REAL ESTATE AND CONSTRUCTION IN EMERGING AND DEVELOPING COUNTRIES

Alter Property Data Webinar, November 2023

November 2023

Alexandre Banquet, Data Scientist, OECD Centre for Entrepreneurship, SMEs, Regions and Cities

OECD
BETTER POLICIES FOR BETTER LIVES

Agenda

1. Main results of recent OECD study "Expanding the Doughnut? The Impact of Remote Work and COVID-19 on the Geography of Housing Demand"

2. Stylised facts on the evolution of built-up areas in emerging and developing countries based on Earth Observation data

Expanding the Doughnut?
The Impact of Remote Work and COVID-19 on the Geography of Housing Demand

Co-authors: Rudiger Ahrend, Alexandre Banquet, Manuel Bétin, Maria Paula Caldas, Boris Cournède, Marcos Díaz Ramírez, Pierre-Alain Pionnier, Daniel Sanchez-Serra, Paolo Veneri, and Volker Ziemann

Main questions

"Doughnut" effect
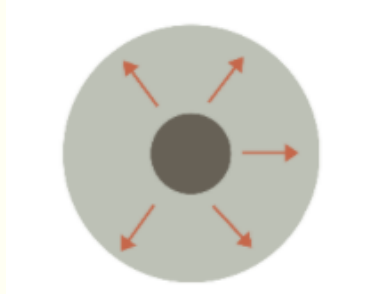
Extended "doughnut" effect

- Have OECD large metropolitan areas experienced a "**doughnut effect**" in housing demand during COVID-19?

- If so, what are the **local drivers** associated to such effect?
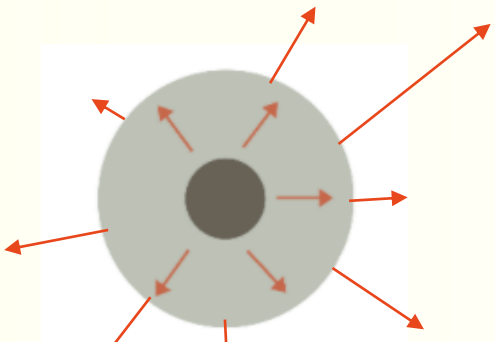
- In the "new normal" of more remote work, did housing demand increase **beyond** the **metropolitan boundaries**?

- What are the **local characteristics** underlying house price increases in places outside metropolitan areas?

Data

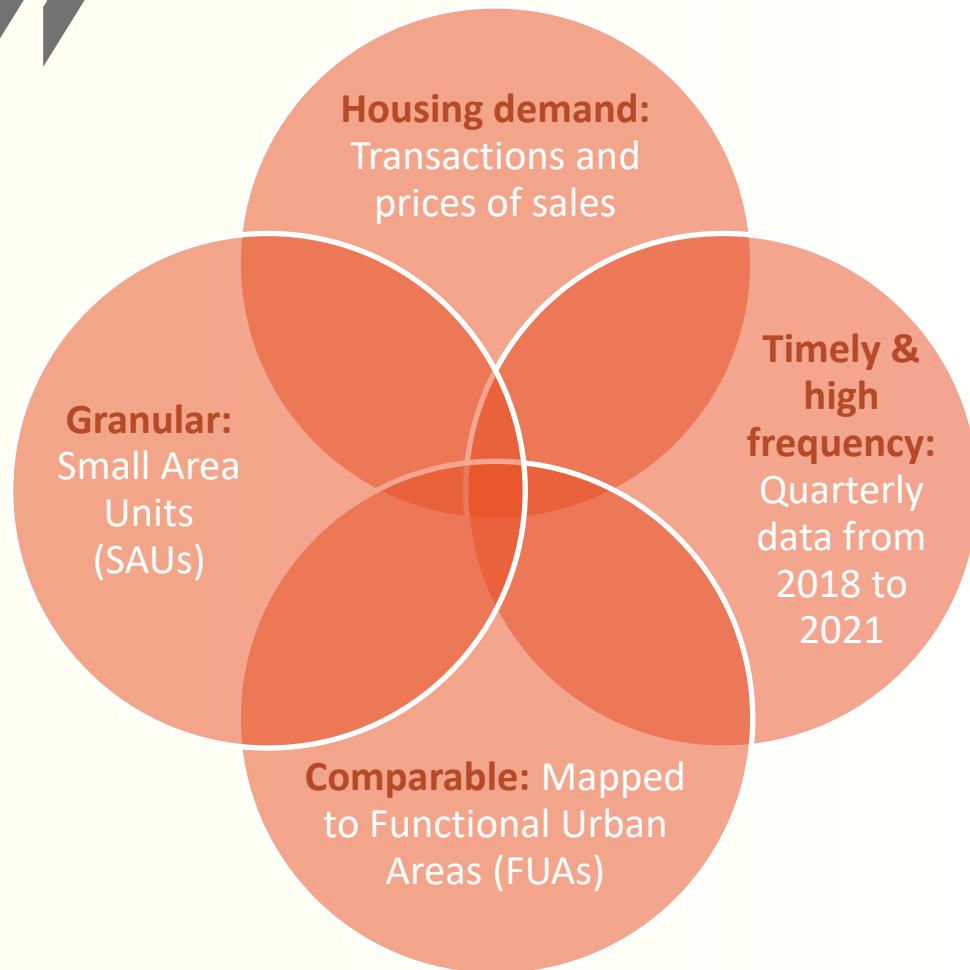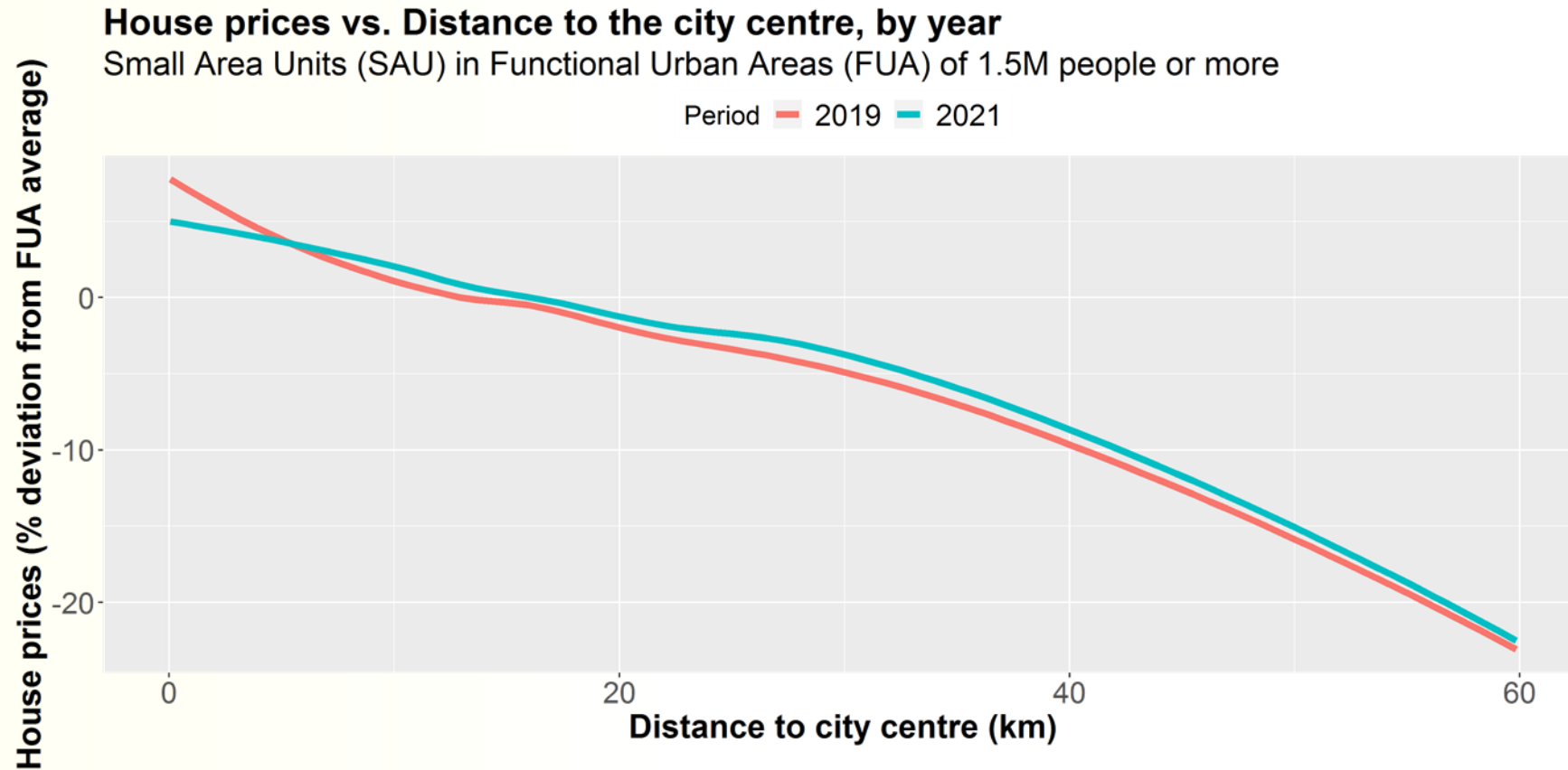## OECD Network of data providers for Sustainable and Inclusive Housing

Housing demand: Transactions and prices of sales

Granular: Small Area Units (SAUs)

Timely & high frequency: Quarterly data from 2018 to 2021

Comparable: Mapped to Functional Urban Areas (FUAs)

	Source	Geographical units
AUT	Statistik Austria	955 municipalities
BEL	STATBEL	532 municipalities
DEU	vdpResearch	4 413 postal codes + 121 districts
DNK	Statistics Denmark	582 postal codes
ESP	INE	5 400 municipalities + 31 districts
FIN	Statistics Finland	225 municipalities
FRA	Demande de valeurs foncieres	1 571 communes + 273 districts
GBR	UK Government Price Paid data	8 382 postcode sectors
HUN	Hungarian Central Statistics Office	2 889 Settlements + 23 Districts
ISR	Central Bureau of Statistics	798 cities
KOR	MOLIT	250 municipalities
MEX	Sociedad Hipotecária Federal (SHF)	10 705 zip codes
NOR	Statistics Norway	56 large municipalities + 11 counties
PRT	Confidencial Imobiliário	1 222 parishes
SWE	Svensk Mäklarstatistik	275 municipalities
USA	Zillow Research Institute	29 827 zip codes

A small but significant "doughnut effect" within the boundaries of large metropolitan areas

House prices vs. Distance to the city centre, by year
Small Area Units (SAU) in Functional Urban Areas (FUA) of 1.5M people or more

Period ▬ 2019 ▬ 2021

Source: Adapted from "Changes in the geography housing demand after the onset of COVID-19", https://doi.org/10.1787/9a99131f-en

Is the doughnut extending?

1. **Identify the metropolitan areas:**
   - FUAs of at least 1.5M people or the largest FUA in the country

2. **Compute two buffers for each metropolitan area:**
   - Buffers are defined based on the FUA area
     - $Buffer1 = 0.2 * \sqrt{FUA\ area}$
     - $Buffer2 = 0.4 * \sqrt{FUA\ area}$

3. **Regress house price changes (%) at SAU level on:**
   - Dummies for commuting zone and buffers (reference group is FUA centre)
   - Control for extended metropolitan areas fixed effects
   - Test different periods (from 2018-2019 to 2020-2021)

New York (Greater)
Average price % change from S1-2019 to S1-2021

FUA = +2.7%
City = +2.3%
Commuting zone = +11.9%
1st buffer = +16.0%
2nd buffer = +17.4%

75 km

% change

40%
30%
20%
10%
0%
−10%
−20%
−30%
−40%

Missing data — FUA — 1st buffer
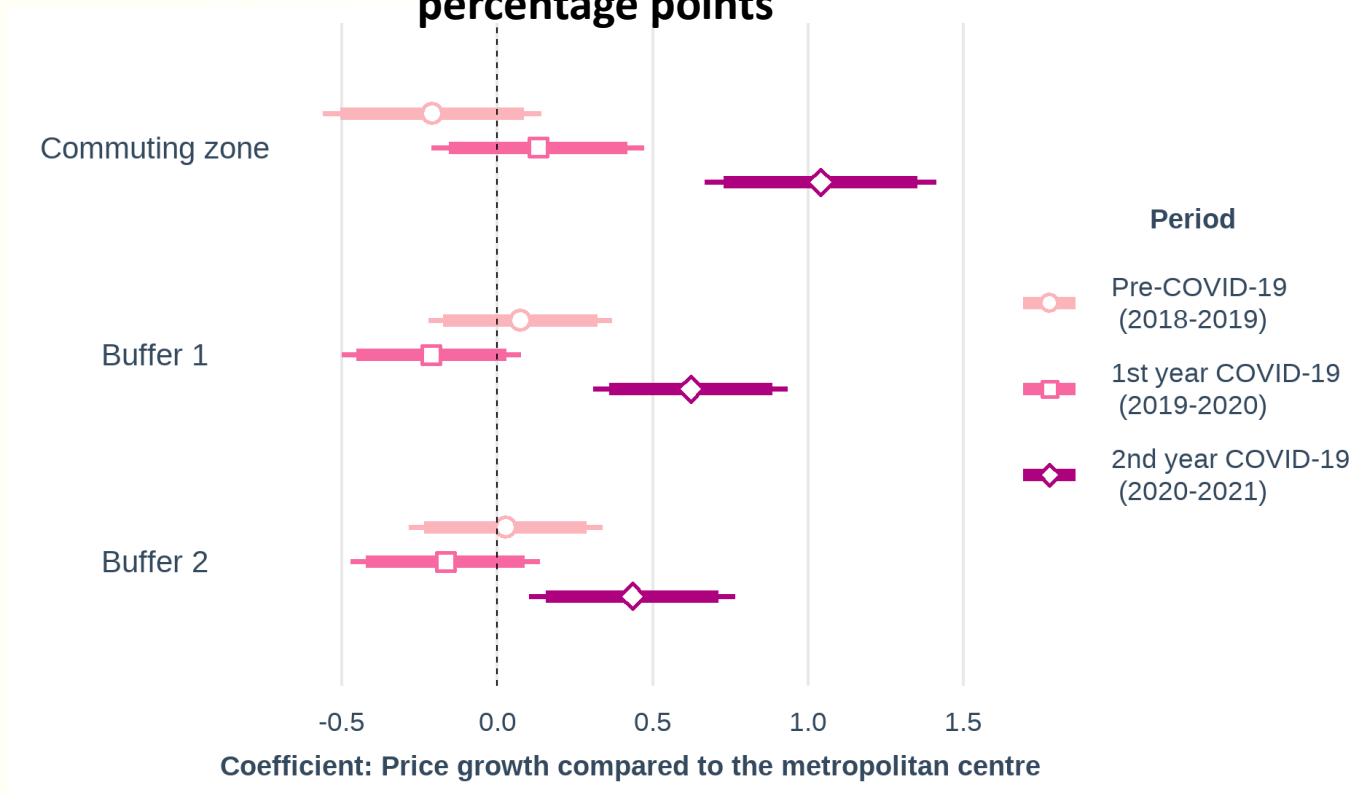Other FUAs — Core — 2nd buffer
Country borders
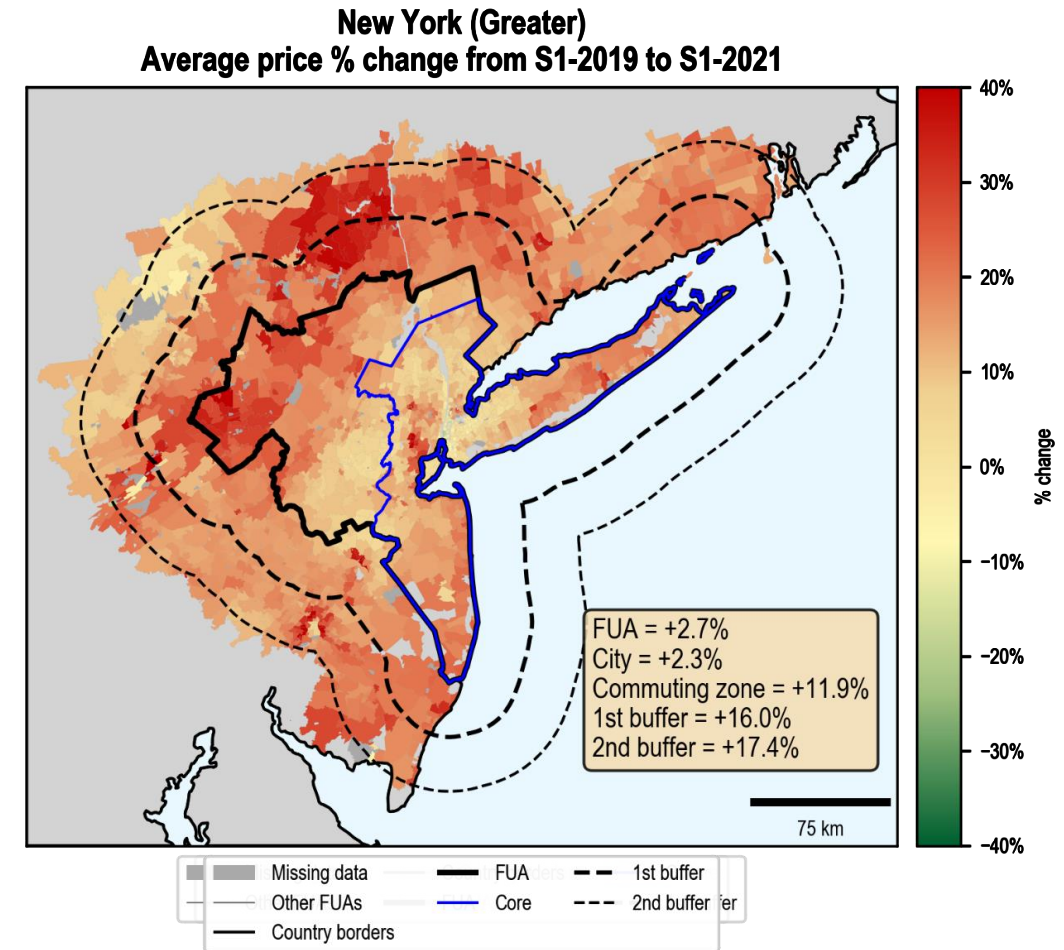
$$\Delta(price_i) = \alpha * Commuting_i + \beta * Buffer1_i + \gamma * Buffer2_{i,j} + ExtMA_{j(i)} + Country_{c(i)} + \varepsilon_{i,j}$$

When most COVID lockdowns ended, house prices increased faster outside metropolitan centres

Regression coefficients: Price growth differentials, in percentage points

Coefficient: Price growth compared to the metropolitan centre

Period

Pre-COVID-19 (2018-2019)

1st year COVID-19 (2019-2020)
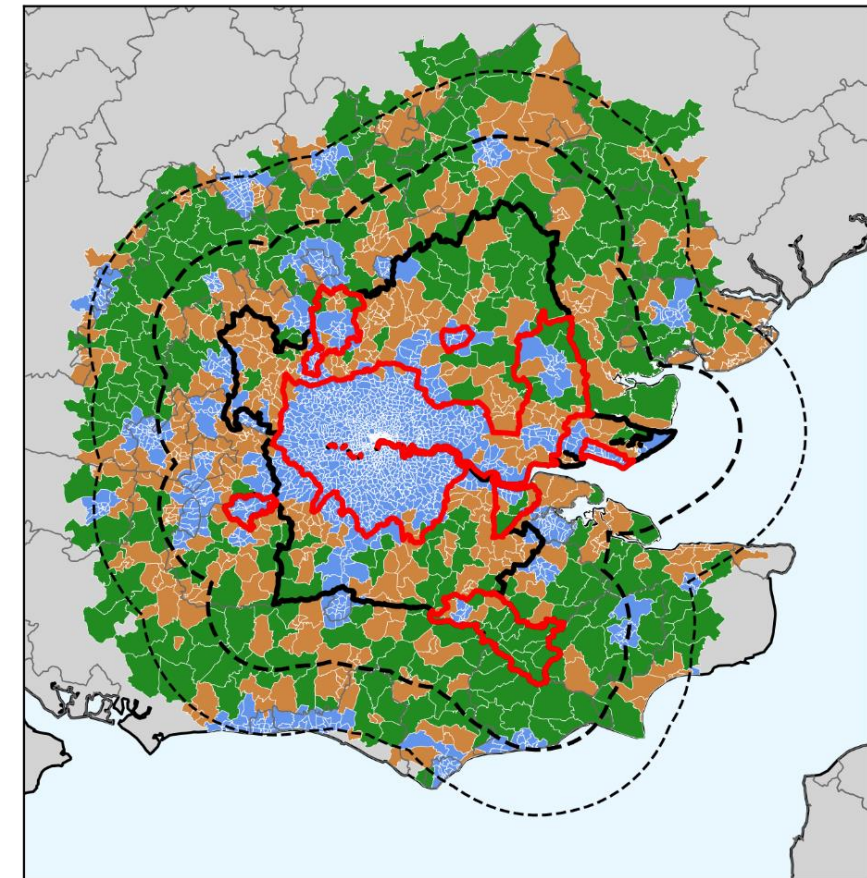
2nd year COVID-19 (2020-2021)

Note: Inner segment represents confidence intervals at the 90%, while whole segment covers confidence intervals at the 95%.

Within the extended doughnut, who is experiencing higher housing demand?

1. **Classify SAUs by their degree of urbanisation (DEGURBA) into:**

   – Rural areas, towns, or cities

2. **For each ring (outside the FUA centre), regress house price changes (%) at SAU level on:**

   – Dummies for rural areas and cities (reference group is towns)

   – Control for extended metropolitan area fixed effects

   – Test different periods (from 2018-2019 to 2020-2021)

   – Robustness checks: including initial house prices

London
Degree of urbanisation

$$\Delta(price_{i,j}) = \delta * Cities_{i,j} + \theta * RuralAreas_{i,j} + ExtMA_{j(i)} + Country_{c(i)} + \varepsilon_{i,j}$$

🟩 Rural areas	Other FUAs	1st buffer
🟫 Towns and suburbs	FUA	2nd buffer
🟦 Cities	Core	

In the commuting zone, house prices increased faster in rural – cheaper – areas

Regression coefficients: Price growth differentials within commuting zones, in percentage points

Pre-COVID-19
(2018-2019)

1st year COVID-19
(2019-2020)

2nd year COVID-19
(2020-2021)

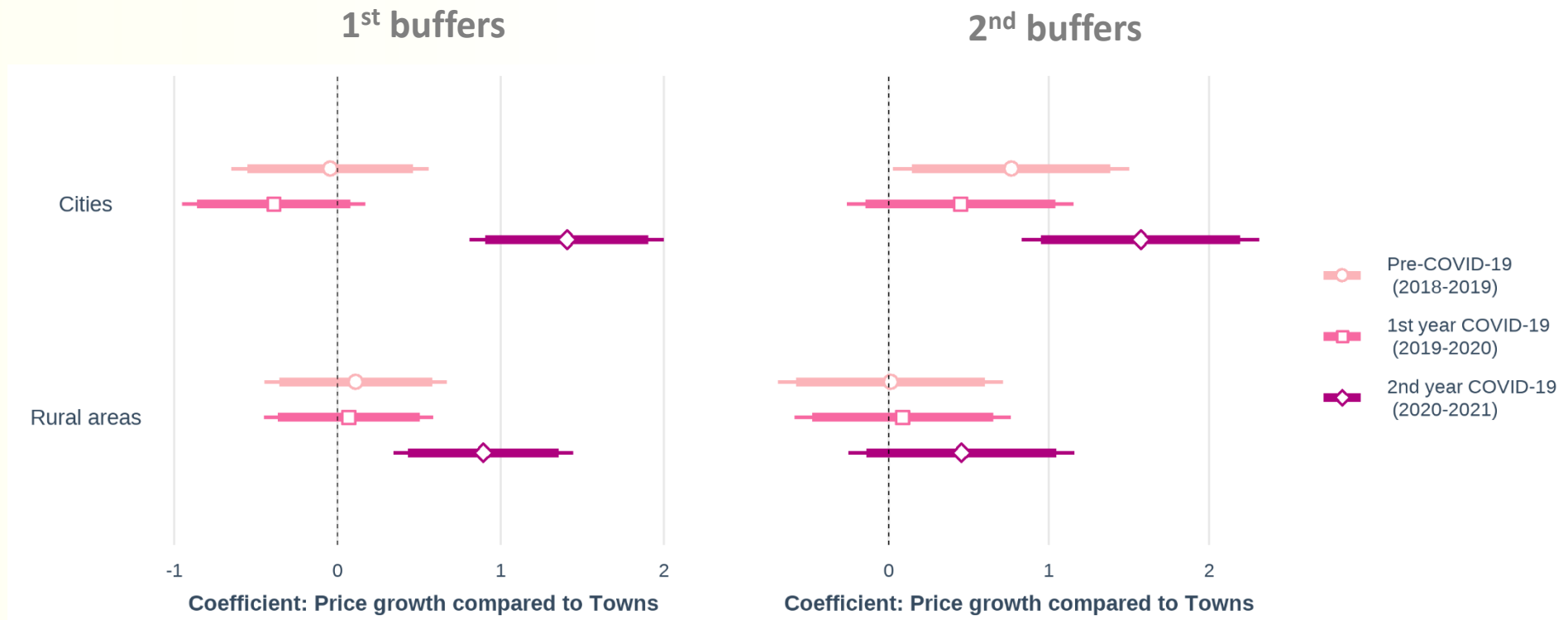**Coefficient: Price growth compared to Towns**

Note: Inner segment represents confidence intervals at the 90%, while whole segment covers confidence intervals at the 95%.

In the first buffers, house prices increased faster in both cities and rural areas

Regression coefficients: Price growth differentials within buffers, in percentage points

1st buffers

2nd buffers

Cities

Rural areas

Pre-COVID-19 (2018-2019)

1st year COVID-19 (2019-2020)

2nd year COVID-19 (2020-2021)

Coefficient: Price growth compared to Towns

Coefficient: Price growth compared to Towns

Note: Inner segment represents confidence intervals at the 90%, while whole segment covers confidence intervals at the 95%.

Conclusion

1. With remote work, faster **house price increase outside metropolitan centres**, reaching areas beyond metropolitan boundaries (**commuting zones** and **outer rings**)

2. Home ownership demand shifted to **places combining the benefits of both rural and urban life:**

   – In the commuting zones: low-density and affordable settlements (rural areas)

   – Beyond large metropolitan areas (buffers): cities

Working papers

"Doughnut effect" papers:

- ✓ "Changes in the geography housing demand after the onset of COVID-19", doi.org/10.1787/9a99131f-en
- ✓ "Urban House Price Gradients in the post-COVID era", https://doi.org/10.1787/3c94ca85-en

"Extended doughnut effect" papers:

- ✓ "Expanding the doughnut? How the geography of housing demand has changed since the rise of remote work with COVID-19", https://doi.org/10.1787/cf591216-en
- ❖ Analysis of local factors underlying housing demand in places outside metropolitan areas (forthcoming)

Built-up monitoring with Earth Observation in emerging and developing economies

Introduction

- **Urbanisation in Emerging Economies**
  - Unprecedented growth of cities
- **Importance of monitoring**
  - Assessing infrastructure development and housing needs
  - Assessing environmental impacts
  - Lack of official statistics
- **Earth Observation (EO) technologies:**
  - **Landsat** and **Sentinel** satellite data publicly available
  - **High-resolution built-up estimates** derived from satellite imagery data

Global datasets on built-up areas

|	GHSL	Dynamic World
Authors	EC-JRC	Google, WRI
Satellite source	Sentinel-1 and 2, Landsat	Sentinel-2
Variables	Building surface, height and volume (including residential vs. non-residential), Population counts	Built-up area (land use/land cover)
Spatial resolution	100 m	10 m
Temporal resolution	Every 5 years	Every 5 days (missing data when clouds)
Time coverage	1975-2030 (projections)	Since 2015
Change analysis	Yes	Yes
Link	https://ghsl.jrc.ec.europa.eu	https://dynamicworld.app/

Global Human Settlement built-up surface 2020
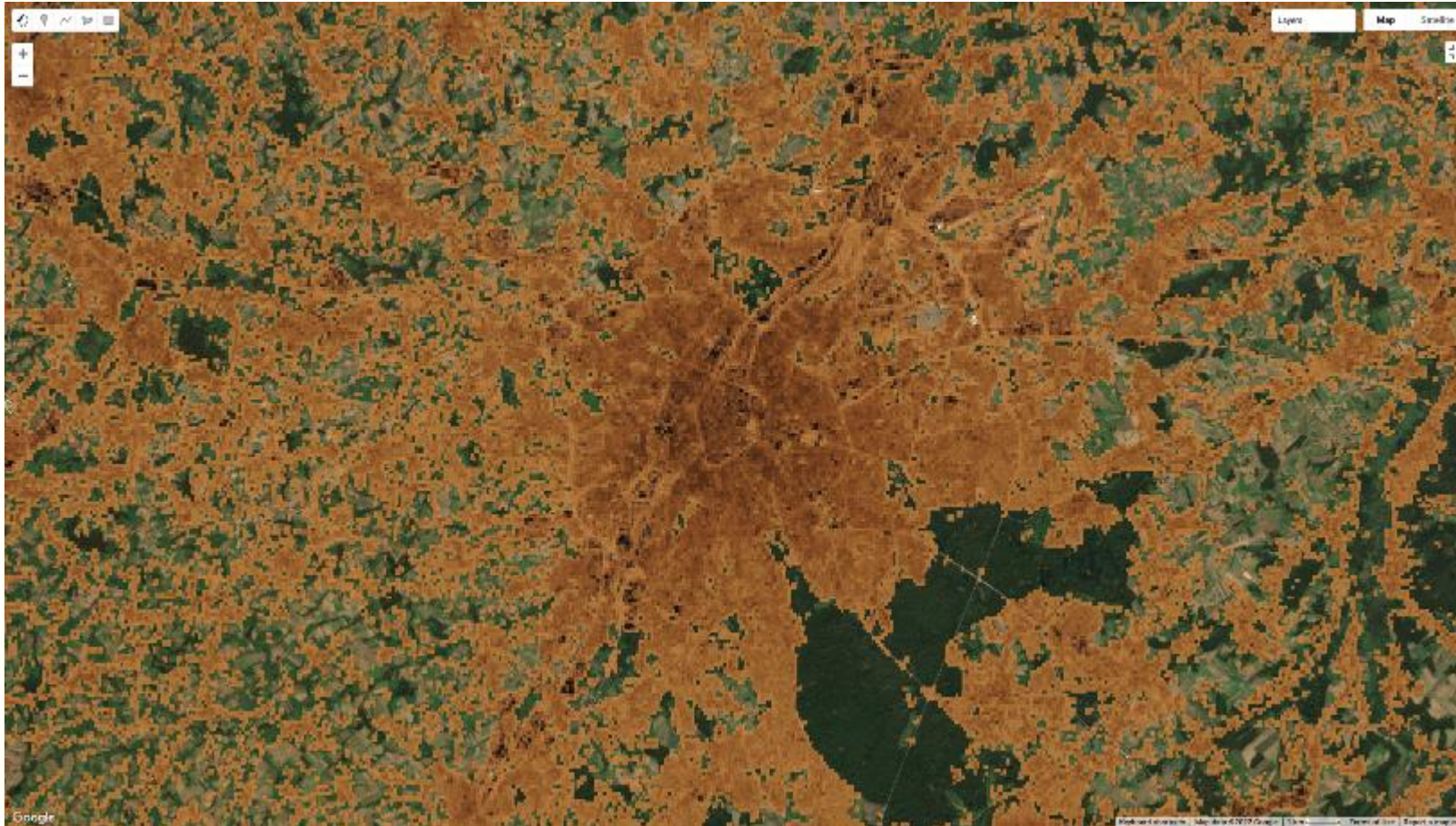
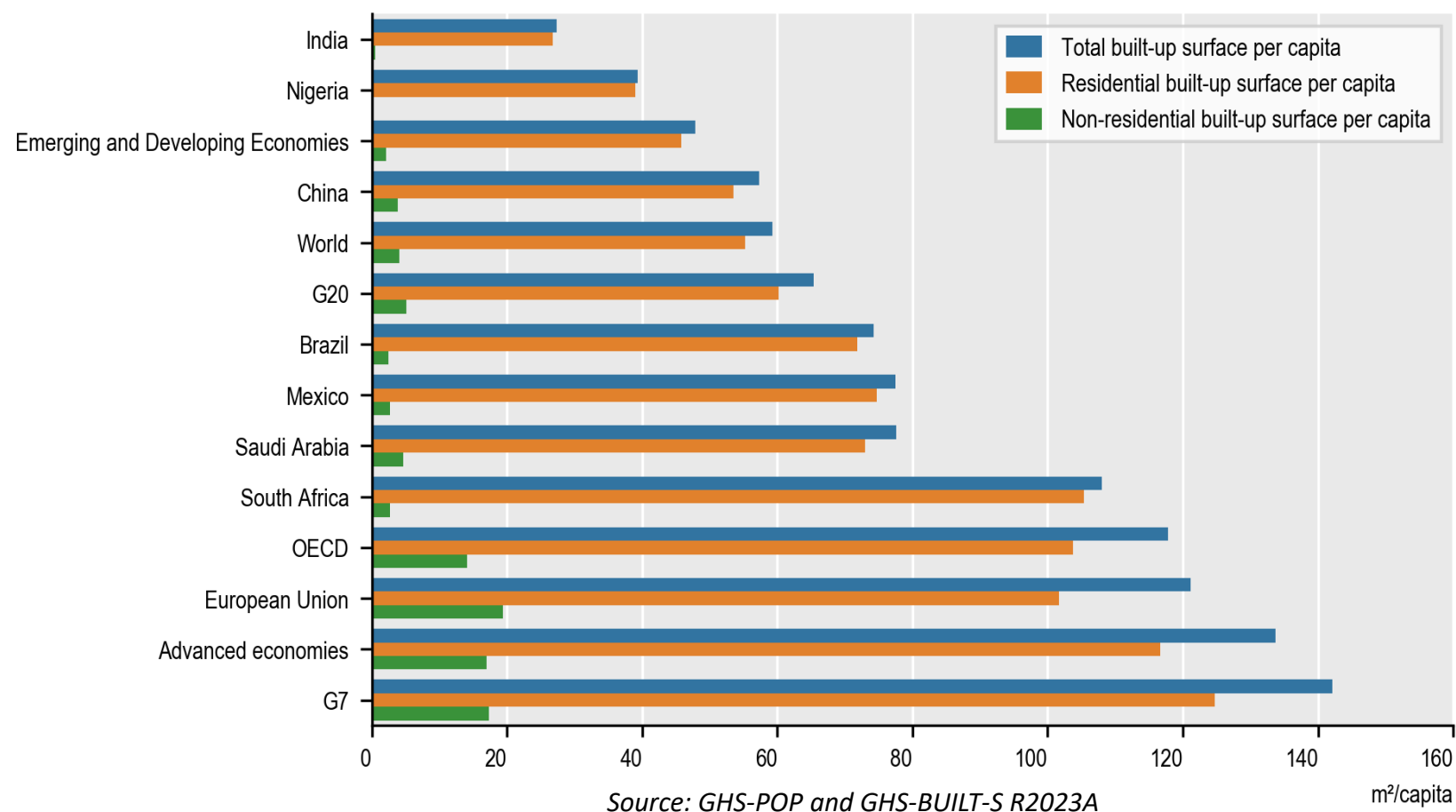# Global Human Settlement residential vs. non-residential built-up surface 2020

Global Human Settlement building height 2018
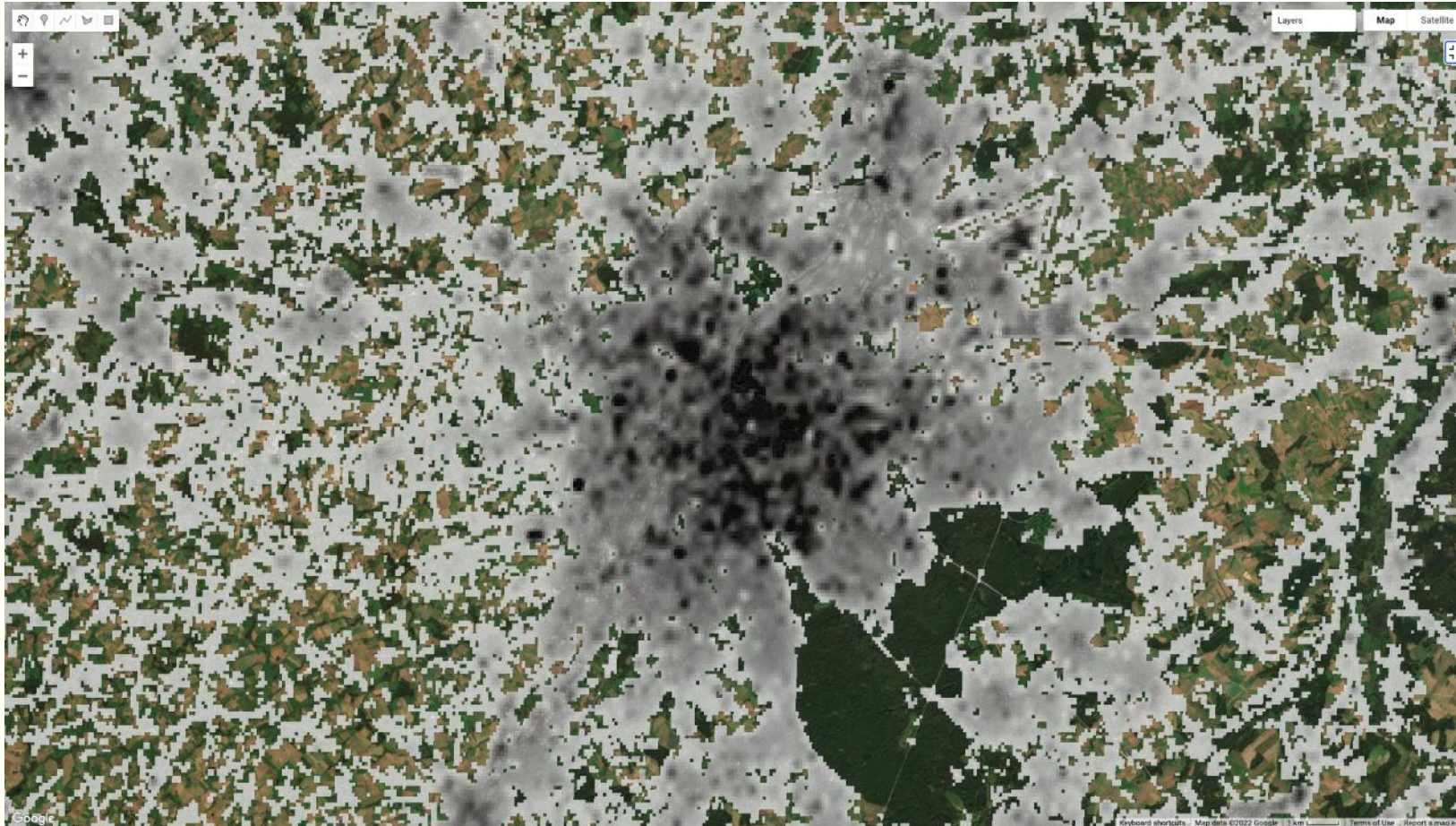
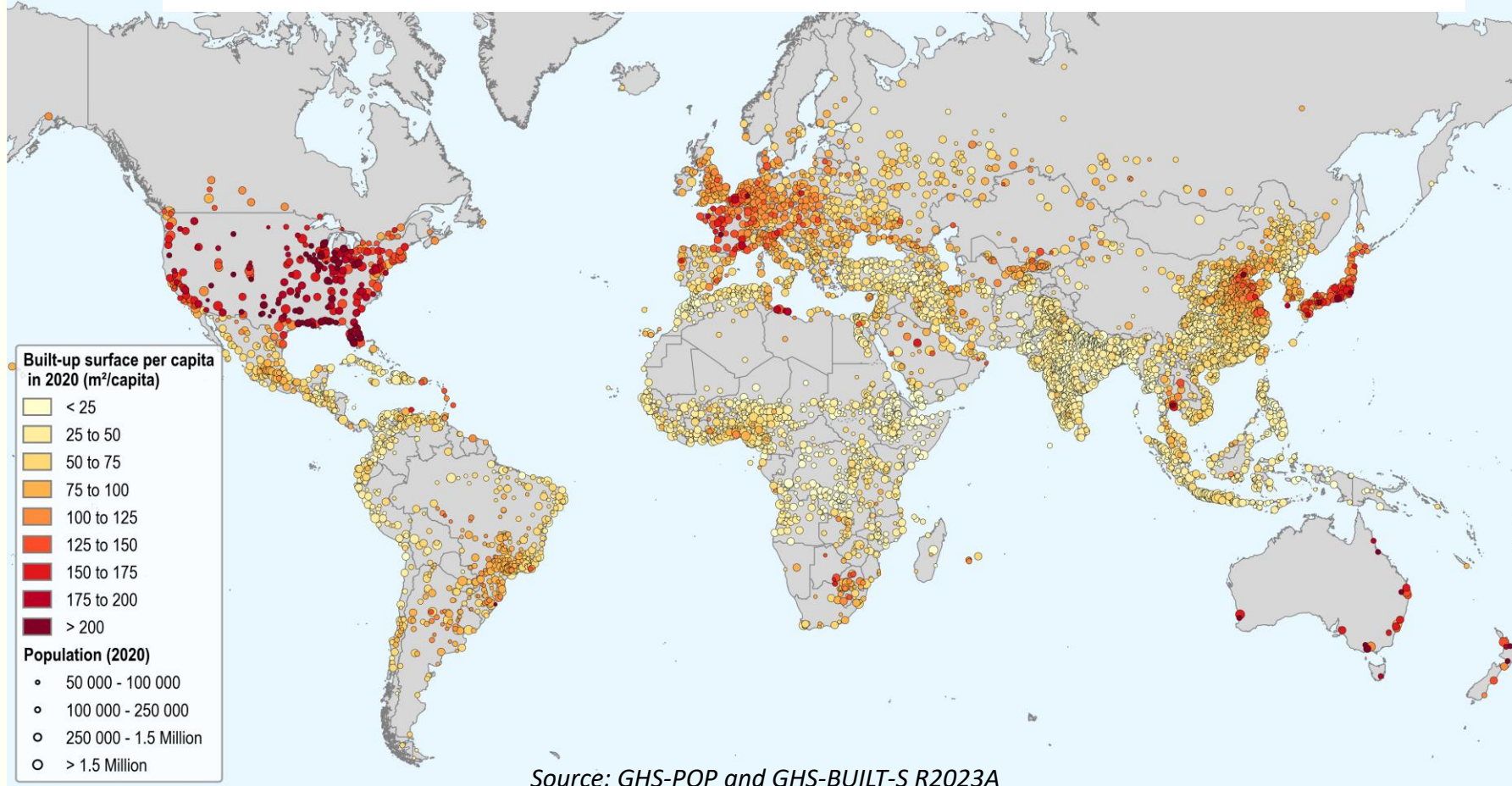# Emerging and developing economies show lower built-up per capita than advanced economies (1/2)

Built-up surface per capita in selected countries and country groups, 2020

Legend:
- Total built-up surface per capita
- Residential built-up surface per capita
- Non-residential built-up surface per capita

Categories (top to bottom): India, Nigeria, Emerging and Developing Economies, China, World, G20, Brazil, Mexico, Saudi Arabia, South Africa, OECD, European Union, Advanced economies, G7

Source: GHS-POP and GHS-BUILT-S R2023A

m²/capita

Emerging and developing economies show lower built-up per capita than advanced economies (2/2)

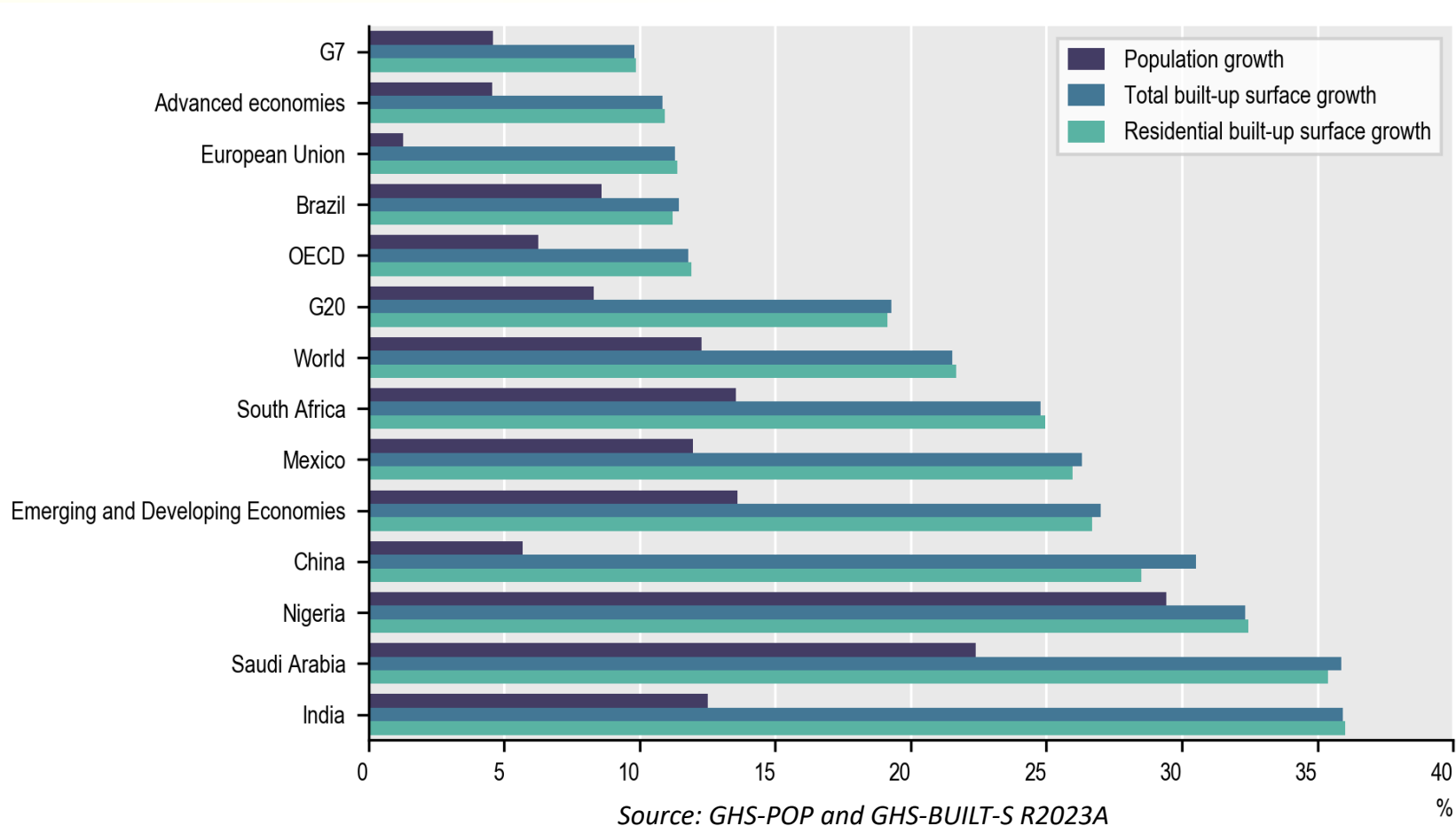**Built-up surface per capita in metropolitan areas (eFUAs), 2020**

Built-up surface per capita in 2020 (m²/capita)
- < 25
- 25 to 50
- 50 to 75
- 75 to 100
- 100 to 125
- 125 to 150
- 150 to 175
- 175 to 200
- > 200

Population (2020)
- 50 000 - 100 000
- 100 000 - 250 000
- 250 000 - 1.5 Million
- > 1.5 Million

Source: GHS-POP and GHS-BUILT-S R2023A

Emerging markets show much higher built-up expansion than advanced economies (1/3)

Built-up surface and population growth in selected countries and country groups, 2010 to 2020

Source: GHS-POP and GHS-BUILT-S R2023A

Emerging markets record much higher built-up expansion than advanced economies (2/3)

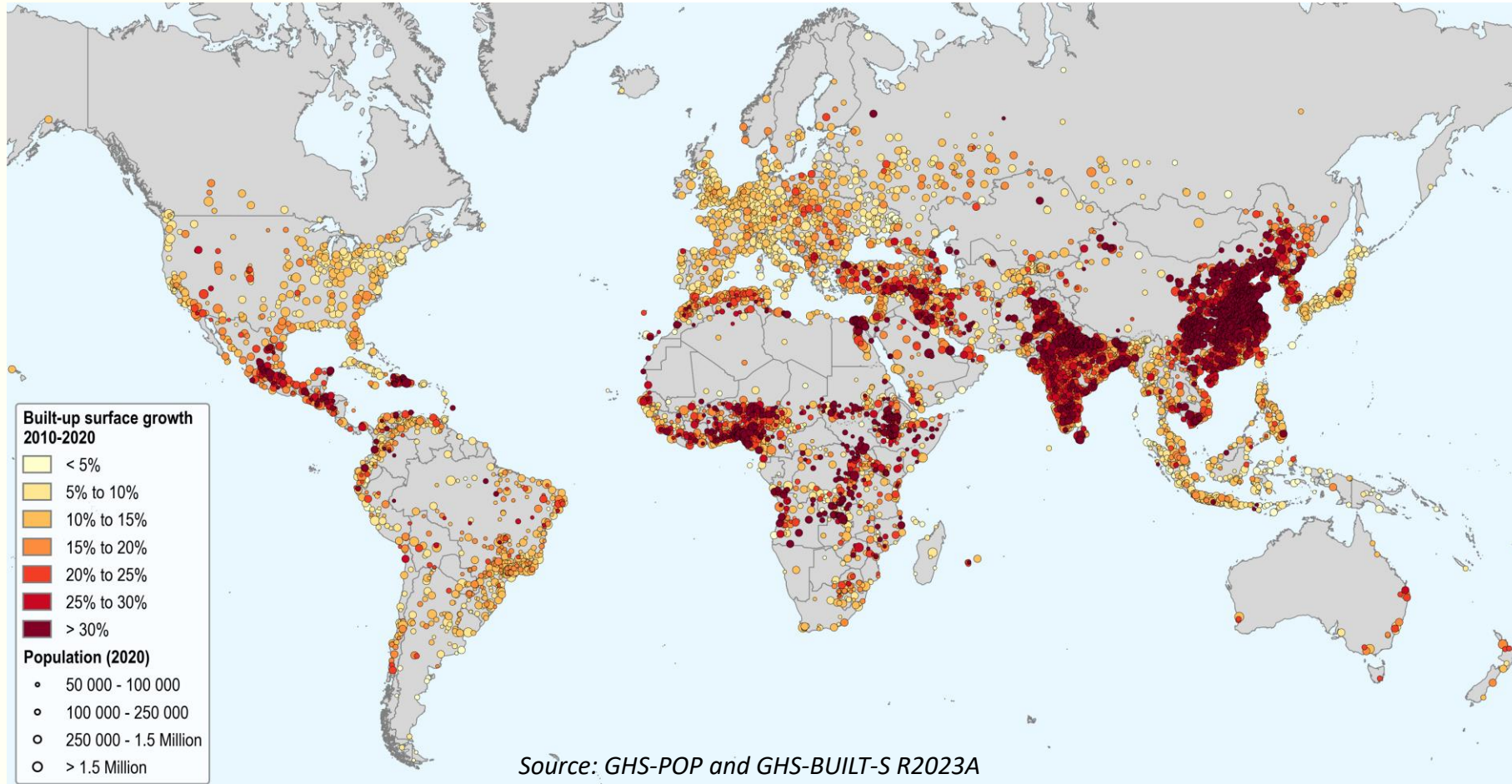**Built-up surface growth in metropolitan areas (eFUAs), 2010 to 2020**

Built-up surface growth 2010-2020
- < 5%
- 5% to 10%
- 10% to 15%
- 15% to 20%
- 20% to 25%
- 25% to 30%
- > 30%

Population (2020)
- 50 000 - 100 000
- 100 000 - 250 000
- 250 000 - 1.5 Million
- > 1.5 Million

Source: GHS-POP and GHS-BUILT-S R2023A

Emerging markets record much higher built-up expansion than advanced economies (3/3)

Population growth in metropolitan areas (eFUAs), 2010 to 2020

Population growth 2010-2020
- < -30%
- -30% to -20%
- -20% to -10%
- -10% to 0%
- 0% to 10%
- 10% to 20%
- 20% to 30%
- > 30%

Population (2020)
- 50 000 - 100 000
- 100 000 - 250 000
- 250 000 - 1.5 Million
- > 1.5 Million

Source: GHS-POP and GHS-BUILT-S R2023A
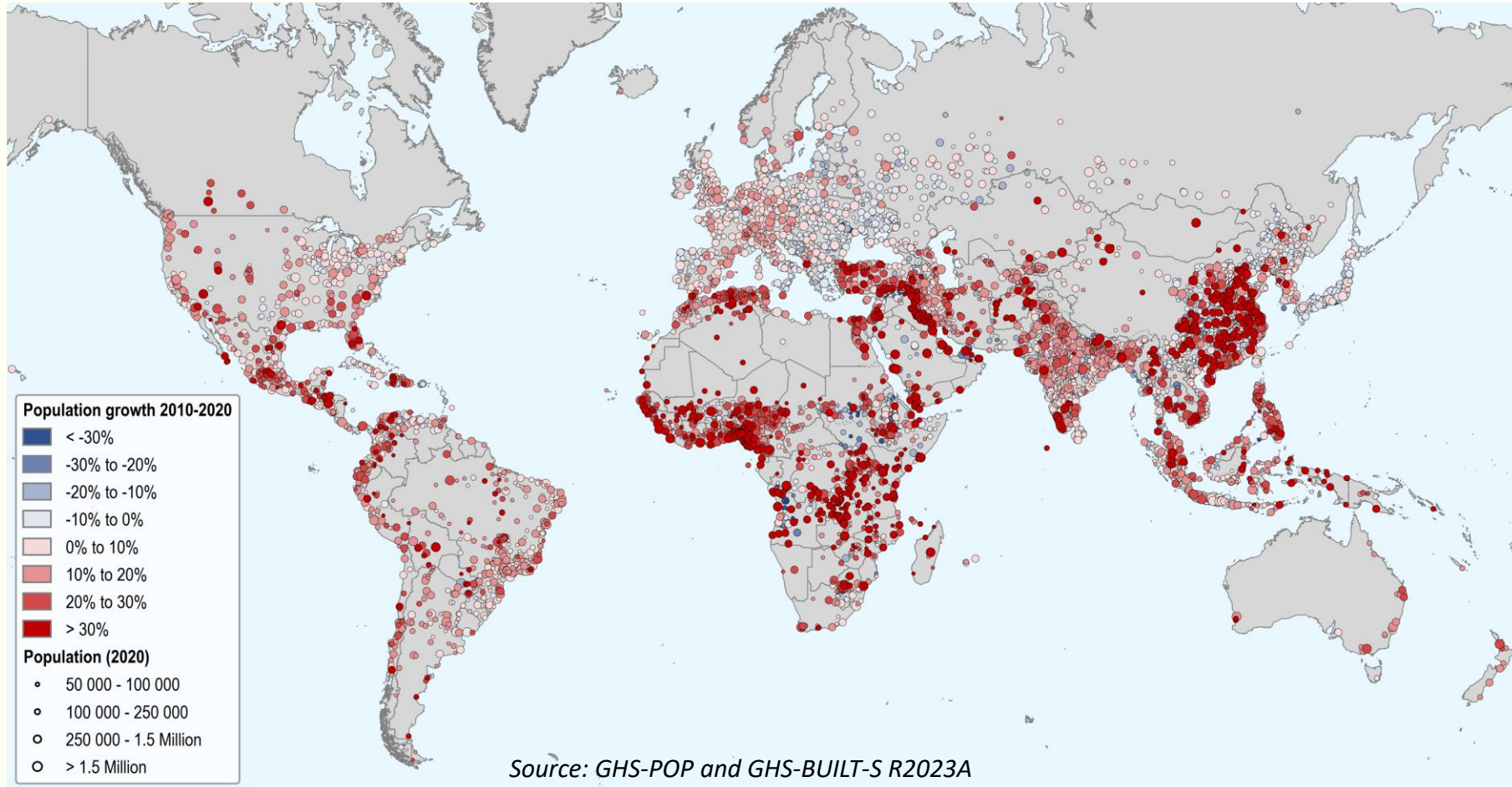
Future urban landscapes: high built-up surface growth projections for India and Nigeria (1/3)

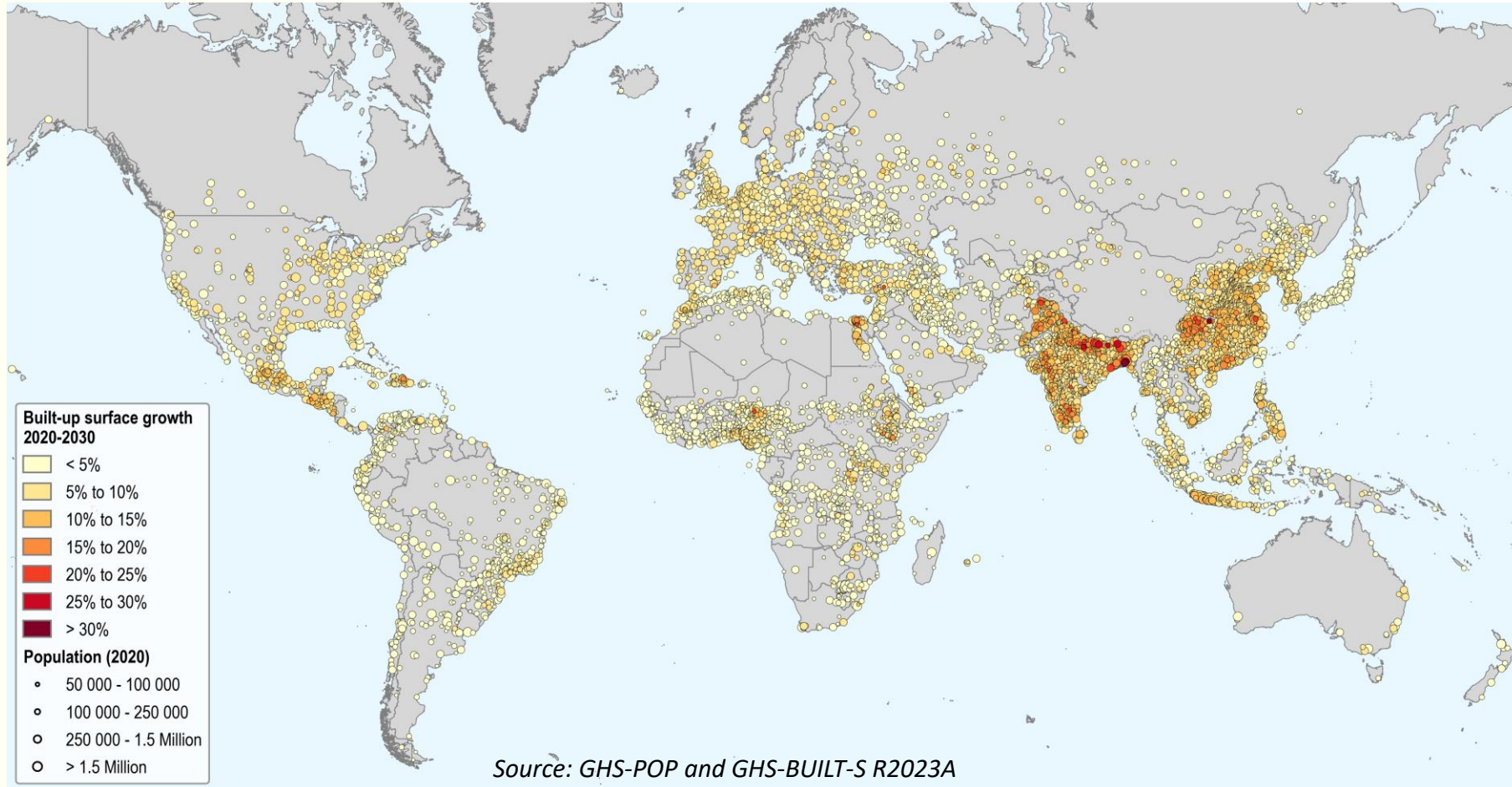**Built-up surface and population growth in selected countries and country groups, 2020 to 2030**
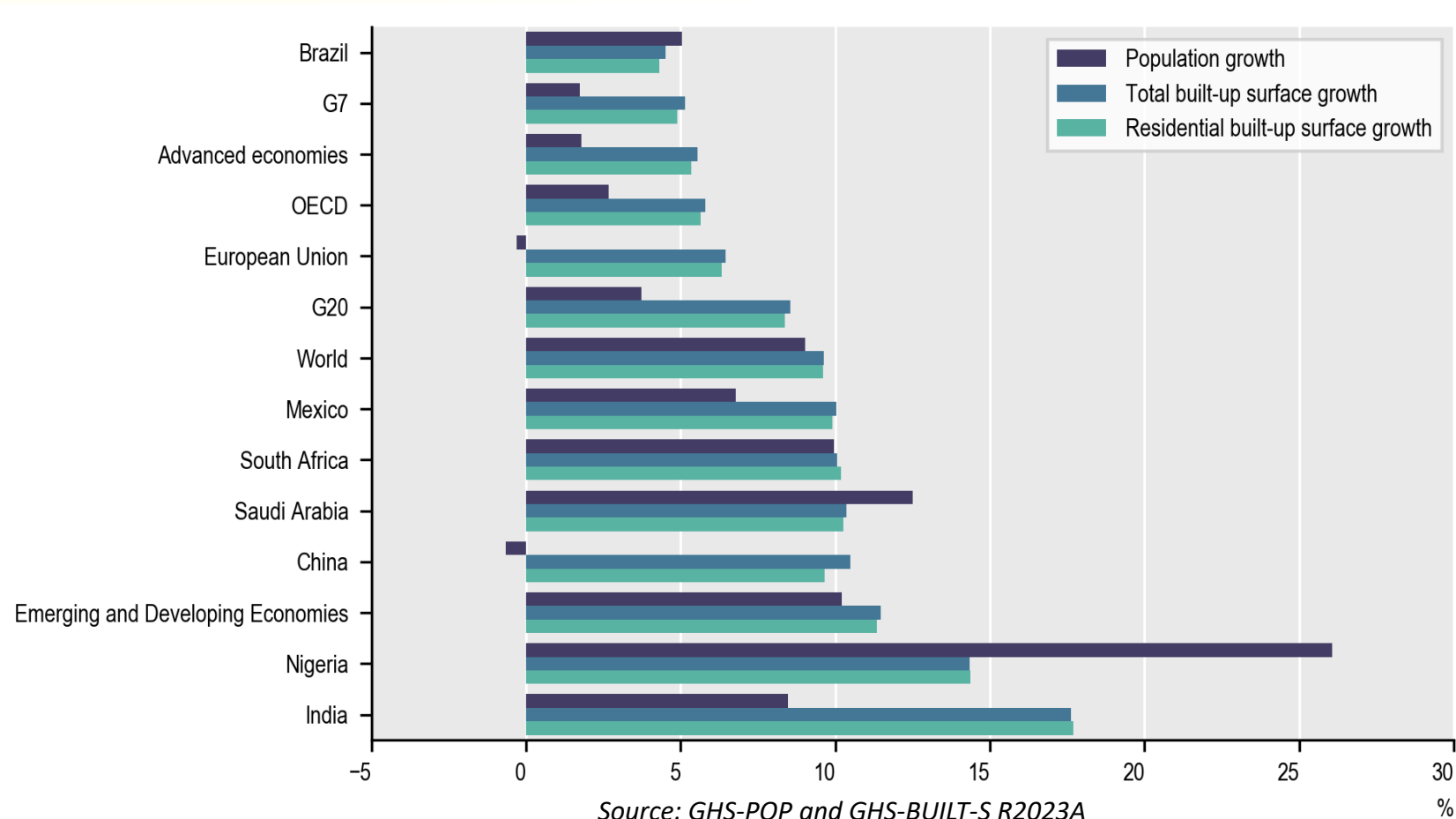
Source: GHS-POP and GHS-BUILT-S R2023A

Future urban landscapes: high built-up surface growth projections for India and Nigeria (2/3)

Built-up surface growth projections in metropolitan areas (eFUAs), 2020 to 2030

Source: GHS-POP and GHS-BUILT-S R2023A

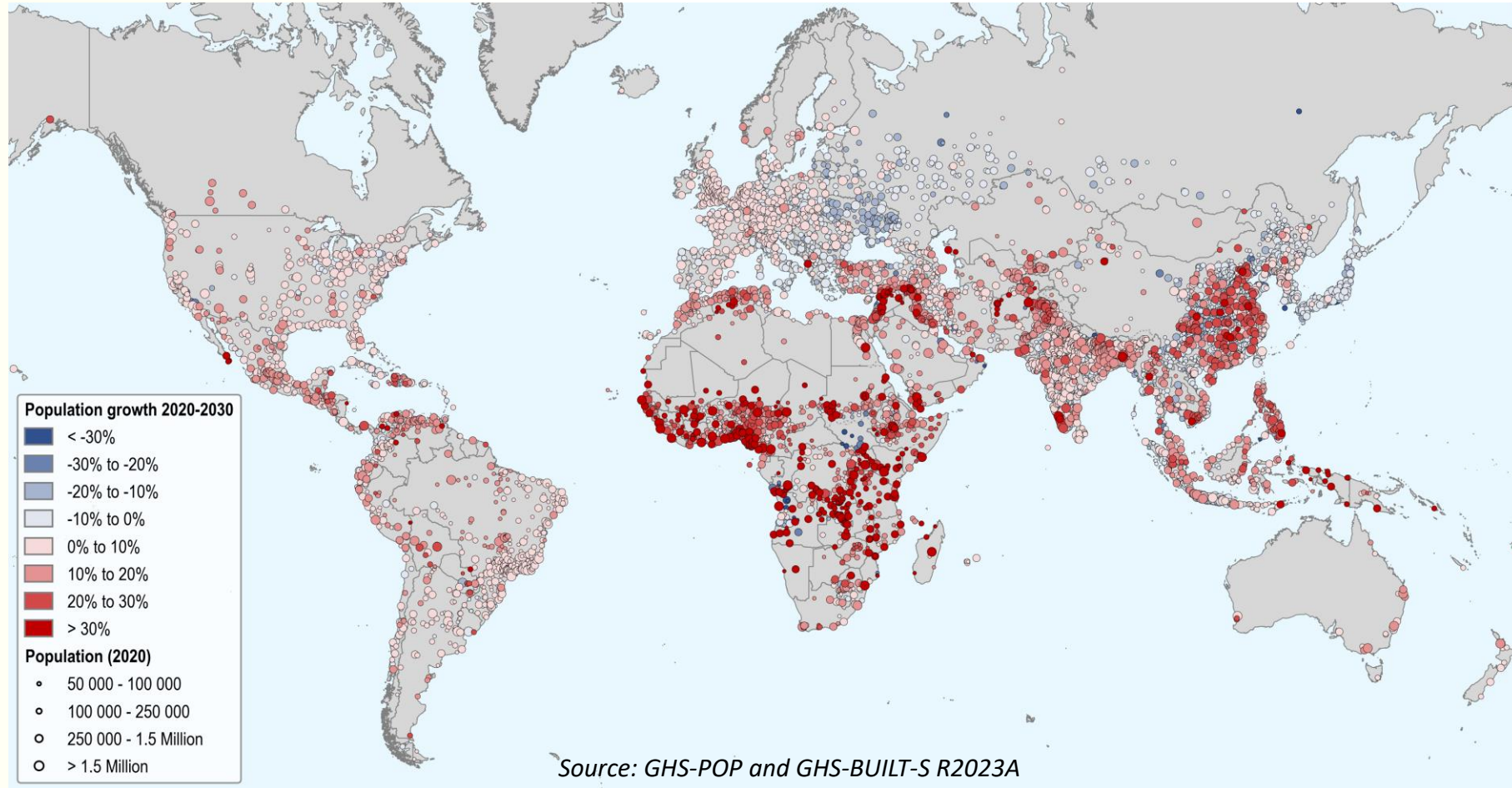# Future urban landscapes: high built-up surface growth projections for India and Nigeria (3/3)

Population growth projections in metropolitan areas (eFUAs), 2020 to 2030

Population growth 2020-2030
- < -30%
- -30% to -20%
- -20% to -10%
- -10% to 0%
- 0% to 10%
- 10% to 20%
- 20% to 30%
- > 30%

Population (2020)
- 50 000 - 100 000
- 100 000 - 250 000
- 250 000 - 1.5 Million
- > 1.5 Million

Source: GHS-POP and GHS-BUILT-S R2023A

Conclusion

- **EO** data powerful to monitor built-up areas and construction in **emerging markets**

- **Unprecedented built-up expansion in emerging and developing economies:**
  - **+22%** built-up over the past 10 years
  - **+11%** expected in the next 10 years

- **Complementary data sources:**
  - Accurate population counts
  - Characteristics of the built environment
  - Land functions within urban areas

Thank you

✉ Alexandre.BANQUET@oecd.org

Twitter: @OECD_local
LinkedIn: www.linkedin.com/company/oecd-local
Website: www.oecd.org/cfe
Blog: oecdcogito.blog

OECD