OECD Regions and Cities at a Glance 2024

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Note by the Republic of Türkiye

The information in this document with reference to "Cyprus" relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the "Cyprus issue".

Note by all the European Union Member States of the OECD and the European Union

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

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Foreword

The 2024 edition of *Regions and Cities at a Glance* offers internationally comparable data to identify places where economic or social outcomes—or both— and the factors that impact on them, have been stronger and weaker, providing tools and guidance for policy development. Compiling this information is a significant task, requiring data from across the OECD and drawing on both conventional and unconventional sources and the findings of this edition underscore the importance of accurate statistics at the scale that matters for policy and people.

Drawing on a number of new and innovative data sources, this edition introduces several new features and indicators. As a response to the recent historically high levels of inflation across OECD countries, and the increased pressures this presented on the cost-of-living, it presents, for the first time, internationally comparable estimates of regional real GDP and real household income growth, adjusted for regional price changes. It also provides timely and detailed indicators on climate change, skill shortages (with a particular emphasis on transitions), and access to opportunities for various socio-economic groups in regions and cities. To complement the report, country profiles with key figures for each OECD country are accessible on the publication website.

The report was produced by the OECD Centre for Entrepreneurship, SMEs, Regions and Cities (CFE), led by Director Lamia Kamal-Chaoui, as part of the Programme of Work of the Regional Development Policy Committee (RDPC) and its Working Party on Territorial Indicators (WPTI). The final report was approved by written procedure by RDPC and WPTI delegates on 28 October 2024. The report was managed and edited by Ana Isabel Moreno Monroy, head of the Territorial Analysis and Statistics Unit, under the supervision of Rudiger Ahrend, head of the Economic Analysis, Data and Statistics Division. It was drafted by Alexandre Banquet, Marcos Díaz Ramírez, Claire Hoffmann, Ana Isabel Moreno Monroy, and Cem Özgüzel. Eric Gonnard, Claire Hoffmann and Josep Espasa Reig performed data collection and statistical analysis. The publication benefitted from support and contributions by Laurenz Baertsch, Claudia Baranzelli, Agustin Basauri, Antonela Miho, Antti Moisio, Miquel Vidal Bover, and Courtenay Wheeler, all from the CFE. Selen Gultekin, Tainá Souza Pacheco and Alison Weingarden (CFE) also provided contributions. Gillian Golden and Abel Schumann (Education Directorate) kindly contributed data. Mauricio Salazar Lozada and Josep Espasa Reig (CFE) prepared the country profiles to complement the report.

The report and country pages benefitted from comments by the delegates of the Working Party on Territorial Indicators and OECD colleagues, in particular Nadim Ahmad, David Burgalassi, Claire Charbit, Isabelle Chatry, Jose Enrique Garcilazo, Peter Horvat, Andres Fuentes Hutfilter, Lukas Kleine-Rueschkamp, Alexander Lembcke, Michelle Marshalian, Carlo Menon, Bernhard Nöbauer, Andrew Paterson, Raffaelle Trapasso, Wessel Vermeulen (CFE) and Ivan Haščič, Mikaël Maes, Vladimir Tesniere (Environment Directorate). The report was edited by Eleonore Morena, it was laid out by Meral Gedik and Jack Waters (CFE) managed the publication process. Finally, the OECD gratefully acknowledges the support from Mapbox in making their data available. The Mapbox data were obtained through the Development Data Partnership (datapartnership.org), a collaboration between international organisations and private sector companies to facilitate the efficient and responsible use of third-party data in international development.

Editorial

Global transformations, from demographic shifts, changing patterns of trade, technological advancements and climate change often have distinct impacts in different regions. Governments are adopting place-based policies to deliver better opportunities for people and businesses, while boosting regional competitiveness and productivity. This 2024 edition of *Regions and Cities at a Glance* provides comparative evidence to help guide these policy responses, with new insights on the local impact of global trends and policies.

The report finds that the effects of technological change vary significantly across regions. In Europe, 9% of jobs in rural areas are at high risk of automation compared to 4% in cities. However, digitalisation can also bring new opportunities and better access to public services in rural areas. The gap in internet speeds between rural and urban areas has decreased by 11 percentage points on average since 2019. However, broadband download speeds remain on average 25% faster in cities than in rural areas located in the same country. Continuing to expand access to digital connectivity will be essential to ensure residents of rural areas have the opportunity to fully participate in and benefit from the digital transformation.

Labour and skill shortages remain a pressing challenge, particularly in non-metropolitan regions where the workforce is shrinking due to ageing populations and outward migration. Upskilling workers and increasing the participation of underrepresented groups in regional labour markets will be key to meet local labour demands, as well as to improve the competitiveness and attractiveness of regions, which is currently uneven – in 2023, across 34 OECD member countries, half of all greenfield foreign direct investment into the OECD went to just 34 out of 357 large regions.

Housing affordability could further exacerbate skill shortages in regions where housing supply does not keep pace with economic growth. This edition finds that in large urban areas, housing prices are 68% higher than in small urban areas. Addressing overly restrictive zoning policies, and enhancing active and public transportation options, would enable densification and lower carbon emissions. Better access to essential services and jobs in suburban areas would also enhance liveability and the sustainability of transport networks.

More broadly, the report emphasises the role of place-based solutions for accelerating climate action. Sub- national governments have an integral role to play in implementing policies on electrification, green innovation, sustainable land use, and ultimately enabling strong, sustainable growth.

Mathias Cormann,
OECD Secretary-General

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Reader's guide

Throughout the publication, regional disparities in different domains are analysed through the persistence of disparities across regions and cities over space and time. More precisely, the report proposes several approaches to measure regional disparities:

- The straightforward difference between the maximum and minimum regional values in a country (regional range).
- Ranking regions by the value of an indicator and taking the ratio (or the difference) between the highest value representing 20% of the population and the lowest value of the regions representing 20% of the population. This approach assesses regional disparities that are less sensitive to possible outliers and cross-country differences in the size of regions.
- Using standard composite indices, such as the Theil general entropy index, which reflects inequality among all regions.
- Summarising spatial disparities by type of territory. This includes using the degree of urbanisation or OECD typology on access to cities in small administrative regions (Territorial Level 3, TL3).

The cut-off date for data included in the publication was 8 September 2024. Due to the time lag of subnational statistics, the last available year is generally 2023 for demographic and labour market and 2022 for socio-economic indicators.

Geographic areas and their typologies

This publication features statistical indicators at three scales: i) administrative regions; ii) functional urban areas (FUAs), composed of local units, and iii) areas defined from grid cells of regular size. The table below summarises the different geographic areas for which the publication reports indicators.

Category	Description
Administrative subnational regions	Large region (Territorial Level 2, TL2)
	Small region (Territorial Level 3, TL3)
Functional aggregations of local units	FUAs (based on local units) Cities (based on local units)
Grid cell areas	Degree of urbanisation (cities, towns and suburbs, and rural areas)

Administrative regions

Administrative regions are the regional boundaries within a country as organised by governments. As such, they refer to areas that are often under the responsibility of a particular subnational government or to the scale targeted by a specific policy implemented at the national or subnational level. Regions are classified into two scales, large (Territorial Level 2, TL2) and small (Territorial Level 3, TL3), which ensures comparability across countries.

Functional urban areas

The report uses the definition of FUA developed by the European Commission (EC) and the OECD (Dijkstra, Poelman and Veneri, 2019). FUAs consist of cities (local units where at least half of the population live in clusters of densely populated grid cells with at least 50 000 inhabitants) and adjacent local units with high levels of commuting (travel-to-work flows) towards the cities. A minimum threshold for the population size of FUAs is set at 50 000 inhabitants. The definition identifies 1 271 FUAs of different sizes in all OECD member countries except Costa Rica and three accession countries. Large FUAs correspond to FUAs with a population of over

1.5 million inhabitants, while midsize FUAs range from 250 000 to 1.5 million inhabitants. Small FUAs have populations between 100 000 and 250 000 inhabitants and very small FUAs contain between 50 000 and 100 000 inhabitants.

Common thresholds and similar geographical units across countries were defined to establish this cross-country methodology. These units and thresholds may not correspond to the ones chosen in the national definitions. Therefore, the resulting FUAs may differ from the ones derived from national definitions and the OECD functional urban delimitation may not capture all of the local factors and dynamics in the same way as national definitions.

Territorial level classification

Regions within the 38 OECD countries are classified on 2 territorial levels reflecting the administrative organisation of countries. The 433 OECD large (TL2) regions represent the first administrative tier of subnational government, for example, the Ontario province in Canada. There are 2 414 OECD small (TL3) regions, each TL3 being contained in a TL2 region (except for the United States). For example, the TL2 region of Aragon in Spain encompasses three TL3 regions: Huesca, Teruel and Zaragoza. TL3 regions correspond to administrative regions, except for Australia, Canada, Germany and the United States. All of the regions are defined within national borders.

This classification – which, for European countries, is largely consistent with the Eurostat Nomenclature of Territorial Units for Statistics (NUTS) 2021 classification – facilitates greater comparability of geographic units at the same territorial level. Indeed, these two levels, which are officially established and relatively stable in all member countries, are used as a framework for implementing regional policies in most countries.

For accession countries, the report identifies only TL2 regions for Brazil and Peru, and TL2 and TL3 regions for Bulgaria, Croatia and Romania (derived from the European NUTS).

For analyses conducted at the TL3 level, data are aggregated at the metropolitan level if multiple TL3 regions are linked to the same FUA. Metropolitan regions are defined by combining TL3 regions where 50% or more of the population resides in FUAs with at least 250 000 inhabitants. This aggregation helps mitigate distortions caused by commuting patterns. The small TL3 regions connected to FUAs can be found in the OECD Territorial Correspondence Table (OECD, 2023).

This report uses shortened labels in figures when relevant. The OECD territorial correspondence table includes a shortened name to enhance readability of graphs, besides the official name and the English or French translation. In shortened names, terms such as “Region”, “District”, or “Province” are omitted, while the terms “North”, “West”, “East”, “South”, “Central”, ‘Island’ are abbreviated to N., W., E., S., C., I., respectively.

The report refers to “capital-city regions” as TL2 or TL3 regions that include the administrative capital city of each country.

Classification of small regions by typology on access to cities

The OECD typology for small regions (TL3) by access to cities helps to assess differences in socio-economic trends in regions – both within and across countries – by controlling for the presence/absence of metropolitan areas and the extent to which the latter is accessible by the population living in each region (Fadic et al., 2019). According to such typology, TL3 regions are classified as “metropolitan” if more than half of their population live in an FUA of at least 250 000 inhabitants and as “non-metropolitan” otherwise. A “metropolitan region” becomes a “large metropolitan region” if the FUA, accounting for more than half of the regional population, has over 1.5 million inhabitants.

In turn, the typology further classifies “non-metropolitan” regions based on the size of the FUA that is most accessible to the regional population. “Non-metropolitan” TL3 regions are sub-classified into three possible types:

- **With access to a FUA with at least 250 000 inhabitants** (>250K), if at least half of the regional population can reach an FUA of at least 250 000 inhabitants within a 60-minute car ride.
- **With access to a FUA with less than 250 000 inhabitants** (<250K), if at least half of the regional population can reach an FUA of between 50 000 and 250 000 inhabitants within a 60-minute car ride.
- **Remote**, if reaching the closest FUA by car takes more than 60 minutes for more than half of the regional population.

The method relies on publicly available grid-level population data and localised information on driving conditions. In this report, the five types of regions identified are sometimes aggregated into three classes only, as indicated in the table below.

Acronym	Grouping	Reduced grouping	
MR-L	Large metropolitan region	Metropolitan region	
MR-M	Metropolitan region		
NM-M	Region near a FUA>250K	Region near a midsize/large FUA	Non-metropolitan region
NM-S	Region near a FUA<250K	Region far from a midsize/large FUA	
NM-R	Remote region		

Degree of urbanisation

The degree of urbanisation classifies local units as: i) "cities" or "densely populated areas"; ii) "towns and semi-dense areas" or "intermediate density areas"; and iii) "rural areas" or "thinly populated areas" based on population density, population size and contiguity using 1 km² grid cells (EC et al., 2020). Each local unit belongs exclusively to one of these three classes. Classification is carried out in two steps:

- **Step 1: Identifying three types of grid cells**
  - An **urban centre** (or a high-density cluster) consists of contiguous grid cells with a density of at least 1 500 inhabitants per square kilometre (km^2) and has a population of at least 50 000 inhabitants. Gaps in this cluster are filled and edges are smoothed. If needed, cells that are 50% built-up can be added.
  - An **urban cluster** (or moderate density clusters) consists of contiguous grid cells with a density of at least 300 inhabitants per km^2 and a population of at least 5 000 inhabitants.
  - **Rural grid cells** (mostly low-density cells) are cells that do not belong to an urban cluster. Most of these will have a density below 300 inhabitants per km^2.
- **Step 2: Classifying local units**

  This step is an overlay of Step-1 classification onto local units:
  - **Cities** (or densely populated areas): local units that have at least 50% of their population in urban centres
  - **Towns and semi-dense areas** (or intermediate density areas): local units that have less than 50% of their population in urban centres and less than 50% of their population in rural grid cells
  - **Rural areas** (or thinly populated areas): local units that have at least 50% of their population in rural grid cells

Structure of this edition

Chapter 1 discusses real economic performance in regions, accounting for the impact of inflation on producers and households in regions and cities and ongoing demographic change. It also provides key indicators of productivity, competitiveness and innovation in regions and cities.

Chapter 2 highlights disparities in worker participation, the rise of remote work and migrant integration, focusing on the varying effects on women and migrants. It also addresses the growing need for green skills and the evolving role of higher education in preparing workers for future demands.

Chapter 3 analyses the progress of OECD regions and cities towards achieving climate neutrality by 2050, indicators of greenhouse gas emissions, sectoral drivers of emissions and climate impacts, and climate projections for different emission scenarios.

Chapter 4 analyses trends in household income inequality within regions and differences in healthcare performance across regions. The chapter also presents accessibility indicators of childcare and education, public transport. Finally, it discusses Internet connectivity across regions and cities.

Further resources

The *OECD Database on Regions, Cities and Local Areas* on the OECD Data Explorer (https://data-explorer.oecd.org/) provides the raw data and indicators presented in *Regions and Cities at a Glance*, along with metadata. This platform enables users to explore the data in more depth than is available in this publication and is regularly updated.

Regions and Cities at a Glance uses the OECD's StatLink service. A URL below each table and figure leads to a corresponding Excel file containing the underlying data for the indicator. These URLs are stable and will not change.

Region and cities indicators can be further explored in the OECD Regions and Cities Atlas data visualisation tool (https://regions-cities-atlas.oecd.org/), while local areas indicators are available on the Local Data Hub (https://localdatahub-pp.oecd.org/). Thematic data visualisation tools also allow for measurement of the distance to United Nations Sustainable Development Goals in regions and cities (https://www.oecd-local-sdgs.org/) and assess how regions perform in terms of well-being (https://www.oecdregionalwellbeing.org/).

Acronyms and abbreviations

	Description
CMIP6	Coupled Model Intercomparison Project Phase 6
COVID-19	Coronavirus disease 2019
DEGURBA	Degree of urbanisation
EC JRC	European Commission Joint Research Centre
ECMWF	European Centre for Medium-Range Weather Forecasts
ECOICOP	Classification of Individual Consumption According to Purpose
EDGAR	Emissions Database for Global Atmospheric Research
ETER	European Tertiary Education Register
FUA	Functional urban area
GDP	Gross domestic product
GFDI	Greenfield foreign direct investment
GFTS	General Transit Feed Specification
GHG	Greenhouse gas
GHS	Global Human Settlement
GVA	Gross value added
GWP	Global warming potential
HEI	Higher education institution
ICD	International Classification of Diseases
ICT	Information and communication technology
IEA	International Energy Agency
ISCED	International Standard Classification of Education
ITF	International Transport Forum
IUCN	International Union for Conservation of Nature
LFS	Labour Force Survey
PCT	Patent Cooperation Treaty
$PM_{2.5}$	Particulate matter (concentration of fine particles in the air)
POI	Point of interest
p.p.	Percentage point
PPP	Purchasing power parity
NEX-GDDP	NASA Earth Exchange Global Daily Downscaled Projections
NRCA	Normalised revealed comparative advantage
R&D	Research and development
RCP	Representative Concentration Pathway
ROPI	Regional output price index
SAU3	Small area unit, Level 3
SSP	Shared Socio-economic Pathway
STEM	Science, technology, engineering and mathematics
TL2	Territorial Level 2
TL3	Territorial Level 3
UN	United Nations
UNEP-WCM	UN Environment Programme World Conservation Monitoring Centre
WDPA	World Database on Protected Areas

OECD member and accession country codes

Code	Country	Code	Country
AUS	Australia	ISL	Iceland
AUT	Austria	ISR	Israel
BEL	Belgium	ITA	Italy
BGR	Bulgaria	JPN	Japan
BRA	Brazil	KOR	Korea
CAN	Canada	LTU	Lithuania
CHE	Switzerland	LUX	Luxembourg
CHL	Chile	LVA	Latvia
COL	Colombia	MEX	Mexico
CRI	Costa Rica	NLD	Netherlands
CZE	Czechia	NOR	Norway
DEU	Germany	NZL	New Zealand
DNK	Denmark	PER	Peru
ESP	Spain	POL	Poland
EST	Estonia	PRT	Portugal
FIN	Finland	ROU	Romania
FRA	France	SVK	Slovak Republic
GBR	United Kingdom	SVN	Slovenia
GRC	Greece	SWE	Sweden
HRV	Croatia	TUR	Türkiye
HUN	Hungary	USA	United States
IRL	Ireland		

Further reading

Dijkstra, L., H. Poelman and P. Veneri (2019), "The EU-OECD definition of a functional urban area", *OECD Regional Development Working Papers*, Vol. 2019/11, https://doi.org/10.1787/d58cb34d-en.

EC et al. (2020), "A recommendation on the method to delineate cities, urban and rural areas", Background document, https://unstats.un.org/unsd/statcom/51st-session/documents/BG-Item3j-Recommendation-E.pdf.

Fadic, M. et al. (2019), "Classifying small (TL3) regions based on metropolitan population, low density and remoteness", *OECD Regional Development Working Papers*, No. 2019/06, OECD Publishing, Paris, https://doi.org/10.1787/b902cc00-en.

OECD (2023), *OECD Territorial Correspondance Table*, OECD, Paris, https://stats.oecd.org/wbos/fileview2.aspx?IDFile=db68c5c3-5fd5-465c-b25b-b50aa14c2da1.

Executive summary

The analyses and indicators in this report underscore the critical importance of adopting a place-based and granular view of our economies. Whether climate, technological, or demographic changes, or the impact of shocks, a detailed look beneath national statistics often reveals a more nuanced and diverse picture. This calls for a broader range of tailored policy actions.

The importance of granular sub-national data has become even clearer in light of recent crises and accelerated transitions, given their often significant and asymmetric spatial impacts. As in previous years, this report offers fresh and timely evidence on these spatial disparities. One innovation that deserves particular mention in this year's edition is the use of sub-national inflation estimates, reflecting the historically high inflation rates of recent years. This approach not only highlights, for the first time, spatial differences in inflation but also illustrates how these variations affect spatial trends in real growth, productivity, and income. For many lagging non-metropolitan regions, where GDP per capita gaps with metropolitan regions have recently narrowed or stabilised, the analysis reveals that price changes, rather than within-industry productivity growth, have been key drivers.

The data also provides new insights on the impact on households, highlighting for example the disproportionate impacts that rising housing costs have on urban residents. Housing costs in large functional urban areas (FUAs with over 1.5 million inhabitants), increased by 68% over the past decade, meaning that in 2023, housing in large FUAs was 86% more expensive than in very small FUAs (with less than 100 000 inhabitants). Within-country real income growth gaps also increased: the gap between regions with the highest and lowest household income growth widened from an average of 2.6 percentage points to 3.6 percentage points between 2014-2018 and 2019-2022 in 10 OECD countries with available data.

The report also provides timely insights across many on-going and mega-transitions.

Demographic changes pose a long-term threat to growth and productivity, as labour shortages intensify across OECD regions. In the next decade, 54% of metropolitan regions, and 74% of regions near midsize or large FUAs, and 64% of regions far from a midsize or large FUA are projected to face a shrinking workforce. The report identifies measures to mitigate these impacts. For example, raising women's labour force participation to match that of men within the next decade would reduce the share of regions with a declining workforce to 13% of metropolitan regions, 24% of regions near a midsize or large FUA and 20% of regions far from a midsize or large FUA.

Climate change continues to exert strong spatial and asymmetric impacts. The year 2023 was the hottest on record, with the most pronounced effects observed in polar and cold regions, where temperatures increased more than twice as much as in OECD arid regions (2°C vs 0.8°C). Actions to curb production-based carbon emissions, including electrification and transitioning towards low-carbon electricity generation, also exhibit significant spatial variation. Regions far from FUAs have been slower to reduce emissions than metropolitan regions and regions close to them, partly due to persistent challenges in cutting emissions in agriculture and transport. Methane emissions, meanwhile, remain concentrated in a small number of regions specialising in fossil-fuel extraction, primarily in North America. Managing land use and transitioning towards low-emission transport will also be crucial for the net-zero transition. Between 2010 and 2020, globally, built-up areas expanded by an amount equivalent to Austria, with rural areas and small cities showing a stronger inclination towards unsustainable land use. Notably, even remote regions experiencing population decline saw their built-up area increase by around 11% during this period.

Promoting public and active transport can make cities more liveable and inclusive while reducing emissions. Although public transport usage is relatively high in some capital cities, most commuters in FUAs (3 out of 4) still rely on cars to get to work. Moreover, 74% of people in cities can walk to a primary school and a childcare facility in 15 minutes, whereas only 36% of people in suburbs can. Similarly, only 56% of people in suburbs can walk to public transport in 10 minutes compared to 84% in their corresponding cities. The uptake of remote work could help to reduce commute frequency, but this requires improving Internet connectivity. Broadband download speeds are notably slower in commuting zones than in their corresponding cities in most OECD countries.

Technological change holds great promise to accelerate the net zero transition, address labour shortages and generate growth in all regions. Automation and Artificial Intelligence, for example, offer huge potential, but their spatial impacts require careful management. Capital-city regions, for example, are currently leading the green transition, with 25% of workers employed in green-task related jobs compared to 17% in other regions. However, challenges are mounting across regions, as vacancy rates for green jobs are 44% higher than other occupations, underscoring the pressing need for more skilled labour in this area.

1. ECONOMIC PERFORMANCE AND LONG-RUN TRENDS

Regions growing in gross domestic product (GDP) per capita in times of volatile prices

Higher inflation in recent years and more volatile commodity prices have resulted in diverging nominal and real GDP per capita trends in many regions

After over a decade of primarily low inflation in regions, the relatively little spread in regional price changes for most regions began to widen in 2021, driven by significant differences in price changes across industries (Figure 1.1), especially in regions with substantial primary sector activities. Between 2015 and 2022, regions specialising in the primary sector saw overall regional price increases (measured with regional GDP deflators) that were, on average, 1.1 times the national median and up to 1.8 times in Antofagasta, Chile. Conversely, GDP deflators in capital-city regions were, on average, 0.96 times the national median in 2022. This slower price growth in capital-city regions was most notable in Bucharest, Romania, and Bogotá, Colombia, where regional price changes in the period were 0.89 and 0.7 times the national median respectively.

Regional price changes affect the measurement of the relative growth performance of regions. The difference between the region with the highest and lowest real GDP per capita growth in 2015-22 relative to the national average was an average of 23 percentage points (p.p.) across large regions in 37 OECD member and accession countries with available data. Chile, Colombia, Mexico and Romania had differences of more than 60 p.p. Although measures using regional price deflators show similar levels of median dispersion to national price deflators, they switch relative growth from positive to negative in 38 regions and from negative to positive in 56 regions (accounting in each case for 11% of the OECD population) (Figures 1.5 and 1.6). Real GDP per capita adjusted by regional price changes grew faster than the national average across 18 capital-city regions. Using national price changes would show only 9 did. For regions specialised in the primary sector, close to half (22 out of 54) of the regions growing below the national average would show real GDP per capita growth above the national average if national rather than regional price changes were used.

Regional inequality measured in real GDP per capita terms (using regional price changes at the small region level where available) increased between 2019 and 2022 compared to 2015-18 in 17 out of 31 countries with available data (Figure 1.2). Over 2021 and 2022, most countries (21 out of 27) broadly continued the inequality trends seen from 2000 to 2020 (OECD, 2023). In Estonia, Hungary, Italy and the United Kingdom, inequality began to fall in 2019 and kept dropping after the pandemic. In Norway and Spain, inequality moved slightly upward after 2020. Whilst national rather than regional price indices show similar trends, national price changes would show smaller decreases in inequality in Denmark, Portugal and Türkiye and larger increases in Czechia, Finland and Hungary. However, using regional price changes reverses the trend for some countries: from decreasing to increasing in Ireland, Romania, and the Slovak Republic and from increasing to decreasing in Türkiye.

Although the use of regional rather than national price changes does not significantly change the perspective of non-metropolitan performance relative to metropolitan areas, they do point to a greater degree of persistence (Figure 1.3). From 2020 onwards, improvements in GDP per capita gaps seen using national GDP deflators, especially in regions far from functional urban areas (FUAs), were mostly due to differential regional price movements and not real GDP per capita growth, as average gaps using regional deflators were typically larger for all types of non-metropolitan regions. Across countries, the gap between metropolitan and non-metropolitan regions widened in 16 out of 30 OECD member and accession countries with available data, with the largest increases in Slovak Republic, Hungary and Romania (Figure 1.4). Using national price changes would suggest that the gap closed in 5 of these 16 countries.

Definitions

Regional Output Price Index (ROPI) deflator: Built as current regional GDP estimates over regional GDP chain-linked volume series (with series rebased to 2015).

Real GDP per capita refers to nominal GDP per capita deflating using the ROPI deflator.

Primary sector specialisation uses the Normalised Revealed Comparative Advantage (NRCA) index.

Refer to Annex C for metadata on the ROPI deflator, the Theil index and the NRCA.

Further reading

OECD (2023), *OECD Regional Outlook 2023: The Longstanding Geography of Inequalities*, OECD Publishing, Paris, https://doi.org/10.1787/92cd40a0-en.

Figure notes

Figure 1.1: Based on 397 TL2 regions in 31 OECD countries, plus BGR, HRV and ROU.

Figures 1.2 and 1.3: Based on 347 regions near a large/midsize FUA in 22 OECD member and accession countries, 283 regions near a small FUA in 27 countries, and 328 remote regions in 26 countries.

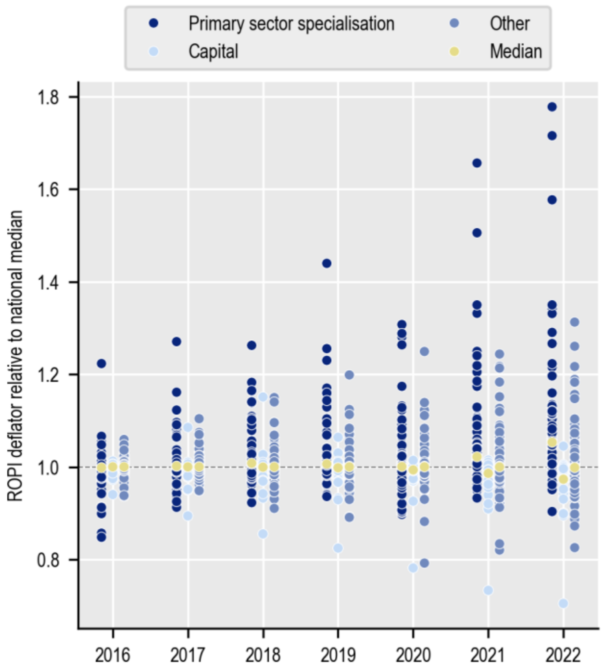
Figure 1.3: Real GDP per capita values based on ROPI deflator.

Figure 1.4: Thirty countries with GDP per capita data available for TL3 regions grouped by access to city typology. 2015-22 (otherwise 2015-21) for 17 countries with TL3 data up to 2022, of which 10 with TL3 regional deflators (marked with *): BEL, CZE,* DNK,* EST, FRA, GBR,* HRV, HUN, KOR,* NLD,* NZL, PRT,* SVK,* SVN, SWE,* TUR,* USA.* Parent TL2 deflators have been used as a proxy for countries without TL3 deflators.

Figures 1.5 and 1.6: 2015-22 period, except CHE and NOR (2015-21). Values for NOR include the part of the GDP generated from the continental shelf that is proportioned to its GDP.

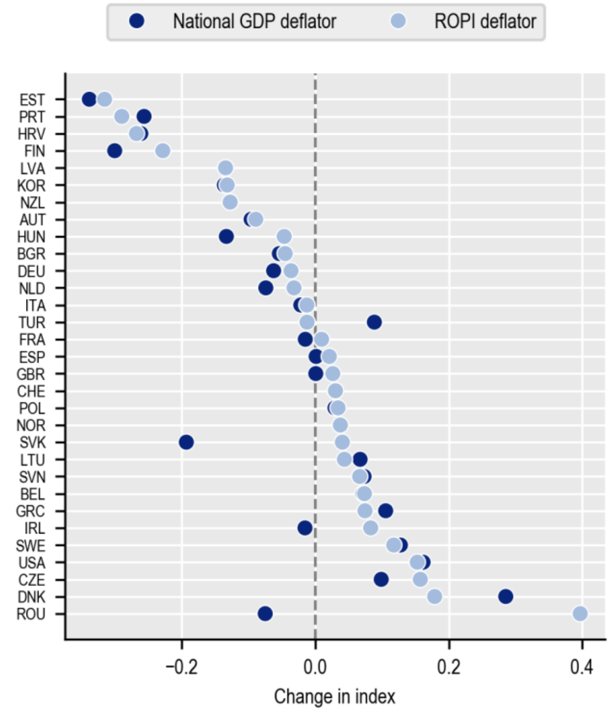
Figure 1.1. Regional Output Price Index (ROPI) deflator in large regions, 2016-22

Relative to the national median. Base year = 2015



StatLink https://stat.link/ntyuzr

Figure 1.2. Change in Theil index of real GDP per capita of small regions, 2015-18 - 2019-22



StatLink https://stat.link/a9ib17

Figure 1.3. Non-metropolitan to metropolitan gap in real GDP per capita by small region type, 2015-22

Metropolitan regions = 100

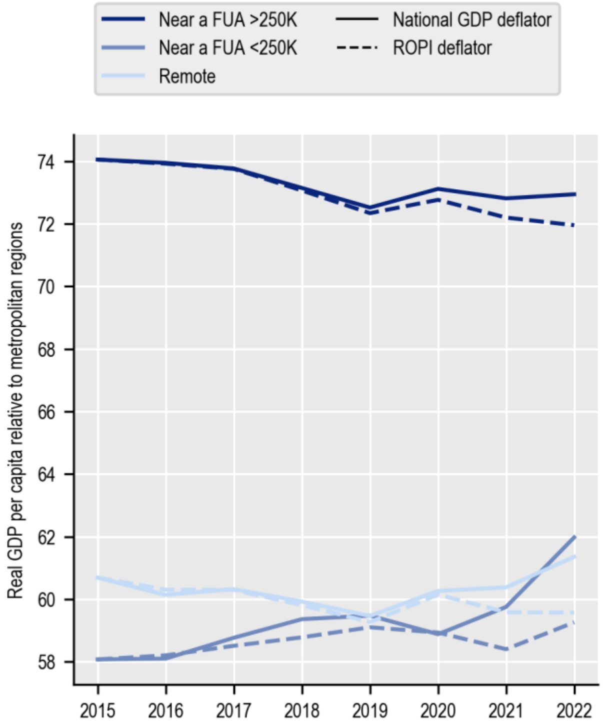


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Figure 1.4. Change in non-metropolitan to metropolitan gap in real GDP per capita, 2015-22

Metropolitan regions = 100

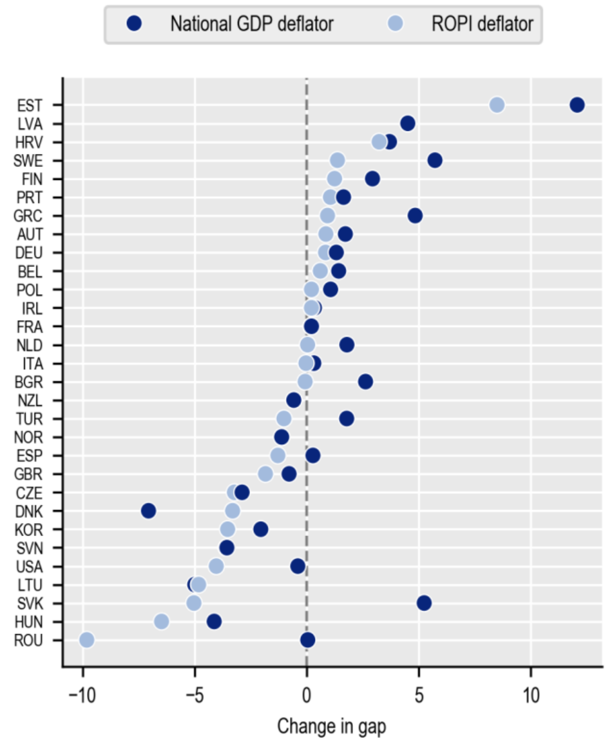

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Figure 1.5. Change in real GDP per capita relative to the national average across large regions, 2015-22 – Americas

"Switch" indicated for cases when sign changes after using the ROPI deflator

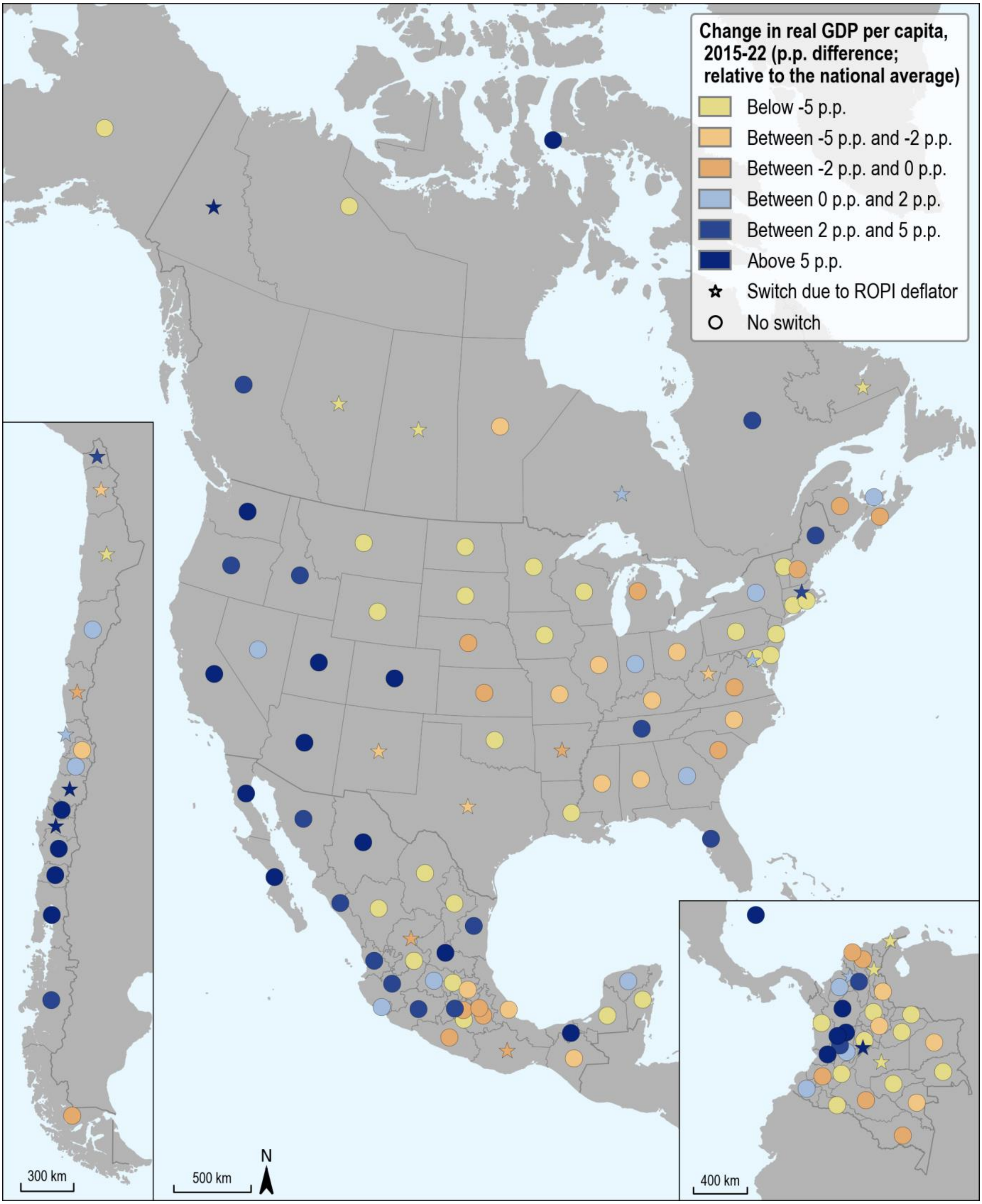

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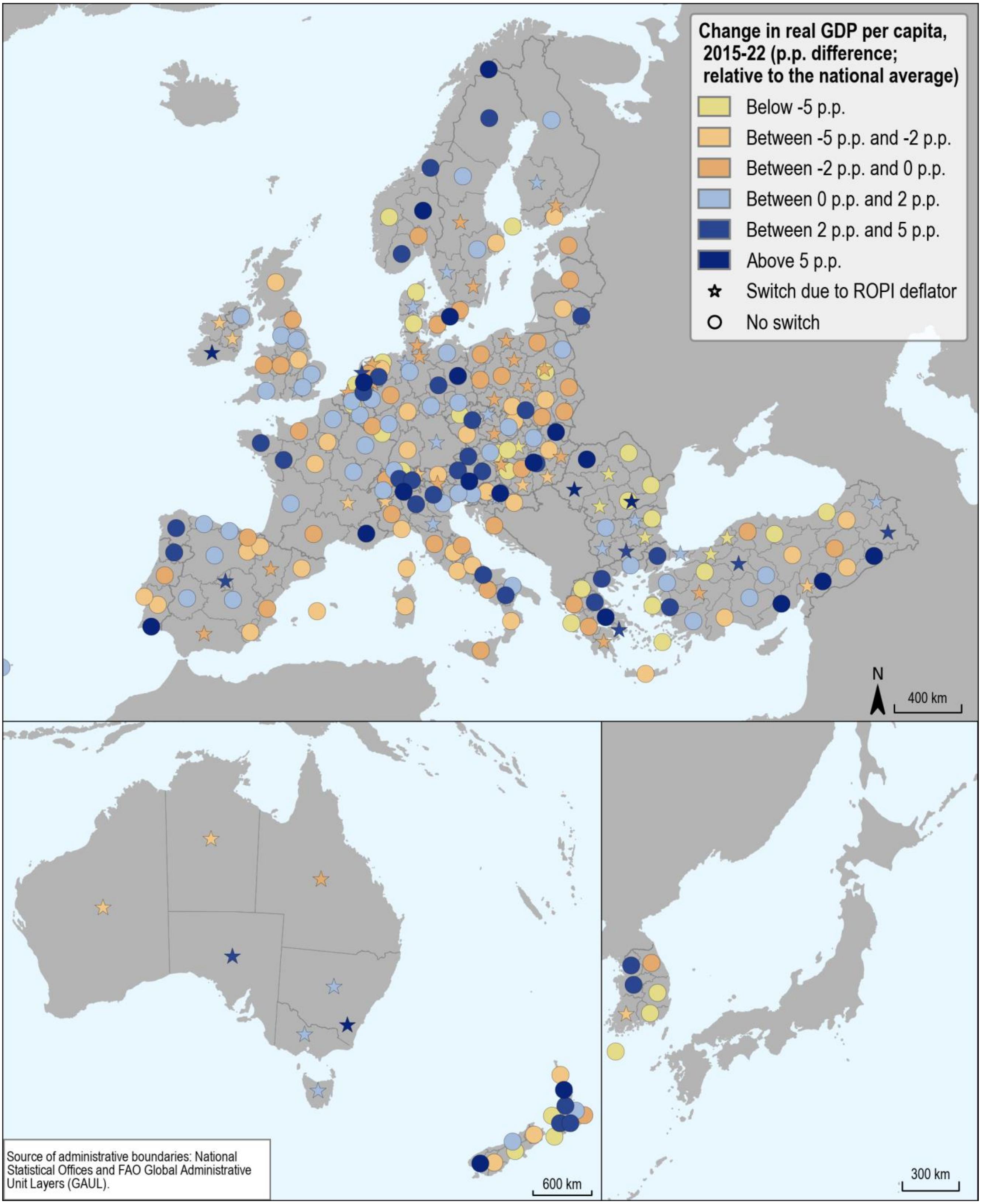
Figure 1.6. Change in real GDP per capita relative to the national average across large regions, 2015-22 – Europe and Asia-Pacific

"Switch" indicated for cases when sign changes after using the ROPI deflator



StatLink https://stat.link/np5re3

Productive, competitive and innovative regions and cities

Regional disparities in labour productivity remain significant and international trade and greenfield foreign direct investment (GFDI) are highly concentrated in a few regions

In 2022, regional disparities in productivity within OECD member and accession countries remained large, with labour productivity in a country's most productive regions being double that of the least productive ones. The differences were particularly pronounced in Colombia, Mexico and Romania, where the most productive regions were four or more times as productive as the least productive. Capital-city regions were the most productive places in 20 out of 33 countries and the second most productive in 5 others (Figure 1.7).

Productivity levels have been slowly converging across regions over the last 2 decades, with low-productivity regions experiencing an average annual growth of 1.3%, compared to 1% for high-productivity ones. Even though a large majority of regions (more than 80%) experienced productivity growth between 2002 and 2022, 14 out of 33 OECD member and accession countries had at least 1 region with productivity decline, and Greece saw productivity decline in most regions (with employment rising faster than output).

Productivity growth can result from employment declining faster than output. Conversely, slow productivity growth can result from employment growing faster than output. Employment grew in 97% of regions in the top 20% of productivity for at least 15 years in 2002-22, where productivity increased. In contrast, only 88% of regions in the bottom 20%, with rising productivity, saw employment growth (Figure 1.8). This means that 3% of high-productivity regions and 12% of low-productivity regions experienced productivity increases that were not matched by employment growth, equivalent to 9% of all regions.

Trade openness – the sum of imports and exports relative to GDP – was below 40% in half of the regions. In contrast, in 24 out of 298 regions, the combined value of imports and exports was equivalent to 100% or more of GDP (Figure 1.9). West Slovenia, Slovenia, and Ticino, Switzerland were the top regions for trade openness in 2022. Overall, regional differences in trade openness within OECD member and accession countries are substantial, averaging around 100 p.p. These differences are even more pronounced in Belgium, Finland, Greece and Switzerland, exceeding 150 p.p. between the most and least open regions. Significant differences in trade openness are partly driven by a high concentration of international trade in a few regions in countries. Indeed, in 2022, around 20% of regions accounted for half of the total imports and exports.

GFDI is even more spatially concentrated than trade. In 2023, half of the total GFDI in the OECD went to just 34 subnational regions (out of 357). The main industries for GFDI were renewable energy, electronic components and semiconductors. Investment in the top five OECD regions receiving GFDI focused on renewable energy (Queensland, Australia; Quebec, Canada; Scotland, United Kingdom; and Texas, United States), and semiconductors (Okinawa, Japan). The industries driving investments remain relatively stable in their locations, even when leading regions vary over time, resulting in a consistent geographical clustering of GFDI over time (Figure 1.10).

Innovation is another growth driver but patenting capacity varies widely with city size. Patents are concentrated in metropolitan regions, which increased their share of patent applications (as a percentage of total patent applications) from 85% in 2000 to 90% in 2022, despite having 70% of the population. Patenting activity tends to be higher in larger cities: large FUAs have an average patenting rate of 8.3 applications per 50 000 inhabitants, 60% higher than midsize FUAs, more than double that of small FUAs, and over 5 times that of very small FUAs. Patenting activity is also geographically concentrated within continents (Figures 1.11 and 1.12).

Definitions

Labour productivity (GVA per worker) is defined as gross value added (GVA) over employment (based on place of work).

High-productivity (low-productivity) regions: regions that have maintained a position within the top 20% (bottom 20%) of regions in terms of productivity for at least 15 years over 2002-22.

Trade openness is defined as imports plus exports as a percentage of GDP.

Greenfield foreign direct investment (GFDI) estimates are based on online database fDi Markets (Financial Times), which monitors cross-border investments involving new physical projects or expansions of existing operations that result in job creation and capital investment. Joint ventures are only included if they lead to establishing a new physical operation. Mergers and acquisitions (M&A) and other equity investments are excluded from tracking.

Refer to Annex B for metadata on trade, GFDI and patent indicators.

Figure notes

Figure 1.7: Values in thousand USD PPP. 2021 for CHE, GBR, NOR and NZL; 2020 for AUS. For NOR, the regional productivity does not take into account GVA generated on the continental shelf.

Figure 1.8: The latest year is 2021 for CHE, GBR, NOR and USA. The initial year is 2003 for BEL and POL; 2005 for COL and MEX; 2008 for KOR and NOR; 2009 for TUR; 2011 for CHE; and 2013 for CHL. Growth was measured in 2015 at constant prices using ROPI deflators, except for NZL, NOR, and CHE (where only national GDP deflators are available).

Figure 1.9: 2021 for CHE and FIN.

Figures 1.11 and 1.12: 2021 for FRA, ITA, POL and USA; 2020 for EST, GRC, MEX, SVN and TUR.

Figure 1.7. GVA per worker in large regions, 2022

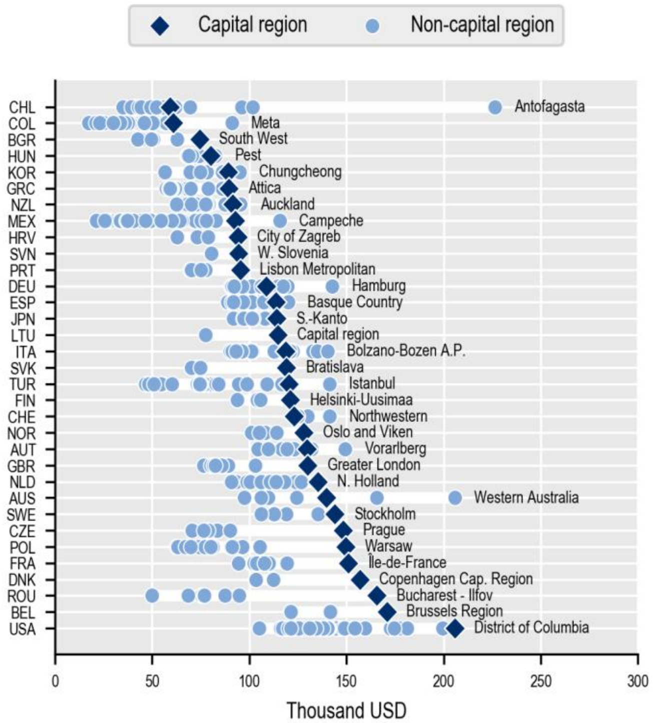


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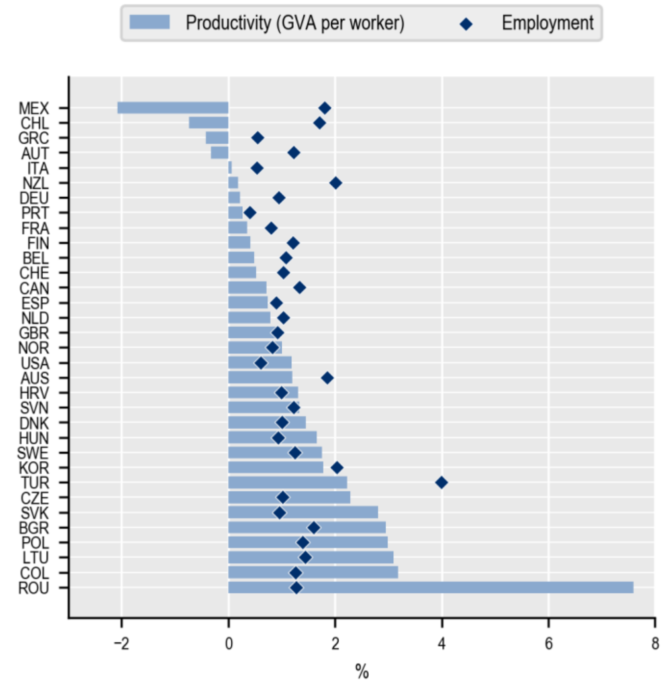
Figure 1.8. GVA per worker growth vs. employment growth in high-productivity large regions, 2002-22



StatLink https://stat.link/65s3a9

Figure 1.9. Trade openness in large regions, 2022

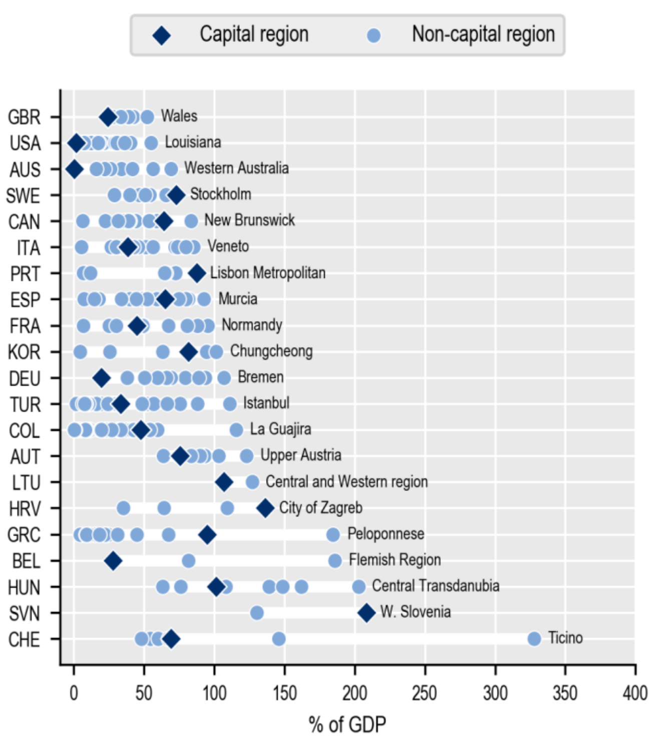


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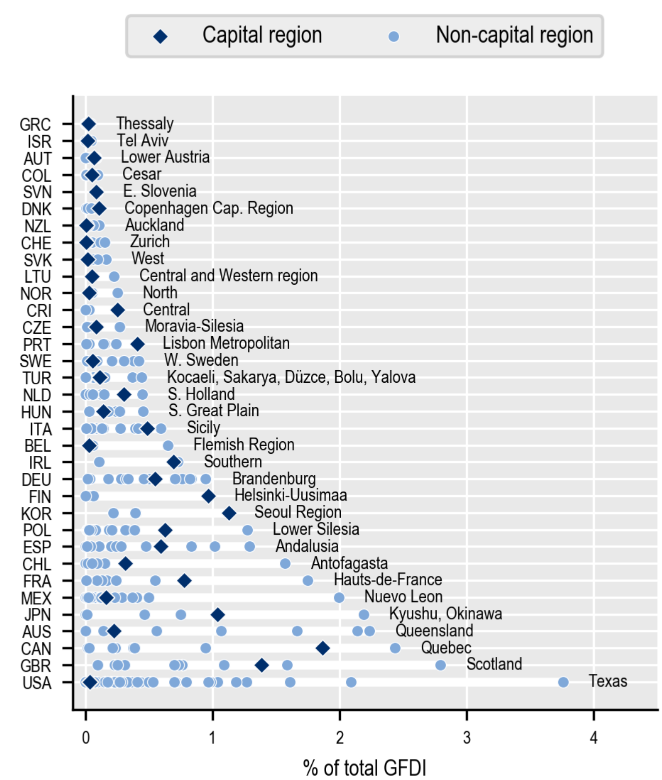
Figure 1.10. GFDI share in large regions, 2023



StatLink https://stat.link/xli29g

Figure 1.11. Patenting rates in FUAs, 2022 – Americas

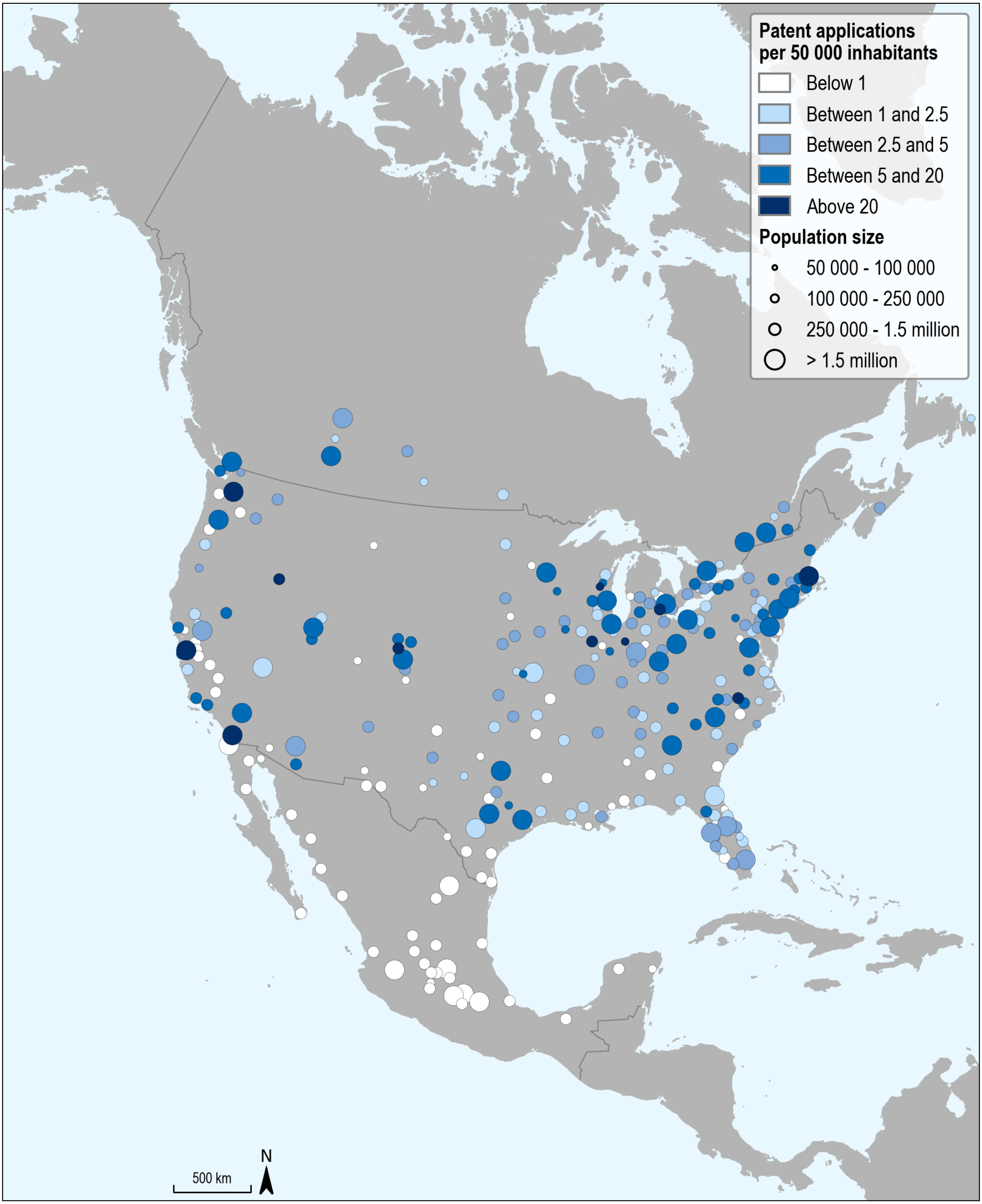


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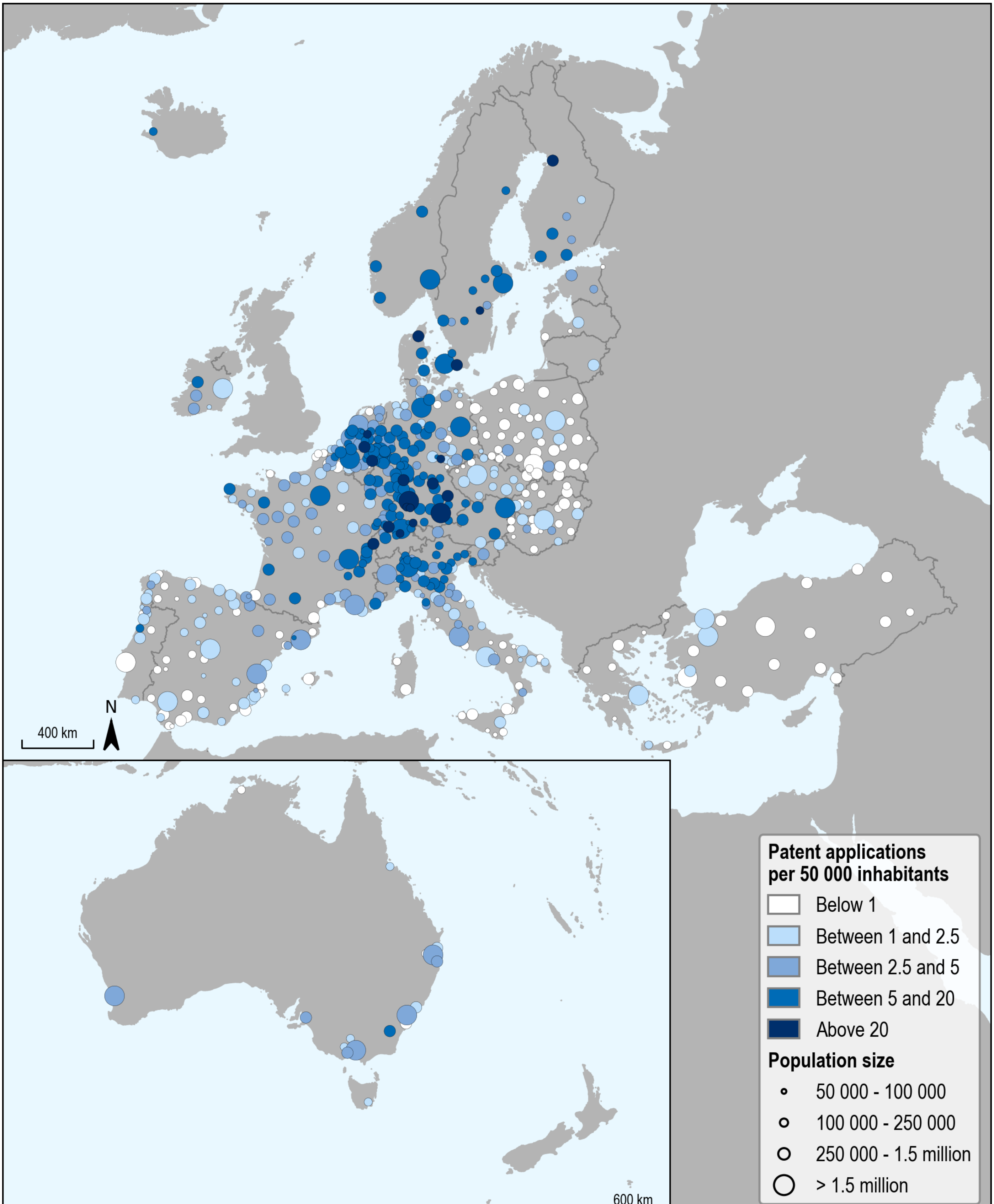
Figure 1.12. Patenting rates in FUAs, 2022 – Europe and Asia-Pacific



StatLink https://stat.link/6m5h7o

Household income gains in regions during high inflation

Within-country differences in real income growth widened in most countries due to inflation and regional GDP per capita and income per capita growth were not necessarily aligned

With inflation at its highest levels in 40 years in most OECD countries in 2022, variations in overall inflation across regions were also higher. In 2019-23, Canada, Italy, Türkiye and the United States had the largest disparities in inflation across regions, with differences above two p.p. per year between the regions with the highest and lowest inflation.

In this context, within-country differences in real income growth widened in most countries in the last five years. The annual growth rate of real income (household income after adjusting for inflation) decreased from 2% to 0.85% in 2019-22 compared to 2014-18, on average, across 171 regions in 10 OECD countries with available data (Figure 1.13). The difference between the regions with the highest and lowest rates increased from 2.6 p.p. on average across 2014-18 to 3.6 p.p. in 2019-22. Only Australia, Korea and Portugal have reduced their regional differences in real income growth rates out of ten OECD countries. In contrast, Canada, Spain and the United States recorded the widest gaps over the past five years, exceeding five p.p.

Real disposable income and GDP growth per capita in regions are not expected to align over the short term. However, comparing the two is informative in terms of whether there are spatial and longitudinal differences in any transmission channels, including mechanisms such as fiscal redistribution and automatic stabilisers during shocks. Between 2019 and 2022, real GDP per capita growth and real household disposable income per capita growth differed by an average of 0.3 p.p. across large regions in 10 countries with available data (Figure 1.14). In all these countries, there were regions where real GDP growth was either higher or lower than income growth. Denmark, Germany and Poland had the smallest gaps, while Australia, Canada and the United States had the largest. This could be due to different levels of fiscal redistribution and/or the presence of regions specialised in the primary sector, where GDP growth was 1.2 p.p. lower than income growth. In contrast to regions specialised in the primary sector, GDP per capita growth in capital city regions was 0.6 p.p. above income per capita growth, on average, across 11 countries with data.

In 2022, gaps between regional types differ when measured with disposable per capita income instead of GDP per capita. This is expected, as income generated from economic activities in one region can flow to businesses or workers located elsewhere in the country or abroad, especially in regions with high levels of multinational corporate or primary sector activities. Moreover, regions with lower GDP per capita may receive government transfers that compensate for GDP per capita gaps. Across 30 countries with available data, GDP per capita in large regions is, on average, 2.04 times the level of disposable income per capita (1.91 excluding Ireland and Türkiye, which show exceptionally large gaps) (Figure 1.15). However, this gap is larger in capital-city regions at 2.29 (or 2.41 when including Ireland and Türkiye). In smaller countries like Belgium, Denmark and Ireland, as well as in the United States, capital-city regions have GDP per capita more than three times higher than disposable income. In contrast, regions focused on the primary sector generally have smaller gaps, except in countries like Australia and Canada where regions specialised in the primary sector show the largest differences.

Similarly, when comparing metropolitan and non-metropolitan regions, disposable income per capita gaps are narrower than GDP per capita. Across 14 countries with available data, the median non-metropolitan region has 76% of the GDP per capita and 92% of metropolitan regions' disposable income per capita level (Figure 1.16). In all countries, the gap is smaller when measured with disposable income, except in Korea. Belgium, Czechia, Norway and Slovenia show differences of 20 p.p. or more between the 2 measures. Ireland has the biggest discrepancy due partly to significant foreign investment. In contrast, Finland, New Zealand and Sweden show the smallest differences.

Definitions

Real disposable income refers to household disposable income (after taxes and transfers) deflated using the regional consumer price index (RCPI) deflator (reference year 2015).

Real GDP per capita refers to nominal GDP per capita deflating using the regional output price index (ROPI) deflator.

Primary sector specialisation uses the Normalised Revealed Comparative Advantage (NRCA) index.

Refer to Annex B for metadata on disposable income and Annex C for RCPI, ROPI and NRCA indices methodologies.

Figure notes

Figures 1.13 and 1.14: 2022 except CAN, DEU, ESP, POL and PRT (2021).

Figure 1.13. Growth of real disposable income in large regions, 2014-18 and 2019-22

Average annual % growth rate

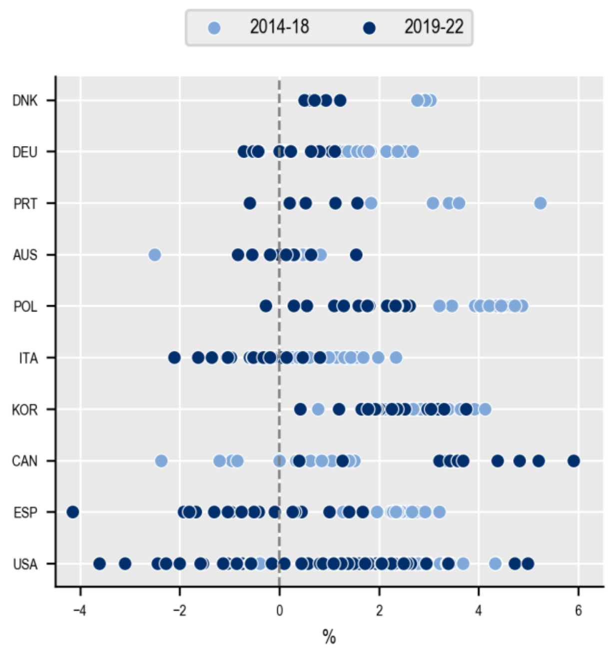


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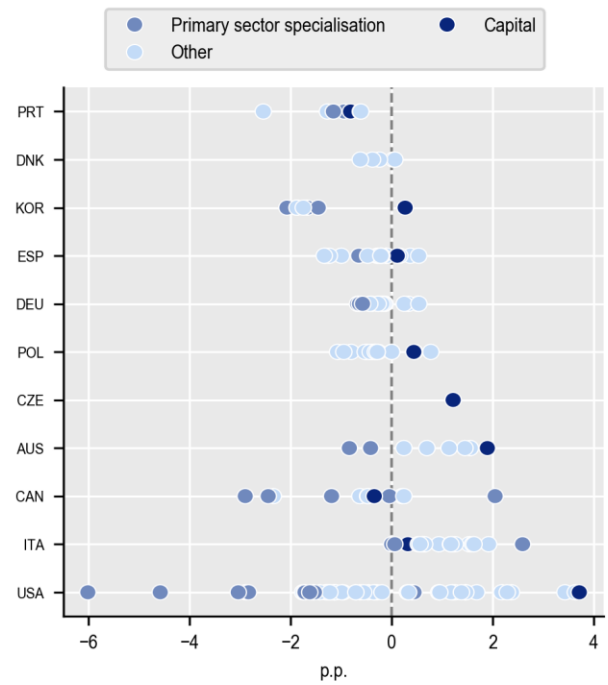
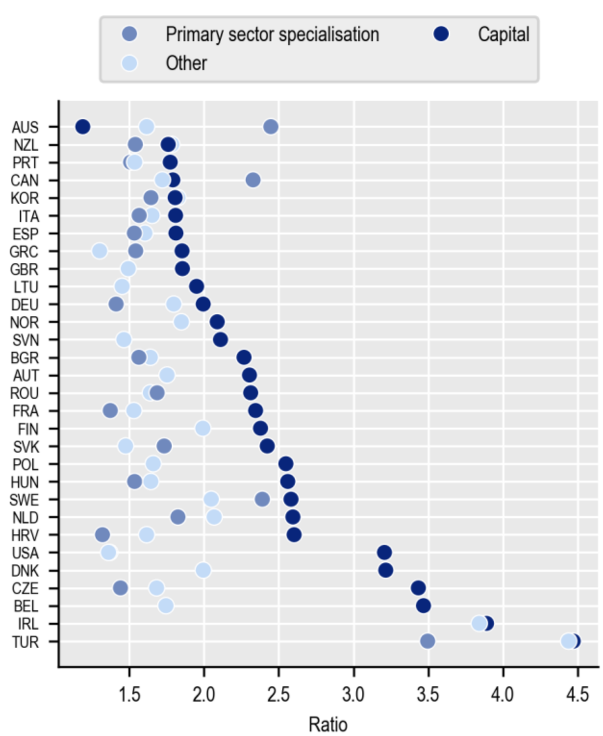
Figure 1.14. Difference in GDP and disposable income per capita growth by country and large region type, 2019-22

Average annual % real growth rate



StatLink https://stat.link/h6dpsl

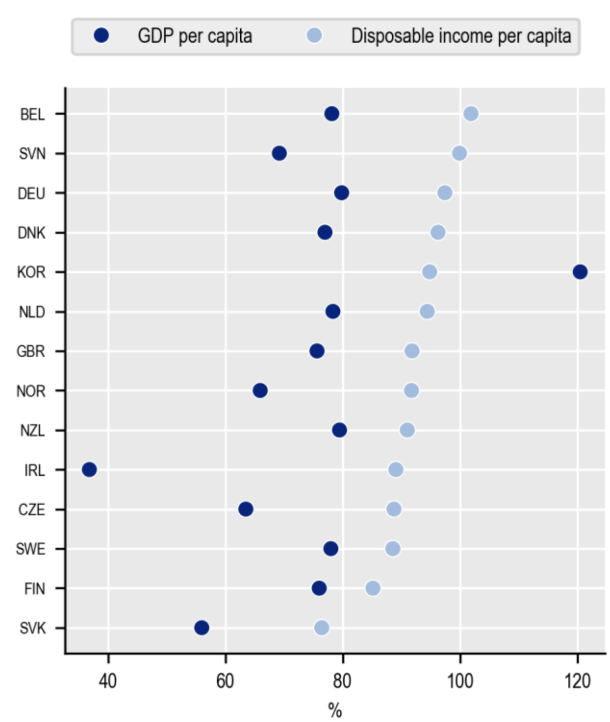
Figure 1.15. GDP over disposable income by country and large region type, 2022



StatLink https://stat.link/u6zyns

Figure 1.16. Non-metropolitan to metropolitan gap in GDP and disposable income per capita, 2022

Metropolitan regions = 100



StatLink https://stat.link/250zjb

Regions and cities navigating the housing crisis

Over the past decade, housing prices have risen in most FUAs, with the biggest increases in large FUAs

Over the past 10 years, large FUAs (with 1.5 million inhabitants or more), where housing supply and available land are limited relative to demand, saw the highest growth in housing prices at nearly 68%, followed by midsize FUAs (between 250 000 and 1.5 million inhabitants) at 50%, small FUAs (between 100 000 and 250 000 inhabitants) at 37% and very small FUAs (with fewer than 100 000 inhabitants) at 16% (Figures 1.20 and 1.21).

The rapid increase in housing prices in large FUAs has further exacerbated disparities in housing markets and added to longstanding pressures related to housing affordability. While, in general, housing prices tend to be higher in cities with larger populations, in practice, the difference remains moderate until the city becomes large. For countries with available data by FUA size, housing prices are 18% higher when going from a very small to a small FUA and are another 18% higher when going from a small to a midsize FUA. However, the gap widens significantly to 46% when comparing large FUAs to midsize ones. Overall, housing prices in large FUAs are now 68% higher than in small FUAs and 86% higher than in very small FUAs, as these disparities have increased by an average of 20 p.p. over the last 5 years. In Hungary, Korea and the United States, where disparities in housing prices between large and very small FUAs are the most pronounced, this gap exceeds 100% (Figure 1.17).

Housing costs – including spending on rents and mortgages, which are influenced by housing prices – represent a significant burden on household finances. On average, households in OECD regions spend nearly one-fifth of their disposable income on housing. In 2022, the average difference in housing costs between the most and least expensive regions within the same country was around ten p.p. This gap is even larger in Colombia, the United Kingdom and the United States (over 15 p.p.). Indeed, in Bogotá in Colombia, Greater London in the United Kingdom and California in the United States, housing costs account for 35%, 27% and 24% of household incomes respectively (Figure 1.18).

Owning a home outright – without a mortgage – can buffer financial or economic shocks that impact housing affordability. Over the past decade, the rate of homeownership outright has been stable across OECD countries (at around 45%). In some capital-city regions like Berlin in Germany, Stockholm in Sweden and Greater London, less than 1 in 4 people owned their homes outright (and less than 55% when considering ownership with a mortgage). Within countries, the difference in homeownership between the regions with the highest and lowest ownership levels is around 20 p.p. on average (for both ownership with and without a mortgage) but, in a few countries, including Austria, Colombia and Germany, this difference can get close to 40 p.p. or more (Figure 1.19).

Definitions

Housing prices refer to the average (or median) price per square metre (m²) of residential dwellings purchases (except for the United Kingdom, where prices consider other observable characteristics of dwellings; and Australia, Ireland, the Netherlands, and the United States, where prices refer to total area).

Home ownership rate refers to the percentage of people who own the home where they live (own outright and with a mortgage).

Housing costs as a percentage of disposable income considers the expenditure of households in housing – such as mortgages and rents – and maintenance of the house – including water, electricity, gas and other fuels, as well as furnishings, household equipment and routine maintenance of the house.

Refer to Annex B for metadata.

Figure notes

Figure 1.17: Number of FUAs in parentheses.

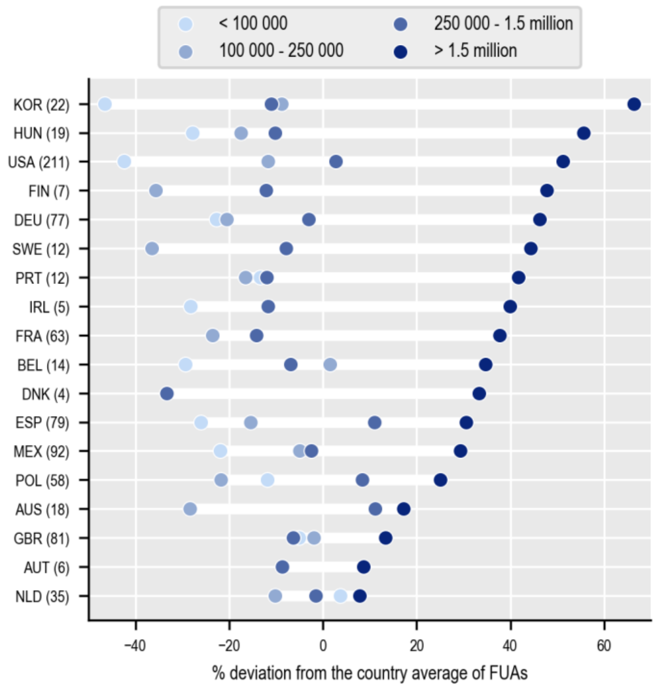
Figure 1.18: 2021 for GBR, ISR, SWE and USA; 2020 for AUT, COL, ITA and LTU; 2019 for CAN, CHE and IRL; 2018 for AUS, ESP and SVK; 2016 for EST. Small regions for EST and LTU.

Figure 1.19: 2021 for GBR, ISR and SWE; 2020 for AUT, COL, ITA, LTU and POL; 2019 for CAN, CHE, DEU and IRL; 2018 for AUS, ESP and SVK; 2016 for EST. Small regions for EST and LTU.

Figures 1.17, 1.20 and 1.21: The latest year 2022 for BEL, ESP, POL and PRT; 2021 for AUT, DEU, IRL and MEX. The initial year is 2014 for FRA; 2015 for AUT and SWE; 2016 for MEX; 2018 for AUS, DEU, DNK, GBR and KOR; 2019 for IRL and PRT.

Figure 1.17. Average price of home purchases by country and FUA size, 2023

Based on small area units (SAU)



StatLink https://stat.link/laq510

Figure 1.18. Expenditure on housing costs as a share of disposable income in large regions, 2022

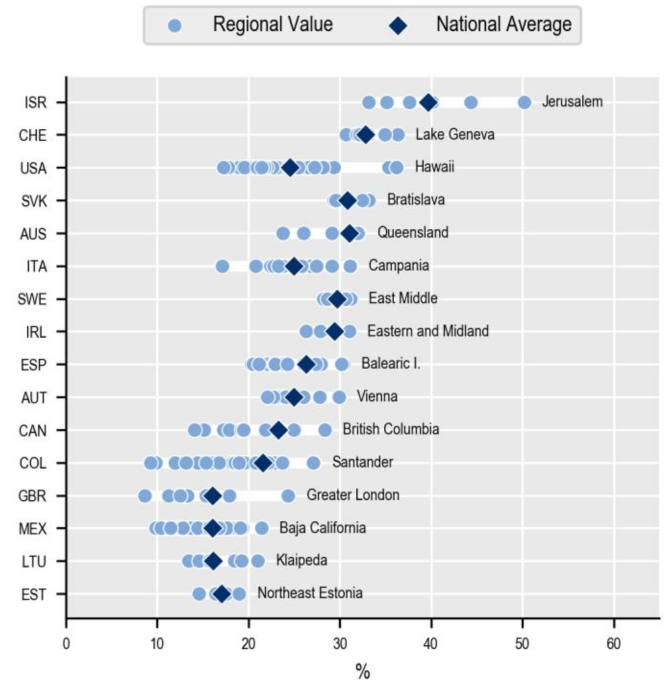


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Figure 1.19. Home ownership in large regions, 2022

Panel A: Share of people owning their home outright (without a mortgage)

Panel B: Share of people owning their home outright and with a mortgage

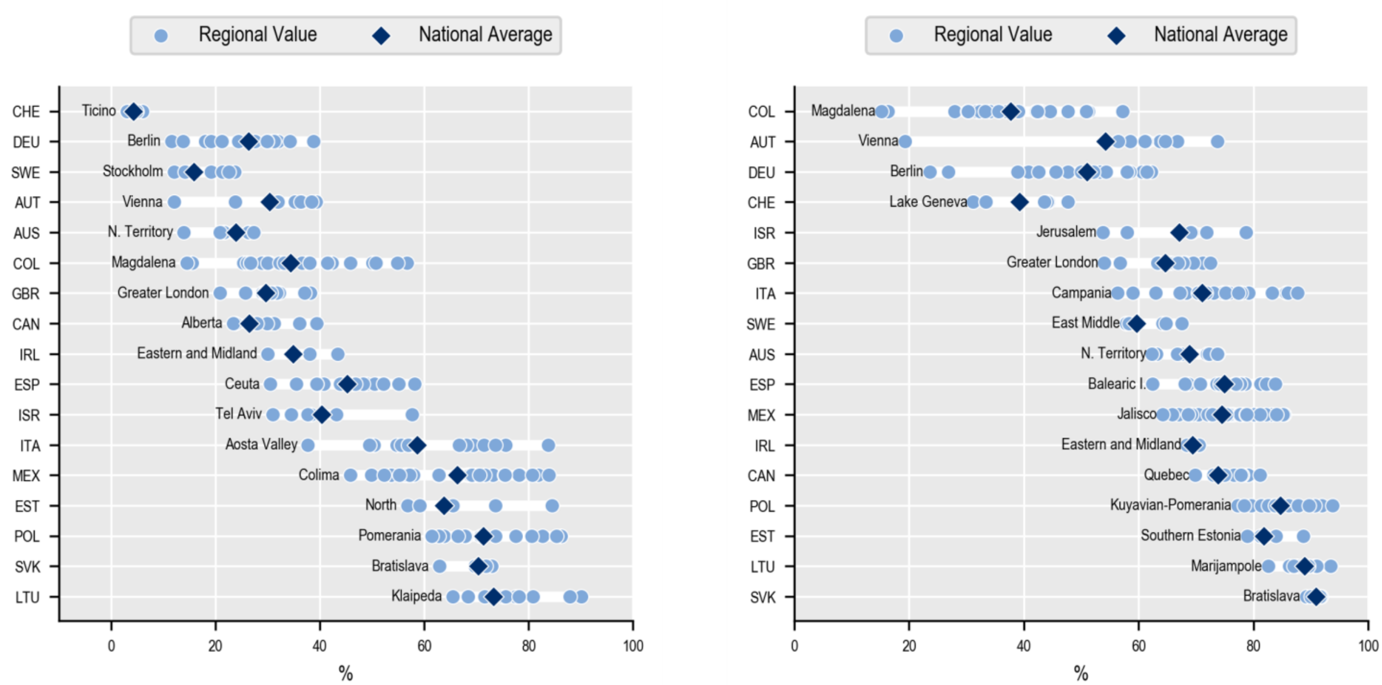

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Figure 1.20. Growth in housing prices in FUAs, 2013-23 – Americas

Average annual % growth rate

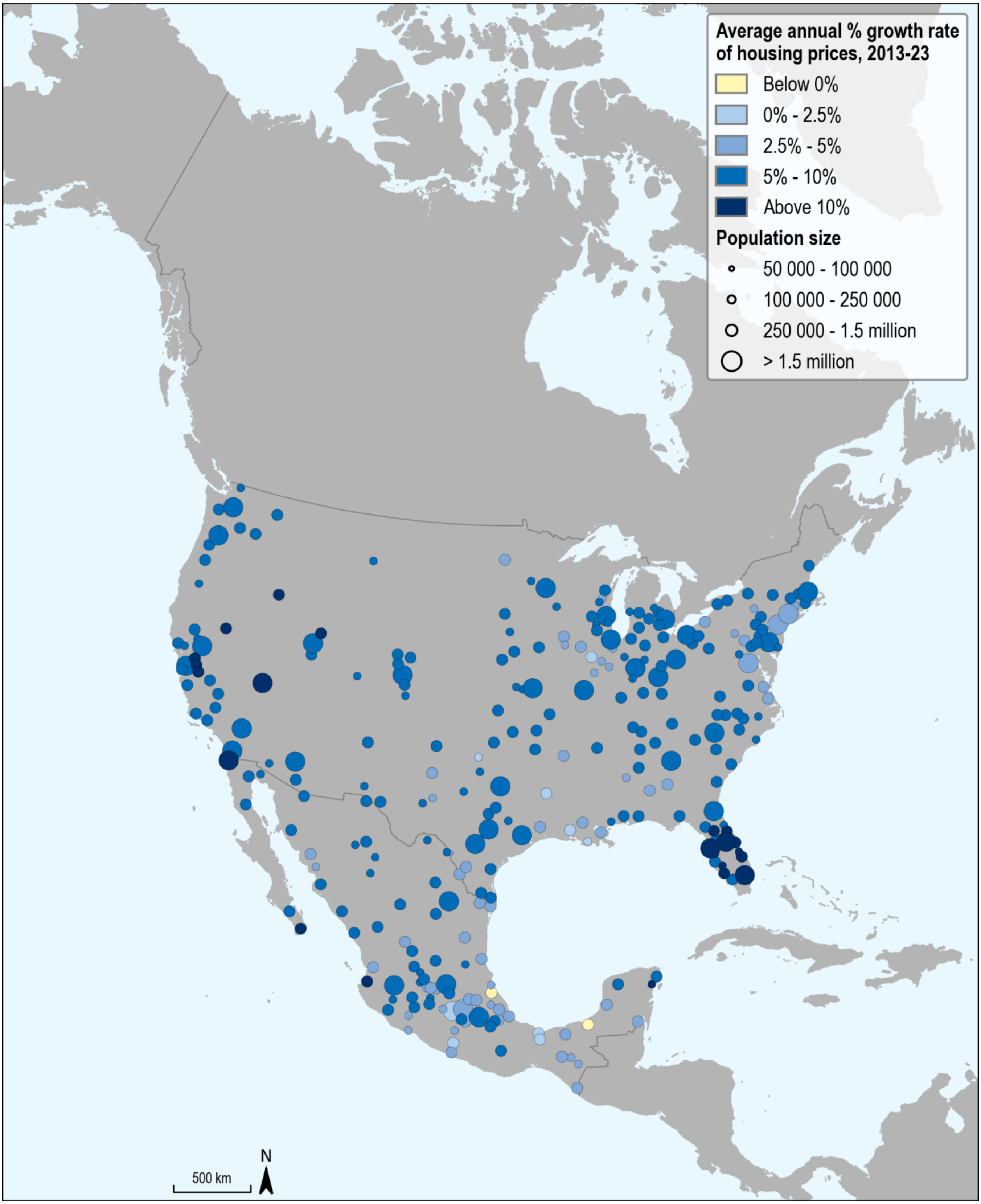

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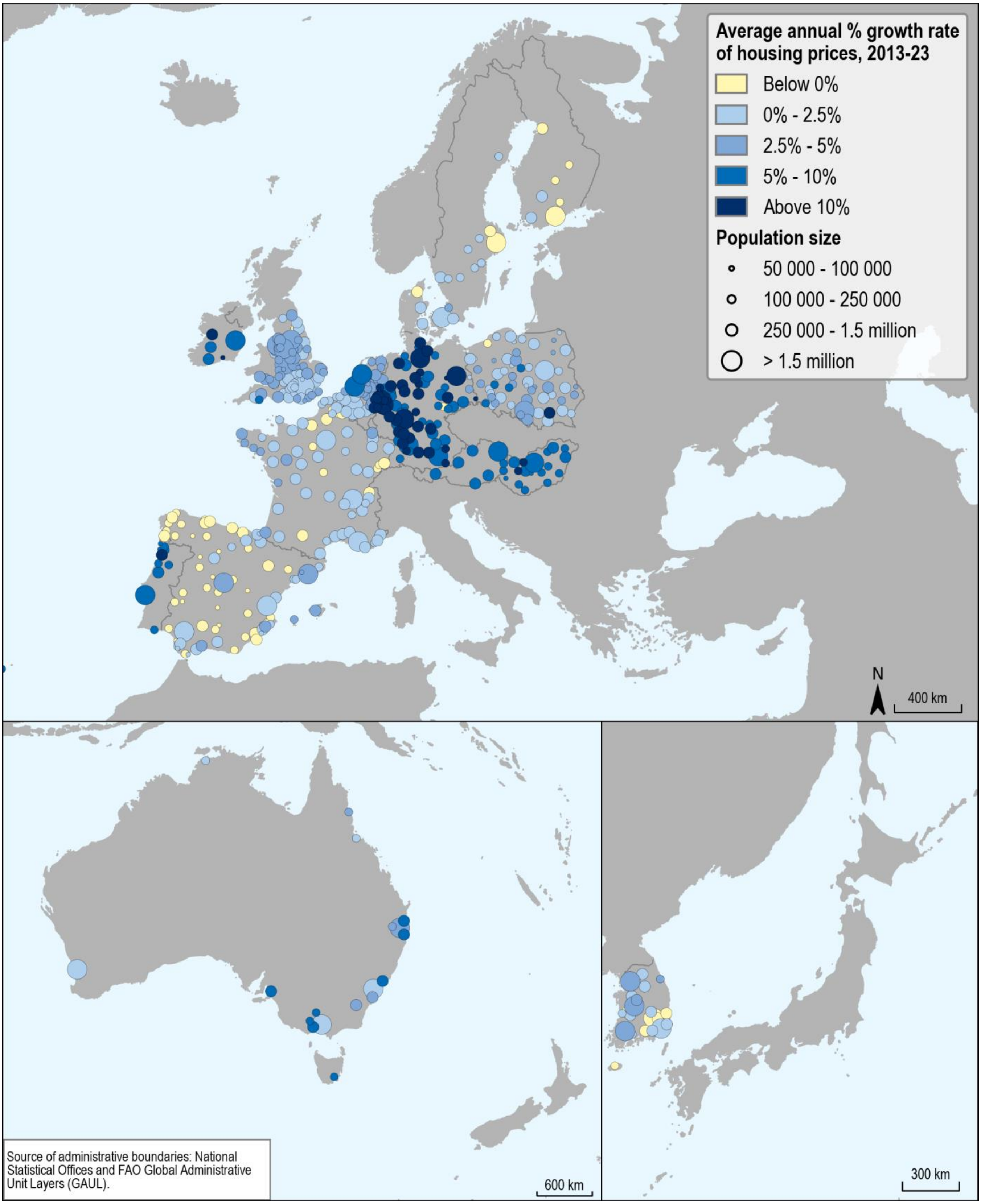
Figure 1.21. Growth in housing prices in FUAs, 2013-23 – Europe and Asia-Pacific

Annual % growth rate



StatLink https://stat.link/ygd0ma

Regions performing under demographic pressure

Demographic change, affecting regions in Asia and Europe more strongly, implies very different transformations within countries

Half of OECD countries are expected to lose population in the coming decades and the old-age to working-age ratio is projected to double over the next four decades (OECD, 2023; 2024). This future is already a reality in many places because demographic change is very uneven within countries. Population decline reduces the labour force and can lower GDP growth in regions and cities due to decreased economic activity. With growing demands on healthcare, pensions and social services, regions, cities and local areas need to prepare to maintain high standards of well-being for all citizens at a new scale (OECD, 2021).

In this context, many OECD large regions, especially in Asia and Europe, have seen their populations stagnate or decline over the last two decades. About 1 in 5 large OECD regions (104 out of 500) lost population, with the most significant declines in Eastern Europe, Germany, Italy, Japan and Korea (Figures 1.24 and 1.25). All regions in Bulgaria, Croatia, Estonia, Latvia and over half of the regions in Greece, Poland and Portugal saw population declines in the past two decades. Almost half (19 out of 40) of OECD member and accession countries with available data had at least 1 region experiencing a population decline. In those countries, population change varied by 89 people per 1 000 per year on average across regions. Japan, Türkiye and the United States had at least 1 region decreasing in population and 1 region growing by at least 200 persons per 1 000 per year in the period. In contrast, most regions in the Americas and Oceania saw their populations expand by as much as 50 people or more per 1 000 per annum. In countries like Hungary, Japan and Romania, capital-city regions grew in population while the rest of the country saw population decline.

The drivers behind population change vary widely across continents and small region types. Between 2001 and 2021, North America and Oceania (Australia and New Zealand) saw faster population growth, especially in metropolitan regions, driven by natural change (births minus deaths) in North America and migration in Oceania (Figure 1.22). In North America, regions far from a midsize/large FUA would have grown as fast as metropolitan regions if they had not experienced negative net migration. In Asia and Europe, population growth was slower, with non-metropolitan regions declining in population due to more deaths than births. Overall, OECD regions experienced moderate population growth, faster in metropolitan regions, thanks to the additional contribution of net migration.

In addition to population losses, many regions are also ageing. In 2023, the old-age dependency ratio – the proportion of people over 64 in the working-age population – varied from 13% in Mexico to 38% in Portugal. Within countries, the average gap between the region with the largest and smallest old-age dependency ratio was 15 p.p., with a maximum of 37 p.p. in France. However, about 1 in 4 (28%) large regions in 27 countries (out of 40 with available data) had 1 old-age person for every 3 working-age individuals (Figure 1.23). In seven regions in Japan, statistically, one person "depends" on the support of only two working individuals (OECD, 2024). In all but three countries (Hungary, Mexico and the Slovak Republic), the old-age dependency ratio is smaller in capital-city regions than the national average. Ageing varies widely within countries: Australia, Canada, France, Japan, Portugal, Spain and Türkiye had gaps in old-age dependency ratios of at least 20 p.p.

Definitions

The **old-age dependency ratio** measures the number of people aged 65 and over relative to the working-age population aged 15-64.

Net migration refers to population change minus natural change (births minus deaths). As such, it may also contain statistical errors in some countries (and be included under natural change).

Further reading

OECD (2024), *Society at a Glance 2024: OECD Social Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/918d8db3-en.

OECD (2023), *OECD Regional Outlook 2023: The Longstanding Geography of Inequalities*, OECD Publishing, Paris, https://doi.org/10.1787/92cd40a0-en.

OECD (2021), *Delivering Quality Education and Health Care to All: Preparing Regions for Demographic Change*, OECD Rural Studies, OECD Publishing, Paris, https://doi.org/10.1787/83025c02-en.

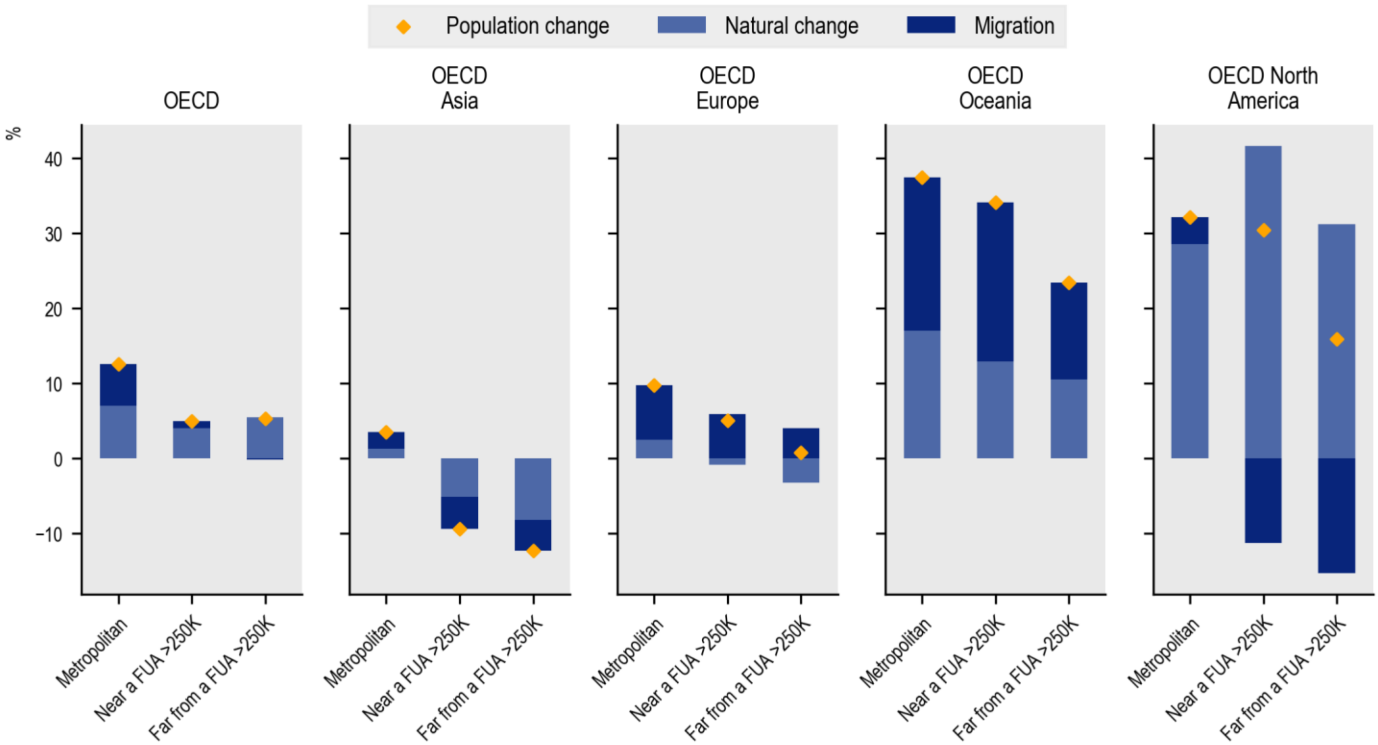
Figure notes

In Figure 1.22: Nine OECD countries are not covered due to data availability for the number of births and deaths: CHL, COL, CRI, DNK, IRL, ISR, SVN, TUR and USA. Data covers 1 January 2001 to 31 December 2020.

Figure 1.23: 448 TL2 regions across 41 countries. 2023, except GBR, JPN, MEX and USA (2022).

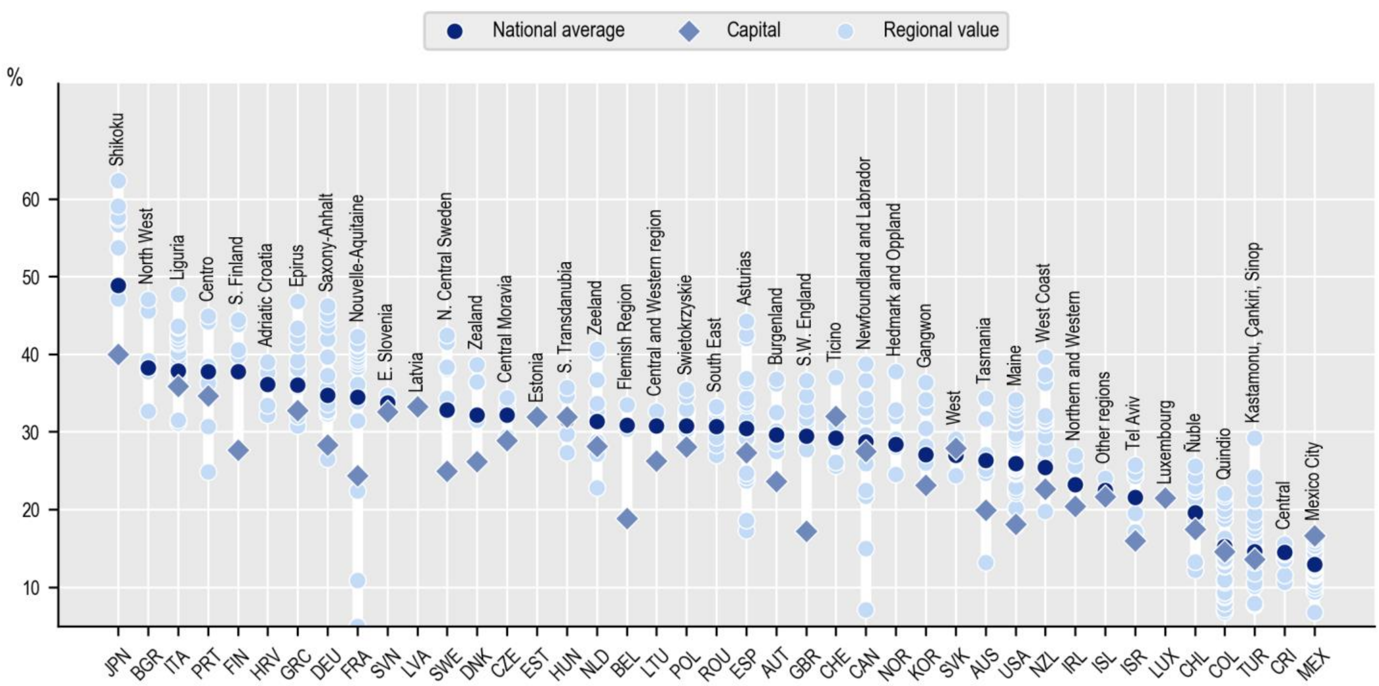
Figures 1.24 and 1.25: 448 TL2 regions across 41 countries. 2003-23, except MEX, GBR and JPN (2003-22).

Figure 1.22. Population changes and components of change by small region type and macro-regions, 2001-21



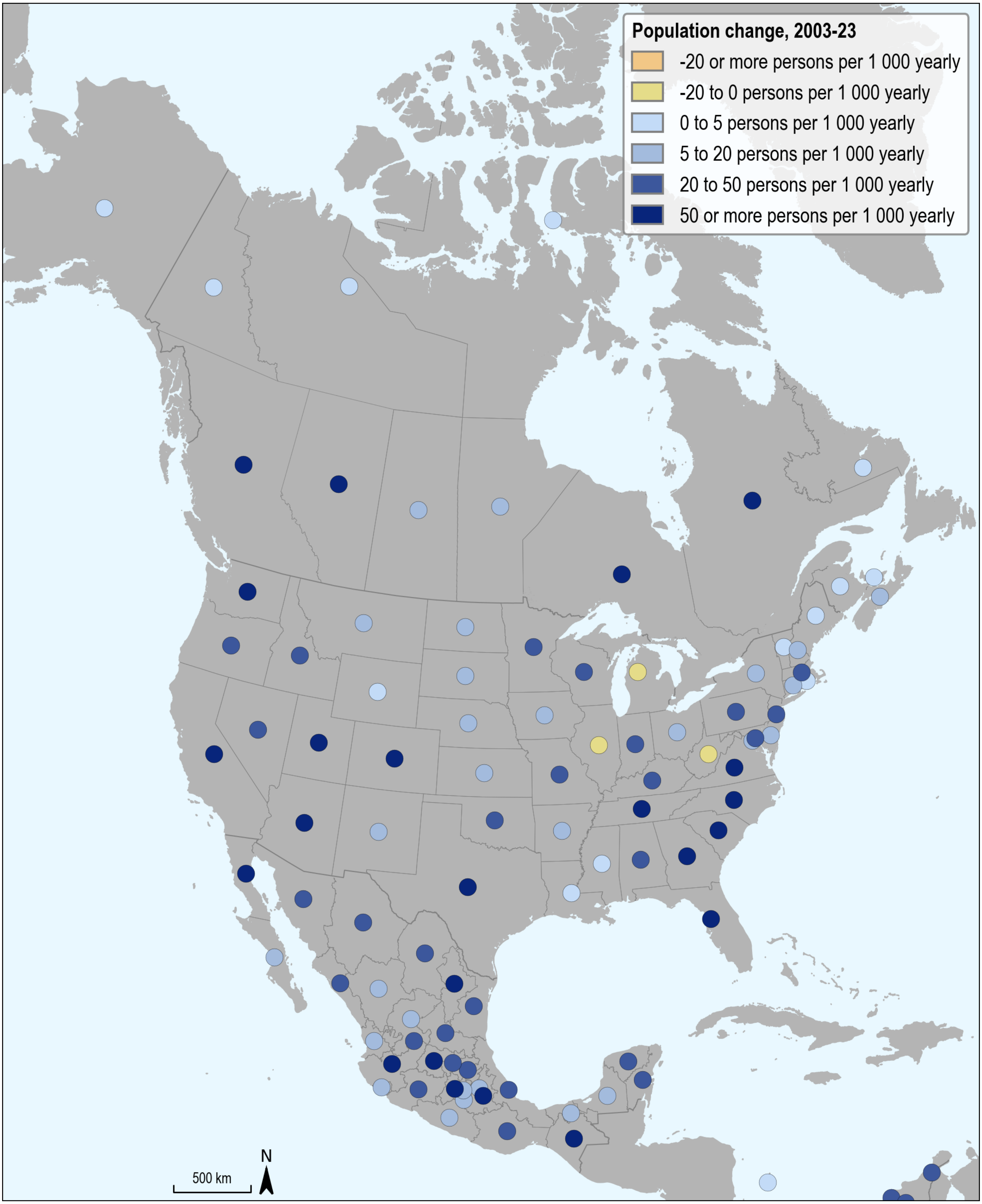
StatLink https://stat.link/1s9fd7

Figure 1.23. Old-age dependency ratio in large regions, 2023



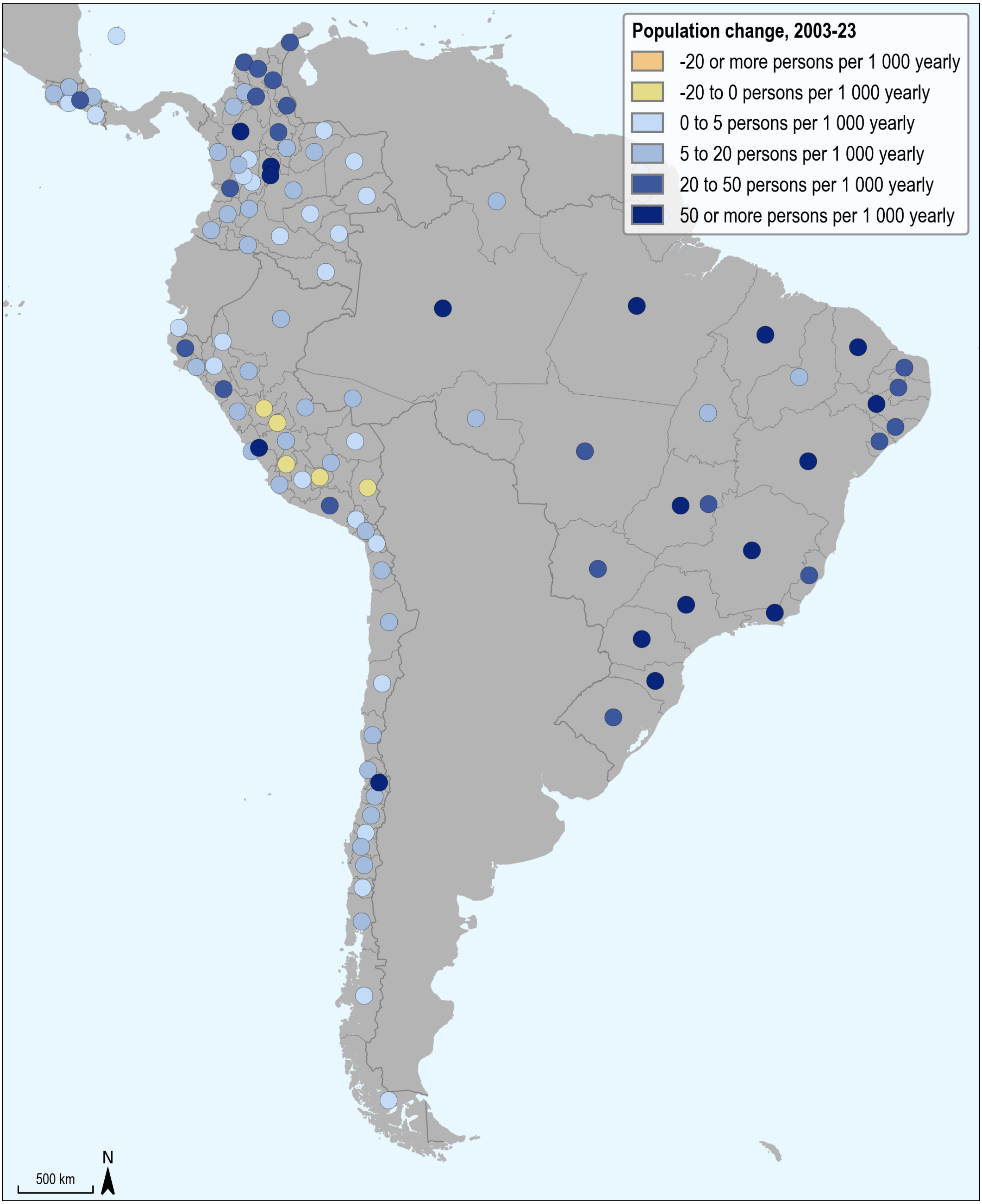
StatLink https://stat.link/g9bvwk

Figure 1.24. Population change in large regions, 2003-23 – North America and Mexico



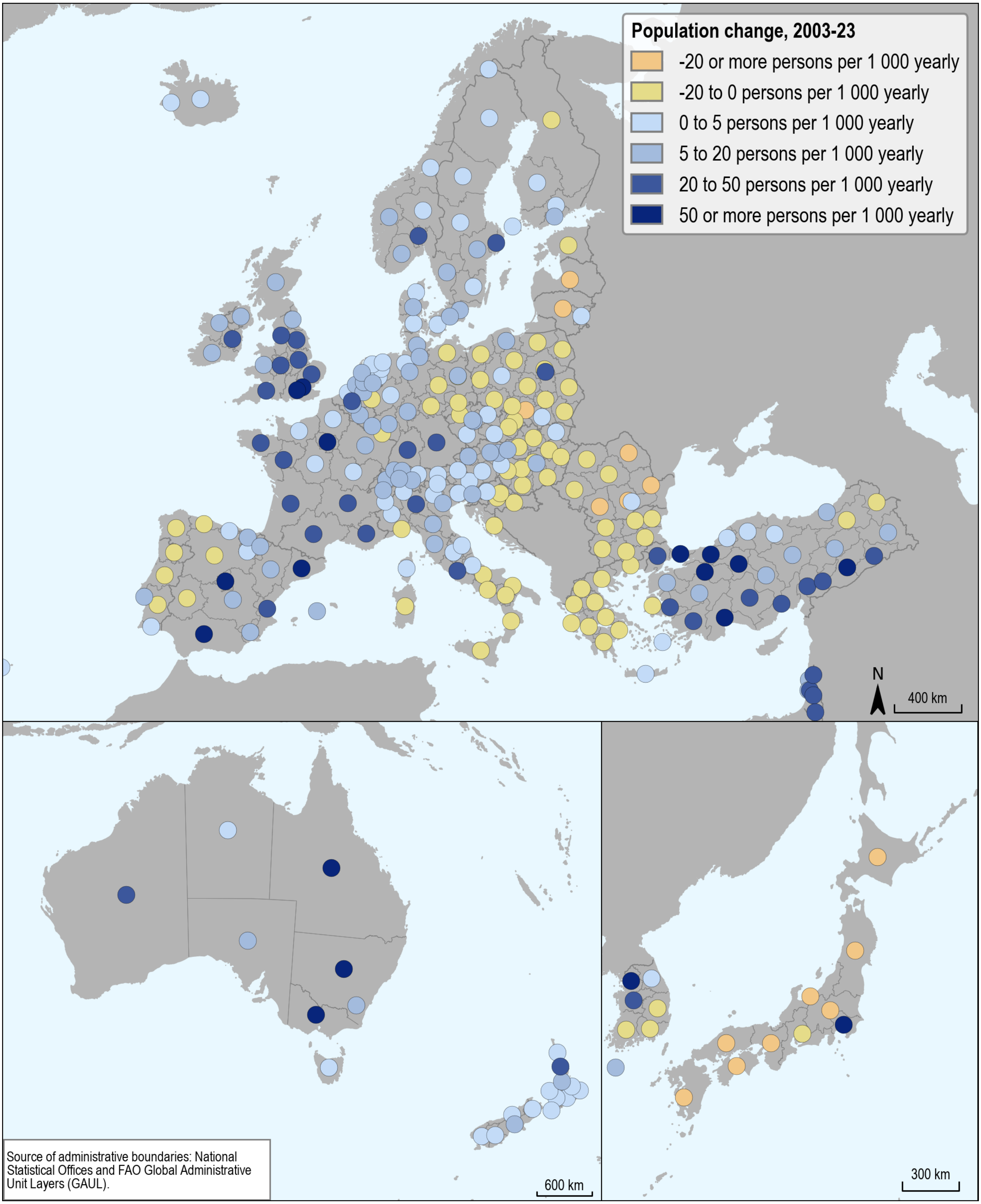
StatLink https://stat.link/58dl0w

Figure 1.25. Population change in large regions, 2003-23 – South America and Costa Rica



StatLink https://stat.link/ghcjmq

Figure 1.26. Population change in large regions, 2003-23 – Europe and Asia-Pacific



StatLink https://stat.link/kvwrj9

2. THE FUTURE OF LABOUR MARKETS

Facing labour and skill shortages in regions, cities and rural areas

Boosting labour force participation of underrepresented groups can alleviate labour market tightness

Employment rates have reached record highs and unemployment rates have reached historic lows across OECD countries (OECD, 2024a). More than half of OECD regions recovered both employment and participation rates relative to pre-Coronavirus disease 2019 (COVID-19) pandemic levels. However, the recovery was more widespread in terms of employment rates and faster and larger in metropolitan regions. Moreover, while the recovery has reduced gender inequalities, labour market inclusion across socio-demographic groups remains an issue. In many regions, labour and skills shortages are emerging and will likely worsen as the working-age population shrinks (OECD, 2024b).

Labour and skill shortages are particularly strong in certain regions, although the labour market tightness (vacancies per unemployed person) has been easing since their post-COVID-19 peak (OECD, 2024b). While developing measures to compare tightness across countries is challenging, within-country comparisons are possible. Regional labour market tightness, relative to the country average, varies widely in OECD countries (Figure 2.1). In 10 of 26 OECD countries with available data, the median regional relative labour market tightness is below the national average (which is normalised to 1). Capital-city regions – as the focus of much of the economic activity of countries – have dynamic labour markets that may be prone to tightness. This could be the case in small countries with a limited internal supply of workers and where international migration is limited. For instance, Prague in Czechia, Budapest in Hungary, Bucharest in Romania and Bratislava in the Slovak Republic all have the highest level of tightness within their countries. Other capital-city regions in larger countries or where international migration is more common, such as Brussels in Belgium, Ile-de-France in France and Oslo in Norway, have the lowest tightness within their countries.

Increasing the labour market participation of underrepresented groups, particularly women, is crucial for addressing labour shortages and offsetting future declines in the workforce. Gender gaps persist, even though male employment has returned to pre-pandemic levels and female employment has surpassed those levels in many regions (Figure 2.2). In 254 out of 302 regions, the female employment rate increased in 2023 relative to 2019. The increase was particularly strong in Greece, Hungary, and Türkiye, where the female employment rate increased, on average, by 10% relative to its pre-pandemic levels. However, the average female employment rate in OECD regions remains around 11 percentage points (p.p.) below the male employment rate in 2023.

Over the next decade, the labour force will shrink in many regions, with new workers unable to fully replace retirees. Half (54%) of metropolitan regions, three-quarters (74%) of regions near a midsize or large functional urban area (FUA) and 6 in 10 (64%) regions far from a midsize or large FUA are expected to see a shrinking labour force. Further reducing these gender gaps is essential for strengthening regional labour markets and tapping the full potential of the female workforce. In the next 10 years, workers entering the labour force (i.e. those who are 15-25 years old today) will not compensate for workers exiting the labour force (i.e. those who are 55-65 years old today) in most regions if everything remains equal. Increasing and keeping female participation levels to those observed for men (from about 68% to 80%) in the next decade could compensate for the reduction in the labour force so that only 13% of metropolitan regions, 24% of regions near midsize or large FUAs and 20% of regions far from a midsize FUA would see a decline in the labour force.

Definitions

The labour market tightness index measures job availability compared to unemployment. It is calculated by dividing the number of job vacancies by the number of unemployed people in a specific region and year. Job vacancy data come from online job postings collected by data platform Lightcast. Unemployment data are taken from labour force surveys and national statistics. For further details on the methodology, see OECD (2024b).

The female employment rate refers to the employment of females as a share of the number of working-age females in regions.

Further reading

OECD (2024a), *OECD Employment Outlook 2024: The Net Zero Transition and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/ac8b3538-en.

OECD (2024b), *Job Creation and Local Economic Development 2024: The Geography of Generative AI*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en.

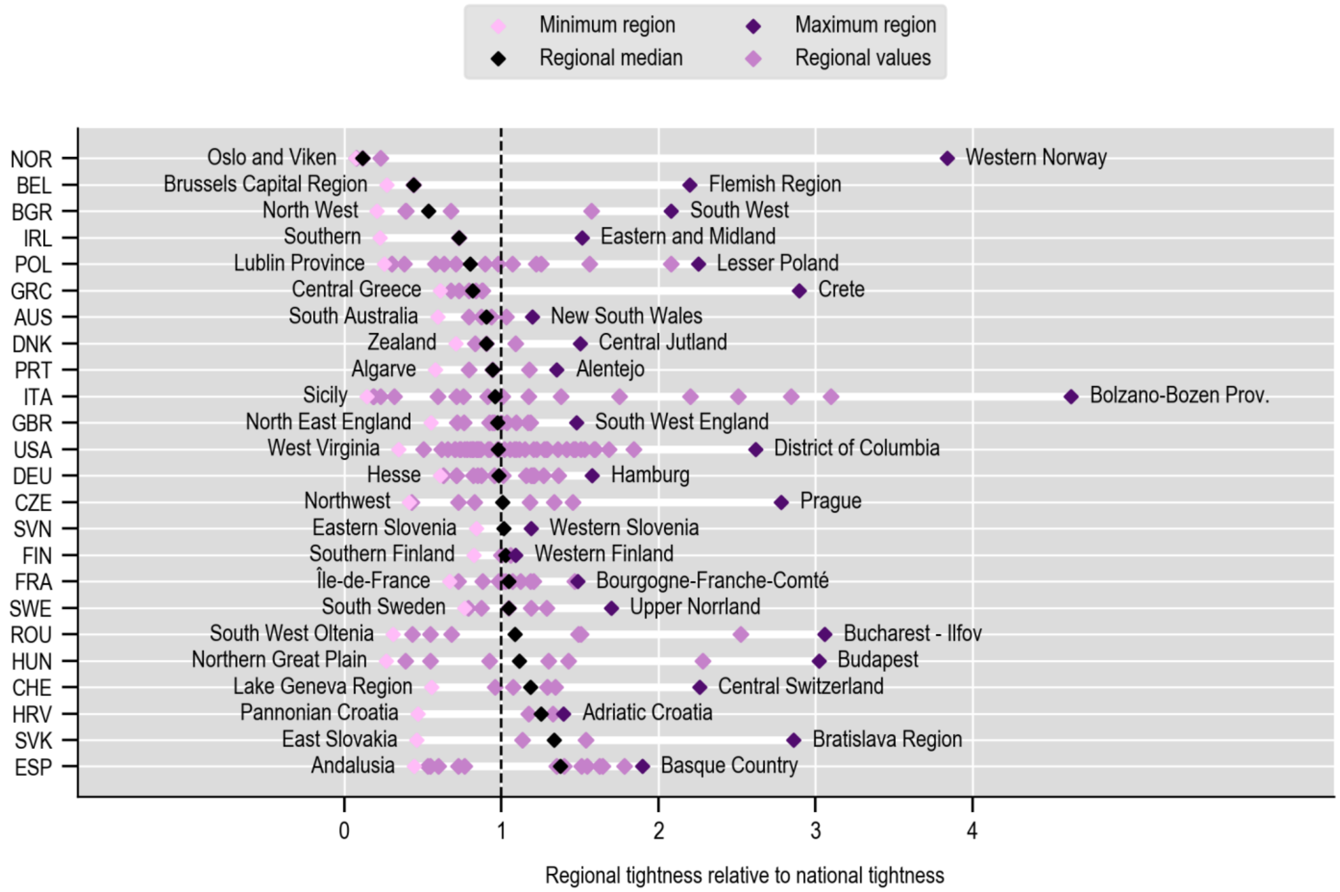
Figure notes

Figure 2.1: OECD elaboration based on the OECD regional database for unemployment data and Lightcast data for vacancies in 2022.

Figure 2.2: OECD elaboration based on the OECD regional database for female employment in 2023 and 2019. 2023 and 2019 data for all countries.

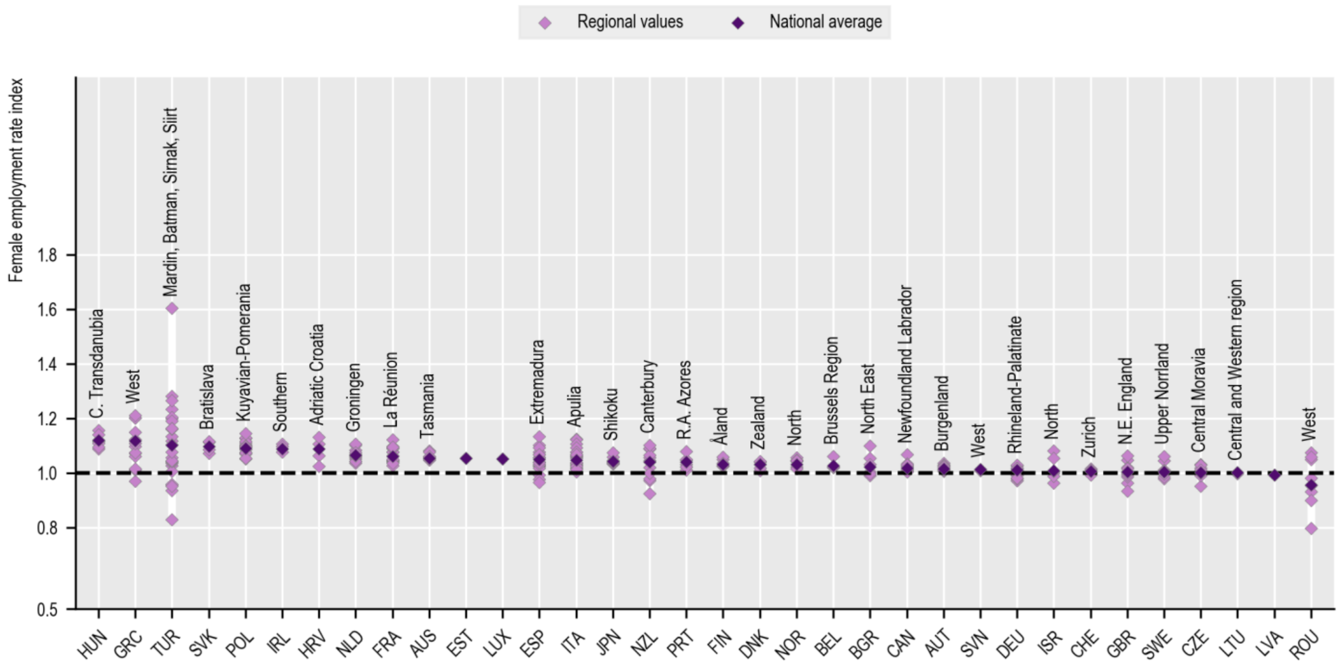
Figure 2.1. Relative labour market tightness in large regions, 2022

Large regions with employment of over 200 000 persons



StatLink https://stat.link/hf59jm

Figure 2.2. Female employment rate in large regions, 2023 relative to 2019



StatLink https://stat.link/vpwzs3

Regional labour markets adapting to the green transition

The green transition is reshaping regional job markets but a shortage of skilled workers could hinder progress

Addressing climate change requires innovative solutions and substantial emissions reductions. As OECD countries aim for net zero greenhouse gas (GHG) emissions by 2050, this transition will affect industries' consumption patterns while reshaping job markets. Jobs in GHG-intensive industries are expected to decline, while low-emission activities will create new roles (OECD, 2023). Existing jobs will also change as tasks become greener. However, a shortage of skilled workers could hinder progress towards a greener economy and this will happen unevenly within countries because the green transition affects job markets differently across regions.

Cities and capital-city regions are leading the green transition with more green-task jobs and fewer polluting ones. Green-task jobs accounted for around 20% of jobs in OECD member countries in 2022, following a broad definition of green-task jobs (including new green jobs, existing jobs transformed by the green transition and those that have seen increased demand due to green activities) (OECD, 2024a). A more conservative definition, which excludes workers not directly involved in green tasks, reduces this share to 18% (OECD, 2023), varying between 8% and 36% across OECD regions, reflecting local industrial structures (Figure 2.3). In capital-city regions, 1 in 4 (25%) workers are employed in occupations including green tasks, compared to less than 1 in 5 (17%) in the rest of the country. In contrast, while 10% of workers in capital-city regions are employed in polluting jobs, 14% are in other regions (Figure 2.4).

Many OECD regions lack workers with the skills needed for green-task jobs. On average, across regions, the number of vacancies per employed person for a given occupation is 44% higher in green-task jobs than in other jobs, indicating higher shortages. However, the extent of these gaps depends on the country. For example, Greece shows the widest gap among the countries with regional data available, with green-task jobs 105% tighter than the regional average across the tightness of other jobs. In contrast, Australia and Finland have the smallest gap (Figure 2.5). In contrast, green-task jobs are less tight in Croatia, Finland, Norway and Sweden compared to the regional average. This difference reflects varying demand for workers with green skills as economies shift towards sustainability.

Definitions

Labour market tightness by occupation measures job availability compared to employment. It is calculated by dividing the number of job vacancies by the number of employed people in a specific occupation, region and year. Growth in occupations, for example, may always show some degree of tightness under this method because the pool of available talent often extends beyond the specific occupation group. As a result, comparing vacancies only to employment within the same occupation can create an upward bias, overstating the actual level of tightness. The job vacancy data come from online job postings collected by Lightcast. Employment data are taken from labour force surveys and national statistics. For further details on the methodology, see OECD (2024b).

Green-task jobs refer to jobs that involve tasks contributing to environmental sustainability. The analysis uses a task-based approach with occupation information to calculate the green intensity of occupations, which measures the proportion of green tasks within them. Occupations are labelled as green if their green intensity exceeds 10%. Regional indicators then aggregate occupation-level data to assess the share of green-task jobs and the green intensity of a region. See OECD (2023) for further information.

Further reading

OECD (2024a), *OECD Employment Outlook 2024: The Net Zero Transition and the Labour Market*, OECD Publishing, Paris, https://doi.org/10.1787/ac8b3538-en.

OECD (2024b), *Job Creation and Local Economic Development 2024: The Geography of Generative AI*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en.

OECD (2023), *Job Creation and Local Economic Development 2023: Bridging the Great Green Divide*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en.

Figure notes

Figures 2.3 and 2.4: The reference year is 2022, except 2021 for POL and SVN.

Figure 2.5: TL2 regions, reference year 2022.

Figure 2.3. Share of green-task jobs in large regions, 2022

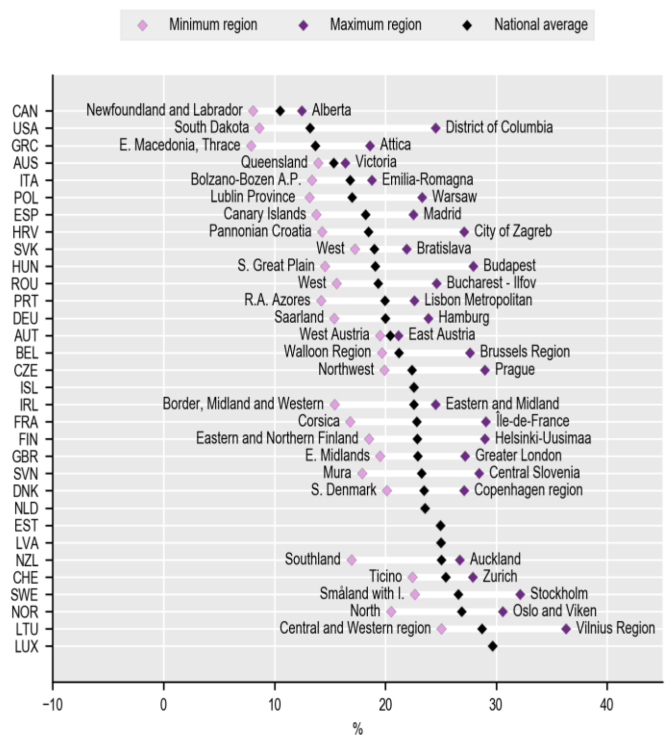


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Figure 2.4. Share of green-task jobs by country and degree of urbanisation, 2022

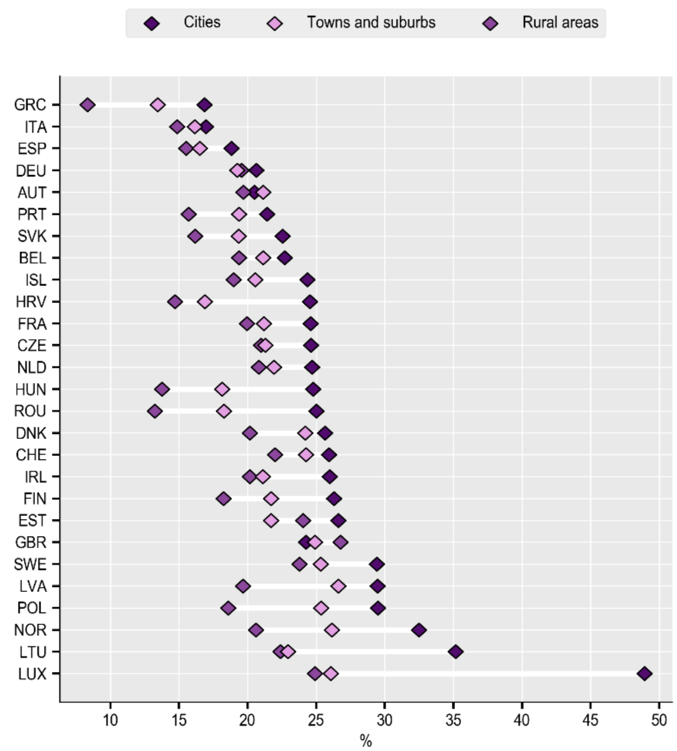

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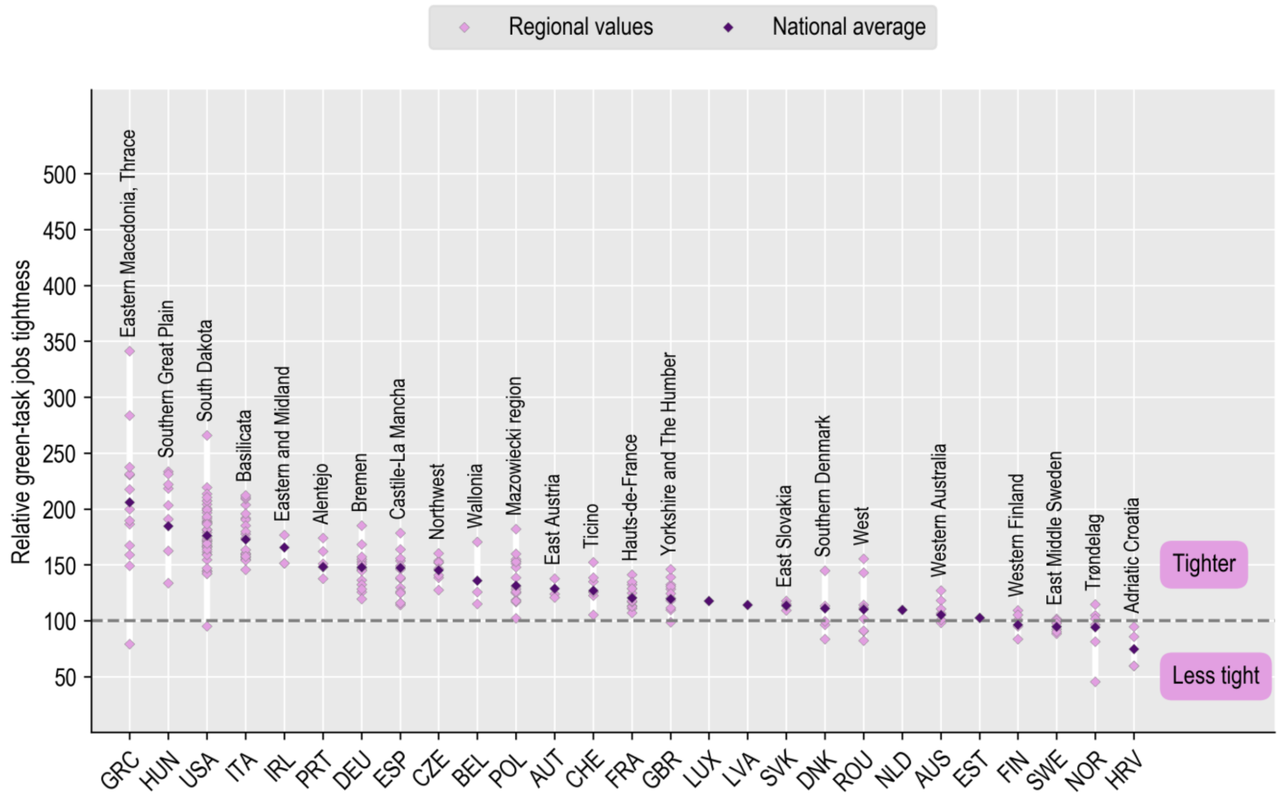
Figure 2.5. Relative labour market tightness of green-task jobs in large regions, 2022

Labour market tightness across all sectors in each region = 100



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Changing nature of skill demands in regional labour markets

AI and automation are shifting skills and deepening regional labour shortages in certain sectors

Shifts in skill demands are changing labour markets in OECD regions. Although employment rates reached historically high levels during the post-COVID-19 recovery, skill shortages hinder economic and productivity growth. While higher-skilled workers increasingly feel the impact of technological change, lower-skilled occupations, with over one-quarter of essential skills replicable by technology, remain the most vulnerable to automation (Lassébie and Quintini, 2022). Changes following technological advancements will have uneven effects across regions, depending on each region's industries and types of workers.

Automation risks – measured by how many skills in each occupation can be automated, considering recent developments in artificial intelligence (AI) and robotics – vary widely across regions within countries. In 2022, the gap between OECD regions facing the highest and lowest risks of automation within a country ranged from around 2 p.p. in Norway to 19 p.p. in Romania. With few exceptions, capital-city regions in OECD countries faced the lowest automation risk, with an average of 7% of employees at risk compared to 13% in other OECD regions (Figure 2.6).

Similarly, in European countries with available data, automation risk is lower for city workers than in towns, semi-dense and rural areas (Figure 2.7). On average, around 4% of city workers in Europe face high risk of automation, compared to 7.5% in towns and semi-dense areas and 9% in rural areas. The difference in automation risk between urban and rural areas is highest in Czechia, Hungary and the Slovak Republic, where the gap exceeds 10 p.p. and the smallest is in Luxembourg and the United Kingdom, where the gaps are less than 2 p.p. Most of these territorial differences are due to educational differences, as cities and capital-city regions have a lower share of lower-educated workers (i.e. without a university degree). However, these measures of the risks of automation do not take into account recent developments in generative artificial intelligence, such as Chat GPT, which are more likely to affect higher-educated workers living in cities (OECD, 2024).

Labour shortages in OECD regions have increased since the COVID-19 pandemic, especially in information and communication technology (ICT) and services. The ICT sector, driven by many factors including technological advancements (e.g. AI, cloud computing) and increased digitalisation across industries, tops the list of occupations suffering from the highest labour tightness, measured as vacancies per employed person, in one in four United States (US) regions and one in three European regions (Figures 2.8 and 2.9). In European regions, after ICT, utilities – which include occupations at all educational levels – and financial activities rank as the sectors with the tightest labour market in 27% and 21% of regions respectively. After finance, in US regions, ICT and utilities are the sectors that face the tightest labour markets in 18% and 16% of regions respectively.

Definitions

Automation risk measures the degree of automatability of skills and abilities in each occupation. See Lassébie and Quintini (2022) for further details on the methodology. Occupations are considered at high risk of automation when they include a large proportion of highly automatable skills.

High risk of automation refers to roles where over 25% of essential skills and abilities can be performed by technology.

Labour market tightness by industry measures job availability compared to employment. It is calculated by dividing the number of job vacancies by the number of employed people in a specific industry, region and year. Growth industries, for example, may always show some degree of tightness under this method because the pool of available talent often extends beyond the specific industry. As a result, comparing vacancies only to employment within the same sector can create an upward bias, overstating the actual level of tightness. Job vacancy data come from online job postings collected by Lightcast. Employment data are taken from labour force surveys and national statistics. For further details on the methodology, see OECD (2024).

Further reading

OECD (2024), *Job Creation and Local Economic Development 2024: The Geography of Generative AI*, OECD Publishing, Paris, https://doi.org/10.1787/21db61c1-en.

Lassébie, J. and G. Quintini (2022), "What skills and abilities can automation technologies replicate and what does it mean for workers?: New evidence", *OECD Social, Employment and Migration Working Papers*, No. 282, OECD Publishing, Paris, https://doi.org/10.1787/646aad77-en.

Figure notes

Figures 2.6 and 2.7: The reference year is 2022, except 2024 for CAN and KOR, 2023 for AUS, COL, CRI, GBR, MEX, NZL and USA.

Figures 2.8 and 2.9: OECD elaboration based on Lightcast; EU Labour Force Survey (EU-LFS), United Kingdom Labour Force Survey (UK-LFS), the U.S. Bureau of Labour Statistics and Australian Bureau of Statistics.

Figure 2.6. Share of workers at high risk of automation in large regions, 2022

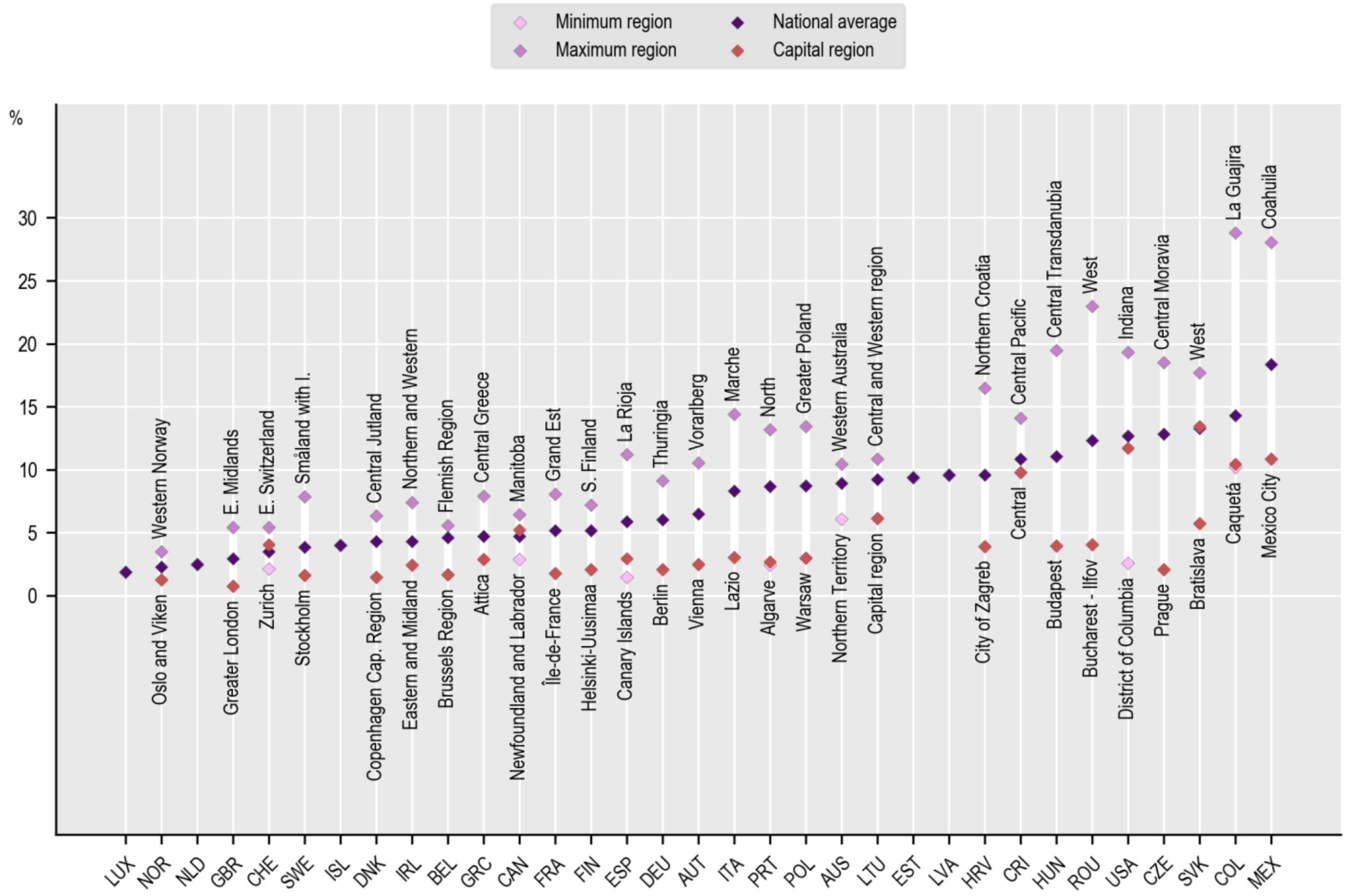

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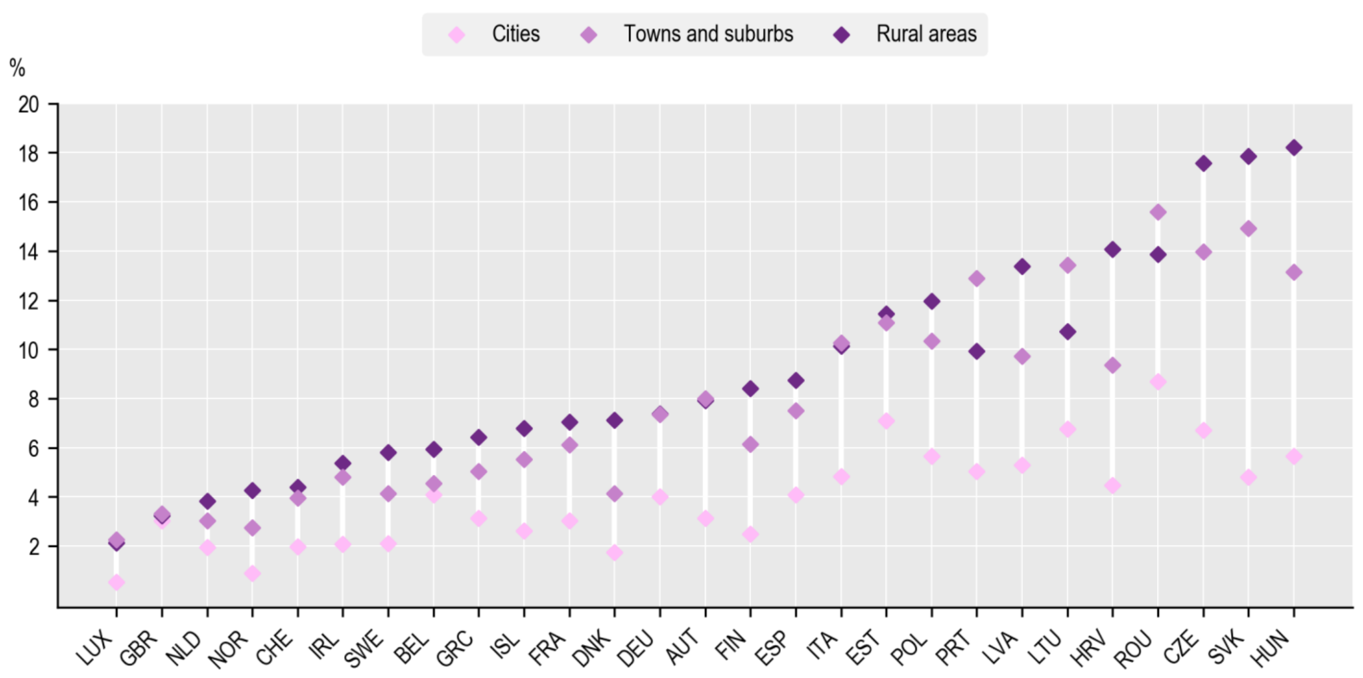
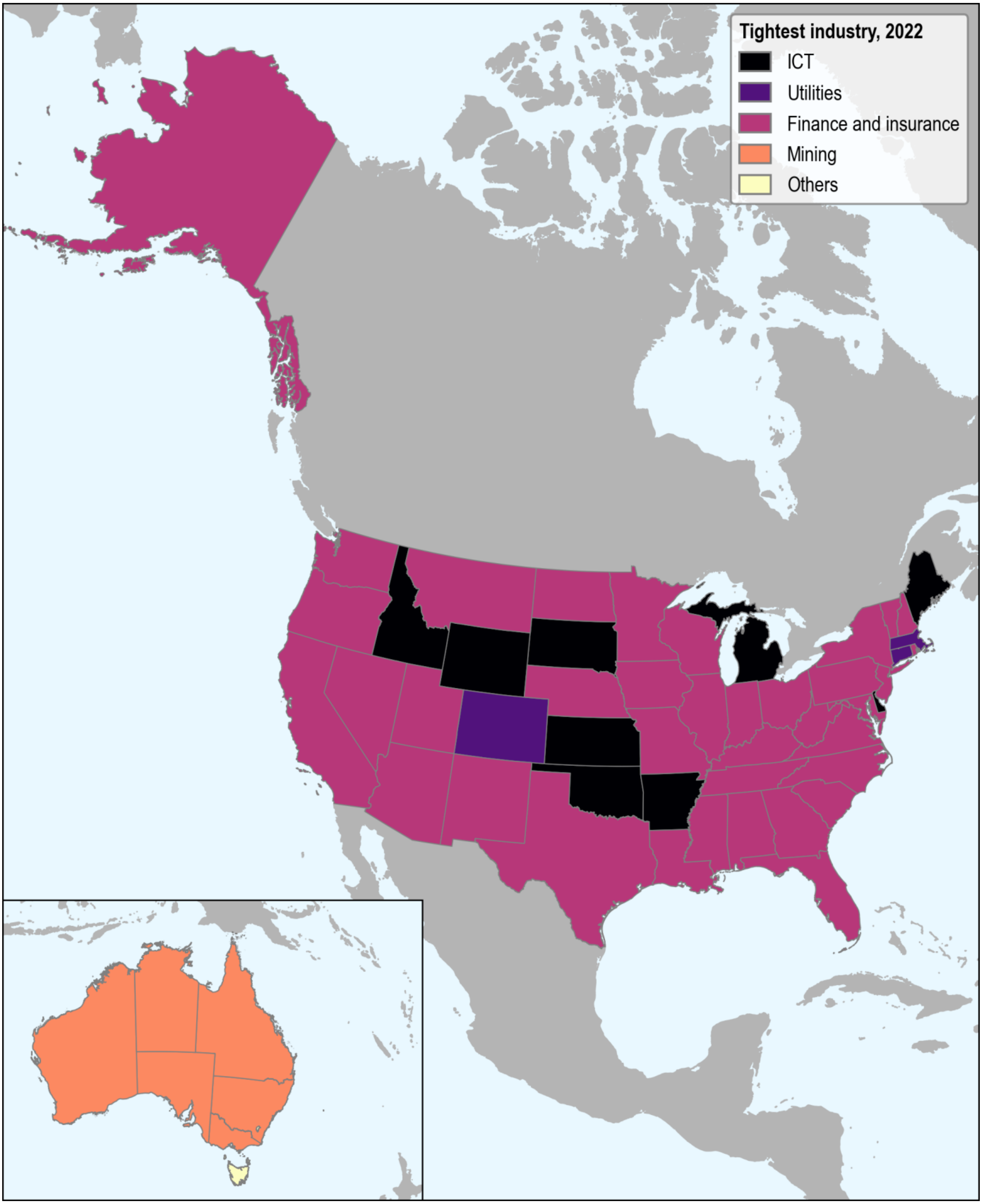
Figure 2.7. Share of workers at high risk of automation by country and degree of urbanisation, 2022



StatLink https://stat.link/oslaev

Figure 2.8. Industries with the highest labour market tightness in large regions – Australia and the United States

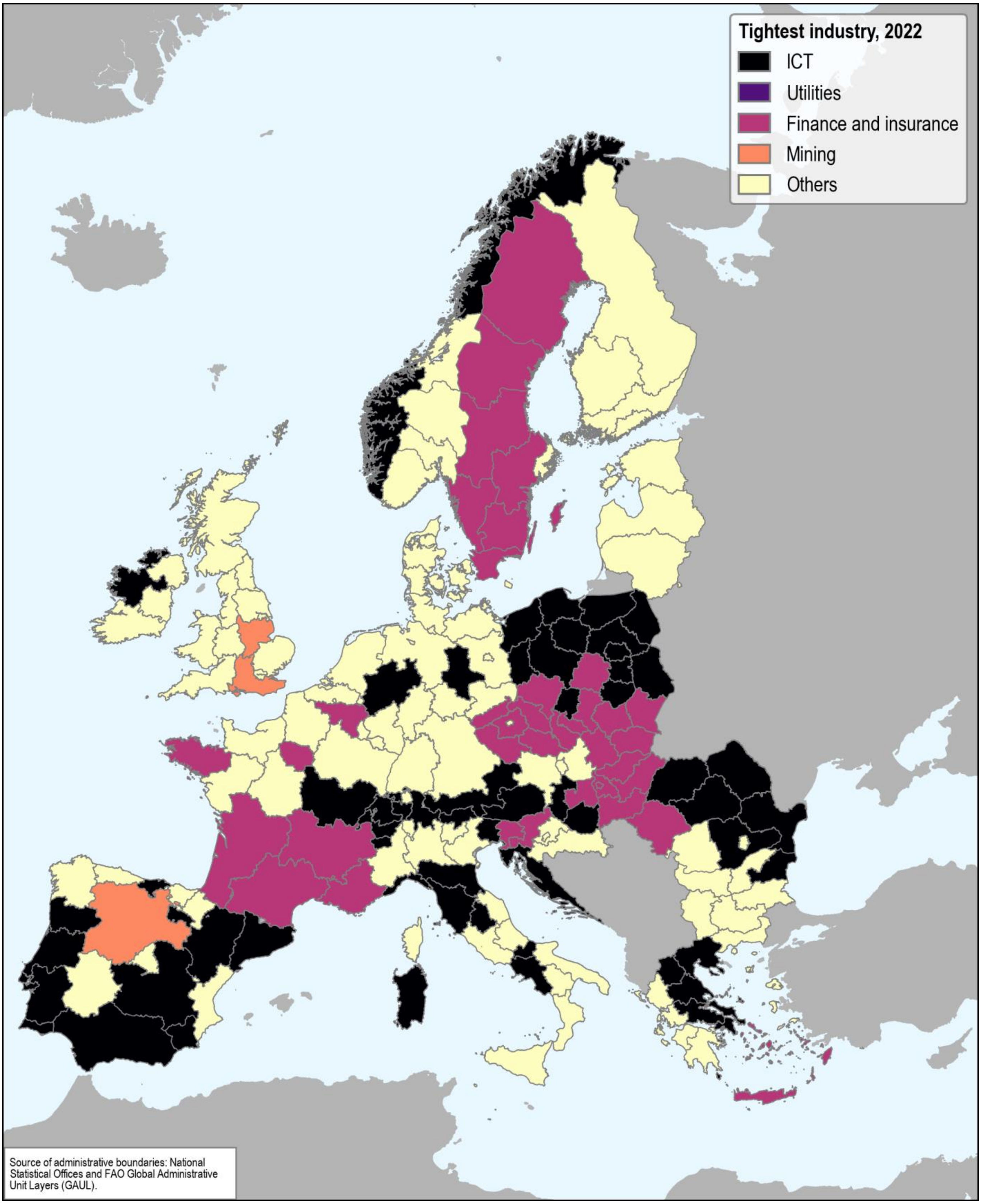
The highest is defined as the top value in each region



StatLink https://stat.link/8phmoa

Figure 2.9. Industries with highest labour market tightness in large regions – Europe

The highest is defined as the top value in each region



StatLink https://stat.link/vryof6

Training the workforce: Higher education in regions

Higher education institutions are crucial for preparing the regional workforce to meet its needs

International evidence shows that people are more likely to attend and complete higher education if they live close to it (OECD, 2022), partly because moving for education is costly. Furthermore, the location of higher education institutions (HEIs) matters because HEIs can contribute to creating knowledge spillovers in their surrounding areas (OECD, 2023).

Higher education opportunities are often concentrated in dense places, as they naturally offer high demand for skills and a large pool of prospective students. HEI students are often more concentrated than the population, especially in capital-city regions. In 2021, the large majority of OECD TL2 regions (391 out of 410) had at least 1 institution offering bachelor's and/or master's degrees. However, the share of enrolment in HEIs was larger than the share of the population in 33% of regions and it was more than double in 21 regions (Figures 2.13 and 2.14). In countries where HEI enrolment is much more concentrated than the population, a significant share of students would have to move locations to attend higher education. On average, population concentration varied by 22 p.p. across countries, while enrolment in HEIs varied by 30 p.p. Enrolment concentration was 1.65 times larger than population concentration in capital city regions, about twice the level for other regions (0.86 times). In 19 out of 31 OECD countries with available data and more than one region, the capital-city region had the highest proportion of HEI students relative to its population share.

Metropolitan regions concentrate most of the higher education enrolment in most OECD countries. In 2021, metropolitan regions hosted 77% – or 7 out of 10 students enrolled in higher education – while regions far from a midsize/large FUA hosted only around 7%. Except for Türkiye – where a regional balancing system distributes higher education students across the country – student enrolment relative to the working-age population in metropolitan regions is above the national average across all countries (Figure 2.10). On average, metropolitan regions have 19 HEI students per 1 000 working-age people, more than the national average across OECD countries. Norway (81 more students), Colombia (56), Slovenia (52) and Austria (45) have the largest gaps between metropolitan regions and the national average. In contrast to metropolitan regions, regions far from midsize/large FUAs have, on average, 20 students per working-age person less than the national average, with the largest gaps in Colombia (74 fewer students), Norway (60) and Austria (43).

Changes in enrolment in higher education reflect changes in the working-age population but not always, due to the movement of students across regions and countries. In 11 out of 25 countries with available data, higher education enrolment increased as the working-age population grew between 2011 and 2021 (Figure 2.12). In 9 out of these 11 countries (except Norway and Switzerland), the yearly increase in working-age population per 1 000 inhabitants was higher than the increase in yearly enrolment per 1 000 inhabitants in metropolitan regions. Enrolment expanded in 6 countries (4 Southern European countries, Finland and France) even as the working-age population declined. This was also the case in metropolitan regions. Lastly, 8 OECD countries, all Eastern European, experienced a decline in both enrolment and the working-age population. In all countries except Hungary, enrolment per 1 000 inhabitants dropped faster every year than the working-age population per 1 000 inhabitants in metropolitan regions. The most striking case is Poland, where metropolitan regions lost 100 working-age people and 49 HEI students per 1 000 people every year in the past decade.

Science, technology, engineering, and mathematics (STEM) education, crucial for digital and green transitions, is mostly concentrated in metropolitan regions and is still largely pursued by men. Except in Greece and Finland, STEM enrolment in metropolitan regions is above the national average across all countries. Metropolitan regions have 17 STEM students per 1 000 working-age people. This number is much lower in non-metropolitan regions, at about 8 per 1 000 people. In addition to a geographical gap, there is also a large gender gap in STEM enrolment. Regions with a higher share of STEM enrolment tend to have fewer women among their students (Figure 2.11).

Definitions

Higher education institutions (HEIs) are defined as entities that are recognised as distinct organisations, nationally recognised as HEIs and whose major activity is providing education at the tertiary level (International Standard Classification of Education [ISCED] 2011 Level 5, 6, 7 and/or 8). Only ISCED 5 to 7 are considered to maximise cross-country comparability for enrolment counts. Due to data limitations, the geographical location of HEIs does not necessarily reflect the location of all campuses in each institution.

Concentration is defined as the share in the region in the national total.

STEM degrees refer to science, technology, engineering and mathematics academic programmes. These programmes focus on biology, chemistry, physics, computer science, information technology, engineering disciplines, mathematics and related fields.

The working-age population refer to individuals aged 15 to 64 years old.

Further reading

OECD (2023), *The Geography of Higher Education in Québec, Canada*, OECD Skills Studies, OECD Publishing, Paris, https://doi.org/10.1787/becf3c60-en.

OECD (2022), *Resourcing Higher Education in Portugal, Higher Education, OECD Publishing, Paris*, https://doi.org/10.1787/a91a175e-en.

Figure notes

All figures: The last available year is 2021, except for 2019 for AUS and CAN; 2020 for COL, KOR, MEX, and USA; from 2014 to 2021 for SVN.

Figure 2.10. HEI enrolment concentration by small region type, 2021

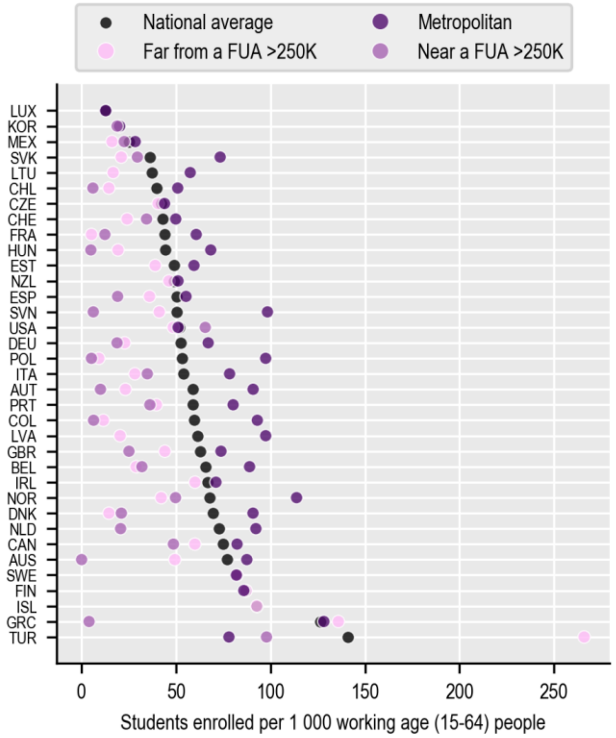


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Figure 2.11. Share of STEM enrolment vs. share of women in HEI enrolment in small regions, 2021

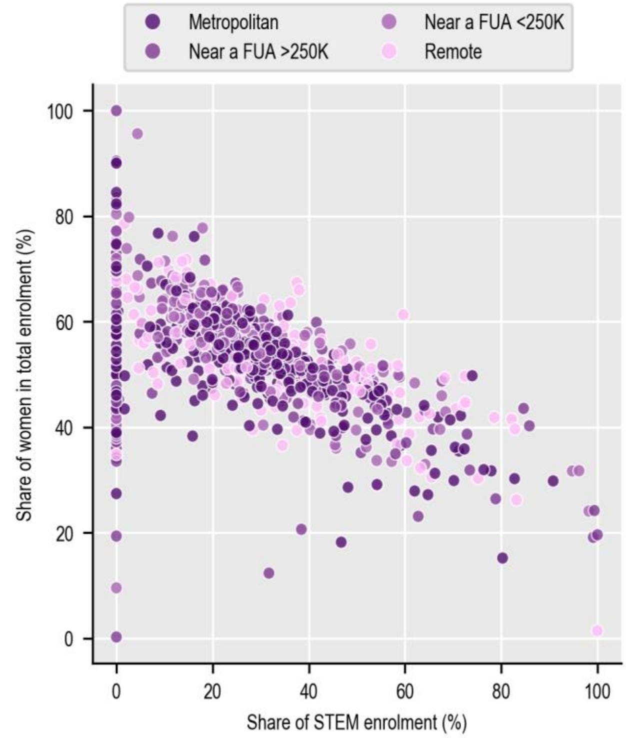

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Figure 2.12. Change in HEI enrolment and working-age population by country and small region type, 2011-21

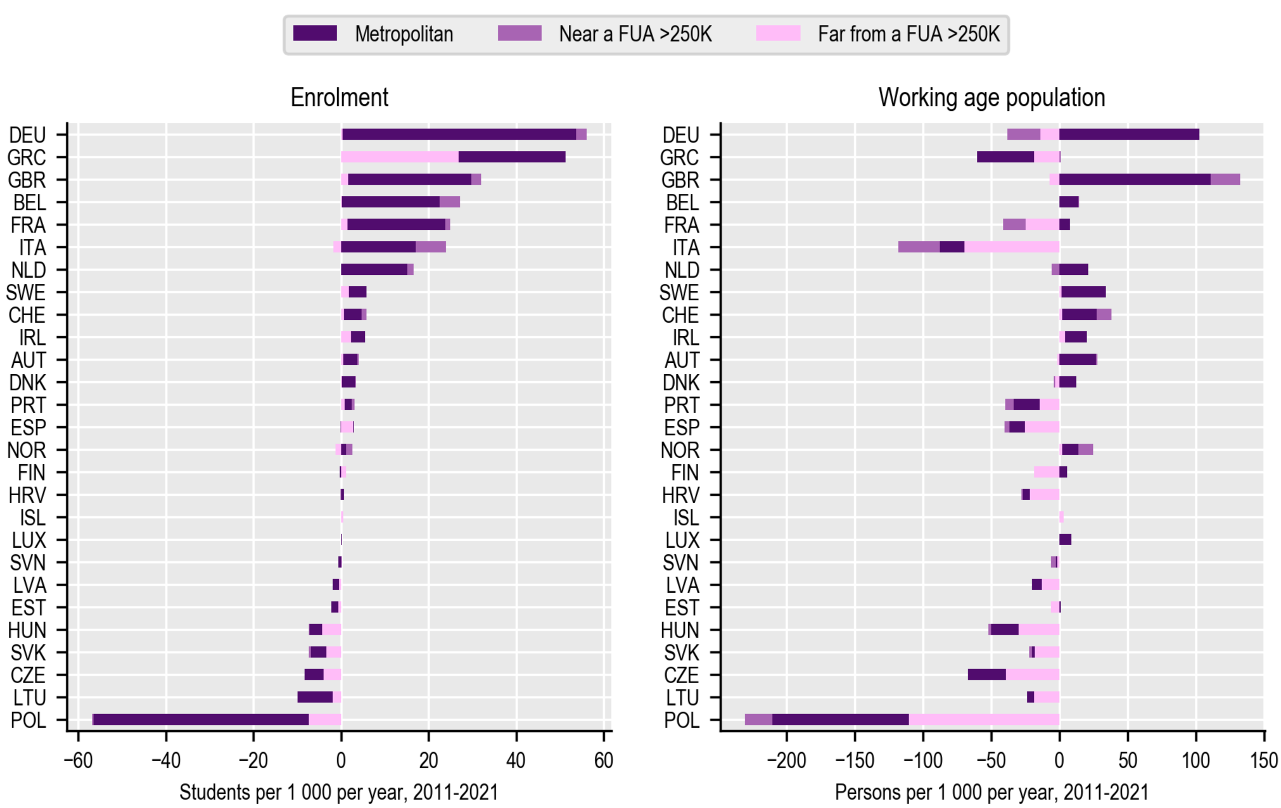

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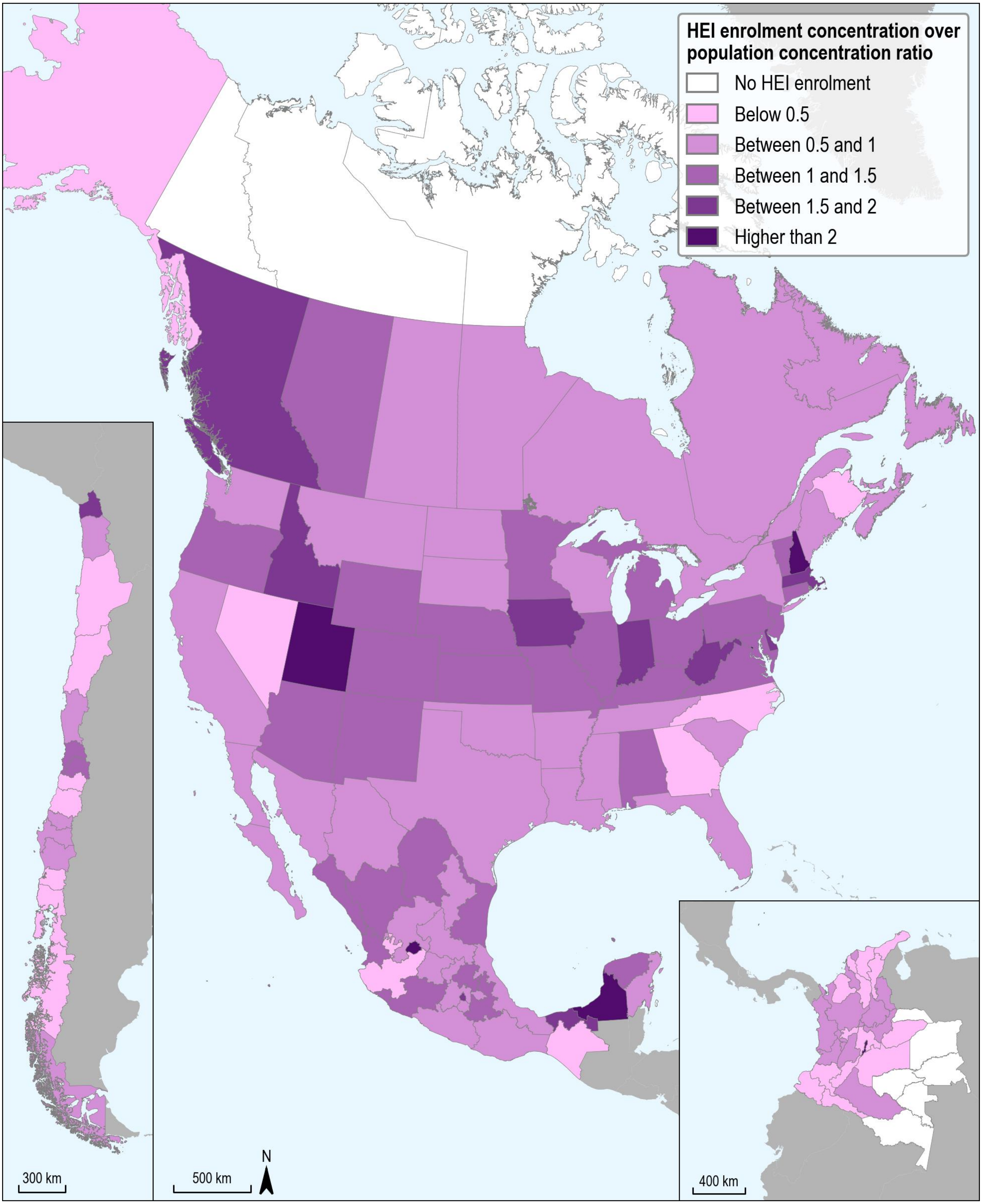
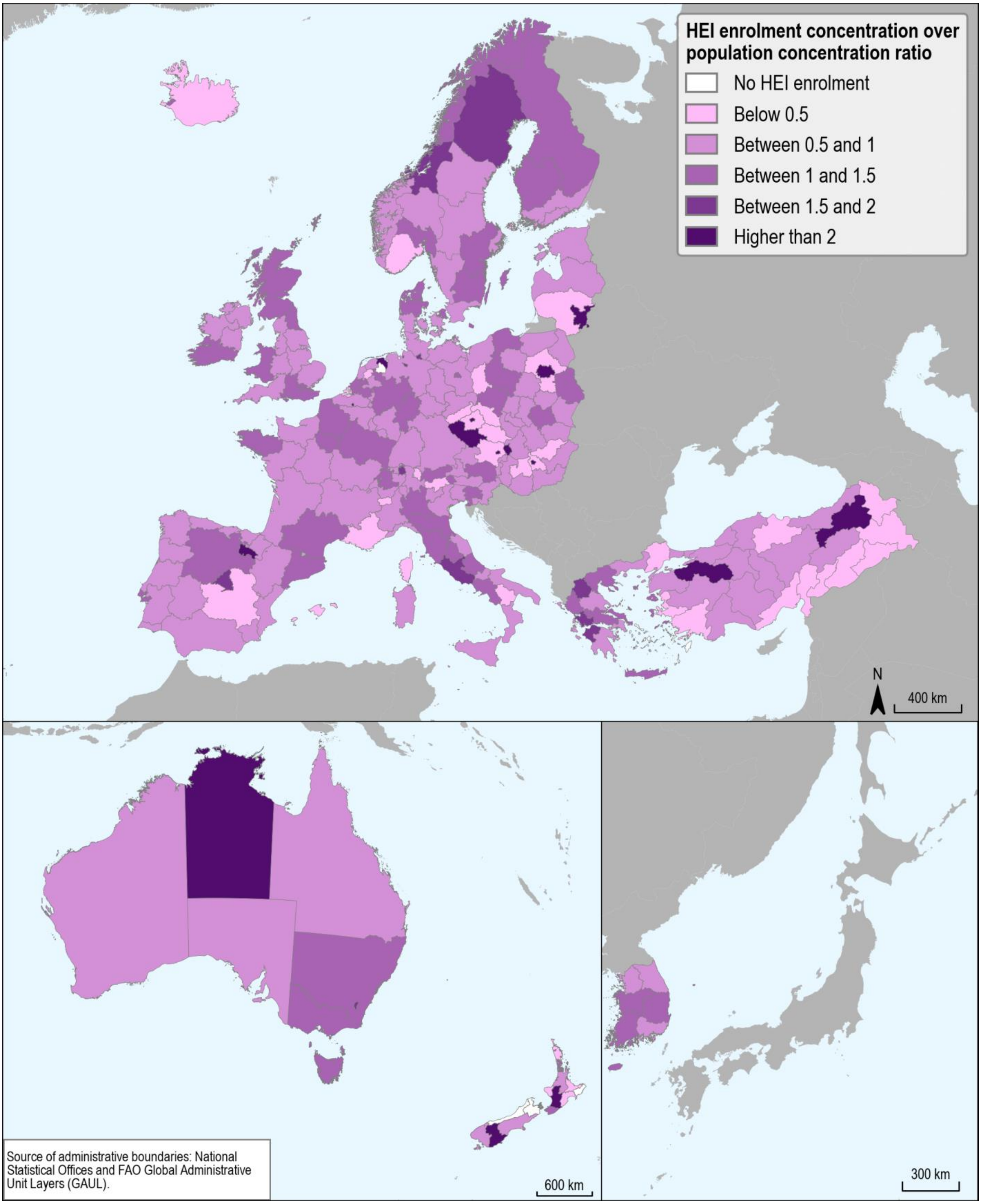
Figure 2.13. HEI enrolment concentration over population concentration in large regions, 2021 – Americas



StatLink https://stat.link/6l87gm

Figure 2.14. HEI enrolment concentration over population concentration in large regions, 2021 – Europe and Asia-Pacific



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Settlement of international migrant populations across regions and cities

Metropolitan regions attract the highest proportion of migrants

As OECD countries face ageing populations and a shrinking workforce, international migration becomes a key source of potential workers (OECD, 2022). In recent years, migrants – defined as individuals born outside of their country of residence – have contributed to labour force growth in most OECD member countries, helping to ease labour shortages (OECD, 2023). By 2022, migrants made up 14% of the OECD population. Luxembourg had the highest proportion at nearly 50%, while Japan, Mexico and Poland had less than 2%. Over the past decade, the migrant share of the population has increased in most OECD countries, except in the Baltic States, Greece and Israel, where it declined.

Metropolitan regions in the OECD have higher shares of migrant populations compared to non-metropolitan regions. In 2022, about 14% of metropolitan residents were migrants, a share almost twice as high as in other regions (7.9% for regions near and 7.5% for regions far from a midsize/large FUA) (Figure 2.15). Over the last decade, the migrant share has increased by about 2 p.p. in metropolitan regions and around 1.5 p.p. in regions near and far from a midsize/large FUA. Importantly, this trend is consistent across all OECD countries with available data, except for Spain (Figure 2.16). The difference between the migrant share in metropolitan regions and other regions is that it is the largest in Austria, Belgium, the United Kingdom and the United States, and the smallest is in Denmark, Italy and Korea.

Most migrants live in regions that are not facing population decline. In 2020, 83% (or 8 out of 10 migrants) lived in regions with stable or growing populations (Figure 2.17). In contrast, 7% lived in regions that faced a decline in the past and are also expected to decline further in the future. An additional 1% of the population lived in regions that experienced a population decline between 2010 and 2020 but are not expected to decline further. Nine percent lived in regions that did not experience a decline in the past but are projected to see a population decrease between 2020 and 2030. Compared to migrants, a larger share of the native-born population resides in regions facing demographic decline. For example, 20% lived in regions that saw a decline in the past and are also expected to decline further in the future. An additional 2% lived in regions that experienced a population decline between 2010 and 2020 but are not expected to decline further. Thirteen percent lived in regions that did not experience a decline in the past but are projected to see a population decrease between 2020 and 2030.

Migrants could potentially help slow population decline in some regions. Currently, migrants comprise about 13% of the population in regions that have not experienced population decline, compared to only 4% in regions that faced a decline between 2010 and 2020 or are projected to by 2030. However, beyond the immediate boost to population levels, the effects of immigration on population shrinking are uncertain; in some cases, the additional population can create a virtuous circle and a critical mass that stymies further outward migration or indeed attracts population. Other immigrants may also eventually choose to migrate to other parts of the country or other countries, especially if perceptions of migrants are negative.

Definitions

The terms "**migrant"** and "**foreign-born**" are used interchangeably. Migrants are defined by place of birth. The migrant population is defined as the population born in a country different from the one of residence. Unlike citizenship, this criterion does not change over time; it is not subject to differences in legislation in countries and is thus adequate for international comparisons.

Population decline refers to changes in the adult population over time. Population decline is measured by tracking reductions in the adult population within a given period. Regions with a decreasing adult population are classified as experiencing population decline.

Further reading

OECD (2023), *International Migration Outlook 2023*, OECD Publishing, Paris, https://doi.org/10.1787/b0f40584-en.

OECD (2022), *The Contribution of Migration to Regional Development*, OECD Regional Development Studies, OECD Publishing, Paris, https://doi.org/10.1787/57046df4-en.

Figure notes

Figures 2.15, 2.16 and 2.17: The latest available year is 2022 for DNK, FIN, ITA, NOR and SWE; 2021 for AUT, BEL, DEU, ESP and GBR; and 2020 for KOR, NLD, PRT and USA.

Figure 2.15. Share of migrant population by small region type, 2012 and 2022

Share in population by small region type

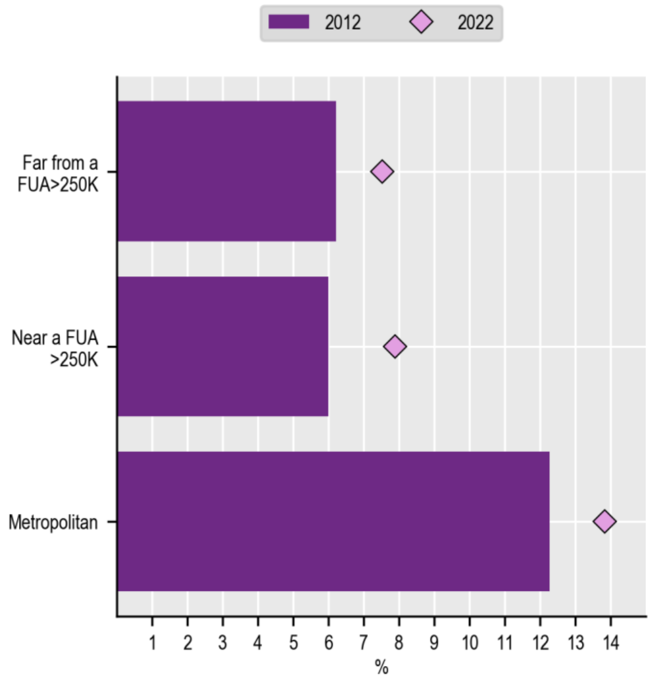

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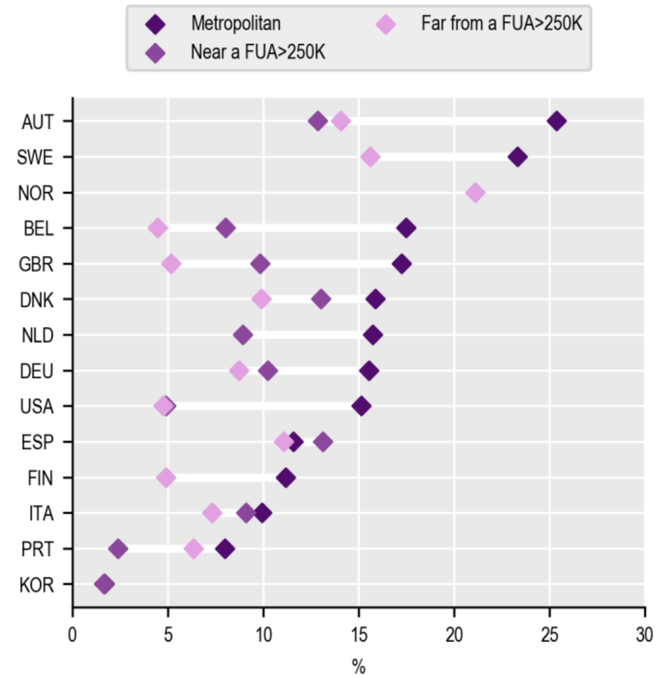
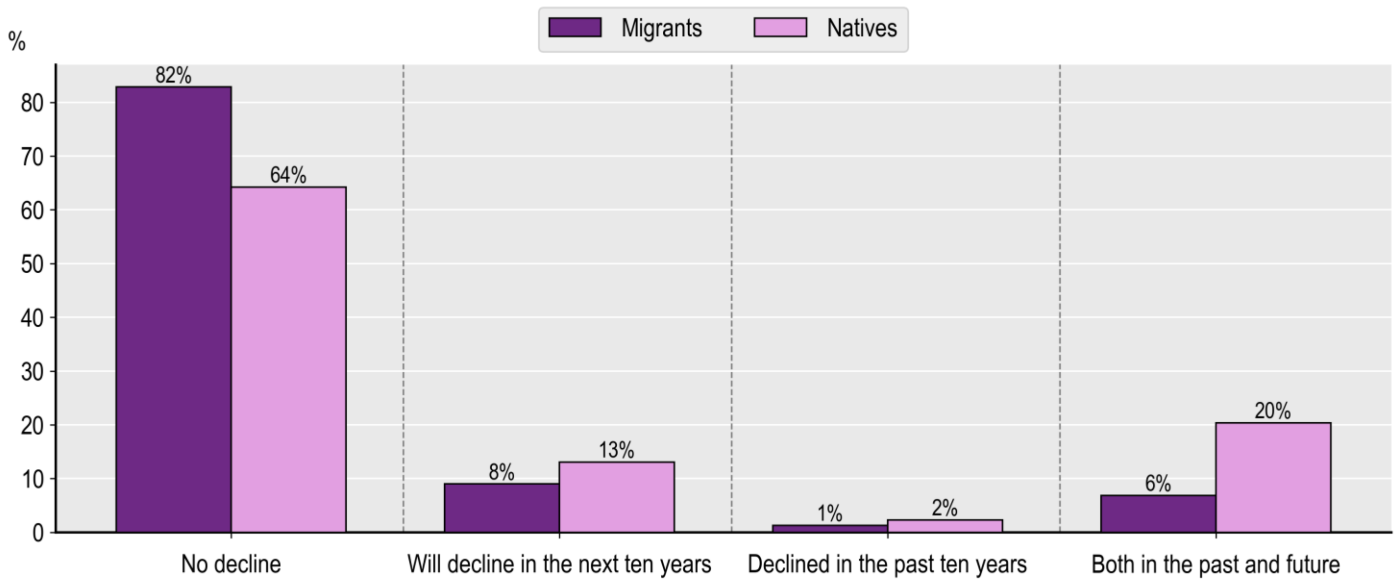
Figure 2.16. Share of the migrant population by country and small region type, 2022

Share in population by small region type



StatLink https://stat.link/kwqof6

Figure 2.17. Concentration of migrant and native-born population by present and future population decline



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The new geography of remote jobs

Workers often shifted from full-time remote work to a hybrid model post-COVID-19, especially in cities

Social distancing measures and concerns about COVID-19 led to a sharp rise in remote work. Even as the situation improved, fewer people returned to working exclusively from the office. Instead, those in remote-compatible jobs often split their time between home and office, creating a new hybrid working model (Özgüzel, Luca and Wei, 2023).

Before the pandemic, European cities already had a higher share of remote workers than sparsely populated areas, largely due to occasional remote work (working from home less than half the time) (Figure 2.18). During the pandemic, remote work increased across all areas, especially in cities, driven by more regular remote work (working from home more than half the time). After the pandemic, the share of remote workers dropped from its peak due to a decline in regular remote work, a pattern also seen in the United States (Barrero, Bloom, and Davis, 2023). However, the number of occasional remote workers grew, signalling a shift towards hybrid work. In 2022, 29% of city workers worked from home, compared to 21% in towns and 18% in rural areas.

The uptake of remote work has been uneven across Europe and Türkiye, with some countries seeing much stronger adoption than others (Figure 2.20). For example, over 40% of workers in Luxembourg, the Netherlands, Norway, Sweden and Switzerland worked remotely occasionally or regularly, while less than 5% did so in Bulgaria, Romania or Türkiye (Figure 2.19, Panel A). In 2022, with a few exceptions, capital-city regions had the highest number of remote workers in their countries, with an average of 32% of employees working from home, compared to 18% in other regions. Similarly, in all countries, cities had the highest number of remote workers (Figure 2.19, Panel B).

Workers with a university or a higher degree are more likely to work remotely, both regularly and occasionally, compared to those with lower education levels. This disparity is especially pronounced in European cities, where approximately 46% of higher-educated workers engaged in remote work, compared to just 14% of lower-educated workers. The gap in remote work uptake between higher- and lower-educated workers is smaller, about 27 p.p., in towns and semi-dense or rural areas. This difference is largely due to a higher share of remote workers among the higher-educated in cities. In contrast, the share of remote workers among the lower-educated remains relatively consistent across different types of areas, though it is slightly higher in cities.

Definitions

Remote work uptake measures the number of individuals, as a share of all workers, who are occasional or regular remote workers.

Occasional remote workers sometimes work remotely, meaning less than half of the time.

Regular remote workers work mainly remotely, meaning they worked half or more of their working hours remotely in the past month.

Further reading

Barrero, J.M., N. Bloom and S.J. Davis (2023), "The evolution of work from home", *Journal of Economic Perspectives*, Vol. 37/4, p. 23-49, https://doi.org/10.1257/jep.37.4.23.

Özgüzel, C., D. Luca and Z. Wei (2023), "The new geography of remote jobs? Evidence from Europe", *OECD Regional Development Papers*, No. 57, OECD Publishing, Paris, https://doi.org/10.1787/29f94cd0-en.

Figure notes

Figures 2.18, 2.19 and 2.20: European Union countries between 2019 and 2022.

Figure 2.18. Share of remote workers by degree of urbanisation, 2019-22

European countries

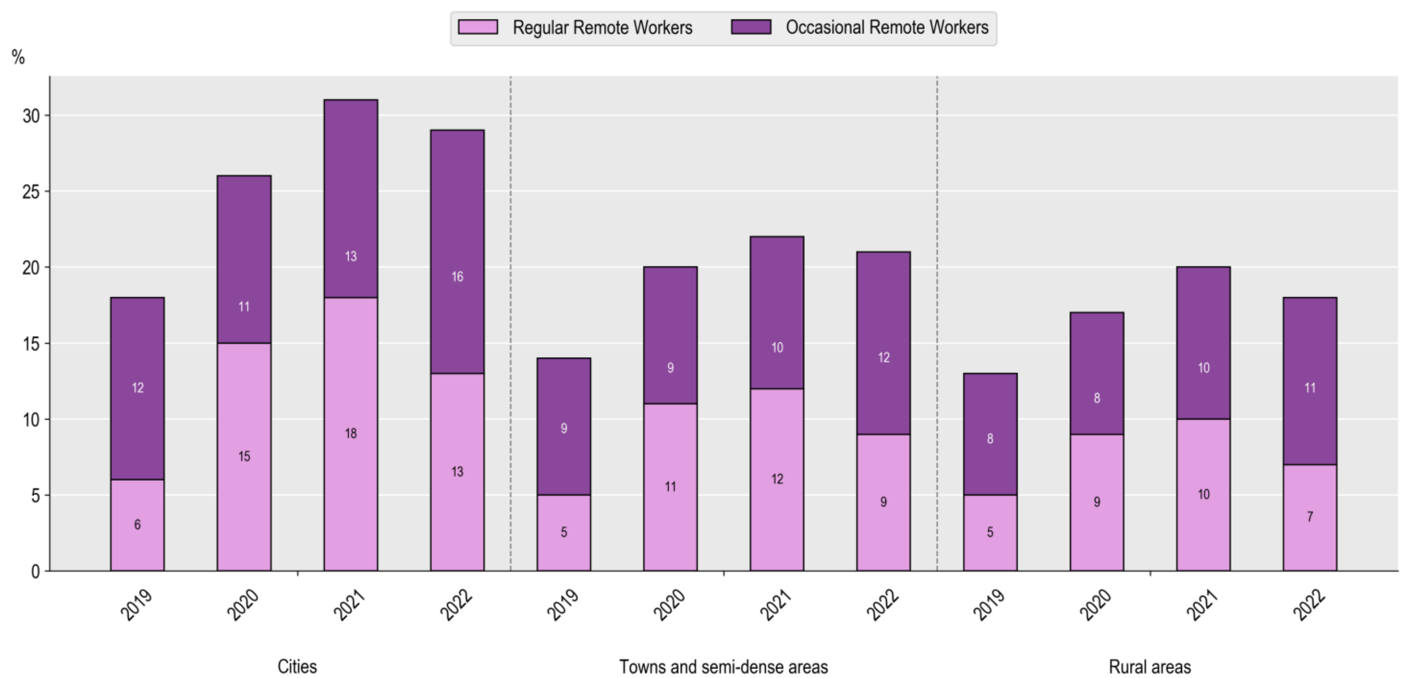

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Figure 2.19. Share of remote workers in large regions by country and degree of urbanisation, 2022

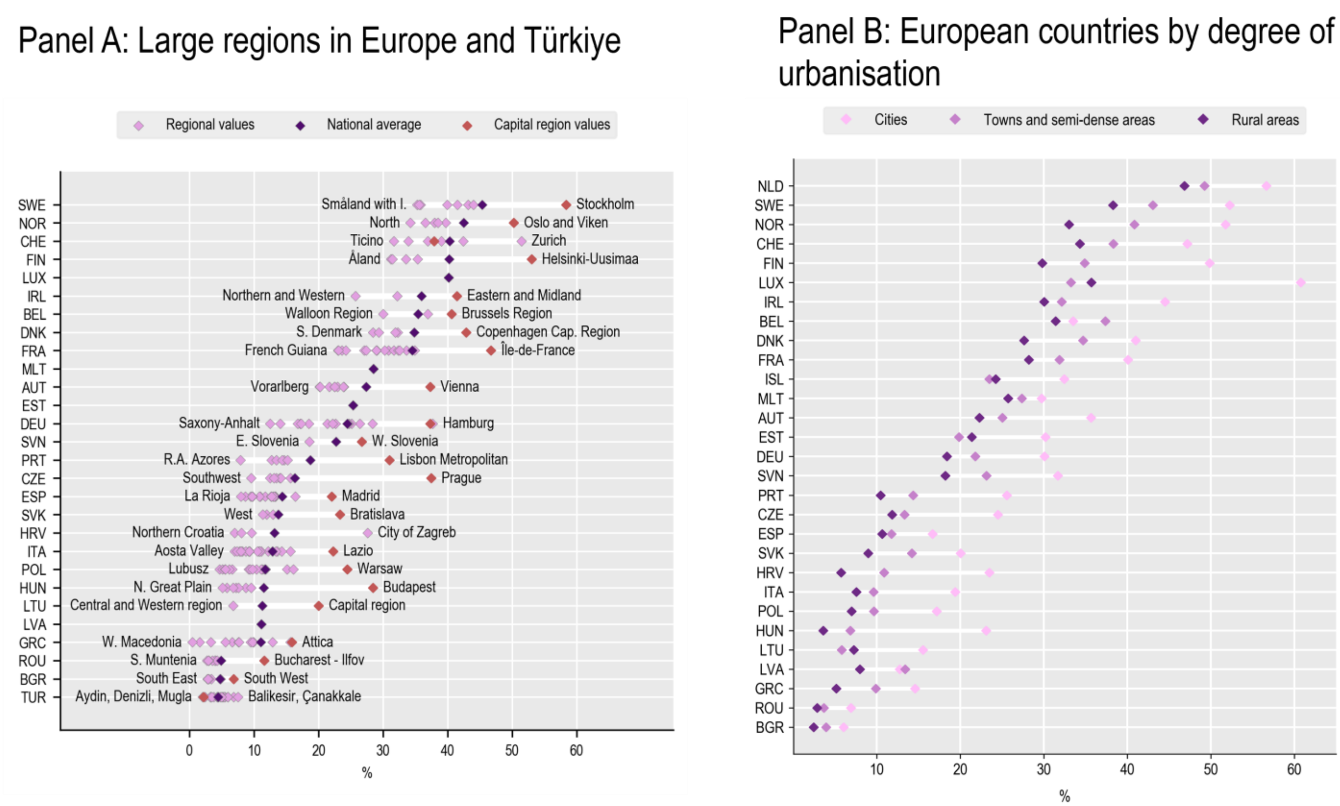

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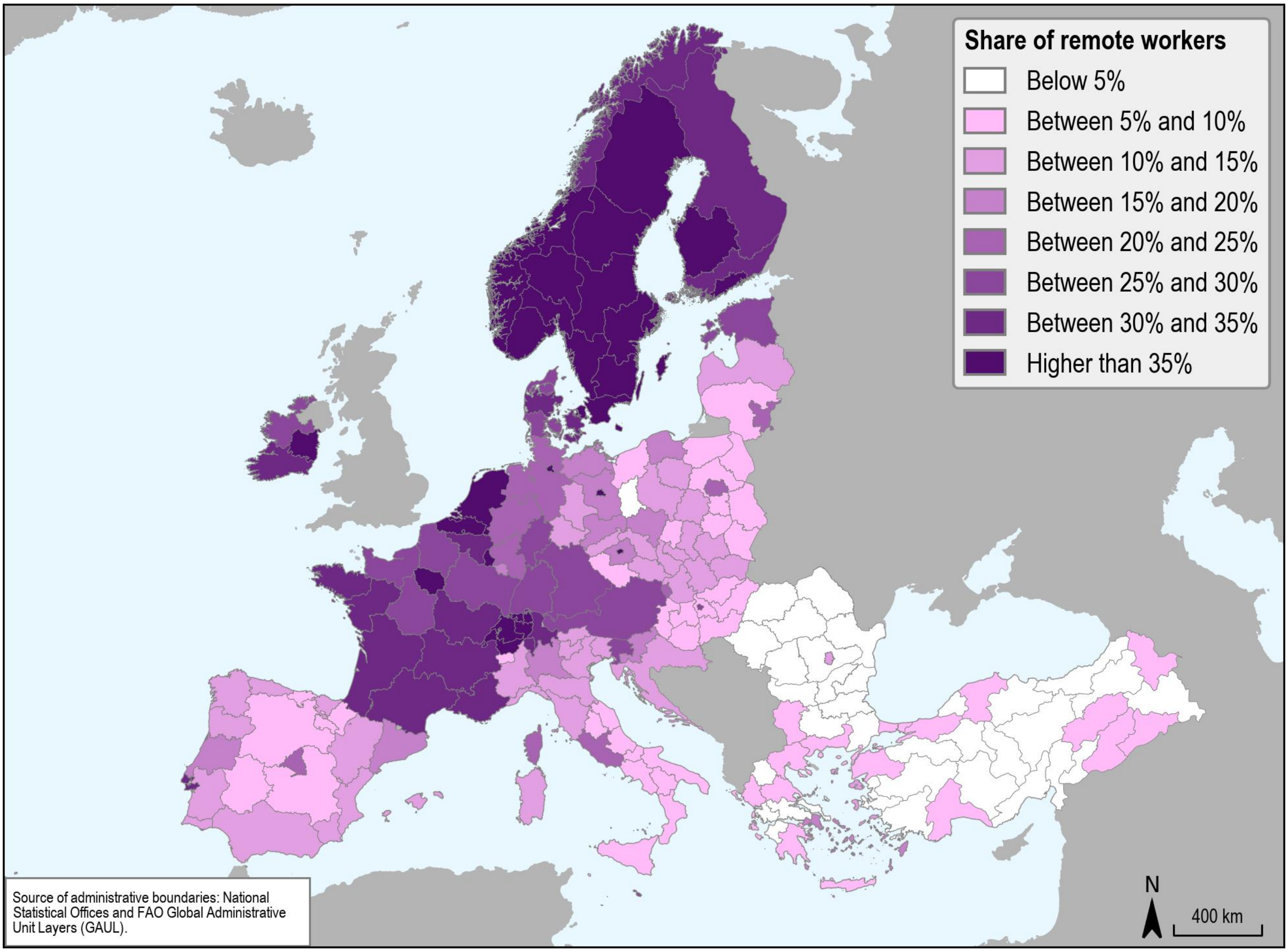
Figure 2.20. Share of remote workers in large regions, 2022 – Europe and Türkiye



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3. TACKLING THE CLIMATE EMERGENCY

Regions facing rising temperatures

2023 was the hottest year ever recorded, marked by stark temperature increases in polar and cold regions, and more frequent extreme temperatures in tropical and arid regions

Every month between June and December in 2023 – the hottest year every recorded – broke previous records. The global mean temperature in 2023 was just under 1.5 degrees Celsius (°C) above the 1850-1900 pre-industrial level, which was not expected until 2045 when the Paris Agreement was signed (ECMWF, 2024). In ten OECD countries and three out of ten OECD large regions, 2023 was the hottest year. Moreover, in 30 OECD countries and about 7 of 10 OECD regions, the hottest year occurred in 1 of the last 5 years.

Across large regions of the OECD, air temperatures rose by an average of 1.4°C in 2023 compared to 1981-2010. Temperature increases were even more pronounced in OECD polar and cold regions, covering more than 40% of the total OECD area, where air temperatures rose by close to 2°C in 2023 compared to 1981-2010. This is more than double the increase observed in OECD arid regions (+0.8°C).

Worryingly, this trend is foreseen to continue across all emission scenarios. In polar regions, temperatures are projected to rise by mid-century by 3°C compared to 1981-2010 in a low-emissions scenario and up to 4.3°C in a high-emissions scenario. In arid regions, temperatures are predicted to rise by 1.3°C in a low-emissions scenario and up to 1.9°C in a high-emissions one (Figure 3.1).

The rapid rise in temperatures in polar and cold regions coincides with a notable drop in icing days. In 2023, OECD polar and cold regions had 17 and 9 fewer icing days respectively compared to 1981-2010 and, for polar regions, these losses are expected to increase to between 20 to 28 days by 2041-60 (Figure 3.2). Higher temperatures will not only impact ice sheets and glaciers, adding to the ongoing rise in sea levels, but they will also impact permafrost areas, leading to large methane and carbon dioxide emissions, triggering negative feedback loops and further accelerating climate change.

Hot days also raise myriad household challenges related to well-being, health systems, the labour market and energy use. While average temperature increases are higher in colder regions, arid and tropical OECD regions remain the regions most exposed to days with extremely high temperatures (hot days). In 2023, people in these regions were exposed to 11 and 8 additional hot days respectively compared to 1981-2010. By 2041-60, people in tropical regions are expected to endure 40 to 60 more hot days per year compared to 1981-2010 (Figure 3.3). Those in arid regions will likely experience 20 to 30 more hot days. By 2041-60, regardless of the emission scenario, these regions are likely to endure 50 extra hot days per year compared to the baseline of 1981-2010 (Figures 3.4 to 3.7). The 20 regions projected to be most affected, hosting more than 29 million people, are all in Australia, Colombia and Mexico.

Definitions

Shared Socioeconomic Pathways (SSPs) are climate scenarios up to 2100 that model how socio-economic factors may change over the next century. These scenarios are combined with **Representative Concentration Pathways (RCPs)**, which outline different greenhouse gas (GHG) concentration levels and their radiative forcings. **Radiative forcing** quantifies how factors like GHGs, aerosols and solar changes affect Earth's atmospheric energy balance. This report highlights four scenarios:

- **SSP1-2.6: Sustainability.** 2.6 watts per square metre (W/m2) radiative forcing, 1.8°C warming by 2100.
- **SSP2-4.5: Middle-of-the-road.** 4.5 W/m2 radiative forcing, 2.7°C warming by 2100.
- **SSP3-7.0: Regional rivalry.** 7.0 W/m2 radiative forcing, 3.6°C warming by 2100.
- **SSP5-8.5: Fossil fuel development.** 8.5 W/m2 radiative forcing, 4.4°C warming by 2100.

Hot days are days when the maximum air temperature exceeds 35°C.

Icing days are days during which the maximum air temperature does not exceed 0°C.

Climate zones (arid, cold, polar, temperate and tropical) are defined using the Köppen-Geiger classification. Refer to Annex C for more details.

Further reading

ECMWF (2024), "Copernicus: 2023 is the hottest year on record, with global temperatures close to the 1.5°C limit", European Centre for Medium-Range Weather Forecasts, https://climate.copernicus.eu/copernicus-2023-hottest-year-record.

Figure notes

Figure 3.3: Hot days are weighted by population.

Figures 3.1 to 3.7: Climate zones are defined based on 1991-2020 climate. 2023 indicators were computed using Copernicus ERA5-Land historical data and 2041-60 projections using NASA NEX-GDDP-CMIP6.

Figures 3.1, 3.2 and 3.3: Number of regions per type in parentheses.

Figure 3.1. Air temperature increase by SSP scenario and small region climate zone, 2023 and 2041-60

Relative to 1981-2010

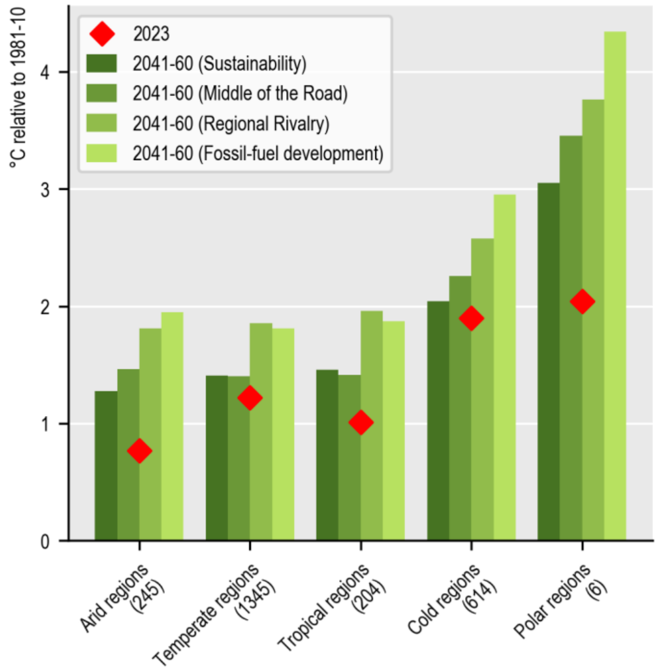

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Figure 3.2. Loss in icing days by SSP scenario and small region climate zone, 2023 and 2041-60

Relative to 1981-2010

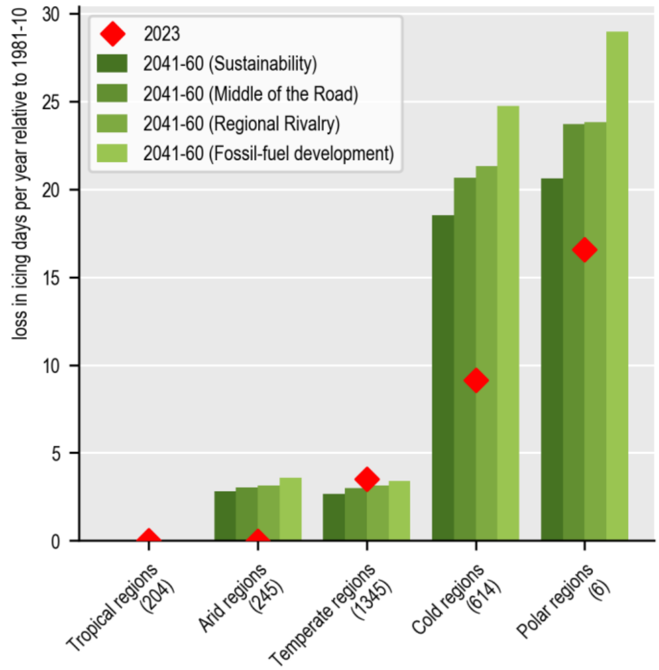

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Figure 3.3. Additional hot days per year by SSP scenario and small region climate zone, 2030-60

Relative to 1981-2010, middle-of-the-road scenario, with shaded areas representing the worst and best-cases from the other three scenarios

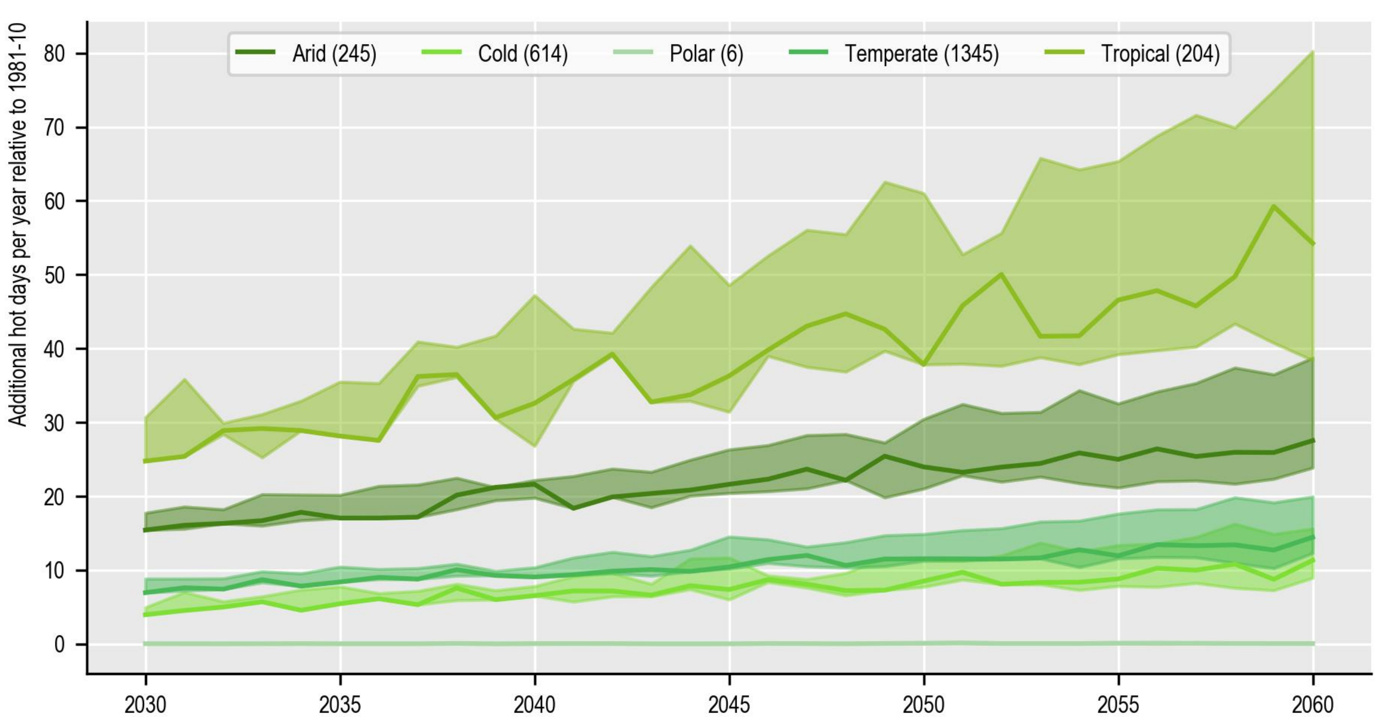

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Figure 3.4. Exposure to hot days in small regions, 2019-23

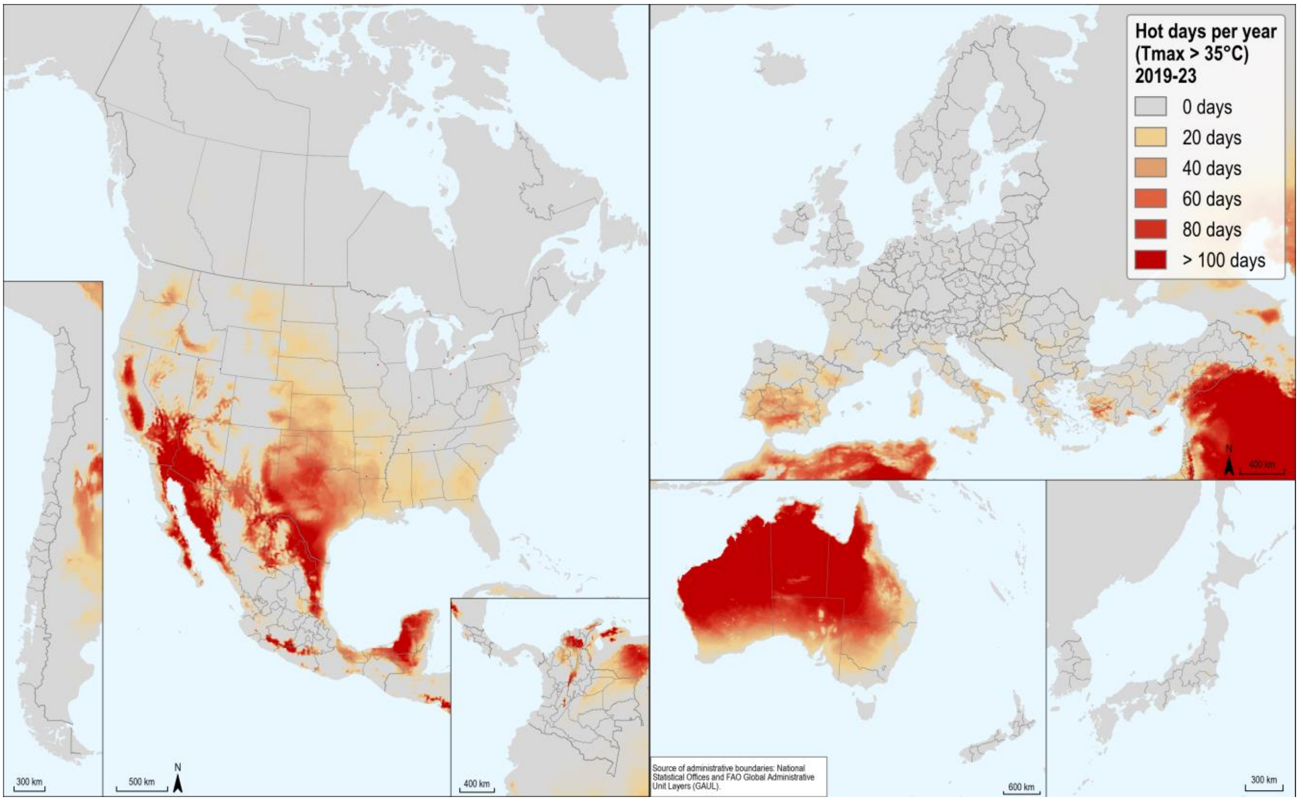

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Figure 3.5. Expected increase in hot days in the sustainability scenario in small regions, 2041-60

Relative to 1981-2010

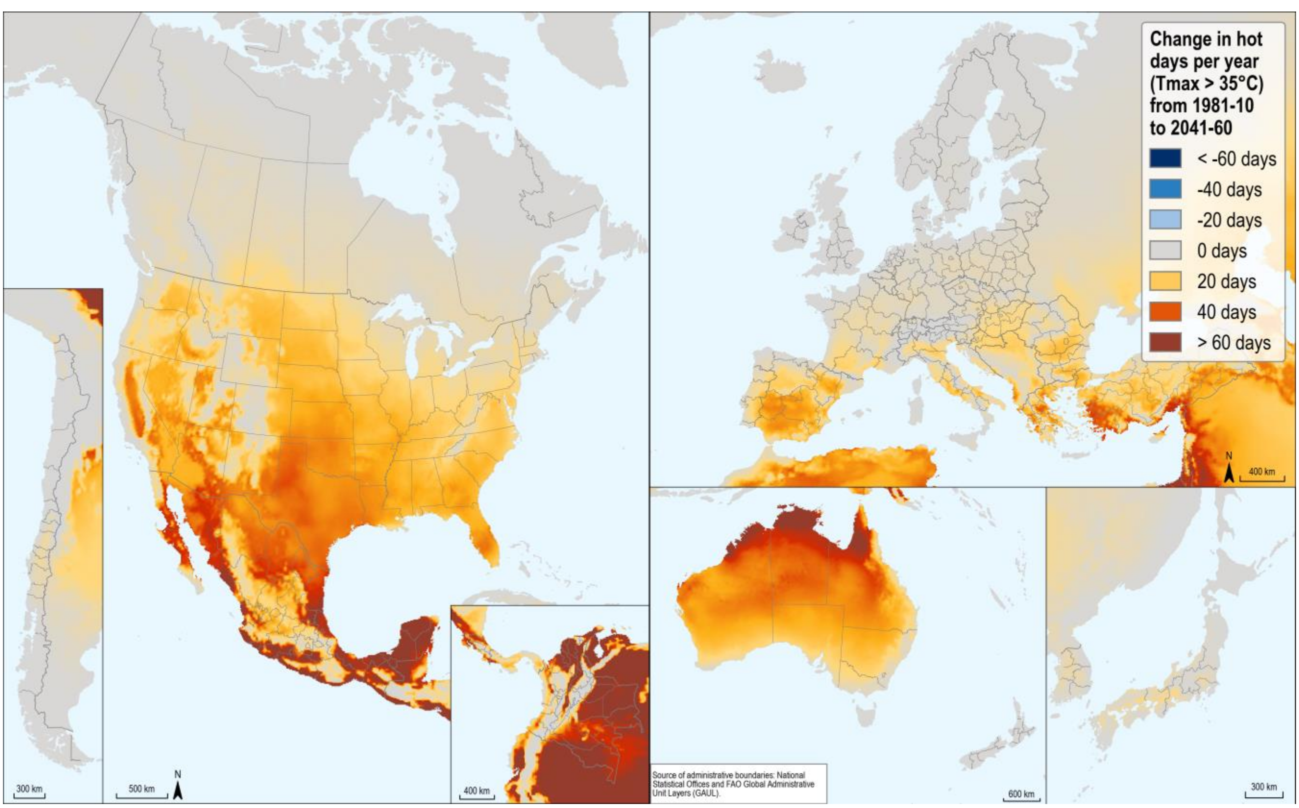

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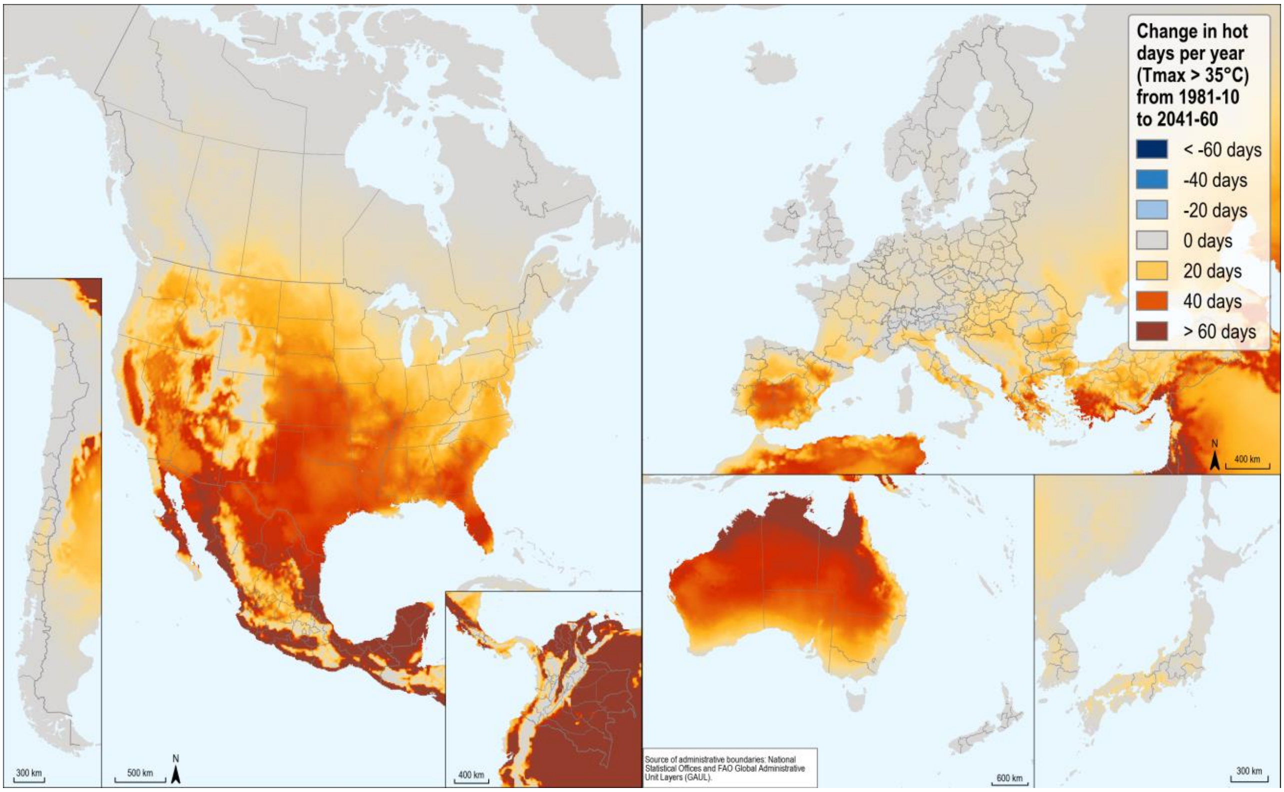
Figure 3.6. Expected increase in hot days in the middle-of-the-road scenario in small regions, 2041-60

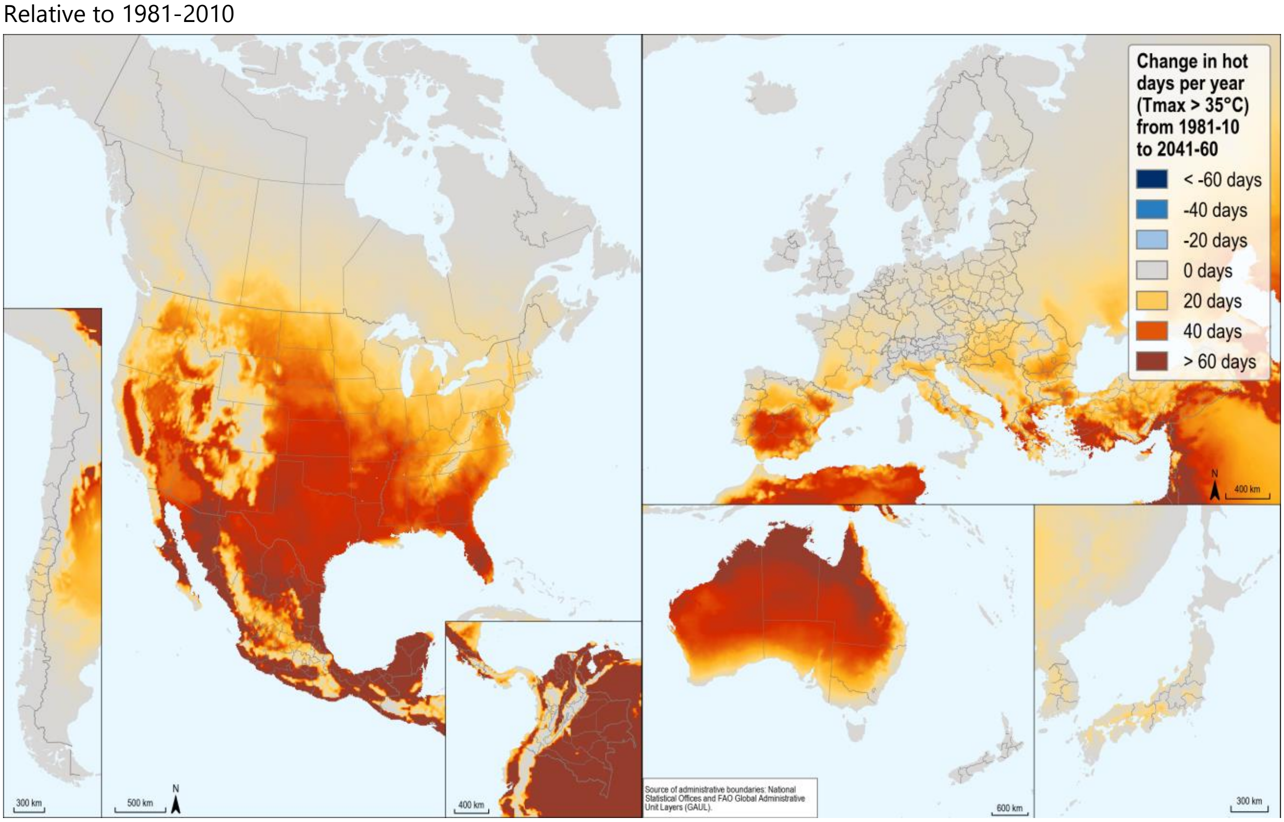
Relative to 1981-2010



StatLink https://stat.link/t0a75o

Figure 3.7. Expected increase in hot days in the fossil fuel development scenario in small regions, 2041-60

Relative to 1981-2010



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Transitions to net zero emissions in regions and cities

Many OECD regions and functional urban areas (FUAs) are still far from 2050 net zero targets, as production-based emissions have increased in close to 40% of large OECD regions since 2010

In 2022, global emissions soared to an unprecedented level of 52.4 gigatonnes of carbon dioxide equivalent (Gt CO_2-eq), 61% higher than in 1990. In this context, many OECD countries have adopted ambitious emissions reduction plans to reach climate neutrality. According to the International Energy Agency (IEA) Net Zero Emissions Scenario, production-based GHG emissions would need to drop to below 4.7 t CO_2-eq per capita by 2030 in OECD countries. In 2022, only around 2 out of 10 OECD large regions (81 out of 433) and 4 out of 10 OECD FUAs (506 out of 1 248) had emissions lower than this level. Indeed, around 80% of regions and 60% of FUAs had roughly twice that level of emissions in 2022. Moreover, 57 OECD regions and 77 FUAs recorded emissions higher than 20 t CO_2-eq per inhabitant in 2022.

Emissions in OECD countries have been falling since their peak in 2007, although progress varies widely across regions. From 2010 to 2022, emissions dropped more quickly in metropolitan regions and regions close to midsize and large FUAs (8.4% and 9.8% decrease respectively) than in regions far from these areas (6.1% decrease) (Figure 3.8), possibly because agriculture and transport emissions, which have not been reduced significantly, are more significant in regions far from FUAs (OECD, 2021). Nearly 40% of OECD regions and FUAs (167 out of 433 large regions and 475 out of 1 248 FUAs saw an increase in emissions from 2010 to 2022. Alaska in the United States (22% increase, to reach 37 t CO_2-eq per habitant in 2022) and the Northern Territory in Australia (37% increase, to reach 41 t CO_2-eq per habitant in 2022) had the highest per capita emissions in 2010 (Figures 3.11 and 3.12).

Regional and local governments play an active role in many areas essential for implementing the net zero transition, including land use regulation, housing, energy, transport and environmental protection. In 2019, subnational governments in European Union (EU) and OECD countries accounted for 63% of climate-significant public expenditure and 69% of climate-significant public investment on average (Figure 3.9). These shares have increased annually since 2009 by 2.5% for expenditure and 1.4% for investment in real terms. Federal countries (e.g. Belgium and Germany) and unitary countries with high levels of decentralisation (e.g. Italy and Japan) tend to show larger values of subnational climate-significant expenditure and investment. Subnational climate-significant expenditure varies from 24% of general government climate-significant expenditure in Iceland to more than 80% in Japan, and investment ranges from 17% in Iceland to 97% in Australia.

Despite their pivotal role in the net zero transition, as a share of GDP, subnational climate-significant expenditure and investment accounted for only 1.1% and 0.4% of GDP respectively in 2019. The share of subnational climate-significant expenditure ranges from 0.2% in Iceland to 2.2% in Belgium. In turn, the share of investment was the lowest in Iceland (0.01%) and the highest in Japan (0.7%) (Figure 3.10). These small shares signal overall low levels of public climate-significant expenditure and investment and reveal significant gaps between public involvement and climate action needs. This calls for more policy action to mobilise funding and financing to subnational governments so they can fulfil their role in accelerating the net zero transition (OECD, 2022).

Definitions

Emissions refer to **production-based emissions**, i.e. emissions produced within a region, estimated using the Emissions Database for Global Atmospheric Research (EDGAR), version 8 and expressed in CO_2 equivalents by considering the four main GHGs – carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and fluorinated gases (F-gases) with a 100-year global warming potential. These subnational estimates are not sourced from official government sources and may not fully capture the specific regional circumstances of each country. Emissions from shipping, aviation, land use, land use changes and forestry are excluded.

Global warming potential (GWP) is an index that allows comparisons (usually over 100 years) of the impacts of different gases on global warming. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period relative to the emissions of 1 ton of CO_2. The larger the GWP, the more a given gas warms the Earth compared to CO_2 over the same period.

Climate-significant expenditure and investment refer to expenditure and investment that could be considered as contributing to climate adaptation or mitigation objectives, defined by functions (e.g. transportation, energy, agriculture) derived from the Classification of the Functions of Government categories from the National Accounts and aligned with the EU taxonomy for sustainable activities.

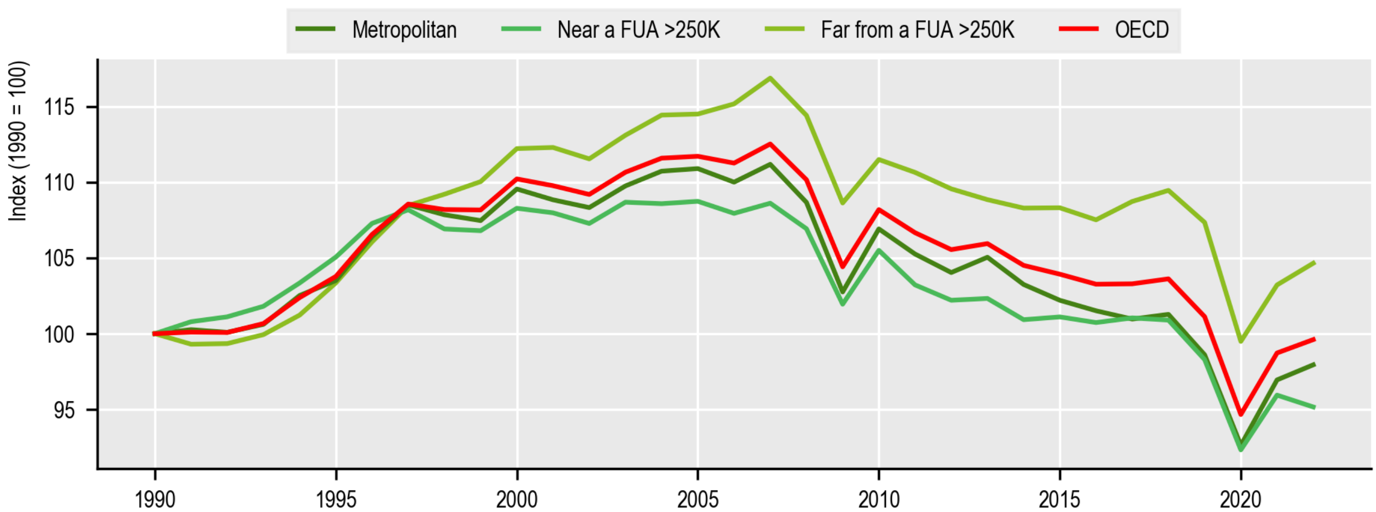
Further reading

OECD (2022), "Subnational government climate expenditure and revenue tracking in OECD and EU Countries", *OECD Regional Development Papers*, No. 32, OECD Publishing, Paris, https://doi.org/10.1787/1e8016d4-en.

OECD (2021), *OECD Regional Outlook 2021: Addressing COVID-19 and Moving to Net Zero Greenhouse Gas Emissions*, OECD Publishing, Paris, https://doi.org/10.1787/17017efe-en.

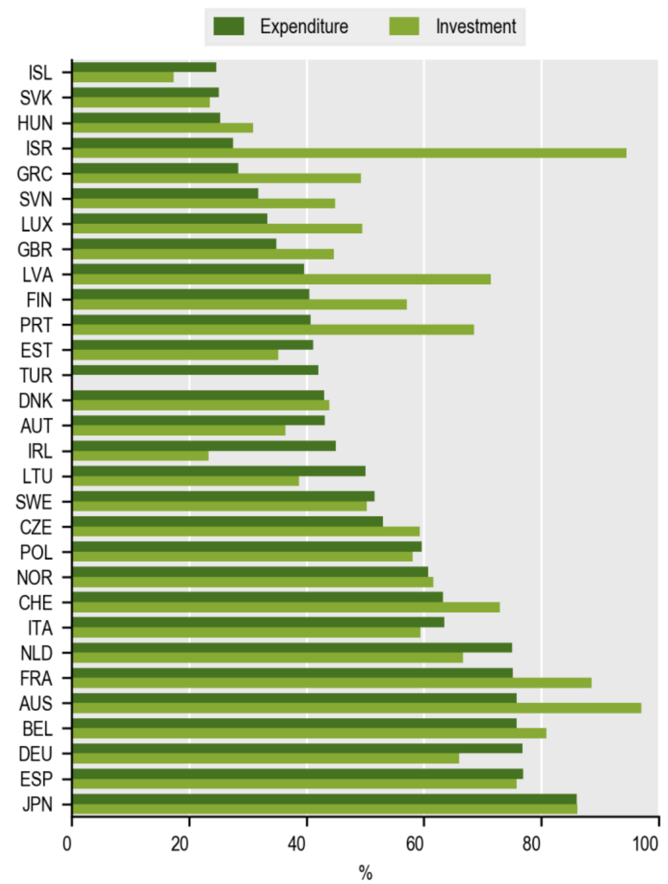
Figure 3.8. Production-based GHG emissions estimates by small region type, 1990-22

T CO_2-eq/capita relative to 1990



StatLink https://stat.link/ea3cur

Figure 3.9. Share of general government climate-significant expenditure and subnational government investment, 2019



StatLink https://stat.link/523ed9

Figure 3.10. Subnational government climate-significant expenditure and investment as a share of GDP, 2019

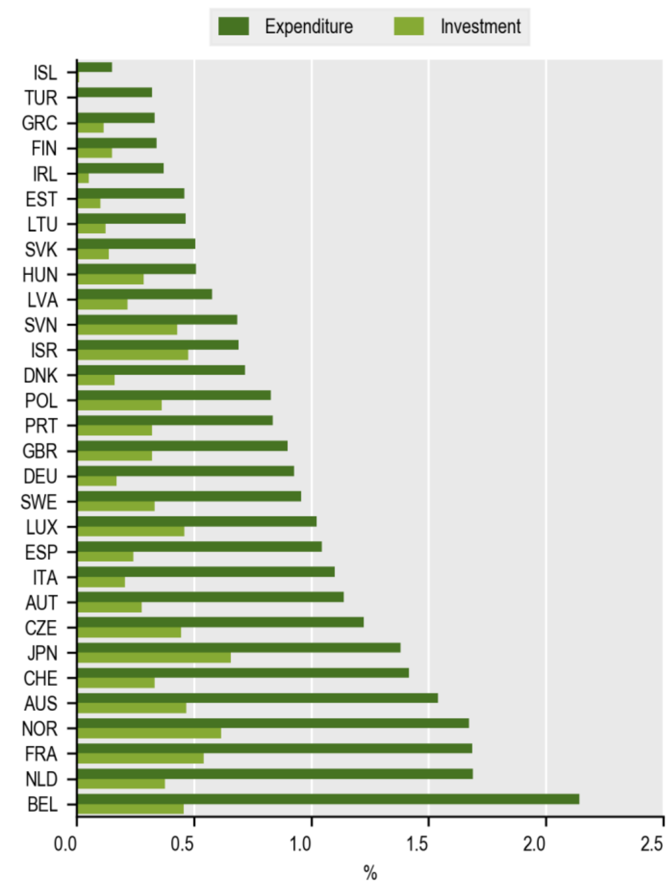


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Figure 3.11. Production-based GHG emissions per capita in large regions, 2022 levels and 2010-22 growth – Americas

Based on total emissions estimates in t CO_2-eq/capita

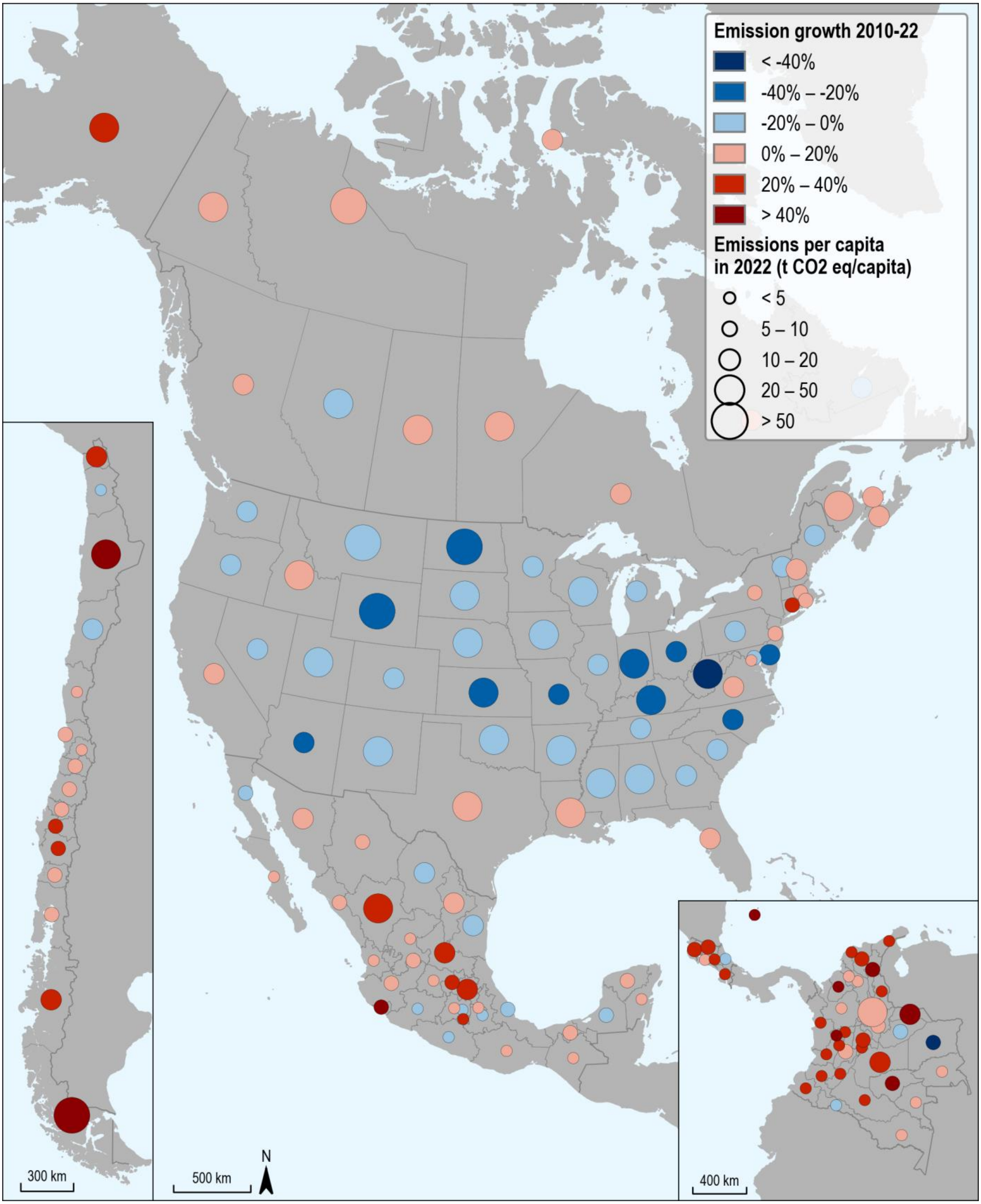

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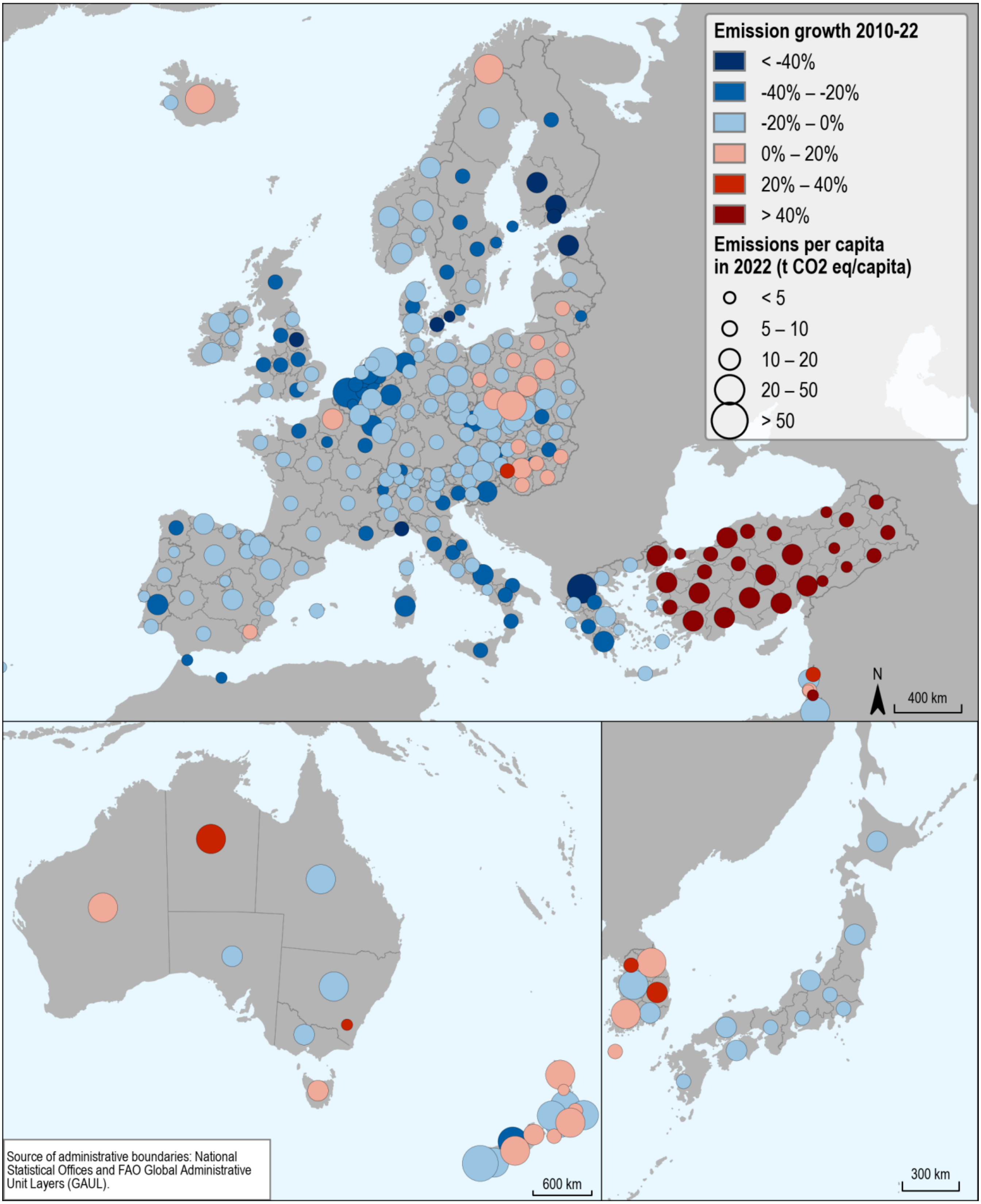
Figure 3.12. Production-based GHG emissions per capita in large regions, 2022 levels and 2010-22 growth – Europe and Asia-Pacific

Based on total emissions estimates in t CO_2-eq/capita



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Sustainable energy systems and industries in regions

Electricity decarbonisation has progressed in most OECD regions but methane emissions remain high and concentrated in a few regions

The transition to net zero calls for low-carbon electricity generation and more industrial electrification. In this context, regions with heavier industries face more challenges in increasing electrification, as these industries are more difficult to electrify than low-temperature heat processes (OECD, 2023).

The power sector is the main reason for the large drop in emissions across OECD countries, with a 24% decrease from 2010 to 2022. Almost 70% of OECD regions reduced their power sector emissions (Figures 3.17 and 3.18). A drop in the share of electricity generated from coal (-14 percentage points, p.p.) and an increase from renewables (+11 p.p.) explains most of this decline. Out of 184 OECD regions, around 126 saw more electricity from low-carbon sources (Figure 3.13). The increase in low-carbon electricity generation was very substantial in some regions: for instance, in Alentejo, Portugal, it surged from 13% in 2017 to 65% in 2021. However, 55 OECD regions did see a reduction in low-carbon electricity generation, such as Pennsylvania in the United States, where it fell from 43% to 35%.

While electrification in industry is crucial for reaching net zero, it remains quite limited across OECD regions. Industry emits more GHG than any other sector in 3 of 10 OECD regions (129 out of 433). In 2021, electricity accounted for one-third of the final energy consumption of industry in OECD countries, varying from 19% in Latvia to 97% in Iceland. Data for 124 regions show that over half (68 regions) have an electrification rate lower than 20% (Figure 3.14). Differences within countries can be large. For instance, the industrial electrification rate in France varies from 19% in Provence-Alpes-Côte d'Azur to 72% in Corsica.

Fossil fuel operations are also a large source of methane emissions. In OECD countries, fossil fuel exploitation accounts for one-quarter of all methane emissions. Four OECD regions emerged as large methane emitters: Alberta, Canada, due to oil sands exploitation; North Dakota, New Mexico and Texas in the United States extracting oil and natural gas from the Williston and Permian Basins (Figure 3.15). In CO_2-equivalent terms, the methane emissions due to fossil fuel exploitation in Texas in 2022 are equivalent to twice the total GHG emissions of Sweden. However, these emissions can be reduced cost-effectively (IEA, 2023).

Beyond emissions reduction, technological change will be key to accelerating change but adaptation and mitigation innovation remains concentrated across regions and countries. Denmark, Finland, Germany, Norway and Sweden record the highest number of patents in climate change adaptation and mitigation technologies per capita among OECD countries. In the past 5 years, Central Jutland, Denmark, recorded the highest number of climate patents per inhabitant, with more than 525 patents in climate change adaptation and mitigation technologies. Whereas large metropolitan regions recorded more than 3 times climate-related patents per million inhabitants compared to remote regions (70 versus 20 patents per million inhabitants), remote regions had a higher share of climate-related patents relative to total patents than large metropolitan regions (Figure 3.16).

Definitions

Power sector emissions were estimated using EDGAR version 8 and expressed in CO_2 equivalents by considering the 4 main GHGs: CO_2, CH_4, N_2O and F-gases.

Methane (CH_4) is the second most abundant anthropogenic GHG after CO_2. With a global warming potential 28 times higher than CO_2, it emanates from both natural sources like wetlands and human activities such as livestock, fossil fuel extraction and waste.

The **final energy consumption** is the total energy used directly by end users. It excludes energy used by the energy sector, including delivery and transformation.

Industry refers to manufacturing (C), construction (F), mining, and quarrying (including utilities: B, D, E).

Low-carbon sources refer to nuclear and renewables (solar, wind, hydropower, biomass, geothermal, tidal and wave).

Patents are recorded based on the inventor's residence; see Annex B for further metadata.

Further reading

IEA (2023), *World Energy Outlook 2023*, IEA, Paris, https://www.iea.org/reports/world-energy-outlook-2023.

OECD (2023), *Regional Industrial Transitions to Climate Neutrality*, OECD Regional Development Studies, OECD Publishing, Paris, https://doi.org/10.1787/35247cc7-en.

Figure notes

Figure 3.14: AUS: 2021; BEL: 2019; FRA: 2021; NLD: 2020, 2021; SWE: 2019, 2020, 2021; USA: 2021

Figure 3.16: OECD countries (except IRL, LTU and TUR, which have no data available).

Figure 3.13. Change in low-carbon electricity generation in large regions, 2017-21

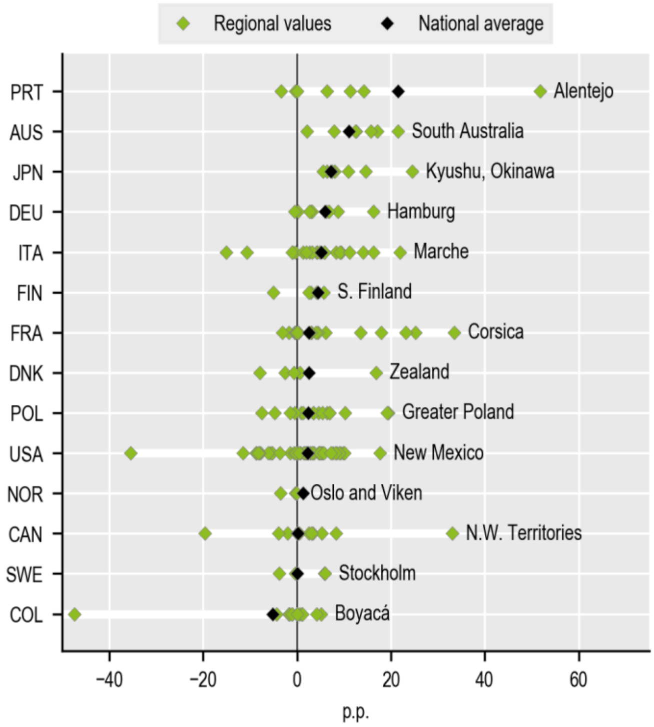

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Figure 3.14. Share of industry final energy consumption coming from electricity in large regions, 2023

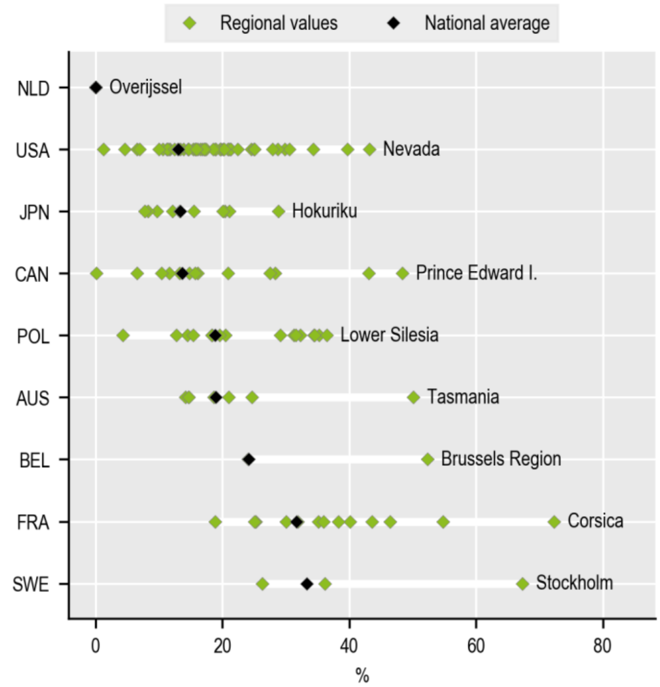

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Figure 3.15. Methane emissions from fossil fuel exploitation in selected large regions, 2022

Regions where > 1 million tons of carbon dioxide equivalent (Mt CO_2-eq) only

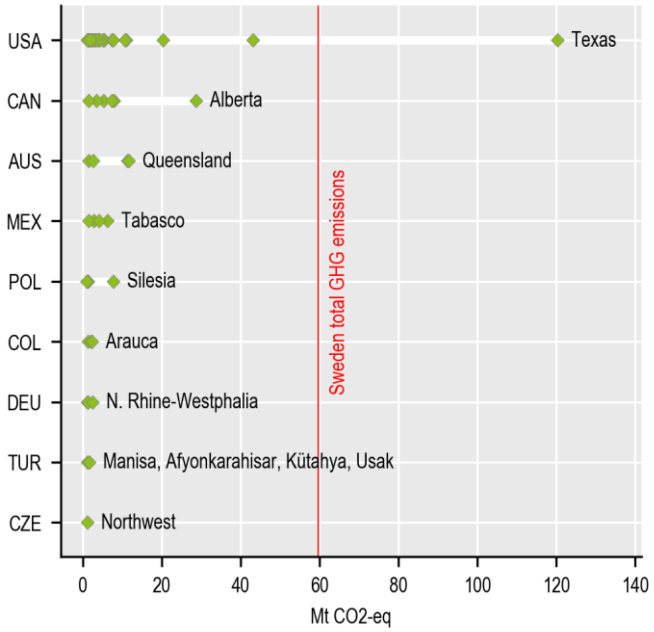

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Figure 3.16. Share of climate adaptation and mitigation technologies patents by small region type, 2018-22

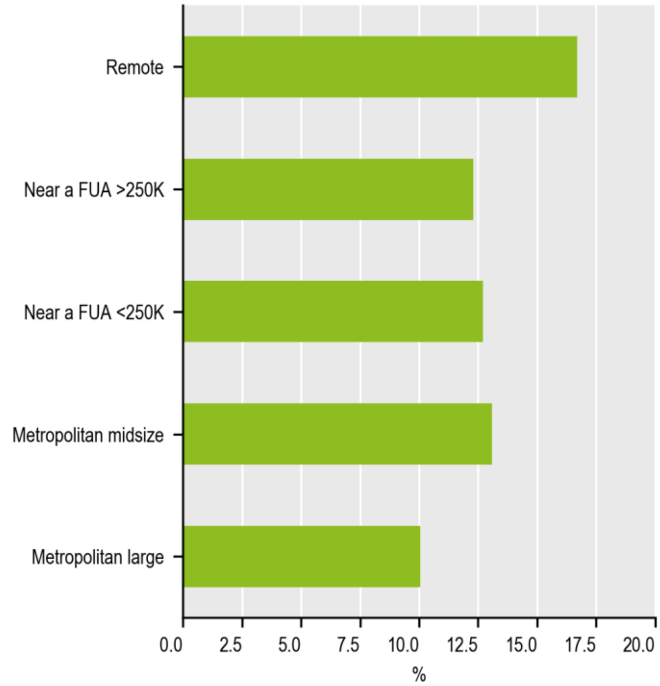

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Figure 3.17. Power sector production-based GHG emissions per capita in large regions, 2022 levels and 2010-22 growth – Americas

Based on estimates in CO_2-eq/capita

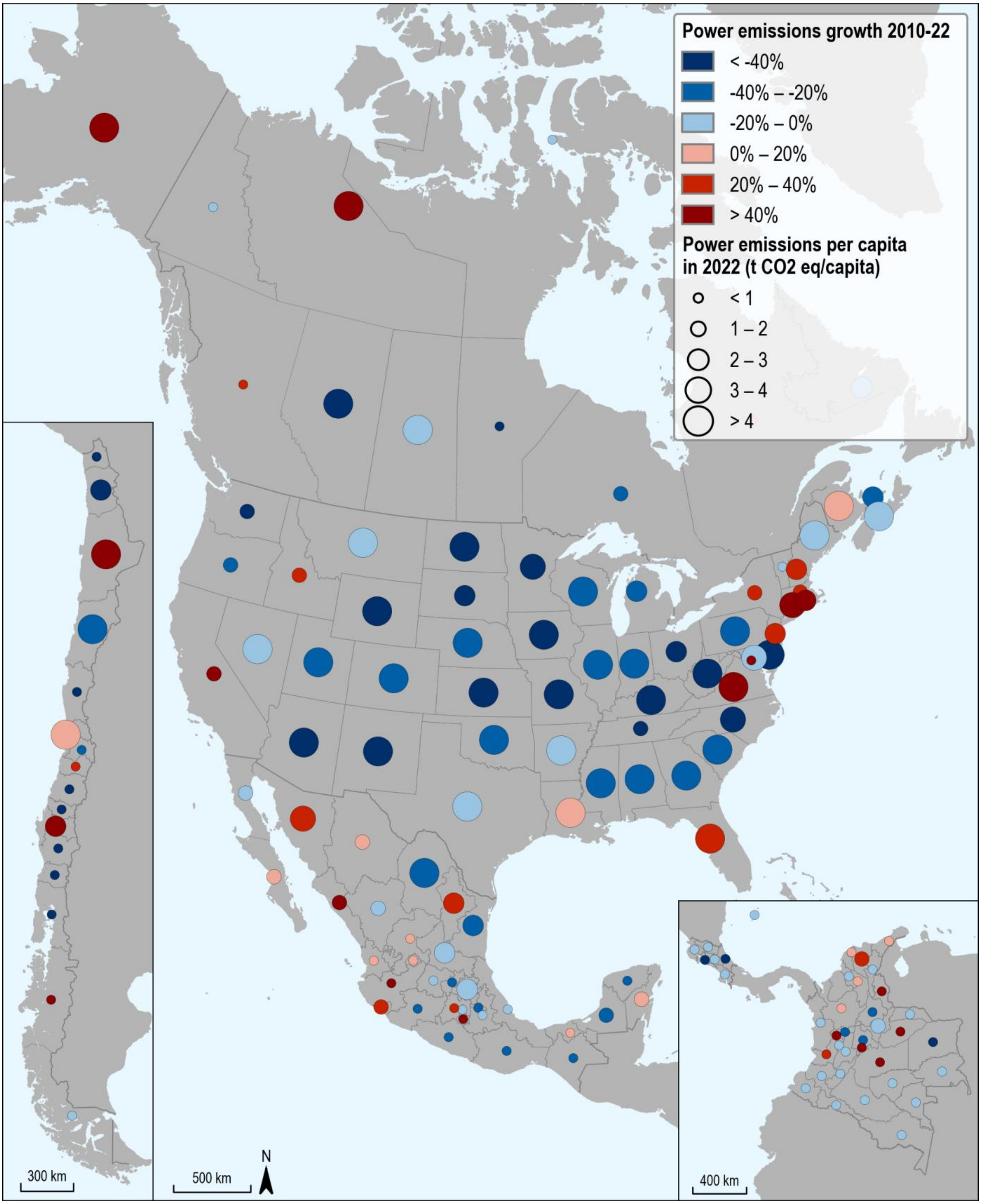

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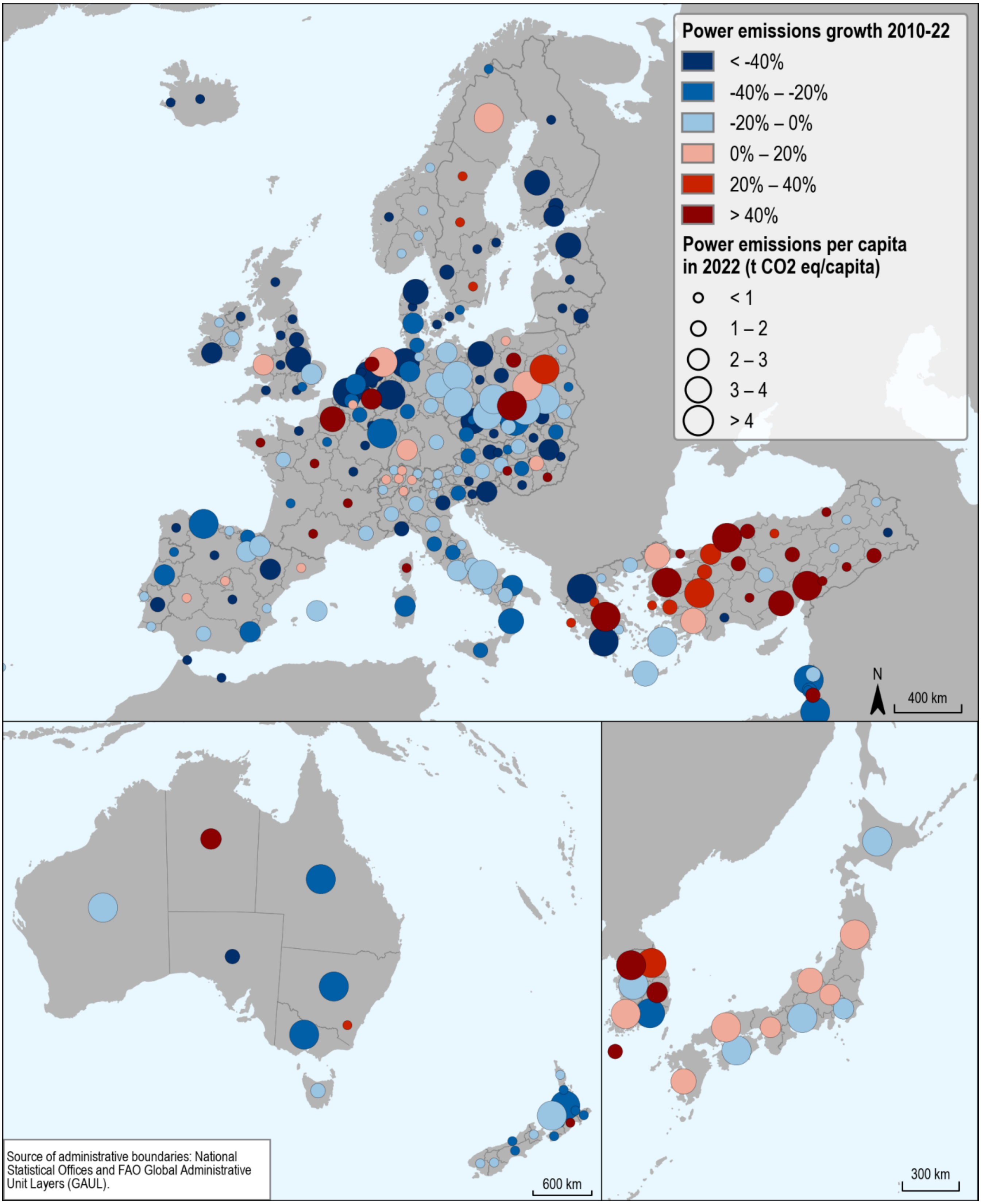
Figure 3.18. Power sector production-based GHG emissions per capita in large regions, 2022 levels and 2010-22 growth – Europe and Asia-Pacific

Based on estimates in CO_2-eq/capita



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The role of the residential sector in climate mitigation

The decarbonisation needs of the residential sector differ widely between rural and urban areas

The residential sector plays a key role in climate mitigation efforts as households can take measures to accelerate the clean energy transition. This involves refurbishing homes, using less energy and choosing goods and services supporting the circular economy.

How much homes rely on fossil fuels to meet their energy needs varies widely across regions. Buildings consume 30% of the world's final energy and cause 26% of energy-related CO_2 emissions (8% are direct emissions and 18% are indirect emissions from producing electricity and heat for buildings). Although direct emissions from buildings decreased slightly in 2022, indirect emissions increased by 1.4% in 2022. This is due to a larger reliance on electricity (IEA, 2023). In 2021, electricity accounted for 38% of the residential final energy consumption in OECD countries (3 p.p. higher than in 2010), while coal, natural gas and oil products accounted for over half. The electrification of the residential sector ranges from 12% in Latvia and Poland to 83% in Norway. Canada and the United States record particularly large disparities across states and provinces. This rate ranges from around 17% in Alaska to more than 85% in Florida, United States, and 17% in Alberta to 100% in Nunavut for Canada.

The decarbonisation needs of existing buildings with respect to energy use differ widely between rural and urban areas. Oil and coal heating systems, the most emission-intensive heating technologies, are much more common in rural areas of some countries, such as Czechia, France, Germany and Ireland. For example, in Ireland, 63% of rural dwellings use fuel oil and 14% use coal for heating, while in cities, these numbers drop to 12% and 1%. This also applies to biomass heating systems, which are common in rural areas of some OECD countries such as Chile, France, New Zealand, Portugal and Switzerland. Although better for the climate, wood burners also release air pollutants, including particulate matter, which can affect well-being. In Portugal, 59% of rural dwellings use biomass, while in cities only 13%. On the other hand, gas boilers and furnaces tend to be more common in cities, towns and suburbs than in rural areas, such as France, Ireland, the Slovak Republic, Switzerland and the United States (Figure 3.19).

Households can also help the environment by reducing their waste, recycling more and in general, contributing to the circular economy. Increased household consumption can lead to pressure on the use of water, land and materials, as well as on GHG and air pollutant emissions. OECD regions show important disparities in the evolution of municipal waste generation per inhabitant. Between 2016 and 2020, municipal waste per capita increased in more than 60% of the 223 OECD regions with available data (Figure 3.20). Except for Belgium and the Slovak Republic, most countries' capital regions recorded a lower growth in per capita municipal waste. Capital-city regions are also at the forefront of municipal waste recovery: the share of municipal waste treated with recovery processes is 12 p.p. higher in capital-city regions than at the national level on average across countries (Figure 3.21).

Definitions

In buildings, **direct GHG emissions** (Scope 1) stem from onsite combustion of fossil fuels, such as heating systems, while **indirect emissions** include Scope 2 from purchased electricity and Scope 3 from waste disposal or building construction.

Residential final energy consumption is the total energy used directly by households. It excludes losses in transformation and distribution. The main sources of final energy are electricity, natural gas, coal, oil products and heat.

Municipal waste recovery includes waste that undergoes material recycling or other forms of recovery (including energy recovery and composting). Landfilling is excluded.

Further reading

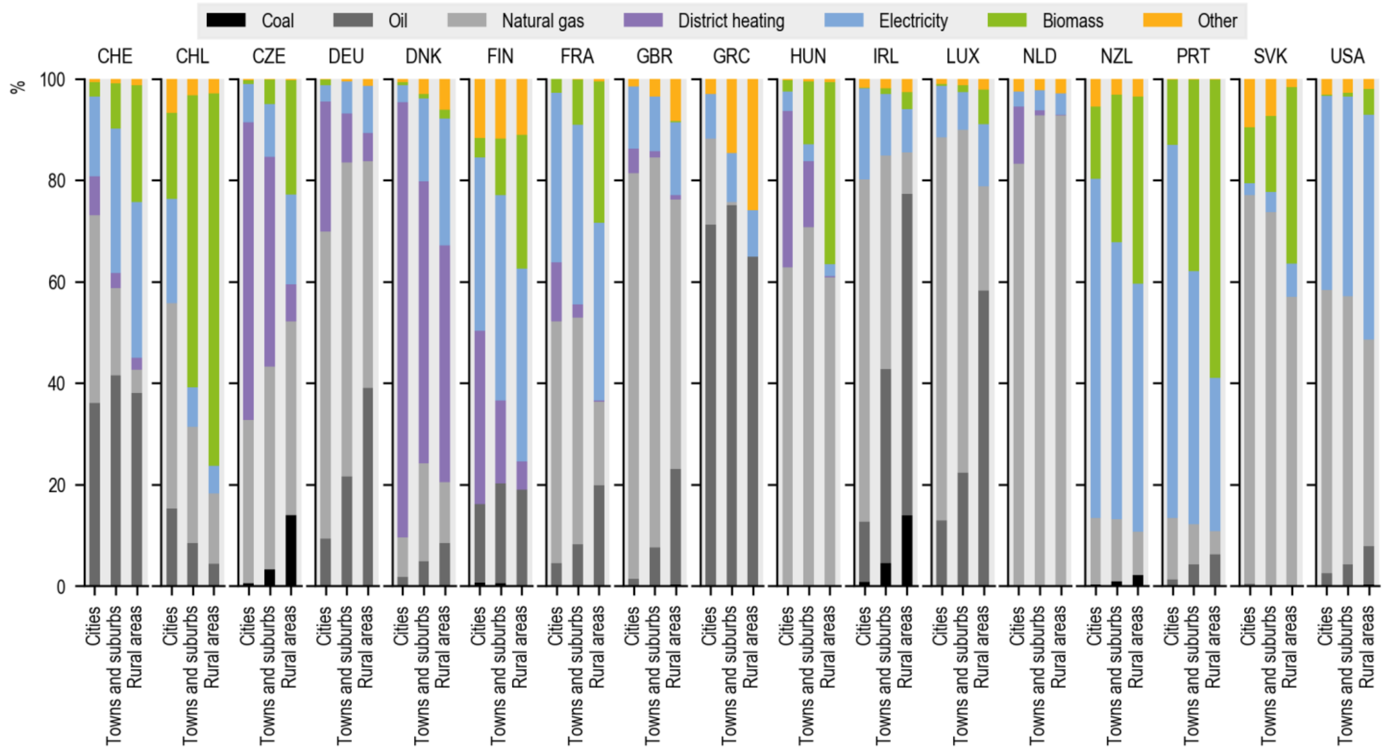
IEA (2023), *Tracking Clean Energy Progress 2023*, IEA, Paris, https://www.iea.org/reports/tracking-clean-energy-progress-2023, License: CC BY 4.0.

Figure notes

Figure 3.19: 17 OECD countries are covered. 2022 is the reference year, except 2023 for DNK; 2021 for CZE, GBR, LUX and SVK; 2019 for FRA; 2018 for NZL; 2011 for GRC and PRT. Other sources refer to geothermal, solar thermal or no heating.

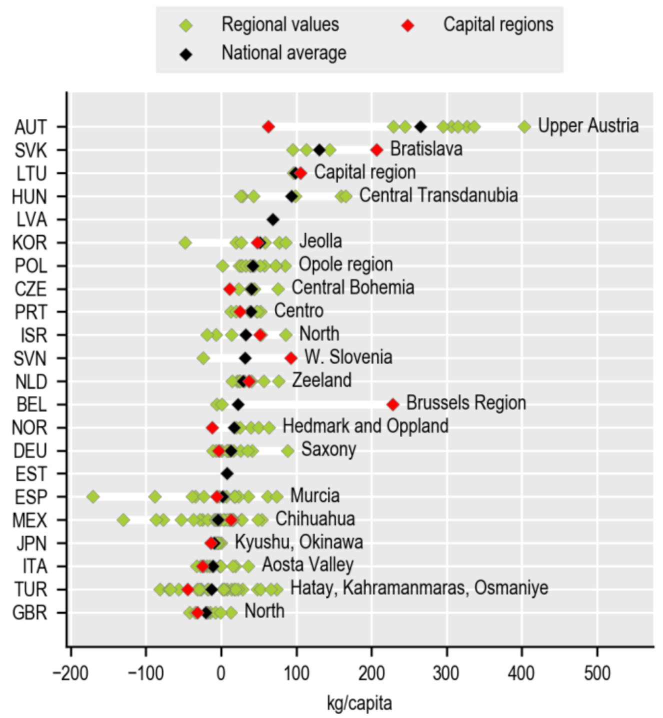
Figure 3.21: 2021 is the reference year, except: 2020 for ITA, LVA, MEX, NOR and PRT; 2018 for AUS and FRA; 2019 for AUT; 2017 for CHL; 2015 for DEU; 2016 for TUR; 2013 for CZE and LUX.

Figure 3.19. Main energy source in occupied dwellings by country and degree of urbanisation, 2022



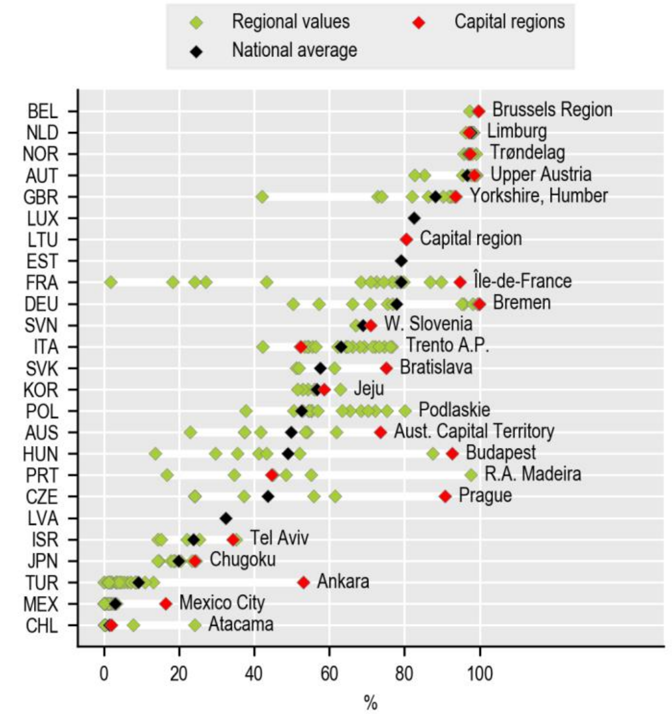
StatLink https://stat.link/xipmtk

Figure 3.20. Change in municipal waste per capita in large regions, 2016-20



StatLink https://stat.link/p5goez

Figure 3.21. Municipal waste recovery rates in large regions, 2021



StatLink https://stat.link/tmxkcs

Towards sustainable transport in regions and cities

While transport electrification has grown rapidly in many OECD regions, remote regions are still lagging

The transport sector will play a key role in the transition towards achieving net zero emissions. It currently accounts for 23% of total GHG emissions in OECD countries (excluding international shipping and aviation). About 88% of these emissions originate from road transport. This transition will involve shifting to less carbon-intensive travel options, such as walking, cycling and public transport, and adopting alternative technologies such as electric vehicles (ITF, 2023). A territorial approach is crucial, as rural and urban areas have distinct transportation needs and infrastructure.

Ground transport emissions were more than three times higher per capita in remote regions than in large metropolitan regions in 2022 (Figure 3.22). As people in remote regions often depend on cars and travel long distances, a higher adoption of electric or hybrid vehicles could certainly contribute to reducing emissions. However, electric and hybrid vehicles currently make up 2.2% of passenger vehicles in these regions, compared to 5.2% in metropolitan regions. Hybrid vehicles, in turn, are four times more common in large metropolitan regions than in remote regions. Capital regions record 2.6 p.p. more electric and hybrid vehicles than the national average (Figure 3.23).

While there are challenges to increasing the use of electric and hybrid vehicles in rural and remote regions, such as fewer charging points due to low population density, many countries have overcome these issues. For example, in Oslo and Viken, Norway, over 30% of vehicles are hybrid or electric; in Northern Norway, the figure is close to 10%. Additionally, in 2022, more than 40% of the vehicles newly registered in most regions in Belgium, Hungary and Switzerland were either hybrid or electric. In regions like Southern Transdanubia, Hungary, and Lake Geneva, Switzerland, over half (53%) of new vehicles were electric or hybrid (Figure 3.24).

Most workers rely mainly on their car for commuting in most OECD FUAs but to a lesser extent in capital cities where public transport, walking or cycling is more widespread. On average, across 858 FUAs with available data, 73% of commuters use their car to go to work, whilst only 20% use low-carbon means of transport (Figures 3.25 and 3.26). Of these, 8% use public transportation, 8% walk and close to 4% commute by bike. In most OECD countries, capital cities have led the shift towards low-carbon modes of transport for commuting. On average, 38% of workers commute there using low-carbon modes of transport, including 26% by public transport. In both Santiago and Valparaiso, Chile, close to 66% of workers use low-carbon modes to get to work, the highest share among FUAs, followed by Geneva, Switzerland, and San Antonio, Chile.

Definitions

Transport emissions estimated using EDGAR version 8 are expressed in CO_2 equivalents by considering the 4 main GHGs: CO_2, CH_4, N_2O and F-gases.

Passenger vehicles include road vehicles, other than motorcycles, intended for the carriage of passengers; they have less than nine seats, including the driver.

Low-carbon modes of transport to work refer to walking, cycling and public transport.

Further reading

ITF (2023), *ITF Transport Outlook 2023*, OECD Publishing, Paris, https://doi.org/10.1787/b6cc9ad5-en.

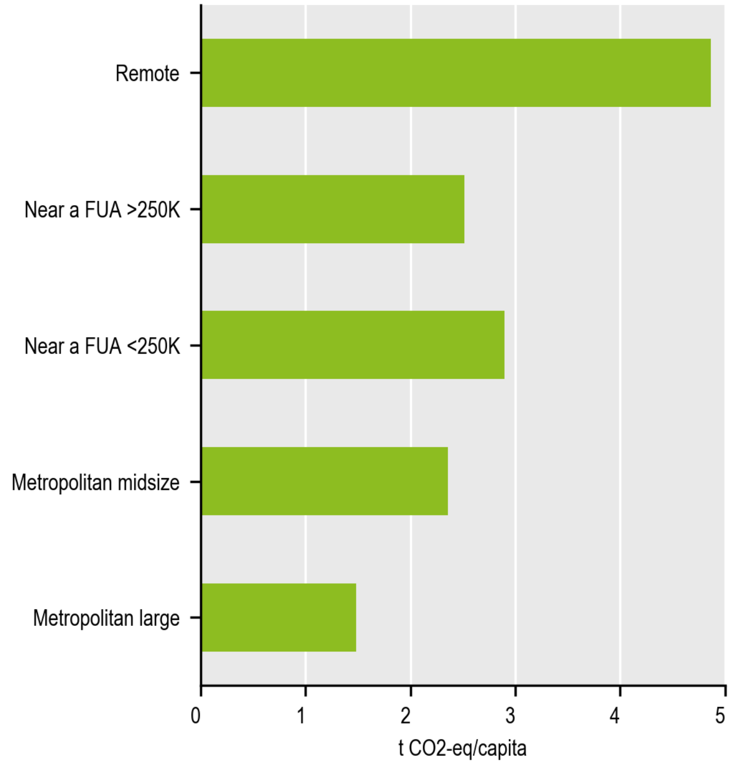
Figure notes

Figure 3.23: 18 OECD countries covered. 2022 is the reference year, except 2021 for DEU, GBR, IRL, POL and SVN; 2020 for NOR: 2020.

Figure 3.24: 10 OECD countries covered. 2022 is the reference year, except 2021 for CAN, GBR, HUN and SVN.

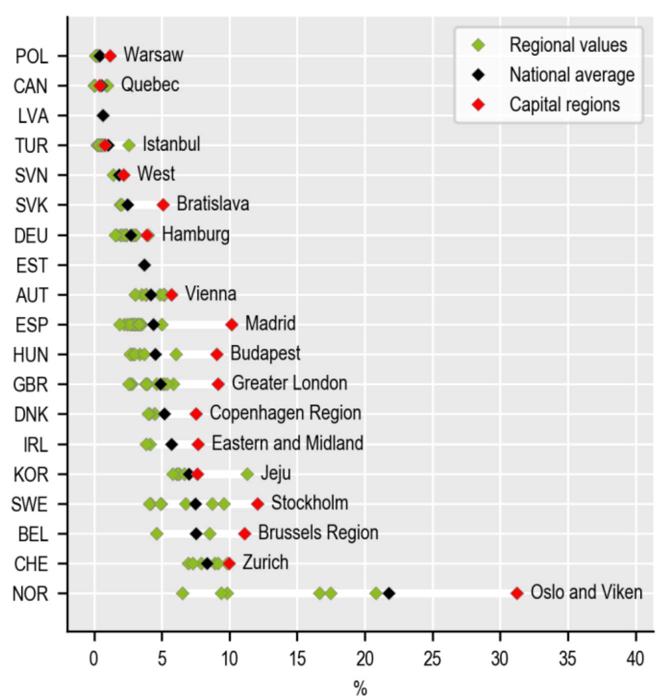
Figures 3.25 and 3.26: 22 OECD countries covered. 2021 is the reference year, except 2022 for CHL, IRL and USA; 2020 for FRA, JPN and KOR; 2018 for EST and NZL; 2017 for LVA and SVN; 2016 for AUS and DEU; 2015 for MEX; 2014 for CHE; 2011 for BEL, FIN, GBR and ITA.

Figure 3.22. Ground transport GHG emissions per capita by small region type, 2022



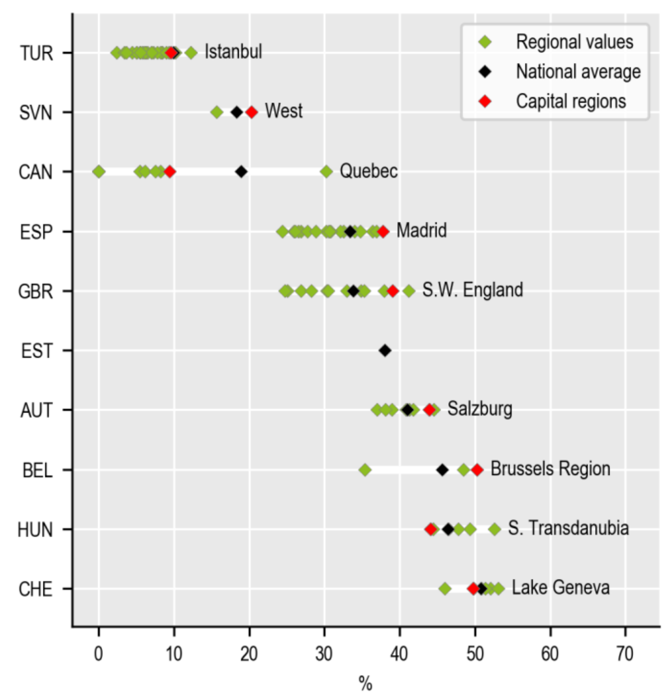
StatLink https://stat.link/kvlsaj

Figure 3.23. Share of electric or hybrid passenger vehicles in large regions, 2022



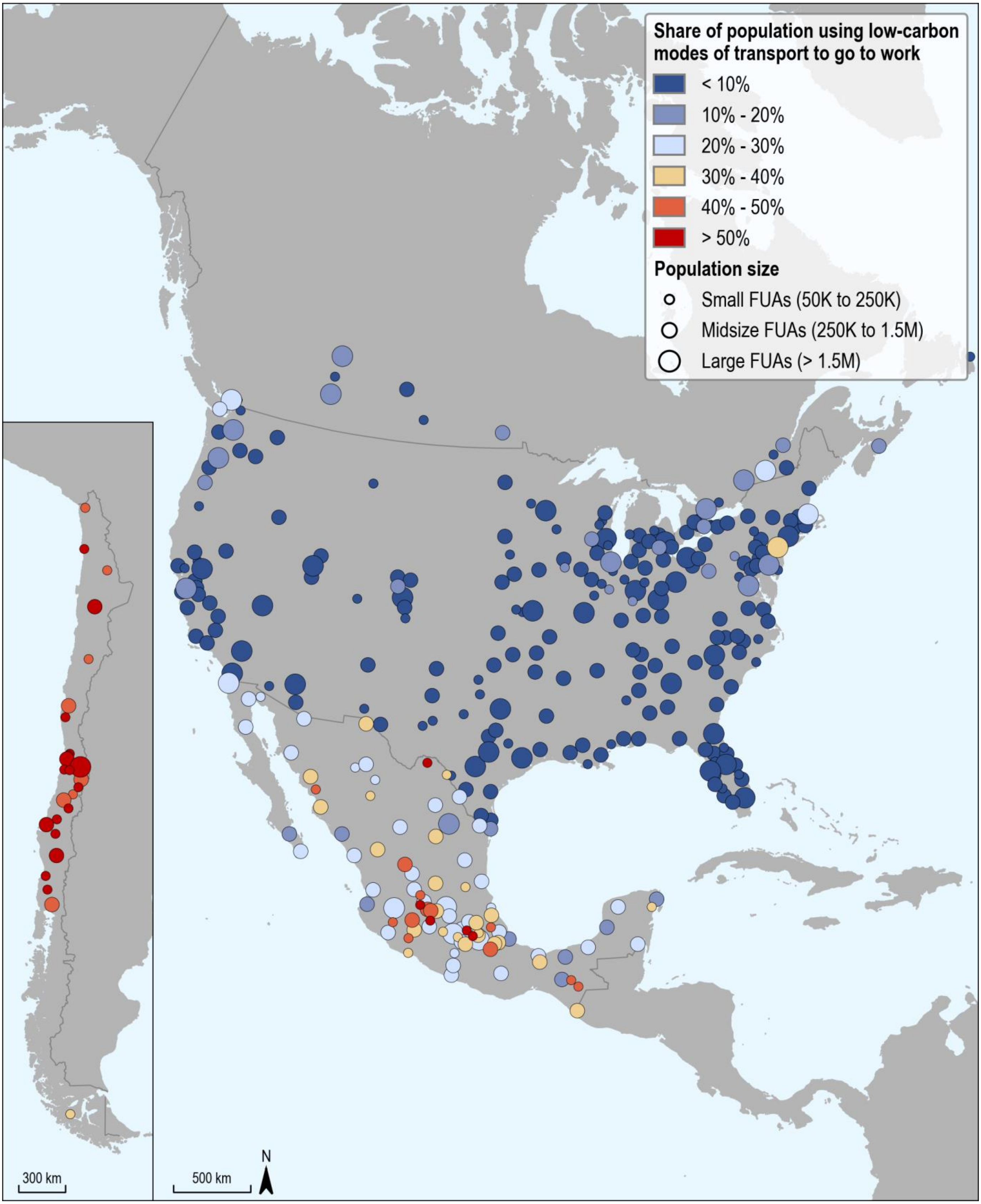
StatLink https://stat.link/z1ehsx

Figure 3.24. Share of new registered electric or hybrid passenger vehicles in large regions, 2022



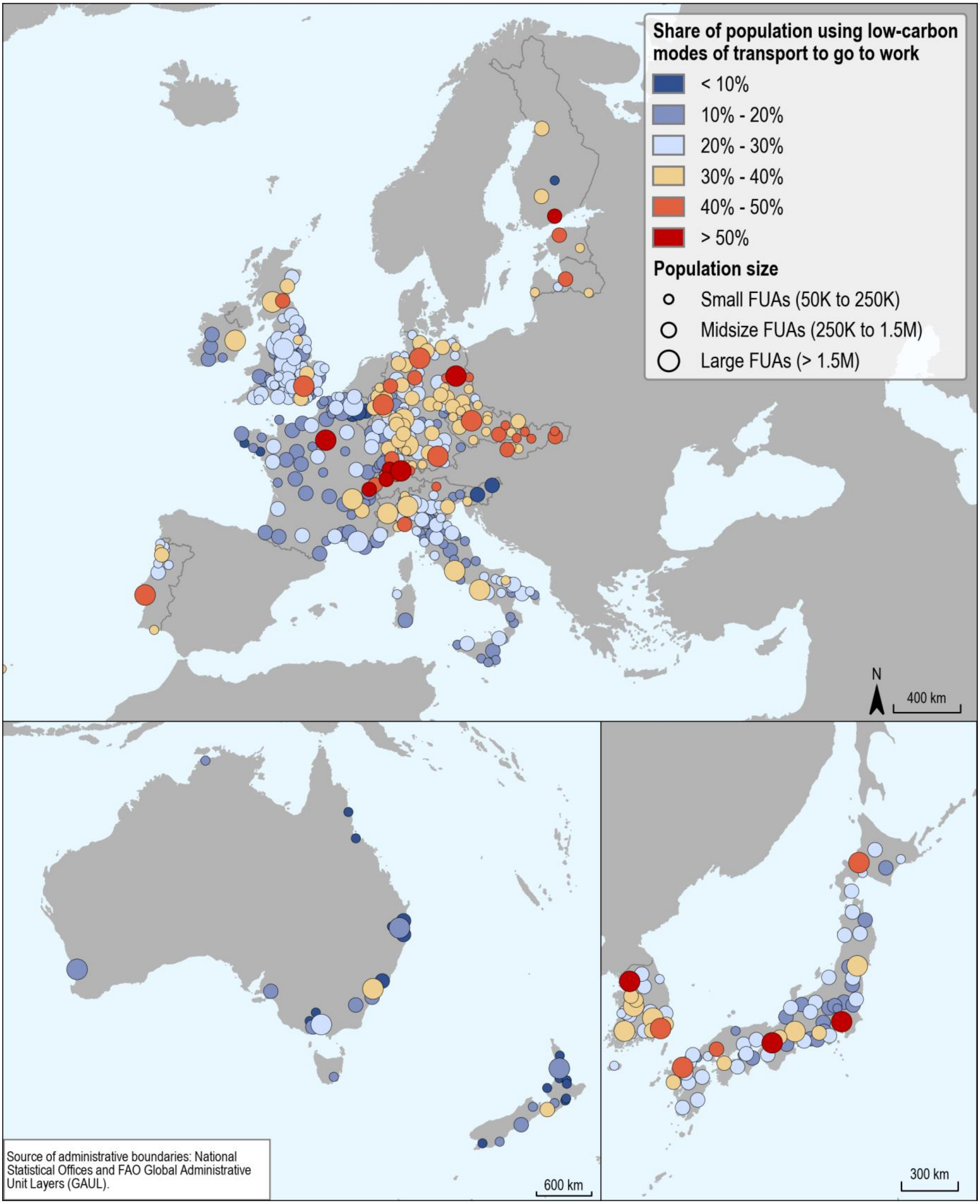
StatLink https://stat.link/w49ds0

Figure 3.25. Share of commuters using low-carbon modes of transport in FUAs by population size, 2021 – Americas



StatLink https://stat.link/k8w0ne

Figure 3.26. Share of commuters using low-carbon modes of transport in FUAs by population size, 2021 – Europe and Asia-Pacific



Source of administrative boundaries: National Statistical Offices and FAO Global Administrative Unit Layers (GAUL).

StatLink https://stat.link/7b0q56

Towards sustainable land use and biodiversity protection in regions and cities

OECD regions have lost 10% of their forests in the last 2 decades and many OECD FUAs – and especially small ones – have seen built-up area growth outpace population growth

Between 2010 and 2020, the new built-up areas across the globe consumed an area as big as Austria. This expansion addresses the growing need for housing and infrastructure, especially in developing and urbanising economies, but it can also harm the environment, biodiversity and many dimensions of well-being. A growing number of countries have set targets to achieve net zero land take by 2050: for instance, the European Union set a non-binding goal for 2050 and France has legally committed to this objective.

Built-up growth has been widespread in OECD regions and even those experiencing population decline increased built-up areas in the last decade, although at a slower pace than regions that are growing in population. In remote regions, where built-up area growth is largest, built-up surface growth in 2010-20 in regions experiencing population decline was around 11%, faster than the growth seen by metropolitan regions with population growth (Figure 3.29).

Although cities record lower built-up area per capita than others, there are also clear signs of increased unsustainable land use in cities, especially in smaller ones. In nearly 70% of FUAs that saw population growth population in 2010-20, the expansion of built-up areas outpaced the population growth. On average, the increase in built-up areas was 6.6 p.p. higher than population growth in OECD FUAs. Smaller FUAs with fewer than 100 000 inhabitants experienced an average population decrease of 2.1%, but their built-up areas expanded by 11.6%. Strikingly, smaller FUAs that saw population decline (by -7.4%) expanded their built-up areas by 11% in built-up, while those that gained population (by 6.3%), saw an increase of 12.2%. In contrast, in large FUAs where the population grew by 10%, the increase in built-up areas matched the population growth rate (Figures 3.31 and 3.32). Large FUAs also tend to use space more efficiently, with 92 m^2 of built-up area per inhabitant, almost 30 m^2 lower than in FUAs with less than 500 000 inhabitants.

Urbanisation is not the only cause of biodiversity loss and the destruction of natural habitats; deforestation and climate change also play significant roles. On average, OECD regions have lost 10% of their forests between 2000 and 2022 (Figure 3.27). Portugal is the most impacted OECD country, with more than half of its forest cover lost. In some regions, forest loss aligns with large forest fires. For example, Centro in Portugal and the Canberra region in Australia lost nearly 60% of their forests from 2000 to 2022. Fires have also severely hit these regions, burning 46% and 82% of their forests from 2000 to 2022.

Natural protected areas are crucial for preserving biodiversity and maintaining natural habitats. Despite this, construction continues to expand in these areas, particularly in remote regions. The Kunming-Montreal Global Biodiversity Framework aims to protect at least 30% of land by 2030 (Convention on Biological Diversity, 2023). Currently, nine OECD countries and about a quarter of OECD large regions have met this goal, with Costa Rica and Luxembourg leading in this effort by protecting more than half of their land. OECD regions protect 21% of their terrestrial areas and the average gap between the most and the least protected region is 31 p.p. (Figure 3.28). Worryingly, from 2010 to 2020, built-up growth consumed an area equal to the Brussels region in Belgium in protected areas that, in principle, have stricter management. In fact, in remote regions, built-up growth was faster in protected areas (18%) than in other (non-protected) remote areas (14%), considering all designated protected areas as recorded in January 2024 (Figure 3.30).

Definitions

Built-up surface refers to the footprint of any roofed structure built above ground.

Forests are defined as vegetation taller than 5 m using the Hansen Global Forest Change (2000-22) data. **Forest cover loss** is defined as a change from a forest to a non-forest state from 2000 to 2022. Forest gains are not considered here.

Protected areas here refer to territorial protected areas from the World Database on Protected Areas, including all categories from the International Union for Conservation of Nature. **Protected areas with stricter management** refer to the following categories: strict nature reserves, wilderness areas, national parks and habitat or species management areas.

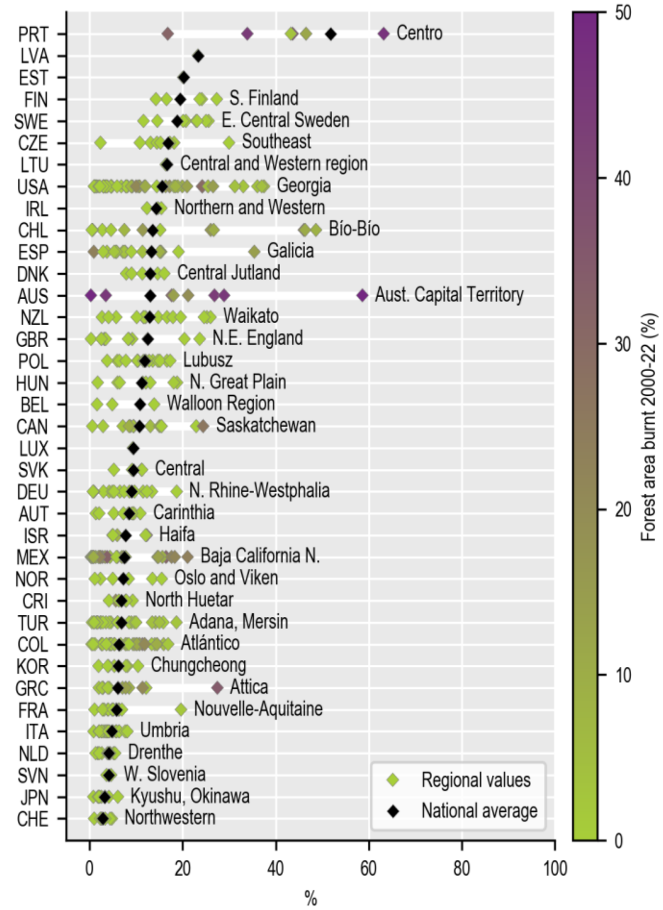
Further reading

Convention on Biological Diversity (2023), *2030 Targets*, https://www.cbd.int/gbf/targets.

Figure notes

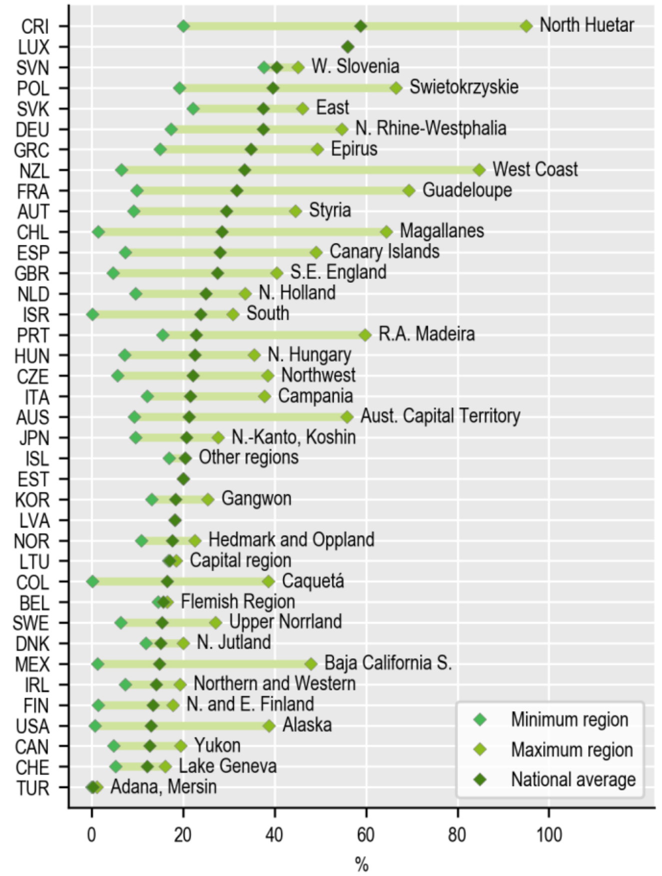
Figure 3.28: Only regions with more than 1% of tree cover in 2000 are represented.

Figure 3.27. Forest loss in large regions, 2000-22



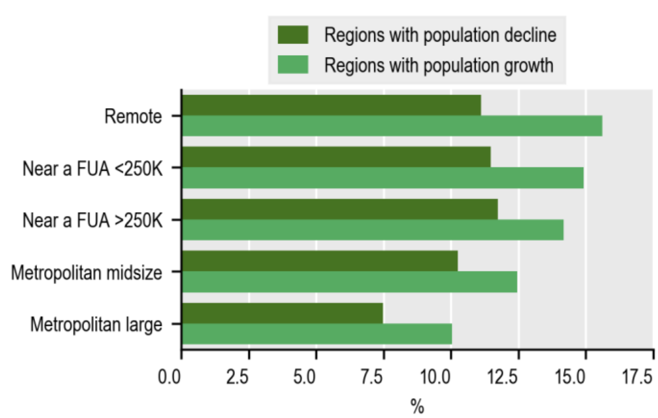
StatLink https://stat.link/f4tnk0

Figure 3.28. Share of protected areas in large regions, 2023



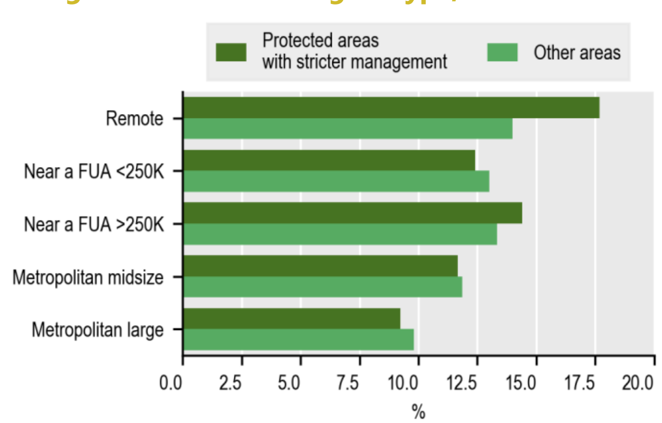
StatLink https://stat.link/eatrjx

Figure 3.29. Built-up surface growth by demographic trend and small region type, 2010-20



StatLink https://stat.link/ryiozp

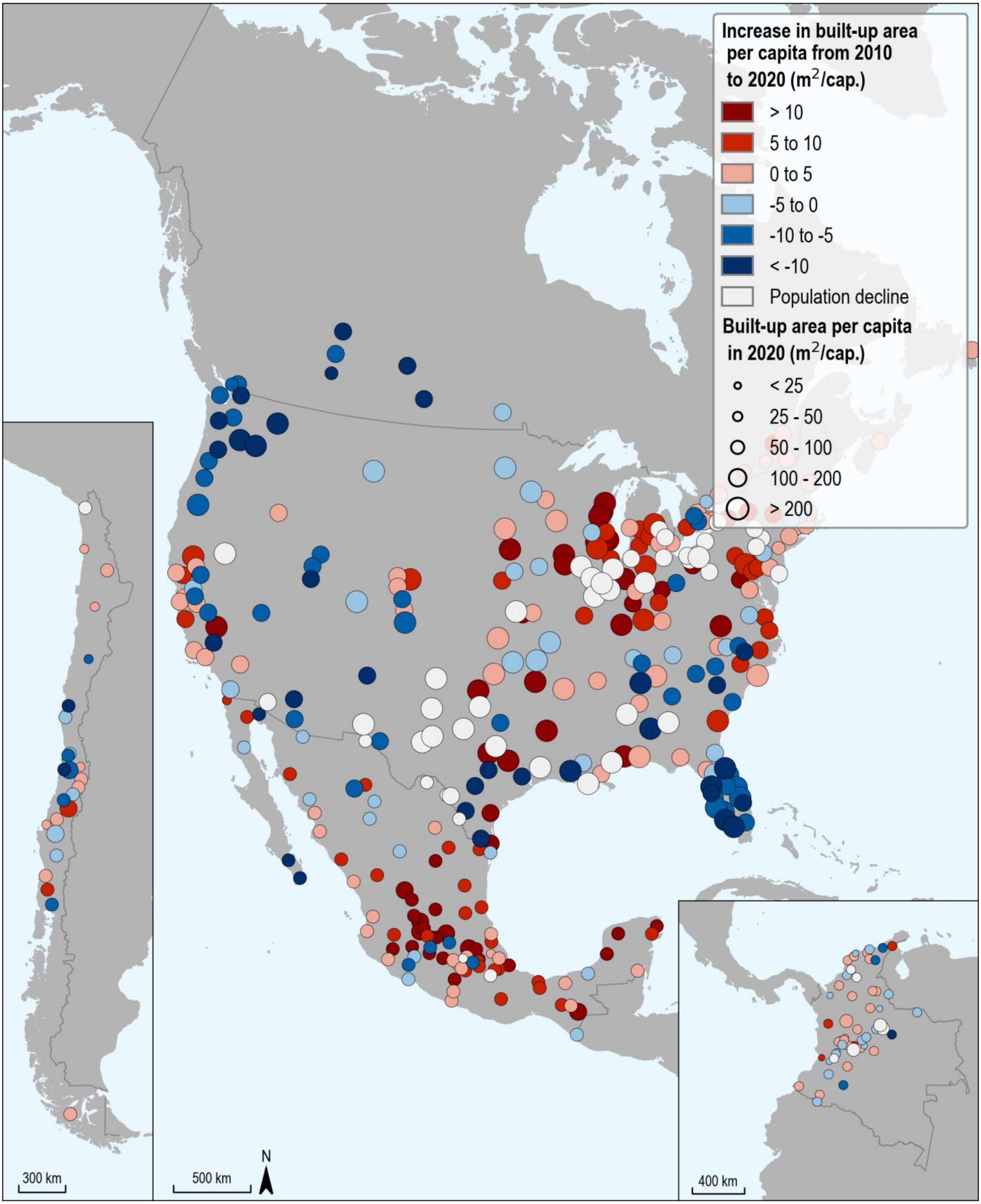
Figure 3.30. Built-up surface growth by type of management and small region type, 2010-20



StatLink https://stat.link/squh7d

Figure 3.31. Built-up surface per capita in FUAs, 2020 levels and 2010-20 change – Americas

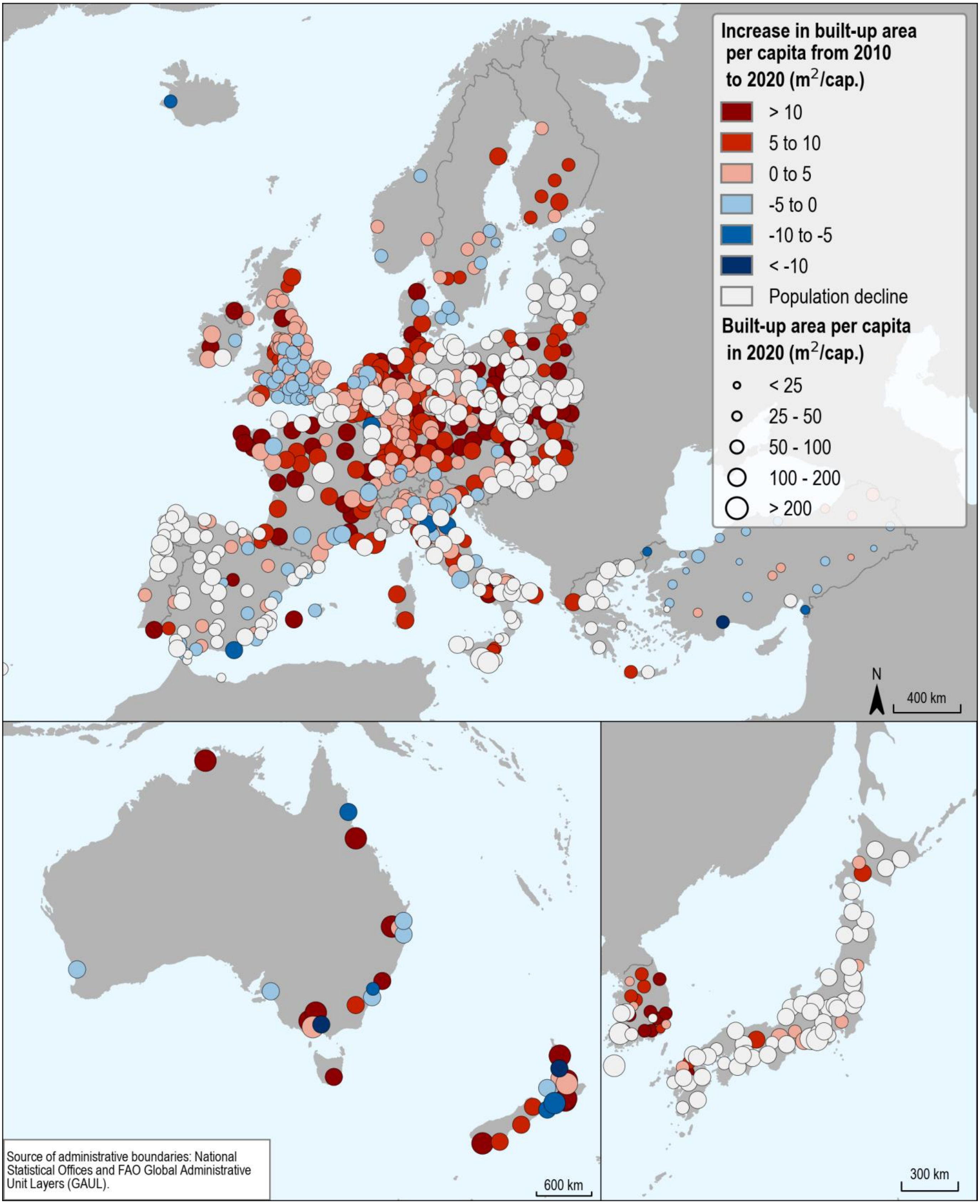
Based on built-up surface per capita in m^2/capita



StatLink https://stat.link/yu1l0x

Figure 3.32. Built-up surface per capita in FUAs, 2020 levels and 2010-20 change – Europe and Asia-Pacific

Based on built-up surface per capita in m^2/capita



Source of administrative boundaries: National Statistical Offices and FAO Global Administrative Unit Layers (GAUL).

StatLink https://stat.link/0phw5r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4. LIVING STANDARDS AND EQUAL OPPORTUNITY

Household income inequality within regions and cities

Over the last decade, household income inequality decreased in regions that were very unequal in 2010

Income deprivation has been linked to lower well-being and economic outcomes (OECD, 2018). Moreover, large income inequalities between people and places can reduce social mobility and worsen the geography of discontent (OECD, 2023). Today, household income inequality within OECD regions remains high. In 276 regions in 23 OECD countries, the income of the richest 20% of households was on average 6.7 times that of the poorest 20% in 2022. Differences between the least and most unequal region within countries were lowest in Ireland, Hungary and the Slovak Republic and highest in Colombia (7.4 in Risaralda - 21.5 in Cauca), Chile (6.6 in O'Higgings -13.2 in Santiago Metropolitan) and the United States (4.9 in South Dakota - 11.4 in the District of Columbia).

Amidst slow changes in income inequality between the richest and the poorest households at the national level over the last decade, regions that were very unequal in 2010 saw substantial changes (Figure 4.1). In 2010-2022, the biggest decreases in inequality were seen in regions that were relatively more unequal in 2010, mostly in Latin America (Figure 4.2). All regions in Germany, Hungary and Lithuania saw increases and all regions in Belgium, Ireland and Poland saw decreases.

Relative poverty remains widespread in OECD regions, with women being disproportionately affected. On average, 14% of people in OECD regions live in relative poverty (in households with incomes below 50% of the national median disposable income), with little variation in the last 12 years. Women are more likely to be in relative poverty than men: across OECD regions, 15% of women were at risk of poverty, compared to 13% of men. The higher risk of poverty for women varies considerably within countries, spanned by more than 8 percentage points (p.p.) in 5 OECD countries. In 240 out of 289 OECD regions with available data, the female poverty rate surpassed that of males and, for 22 of those, the gap was larger than 5 p.p. (Figure 4.3). Moreover, in 17 out of 24 OECD countries with available data, women may experience more or less poverty compared to men, depending on the region where they live. Regions in Czechia, Lithuania and Spain have the largest female-to-male relative poverty gaps.

Where do the richest and poorest households concentrate? Data available for 222 functional urban areas (FUAs) indicate that incomes in urban centres are 7.5% lower than in commuting zones, except in most (8 out of 14) capital cities, where income is generally higher in urban centres. In 11 out of 15 countries with available data, commuting zones had higher mean income than urban centres (Figure 4.4). In Belgium, where disparities were highest, mean income in urban centres was 25% lower than in commuting zones.

Definitions

S80/S20 ratio: The total income received by the 20% of people with the highest income in a region divided by the total income received by the 20% of people with the lowest income in the same region.

Relative poverty rate: The share of people – as a percentage of the total population – living in households with a disposable income below the relative poverty line (50% of the national median disposable income).

Gender difference in relative poverty rates: Percentage point difference between the percentage of adult women and men (18 years old or older) living in households with disposable income below the poverty line.

Disposable income: Household income after taxes and transfers.

Further reading

OECD (2023), *The Longstanding Geography of Inequalities*, OECD Publishing, Paris, https://doi.org/10.1787/92cd40a0-en.

OECD (2018), *A Broken Social Elevator? How to Promote Social Mobility*, OECD Publishing, Paris, https://doi.org/10.1787/9789264301085-en.

Figure notes

Figure 4.1: Colombian regions excluded to aid visualisation.

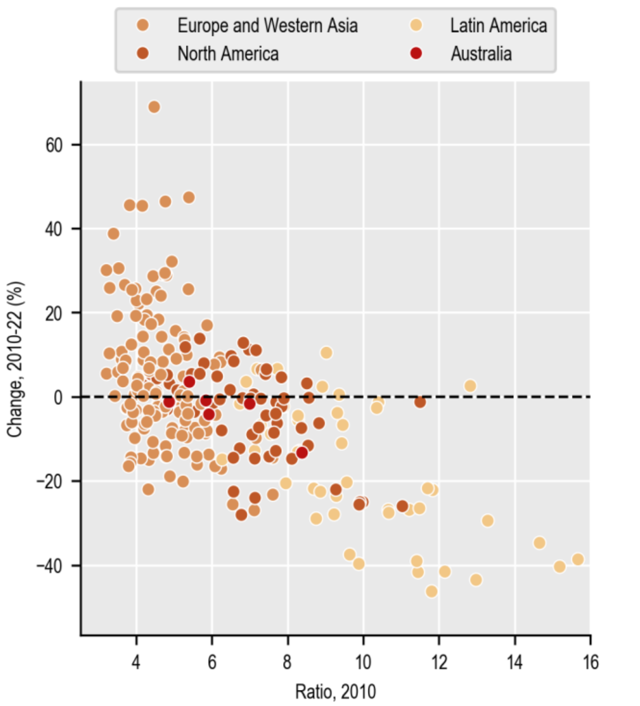
Figure 4.1 and Figure 4.2: First year: 2011 for CHL and IRL. Last year: 2021 for GBR, ISR, SWE and USA; 2020 for AUT, COL and LTU; 2019 for CAN, CHE, DEU and IRL; 2018 for AUS, FRA and SVK; 2017 for CHL.

Figure 4.3: 2021 for GBR, ISR, SWE and USA; 2020 for AUT, COL and LTU; 2019 for CAN, CHE and IRL; 2018 for AUS, FRA and SVK; 2017 for CHL. Includes only countries with data from 2017 or older.

Figures 4.1, 4.2 and 4.3: TL3 regions for LTU; NUTS1 regions for GRC, HUN and POL.

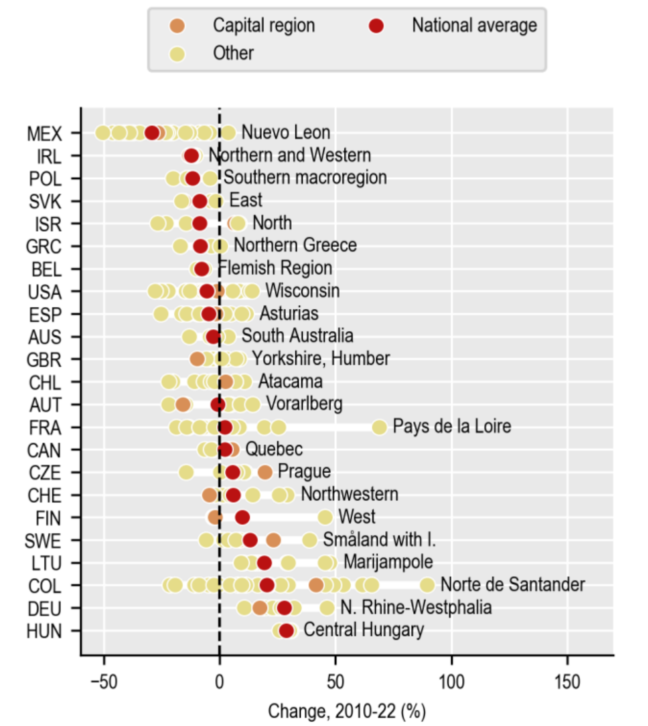
Figure 4.4: Number of FUAs in parentheses. Only FUAs with more than 5 small area units were selected. 2021 for CAN and USA; 2020 for DNK, FIN, FRA and LUX; 2019 for BEL, ESP, PRT and SWE; 2018 for AUT, CHE, DEU and GBR.

Figure 4.1. S80/S20 disposable income ratios in large regions, 2010 vs. 2010-22



StatLink https://stat.link/a6wpkg

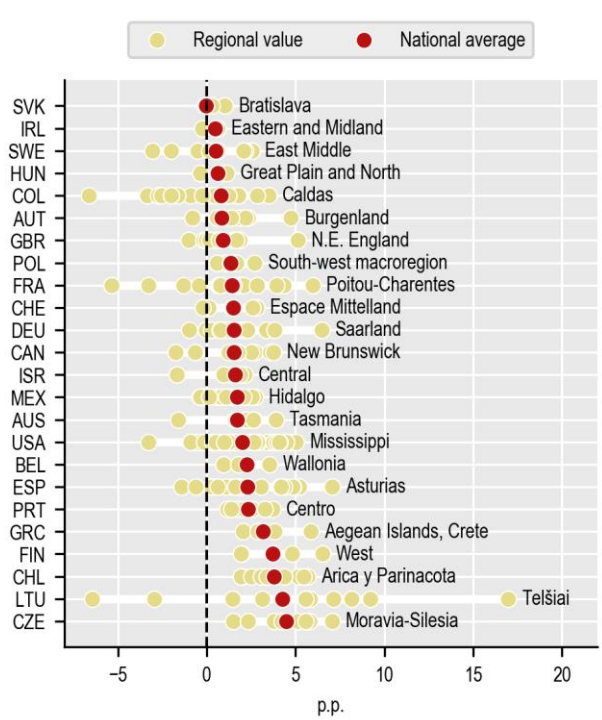
Figure 4.2. Change in S80/S20 disposable income ratio in large regions, 2010-22



StatLink https://stat.link/8nxbfa

Figure 4.3. Difference between women and men relative poverty shares in large regions, 2022

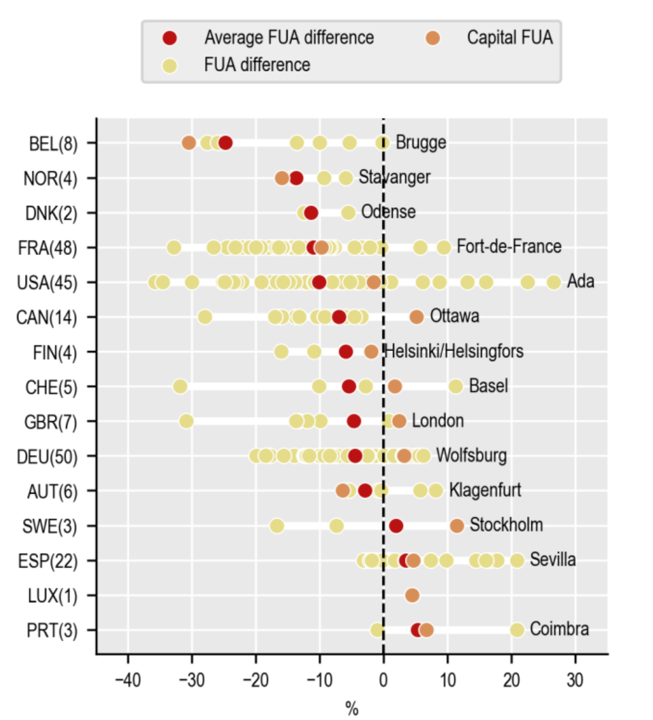
Percentage point difference between % of adult women and men living in households in relative poverty



StatLink https://stat.link/2g3prv

Figure 4.4. City-commuting zone difference in mean disposable income, 2022

% difference based on small area units in midsize/large FUAs



StatLink https://stat.link/kacgl4

Healthy populations and performing health systems in regions

Regions far from cities have fewer health system resources relative to potential needs than regions with or close to a city

Strong health systems in regions that provide equitable access and can respond effectively to emergencies are essential to the overall health and well-being of populations, as well as a foundation for economic and social development. The performance of health systems can be measured across five dimensions: health status, risk factors for health, capacity and resources, access to care and quality of care (OECD, 2023).

Health status differences between remote and other regions persist after the pandemic. At the pandemic's peak, life expectancy gains in the last decade were cut by half in large metropolitan regions and by more than two-thirds in regions far from an FUA. In 2023, the life expectancy gaps between remote and metropolitan regions were 2.4 years (Figure 4.5). Cardiovascular mortality, another health status indicator, was 19% higher in remote regions than the national average (Figure 4.6). Finland had the largest relative disparities between metropolitan and remote areas (67% or 263 vs. 440 deaths per 100 000 inhabitants), whilst Hungary had the largest absolute difference (604 vs. 813 deaths per 100 000 inhabitants).

Regions also face different exposure to health risks. Obesity, which can lead to several chronic conditions, was more common (2 p.p. higher) in regions far from a midsize/large FUA than in other region types on average across 11 OECD countries with available data. Metropolitan and near a midsize/large FUA region typically have higher exposure to air pollution, causing respiratory and chronic diseases. Pollution levels, measured by particulate matter (PM2.5) concentration, were, on average, well above the World Health Organization (WHO) guidelines in those regions (13.8 and 12.1 microgram per cubic metre ($\mu g/m^3$) vs. the recommended level of 5) and above levels in remote regions (9.3 $\mu g/m^3$) (Figures 4.9 and 4.1). The five most polluted OECD small regions, all in Chile, have PM2.5 concentrations more than ten times above the WHO guidelines.

Health resources – in particular, health workforce and inpatient care capacity – are often less available in regions far from cities. Regions far from a midsize/large FUA have 12% fewer doctors per inhabitant than the national average, while metropolitan regions have 4% more doctors (Figure 4.7). Although the distribution of nurses and hospital beds is more even across different regions, in 13 countries with available data, 30% of people live in regions (124 out of 367) below the national average for doctors, nurses and hospital beds per inhabitant. More than half of these less-equipped regions are far from a midsize/large FUA (67/124 regions).

People who live far from cities also struggle to access healthcare physically. In regions far from a midsize/large FUA, 9% of the population cannot reach a general hospital in less than 45 minutes' drive (Figure 4.8). The ease of reaching a hospital varies within these regions, with up to 11% of people in rural areas unable to reach a hospital within 45 minutes compared to as little as 1% of people living in small cities. In countries with vast, thinly populated areas or islands, like Greece, a significant portion of people living far from cities cannot get to a hospital within 45 minutes, even in towns and small cities. However, this is not the same everywhere. In Australia, for example, almost everybody living in towns within regions far from a midsize/large FUA can access a hospital.

Quality differences in access to healthcare across places remain difficult to evaluate without more granular data. More human resources and capacity have been associated with higher quality at the national level, while there is no clear pattern with respect to health spending (OECD, 2023). Available survey data for OECD countries show that, in 28 out of 38 OECD countries, a larger share of people in rural areas report dissatisfaction with the availability of quality healthcare compared to those in cities (35% vs. 28%). This difference is bigger for men (8.5 p.p.) than for women (5.1 p.p.).

Definitions

General hospitals comprise licensed establishments primarily engaged in providing general diagnostic and medical treatment (both surgical and non-surgical) to inpatients with a wide variety of medical conditions, as defined in the OECD Health care resources dataset (OECD, 2024).

Life expectancy at birth estimates the number of years a newborn can expect to live if current death rates by age group remain the same during their lifetime.

Cardiovascular mortality corresponds to the number of deaths from diseases of categories I00 to I99 in the International Classification of Diseases.

Obesity refers to the population aged 15 or older with a body mass index above 30 kilograms per square metre.

Doctors (physicians) are usually generalists who assume responsibility for providing continuing care to individuals and families or specialists such as paediatricians, obstetricians/gynaecologists, psychiatrists, medical specialists and surgical specialists.

Practising nurses provide services directly to patients. It includes professional nurses, associate professional nurses and foreign nurses licensed to practice and actively practising in the country. It excludes midwives unless they work most of the time as nurses.

Further reading

OECD (2024), "Health care resources", *OECD Health Statistics* (database), https://doi.org/10.1787/data-00541-en.

OECD (2023), *Health at a Glance 2023: OECD Indicators*, OECD Publishing, Paris, https://doi.org/10.1787/7a7afb35-en.

Figure notes

Figure 4.5: 2022 for AUS, CEZ, DNK, ESP, EST, FIN, FRA, HUN, LTU, LVA, NOR and PRT; 2021 for GBR and SWE; 2020 for DEU, JPN, KOR and TUR; 2018 for NZL.

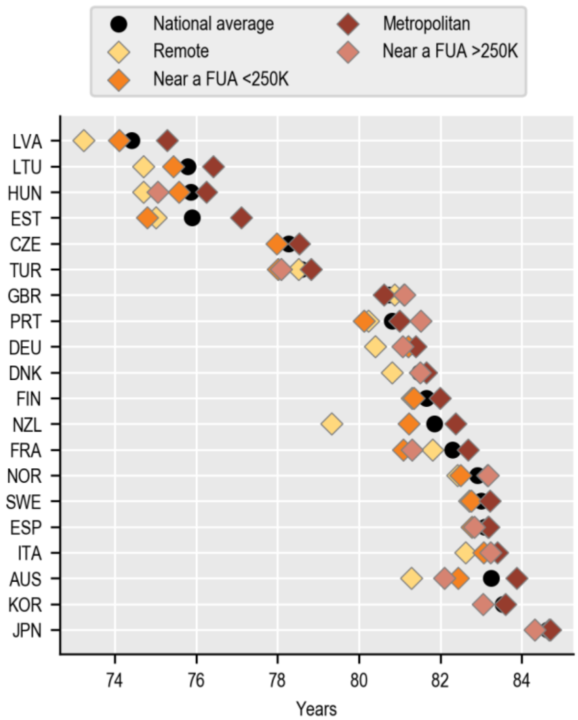
Figure 4.6: 2021 for AUS, FIN, GRC, IRL, ITA, KOR, PRT and SWE; 2020 for FRA.

Figure 4.7: 2022 for CHE, CZE, FRA, HUN, JPN, KOR, LTU, LVA, MEX, PRT, SVK, SVN and TUR; 2021 for AUS, DEU, EST and SWE; 2020 for FIN; 2019 for NZL; 2011 for ESP.

Figure 4.8: See metadata and methodology in Annexes B and C.

Figure 4.5. Life expectancy at birth by country and small region type, 2023

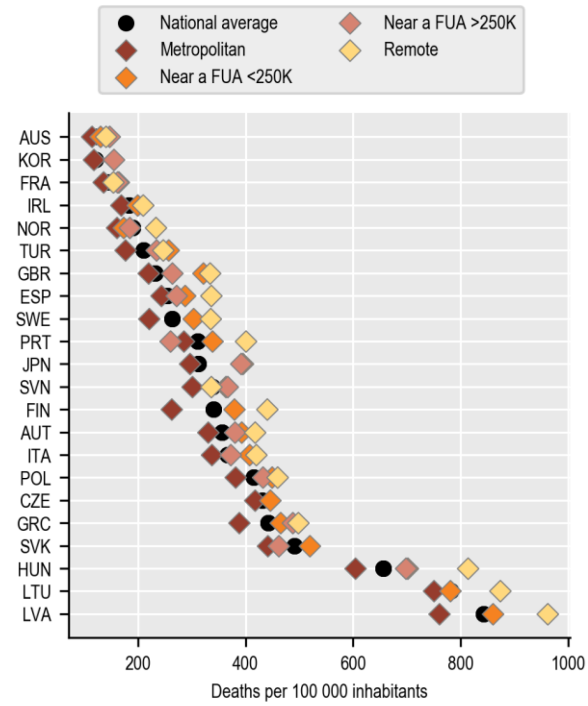
Population-weighted averages



StatLink https://stat.link/cz5go3

Figure 4.6. Cardiovascular mortality by country and small region type, 2022

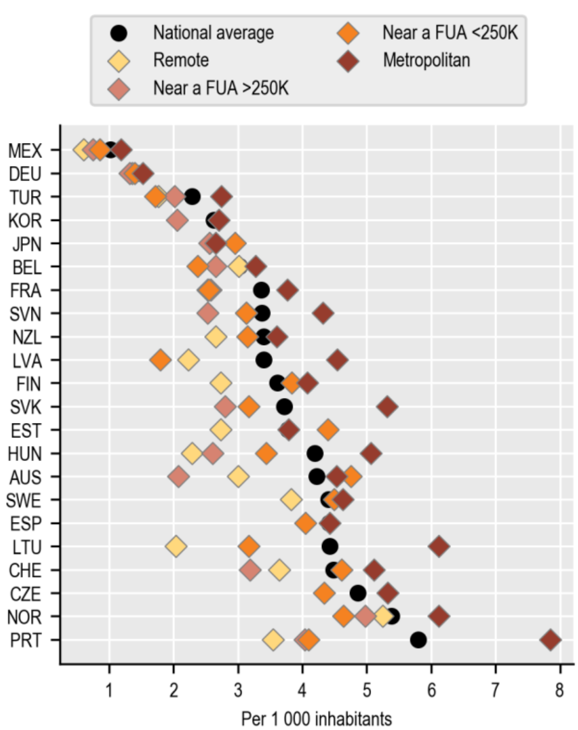
Population-weighted averages



StatLink https://stat.link/2i3t7a

Figure 4.7. Doctors by country and small region type, 2023

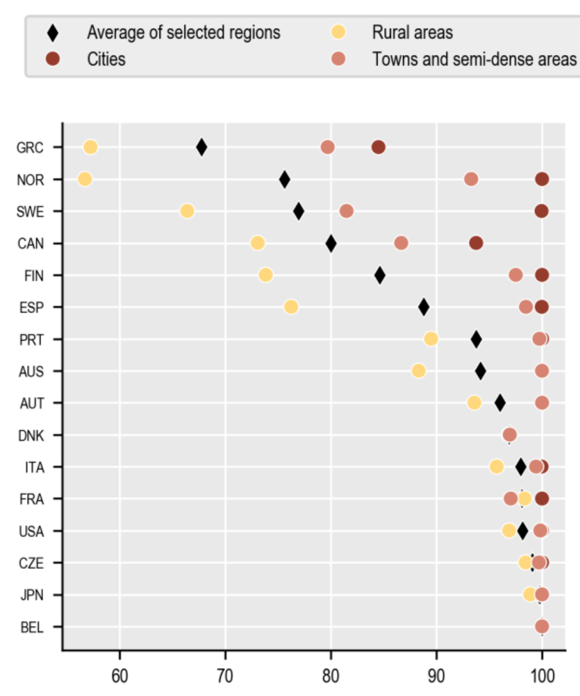
Population-weighted averages



StatLink https://stat.link/owpj02

Figure 4.8. Hospital access in regions far from a midsize/large FUAs by degree of urbanisation, 2023

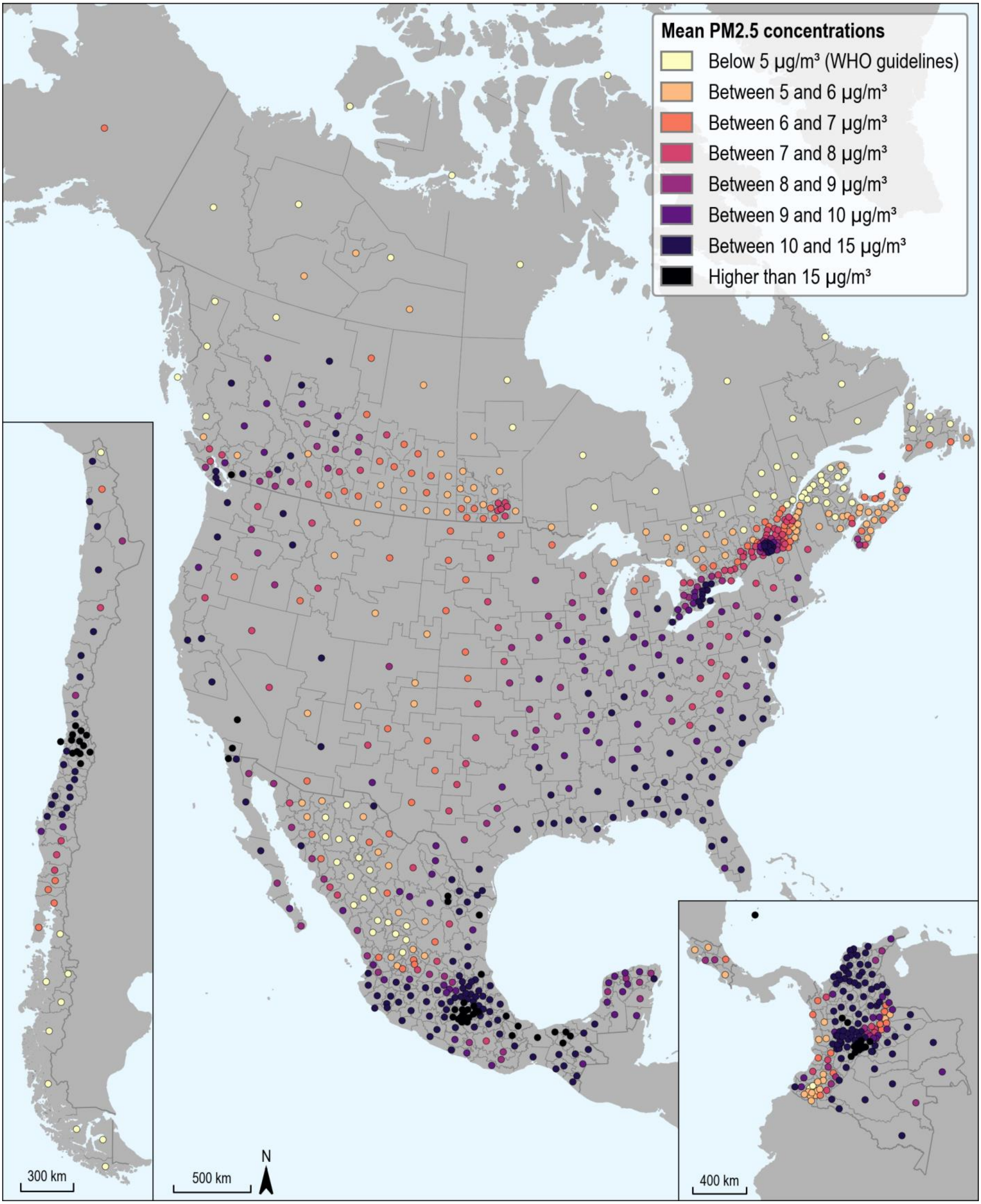
Share of population with access. Population-weighted averages



StatLink https://stat.link/mj7o1a

Figure 4.9. PM2.5 concentration in small regions, 2022 – Americas

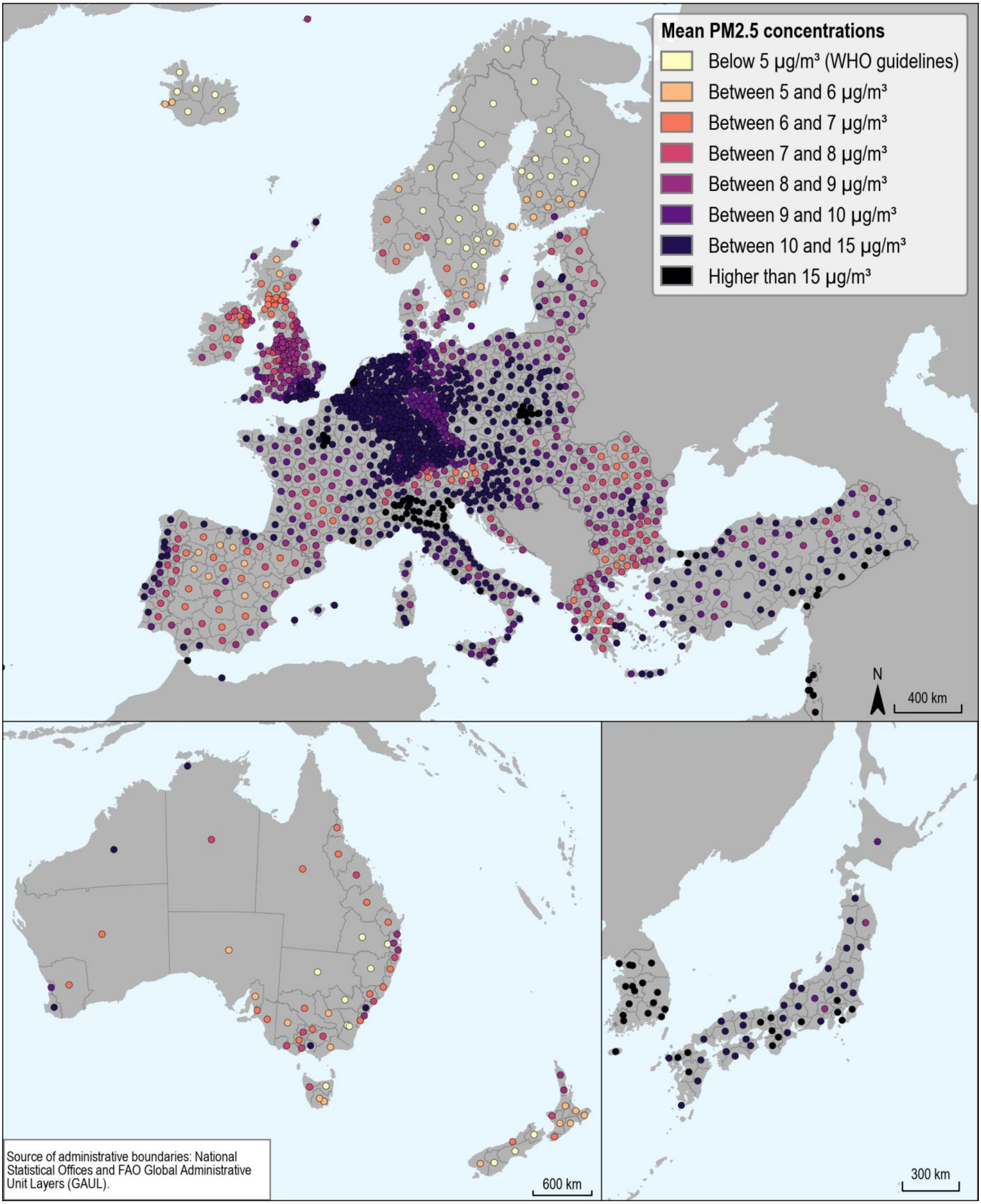
Population-weighted averages



StatLink https://stat.link/wilrvu

Figure 4.10. PM2.5 concentration in small regions, 2022 – Europe and Asia-Pacific

Population-weighted averages



Source of administrative boundaries: National Statistical Offices and FAO Global Administrative Unit Layers (GAUL).

StatLink https://stat.link/ohexdm

Quality public transport in cities

While seven out of ten persons living in FUAs can reach public transport within a short walk, car dependency is still the norm in many OECD FUAs – and especially in commuting areas

More and better public transport can make cities more inclusive and resilient (ITF, 2019; OECD, 2016). Public transport makes opportunities accessible to everyone, including those who cannot afford private vehicles, people with disabilities, the elderly and the young. Together with walking and cycling, public transport is a low-carbon transport option that can help reduce air pollution in cities. Although electric cars can help reduce pollution, public transport is also more cost-effective in terms of maintenance and expansion compared to road networks and it offers a more inclusive transport solution across age and income groups.

Across OECD countries, 71% of people in midsize and large FUAs can reach a public transport stop within a short walk (10 minutes) (Figure 4.11). In 12 European and Asian-Pacific countries (including Australia, Germany, Korea, Türkiye and the United Kingdom), almost everybody (90%) can. However, less than half of people in Mexico and the United States have such access. The difference in public transport access within a country can be large, 16 p.p. on average. In the United States, where this difference is biggest (above 50 p.p.), in some FUAs, less than 20% of people can access public transport within a short walk (Figures 4.15 and 4.16).

Apart from how easy it is to get to public transport, its quality also affects how much people use it. One way of measuring quality is by looking at how many people can be reached within a 30-minute journey compared to how many people can be reached by car without any traffic simultaneously (the “transport performance ratio”). On average, in OECD FUAs, people using public transport can access about a quarter of the people they could by car in perfect conditions (Figure 4.12). Users can access half or more in the countries with the best public transport quality, including Denmark, Korea and Switzerland. The quality of transportation tends to vary more from one area to another within a country rather than being consistent across the whole country: on average, the difference in quality between the best and worst FUA within the same country is around 23 p.p. Belgium, Germany, Korea and the United Kingdom have the largest differences with over 50 p.p.

The access and quality of public transport differ a lot between urban centres and suburbs. In OECD FUAs’ urban centres, 84% of the population can reach public transport in a 10-minute walk. This share in suburbs (excluding its rural areas) drops to 56% (Figure 4.13). In Latin and North American FUAs, the difference in public transport access within a short walk between centres and suburbs is above 40 p.p., much higher than that of less than 15 p.p. observed in Asian and European FUAs. Moreover, in most OECD FUAs, public transport users can reach a much larger share of people, relative to the same traffic-free car journey, in urban centres than in commuting zones, with an average gap of 18 p.p. across OECD FUAs (Figure 4.14). The quality of public transport in suburbs versus urban centres can differ more within one country than across similar FUAs in different countries, highlighting differences in land use policies and transport investments at the local level.

Definitions

Access to public transport: Percentage of the population that can reach at least one public transport stop (including buses, trams and metros) within a 10-minute walk.

Transport performance ratio: The ratio between the accessibility to certain amenities (here, the number of people) by using public transport for a given time (here, 30 minutes of public transport) and the proximity of those amenities in a given area (here, the number of people located in a radius of 8 km). Proximity is understood as the area that would be covered in a traffic-free car journey at the maximum allowed speed.

Walking access to public transport refers to access to a stop within a 10-minute walk.

See metadata and methodology in Annexes B and C.

Further reading

ITF (2019), “Benchmarking Accessibility in Cities: Measuring the Impact of Proximity and Transport Performance”, *International Transport Forum Policy Papers*, No. 68, OECD Publishing, Paris, https://doi.org/10.1787/4b1f722b-en.

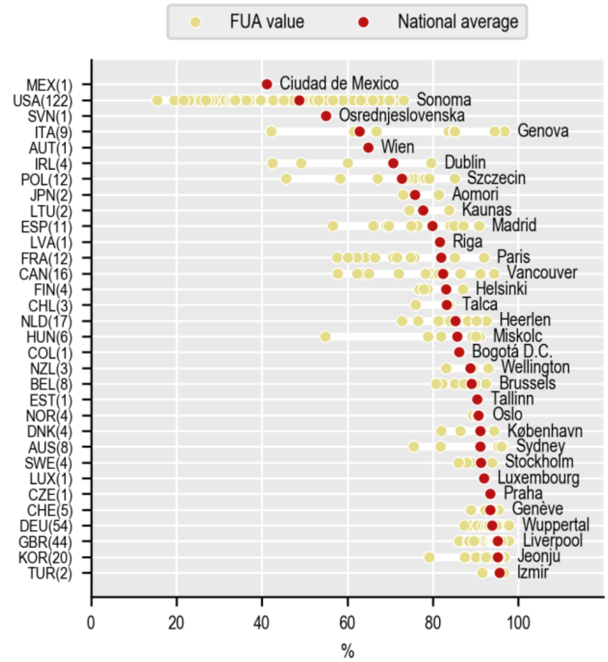
OECD (2016), *Making Cities Work for All: Data and Actions for Inclusive Growth*, OECD Publishing, Paris, https://doi.org/10.1787/9789264263260-en.

Figure notes

Figures 4.11, 4.12, 4.14: Number of FUAs in parentheses.

Figure 4.11. Walking access to public transport in FUAs, 2023

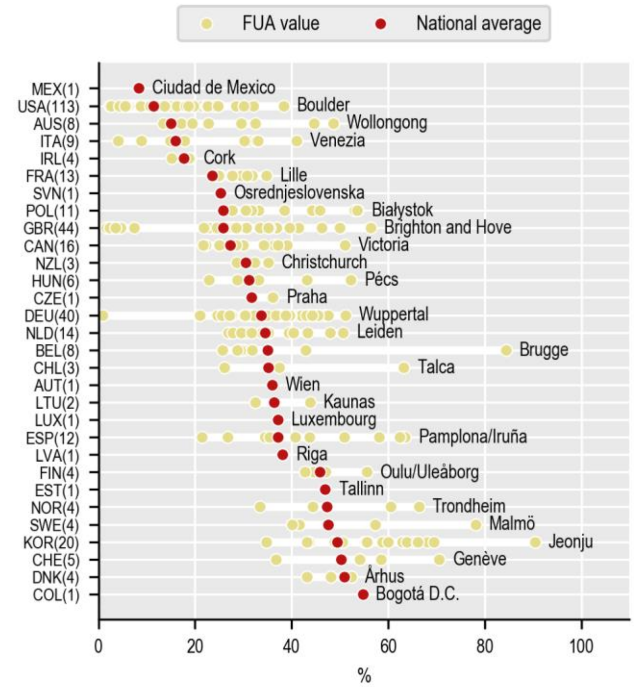
Share of population with access in midsize/large FUAs



StatLink https://stat.link/vwcd24

Figure 4.12. Transport performance in FUAs, 2023

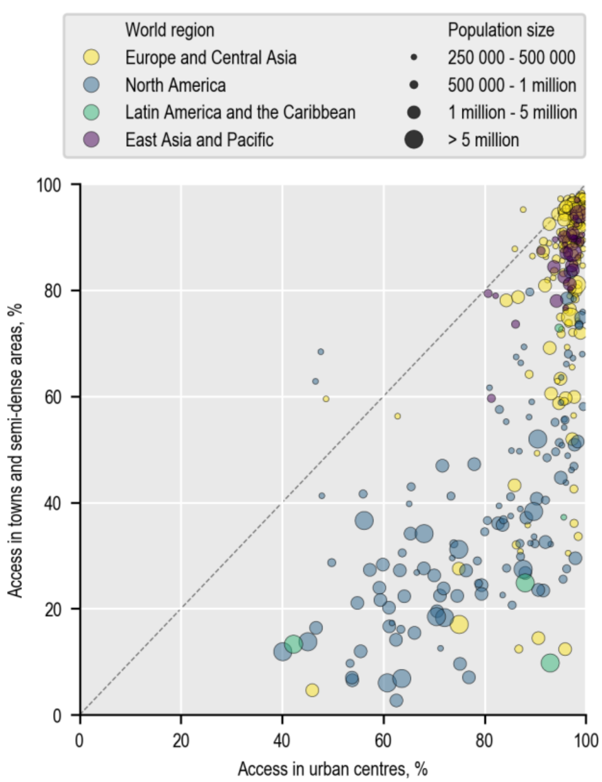
Accessibility over proximity in midsize/large FUAs



StatLink https://stat.link/7eq9uw

Figure 4.13. Walking access to public transport in urban centres vs. suburbs, 2023

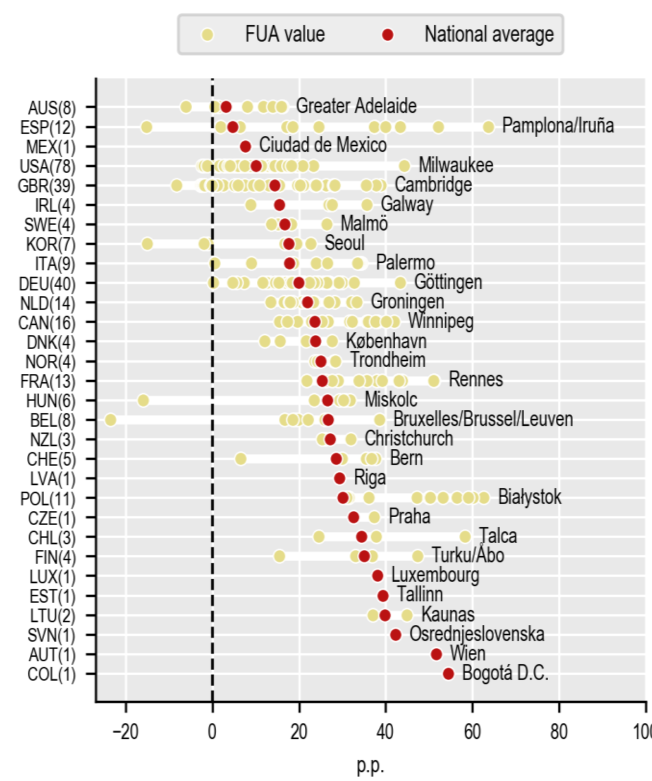
Share of population with access in midsize/large FUAs



StatLink https://stat.link/59c8ks

Figure 4.14. Transport performance in urban centres and suburbs, 2023

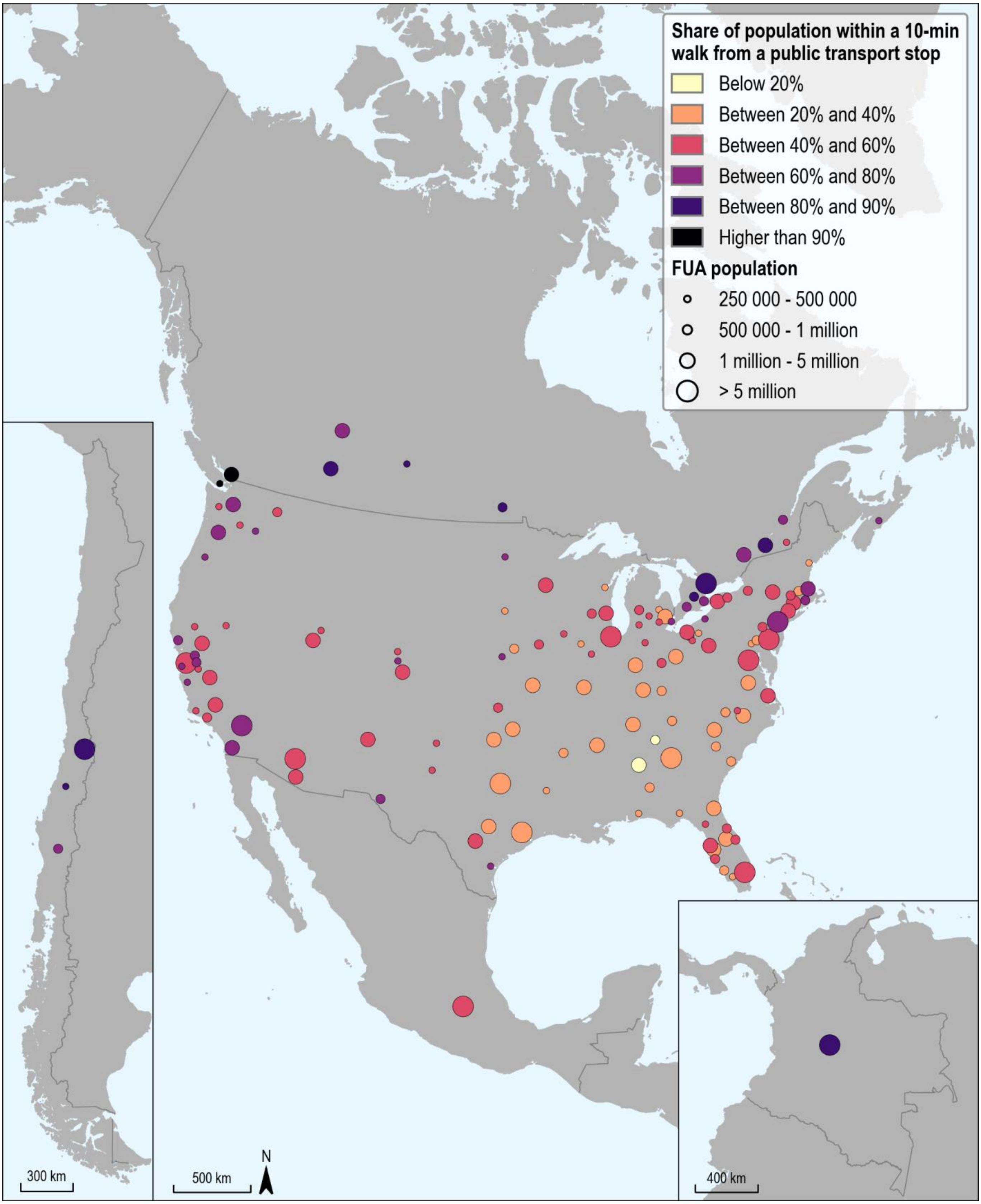
Difference in midsize/large FUAs



StatLink https://stat.link/kl54h1

Figure 4.15. Walking access to a public transport stop in FUAs, 2023 – Americas

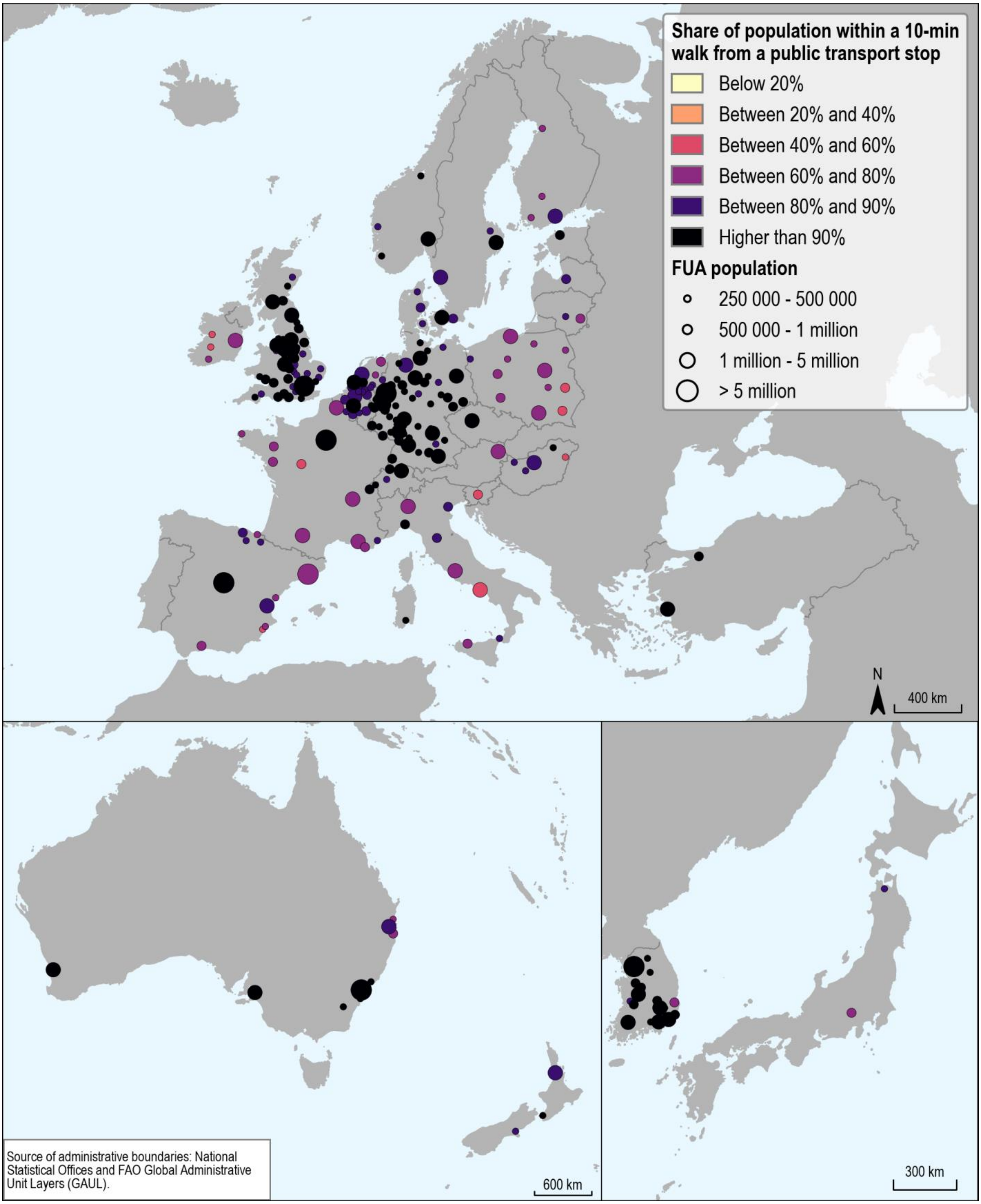
Share of population with access in midsize/large FUAs



StatLink https://stat.link/cwqmvr

Figure 4.16. Walking access to a public transport stop in FUAs, 2023 – Europe and Asia-Pacific

Share of population with access in midsize/large FUAs



Source of administrative boundaries: National Statistical Offices and FAO Global Administrative Unit Layers (GAUL).

StatLink https://stat.link/pj7oma

Walkable cities with access to services and amenities for all

Walking access to daily critical services and amenities is much lower in the suburbs than in urban centres

Daily lives require access to everyday services and amenities like schools, parks and pharmacies. Urban layouts with low density, car-oriented designs and poor provision can exclude less mobile people, such as the elderly, the young and the carless. Easy walking access to schools and childcare facilities, in particular, can promote health, reduce traffic congestion and pollution, enhance safety and encourage equitable access to education.

In OECD countries with available data, 76% of people in urban centres of FUAs can walk to a primary school and a childcare facility in 15 minutes (Figure 4.17). Data for 46 large FUAs in 8 OECD countries show that people living in poorer areas have similar walking access to schools per head compared to people living in richer areas. However, this measure does not account for quality differences. Access drops drastically in the suburbs (excluding their rural parts) as only 36% of people can walk to a primary school and a childcare facility within 15 minutes. This share varies from less than 20% in the United States to over 70% in Mexico, the Netherlands and Portugal. The difference in walking access to primary schools and childcare facilities between urban centres and suburbs grows with the size of the FUA, from 20 p.p. in small FUAs to 44 p.p. in large FUAs (Figure 4.18).

OECD cities offer services and amenities but many people – especially old-age people – cannot walk to essential services like pharmacies. Across OECD countries with available data, only 2 out of 3 (64%) people living in urban centres of midsize and large FUAs can reach a pharmacy on foot in 15 minutes. In these cities, 36% of the 17% of people over 65 cannot walk to a pharmacy (Figure 4.19). The five urban centres with the worst accessibility to pharmacies for people over 65 are all in the United States. In Collier, Florida, United States, 77% of the 33% of people who are over 65 cannot walk to a pharmacy. In contrast, in Thessaloniki, Greece, only 8% out of 21% cannot.

Moreover, not everyone in OECD cities can easily access green spaces, even though these areas are important for physical and mental health, and environmental sustainability. In OECD countries with available data, about 1 in 4 people living in urban centres (26%) cannot access a green area within a short walk (i.e. more than 400 metres away) (Figures 4.21 and 4.22). Only 60% and 54% (respectively) are in the United States and Mexico. Moreover, wealthier cities offer better access to green spaces in some countries, including France, Switzerland and the United States (Figure 4.20). In the United States, where the gap between the poorest and the wealthiest cities is among the largest, 54% of people living in urban centres of the poorest FUAs do not have access to a green area within a short walk, compared to 36% of people living in the wealthiest FUAs. In contrast, green space access is uniformly high across cities in Austria, Finland, Germany and the United Kingdom, regardless of income levels.

Definitions

Access to primary schools and childcare centres: A percentage of the population that can reach a primary school and a childcare centre within a 15-minute walk.

Access to pharmacies: a percentage of the population that can reach a pharmacy within a 15-minute walk.

Access to green areas refers to the population's share that can reach a green area within 400 metres. Green areas were extracted from OpenStreetMap, including parks, playgrounds, recreation grounds, village greens, nature reserves, gardens, zoos, cemeteries, graveyards, forests, woods, scrub, heath, grassland and wetland.

Primary schools refer to public or private schools that provide at least primary education (ISCED level 1).

Childcare centres refer to public or private entities that provide education and care for children between 0 and 5 or 6 years (ISCED level 0), depending on the country. It includes entities with valid licenses registered with the authorities; family care arrangements are not considered. Data can include day care centres, registered childminders and pre-schools depending on the country.

Walking access to a primary school/childcare centre refers to a 15-minute walk to the nearest facility.

Access to a green area refers to access within 400 metres of the nearest green area.

Income: Household income after taxes and transfers, based on disposable income in small area units.

See metadata and methodology in Annexes B and C.

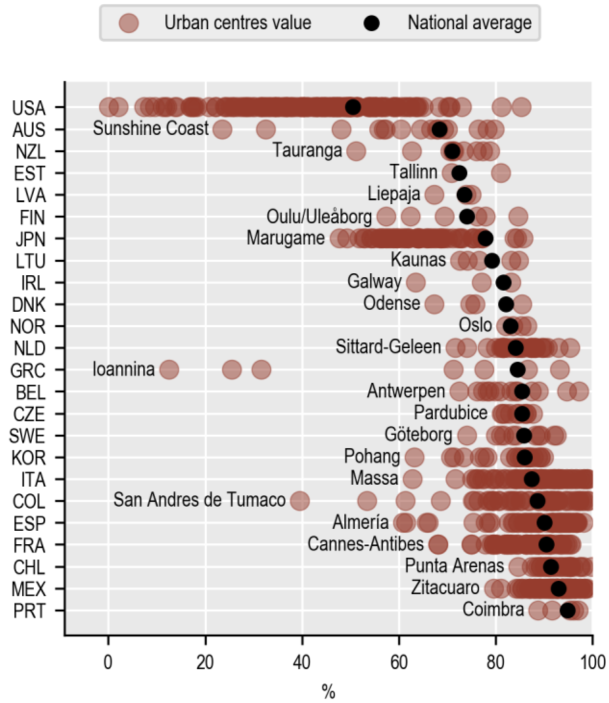
Figure notes

Figures 4.17 and 4.18: Childcare information is not available for AUS, CHL, COL, DNK, JPN, KOR, LTU, LVA, PRT and SWE. The indicator refers to access to primary schools only for these countries.

Figure 4.19: The graph includes FUAs of 250 000 inhabitants or more and Reykjavik, Iceland.

Figure 4.17. Walking access to a primary school/childcare centre in urban centres, 2024

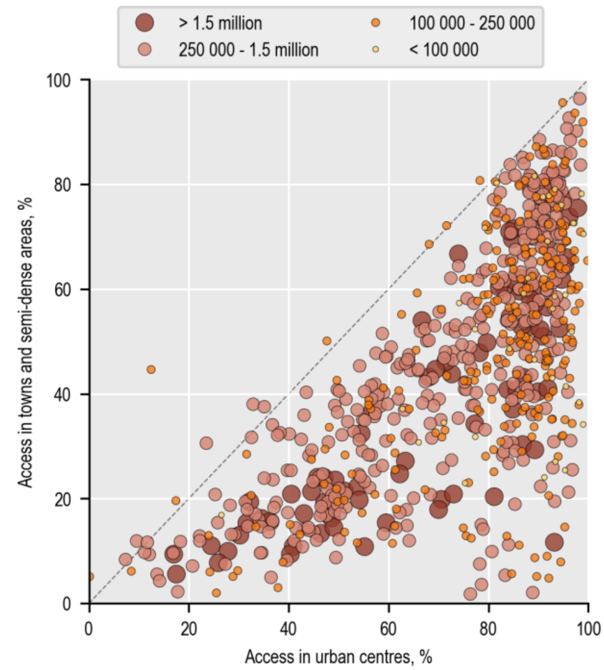
Share of population with access



StatLink https://stat.link/i61cx5

Figure 4.18. Walking access to a primary school/childcare centre, urban centres vs. suburbs, 2024

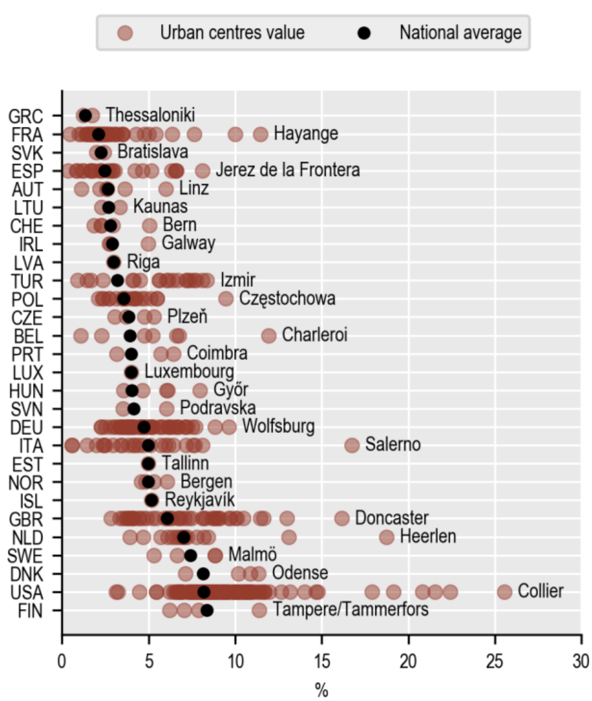
Share of population with access



StatLink https://stat.link/had4sf

Figure 4.19. Old-age population without walking access to a pharmacy in urban centres, 2024

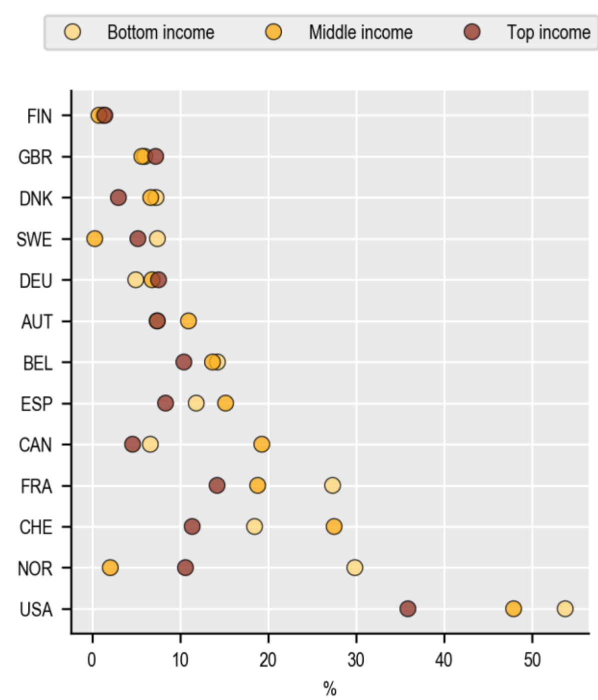
Share of population over 65 without access in midsize/large FUAs



StatLink https://stat.link/ywe75o

Figure 4.20. Urban centre population without walking access to a green area in FUAs by income, 2024

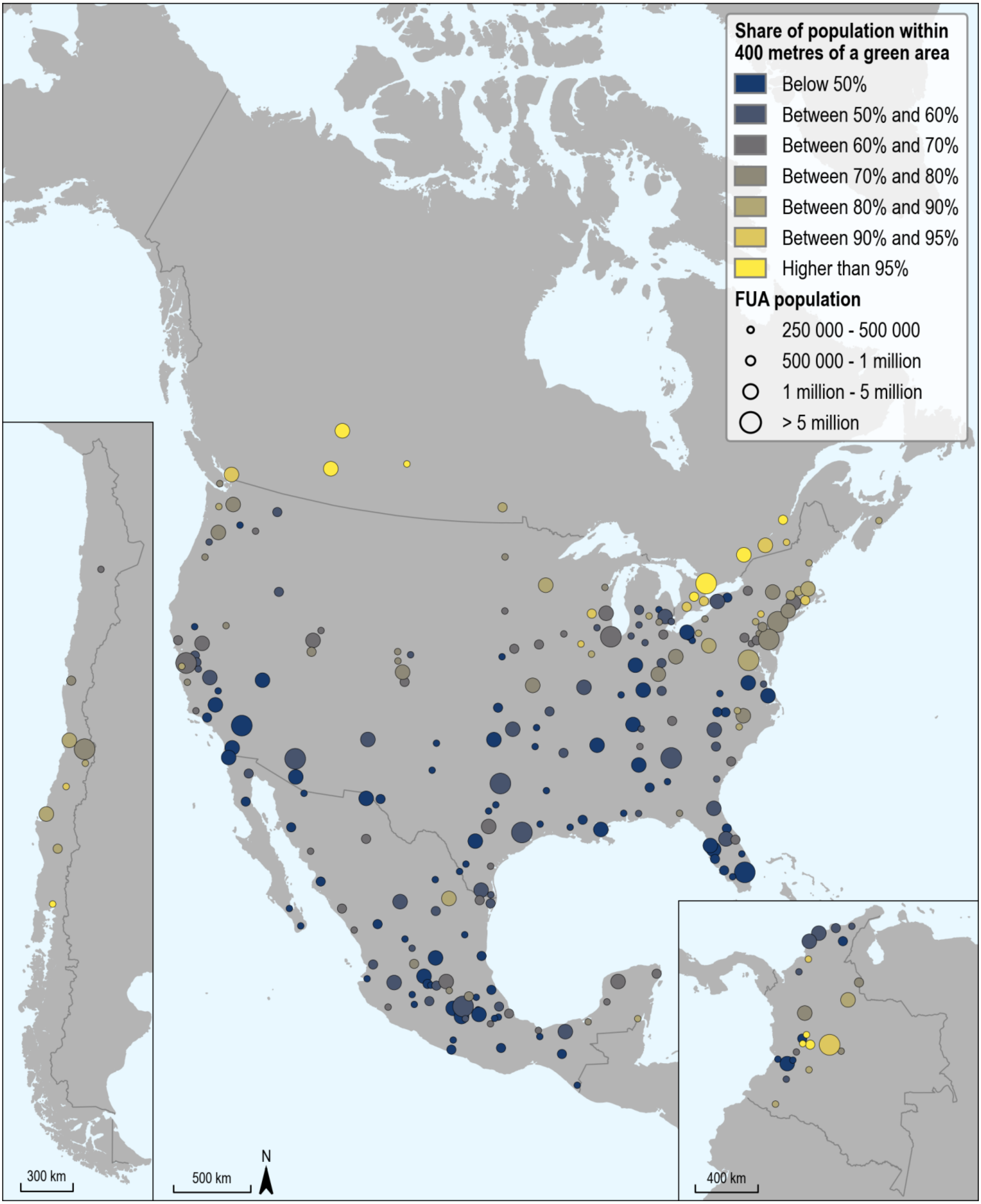
Share of population without access in midsize/large FUAs



StatLink https://stat.link/6dc2fq

Figure 4.21. Walking access to a green area in FUAs – Americas

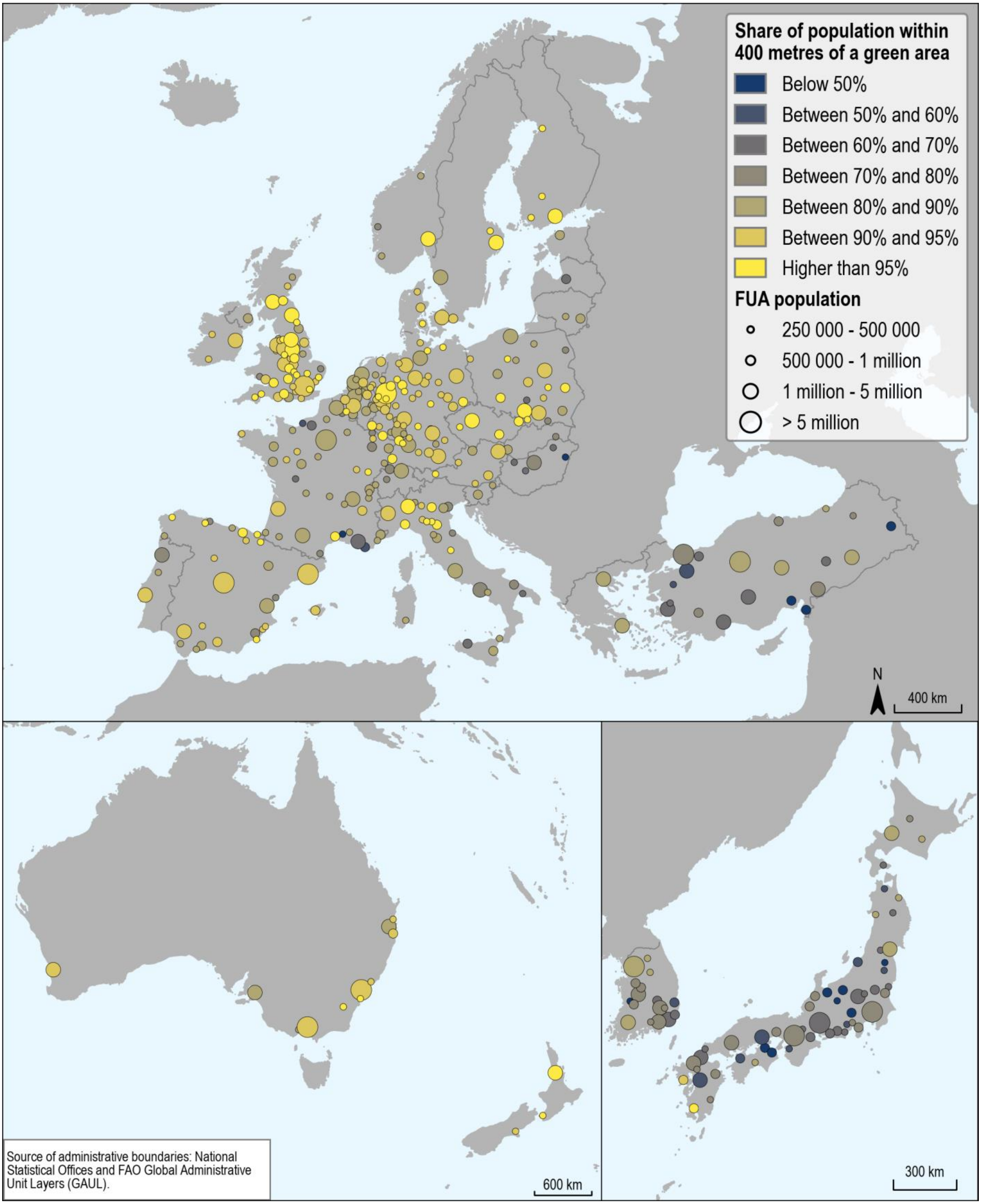
Share of population with access in midsize/large FUAs



StatLink https://stat.link/l1w9k0

Figure 4.22. Walking access to a green area in FUAs – Europe and Asia-Pacific

Share of population with access in midsize/large FUAs



StatLink https://stat.link/6f7wgy

Quality Internet in cities and rural areas

Small cities witnessed the most significant increases in broadband download speeds over the past five years, yet disparities persist between small and large cities and between rural areas and cities

Access to quality Internet plays a crucial role in enhancing the well-being of regions and cities by making services more accessible, improving public services, promoting social inclusion, supporting environmental sustainability, improving healthcare, enhancing education and fostering community engagement. Broadband Internet coverage has progressed steadily in the past decades. However, 16% of households still did not have access to broadband in 2023 and in some of the poorest OECD regions, such as Chiapas, Mexico, only half of households had access.

Despite rapid advancements, people living in rural areas still have lower-quality Internet compared to cities in OECD countries. On average, user-experienced broadband download speeds – a measure of Internet quality – are 13% faster than the national average across cities, while in rural areas, it is 22% slower (Figure 4.23). Over the last 5 years, Internet speed differences between cities and rural areas have decreased by 11 p.p. on average. France and Ireland made the biggest improvements in closing this gap (-80 p.p. and -65 p.p.), while Belgium, Colombia, Greece and Türkiye saw their gaps widen by more than 20 p.p. In these countries, download speeds have at least doubled in all kinds of areas, but improvements in Internet speeds were faster in cities. In Colombia, download speeds in rural areas were 5 times higher in 2024 compared to 2019, while in cities, speeds increased 11-fold over the same period.

Broadband download speeds increased the fastest in smaller FUAs over the past five years and especially during the first year of the COVID-19 pandemic (Figure 4.24). Although growth has slowed in midsize and large FUAs, small FUAs continued to improve steadily. By 2024, broadband download speeds in small FUAs were more than twice (2.4) as fast as they were in 2021, faster than the increase seen in larger FUAs (2.1 times). In Colombia, the country with the most improvement, cities below 100 000 inhabitants saw their speeds increase sixfold (5.7 times) from 2021 to 2024, while large FUAs (1.5 million inhabitants or more) tripled (3.3 times) their speeds.

Despite these gains in smaller FUAs, large FUAs still have faster (by 14%) broadband download speeds than the national average (Figure 4.25). Some countries like Austria, Bulgaria, Greece and Türkiye have even bigger gaps of at least 25%. Midsize FUAs have Internet access a bit faster than the national average but, in small FUAs, it tends to be slower.

Broadband download speed is also slower in commuting zones compared to urban centres in all OECD countries except Korea and Norway. The difference in speed between urban centres and commuting zones is over 50 p.p. in Austria, Czechia, Italy and Latvia, with the largest gap in Czechia at 55 p.p. (Figure 4.26). Most of the largest gaps are due to urban centres having much faster Internet rather than commuting areas with much slower Internet compared to the national average. However, in about two-thirds of OECD countries, commuting zones have slower speeds than the national average. In Czechia and New Zealand, where the city-commuting zone gap is almost 50 p.p., downloading speeds are around 20% slower in commuting zones than the national average.

Definitions

Broadband Internet refers to a download speed of at least 256 kilobits per second and high-speed Internet corresponds to a download speed of at least 30 megabits per second (Mbps).

Broadband download speed estimates, measured in Mbps, are based on user-performed tests from Speedtest by Ookla. As such, data may be subject to testing biases (e.g. fast connections being tested more frequently) or strategic testing by Internet service providers in specific markets. As speed-testing methodologies can vary across test providers (OECD, 2021), indicators at the regional level are presented as deviations from the national or OECD average (in %) or as changes over time (in %).

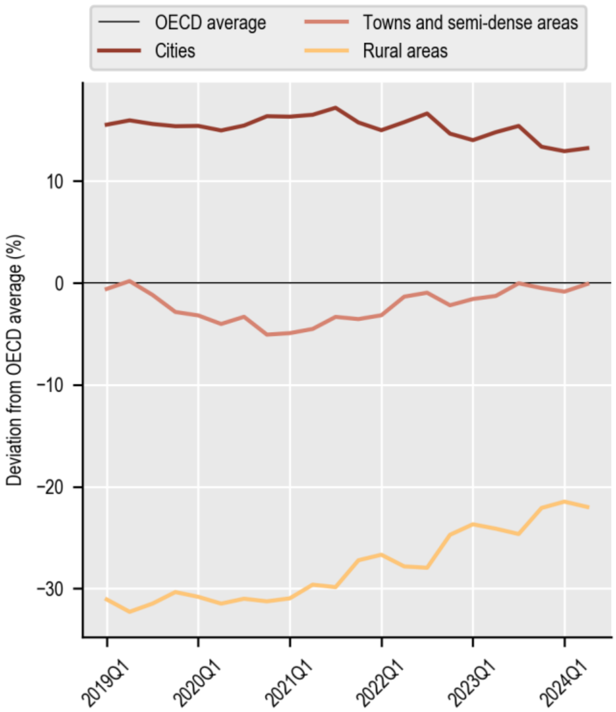
See metadata in Annex B.

Further reading

OECD (2021), *Bridging digital divides in G20 countries*, OECD Publishing, Paris, https://doi.org/10.1787/35c1d850-en.

Figure 4.23. Fixed broadband download speeds by degree of urbanisation, 2019Q1-2024Q2

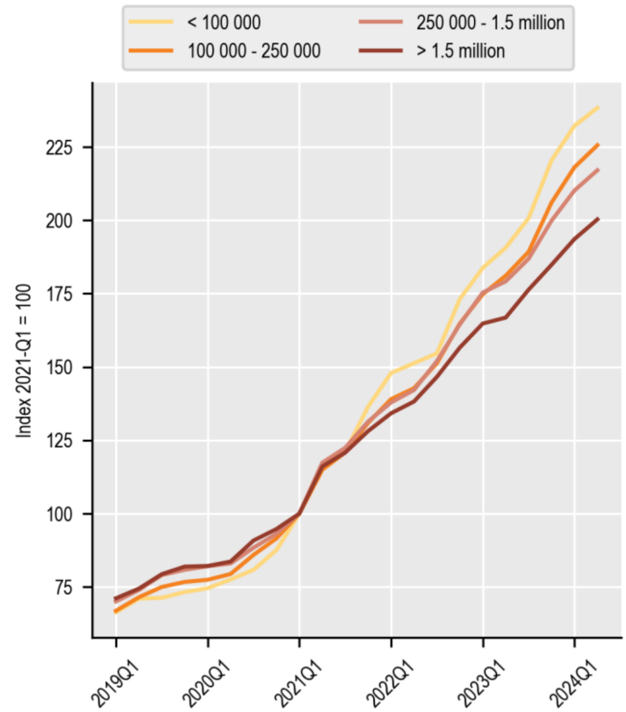
Deviation from the OECD average



StatLink https://stat.link/jv823b

Figure 4.24. Fixed broadband download speeds by FUA size, 2019Q1-2024Q2

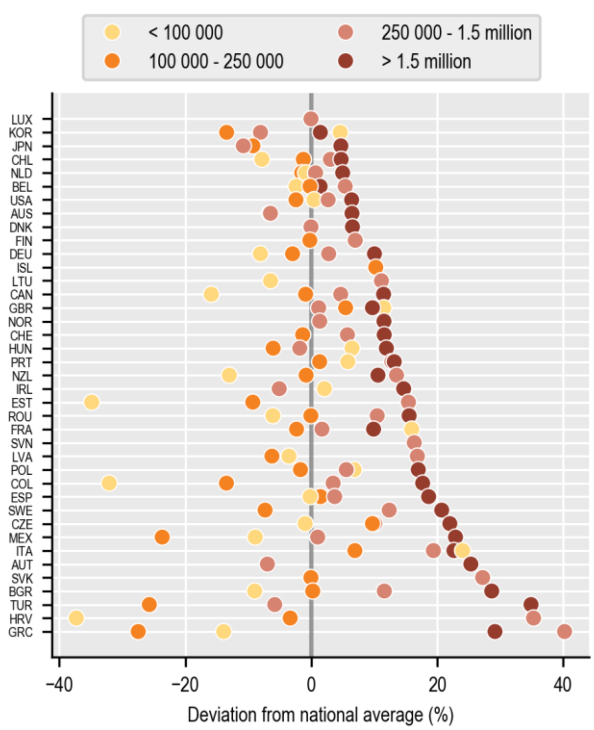
Weighted averages of FUAs, index 2021 Q1=100



StatLink https://stat.link/cb6fs4

Figure 4.25. Fixed broadband download speeds by country and FUA size, 2019Q1-2024Q2

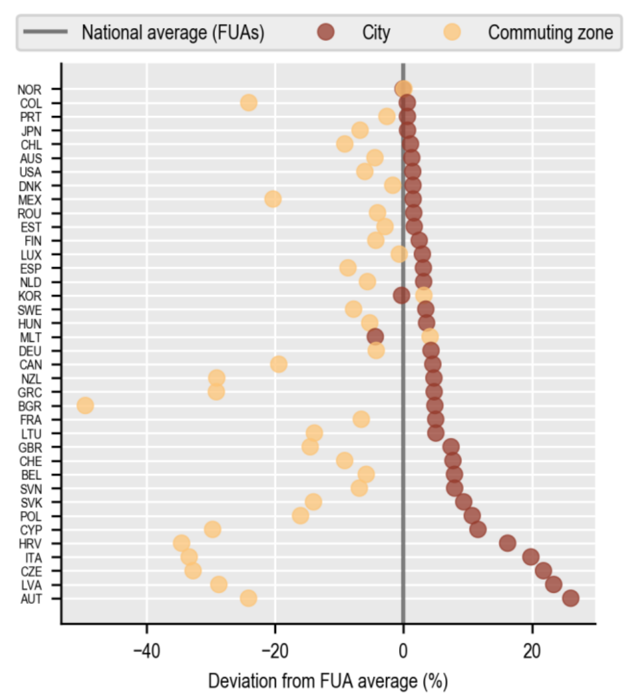
Weighted averages of FUAs within a given size range



StatLink https://stat.link/bikqm3

Figure 4.26. Difference in fixed download speeds between cities and their commuting zones in midsize/large FUAs, 2023

Weighted averages



StatLink https://stat.link/8qduyc

Annex A. Description of regions and FUAs

Table A.1. Territorial grid of OECD member and accession countries

Country	Territorial Level 2 (TL2)	Territorial Level 3 (TL3)
AUS	States/territories (8)	Statistical Areas Level 4 and Greater Capital City Statistical Area (50)
AUT	*Bundesländer* (9)	*Gruppen von Politischen Bezirken* (35)
BEL	*Régions* (3)	*Arrondissements* (44)
CAN	Provinces and territories (13)	Census divisions (293)
CHE	*Grandes regions* (7)	*Cantons* (26)
CHL	Regions (16)	*Provincias* (56)
COL	*Departamentos* + Capital District (33)	Subregions (158)
CRI	Planning regions (6)	Planning regions (6)
CZE	*Oblasti* (8)	*Kraje* (14)
DNK	*Regioner* (5)	*Landsdeler* (11)
DEU	*Länder* (16)	*Kreise* (401)
ESP	*Comunidades autónomas* (17)/ *Ciudades autónomas* (2)	*Provincias* (59)
EST	Region (1)	Groups of *maakond* (5)
FIN	*Suuralueet* (5)	Maakunnat (19)
FRA	*Régions* (13) + *Régions d'outre-mer* (5)	*Départements* (96) + *Départements d'outre-mer* (5)
GBR	Regions and countries (12)	Upper-tier authorities or groups of lower-tier authorities or groups of unitary authorities, local enterprise companies (LECs) or groups of districts (179)
GRC	Regions (13)	Regional units and combination of regional units (52)
HUN	Planning statistical regions (8)	*Vármegyét* (counties) and Budapest (20)
ISL	Regions (2)	*Landsvaedi* (8)
IRL	Groups Regional Authority Regions (3)	Regional Authority Regions (8)
ISR	Districts (6)	Districts (6)
ITA	*Regioni* (21)	*Province* (107)
JPN	Groups of prefectures (10)	Prefectures (47)
KOR	Regions (7)	Special city, metropolitan area and province (17)
LVA	Region (1)	Statistical regions (6)
LTU	Group of counties (2)	Counties (10)
LUX	State (1)	State (1)
MEX	*Estados* (32)	*Grupos de municipios* (209)
NLD	Provinces (12)	COROP regions (40)
NZL	Regional councils (14)	Regional councils (14)
NOR	*Landsdeler* (7)	*Fylker* (13)
POL	*Vojewodztwa* (17)	*Podregiony* (73)
PRT	*Comissaoes de coordenaçao e desenvolvimento regional e regioes autónomas* (7)	*Grupos de municipios* (25)
SVK	*Zoskupenia krajov* (4)	*Kraj* (8)
SVN	*Kohezijske regije* (2)	*Statistične regije* (12)
SWE	*Riksomraden* (8)	*Län* (21)
TUR	Regions (26)	Provinces (81)

Country	Territorial Level 2 (TL2)	Territorial Level 3 (TL3)
USA	States and the District of Columbia (51)	Economic areas (179)
BRA	*Estados + districto federal* (27)	*Mesoregiao* (137)
BGR	Planning regions/*Rayoni za planirane* (6)	Oblasts/*Podregioni* (28)
HRV	Statistical regions (4)	Counties/*županije* and City of Zagreb (21)
PER	*Departamentos + Provincia Constitucional del Callao* (25)	-
ROU	Regions/*Regiuni* (8)	Counties + Bucharest/*Județe + București* (42)

Table A.2. Number of small regions by access to city typology

	Metropolitan large	Metropolitan midsize	Metropolitan regions	Near an FUA >250K	Near an FUA <250K	Remote	Non-metropolitan regions	Total
AUS	4	6	**10**	1	9	30	**40**	50
AUT	5	6	**11**	10	7	7	**24**	35
BEL	7	10	**17**	25	1	1	**27**	44
CAN	35	26	**61**	14	14	204	**232**	293
CHE	..	10	**10**	11	3	2	**16**	26
CHL	5	9	**14**	4	17	21	**42**	56
COL	6	17	**23**	20	33	82	**135**	158
CZE	2	3	**5**	..	9	..	**9**	14
DEU	62	147	**209**	141	31	20	**192**	401
DNK	4	3	**7**	1	..	3	**4**	11
ESP	4	19	**23**	3	23	10	**36**	59
EST	..	1	**1**	..	2	2	**4**	5
FIN	..	3	**3**	..	4	12	**16**	19
FRA	9	34	**43**	14	10	34	**58**	101
GBR	61	55	**116**	42	5	16	**63**	179
GRC	6	1	**7**	4	12	29	**45**	52
HUN	2	4	**6**	1	11	2	**14**	20
IRL	2	1	**3**	..	3	2	**5**	8
ISL	..	..	**0**	..	4	4	**8**	8
ITA	6	18	**24**	27	44	12	**83**	107
JPN	11	20	**31**	13	3	..	**16**	47
KOR	7	6	**13**	4	..	..	**4**	17
LTU	..	2	**2**	..	4	4	**8**	10
LUX	..	1	**1**	..	..	..	**0**	1
LVA	..	2	**2**	..	1	3	**4**	6
MEX	14	50	**64**	35	17	93	**145**	209
NLD	10	13	**23**	17	..	..	**17**	40
NOR	..	3	**3**	2	1	7	**10**	13
NZL	..	3	**3**	..	9	2	**11**	14
POL	8	21	**29**	9	25	10	**44**	73
PRT	1	2	**3**	5	4	13	**22**	25
SVK	..	2	**2**	1	5	..	**6**	8
SVN	..	2	**2**	7	2	1	**10**	12
SWE	1	3	**4**	..	6	11	**17**	21
TUR	5	6	**11**	12	5	53	**70**	81
USA	31	59	**90**	18	15	56	**89**	179
BGR	3	3	**6**	1	16	5	**22**	28
HRV	..	4	**4**	1	7	9	**17**	21
ROU	2	8	**10**	3	23	6	**32**	42

Table A.3. Number of functional urban areas (FUAs) and share of the national population in FUAs, 2023

	Total FUAs		FUAs with 50 000 to 100 000 inhabitants		FUAs with 100 000 to 250 000 inhabitants		FUAs with 250 000 to 1.5 million inhabitants		FUAs with more than 1.5 million inhabitants		Rest (non-FUA)
Country	No.	% of national population	No.	% of national population	No.	% of national population	No.	% of national population	No.	% of national population	% of national population
AUS	18	77.4	0	0	6	3.7	8	16	4	57.7	22.6
AUT	6	59.8	0	0	0	0	5	25.9	1	33.9	40.2
BEL	14	69.3	1	0.6	6	8.5	6	31.5	1	28.8	30.7
CAN	17	59.6	8	9.4	5	10.1	3	17.7	1	22.5	40.4
CHE	35	40.9	12	5	16	13.3	6	11	1	11.7	59.1
CHL	26	70.1	1	0.2	9	4.5	11	18.5	5	46.9	29.9
COL	10	51	0	0	5	9.1	4	24	1	17.9	49
CZE	26	77.7	2	0.7	14	12	9	24.1	1	40.9	22.3
DEU	53	64.5	6	1	25	7.4	18	20	4	36.2	35.5
DNK	15	52.5	3	2.5	8	12	3	16.9	1	21.1	47.5
ESP	98	67.8	9	1	36	7.9	46	30.2	7	28.7	32.2
EST	4	57.8	0	0	0	0	3	21.2	1	36.6	42.2
FIN	81	70.7	20	3.3	35	12.1	22	22.9	4	32.4	29.3
FRA	3	60.9	1	3.6	1	11.7	1	45.6	0	0	39.1
GBR	7	57.4	0	0	3	9.8	3	19.7	1	28	42.6
GRC	69	64.4	1	0.1	20	5.3	44	31.4	4	27.7	35.6
HUN	86	77.8	5	0.7	35	8.1	40	31.7	6	37.3	22.2
IRL	14	58.2	6	4.7	6	10	1	9.9	1	33.7	41.8
ITA	7	58.1	2	4.7	3	12.9	2	40.5	0	0	41.9
JPN	19	64	2	2	12	19.5	4	11.6	1	30.9	36
KOR	5	64.8	1	1.7	0	0	3	20.6	1	42.5	35.2
LTU	1	56.7	0	0	1	56.7	0	0	0	0	43.3
LUX	82	55.6	16	2.2	42	12.5	20	16.8	4	24.1	44.4
LVA	61	79.3	0	0	9	1.5	47	24.3	5	53.5	20.7
MEX	22	80.9	0	0	2	0.6	16	18	4	62.2	19.1
NLD	6	52.8	2	5	2	8.9	2	39	0	0	47.2
NOR	1	100	0	0	0	0	1	100	0	0	0
NZL	4	64	1	4.5	2	11	1	48.6	0	0	36
POL	91	63.9	1	0	26	3.6	54	25.3	10	35	36.1
PRT	35	81	3	1.3	16	14.3	14	38.5	2	26.9	19
SVK	14	74.5	7	10.7	4	12.3	2	18.6	1	32.9	25.5
SVN	58	56.3	12	2.7	27	11.4	17	27.2	2	15.1	43.7
SWE	12	56.4	2	1.4	7	11	2	14.9	1	29.1	43.6
TUR	8	34.6	0	0	6	15.4	2	19.2	0	0	65.4
USA	2	41.8	0	0	0	0	2	41.8	0	0	58.2

Annex B. Sources and data description

Table B.1. List of variables

Indicators	Chapter(s)
Air temperature, hot days and icing days (historical series)	3
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Foreign-born	2
Forest cover	3
Greenhouse gas emissions by sector and by gas	3
Green tasks jobs	2
Greenfield foreign direct investment (GFDI)	1
Gross domestic product (GDP), GDP per capita, gross value added per worker	1
Higher education institutions (location, enrolment, enrolment by gender, science, technology, engineering and mathematics enrolment)	2
Homeownership	1
Housing prices	1
Housing costs	1
Labour market tightness	2
Location of childcare facilities	4
Location of general hospitals	4
Location of pharmacies	4
Location of primary schools	4
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Main mode of transport for commuting	3
Mean disposable income in functional urban areas	4
Municipal waste and waste recovery	3
Passenger vehicles, electric and hybrid vehicles	3
Patent applications and climate-related patents	1, 3
Population	1
Remote work uptake	2
Regional output price index (ROPI)	1
Regional consumer price index (RCPI)	1
S80/S20 ratios for disposable income	4
Share of workers at high risk of automation	2
Subnational government climate-significant expenditure and investment	3
Trade openness	1
Women in relative poverty compared to men in relative poverty	4

Air temperature, hot days and icing days (historical series)

Country	Source	Year	Territorial level
All countries	Muñoz Sabater, J. (2019), *ERA5-Land Hourly Data from 1950 to Present*, Copernicus Climate Change Service (C3S) Climate Data Store (CDS), https://doi.org/10.24381/cds.e2161bac. See methodology in Annex C.	1981-2023	TL2, TL3, FUA

Air temperature, hot days and icing days by emission scenario (projected series)

Country	Source	Year	Territorial level
All countries	Thrasher, B. et al. (2022), *NASA Global Daily Downscaled Projections, CMIP6, Sci Data 9, 262*, https://doi.org/10.1038/s41597-022-01393-4. See methodology in Annex C.	2030-60	TL2, TL3, FUA

Broadband download speed

Country	Source	Period	Territorial level
All countries	Speedtest® by Ookla® Global Fixed and Mobile Network Performance Maps. Based on analysis by Ookla of Speedtest Intelligence® data. Provided by Ookla and accessed on 25 September 2024.	2019Q1-2024Q2	TL3

Built-up surface

Country	Source	Year	Territorial level
All countries	Schiavina M. et al. (2023), *GHS-POP R2023A - GHS Population Grid Multitemporal (1975-2030)*, Joint Research Centre, European Commission, http://data.europa.eu/89h/2ff68a52-5b5b-4a22-8f40-c41da8332cfe	1975-2030 (5-year intervals)	TL2, TL3, FUA, municipalities and local areas

Dwellings by main energy source

Country	Source	Year	Territorial level
CHE	Bâtiments selon les niveaux géographiques institutionnels, la source d'énergie du chauffage, la catégorie de bâtiment et l'époque de construction	2021-22	Municipalities and local areas
CHL	Encuesta de caracterización socioeconómica nacional, Ministerio de Desarollo Social y Familia	2022	Municipalities and local areas
CZE	Inhabited apartments by main energy source used for heating, Inhabited houses by heating method and house type, CZSO	2021	Municipalities and local areas
DEU	Zensus 2022, Gebaüde und Wohnungen, DESTATIS	2022	Municipalities and local areas
DNK	BOL105: Dwellings by county, type of resident, type of dwelling, heating, toilet facilities, bath facilities, type of household and number of children living with parents, Statistics Denmark	2010-23	Municipalities and local areas
FIN	116h -- Number of buildings by intended use and heating fuel, 2022, Statistics Finland	2022	Municipalities and local areas
FRA	PRINC30M – Résidences principales par type de logement, statut d'occupation et combustible principal, INSEE	2019	Municipalities and local areas
GBR	Energy efficiency of Housing, England and Wales, local authority districts, ONS; Census 2021 main statistics housing and accommodation tables, Northern Ireland Statistics; Scotland Housing Census 2022	2022	Municipalities and local areas
GRC	B32. Households and their members by main energy source used for heating. Regional Units, Municipalities, ELSTAT	2011	Municipalities and local areas
HUN	Summary data of dwellings by settlement, Census database, KSH	2001, 2011, 2021	Municipalities and local areas
IRL	Permanent private households - local electoral areas (SAU3), Irish CSO	2011, 2016, 2022	Municipalities and local areas
LUX	Luxembourg 2021 Census, STATEC	2021	Municipalities and local areas
NLD	Regional Climate Monitor	2010-21	Municipalities and local areas
NZL	Main types of heating used (total responses) by occupied dwelling type, for occupied private dwellings, 2018 Census (RC, TA, SA2, DHB) Information on table, NZ Stats	2018	Municipalities and local areas
PRT	Housing units of usual residence (No.) by Geographic localization (at the date of Census 2011), Type (building) and Main source of energy used for heating; Decennial	2011	Municipalities and local areas

Country	Source	Year	Territorial level
SVK	Population and Housing Census 2021, Slovak Statistics	2021	Municipalities and local areas
USA	DP04 - Selected Housing Characteristics, US Census Bureau	2015-21	Municipalities and local areas

Electricity generation by source

Country	Source	Product types	Year	Territorial level
AUS	Table O: Australian electricity generation, by state and territory, by fuel type, physical units, energy.gov.au	Coal, natural gas, oil products, biofuel and waste, wind, solar	2015-22	TL2
CAN	Canada's energy future 2023: Energy demand and demand projections to 2050	Oil, natural gas, coal and coke, uranium, wind, solar, biomass/geothermal, hydro/wave/tidal	2005-23	TL2
DEU	Bruttostromerzeugung nach Energieträgern, Bruttostromerzeugung nach Erneuerbaren Energieträgern, Länderarbeitskreis Energiebilanzen	Total, coal, oil, natural gas, renewables, nuclear, other	1990-2021	TL2
FIN	Electricity production by region 2007-2022, Energiateollisuus	Total, hydro, wind, nuclear, fossil	2007-22	TL3, TL2
FRA	Données régionales de production et de consommation finale de l'énergie	Total, natural gas, coal, oil, nuclear, solar, wind, biofuels and waste, geothermal, other	2014-21	TL2
GBR	Regional Renewable Statistics/Regional Statistics 2003-2022: Generation	Renewables, wind, solar, hydro, biomass and waste	2003-22	TL2
JPN	IEA Real-Time Electricity Tracker	Gas, coal, oil, wind, solar, hydro, nuclear, biomass/waste	2016-23	TL2
NOR	08308: Production of electricity, by type of power (GWh) (C) 2006 - 2022, Statistics Norway	Total, hydro, thermal, wind, pump storage	2006-22	TL2
POL	Fuel, Energy and Materials market/Power Sector/Production of electricity by sources, Statistics Poland	Total, fossil, hydro, renewables	2000-20	TL2
PRT	Gross production of electric energy (kWh) by Geographic localization (NUTS - 2013) and Type of electricity production; Annual	Total, wind, solar, hydro, thermal, geothermal	2011-21	TL2
SWE	Elproduktion och bränsleanvändning (MWh), efter län och kommun, produktionssätt samt bränsletyp. År 2009 - 2021, SCB	Total, hydro, wind, nuclear, fossil	2009-21	TL3, TL2
USA	Electricity, Historical State Data, Net Generation by State by Type of Producer by Energy Source, EIA	Total, coal, oil, natural gas, biomass, wind, solar, hydro	2001-22	TL2

Female employment rate

Country	Source	Year	Territorial level
EU countries	Eurostat, Regional employment rates by sex (lfst_r_lfe2emprt)	2023	TL2
AUS	ABS 6291.0.55.001 Labour Force, Australia, Detailed	2023	TL2
CAN	Statistics Canada. Table 14-10-0327-01 Labour force characteristics by sex	2023	TL2
CHE	OFS - Swiss Labour Force Survey in 2nd quarter 2022 - Table je-f-03.02.00.02.02.01	2023	TL2
COL	DANE, Gran encuesta integrada de hogares	2023	TL2
CRI	INEC-Costa Rica, Encuesta Continua de Empleo	2023	TL2
ISL	Statistics Iceland	2023	TL2
ISR	CBS	2023	TL2
JPN	Labour Force Survey/Basic Tabulation Historical data	2023	TL2
KOR	Statistics Korea, Economically Active Population Survey	2023	TL2
MEX	INEGI, Encuesta Nacional de Ocupación y Empleo	2023	TL2
NZL	Household Labour Force Survey - HLF - Table: Labour Force Status	2023	TL2
NOR	Statistics Norway, Table 13497: Population, by labour force status, age and region	2023	TL2
TUR	Turkish Statistical Institute (TurkStat) Household Labour Force Survey	2023	TL2

Final energy consumption by sector and by source

Country	Source	Sectors	Fuel types	Year	Territorial level
AUS	States and territories, energy.gov.au	Total; agriculture, forestry and fishing; mining; manufacturing; electricity, gas, water and waste services; construction; transport, postal and warehousing; residential; solvents, lubricants, greases and bitumen	Total, coal, oil, natural gas, renewables	1973-2021	TL2
AUT	STATcube: Energy balances for the federal provinces as of 1988	Total, industry, transport, residential, agriculture, commercial and public services	Total, coal, oil, gas, renewables, wastes	1988-2022	TL2, TL3
BEL	Vlaams Energie- & Klimaatbeleind, IBSA, Walstat	Industry, residential, services, transport, agriculture	Electricity, gas, oil, wastes, coal, heat, other	1990-2021	TL2
CAN	Canada Energy Regulator	Total, industry, residential, commercial, transport	Total, electricity, gas, oil, biofuels and emerging energy, other	2005-23	TL2
DEU	Endenergieverbrauch nach Energieträgern, Endenergieverbrauch nach Verbrauchergruppen, Länderarbeitskreis Energiebilanzen, (43531-01-02-4: Energieverbrauch - Jahressumme - regionale Tiefe: Kreise und krfr. Städte, 43531-01-02-4-B: Energieverbrauch - Jahressumme - regionale Ebenen, Regional Datenbank)	Total	Total, coal, oil, natural gas, renewables, electricity, heat, others	2003-21	TL2, TL3
FIN	Electricity consumption by region 2007-2022, Finnish Energy	Housing and agriculture, industry, services and construction, total	Electricity	2007-21	TL2, TL3
FRA	Données locales de consommation d'énergie	Agriculture, residential, services, industry, other	Electricity, gas, heat, petroleum products	2018-22	TL2, TL3
KOR	Final energy consumption	Total	Total	1996, 2000, 2010-21	TL2, TL3
NLD	Regional Climate Monitor	Built environment, traffic and transport, industry, energy, waste, water, agriculture, forestry and fishing	Total, electricity, natural gas, district heating, solar	2010-21	TL2, TL3
POL	Consumption of fuels and energy carriers 2022, 2021, 2020, 2019, Statistics Poland	Total, industry, energy, residential, transport, agriculture, other	Hard coal, natural gas, LPG, light fuel oil, heavy fuel oil, heat, electricity	2001-22	TL2
PRT	Consumption of electric energy (kWh) by Geographic localization (NUTS - 2013) and Type of consumption; Annual, Consumption of natural gas (Nm³) by Geographic localization (NUTS - 2013); Annual, Consumption of motor fuel by inhabitant (toe/ inhab.) by Place of residence (NUTS - 2013); Annual	For electricity only: residential, non-residential, industry, agriculture, lightning of public roads, inner lightning of state/public buildings, others	Electricity, natural gas, motor fuel	2011-21	TL2, TL3
SVK	Consumption of fuels, electricity, heat, Slovakia Statistics	Total	Electricity, heat, natural gas, fuel oil, coal, diesel oil	2000-22	TL2, TL3
SWE	End use (MWh), by county and municipality, consumer category and fuel type. Year 2009 - 2021, Sweden Statistics	Agriculture, industry, public sector, services, transport, residential, other	Electricity, district heating, natural gas (non-renewable and renewable), fixed (non-renewable and renewable), liquid (non-renewable and renewable)	2009-21	TL2, TL3

Country	Source	Sectors	Fuel types	Year	Territorial level
USA	Consumption, all consumption estimates in Btu, State Energy Data System (SEDS): 1960-2021 (complete), EIA US States, EIA, US Department of Energy	Total, coal, oil, natural gas		2021	TL2

Foreign-born

Country	Source	Year	Territorial level
All countries	OECD Migrant Municipal Database. Astruc-Le Souder, M., et al. (2024), « The OECD Municipal Migration Database : Going granular », OECD Regional Development Papers, n° 96, Éditions OCDE, Paris, https://doi.org/10.1787/a79b007d-en. OECD (2022), *The Contribution of Migration to Regional Development*, OECD Regional Development Studies, OECD Publishing, Paris, https://doi.org/10.1787/57046df4-en.	2012-22	TL2 and TL3

Forest cover

Country	Source	Year	Territorial level
All countries	Hansen, M.C. et al. (2013), "High-resolution global maps of 21st-century forest cover change", *Science*, Vol. 342, p.p. 850-53, https://doi.org/10.1126/science.1244693. Data available at: https://glad.earthengine.app/view/global-forest-change.	2000-22	TL2, TL3, FUA, municipalities and local areas

Greenhouse gas emissions by sector and by gas

Country	Source	Year	Territorial level
All countries	Emissions Database for Global Atmospheric Research (EDGAR) Community GHG Database, a collaboration between the European Commission Joint Research Centre (JRC), the International Energy Agency (IEA) and comprising IEA-EDGAR CO2, EDGAR CH4, EDGAR N2O, EDGAR F-GASES version 8.0, (2023) European Commission, JRC (Datasets). See methodology in Annex C.	1970-2022	TL2, TL3, FUA

Green-task jobs

Country	Source	Year	Territorial level
EU countries,[1] CHE, ISL, NOR	Eurostat	2022	TL2, DEGURBA
AUS	Australian Bureau of Statistics (ABS)	2022	TL2
CAN	Labour Force Survey	2022	TL2
GBR	UK Labour Force Survey	2022	TL2, DEGURBA
NZL	Household Labour Force Survey (HLFS)	2022	TL2
USA	Bureau of Labour Statistics	2022	TL2

1. EU countries 21022, except POL and SVN (2021).

Greenfield foreign direct investment

Country	Source	Year	Territorial level
OECD countries	fDi Markets (2022), *Homepage*, Financial Times Limited, www.fdimarkets.com. Accessed in July 2024.	2023	TL2

Note: The fDi Markets database primarily gathers information from publicly available media and business sources.

Gross domestic product (GDP), GDP per capita, gross value added per worker

Country	Source	Territorial level (GDP last available year)
EU countries[1]	Eurostat, Regional economic accounts	TL2 (2022), TL3 2(021)
AUS	Australian Bureau of Statistics, 5220.0. Gross state product, figures based on fiscal year (July-June)	TL2 (2022)
CAN	Statistics Canada, Provincial economic accounts	TL2 (2022)
CHE	Swiss Federal Statistical Office, Statweb	TL2 and TL3 (2021)
CHL	Banco Central de Chile, Cuentas nacionales de Chile	TL2 (2022)
COL	DANE, Directorate of Synthesis and National Accounts	TL2 (2022)
CRI[2]	Not available	-
ISL[2]	Not available	-
ISR[2]	Not available	-
JPN	Economic and Social Research Institute, Cabinet Office, data are based on fiscal year (April-March)	TL2 and TL3 (2020)
KOR	Korean National Statistical Office	TL2 and TL3 (2022)
MEX	INEGI, System of national accounts of Mexico	TL2 (2022)
NZL	Statistics New Zealand	TL2 and TL3 (2022)
NOR	Norwegian Regional Accounts	TL2 and TL3 (2021)
TUR	Turkish Statistical Institute (TurkStat)	TL2 and TL3 (2022)
USA	Bureau of Economic Analysis	TL2 and TL3 (2022)

1. EU countries: TL3 last available year 2022 for CZE, DNK, EST, NLD, PRT, SWE and SVK.
2. CRI, ISL and ISR: data not available at the regional level.

Higher education institutions (location, enrolment, enrolment by gender, science, technology, engineering and mathematics enrolment)

Country	Source	Year
EU countries	ETER, https://eter-project.com/	2011-21
AUS	Department of Education, Skills and Employment (DESE)	2019
CAN	https://www.cicic.ca/869/results.canada?search=&t=1,2,3,4&ud=20,9,4,8,3,2	2019
CHL	https://www.mifuturo.cl/bases-de-datos-de-matriculados/, https://www.mifuturo.cl/instituciones-de-educacion-superior-en-chile/	2021
COL	https://snies.mineducacion.gov.co/portal/ESTADISTICAS/Bases-consolidadas/	2020
KOR	https://kess.kedi.re.kr/eng/post/6681132?itemCode=03&menuId=m_03_03_03	2020
MEX	http://www.anuies.mx/informacion-y-servicios/informacion-estadistica-de-educacion-superior/anuario-estadistico-de-educacion-superior	2020
NZL	https://www.educationcounts.govt.nz/directories/list-of-tertiary-providers	2021
USA	https://nces.ed.gov/ipeds/use-the-data	2020

Homeownership

Country	Source	Year	Territorial level
AUS	Luxembourg Income Study (LIS)	2018	TL2
AUT		2020	TL2
CAN		2019	TL2
CHE		2019	TL2
COL		2020	TL2
DEU		2019	TL2
ESP		2018	TL2
EST		2016	TL3
GBR		2021	TL2
IRL		2019	TL2
ISR		2021	TL2
ITA		2020	TL2
LTU		2020	TL3
MEX		2022	TL2
POL		2020	TL2
SVK		2018	TL2
SWE		2021	TL2

Housing prices

Country	Source	First year	Last year	Territorial level	House price definition
AUS	Australian Bureau of Statistics (ABS)	2018	2023	Municipalities and local areas	Median price
AUT	Statistik Austria	2015	2021		Median price per square metre (m^2)
BEL	Statistics Belgium (Statbel)	2013	2022		Mean price per m^2
DEU	vdpResearch	2018	2021		Mean price per m^2
DNK	Statistics Denmark	2018	2023		Mean price per m^2
ESP	INE	2013	2022		Mean price per m^2
FIN	Statistics Finland	2013	2023		Mean price per m^2
FRA	*Demande de valeurs foncières* (DVF)	2014	2023		Median price per m^2
GBR	UK Government Price Paid Data	2018	2023		Mean price adjusted by dwelling characteristics
HUN	Hungarian Central Statistics Office	2013	2023		Mean price per m^2
IRL	Irish Central Statistics Office (CSO)	2019	2021		Median price
KOR	Ministry of Land, Infrastructure and Transport (MOLIT)	2018	2023		Mean price per m^2
MEX	*Sociedad Hipotecária Federal* (SHF)	2016	2021		Mean price per m^2
NLD	Statistics Netherlands (CBS)	2013	2023		Mean price
POL	Statistics Poland	2013	2022		Mean price per m^2
PRT	Statistics Portugal (INE)	2019	2022		Median price per m^2
SWE	*Svensk Mäklarstatistik*	2015	2023		Mean price per m^2
USA	Zillow Research Institute	2013	2023		Mean price

Housing costs

Country	Source	Year	Territorial level
AUS	Luxembourg Income Study (LIS)	2018	TL2
AUT		2020	TL2
CAN		2019	TL2
CHE		2019	TL2
COL		2020	TL2
ESP		2018	TL2

Country	Source	Year	Territorial level
EST		2016	TL3
GBR		2021	TL2
IRL		2019	TL2
ISR		2021	TL2
ITA		2016	TL2
LTU		2020	TL3
MEX		2022	TL2
SVK		2018	TL2
SWE		2021	TL2
USA	American Community Survey (ACS)	2021	TL2

Labour market tightness

Country	Source	Year	Territorial level
All countries	Job vacancy data come from online job postings collected by Lightcast. Employment data are taken from labour force surveys and national statistics.	2022	TL2

Location of childcare facilities

Country	Source	Link	Year
AUS	For Flanders: *Opgroeien* (Grandir) for nurseries and *Onderwijs* for kindergartens; For Wallonia and Brussels: ONE (*Office de la naissance et de l'enfance*) for nurseries and Enseignement.be, *Annuaire des écoles d'enseignement fondamental ordinaire*, for kindergartens	For Flanders: https://data-onderwijs.vlaanderen.be/onderwijsaanbod/bao/lijst?hs=111+121 For Wallonia and Brussels: http://www.enseignement.be/index.php?page=25932	Flanders: 2024 Wallonia: 2023
AUT	*Ministerio de Educacion y Formacion Profesional*	https://www.educacion.gob.es/centros/home.do	2023
ESP	Ministerio de Educacion y Formacion Profesional	https://www.educacion.gob.es/centros/home.do	2023
EST	*Haridus - ja teadusministeerium*	https://www.ehis.ee/	2023
FIN	*Oeptus – Ja Kulttuuriministeriö* (OKM)	Data sent via email	2023
FRA	*Annuaire de l'éducation*	https://data.education.gouv.fr/explore/dataset/fr-en-annuaire-education/table	2024
GRC	Υπουργείο Πολιτισμού, Παιδείας και Θρησκευμάτων	https://geodata.gov.gr/el/dataset/skholeia	2015
IRL	The Department of Children, Equality, Disability, Integration and Youth (DCEDIY)	Data sent via email	2023
ITA	*Ministerio dell'Istruzione e del Merito*	Public:https://dati.istruzione.it/opendata/opendata/catalogo/elements1/leaf/?area=Scuole&datasetId=DS0400SCUANAGRAFESTAT; Private:https://dati.istruzione.it/opendata/opendata/catalogo/elements1/leaf/?area=Scuole&datasetId=DS0410SCUANAGRAFEPAR	2022
NLD	*Ministrie van Onderwijs, Cultuur en Wetenschap*	https://data.overheid.nl/dataset/gegevens-kinderopvanglocaties-lrk#panel-description	2022
NOR	*Utdanningsdirektoratet*	https://barnehagefakta.no/sok ; https://www.udir.no/om-udir/data/barnehagefakta-baf/	2023
NZL	Ministry of Education	https://www.educationcounts.govt.nz/directories/early-childhood-services	2022
USA	Homeland Infrastructure Foundation-Level Data (HIFLD) database	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::child-care-centers/about	2023

Location of general hospitals

Country	Source	Link	Year
EU countries	Eurostat GISCO, Healthcare services in Europe	https://gisco-services.ec.europa.eu/pub/healthcare	2023 (reference year is different for each country)
AUS	Australian Institute of Health and Welfare	https://www.aihw.gov.au/reports-data/myhospitals/themes/hospital-access	2024
AUT	Statistics Canada, The Open Database of Healthcare Facilities	https://www.statcan.gc.ca/en/lode/databases/odhf	2020
JPN	National Land Numerical Information, Ministry of Land, Infrastructure, Transport and Tourism	https://nlftp.mlit.go.jp/ksj/gml/datalist/KsjTmplt-P04-v3_0.html	2020
NZL	New Zealand Ministry of Health	Public: https://www.health.govt.nz/your-health/certified-providers/public-hospital Private: https://www.health.govt.nz/your-health/certified-providers/ngo-hospital	2024
USA	HIFLD Open Data	https://hifld-geoplatform.hub.arcgis.com/search?collection=Dataset&q=hospital	2023

Note: Additional filtering was done for each of the source dataset, to select general hospitals as defined in the OECD healthcare resources dataset (OECD, 2024[1]) and ensure international comparability.

Location of pharmacies

Country	Source	Link	Year
EU countries	HIFLD Open Data	https://hifld-geoplatform.hub.arcgis.com/datasets/geoplatform::pharmacies-/about	2021
USA	ESPON Database	https://database.espon.eu/indicator/882/#metadata-download	2023

Location of primary schools

Country	Source	Link	Year
AUS	Australian Curriculum, Assessment and Reporting Authority	https://www.acara.edu.au/contact-us/acara-data-access	2023
AUT	OPEN DATA Wallonia-Brussels, *Vlaams ministerie van onderwijs en vorming*	https://www.odwb.be/explore/dataset/243300/ ; https://data-onderwijs.vlaanderen.be/onderwijsaanbod/bao/lijst?hs=211 and https://data-onderwijs.vlaanderen.be/onderwijsaanbod/so/structuur/1stegraad	2023
CZE	*Ministerstvo školství, mládeže a tělovýchovy*	https://data.gov.cz/dataset?iri=https%3A%2F%2Fdata.gov.cz%2Fzdroj%2Fdatov%C3%A9-sady%2F00022985%2F63989c80e16fc31c77e23ab529c76b52	2023
ESP	*Ministerio de Educacion y Formacion Profesional*	https://www.educacion.gob.es/centros/home.do	2023
EST	*Haridus - ja teadusministeerium*	https://www.ehis.ee/	2023
FIN	*Tilastokeskuksen*	https://www.paikkatietohakemisto.fi/geonetwork/srv/eng/catalog.search#/metadata/6a8b4061-7a48-4667-bbdb-13952726c79f https://tilastokeskus.fi/tup/oppilaitosrekisteri/index_en.html	2023
FRA	*Ministère de l'Éducation nationale et de la Jeunesse*	https://data.education.gouv.fr/explore/dataset/fr-en-annuaire-education	2024
GRC	Υπουργείο Πολιτισμού, Παιδείας και Θρησκευμάτων	https://geodata.gov.gr/el/dataset/skholeia	
IRL	SchoolDays.ie	http://www.schooldays.ie/articles/primary-Schools-in-Ireland-by-County	2023
ITA	*Ministerio dell'Istruzione e del Merito*	Public: https://dati.istruzione.it/opendata/opendata/catalogo/elements1/leaf/?area=Scuole&datasetId=DS0400SCUANAGRAFESTAT Private: https://dati.istruzione.it/opendata/opendata/catalogo/elements1/leaf/?area=Scuole&datasetId=DS0410SCUANAGRAFEPAR	

Country	Source	Link	Year
JPN	National Land Information Division, Ministry of Land, Infrastructure, Transport and Tourism of Japan	https://nlftp.mlit.go.jp/ksj/gml/datalist/KsjTmplt-P29-v2_0.html	2021
KOR	National Geographic Information Institute (NGII)	Data sent via email	2023
LTU	Geoportal Lithuania	https://www.geoportal.lt/geoportal/en/web/en/search#queryText=educational%20establishments	2022
LVA	Latvia Ministry of Education and Science	Data sent via email	2023
MEX	*Sistema de Información y Gestión Educativa* (SIGED)	https://siged.sep.gob.mx/tableros/mapas.html	2024
NLD	Statistics Netherlands (CBS)	Data sent via email	2022
NOR	*Utdanningsdirektoratet*	https://data-nsr.udir.no/swagger/index.html	
NZL	New Zealand Ministry of Education	https://www.educationcounts.govt.nz/directories/list-of-nz-schools#	2024
PRT	*Instituto Nacional de Estatística*	Data sent via email	
SWE	National Agency for Education	https://www.skolverket.se/om-oss/oppna-data/api-for-skolenhetsregistret	2022
USA	National Center for Education Statistics (NCES)	Public schools: https://data-nces.opendata.arcgis.com/datasets/nces::public-school-characteristics-current/about Private schools: https://nces.ed.gov/surveys/pss/pssdata.asp	2023

Location of public transport using General Transit Feed Specification (GTFS) data

Country	Link
All countries	The mobility database: https://mobilitydatabase.org/
DEU	https://gtfs.de/de/feeds/, https://github.com/justusjonas74/vgn
ESP	https://nap.mitma.es/Files/Detail/1293, https://www.guaguas.com/transit/google_transit/agency.csv
FRA	https://transport.data.gouv.fr/datasets?type=public-transit, https://transport.data.gouv.fr/datasets/reseau-urbain-et-interurbain-dile-de-france-mobilites, https://transport.data.gouv.fr/datasets/localisation-des-arrets-ilevia-bus-metro-et-tram-gtfs-pictogrammes-du-reseau-ilevia, https://transport.data.gouv.fr/datasets/fil-bleu-syndicat-des-mobilites-gtfs-gtfs-rt, https://transport.data.gouv.fr/datasets/gtfs-tadao, https://transport.data.gouv.fr/datasets/horaires-theoriques-et-temps-reel-des-bus-et-tramways-circulant-sur-le-territoire-de-brest-metropole, https://transport.data.gouv.fr/datasets/versions-des-horaires-theoriques-des-lignes-de-bus-et-de-metro-du-reseau-star-au-format-gtfs
GBR	https://data.bus-data.dft.gov.uk/downloads/
GRC	https://geodata.gov.gr/en/dataset/oasa
NLD	http://gtfs.ovapi.nl/
ITA	https://dati.toscana.it/dataset/rt-oraritb, https://opendata.comune.palermo.it/opendata-dataset.php?dataset=1303, https://dati.toscana.it/dataset/rt-oraritb/resource/d6dc70c1-24ca-4d18-8f9c-b266d64fe4c9, https://solweb.tper.it/web/tools/open-data/open-data-detail.aspx?source=&filename=gommagtfsfe, https://solweb.tper.it/web/tools/open-data/open-data-detail.aspx?source=&filename=gommagtfsbo
PRT	https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=1&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=71&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=41&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=3&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=13&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=2&u=web, https://www.transporlis.pt/desktopmodules/trp_opendata/ajax/downloadFile.ashx?op=4&u=web

Main mode of transport for commuting

Country	Source	Year	Territorial level
Eurostat	Transport - functional urban areas, Eurostat	Eurostat	Transport - functional urban areas, Eurostat
AUS	Data by region 2011-2022, by ASGS main structure (ASGS Ed. 3, 2021)	2011-22	Municipalities and local areas, FUAs
CAN	Statistics Canada. Table 98-10-0503-01 Commuting duration by main mode of commuting and time arriving at work: Canada, provinces and territories, census divisions and census subdivisions of work	2021	Municipalities and local areas, FUAs
CHL	Encuesta de caracterización socioeconómica nacional, Ministerio de Desarollo Social y Familia	2022	Municipalities and local areas, FUAs
FRA	Caractéristiques de l'emploi en 2020	2020	Municipalities and local areas, FUAs
GBR	Method used to travel to work, ONS	2021	Municipalities and local areas, FUAs
JPN	System of Social and Demographic Statistics H Dwelling, Statistics of Japan	2020	Municipalities and local areas, FUAs
KOR	Commuting population by gender/age/transportation method (12 years and older) - city/county/district, Census Population 2020, KOSIS	2020	Municipalities and local areas, FUAs
MEX	Encuesta Intercensal 2015, INEGI	2015	Municipalities and local areas, FUAs
NZL	Main means of travel to work and work status by status in employment, for the employed census usually resident population count aged 15 years and over, 2018 Census (RC, TA, SA2, DHB) Information on table, NZ.Stat	2018	Municipalities and local areas, FUAs
USA	B08301: Means of transportation to work, US Census Bureau	2010-22	Municipalities and local areas, FUAs

Mean disposable income in functional urban areas

Country	Source	Year	Territorial level	Income definition
AUT	Statistics Austria	2018	Municipalities and local areas	Individual gross income plus transfers
BEL	Statbel	2019		Household gross income
CAN	Statistics Canada	2021		Disposable income
CHE	Federal Tax Administration	2018		Household gross income
DEU	*ifo Schnelldienst*	2018		Total income
DNK	Statistics Denmark	2020		Household disposable income
ESP	Spanish Statistical Office	2019		Household disposable income
FIN	Statistics Finland	2020		Household disposable income
FRA	*Institut national de la statistique et des études économiques*	2020		Disposable income
GBR	Office for National Statistics	2018		Disposable income
LUX	Ministry for Social Security	2020		Household disposable income
NOR	Statistics Norway	2022		Household disposable income
PRT	Statistics Portugal	2019		Household disposable income
SWE	Statistics Sweden	2019		Household disposable income
USA	American Community Survey	2021		Total income

Note: The mean disposable income in the city and commuting zone are computed as the average of the median disposable income in the small area units (SAU3) within those areas (mean incomes for DEU and GBR).

Municipal waste and waste recovery

Country	Source	Year	Territorial level
AUS	National Waste report	2018	TL2
AUT	Environment Agency Austria (UBA) - Austrian Federal Waste Management Plan and related Status Reports	2019	TL2
CHL	INE, Chile. Pollutant Release and Transfer Register (PRTR) - *Registro de Emisiones y Transferencias de Contaminantes (RETC)*	2017	TL2
CZE	Czech Statistical Office CZSO, Annual statistical survey	2013	TL2
DEU	Waste Statistics of the Federal Statistical Office and the Statistical Offices of the Federal States, Spatial Monitoring System of the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR	2021	TL2
ESP	National Institute of Statistics/*Instituto Nacional de Estadística* (INE)	2021	TL2
EST	Eurostat, Municipal waste (env_rwas_gen)	2021	TL2
FRA	Odd-numbered years: enquêtes collecte de l'Ademe ; Even-numbered years: estimations SDES	2019	TL2
GBR	Department for Environment, Food and Rural Affairs, Local Authority Collected Waste Statistics	2021	TL2
HUN	HCSO, Hungarian Central Statistical Office	2021	TL2
ISR	Central Bureau of Statistics Israel	2021	TL2
ITA	Italian Institute for Environmental Protection and Research (ISPRA)	2020	TL2
JPN	Ministry of Internal Affairs and Communications	2021	TL2
KOR	Korean Ministry of Environment	2021	TL2
LVA	Official statistics 2-Waste by Latvian Environment, Geology and Meteorology Agency	2020	TL2
LUX	Eurostat, Municipal waste (env_rwas_gen)	2013	TL2
MEX	INEGI. *Censo Nacional de Gobiernos Municipales y Delegacionales 2017*	2020	TL2
NLD	Statistics Netherlands	2021	TL2
NOR	Statistics Norway	2020	TL2
POL	Central Statistical Office	2021	TL2
PRT	Statistics Portugal, Urban waste statistics	2020	TL2
SVK	Statistical Office of the Slovak Republic, statistical survey	2021	TL2
SVN	Statistical Office of the Republic of Slovenia (SURS), Generated amounts	2021	TL2
TUR	Municipal Waste Statistics Survey	2020 (2016 recovery)	TL2

Passenger vehicles, electric and hybrid vehicles

Country	Source	Year	Territorial Level
AUS	Australian Bureau of Statistics (ABS), Motor Vehicle Census (cat. no. 9309.0)	2021	TL2
AUT	Statistics Austria, Transport statistics	2021	TL2
BEL	Statbel and IWEPS computation: https://statbel.fgov.be/fr/themes/mobilite/circulation/parc-de-vehicules	2021	TL2
CAN	Statistics Canada. CANSIM database: Table 23-10-0067-01 Vehicle registrations, by type of vehicle; Electric vehicles OECD estimates based on Table 20-10-0025-01 Zero-emission vehicle registrations, quarterly	2019	TL2
CHE	Federal Statistical Office, Federal Roads Office: Stock of road vehicles (MFZ)	2022	TL2
CHL	INE	2021	TL2
CZE	Czech Statistical Office CZSO, Ministry of Transport of the Czechia. www.mdcr.cz	2021	TL2
DEU	Motorist's Federal Office (*Kraftfahrt-Bundesamt*), Spatial Monitoring System of the BBSR, Private cars	2021	TL2
DNK	Statistics Denmark, StatBank Table BIL707: Stock of vehicles per 1 January by region, passenger cars (for private use, taxis and rental)	2022	TL2
ESP	*Govierno de España, Ministerio del Interior, Direción General de Tráfico. Parque de vehículos por provincias* y tipos, https://www.dgt.es/menusecundario/dgt-en-cifras/dgt-en-cifras-resultados/?categorias=/Tema/Vehiculos/	2022	TL2
EST	Statistics Estonia	2022	TL2
FIN	Statistics Finland, Transport and tourism statistics	2022	TL2

Country	Source	Year	Territorial Level
FRA	MEDDTL (CGDD/SOeS) *Fichier central des automobiles*, https://www.statistiques.developpement-durable.gouv.fr/	2022	TL2
GBR	Office for National Statistics, United Kingdom Ministerial Department for Transport statistics	2021	TL2
GRC	Hellenic Statistical Authority	2020	TL2
HUN	Hungarian Central Statistical Office. Until 2017: Central Office for Administrative and Electronic Public Services, from 2017 Ministry of Interior - stock of road vehicles	2022	TL2
IRL	CSO Department of Transport, Tourism and Sport. Irish Bulletin of vehicle and driver statistics, Table 5a. Number of Private Cars by CO_2 Emission Band in each Licensing Authority Area, http://www.dttas.ie	2021	TL2
ISR	Central Bureau of Statistics Israel	2022	TL2
ITA	*Automobile club d'Italia*	2020	TL2
KOR	Ministry of Land, Infrastructure and Transport	2021	TL2
LVA	CSB Directorate of Road Traffic Safety	2021	TL2
LTU	State Enterprise Registrar, Register of Road Motor Vehicles of the Republic of Lithuania	2021	TL2
MEX	INEGI. Statistics of Motor Vehicles Registered in Circulation; Administrative record of the light vehicle automotive industry	2021	TL2
NLD	CBS, datasets 70072ned and 71405ned	2022	TL2
NOR	Statistics Norway: Tables 07849 and 11823	2020	TL2
POL	Ministry of Interior of Poland, Central Register of Vehicles	2021	TL2
SVK	Ministry of Interior of the Slovac Republic	2022	TL2
SVN	Statistical Office of the Republic of Slovenia (SURS), the Central Register of Vehicles and Traffic Documents (MRVL) by the Ministry of Infrastructure (MZI)	2021	TL2
SWE	Statistics Sweden, Registered vehicles, table START__TK__TK1001__TK1001A	2022	TL2
TUR	Türkiye Statistical Institute (TurkStat)	2022	TL2
USA	Federal Highway Administration, State Motor Vehicle Registrations, Private and commercial automobiles (including taxis cabs), http://www.fhwa.dot.gov/policyinformation/statistics.cfm	2021	TL2

Patent applications and climate-related patents

Patent data refer to patent applications at the internationalisation phase filled under the Patent Cooperation Treaty (PCT) at the World Intellectual Property Organization. Patent counts are based on the inventor's region of residence. Patent rates at the subnational level may be influenced by "headquarters effects" when patents are registered under a company's headquarters address rather than the site of the actual inventive activity. This bias may inflate patent rates in areas with a high concentration of headquarters, which are often large cities or capital-city regions.

Climate-related patents include climate adaptation and mitigation technologies, based on OECD (2023), *Patents - Technology Development*, OECD, Paris, (link to metadata, pdf).

Country	Source	Year	Territorial level
OECD countries	Authors elaboration based on OECD, STI Micro-data Lab: Intellectual Property Database, http://oe.cd/ipstats	2023	FUA, TL3 typology

Population

Country	Source	Territorial level (last available year)
EU countries, CHE, NOR and TUR	Eurostat, Regional demographic statistics (reg_dem), population at 1st of January	2 and 3 (2023)
AUS	Australian Bureau of Statistics (ABS), Australian Demographic Statistics (cat. no. 3101.0)	2 and 3 (2023)
AUT	Statistics Canada. Cansim TL2: Table 051-0001 - Estimates of population, by age group and sex for July 1, Canada, provinces and territories	2 and 3 (2023)
CHL	INE, Chile. Population projection and estimates by sex and age. Break in series before 2002 (as from 2002, 2002-2035 projection data)	2 and 3 (2023)

Country	Source	Territorial level (last available year)
COL	DANE - Departamento Administrativo Nacional de Estadistica. Estimation of population 1985-2005 and projection of population 2005-2023 by department. June 30. 2018: Census data.	2 and 3 (2023)
CRI	Costa Rica Población total estimada al 30 de junio por grupos de edades, según provincia y sexo. Population projections from 2000-2025. National Institute of Statistics and Census.	2 and 3 (2023)
ISL	Statistics Iceland. Population at 1st of January by municipality	2 and 3 (2023)
ISR	Central Bureau of Statistics Israel.	2 and 3 (2023)
JPN	Statistics Bureau, Current Population Estimates as of October 1st.	2 and 3 (2023)
KOR	Statistics Korea, KOSIS database. Yearly average projected population by age	2 and 3 (2023)
MEX	INEGI, mid-year estimates, Population and Housing Census 2020 ; OECD estimates for intercensus years.	2 and 3 (2023)
NZL	Statistics New Zealand, Population Statistics, Estimated resident population at 30 June.. NZ.DOTSTAT (Tablecode 7501)	2 and 3 (2023)
USA	United States Census Bureau - State and County Population Estimates	2 and 3 (2023)

Regional output price index (ROPI)

Country	Note	TL2	TL3	Data source
AUS	1	2000-22		ABS - 5220.0 Australian National Accounts: State Accounts. Table 1. Gross State Product Link to method (abs.gov.au)
AUT	3	2000-22		Eurostat - table nama_10r_2gvagr
BEL	2,3	2003-22		Eurostat - table nama_10r_2gvagr
CAN	1	2000-22		Statistic Canada - Statistics Canada. Table 36-10-0222-01 - Gross domestic product Link to method (statcan.gc.ca)
CHE	4			Not available
CHL	3	2013-22		Banco Central de Chile - *Gasto del PIB volumen a precios del año anterior encadenado y a precios corrientes*, Link to method (bcentral.cl)
COL	1,3	2005-22		DANE - *PIB por departamento*. Link to method (dane.gov.co - pdf)
CZE		2000-22	2000-22	Czech Statistical Office CZSO - GDP, volume indices. Table REG_HDP_SC_V, Link to data source (apl.czso.cz)
DEU	2	2000-22		Eurostat - table nama_10r_2gvagr
DNK	2,3	2000-22	2000-22	Statistics Denmark - NRHP: 1-2.1.1 Production, GDP and generation of income by region, Link to method (dst.dk)
ESP	3	2000-22		Spanish Regional Accounts (SRA) 2000-22 Series. National Statistics Institute
EST	1	2000-22	2000-22	Statistics Estonia. Table RAA0053 chain-linking and Table RAA0052 current prices Link to method (stat.ee - pdf)
FIN	1	2000-22	2000-21	Statistics Finland - 12bc Gross domestic product Link to data source (stat.fi) Link to method (stat.fi)
FRA	2	2000-22		Eurostat - table nama_10r_2gvagr
GBR	3	2000-22	2000-22	Office for National Statistics, ONS, Link to GDP data source (ons.gov.uk); Link to GVA data source (ons.gov.uk)
GRC	2	2000-22		Eurostat - table nama_10r_2gvagr
HUN	2,3	2000-22		Eurostat - table nama_10r_2gvagr
IRL	2	2000-22		Eurostat - table nama_10r_2gvagr
ITA	1,3	2000-22		ISTAT Gross domestic product supply side Source: Gross domestic product supply side (istat.it)
JPN	1		2006-20	Statistics Bureau - Gross prefectural domestic product
KOR	1,3	2000-22	2000-22	Statistics Korea, KOSIS database - Korean Regional Accounts Link to data source
LVA		2000-22		OECD Annual National Accounts, GDP deflator
LTU	2	2000-22		Eurostat - table nama_10r_2gvagr
LUX		2000-22		OECD Annual National Accounts, GDP deflator
MEX	3	2003-22		INEGI. System of National Accounts of Mexico

Country	Note	TL2	TL3	Data source
NLD	1	2000-22	2000-22	Statistics Netherlands, StatLine database
NZL	4			Not available
NOR	4			Not available
POL	2,3	2003-22		Eurostat - table nama_10r_2gvagr
PRT	3	2000-22	2000-22	Statistics Portugal (INE), Regional accounts
SVK	1	2000-22	2000-22	Statistical Office of the Slovak Republic, database DATAcube tables nu3001rr and nu3803rr
SVN	2,3	2000-22		Eurostat - table nama_10r_2gvagr
SWE	3	2000-22	2000-22	Statistics Sweden, National Accounts
TUR	3	2004-22	2004-22	Türkiye Statistical Institute (TurkStat). Regional accounts
USA	1	2000-23	2001-22	Bureau of Economic Analysis table SAGDP1 and CAGDP1 State and county annual GDP
BGR	2	2000-22		Eurostat - table nama_10r_2gvagr
BRA	1	2010-20		*Instituto Brasileiro de Geografia e Estatística*, IBGE, regional accounts
HRV	2	2000-22		Eurostat - table nama_10r_2gvagr
PER	1	2007-23		*Instituto Nacional de Estadística e Informática - Cuentas Nacionales*
ROU	2	2000-22		Eurostat - table nama_10r_2gvagr

1. ROPIs are estimated by dividing the current regional GDP by the GDP chain-linked volumes and rebased on the reference year 2015.
2. Eurostat table "Gross domestic product (GDP) and Gross value added (GVA) in volume by NUTS 2 regions" (nama_10r_2gvagr), from which ROPIs are derived.
3. ROPIs transmitted through the regional questionnaire by the delegates of the OECD Working Party on Territorial Indicators: AUT, CHL, DNK, ITA, KOR, MEX, POL, PRT, ESP, TUR and GBR (GDP and GVA deflators); SWE (GDP deflator); BEL, HUN and SVN (GVA deflator).
4. Regional GDP series in volume not available.

Regional consumer price index (RCPI)

Country	Data sources and methods	TL (periodicity: Monthly/Quarterly/Yearly)
AUS[1]	ABS, Consumer Price Index, 8 cities, 130 categories Link to data source, Link to methods	8 capital cities (M)
CAN	Statistics Canada, Consumer Price Index, monthly, percentage change, not seasonally adjusted, Canada, provinces, Whitehorse and Yellowknife – Shelter. Link to data source, Link to methods	TL2 (M)
CZE	CZSO, Consumer price indices according to ECOICOP, 2015=100. Link to data source, Link to methods	Prague (M)
DNK[2]	Statistics Denmark, Household budget survey, table FU07 - Consumption by group of consumption, region and price unit, current and real prices. Link to data source.	TL2 (Y)
DEU	Destatis, Table 61111-0011 - Consumer price index, and price index for rents: Länder, months. Link to data source, Link to method	TL2 (M)
ESP	INE - Table 50913. Consumer Price Index. Base 2016 Indices by Autonomous Community: overall and by ECOICOP group. Link to data source, Link to methods	TL3 (M)
ITA	ISTAT CPI ECOICOP classification (3 digit) - prov., indexes (100 categories) and weights (12 categories) ECOICOP classification (3 digit) - prov. (istat.it). Link to method	TL3 (M)
JPN	e-stat.go.jp Retail price survey (trend). Link to data source, Link to methods	TL3 (M)
KOR	KOSIS - CPI by Item(Expenditure Category:2020=100) Source: https://Kosis.kr/eng > Statistical Database > Prices > Consumer Price Survey. Link to method	TL2 (M)
NZL	StatsNZ - Table CPI Regional Groups (Broad Regions) (Qrtly-Mar/Jun/Sep/Dec) Source: statnz > Economic indicators > Consumers Prices index – CPI. Link to methods	Broad regions (Q)
POL[3]	Statistics Poland, Table P2955 - Price indices of consumer goods and services Source: https://bdl.stat.gov.pl/bdl/dane/podgrup/temat > Prices > Prices indices. Link to methods	TL2 (Y)
PRT	Statistics Portugal - Price indices of consumer goods and services Consumer price index (Month-on-month growth rate - Base 2012 - %) Link to data source	TL2 (M)

Country	Data sources and methods	TL (periodicity: Monthly/Quarterly/Yearly)
TUR	Türkiye Statistical Institute (TurkStat)	TL2(M)
USA	BEA, table SAIRPD - Implicit regional price deflators by state. Link to data source, Link to methods	TL2 (Y)

1. Australia: An alternative to measure inflation for consumers is the implicit deflator of Final Demand, which excludes exports (ABS Australian National Accounts: State Accounts, 5220.0).
2. Denmark: The implicit regional CPI computed from Table FU07 downloaded in September 2024 differs from the national CPI Table PRIS8, by around -2% for the reference year 2022 due to differences in methodologies and the lag between updates.
3. Poland: The index available for Mazowieckie voivodship (PL9) has been duplicated for both embedded TL2 regions: Warszawski stołeczny (PL91) and Mazowiecki regionalny (PL92).

Remote work uptake

The Labour Force Survey (LFS) includes a specific question on working-from-home (WFH) practices. It classifies respondents according to the frequency with which they work from home in their primary employment: (1) those who "mainly work at home"; (2) those who "sometimes work at home"; and (3) those who "never work at home." In the survey question, within a reference period of four to twelve working weeks prior to the reference week, "mainly" denotes working from home at least half of the time, "sometimes" denotes working from home less than half of the time, and "never" indicates no instances of working from home.

Country	Source	Year	Territorial level
EU countries	OECD calculation based on the European Labour Force Survey	2019-22	TL2, DEGURBA
TUR	Turkish Labour Force Survey	2019-22	TL2, DEGURBA

S80/S20 ratios for disposable income

Country	Source	First year	Last year	Territorial level
AUS	Luxembourg Income Study (LIS)	2010	2018	TL2
AUT	LIS	2010	2020	TL2
BEL	EU statistics on income and living conditions (EU-SILC)	2010	2022	TL2
CAN	LIS	2010	2019	TL2
CHE	LIS	2010	2019	TL2
CHL	LIS	2011	2017	TL2
COL	LIS	2010	2020	TL2
CZE	EU-SILC	2010	2022	TL2
DEU	LIS	2010	2019	TL2
ESP	EU-SILC	2010	2022	TL2
FIN	EU-SILC	2010	2022	TL2
FRA	LIS	2010	2018	TL2
GBR	LIS	2010	2021	TL2
GRC	EU-SILC	2010	2022	NUTS1
HUN	EU-SILC	2010	2022	NUTS1
IRL	LIS	2011	2019	TL2
ISR	LIS	2010	2021	TL2
LTU	LIS	2010	2020	TL3
MEX	LIS	2010	2022	TL2
POL	EU-SILC	2010	2022	NUTS1
SVK	LIS	2010	2018	TL2
SWE	LIS	2010	2021	TL2
USA	LIS	2010	2021	TL2

Share of workers at high risk of automation

The OECD methodology (https://doi.org/10.1787/646aad77-en) focuses on task-based analysis to identify workers at high risk of automation. It evaluates the automatability of tasks within occupations, linking them to the required skills. Jobs with a higher proportion of routine, manual tasks are considered more vulnerable to automation.

Country	Source	Year	Territorial level
EU countries, CHE, ISL, NOR	Eurostat	2022	TL2, DEGURBA
AUS	Australian Bureau of Statistics (ABS)	2023	TL2
CAN	Labour Force Survey	2024	TL2
COL	*Gran Encuesta Integrada de Hogares* (GEIH)	2023	TL2
CRI	*Encuesta Continua de Empleo*	2023	TL2
GBR	UK Labour Force Survey	2023	TL2, DEGURBA
MEX	Mexican National Survey of Occupation and Employment (ENOE)	2023	TL2
USA	Bureau of Labour Statistics	2023	TL2

Subnational government climate-significant expenditure and investment

Country	Source	Year	Territorial level
All countries	OECD Subnational Government Climate Finance Database	2019	Country

Trade openness

Some care is needed in interpreting measures of trade openness. The first concerns what can be referred to as "smaller country biases", which reflect the fact that smaller countries will typically need to source more of their inputs from abroad compared to larger countries. The second reflects that the measures respect gross trade. In countries with large processing activities, the contribution of trade (in value-added terms) to growth may be much smaller than implied by gross trade data. Third, for regional measures of trade openness, there may be "port biases", which reflect the fact that exports (imports) may be recorded as originating from those destinations even if the actual origin of the producer (or destination of the imports) is elsewhere. However, trade data typically reflect the final destination for imports and the producer for origin, rather than the location of the company's head office or logistical hubs (such as airports, ports and warehouses); exceptions are detailed in the table below.

Country	Note	Source	Territorial level
AUS		Australian Bureau of Statistics, 5368.0 - International Trade in Goods and Services. Table 15a. Merchandise exports, State and Australia, FOB Value and Table 15b. Merchandise imports, State and Australia, Customs Value, States of final destination (imports) and origin (exports), ABS data, ABS method	TL2
AUS	1	Statistics Austria compiles on behalf of the Austrian Chamber of Commerce (WKO) and the nine Austrian federal states regionalised foreign trade data by federal states	TL2
AUT		National Bank of Belgium, Dataset=EXTTRADEBENAT, region of final destination (imports) and initial origin (exports), NBB data, NBB method	TL2
CAN		Statistics Canada. CANSIM database. Table 228-0060 Merchandise imports and domestic exports (customs basis), Statcan data, Statcan method	TL2
CHE	7	Swiss Federal Customs Administration, FCA data	TL2
COL		National Administrative Department of Statistics - DANE, Directorate of Methodology and Statistical Production, DANE data	TL2
FIN	2	Tulli, Tilastointi - Tullen, Statistik - Finnish Customs, Statistics Tulli data, Tulli method	TL2, TL3
FRA	3	Douanes. *Statistiques départementales et régionales du commerce extérieur pour l'exportation de marchandises*	TL2, TL3
DEU		Spatial Monitoring System of the BBSR	TL2
ESP		*Agencia Tributaria, Ministerio de Hacienda y Función Pública*	TL2, TL3

Country	Note	Source	Territorial level
GBR		HM Revenue and Customs: Trade Statistics, UK Regional Trade in Goods Statistics	TL2
GRC		Hellenic Statistical Authority. External Trade Survey	TL2
ITA		ISTAT, Instrastat System	TL2, TL3
KOR		Statistics Korea	TL2
LVA	4	The External trade database and the Business register information of the Central Statistical Bureau	TL2, TL3
LTU	5	Statistics Lithuania, Lithuanian Customs: extra-EU trade Customs declarations, intra-EU trade (since 2004) Intrastat survey; Statistics Lithuania: Statistical Business Register	TL2
PRT	6	Statistics Portugal, Statistics on external trade of goods	TL2, TL3
SVN		SURS	TL2
SWE		Statistics Sweden	TL2, TL3
USA		U.S. Census Bureau: Economic Indicators Division USA Trade Online. U.S. Import and Export Merchandise trade statistics	TL2
CHN		National Bureau of Statistics China. Customs statistics	TL2

1. Austria: Austrian federal states regionalised foreign trade data by federal states. In order to calculate statistically reliable regional foreign trade data in compliance with the principles of the official national statistical institution, individual records are matched and reassigned by resorting to already existing data sources.
2. Finland: Some large companies file declarations centrally, so no office-specific data are available in Intrastat or customs declarations. Customs estimates these data based on previous years and adjusts for actual production locations when necessary.
3. France: On exports, the department is the initial place from which the goods are exported (not the department of the exporting company's head office). On import, it is the department of the final destination of the imported goods (and not the department of the importer's head office). However, i) this general rule does not apply to trade in natural gas and electricity (by pipeline or high-voltage line): flows assigned by agreement to the Ile-de-France region and the department of Paris (75); ii) there are some structural effects: in some cases, the department indicated on customs documents is that of storage and not necessarily that of dispatch (for export), consumption or use (for import). In this way, flows are attributed to regions with major logistical hubs for trade (airports, ports, warehouses), even though they may not have originated in or been destined for these regions; this is notably the case for petroleum products.
4. Latvia: Unspecified data have been adjusted for non-response as well as trade below threshold related to the trade between the member states. Other unspecified information includes trade figures about the enterprises not registered in the business register (foreign enterprises) but which were carried out in trade in goods activities in Latvia.
5. Lithuania: Trade data are compiled according to the Special Trade System. Data by regions were compiled by linking International Trade in Goods Statistics and Statistical Register of Economic Entities (Statistical Business Register) data. Intrastat adjustments for non-response and trade below exemption thresholds are not included. Data are based only on the information of successfully linked enterprises.
6. Portugal: The country's value may not match the sum of the regions since the head offices of some economic operators are not identified or are located abroad.
7. Switzerland: Data include gold, silver in bars and coins, electricity, returned goods and outward processing. Data omit two regions considered by the Federal Customs Administration (the Principality of Liechtenstein and canton not specified); therefore, the sum of CH01-CH07 does not correspond to the official Swiss foreign trade at the total level.

Women in relative poverty compared to men in relative poverty

Country	Source	Year	Territorial level
AUS	Luxembourg Income Study (LIS)	2018	TL2
AUT	LIS	2020	TL2
BEL	EU statistics on income and living conditions (EU-SILC)	2022	TL2
CAN	LIS	2019	TL2
CHE	LIS	2019	TL2
CHL	LIS	2017	TL2
COL	LIS	2020	TL2
CZE	EU-SILC	2022	TL2
DEU	EU-SILC	2022	TL2
ESP	EU-SILC	2022	TL2
FIN	EU-SILC	2022	TL2
FRA	LIS	2018	TL2
GBR	LIS	2021	TL2
GRC	EU-SILC	2022	NUTS1
HUN	EU-SILC	2022	NUTS1
IRL	LIS	2019	TL2
ISR	LIS	2021	TL2
LTU	LIS	2020	TL3
MEX	LIS	2022	TL2
POL	EU-SILC	2022	NUTS1
PRT	EU-SILC	2022	TL2
SVK	LIS	2018	TL2
SWE	LIS	2021	TL2
USA	LIS	2021	TL2

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OECD (2024), "Health care resources", *OECD Health Statistics* (database), https://doi.org/10.1787/data-00541-en (accessed on 25 March 2024). [1]

Annex C. Methodologies

Estimation of economic trends based on regional price changes

Factors like real productivity growth, industrial specialisation and price changes influence regional economic performance over time. When the baskets of goods produced across regions are similar and/or inflation is low, the price effect will typically be negligible in explaining differences in regional performance, including over time. However, in nominal prices, the basket of goods produced can vary significantly across regions, especially in resource-rich regions and recent years have seen inflation reach its highest levels in decades. As such, the underlying assumption that regional economic performance can be assessed using national price indices has become increasingly strained. However, newly available data on regional price indices are now available, providing the scope to better understand relative performance across regions and how this translates into long-term economic growth.

This edition of *Regions and Cities at a Glance* introduces two significant methodological improvements: the use of regional deflators instead of national deflators in real gross domestic product (GDP) and gross value added (GVA) series at the large (TL2) and small (TL3) region levels and the use of regional consumer price indices (CPIs) to estimate real household incomes at the TL2 region level. Accounting for regional price changes provides a more accurate picture of economic growth drivers and changes in regions' living conditions. These methodological improvements build on the recent release of regional deflators in European Union (EU) countries, complemented by data collection for other OECD countries.

Until recently, most countries did not produce volume estimates of regional GDP in basic prices that reflected the actual price changes of GDP in regions. Volume estimates, where available, were derived using national GDP deflators. While most countries do not currently produce regional estimates of GDP in volume terms using actual price change data observed by economic actors resident in the region, many are now generating volume estimates of regional GDP in basic prices by deflating regional value-added in a given industry using the national deflator for that activity. Whilst not perfect, this significantly improves a whole economy's national GDP deflator. Moreover, whilst there may be significant differences in the price of a given product across regions in a country, there is less likely to be a significant difference in the price change of that product across the country, which means that volume measures of regional GDP produced in this way can be considered robust.

The primary advantage of employing regional deflators is the enhanced accuracy in measuring real (or volume) estimates of economic activity across distinct regions. National deflators, which average price changes across the entire country, can hide significant regional disparities in price changes. Using regional deflators better accounts for actual price changes producers and consumers face in each region. This methodological refinement facilitates more informed policy making, enabling the development and implementation of strategies better tailored to the specific economic circumstances of individual regions.

However, the transition to regional deflators presents certain challenges. Collecting and maintaining accurate regional price data require substantial resources and sophisticated statistical methodologies. Variations in data quality and availability across regions can affect the consistency and comparability of regional deflators. Additionally, while regional deflators provide a more accurate local perspective, chain-linked measures can result in a loss of additivity between deflated subnational measures and the equivalent national totals. Despite these challenges, the benefits of adopting regional deflators – such as enhanced accuracy of regional economic analysis – outweigh the drawbacks, ultimately leading to more effective economic policies.

This section explains the concept of regional deflators and, to help illustrate their importance, compares economic indicators with previous series using national deflators. The first section focuses on output prices, the second on consumer prices.

Regional output price indices

To arrive at the price deflators for regional GDP (hereafter called Regional Output Price Index, ROPI), current regional GDP estimates are divided by the regional GDP chain-linked volume series (with the series rebased on the reference year 2015). Regional GDP chain-linked volumes are available for most OECD and EU countries at the TL2 level. In addition, a few countries, such as Czechia, Denmark, Estonia, Finland, Japan, Korea, the Netherlands, Portugal, the Slovak Republic, Sweden, Türkiye, the United Kingdom and the United States, have data available at the more granular TL3 level. New Zealand, Norway and Switzerland do not have GDP series in volume at the regional level (Table C.1).

Some national statistical offices (NSOs) provide public information about the methodology used to compile regional volume growth (Table C.1). In essence, countries use two distinct approaches, in part reflecting the scarcity of regional-level price data in many countries, as outlined in Chapter 6 of the EU *Manual on Regional Accounts Methods* (Eurostat, 2013[1]). As such, many countries use a top-down approach, applying national-level price changes to the region's industrial structure (meaning that at the product level, all price changes are the same across the country) and differences across regional aggregates reflect only composition and not price effects. This compares with those countries able to adopt bottom-up methods, which capture differences in price changes across regions. In some cases, both approaches are combined, depending on data availability and regional characteristics.

Whilst these differences may impact international comparability, and indeed within-country comparability, the impact is mitigated somewhat by the fact that the methods only require estimates of price change of a given product rather than price levels, which is generally a weaker assumption (albeit with some exceptions, for example when price changes ripple from one part of the country to another, as is sometimes seen in housing markets).

Table C.1 summarise different methods countries use to produce GDP and GVA volume series at the regional level, with some using bottom-up and others applying mixed or top-down methods. The information is provided for the seven countries where the methods are publicly available.

Table C.1. Methods to produce GDP/GVA volume series

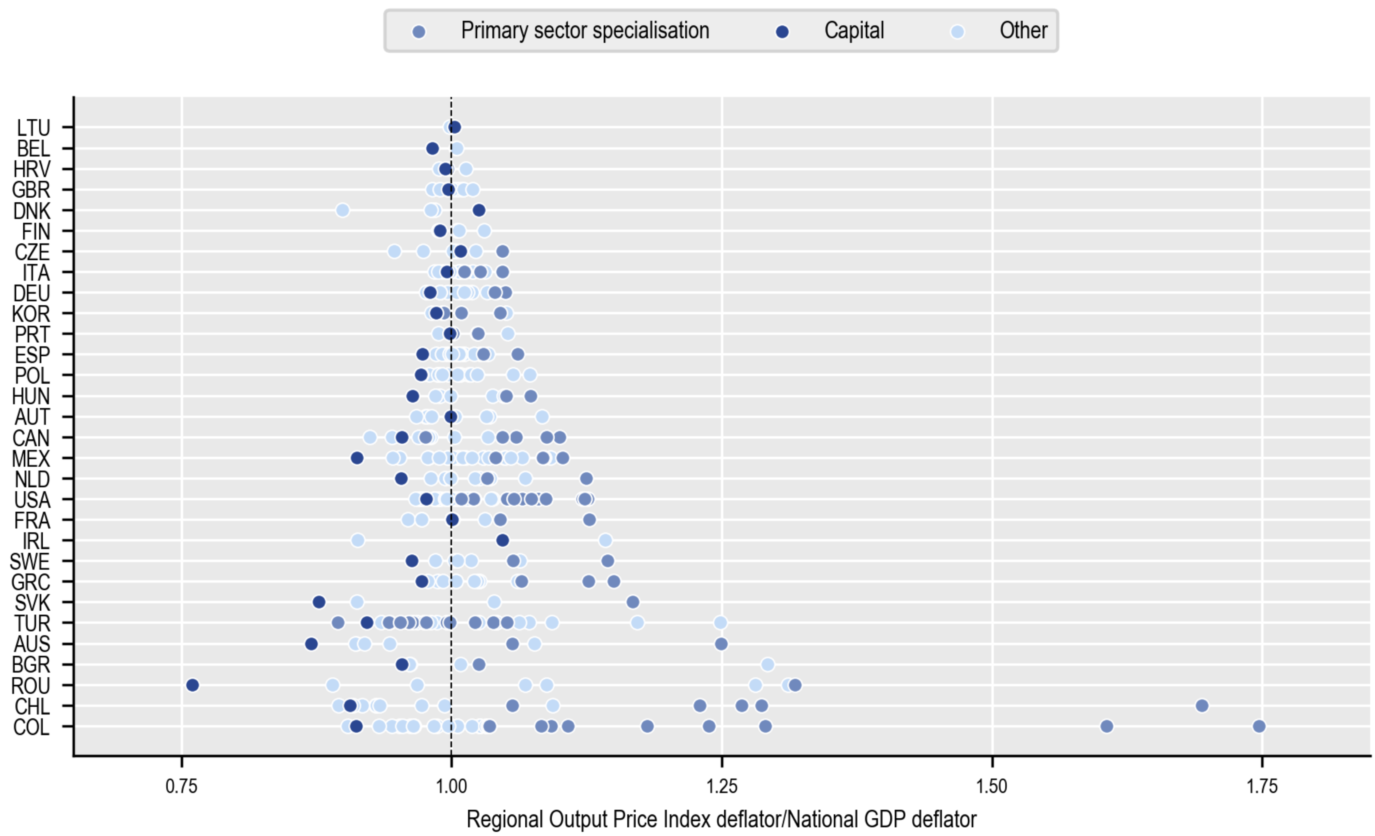
	Nominal GDP data	**Price deflators**	**Sectoral output data**	**Base year**
AUS	Sourced from state accounts; used as the base before deflation	Regional deflators are applied to adjust nominal GDP to real terms (bottom-up approach)	Sector-specific data are aggregated to obtain state-level GDP	Regularly updated base year to ensure the relevance of real GDP calculation using chain-linked indices)
CAN	Derived from provincial economic accounts	Uses provincial deflators based on sector-specific price indices (bottom-up approach)	A detailed sectoral breakdown is available and can be used in provincial accounts	Base year updates follow national guidelines, ensuring comparability using chain-linked indices
DNK	Collected through national accounts; adjusted for price levels	Applies regional deflators calculated using a combination of national and regional price data (mixed approach)	Sectoral data are critical, with each sector's output deflated individually	Consistently updates the base year to maintain the accuracy of real GDP estimates using chain-linked indices
EST	Sourced from national accounts with adjustments for regional economic activities	Utilises specific regional price indices, though data limitations may affect accuracy (bottom-up approach)	Sector-specific data, though more limited, are used to adjust regional GDP	The base year is periodically updated, though challenges exist due to data availability
FIN	Based on national accounts aggregated from regional economic activities	Applies region-specific deflators derived from national price indices (top-down approach)	Detailed sectoral data are used, reflecting the diverse economic activities in different regions	The base year is updated periodically, following changes in economic structure, using chain-linked indices
GBR	Derived from regional economic accounts	Utilises regional price indices to calculate deflators (bottom-up approach)	Extensive sectoral breakdowns are used, with sector-specific deflators applied	The base year is updated regularly, using chain-linked indices, though temporal consistency issues are noted
POL	Current prices from the year preceding the reference year are adopted as constant prices	Applies regional deflators calculated using a combination of national and regional price data (mixed approach)	Calculations are conducted separately for five national institutional sectors	Current prices from the year preceding the reference year are adopted as constant prices

Effect of ROPIs on GDP measures for large regions

ROPIs vary substantially compared to the national (implicit GDP) deflator previously used to deflate the regional GDP current series. Over the period covered, most regions with the largest gaps between regional and national deflators are either specialised in the primary sector or are capital-city regions (Figure C.1). Using the ROPI deflator has two main effects in countries with regions specialised in the primary sector (e.g. Chile, Colombia) over the period covered: i) the GDP per capita of regions specialised in natural resources decreases, as over the period covered price changes on the prices of natural resources increased at a significantly higher rate than for other products; and ii) in turn the GDP per capita of other regions, in particular capital-city regions, increases because the regional deflator is smaller than the national deflator.

Figure C.1. ROPI deflator over national GDP deflator, by country and type of large region

2022 or latest year available



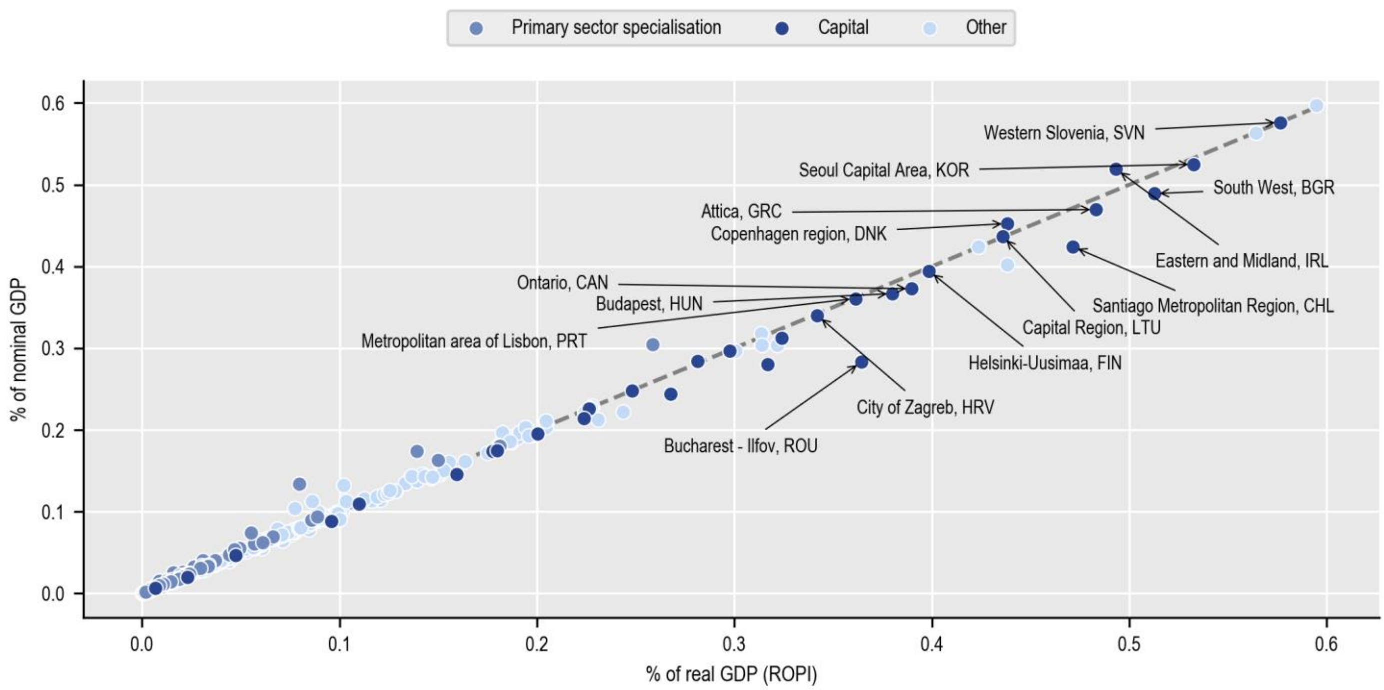
Note: Each point represents the value of the ROPI deflator of a TL2 region over the national GDP implicit deflator. Regions are highlighted by their type (specialised in the primary sector, capital-city region and others). Primary sector specialisation: the region is specialised in the primary sector, according to the Normalized Revealed Comparative Advantage (NRCA) index. See Annex B for more details on the NRCA index. The primary sector is defined as the sum of GVA in agriculture, forestry and fishing (A), mining and quarrying (B), electricity, gas, steam and air conditioning supply (D) and water supply, sewerage, waste management and remediation activities (E).

StatLink https://stat.link/024ld3

To illustrate regional deflators' impact on measures of real GDP growth, Figure C.2 below compares regional shares of GDP based on nominal values (equivalent to shares derived via deflating with a national deflator) and equivalent shares using regional deflators. As expected for the period in question, shares for many regions specialised in the primary sector substantially decreased when using regional deflators. Additionally, the share of some capital regions, especially countries with regions specialising in the primary sector, increases.

Figure C.2. Share of nominal versus real GDP, by type of large regions

2022 or latest year available



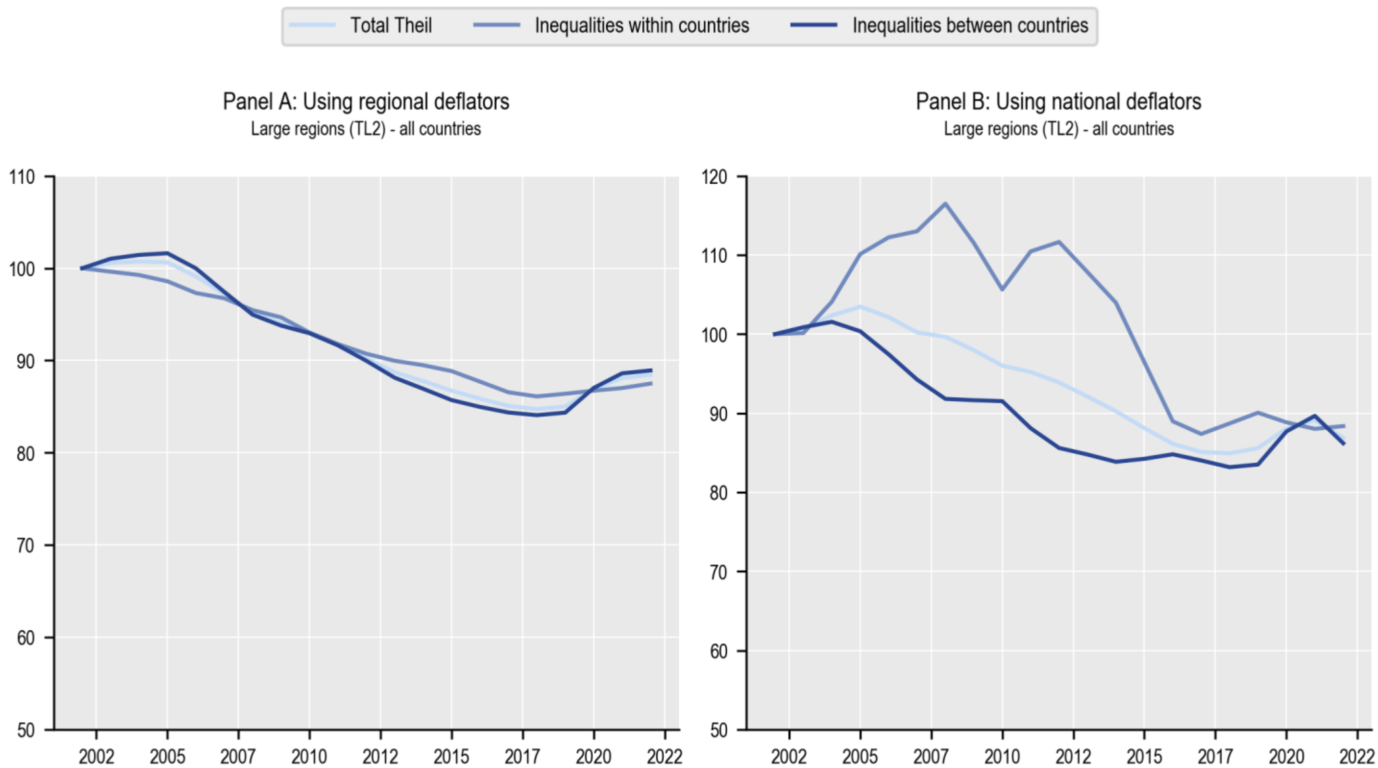
Note: Primary sector specialisation: the region is specialised in the primary sector, according to the NRCA index (see Annex A for more details on the index). The primary sector is defined as the sum of GVA in agriculture, forestry and fishing (A), mining and quarrying (B), electricity, gas, steam and air conditioning supply (D) and water supply, sewerage, waste management and remediation activities (E).

StatLink https://stat.link/zy2mwh

The effects of the deflator are also significant enough to impact some inequality measures, such as the Theil index; which uses regional deflators and generally exhibits less variability than national deflators, especially when measuring within-country inequality (Figure C.3). However, there is a consistent downward pattern when using regional deflators.

Figure C.3. Theil index per capita GDP change in 2002-22, large TL2 regions

Index 2002 = 100



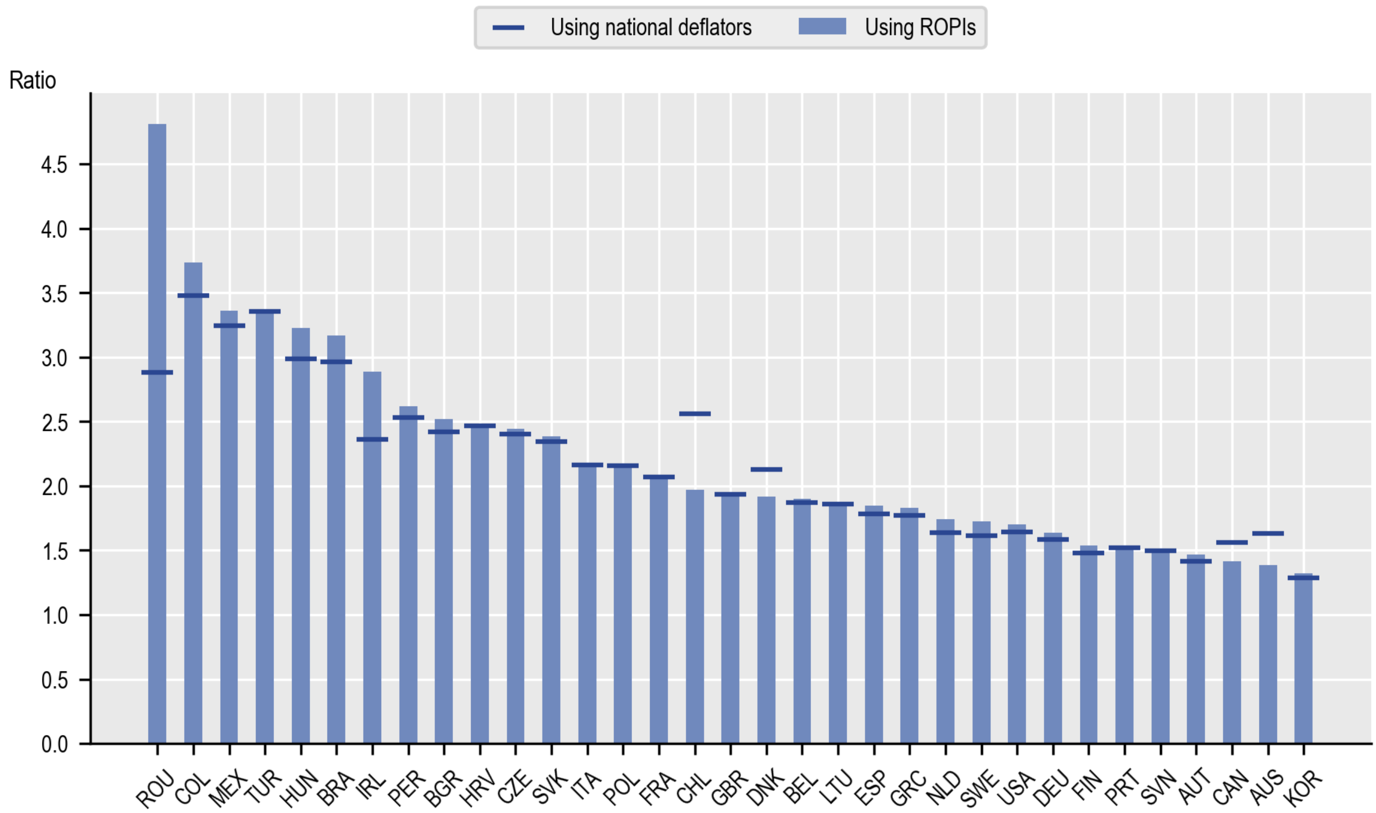
Note: The Theil index measures the inequality in GDP per capita between OECD regions. It breaks down the overall inequality into inequality due to differences within countries and inequalities due to differences across countries. The 32 countries covered are: AUS, AUT, BEL, CAN, CHE, COL, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ITA, KOR, LTU, LVA, MEX, NLD, NOR, NZL, POL, PRT, SVK, SVN, SWE, TUR and USA.

StatLink https://stat.link/yi72ou

The effect of regional price measures can also impact estimates of other measures of polarisation (top 20% over bottom 20%, Figure C.4). However, some care is needed in interpretation. Nominal comparisons of regional inequalities should remain the primary vehicle for comparing GDP per capita estimates. Deflated estimates, however, provide a means to understand to what extent the drivers of change in GDP per capita over time (convergence or divergence) reflect price changes (which may only be temporary and short-lived) or other structural changes (and, in particular, productivity growth).

Figure C.4. Index of regional disparity in GDP per capita, ROPIs versus national GDP deflator

The ratio of the top 20% richest regions over the bottom 20% poorest regions, large regions, 2022



Note: The GDP per capita of the top and bottom 20% regions are defined as those with the highest/lowest GDP per capita until the equivalent of 20% of the national population is reached.

StatLink https://stat.link/bzc5yi

Using regional deflators for regional GDP affects additivity, meaning that the sum of regional GDPs no longer equals the national GDP. This discrepancy arises because industry-specific price changes influence inflation rates in different regions. When aggregated, these variations in industry deflators can result in mismatches with national GDP, especially if a region experiences significant price changes in a dominant sector that do not reflect national trends. However, the additivity gap is generally small, with 37 countries showing a gap below +/-0.5% on average over the 2020-22 period. Notable exceptions include Latvia (0.5%), Romania (1.7%), and the Slovak Republic (0.9%). The additivity gap tends to be larger for years beyond the 2015 reference year. For example, in 2002, the gap was -2.3% for Denmark, -1.6% for Latvia, 9% for Romania and -3% for the United Kingdom (Table C.2).

Table C.2. Additivity gap when using ROPI for large regions

Percentage difference between the sum of large regional GDP by country using regional deflators vs. national deflators

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
AUS	0.6	0.5	0.5	0.5	0.5	0.4	0.4	0.3	0.3	0.2	0	0	0	0	0	0	0	0	0	0	0
AUT	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BEL		0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAN	0	0.1	0.2	0.1	0.1	0	0	0	0	-0.1	-0.2	-0.1	-0.1	0	0	0.2	0.1	0.1	0.3	0.4	0.2
CHL												-0.3	-0.1	0	-0.1	-0.4	-0.2	-0.3	-0.6	-0.4	0.7
COL				0.6	0.5	0.7	0.9	1.3	0.7	0.2	0.3	-0.1	0	0	0	0	0	0	0	0.1	0.7
CZE	0.2	0.2	0.1	0.2	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DEU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DNK	-2.3	-2.3	-2	-1	-0.3	0	0.8	-0.5	0	0.8	1	1	0.6	0	-0.2	0	0.4	0.2	-0.1	0.1	0.7
ESP	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EST	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FIN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0
FRA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.3	-0.2	-0.4	-0.4	-0.4
GBR	-3	-3	-2.8	-2.4	-1.9	-1.7	-1.7	-2.8	-1	0.5	0.7	0.9	0.8	0	0.1	0.4	0.5	0.3	-0.6	0.1	0
GRC	0.1	0.1	0	0.1	0	-0.1	-0.1	-0.1	-0.1	0	0.1	0	0	0	0	0	0	0	0.1	0	0
HUN	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	-0.2
IRL	-0.5	-0.4	-0.5	-0.6	-0.6	-0.7	-0.7	-0.8	-0.8	-0.8	-0.8	-0.8	-0.8	0	0	-0.1	-0.1	-0.2	0	0.2	0.5
ITA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6
JPN										0	0	0	0	0	0	0	0	0	0	0	
KOR	-0.1	-0.2	-0.8	0	-0.2	0	-0.4	0	0.1	0.1	-0.1	0	0	0	0	-0.1	-0.1	-0.1	0	0	0
LTU	-0.1	-0.1	-0.1	-0.1	-0.1	0	0	0	-0.1	-0.1	0	0	0	0	0	0	0	0	0	0	0
LUX	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
LVA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MEX		-0.5	-0.4	-0.4	-0.3	-0.3	-0.2	-0.2	-0.1	-0.1	0	0	0	0	0.1	0.2	0.2	0.3	0.2	0.2	0.2
NLD	-0.2	-0.2	-0.2	-0.1	0	0	0.1	0	-0.1	0	0.1	0.1	0	0	-0.2	-0.1	-0.1	-0.2	-0.3	0	0.5
POL		0.2	0.2	0.2	0.1	0.1	0	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0.1	0.1	-0.1
PRT	0.1	0	0	0	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SVK	0.2	0.3	0.3	0.1	0.2	0.2	0.2	0	0.1	0.1	0.1	0	0	0	0.1	0.3	0.6	0.9	1	0.9	0.8
SVN	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SWE	-0.8	-0.7	-0.6	-0.5	-0.6	-0.5	-0.4	-0.4	-0.3	-0.3	-0.3	-0.2	-0.1	0	0.1	0.2	0.4	0.3	0.1	0.3	0.1
TUR			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1	0.1	0	0.1
USA	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	-0.2	-0.1	-0.1	-0.1	-0.2	-0.2	-0.3
BGR	0.1	0.1	0	0.1	0	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	-0.1	-0.1	0
HRV	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0.1	0.1	0.1	0.2	0.8	0
PER						-0.4	-0.4	-0.4	-0.2	0	0	-0.1	0.1	0	0.1	0.1	0.1	0.2	0.1	0.2	0.1
ROU	9.1	8.6	7.9	6.2	5.6	4.4	2.7	2.7	1.6	0.8	0.4	0.2	0.1	0	0	0.2	0.3	0.8	1.2	1.8	2.2

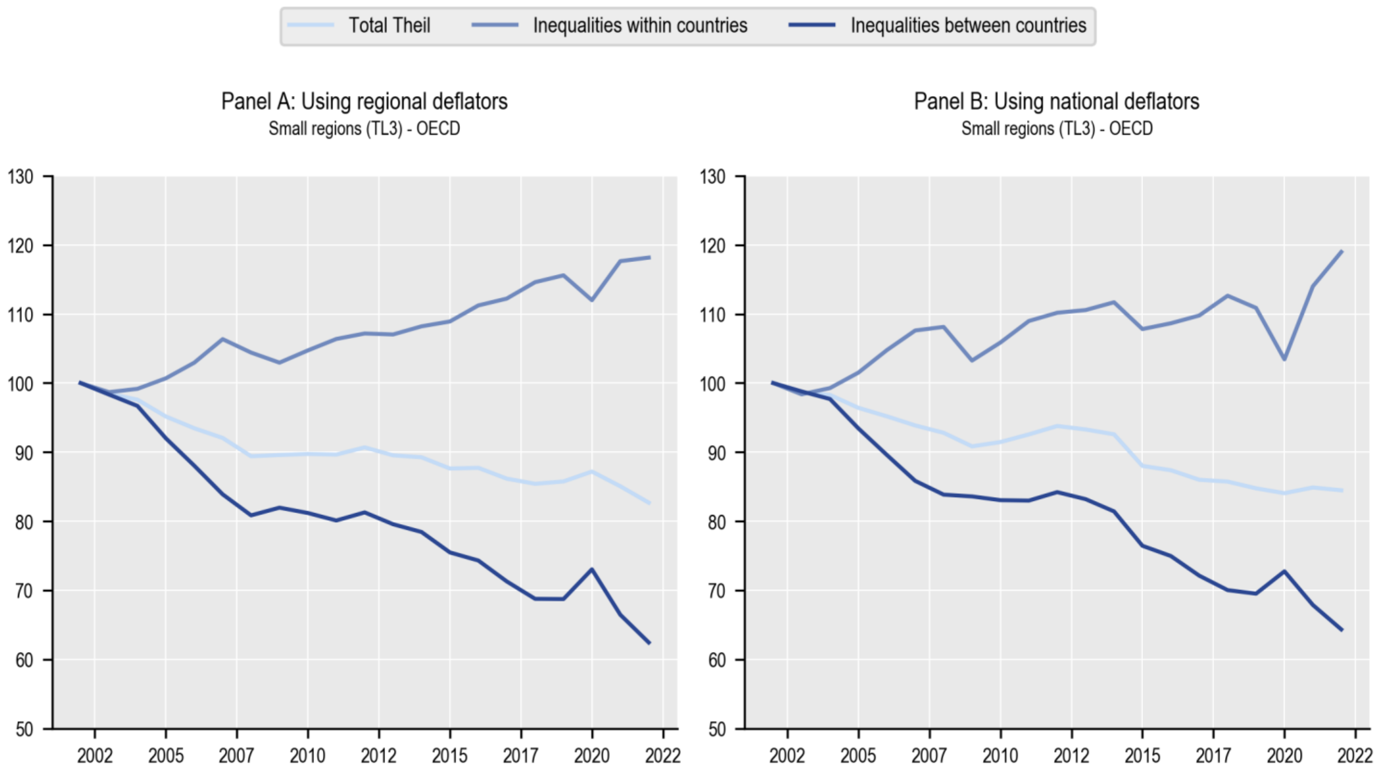
Effect of ROPIs on GDP measures for small regions

Currently, 13 OECD countries have ROPI deflators available at TL3 levels listed in Annex B. To conduct analysis at the TL3 level using regional deflators for all countries, the available information has been optimised by primarily using TL3 deflators where available. For countries where TL3 deflators are unavailable, TL2 deflators of the parent regions have been used to estimate GDP TL3 series in constant prices. National deflators have been applied for three countries lacking regional deflators (New Zealand, Norway and Switzerland).

The changes in regional inequality in GDP per capita within countries display less variance when using ROPI deflators (Panel A, Figure C.5) compared to national GDP deflators (Panel B, Figure C.5). In addition, the pattern of raising inequalities within countries for small regions differs from the observed downward trend in inequality between large regions (Figure C.3).

Figure C.5. Theil index per capita GDP change, small OECD TL3 regions

Index 2002 = 100



Note: Theil index for 1 304 small regions over 29 countries (AUT, BEL, BGR, CZE, DEU, DNK, ESP, EST, FIN, FRA, GBR, GRC, HUN, IRL, ITA, KOR, LTU, LUX, LVA, NLD, NOR, NZL, POL, PRT, SVK, SVN, SWE, TUR and USA), with estimates for 2002 (BEL, POL, TUR) and 2003 (TUR). The last year is 2022 estimates based on TL2 parent growth in 2021-22 for AUT, DEU, ESP, FIN, GRC, IRL, ITA, LTU, LVA and POL and 2020-22 national growth for JPN and NOR.

StatLink https://stat.link/jsmfx0

Regional consumer price indices

Inflation reduces households' disposable incomes and, other things being equal, more so in regions experiencing higher inflation. Regional differences in price changes are due to two factors: regional differences in price changes of individual products included in consumer baskets and different compositions (weights) of consumption baskets across regions. For example, housing costs and their weight in consumption baskets are typically higher in cities. This means that relative price falls in housing costs translate, in theory, into smaller price changes in urban versus non-urban areas.

The regional consumer price indices (RCPIs) are available at different subnational levels for 13 OECD countries (see Annex B for data sources and methods for countries with available data). The RCPI reflects changes in consumer prices experienced by households at their place of consumption. Whilst the basket of goods and services consumers purchase over time is typically the same across regions, the weighting schemes usually differ, as shown below.

In Australia, capital city CPIs are based on the 2011 Australian Statistical Geography Standard (ASGS) Greater Capital City Statistical Areas. These indices measure price movements over time in each city individually but they do not measure differences in retail price levels between cities.

In Canada, price surveys are based on a sample of representative goods and services for which prices are observed in selected areas of a city or province. The geographical distribution of the sample varies by product. The most geographically dispersed price samples are for goods and services where prices are likely to be heavily influenced by local market conditions (e.g. locally determined prices such as rents, water charges, local transit fares and property taxes). In contrast, prices for car registration or postage fees are collected from provincial or national agencies.

In Czechia, CPIs are calculated for all households in the country and specifically for households living in the capital city of Prague. The weighting scheme for households in Prague is based on their expenditure structure, with average prices calculated as the simple arithmetic mean of prices surveyed in the city. For certain expenses (such as therapeutic stays at a spa, ski lift tickets, university canteen catering services and university accommodation services), the average consumer prices for the whole of Czechia are used. Differences in weighting schemes between household groups reflect their distinct economic and living conditions, resulting in varied expenditure structures. The weighting schemes for pensioner households do not include imputed rentals.

In Italy, CPIs are calculated by aggregating product indices compiled at the provincial level. The all-items indices by province are derived as the weighted average of these provincial product indices. The weighting coefficients are based on the household consumption share of each product aggregate, defined at the regional level.

In Japan, the relative price index for each item is calculated for each municipality and then averaged using the respective weight for each municipality to obtain the average price index by item nationwide. This index is then averaged with the weight for each item to produce upper-level groups and the total index for Japan. The same procedure is also applied to city classes and districts.

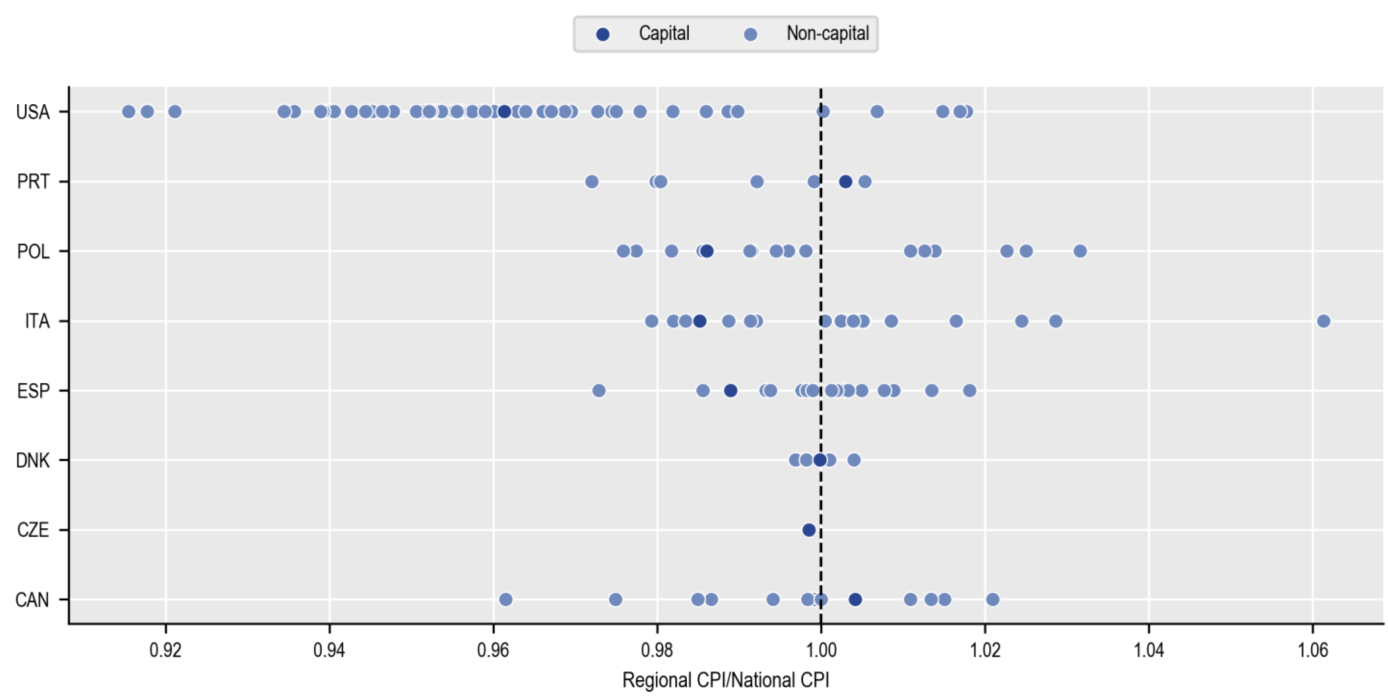
In New Zealand, regional indices cover five broad regions (based on regional council areas): Auckland, Canterbury, the Rest of North Island, the Rest of South Island and Wellington. The regional indices currently being published[1] are not considered fit for purpose as they rely on national movements for about 30% of the basket (based on expenditure weight), even when regional variation is possible. This includes important goods and services such as constructing new dwellings, dwelling rentals and used cars. The indices for the five broad regions will now incorporate price movements specific to their respective regions for these categories.

Regional vs. national CPIs to adjust regional GDP

Perhaps not surprisingly as baskets and weights of consumers are broadly much more comparable than comparisons of regional specialisations, the range of regional variation in CPIs compared to the national CPI is much smaller. For the period in question, in four out of eight countries with available data, CPIs in capital-city regions were lower than the national average across 2022 (Figure C.6).

Figure C.6. Regional over national CPI, large regions

2022 or latest year available, countries with available data



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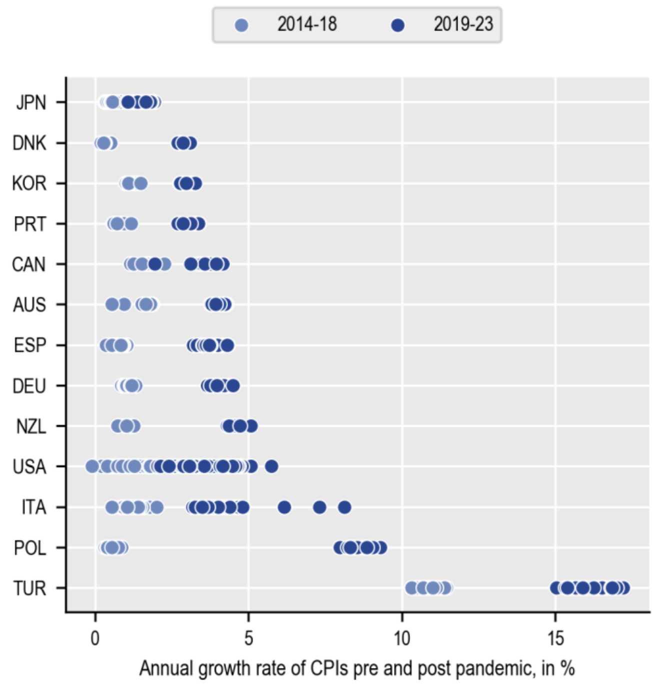
Regional vs. national CPIs to adjust household income

Overall, regional variations in inflation rates are not too high. However, in recent years, in line with higher inflation overall (2019-23), they have widened by 70% compared to the period from 2014-18 (Figure C.7).

Figure C.7. Regional disparities in inflation, based on regional CPIs

Average annual growth rate of RCPI, reference year 2015, in %, 2014-18 and 2019-23, large regions



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Methodology to estimate sectoral specialisation

The specialisation in the primary sector is based on GVA in several industries: agriculture, forestry and fishing (A); mining and quarrying (B); electricity, gas, steam and air conditioning supply (D); water supply, sewerage, waste management and remediation activities (E).

The specialisation is assessed with the Normalized Revealed Comparative Advantage (NRCA). This index measures the share of GVA in a particular industry i of a region r relative to the national GVA share in the same industry. The normalisation helps interpret the index; for example, a positive NRCA ($NRCAir > 0$) indicates that region r has a specialisation or comparative advantage in industry i (Yu, Cai and Leung, 2008[2]). The NRCA was calculated for each year in 2000-22. Regions are identified as specialised if their NRCA is greater than 0.25 for at least half of the available data period or if they have been specialised in the last years of the period.

For Canada, since GVA by industries is only available in chained volumes, which affects the weight of natural resources industries, the regions are identified as specialised if their NRCA is greater than 0.

Methodology to estimate access to hospitals

Access to hospital indicators was estimated using point of interest (POI) data, a one-kilometre resolution population (GHS-POP 2020) and degree of urbanisation (GHS-SMOD 2020) grids (Schiavina et al., 2023[3]) and the Mapbox Isochrone application programme interface (API).

Details on the hospital POI data sources for each country are available in Annex. For countries where data were available only in the form of postal addresses, these were converted into geographic co-ordinates using the Python package Geocoder (https://pypi.org/project/geocoder/; ArcGIS provider https://developers.arcgis.com/rest/geocode/api-reference/overview-world-geocoding-service.htm).

The Mapbox Isochrone API[2] provides isochrone polygons for a facility using its geographical co-ordinates as inputs for time ranges up to 60 minutes for 3 modes of transport: driving, cycling and walking.

For each hospital, the 45-minute driving isochrone (i.e. the area that is reachable in 45 minutes by car around the considered hospital) was downloaded using the Mapbox Isochrone API. Isochrone polygons for all hospitals within the same country are dissolved into a single polygon to obtain the area within reach of at least one hospital and avoid overlaps. Isochrones are dissolved regardless of the regional borders, i.e. the area within reach of a hospital located in a given region is not limited to that region. These dissolved isochrones are then combined with the population grid, regional administrative borders and the degree of urbanisation grid to obtain the population within each region and the degree of urbanisation that can access a hospital in a 45-minute drive.

Methodology to classify OECD small regions by climate zone

The climate zone for each TL3 region was defined using the Köppen-Geiger classification for 1991-2010 (Beck et al., 2023[4]). Figures C.10 and C.11 show the macro climate zones obtained in OECD countries. The climate zones for each TL3 region are obtained by first computing the population share in each climate zone using GHS-POP 2020 (Schiavina et al., 2023[3]). The climate zone of a TL3 region corresponds to the zone with the highest population share. Figures C.8 and C.9 show respectively the distribution of regions and population by climate zone and country.

Figure C.8. Distribution of OECD regions by climate zone

Distribution of the number of small regions by climate zone and by country.

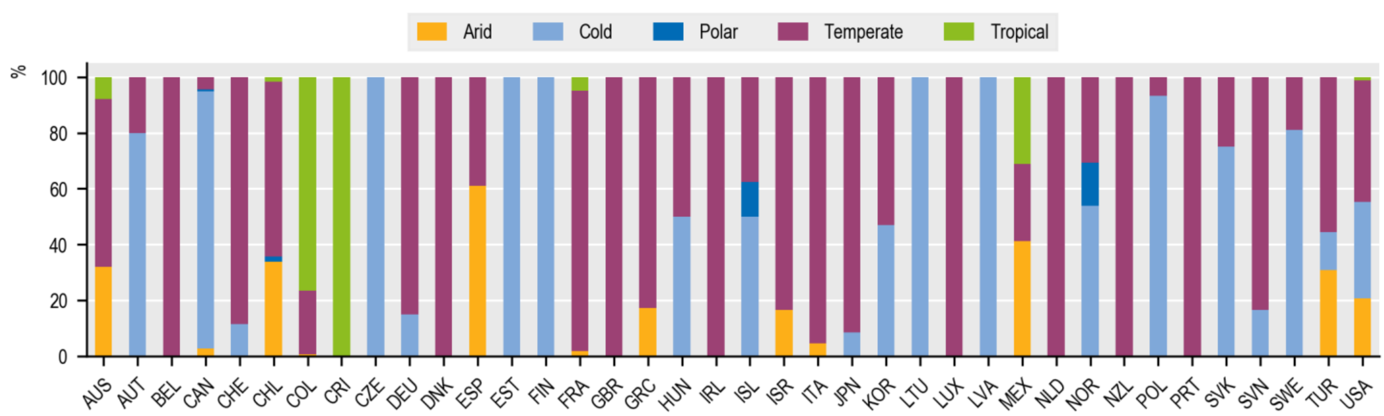

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Figure C.9. Distribution of population by climate zone and country, 2020

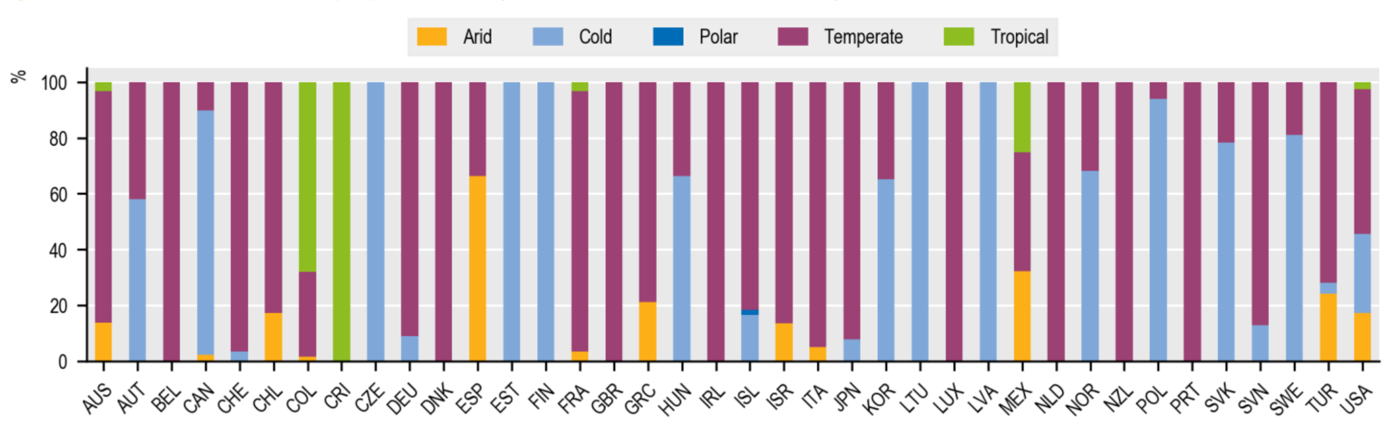

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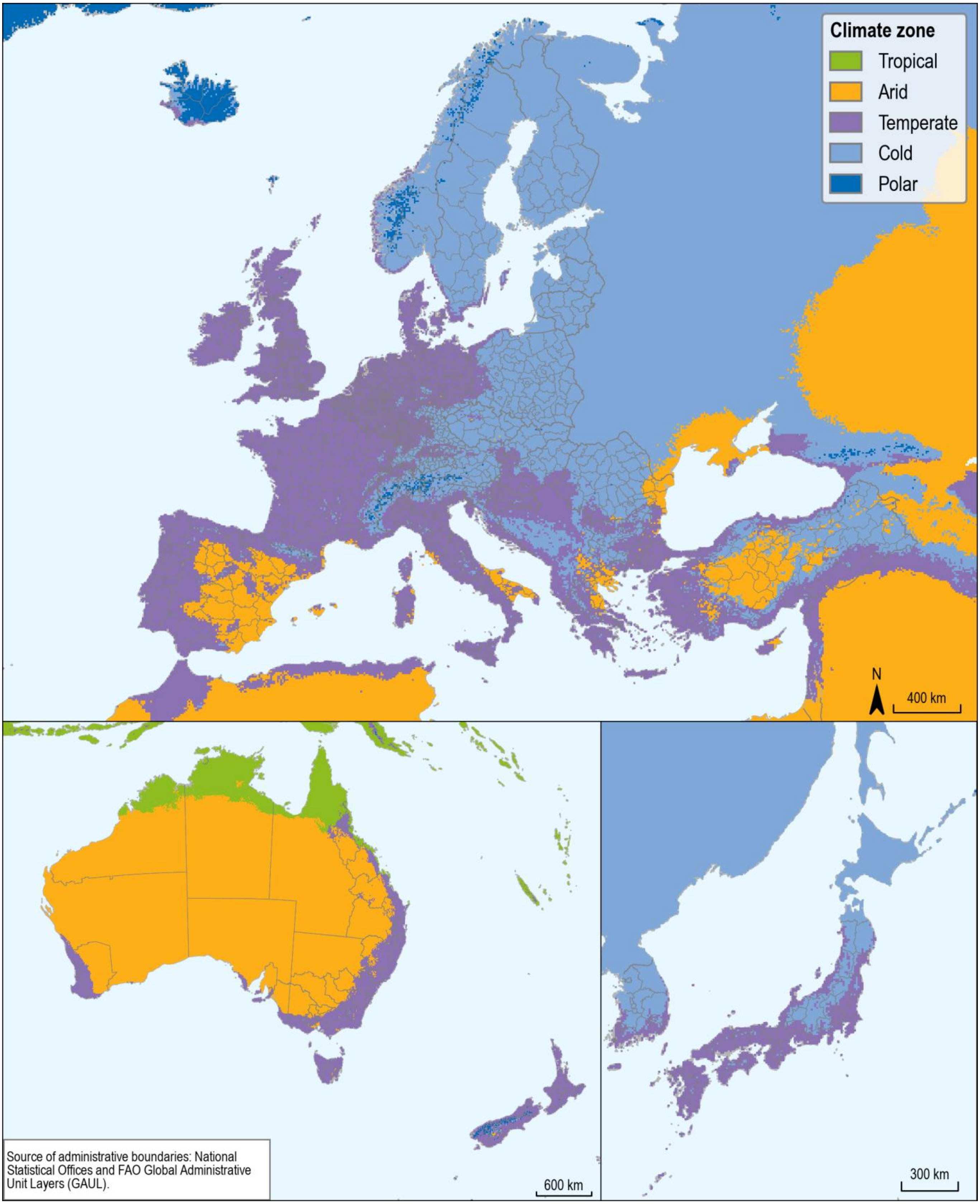
Figure C.10. Classification of small regions by climate zone – Americas

Using the Köppen-Geiger classification for 1991-2010

StatLink https://stat.link/vu49t3

Figure C.11. Classification of small regions by climate zone – Europe and Asia-Pacific

Using the Köppen-Geiger classification for 1991-2010



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Methodology to estimate temperature change, hot days and icing days by Shared Socio-economic Pathways (SSP) scenario

Climate projections by SSP scenario are derived from the NASA NEX-GDDP-CMIP6 dataset (Thrasher et al., 2022[5]). This dataset consists of global daily downscaled climate scenarios derived from the General Circulation Model (GCM) runs conducted under the Coupled Model Intercomparison Project Phase 6 (CMIP6). The CMIP6 GCM runs were developed to support the Intergovernmental Panel on Climate Change Sixth Assessment Report (IPCC AR6). The following CMIP6 models were used: ACCESS-CM2, ACCESS-ESM1-5, BCC-CSM2-MR, CMCC-ESM2, CanESM5, FGOALS-g3, GISS-E2-1-G, MIROC-ES2L, MIROC6, MPI-ESM1-2-HR, MPI-ESM1-2-LR, MRI-ESM2-0, NorESM2-LM, NorESM2-MM, TaiESM1 and UKESM1-0-LL.

Three climate indicators were derived from this dataset: air temperature, icing days and hot days. Hot days are days when the maximum air temperature exceeds 35 degrees Celsius (°C). Icing days are days during which the maximum air temperature does not exceed 0°C. These variables are then compared to the 1981-2010 baseline climatology.

To estimate population exposure to hot days, the 2030 GHS-POP layer (Schiavina et al., 2023[3]) was used to compute population-weighted averages of hot days by region.

Methodology to estimate greenhouse gas (GHG) emissions by sector

GHG emissions at the subnational level were estimated using the Emissions Database for Global Atmospheric Research (EDGAR) version 8.0 developed by the European Commission Joint Research Centre and the International Energy Agency (EC JRC/IEA, 2023[6]). EDGAR provides annual sector-specific grid maps for the four GHGs (carbon dioxide or CO_2, methane or CH_4, nitrous oxide or N_2O and fluorinated gases or F-gases) at a 0.1° spatial resolution (approximately 11 km). The different sectors and subsectors covered are:

- **Energy**: Power generation.
- **Industry**: Combustion in the manufacturing industry, oil refineries and transformation industry, chemical processes, fuel exploitation, iron and steel production, non-energy use of fuels, non-ferrous metals and non-metallic minerals production, solvents and products use.
- **Transport**: Ground transport: road, trains and off-road transport. Shipping and aviation are excluded in the subnational GHG estimates for the transport sector.
- **Building**: Energy for buildings.
- **Agriculture**: Agricultural soils, agricultural waste burning, enteric fermentation, manure management, indirect N_2O emissions from agriculture.
- **Waste**: Solid waste incineration, landfills, wastewater handling.

Emissions from land use and land cover change are not included. National GHG emissions are disaggregated by using subsector-specific geospatial proxies. GHG emissions are expressed in CO_2 equivalents using 100-year global warming potential from the IPCC 5th Assessment Report (AR5), i.e. 28 for CH_4 and 265 for N_2O.

To estimate an emissions reduction target for 2030 for advanced economies as a whole, and that can serve as a reference to compare OECD regions, this publication derives a per capita GHG emissions 2030 target from the IEA Net Zero Emissions Scenario (IEA, 2021[7]). In this scenario, CO_2 emissions from energy-related and industrial processes in advanced economies, i.e. in OECD countries and the 27 European Union member states, drop from 12.3 gigatonnes of CO_2 equivalent (Gt CO_2-eq) to around 5.5 Gt CO2-eq in 2030, which corresponds to a drop from 8.8 t CO2-eq per person in 2019 to 3.8 t CO_2-eq per person in 2030. The share of CO_2 emitted by global energy-related and industrial processes from advanced economies falls from 34% to 26%. Given that CO_2 from fossil fuel and industry, CH_4 and N_2O account for respectively 12.8 Gt CO2-eq, 2.2 Gt CO2-eq and 0.8 Gt CO2-eq of net anthropogenic GHG emissions in advanced economies (EC JRC/IEA, 2023[6]), we assume the same distribution of GHG in 2030. GHG emissions per capita, would have to drop to 4.7 t CO2-eq per person in 2030.

Methodology to estimate forest cover loss

Forest cover loss at the subnational level was estimated using the Hansen Global Forest Change (2000-22) data (Hansen et al., 2013[8]). This dataset provides forest extent and changes at 30 metre (m) resolution. It is derived from Landsat satellite images. Trees are defined as vegetation taller than five m in height and are expressed as a percentage per output grid cell as 2000 Percent Tree Cover. Forest Cover Loss is defined as a stand-replacement disturbance, or a change from a forest to a non-forest state, from 2000 to 2022. Due to data availability, only forest cover loss is included in this publication and not net forest change, which would also include forest gain from 2000 to 2022.

Methodology to estimate protected areas

Protected areas are delineated using the World Database on Protected Areas (UNEP-WCMC/IUCN, 2024[9]), the most comprehensive global database on terrestrial and marine protected areas. It is a joint project between the United Nations Environment Programme (UNEP) and the International Union for Conservation of Nature (IUCN) and is managed by the UNEP World Conservation Monitoring Centre (UNEP-WCMC), in collaboration with governments, non-governmental organisations, academia and industry.

Protected areas are classified into 100% terrestrial, coastal, marine and terrestrial, and 100% marine. In this publication, marine protected areas are excluded. The IUCN also classifies protected areas by management categories:

- **Ia: Strict nature reserve**: Areas strictly protected to preserve biodiversity and possibly geological features, where human visits are strictly controlled.
- **Ib: Wilderness area**: Large, unmodified or slightly modified areas retaining their natural character without permanent or significant human habitat.
- **II: National park**: Large natural or near natural areas set aside to protect large-scale ecological processes.
- **III: Natural monument or feature**: To protect a specific natural monument, which can be a landform, mountain or geological feature.
- **IV: Habitat/species management area**: To protect particular species or habitats where management reflects this priority.
- **V: Protected landscape/seascape:** An area where the interaction of people and nature over time has produced an area of distinct character with significant ecological, biological, cultural and scenic value.
- **VI: Protected areas with sustainable use of natural resources**: Areas that conserve ecosystems and habitats together with associated cultural values and traditional natural resource management systems.

This publication defines protected areas with strict management based on Categories Ia, Ib, II and IV.

The boundaries of protected areas are intersected with OECD regions to get the share of protected areas.

The Kunming-Montreal Global Biodiversity Framework aims to protect at least 30% of land by 2030 (Convention on Biological Diversity, 2023[10]).

Methodology to estimate forest area burnt

Burnt areas by land cover were obtained using the JRC global wildfire dataset to analyse fire regimes and fire behaviours (Artés et al., 2019[11]), based on MODIS burnt area product Collection 6. This dataset provides yearly individual fire perimeters from 2000 to 2022. Burnt areas are combined with Copernicus annual 300 m land cover (CCI-LC) data (C3S CDS, 2019[12]) to get burnt forest areas.

Methodology to estimate enrolment in higher education institutions (HEIs)

Enrolment in HEIs refers to enrolment in International Standard Classification of Education (ISCED) 5 to 7 programmes (including ISCED 7 long degrees). The presented indicators include institutions with at least 200 students enrolled at ISCED 5 or above and where at least 1 person graduated at ISCED 5 or above in the latest year for which data are available.

Methodology to estimate transport performance ratio

The methodology follows the OECD-International Transport Forum/European Commission Urban Access Framework (UAF) (ITF, 2019[13]). The UAF addresses comparability issues arising from city size and administrative boundaries. The framework proposes the “transport performance ratio”, a measure that standardises the accessibility measure by a proximity indicator. The rationale for the indicator is to compare what can be reached using the transport network to what could have been reached if one had no barriers to move in space.

$$actual - to - maximum = \frac{absolute\ accessibility}{absolute\ proximity}$$

Accessible destinations are measured by the absolute cumulative opportunity index (the number of destinations reachable within a given time by a given mode). In contrast, nearby destinations are measured with the proximity indicator (total number of destinations within a certain Euclidian distance radius buffer). The time and distance ratios are described in the following table. Implicitly, the ratios assume a travel speed of 4 km per hour for walking and 16 km per hour for cycling, driving and public transportation.

Mode	Time-distance ratios			
Walking	15 min – 1 km	30 min – 2 km	45 min – 3 km	60 min – 4 km
Cycling, driving and transit	15 min – 4 km	30 min – 8 km	45 min – 12 km	60 min – 16 km

Transport performance ratios were computed using General Transit Feed Specification (GTFS) data from the Mobility Database (https://database.mobilitydata.org/) and additional GTFS data sources as described in Annex B, OpenStreetMap road network data, a 1-kilometre resolution population grid (GHS-POP 2020) (Schiavina et al., 2023[3]), elevation data (Terrain Tiles on Amazon Web Services)[3] and the r5r R package.[4]

Methodology to estimate access to public transport, pharmacies and schools and childcare facilities

Access to services in functional urban area (FUA) indicators was estimated using point of interest (POI) data, OpenStreetMap (OSM) road network, a 100-metre resolution population grid (GHS-POP 2020) (Schiavina et al., 2023[3]) and the *r5py* Python library (Fink, 2022[14]).

Details on the POI data sources for each country are available in Annex B. For countries where data were available only in the form of postal addresses, these were converted into geographic co-ordinates using the Python package Geocoder (https://pypi.org/project/geocoder/; ArcGIS provider https://developers.arcgis.com/rest/geocode/api-reference/overview-world-geocoding-service.htm).

The *r5py* library allows computing origin-destination (OD) matrices from two sets of co-ordinates (origin and destination points). OD matrices provide the travel time (in minutes) between each origin and each generation. Origin points correspond to the facilities' co-ordinates for the service of interest (e.g. pharmacies). Destination points correspond to population and are computed as the centroids of the population grid cells. Due to computational limitations, the 100-metre GHS-POP 2020 grid was re-scaled to a 500-metre population grid. The OD matrices were computed using a walking speed of 4 km/h.

The share of the population that lives within a certain time (e.g. 15 minutes) from the nearest facility (e.g. a pharmacy) is derived from the OD matrices.

Methodology to estimate access to green areas

Access to green area indicators in FUAs' urban centres was estimated using Open Street Map data. Selected amenities include the following tags: grave_yard; land use: cemetery, forest, recreation_ground, village_green; leisure: nature reserve, park, playground, recreation_ground, garden; tourism: zoo; natural: wood, scrub, heath, grassland, wetland. The population within 400 metres of the nearest green area was calculated using a 400-metre buffer around the green areas' polygons and the 100-metre resolution GHS-POP 2020 population grid (Schiavina et al., 2023[3]).

Theil entropy index

Regional disparities are also measured by a Theil entropy index, which is defined as:

$$Theil = \sum_{i=1}^{N} \frac{y_i}{\bar{y}} ln\left(\frac{y_i}{\bar{y}}\right)$$

where N is the number of regions in the OECD, y_i is the variable of interest in the i-th region (i.e. household income, life expectancy, homicide rate, etc.) and $\bar{y}$ is the mean of the variable of interest across all regions.

The Theil index can be easily decomposed into two components: i) the disparities within subgroups of regions, where, for example, a subgroup is identified by a set of regions belonging to a country; ii) the disparities between subgroups of regions (i.e. between countries). The sum of these two components is equal to the Theil index.

In order to decompose the Theil index, let us start by assuming m groups of regions (countries). The decomposition will assume the following form:

$$Theil = \sum_{j=1}^{M}\sum_{i=1}^{N} s_j \frac{y_{ij}}{\bar{y}_j} ln\left(\frac{y_{ij}}{\bar{y}_j}\right) + \sum_{j=1}^{M} s_j ln\left(\frac{y_j}{\bar{y}}\right)$$

where the first term of the formula is the *within* part of the decomposition equal to the weighted average of the Theil inequality indices of each country. Weights, s_i, are computed as the ratio between the country average of the variable of interest and the OECD average of the same variable. The second term is the between a component of the Theil index and represents the share of regional disparities that depends on the disparities across countries.

The Theil index ranges between zero and ∞, zero representing an equal distribution and higher values representing a higher level of inequality.

The index assigns equal weight to each region regardless of its size; therefore, differences in the values of the index among countries may be partially due to differences in the average size of regions in each country.

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Notes

[1] Stats NZ Consumers Price Index methods, https://datainfoplus.stats.govt.nz/Item/nz.govt.stats/8b0860b8-cf63-4f12-a578-8eed8ba69ac3/?_ga=2.200485870.1749673349.1620332052-1586433161.1610308723.

[2] For more information, see https://docs.mapbox.com/api/navigation/isochrone/. Access to the Mapbox Navigation API (https://www.mapbox.com/navigation) is granted through the Development Data Partnership (https://datapartnership.org/).

[3] See https://registry.opendata.aws/terrain-tiles/.

[4] See https://github.com/ipeaGIT/r5r.

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The 2024 edition of Regions and Cities at a Glance aims to understand the size, scale, and evolution of the spatial impacts of megatrends, including demographic shifts, climate change, and technological advancements. By offering internationally comparable data, it aims to identify countries where economic or social outcomes—or both—have been stronger, providing guidance for policy development in regions with weaker performance. The analysis on this edition draws from conventional and unconventional sources of data to provide timely and detailed metrics on, among others, the impacts of climate change, skill shortages during transitions, and access to opportunities for various socio-economic groups in regions and cities. This edition also presents for the first time internationally comparable estimates of real GDP and household income growth, adjusted for regional price changes.

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