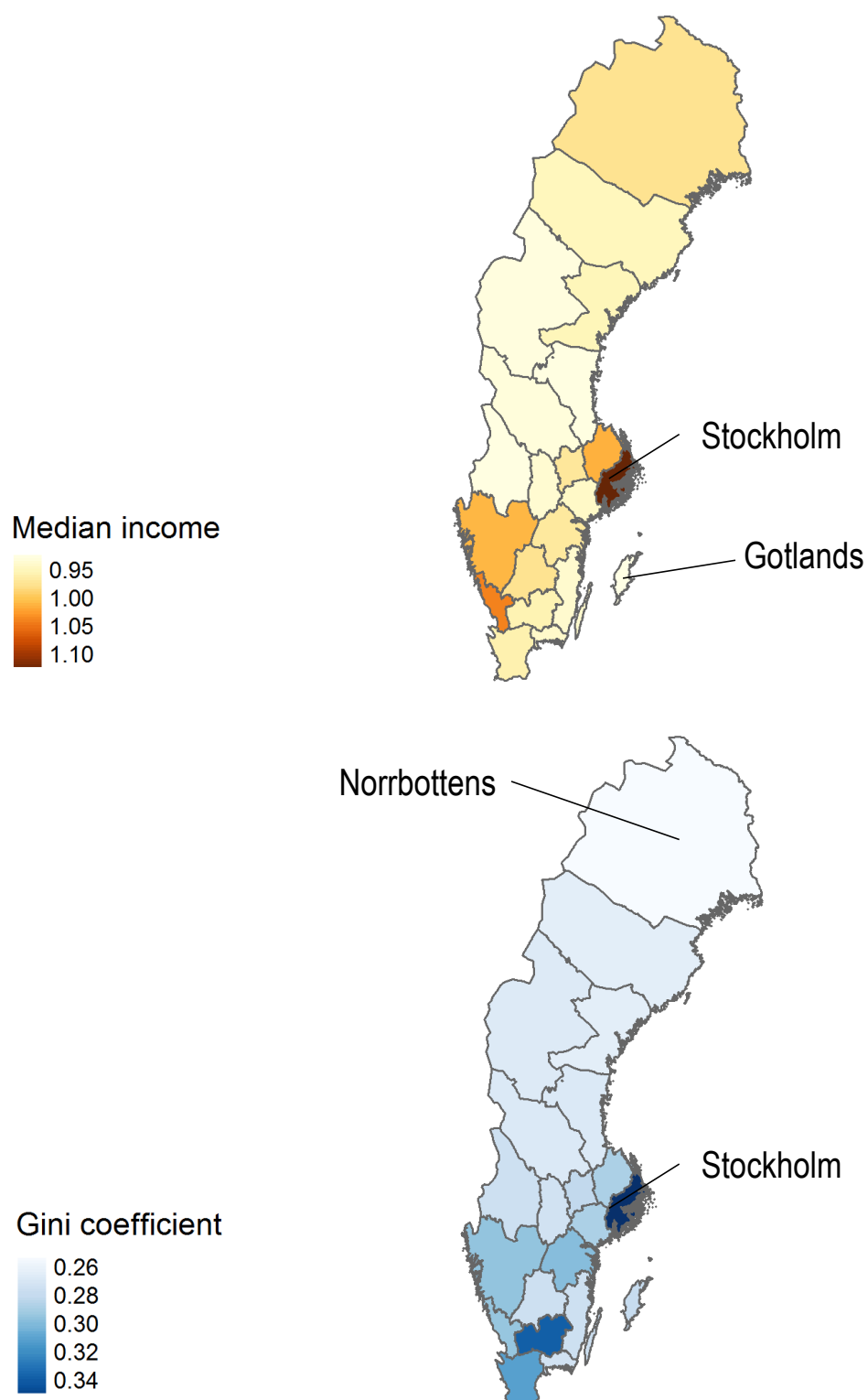- 0.32

Área
Metropolitana
de Lisboa

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.9. Regional map of income levels and inequality in the Slovak Republic
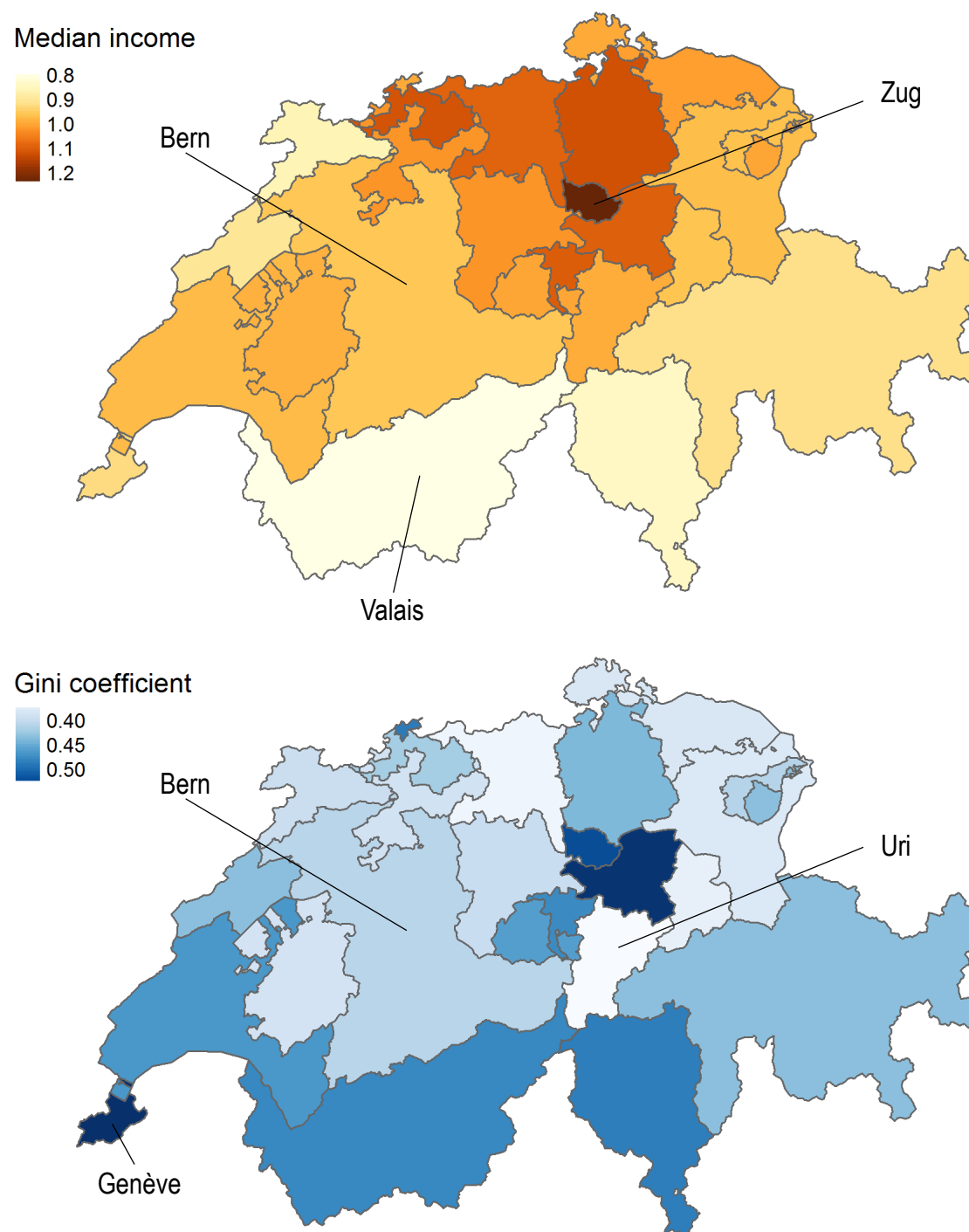

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.10. Regional map of income levels and inequality in Sweden

Median income

0.95
1.00
1.05
1.10

Stockholm

Gotlands

Norrbottens

Stockholm

Gini coefficient

0.26
0.28
0.30
0.32
0.34

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.

Figure A B.11. Regional map of income levels and inequality in Switzerland

Source: OECD calculations using statistics drawn from national tax record data, see Table 1.