Measuring regional economies in OECD countries

What do regional data tell us?

Traditionally, regional policy analysis has used data collected for *administrative* regions, that is, the regional boundaries as organised by governments. Such data can provide sound evidence on the contribution of regions to national performance as well as on the persistence of disparities within a country. They show, for example, that during the past 15 years, more than 30% of growth in GDP, employment and population within the OECD is attributable to a small number of regions.

They also show that the economic crisis has widened inequalities across regions within countries. Whereas in France and the United States, for example, metropolitan areas have managed to maintain an advantage in terms of GDP and employment creation compared to the rest of the country, metropolitan areas in Japan or Italy are struggling, due to an ageing labour force or high youth unemployment.

Data on administrative regions can also help us to understand the role of subnational governments in policy planning and public service delivery. OECD subnational governments were responsible for more than 40% of public expenditure and two-thirds of direct public investment in 2012, allocated mainly to economic affairs, education and housing.

A new way to think about regions and urban areas

At the same time, the places where people live, work and socialise may have little formal relationship to the administrative boundaries around them: a person may inhabit one city or region but go to work in another and, on the weekends, practice a sport in a third, for example. Regions interact through a broad set of linkages such as job mobility, production systems, collaboration among firms, for example. These often cross local and regional administrative boundaries. The analysis, therefore, should take into consideration the geography most relevant for the policy question, whether this geography reflects the *administrative* boundaries of a region or instead reflects an economic or social area of influence known as the *functional* region.

Functional regions are well-suited for analysing how geography plays a part in production, productivity growth, the organisation of urban labour markets, and the interactions between urban and rural areas. This notion can better guide the way national and city governments plan infrastructure, transportation, housing, schools, and space for culture and recreation. In summary, functional regions can trigger a change in the way policies are planned and implemented, better integrating them and adapting them to the local needs.

> ### Box 1. **Defining functional regions and functional urban areas**
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> **Functional regions** are geographic areas defined by their economic and social integration rather than by traditional administrative boundaries. A functional region is a self-contained economic unit according to the functional criteria chosen (for example, commuting, water service, or a school district, etc.).
>
> **Functional urban areas** are here defined as densely populated municipalities (urban cores) and adjacent municipalities with high levels of commuting towards the densely populated urban cores (hinterland). Functional urban areas can extend across administrative boundaries, reflecting the economic geography of where people actually live and work. A minimum threshold for the population size of the functional urban areas is set at 50 000.
>
> **Metropolitan areas** are here defined as functional urban areas with a population above 500 000 people. There are 275 metropolitan areas in the 29 OECD countries examined; of these, 77 have a population greater than 1.5 million.
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> **Regions** are classified by the OECD on two territorial levels reflecting the administrative organisation of countries. **OECD large (TL2) regions** represent the first administrative tier of subnational government. For example, the Ontario region in Canada. **OECD small (TL3) regions** are contained in a TL2 region. For example, the TL2 region of Aquitaine in France encompasses five TL3 regions: Dordogne, Gironde, Landes, Lot-et-Garonne and Pyrénées-Atlantiques. In most cases, TL3 regions correspond to administrative regions, with the exception of those in Australia, Canada, Germany and the United States.
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> *Note:* See Annex A for details on the various definitions.

Better data for better policy making

Regional and local data are increasingly available from a variety of sources: surveys, geo-coded data, administrative records, big data, and data produced by users. The range of techniques to integrate and analyse these different sources has also changed the supply of data on different geographical scales, with the potential for dramatically improving both the quantity and timeliness of local information.

The integration of data sources can help governments to better understand interactions among economic, social and environmental changes at the local level. In addition, a rich set of information at different geographical levels responds not only to policy makers' needs but also to people's desire to better understand the area they live in to make decisions, voice their interests, and participate in democratic life. Meeting these expectations will help governments to receive feedback, restore trust and, ultimately, improve the efficacy of their actions.

However, while countries have started to make use of the various sources to produce and analyse data at different geographic levels, significant methodological constraints still exist, making it a challenge to produce sound, internationally comparable statistics linked to a location. These constraints include both the varying availability of public data across OECD countries and the different standards used by National Statistical Offices in defining certain variables. Such constraints are even larger in non-OECD countries, where – at the same time – the production and usability of geo-coded information could be one solution to improve statistical evidence for different policy uses. The trade-off between sound methodological estimations and international comparability should be always considered, as the latter depends on the commonly available information.

In response to these challenges, the OECD has been working to:

- Improve the analysis of different regions by looking beyond administrative boundaries.
- Establish an agreed common methodology for identifying functional regions in a comparative way across countries, starting with the definition of functional urban areas in OECD countries. Develop a socio-economic and environmental database for the OECD metropolitan areas.
- Improve available information on economic competitiveness and quality of life in different territories within and across OECD countries by broadening the range of measures to include well-being and societal progress, and by integrating official statistics with other sources of data.

Why a special focus on metropolitan areas?

Almost half of the population in OECD countries live in metropolitan areas. These 275 metropolitan areas contribute to more than 50% of OECD GDP and account for 60% of patents in the OECD area. By 2050, 6 billion people worldwide are expected to live in cities, a consequence of the continuous expansion of mega-cities in emerging economies and the coming together of people and business in urban centres of different scales in other parts of the world. Even in OECD countries where urbanisation is already high, many metropolitan areas keep growing, and the distribution of people and activities over space continues to change. Such changes may, for example, take the form of evolution from a *monocentric* urban area to a more *polycentric* system of integrated urban centres and sub-centres. Evidence shows that different forms of organisation of people and production over space may have important implication for the overall performance of a country (Brezzi and Veneri, 2013).

Regional policies need to better account for the fact that urbanisation can take many forms and to recognise that these forms have an impact on the type and pace of urban development. The ways people in cities have access to education and jobs, decent housing and efficient transportation, as well as enjoy a safe and sustainable environment, will in turn have a strong impact on national and global prosperity. Moreover, reduced transport and communication costs will continue to make urban areas increasingly interconnected. It is important to better understand the functioning and efficiency of these connections since they represent key links between urbanisation and productivity growth, and they can lead to important changes in how and where production takes place. Key goals of regional policies, such as increased social cohesion, depend critically on how urban areas grow and on how they interact among themselves and with their surrounding areas.

This 2013 edition of *Regions at a Glance* presents, for the first time, a new section on the socio-economic, environmental and demographic performance of metropolitan areas in OECD countries. It uses the *OECD Metropolitan Database*, which provides a harmonised base for examining cities beyond administrative boundaries and includes estimates of socio-economic indicators (gross domestic product, employment and unemployment) and environmental assets (land use, air quality and green spaces) in metropolitan areas.

Overview of the OECD methodology for examining functional urban areas

The OECD, in collaboration with the European Commission and Eurostat, has developed a methodology for defining urban areas as functional economic places in a consistent way across countries. Using population density and travel-to-work flows as key information, urban areas emerge as characterised by densely inhabited "urban cores" and less-populated municipalities whose labour market is highly integrated with the cores (OECD 2012).[1]

The methodology consists of three main steps:

1. Identification of contiguous densely inhabited urban cores.

2. Identification of interconnected urban cores that are part of the same functional area.

3. Definition of the outlying area or hinterland of the functional urban area, linked by commuting flows to the urban cores.

First, population grid data at 1 km² are used to define urban cores, ignoring administrative boundaries. An urban core is made up of contiguous municipalities that have more than 50% of their populations living within "high density" cells. This use of population grid data to identify urban cores compensates for the fact that traditional administrative units are unevenly sized and vary greatly within and between countries.

The second step of the procedure allows the identification of urban cores that are not contiguous but belong to the same functional urban area. Two urban cores are considered part of the same polycentric functional urban area if more than 15% of the population of any of the cores commutes to work in the other core. In countries where commuting distances are steadily increasing, large urban areas are developing in a polycentric way, hosting highly densely inhabited cores that are physically separated but economically integrated. This is, for example, the case in London, whose increased connectivity among different urban centres has resulted from the combined effect of infrastructural improvements and re-organisation of production activities (firms keeping their administrative headquarters in the central core and relocating production facilities to well-connected agglomerations outside the central core).

The final step of the methodology defines the hinterland of the functional urban area as the surrounding municipalities linked to the urban cores by the commuting of their workforce. Any municipality that has at least 15% of its employed residents working in a certain urban core is considered part of the same functional urban area.

Applying this methodology to 29 OECD countries,[2] a total of 1 179 functional urban areas have been identified where two-thirds of the OECD population lives. Metropolitan areas are defined as the 275 functional urban areas with a population larger than 500 000 people.

This procedure for delimiting functional urban areas is relatively easy in terms of data inputs needed (though this may still be challenging in many non-OECD countries). The improvement and finalisation of new subnational data has required – and will continue to require – a high level of co-operation between the OECD, National Statistical Offices and EC-Eurostat in order to agree on standards, harmonisation, production and the dissemination of small administrative units.

The novelty of the OECD approach to functional urban areas is to create a methodology that can be applied across the whole OECD, thus increasing comparability across countries, unlike definitions and methodologies created within individual countries, which have been internally focused.[3] In order to establish this cross-country methodology, common thresholds and similar geographical units across countries were defined. These units and thresholds may not correspond to the ones chosen in the national definitions. Therefore, the resulting functional urban areas may differ from the ones derived from national definitions; as well the OECD functional urban delimitation may not capture all the local factors and dynamics in the way national definitions do.

This methodology has clear advantages over the use of administrative regions to identify urban areas:

● It captures a city's socio-economic area of influence. In the past, using small (TL3) regions as territorial units of analysis has led to identifying urban areas either too large (including areas outside the economic influence of central cores) or too small (excluding areas strongly connected with the urban core), and thus hindering international comparisons. Houston (United States) and Paris (France) illustrate that the actual population distribution within administrative boundaries may be very different (Figure 1).

● Since the methodology establishes urban areas from the bottom up by aggregating densely populated small areas, it identifies all of a country's urban systems with a population of at least 50 000, thus enabling analysis of urban areas of different sizes, including small and medium-sized urban areas.

● It enables the identification of polycentric urban areas, with physically separate "cores" belonging to the same larger functional urban area. This better illustrates the economic and geographic organisation of urban areas and the linkages between such places.

● It allows the analysis of different patterns of urban development of the cores and surrounding municipalities ("hinterlands") of each urban area.

● It provides a sound analytical base to examine governance challenges and the economic development of functional urban areas.

Figure 1. **Urban and non-urban population density, as mapped onto functional and administrative boundaries: Houston and Paris**
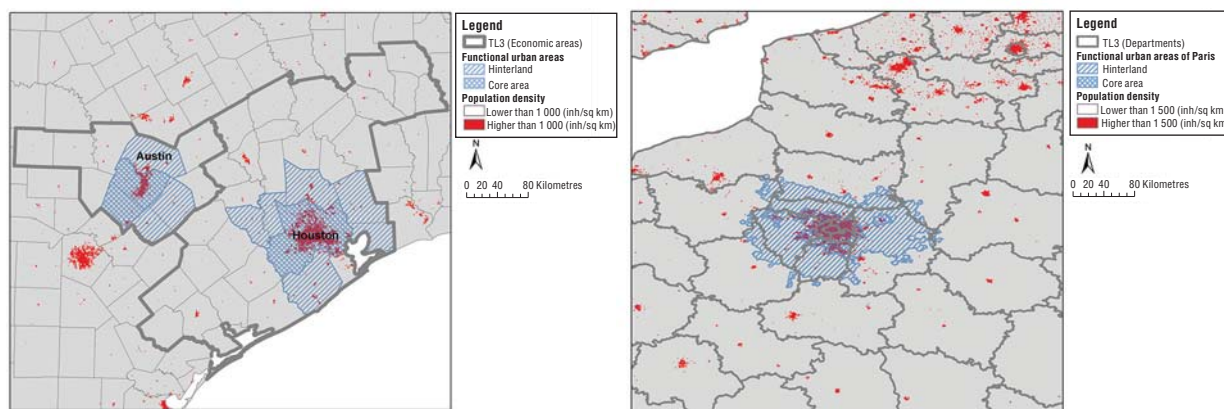
Note: These maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory covered by these maps.
Source: OECD calculations based on population density as disaggregated with Corine Land Cover, Joint Research Centre for the European Environmental Agency.

Increasing the availability of subnational statistics

The estimated variables for the metropolitan areas presented in *Regions at a Glance 2013* are derived by integrating different sources of data, making use of GIS and adjusting existing regional data to non-administrative boundaries. Two types of methods to obtain estimates at the desired geographical level are applied, both requiring the use of GIS tools to disaggregate socio-economic data. These techniques are increasingly used

today, especially in the field of environmental indicators and for other issues that are particularly attached to the geography of a territory (Nordhaus et al., 2006; Milego and Ramos, 2006; Doll et al., 2000).

The first method makes use of satellite datasets (global layers) at different resolutions, but which are always smaller than the considered regions. The statistics for one region are obtained by superimposing the source data onto regional boundaries. In these cases, the regional value is either the sum or a weighted average of the values observed in the source data within the (approximated) area delimited by the regional boundaries. This method has been applied, for example, to estimate the amount of green space, the share of built-up areas and the changes in land use in metropolitan areas (Piacentini and Rosina, 2012). The integration of geographical information and population data allows a better understanding of urban forms and urbanisation processes. In many OECD metropolitan areas, the pace of growth of the built-up areas has been faster than population growth in the last ten years, and in more than 30% of them this has resulted in an increase in the built-up area "available" to inhabitants, a phenomenon known as urban sprawl.

The second method makes use of GIS tools to adjust or downscale data, available only for larger geographies, to regularly spaced "grids" by using additional data inputs that capture how the phenomenon of interest is distributed across space (Goldring et al., 2005; Milego and Ramos, 2006; OECD, 2012; Panek et al., 2007). Thanks to this method we have estimated, for example, the GDP values, employment, unemployment and the carbon emissions of metropolitan areas using the corresponding values for small (TL3) regions.[4]

We opted for GIS-based methodologies to estimate not only environmental, but also socio-economic indicators (GDP and labour market), because these methods are less dependent on the type of information available in the different countries and, therefore, they enable a good comparability of results among metropolitan areas in different countries. This choice, however, has the disadvantages of lack of precision for some estimates and difficulty to obtain comparable measures over time of environmental variables so as to monitor improvements induced by targeted policies and behavioural changes. Specific data products enabling comparison of data over time need to be produced, and, as well, international standards for the production of indicators from remote sensing observation could be developed.

Geographical data combined with socio-economic statistics can also be used to increase the available information for administrative regions. For example, this publication presents measures of air quality and share of forests in large (TL2) and small (TL3) regions to compensate for the lack of international standards for statistics of environmental conditions in regions. More generally, the OECD is working to connect information about the people, the society and the economy of a location with the aim of broadening the measures of well-being and societal progress in regions.

Future directions for the study of regional economies

Although the OECD has taken important first steps in defining functional regions and urban areas and in establishing a methodology for reliable cross-country comparisons, there remains much to be done and many possible directions for future work. These include examining: the various kinds of interactions that cause functional areas to develop and the way these interactions are governed; the development of well-being metrics linked to where people live and how policies are implemented; and a common framework to connect socio-economic statistics to geographical information at different scales.

Functional regions beyond urban areas

A significant portion of the OECD population still lives outside the commuting sphere of large cities, in territories where commuting within a larger rural region is even more important. For this reason, a possible future step consists in identifying functional regions in non-urban territories, using methodologies not built around an urban core. Canada, for example, is working on a methodology that identifies self-contained labour markets by aggregating municipalities that are linked in terms of commuting flows. Similar methodologies have been applied in other countries such as Italy (Istat, 2005), Australia (ABS, 2011) and the United Kingdom (Coombes, 2009).

Functional regions result from changes in the behaviours of individuals and firms, as well as changes in mobility, economic prosperity, and information and communication technology. Their boundaries are generally identified with the labour market shed, measured in terms of daily commuting. However, depending on the relevant interactions between rural and urban areas, and on the policy issue under consideration, there are different possible delineations of functional regions. For example, the provision of health services and the consequent organisation of hospitals may have a different geography than that of a labour market; or in the case of environmental policy, the appropriate functional geographies might depend on the location of natural resources and on the extent to which a certain place is part of the externalities that they may generate.

Functional regions may not coincide with administrative or political regions and generally linkages across different areas need to be governed beyond administrative boundaries. Mechanisms of co-ordination among different but interdependent local authorities and other potential public and private actors can help improve regional prosperity and people's well-being. Depending on the economic, institutional and cultural conditions in each territory, different governance approaches for territorial co-operation at a functional region level have been identified (OECD, 2013).

Broadening measures of well-being in regions

Across and within regions, there can be significant differences in the access to basic and advanced services such as transport, water and sanitation, education, health, and ICT, affecting the opportunities available to people. Quality of services is another dimension for measurement at the subnational level. Such measures should be citizen-focused since their judgment on the performance and quality of services offered can help improve the match between services provided by governments and the actual needs of people. Evidence shows that trust in local governments is affected by the availability and quality of public services and whether citizens perceive the access to services to be fair. In this respect, a possible future development consists in combining the location of infrastructure and services with their characteristics and with citizens' appraisal of the quality of services to better track the contribution they are making towards improving people's well-being.

Reliable statistics that include a broad definition of development and quality of life in different regions could be developed. OECD governments, engaged today in structural reforms, need this information to increase job opportunities and fiscal sustainability, address inequalities and environmental challenges, and regain citizens' trust. The current OECD project *How's Life in your Region?* aims to advance work on measuring well-being and progress at the subnational level by providing a common framework for measurement and compiling a set of subnational well-being indicators for different types of regions. Preliminary results published in this 2013 edition of *Regions at a Glance* show large regional disparities in life expectancy, employment opportunities for women, youth unemployment

and security even within the same country. Future work will move towards guidelines on how countries and regions can use well-being metrics to help define policy actions, monitor policy implementation, and better assess the interactions among different economic and non-economic dimensions of regional development.

Towards common guidelines to improve comparability of statistics by location

Finally, a common approach to connect socio-economic information to a location would dramatically improve the internal and international comparability of statistics at different geographical scales. National Statistical Offices and international initiatives (UN Economic and Social Council, 2012) have started to put in place data production that integrates statistical and geospatial information. A possible future development could consist in contributing to the development of common guidelines for such an integration of information and provide tools to improve the usability of statistics at different geographical scales.

Notes

1. The methodology uses small administrative units as building blocks for analysis, generally the smallest administrative unit for which national commuting data are available. For all European countries these are municipalities, corresponding to LAU2 in Eurostat terminology (with the exception of Portugal, where LAU1 have been used).

2. The methodology has not been applied to the following countries: Australia, Iceland, Israel, New Zealand and Turkey.

3. Some OECD countries have adopted a definition for their own metropolitan areas or urban systems that looks beyond the administrative approach. For example, Canada (Statistics Canada, 2002) and United States (U.S. Office of Management and Budget, 2000) use a functional approach similar to the one adopted here, to identify metropolitan areas. Several independent research institutions and National Statistical Offices have identified metropolitan regions in Italy, Spain, Mexico and the United Kingdom based on the functional approach.

4. See Annex C for a detailed description of the method to adjust variables at metropolitan level.

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