

Chapter 3

How cities affect citizens, countries and the environment

This chapter examines the role of cities in the local, national and supra-national dimension. For each of these levels, the chapter asks the question of whether cities are “good”. The first section considers whether cities are good for their residents, with an emphasis on the trade-off between the benefits and costs that arise from agglomeration for city residents. Taking the question to the national level, the second section investigates whether cities are good for their country. This section considers the concentration of countries’ activity in cities, the role of cities for innovation and the impact of cities beyond their borders. The final section asks whether cities are good for the planet, focusing on the environmental footprint of cities.

Chapter Synopsis

Above all, cities are where people live. While the question whether cities correspond to the needs and aspirations of their residents has many nuances, overall, individuals generally benefit from living in well-functioning large cities, and many millions of individuals even choose to live in poorly functioning large cities rather than in small towns or rural places.

Big cities raise their workers' productivity and wages, offer a large set of opportunities and allow for an unrivalled access to amenities of all types. The benefits that larger cities provide are, however, balanced by increased costs of living, as well as non-pecuniary cost such as congestion, long commutes or air pollution. These non-pecuniary costs are significantly driven by urban form and transport infrastructure, and hence largely reflect policy choices (or the lack thereof).

Large cities – being particularly attractive for the well-educated – are often characterised by the joint presence of highly productive districts and pockets of high unemployment. Inequality tends to be higher in larger cities, and this spread between rich and poor appears to have widened in recent decades. Still, the more pressing problem may be social exclusion. Social exclusion is often concentrated among certain groups, and its impact can be highly persistent across generations. A key challenge is therefore to ensure that access to jobs, education and training, is within reach for all residents.

Roughly half of the population in the OECD lives in one of 300 metropolitan areas that account for significantly more than half of gross domestic product (GDP) produced. But the importance of cities goes far beyond simple arithmetic. Nested within countries and linked to both surrounding and distant regions, cities are hubs of productivity and innovation, goods and service providers for their local area, and they play a critical role in providing skills and environmental efficiency for sustainable and inclusive growth.

While innovation can happen anywhere, it tends to be concentrated in highly urbanised areas. Cities are thus crucial in pushing out the productivity frontier, thereby becoming drivers of a country's potential for long-run economic growth. The benefits that cities generate extend beyond their borders. These spillovers of larger cities to smaller cities and surrounding or adjacent regions are sizeable, and the positive economic impact of large cities on regions remains measurable up to a distance of 200-300 kilometres.

It is modern lifestyles rather than urbanisation *per se* that determine environmental impact. In this context, it is improbable that a wider spread of city populations across small towns and rural areas would bring any systematic ecological benefits. When taking into account the per capita contributions to soil sealing or climate change, larger cities actually perform better in a wide array of dimensions. Overall, whether or not cities are good for the planet seems to depend mainly on how they are organised. The choices made during the current wave of urbanisation will therefore have a huge and likely lasting impact on the environmental sustainability of human activity.

The empirical evidence suggests that with urban sprawl the environmental impact of urbanisation deteriorates, and many countries have the stated policy objective of limiting sprawl. This makes it surprising that in most cities, existing policy frameworks actually subsidise or incentivise it. As a consequence, people are pushed further apart than they would otherwise wish to be. Correcting such policies, including via the imposition of realistic carbon prices and congestion charges would make an important contribution towards improved environmental outcomes.

Are large cities good for their residents?

“Have you seen Paris?”

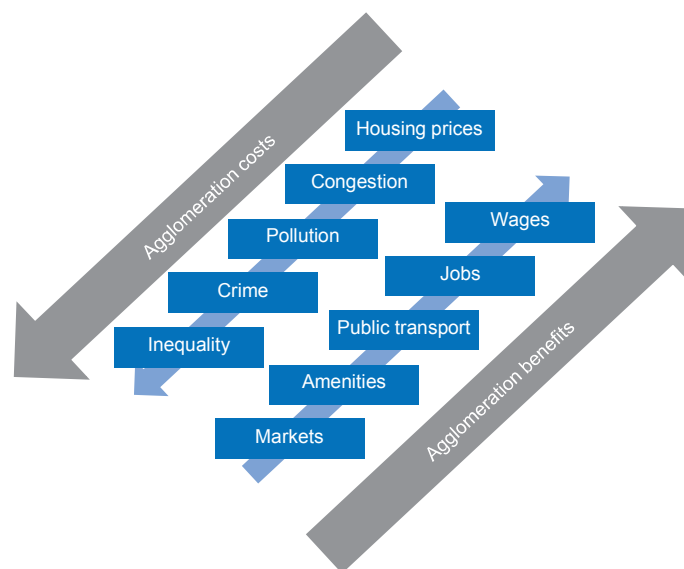
“I should think I have! I’ve knocked about there a little.”

“And is it really so beautiful as they say?” asked Little Chandler. [...]

“Beautiful?” said Ignatius Gallaher, pausing on the word and on the flavour of his drink. “It’s not so beautiful, you know. Of course, it is beautiful.... But it’s the life of Paris; that’s the thing. Ah, there’s no city like Paris for gaiety, movement, excitement....”
(James Joyce, “Dubliners”, 1914)

Nearly 12 million people choose to live in London, 17 million in Los Angeles and 35 million in Tokyo, but fewer than 150 000 make their home in Hastings in the United Kingdom, Galveston in the United States or Niihama in Japan.¹ What is it that makes the larger cities so attractive? And if larger cities are indeed more attractive, why do smaller cities persist? The evidence presented in this section focuses on the perspective of a city’s residents, who experience both their city’s benefits and drawbacks in their daily lives. These agglomeration benefits and costs can be pecuniary, such as higher wages or higher costs for housing, but they can also be non-pecuniary, e.g. air quality or a variety of cultural amenities (Figure 3.1).

Figure 3.1. Large cities have benefits and costs



The remainder of this section considers specific benefits and costs in more detail. The first part focuses on pecuniary agglomeration benefits and costs, such as jobs, wages, housing costs and, more generally, price levels. The second looks at non-pecuniary aspects of city life, including (public) transport and congestion, local (dis)amenities, access to goods and services, and social equity.² The section concludes by considering what policy levers can be used to improve well-being in cities.

Jobs and wages

As already mentioned, the presence of agglomeration economies implies that workers in larger cities are more productive. For the individual worker, some of the agglomeration economies accrue when arriving in a city, manifested in, on average, a higher wage. But some of the benefits develop only over time. For example, the worker usually also experiences higher subsequent wage growth. The reason seems to be that training, networks and knowledge gained while living and working in a large city are a valuable experience. This is supported by evidence from Spain that even when workers move away from a bigger city, their experience is still reflected in their earnings.³

Another characteristic of large cities are “deep” labour markets. This means that larger cities offer a wider range of jobs than smaller cities or rural areas, but also that there is more competition among workers for these jobs. Deep labour markets affect both wages and job quality. For example, the likelihood that a university graduate works in a job that is closely related to their field of study increases with city size and has a positive impact on both wage and job satisfaction.⁴ Benefits from “deep” labour markets in large cities are not reserved for the well-educated but extend to all young workers. Evidence from the United States shows that in the early stages of their careers, young people in large cities are more likely to switch jobs across occupations and industries. The greater range of job opportunities allows them to move quickly into different fields until they find the right match.⁵

The advantage of living in larger cities can go beyond a worker’s own job, especially for highly educated workers. The versatility of the labour market helps attract households in which both partners have a university degree. The specialisation that accompanies advanced educational degrees often makes it difficult to find adequate employment for both partners in smaller communities, which results in large shares of highly educated couples in larger cities.⁶

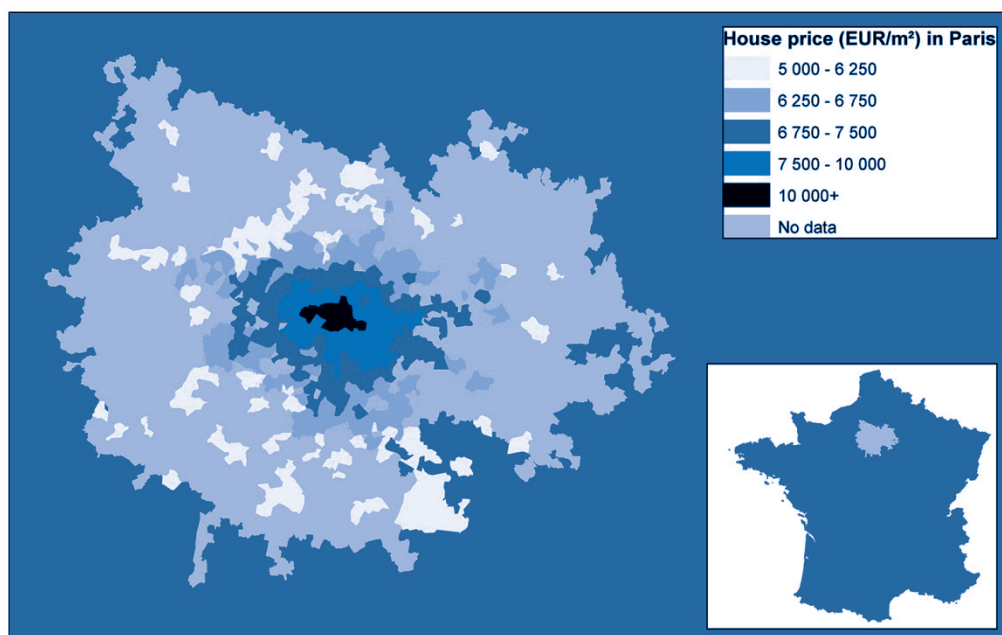
Housing and consumer prices

Residential mobility across and within cities implies that – at least in the medium to long term – wage levels, urban (dis)amenities and commuting costs will be reflected in land prices and, more generally, in a city’s price level. As a result, housing prices and rents in larger cities are higher, and attractive areas within cities usually carry large premiums. What constitutes a “sought-after” area depends on the specific city and is partly determined by historical and cultural preferences.⁷ For example, while in certain US cities property prices in inner cities are below those of suburbs, in most other OECD countries the central parts of a city are typically more highly valued. In Paris, for example, the core *arrondissements* in the city centre are (by far) the most expensive (Figure 3.2). On average, land prices of the most central properties in France are about 85% higher than the most peripheral properties in a city.⁸

Since businesses have to pay higher prices for inputs (such as rents and wages), local prices tend to rise with city size. However, increased local competition in larger cities is likely to squeeze profit margins and thereby partly offsets the increase in consumer prices. Empirical studies find that, on average, prices increase at the same rate at which agglomeration economies accrue.⁹ But these studies usually also find large variation in real local earnings (i.e. city price-level adjusted earnings) across cities. One reason for this variation is that quality differences may blur price statistics. A meal in an average restaurant in Madrid’s (exclusive and expensive) Salamanca district is presumably not the same as a meal in an average restaurant in the city of Salamanca (Spain). While it is

impossible to identify systematically quality differences in services across cities, for certain goods this is possible by tracing barcodes. Barcode-based evidence from the United States suggests that 97% of the variation in goods prices across metropolitan areas is due to differences in the products purchased.¹⁰ This suggests that higher prices in larger cities might indeed be partly justified by higher quality.

Figure 3.2. House prices in Paris, 2008



Source: Faucheux, L., F. Grazi and H. Waisman (2014) “Policy choices for the cities of tomorrow: Assessing the general equilibrium effects of selected urban policy measures in French metropolitan areas”, mimeo, <http://mythesis.alwaysdata.net/gemse/> (accessed 29 October 2014).

Scarcity of land and slow adjustments to the quantity of available housing are the main reasons for higher housing costs in growing cities. Creating new housing opportunities requires planning, investment and time. As a result, housing supply often fails to respond rapidly enough to increases in demand. The result is that population growth frequently leads to increases in land prices, house prices and rents. Effects can be sizeable: evidence on land prices from France suggests that for each percentage point increase in the population growth rate, the cost of land increases by 3%.¹¹ As a consequence, population growth in a city has significant distributional implications.

Home owners benefit doubly from population growth in their city, as their property becomes more valuable and their wages, on average, go up. Residents who rent their apartments, however, typically see the price of housing go up in tandem with, or even faster than, their earnings, and prospective buyers are often confronted by house price increases that far outstrip their wage increases. How much housing prices adjust, and therefore how the benefits of living in a larger city are split between property owners on the one side, and tenants or prospective buyers on the other, depends on the ability of housing supply to respond flexibly.¹² Flexibility of housing supply, in turn, largely depends on policies, for example, land-use regulations. This implies that the degree to which the growth of cities leads to – often undesirable – redistribution largely depends on policy choices.

Transport and congestion

A key factor in explaining the large price differential for housing within cities, for example between a city's centre and its outskirts, is the trade-off between higher housing cost and longer commutes (Box 3.1). A city's outskirts often offer cheaper and larger flats or houses, but typically require spending a significant amount of time commuting to the city centre. In reality, jobs in most cities tend to be located not only in the city centre but are more widely spread. Nevertheless, it still holds that the time workers spend in daily commute increases with city size (Figure 3.3). In London, about half the workforce spends more than 45 minutes commuting, whereas in Glasgow only about 30% need that long to get to work. Of course, there are other factors that contribute to widening the gap between prices in the centre and the outskirts; for example, building height in city centres is often limited and hence expanding the existing housing stock in the centre is difficult.

Box 3.1. A basic model of a city (Part I): Housing prices and distribution of people within a city

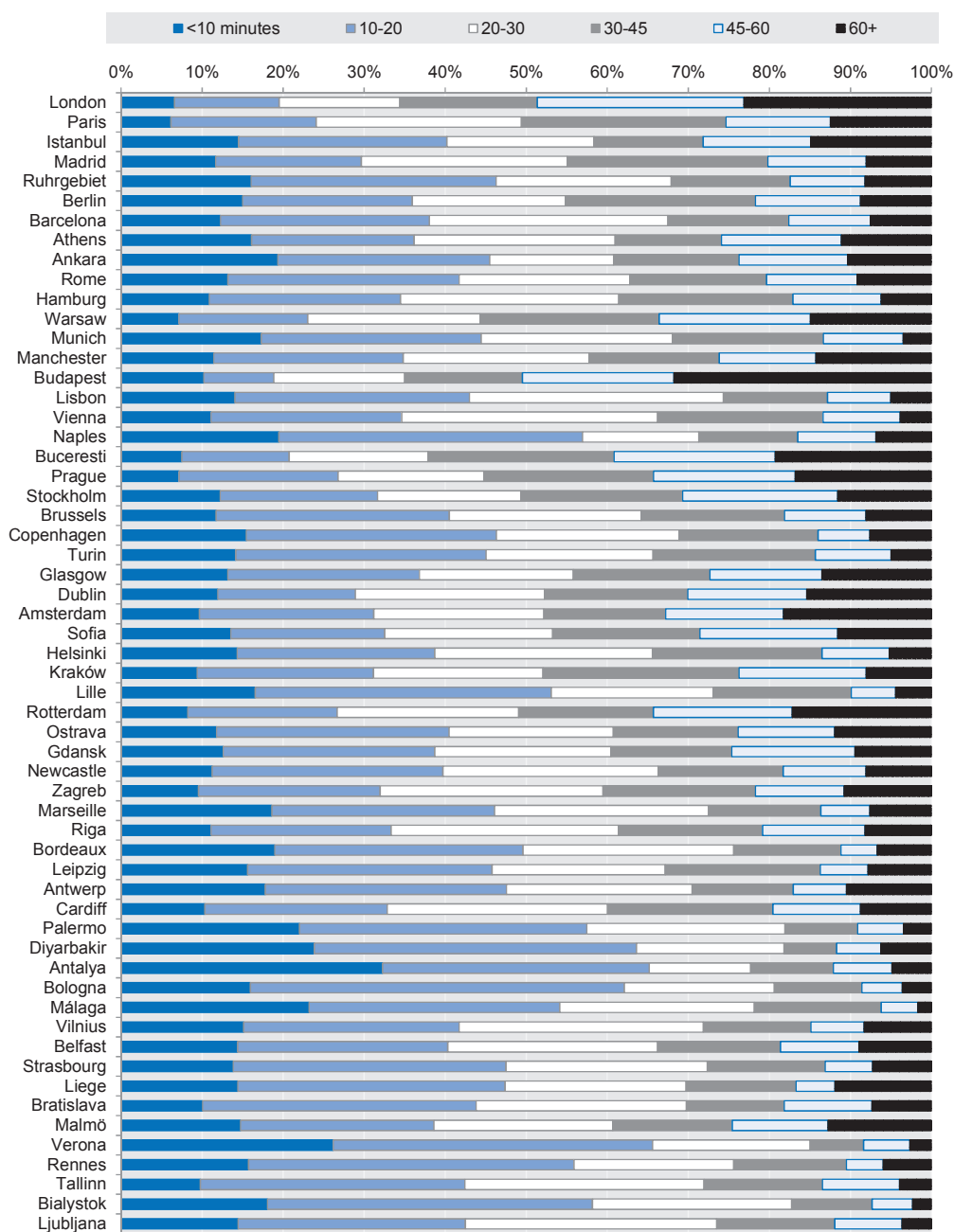
In a basic model a city – let it be called Cityville – takes the form of a large circle with a small circle in the centre. This inner circle represents the central business district (CBD), the place where every resident works. The homes of its residents are spread across the remaining area of Cityville outside the CBD. To get to work, all residents commute each day to the CBD. For simplicity, travel time is assumed to be proportional to distance, and that the only travel that occurs is the daily commute between homes and the CBD. This model obviously is a gross oversimplification, but it is useful to understand many basic phenomena of cities that apply similarly in more complex and realistic frameworks.

In this basic model, rental prices decline with distance to the CBD. More precisely, the rental price for a flat some distance away from the CBD needs to equal the rental price of an identical flat right at the frontier of the CBD, minus the monetary equivalent of the costs that individuals incur by commuting back and forth to the CBD each day (this not only includes transport fares, but mainly reflects the opportunity cost of time spent and inconvenience suffered in transport). The necessity for the condition above to hold can be seen from the following thought experiment: if, for example, flats 1 kilometre from the CBD were cheaper than the price determined as stated above, people would improve their well-being by moving from other locations to the area 1 kilometre from the CBD. This would bid up prices there until the above-stated condition is restored.

In the model, for a given income level, residents living further away from the CBD will have larger flats/houses than if they lived closer to the city centre. This results from their demand for living space going up with a lower square metre price of housing further away from the city centre. Put differently, for a given quality and size of a flat or house, occupants closer to the city centre will have higher incomes than if they lived further away. The latter comes from the fact that people with a higher income will be willing to pay a higher price for having a shorter commute. Also, when new people come to the city, if a sufficient amount of new housing cannot be built, shortage of housing will increase rents and housing prices where they settle. Given that prices in different parts of the city are connected – the more remote location being cheaper by the monetary equivalent of the additional commuting requirements to the CBD – pressure on prices in one area will translate to price increases all over the city.

Obviously, in reality richer people may live further out if for some reason, not captured in the basic model, living in, or close to, a certain area has specific attractions (e.g. the possibility to have house with garden, better schools, a location on the waterfront, etc.). This, however, is just a simple extension of the basic model, in the sense that housing prices increase with proximity to desirable places (which in the basic model is the CBD).

Figure 3.3. Time spent commuting (European Union and neighbouring countries)



Note: Cities are ordered by city size.

Source: OECD calculations based on European Union (2013), "Quality of Life in European Cities: Annexes", *Flash Eurobarometer 366*, http://ec.europa.eu/public_opinion/flash/fl_366_anx_en.pdf (accessed 19 June 2014).

While commuting time increases with city size, some cities fare much better than others in handling the daily flows. In part, this might be explained by a polycentric city structure. For example, the German Ruhr area is an amalgamation of several cities. Each city has its own urban core and supporting industry structure, which alleviates the amount

of traffic across the different centres. This is not only evident in the time workers spend commuting, but also in the amount of congestion they are confronted with. Among 59 European (greater) city regions, only 6 are less congested than the Ruhr area.¹³

But even in monocentric cities – those with a single contiguous core – the burden of daily commute is very diverse. In Moscow, commuters who take the car face on average 76 minutes' delay for each hour of daily commute, while in London the average time lost per hour is 36 minutes, or less than half.¹⁴ Part of the difference in commuting time across Europe can be explained by past underinvestment in adequate transport infrastructure or limits set by a city's natural environment. Another part is attributable to transport policies. For example, in London the congestion charge, which is levied for car trips into London's city centre, strengthens the role of public and shared transport (see also Chapter 2).

City morphology and public transport have important implications for access to jobs. Connectivity can be a particularly critical problem for low-income workers, whose (potential) earnings typically do not allow them to live close to the areas of a city that offer the most jobs. Their “effective” labour market – the area accessible to them for daily work – is therefore highly dependent on the city structure and the city's transport networks, and might in fact cover only a small part of the city. In Sydney, for example, residents living in the outskirts can reach less than 10% of the jobs in the city within 45 minutes by car or 60 minutes by public transport (Figure 3.4). This means that from the point of view of a job seeker, living in one of these disconnected neighbourhoods, Sydney is not a labour market with 2.3 million jobs but one with less than 230 000.

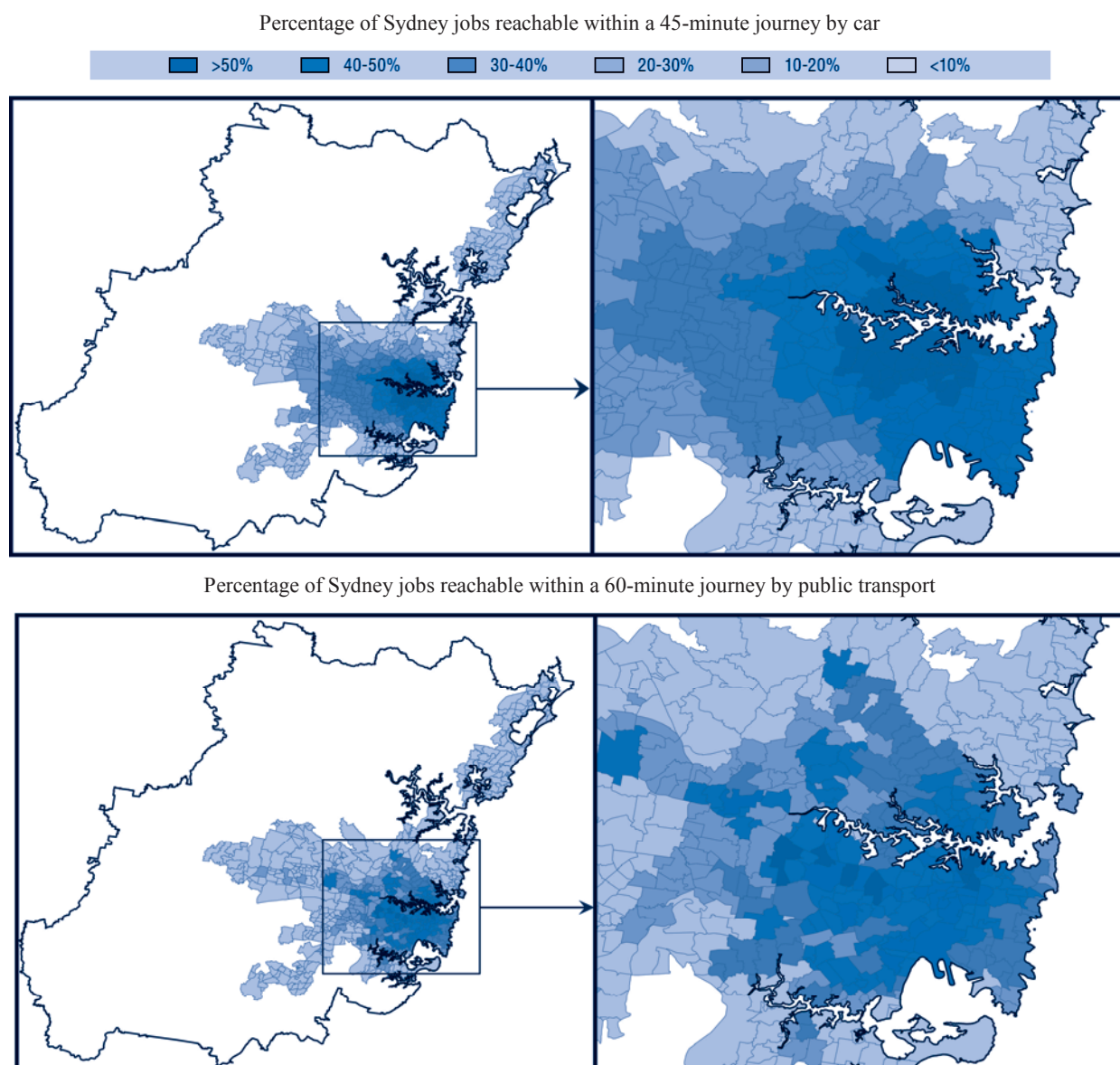
Having access to public transport is one dimension of access, another is the frequency of service. For example in Daejeon (Korea), few areas outside the city centre are within five minutes' walking distance from public transport. Moreover, most of the areas that are well-connected to the public transport network are serviced only at a low frequency (Figure 3.5), which further reduces the attractiveness of public transport. High concentration of access points to public transport can shape a city structure: better connected areas are more attractive and therefore typically made up of higher income residents than comparable less well-connected areas.

Even though the area covered by a city typically increases with its population size, access to public transport tends to be significantly better in larger cities. Recent indicators, which combine a range of data sources with a common and coherent methodology, show that the share of residents that lives within walking distance to high-frequency public transport in metropolitan areas is nearly double the share in small cities (Figure 3.6).

Amenities, disamenities and (subjective) well-being

A person's job, income and residence are certainly important for their daily life, but they are only part of the experience of living in a city. This experience is also shaped by the fact that large cities host a wide array of amenities. In 2013, nearly 60% of international visitors to the United Kingdom stayed in London, where they spent an even slightly higher share of total tourist expenditure in the country.¹⁵ Part of this dominance is due to London's economic strength: business travel makes up about one-fourth of international visits to the United Kingdom. But for a large share of visitors, London's attraction stems from its plethora of museums, historical sites, theatres, musicals, markets, high street shops, clubs or bars. Of course, these amenities are not only available to visitors, the residents of the city benefit from them as well.

Figure 3.4. Urban morphology and public transport: Access to jobs in Sydney (Australia)

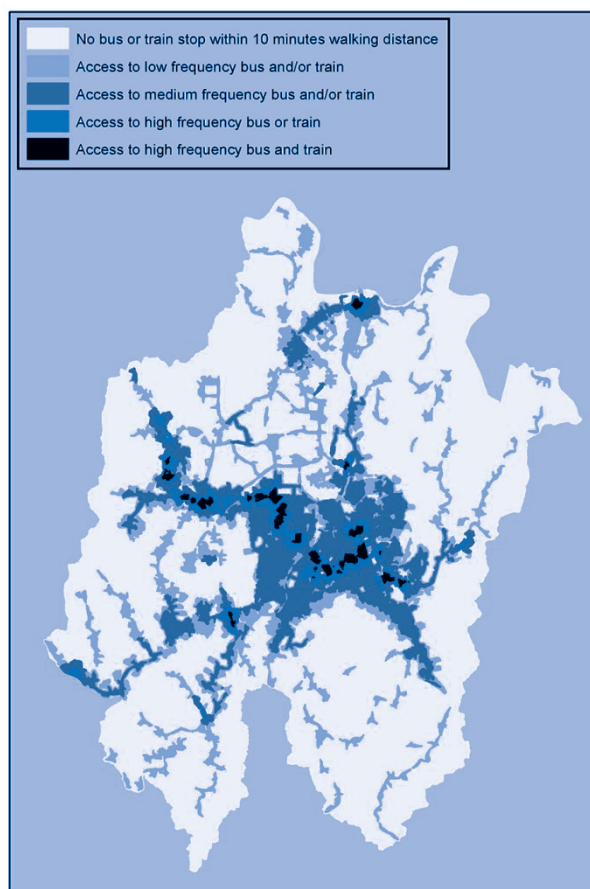


Note: These maps are for illustrative purposes and are without prejudice to the status of or sovereignty over any territory covered by these maps.

Source: Kelly, J.-F., Mares, P., Harrison, C., O'Toole, M., Oberklaid, M. and J. Hunter (2012), *Productive Cities*, Grattan Institute.

The attractiveness of large cities stems in part from the variety of possibilities that they can offer. As larger cities can support a wider range of (cultural) amenities, their residents have more choice, which enhances their well-being. This is directly reflected in the price level in larger cities. Empirical studies suggest that residents are willing to accept higher price levels in cities that they consider to be more attractive.¹⁶ This willingness to pay appears to be particularly marked for more highly educated persons.¹⁷

Figure 3.5. Access to public transport in Daejeon (Korea)



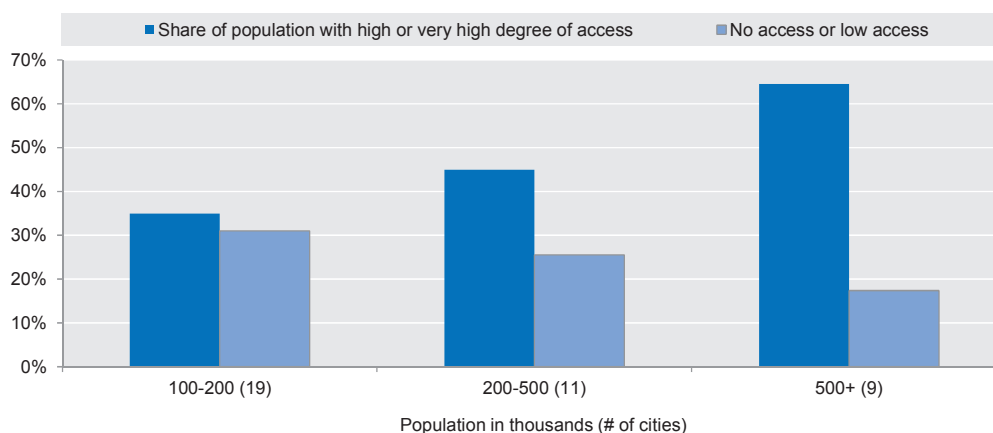
Note: Areas are considered without access to public transport if there is no bus stop within a five-minute walking distance and no train station within a ten-minute walking distance. See Dijkstra and Poelman (2014) for a detailed description of this type of methodology.

Source: OECD calculations based on Korea Transport Database (2011).

Evidence suggests that, on average, the positive impact of larger cities on productivity is neutralised by an accompanying increase in price levels (Figure 3.7). There are, however, huge variations across cities: some cities are more, and others less, expensive relative to their residents' earnings. These deviations can in large part be explained by non-pecuniary benefits, i.e. amenities, and costs, e.g. pollution, associated with certain cities. In a sense, people accept lower real incomes – earnings relative to price levels – in exchange for more attractive features of a city. Attractiveness is multifaceted, but seems to include leisure opportunities as exemplified for example by proximity to a large lake or the sea, cultural amenities such as theatres, but also lower levels of pollution.

Take, for example, the cities of Munich and Ingolstadt, which have similar levels of earnings and productivity, but different price levels. The fact that many people prefer to live in Munich despite a much higher price level can at least in large part be explained by the benefits they draw from using the amenities Munich offers (Table 3.1).

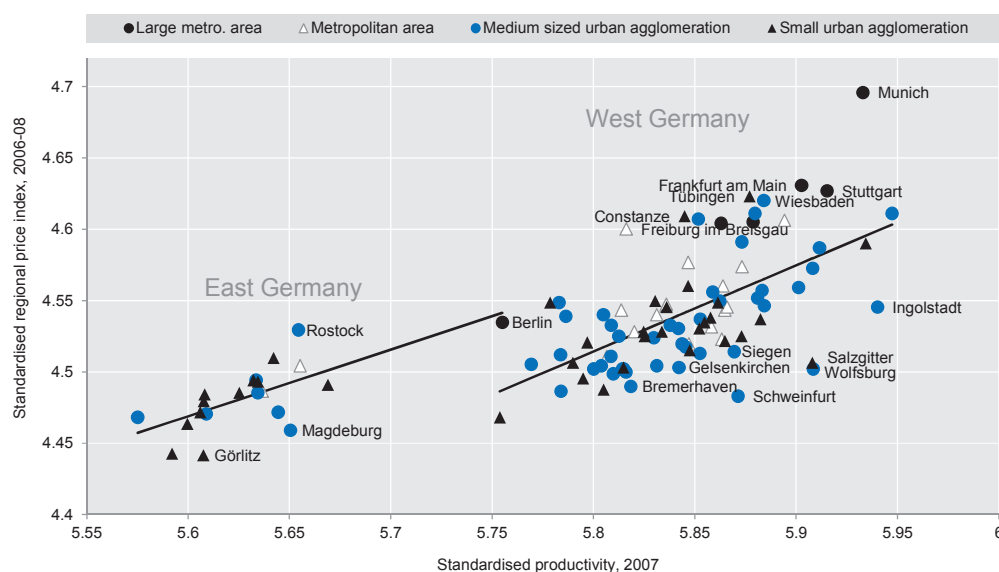
Figure 3.6. Access to public transport and city size, 2011-14



Note: Figure includes (functionally defined) cities with at least 100 000 inhabitants in 2006 from Belgium, Denmark, Estonia, Finland, the Netherlands and Sweden.

Source: Dijkstra, L. and H. Poelman (2014), “Access to public transport in European cities”, *Regional Working Paper*, Directorate-General for Regional and Urban Policy, European Commission, Brussels.

Figure 3.7. Productivity and price levels in East and West Germany



Source: Ahrend, R. and A.C. Lembcke (2015), “Does it pay to live in big(ger) cities? The role of agglomeration benefits, local amenities, and costs of living”, *OECD Regional Development Working Papers*, OECD Publishing, Paris, forthcoming.

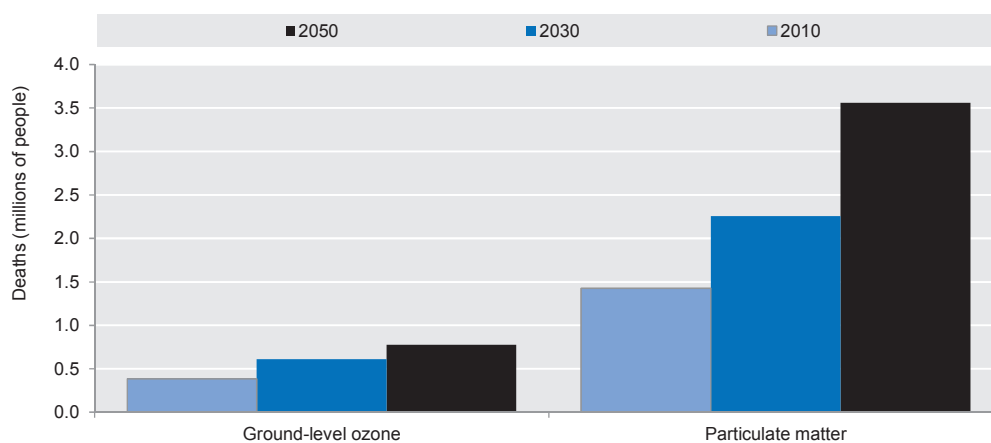
Residents of larger cities also face a range of non-pecuniary costs. The crime rate in cities increases with city size.¹⁸ As crime within cities tends to be concentrated in certain areas, the actual likelihood of being the victim of a crime might not be very high, but even the perceived threat can constitute a severe burden.¹⁹ As discussed previously, congestion is also a challenge for large cities. The concentration of car traffic and the accompanying exhaust and noise levels have a large detrimental impact on the health and well-being of city dwellers.

Table 3.1. **Urban amenities in Munich and Ingolstadt (Germany)**

Urban conditions	Munich	Ingolstadt
Population of functional urban area (EU-OECD definition)	2.8 million	336 370
Large lake within functional urban area	Yes	No
Natural reserves (green spaces) as a percentage of total area	1.2%	0.5%
Hotels	1 079	238
Visitors (with hotel stays)	7.4 million	712 000
Air pollution (annual average normalised PM ₁₀ level)	1.31	0.59
Sites for plays, operas, other performances (central city only)	41	6
Registered theatres and orchestras	11	1
Number of universities (granting PhDs)	15 (6)	2 (1)
Share of workers with university education (tertiary degree)	23.6%	11.5%

Source: Ahrend, R. and A.C. Lembcke (2015), “Does it pay to live in big(ger) cities? The role of agglomeration benefits, local amenities, and costs of living”, *OECD Regional Development Working Papers*, OECD Publishing, Paris, forthcoming.

Air pollution, in particular, is measurably detrimental to health and is estimated to account for more than 1.5 million premature deaths annually (Figure 3.8). Rapid industrialisation, energy production and increased motorisation are driving air pollution. If current trends continue, the number of annual premature deaths from air pollution is expected to grow steadily – possibly even at an accelerating pace – and is projected to reach 3.5 million by 2050. The associated implicit costs of pollution are staggering: for 2010 they are estimated at USD 1.7 trillion for the 34 OECD countries.²⁰

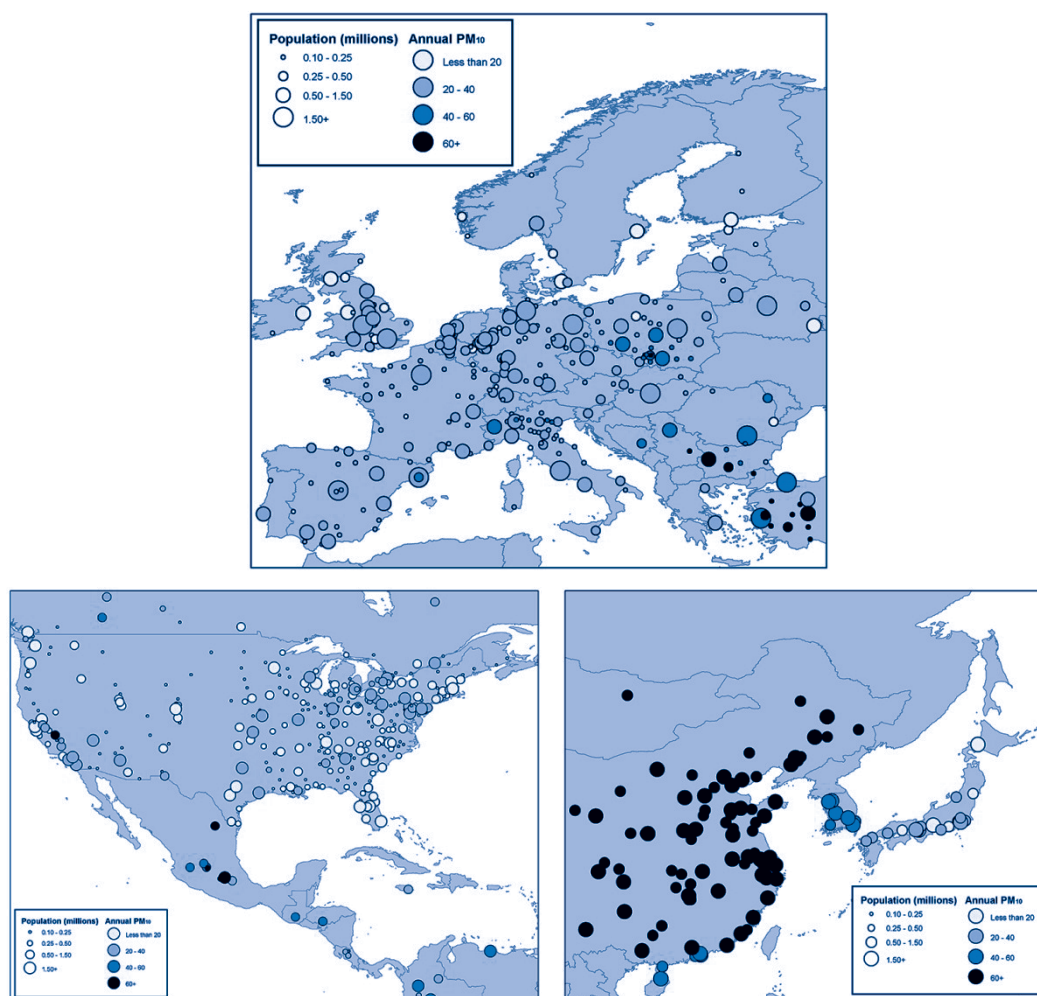
Figure 3.8. **Global premature deaths from selected environmental risks, 2010-50**

Source: OECD Environmental Outlook Baseline; output from IMAGE, in OECD (2012b), *OECD Environmental Outlook to 2050: The Consequences of Inaction*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264122246-en>, p. 25.

The public discussion tends to focus on the severity of air pollution in developing and emerging economies, where, indeed, air pollution levels of five times the recommended limit are common. The lower right panel of Figure 3.9 shows, for example, the high pollution levels in Chinese metropolitan areas. For the People’s Republic of China and India alone, the cost of pollution-related ill-health is estimated to be higher than for all 34 OECD member countries combined.²¹ Nonetheless, metropolitan areas in most developed countries also regularly exceed limits set by the World Health Organization

(WHO). For example, the vast majority of metropolitan areas in Europe do not manage to stay below the WHO limits set for PM_{10} .²² Few exceed double that bound, though (Figure 3.9, upper panel). In the United States the problem is more contained: the majority of cities achieve pollution standards below the recommended level (Figure 3.9, lower left panel).

Figure 3.9. Annual average PM_{10} level in cities



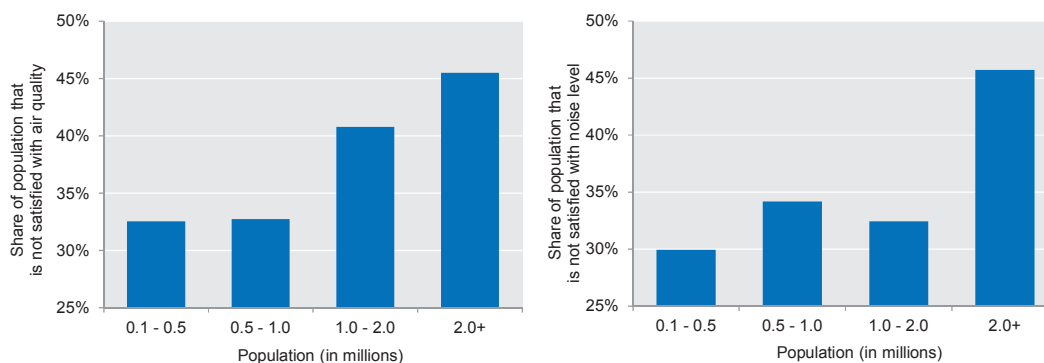
Note: The map depicts annual mean concentration of PM_{10} (particulates smaller than 10 microns) measured in mg/m^3 for cities of different size. The WHO recommended upper bound for annual mean concentration of PM_{10} is 20 mg/m^3 . This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Source: OECD calculations based on WHO (2014) *Ambient (outdoor) Air Pollution in Cities* (database), www.who.int/phe/health_topics/outdoorair/databases/cities/en (accessed 30 October 2014); United Nations (2012), *2012 Demographic Yearbook*, United Nations, Department of Economic and Social Affairs; US 2010 Census and China 2010 Population Census.

Air quality is one of the (dis)amenities of cities. When asked about their satisfaction with local air quality, residents of larger cities show greater levels of dissatisfaction (Figure 3.10, left panel). While air pollution and greenhouse gas emissions rightly tend to be the major focus in the national and international debate, well-being can also be

affected by other forms of pollution. Noise pollution, for example, can be both physically and mentally harmful for residents, mainly through the stress and the annoyance that constant noise can generate.²³ Especially residents in the largest metropolitan areas are affected by noise pollution (Figure 3.10, right panel).²⁴

Figure 3.10. **Pollution and health problems increase with city size**



Source: OECD calculations based on European Union (2013), “Quality of Life in European Cities: Annexes”, *Flash Eurobarometer 366*, http://ec.europa.eu/public_opinion/flash/fl_366_anx_en.pdf (accessed 19 June 2014).

Both amenities and disamenities of a city contribute to the subjective well-being of its residents – measured as their self-reported satisfaction with their “life in general”. Comparing the subjective well-being of city dwellers with residents of smaller towns and villages shows no clear difference among the two groups for developed countries. In contrast, in developing countries city dwellers tend to be happier, even though cities in these countries tend to have relatively high levels of disamenities.²⁵

Access to (better) goods and services

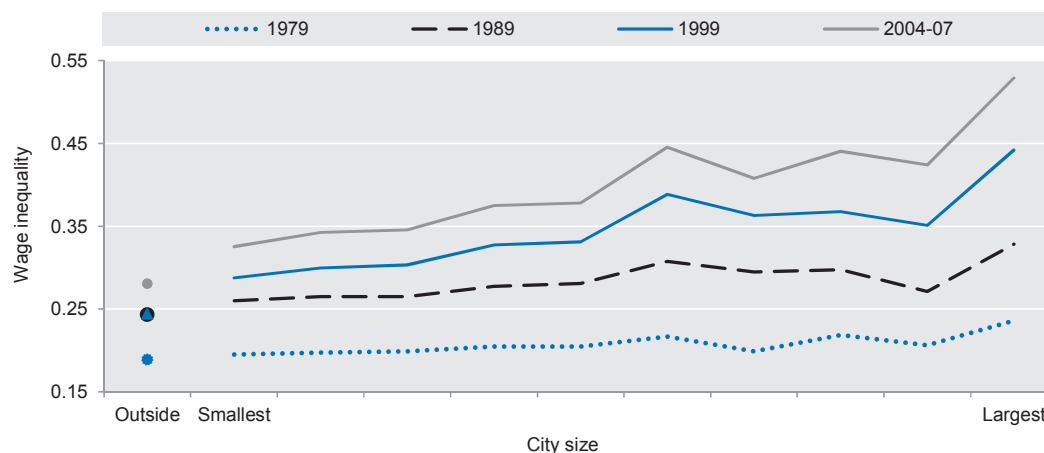
Larger cities provide more and – to a degree – better goods and services. The greater demand in larger cities sustains both more and a greater variety of providers. This increases competitive pressure and reduces margins. Empirical evidence from the United States shows that the number of available products increases by about 20% for each doubling in city size. As previously mentioned, higher prices in larger cities can therefore be indicative of higher product quality, or are, to a degree, compensated by a larger range of choice. Larger cities also ease consumers’ access to shops or services, as the distance to the nearest convenience store, post office or bank is typically shorter than in less densely populated areas.²⁶ What cities cannot offer is a wide range of fresh locally produced food, but the variety of fresh food produced outside and on offer in large cities is usually good.

The availability and quality of many services is also positively related to city size. Recent evidence from a reform of the United Kingdom’s National Health Service suggests that for elective procedures residents of larger cities can choose from a wider range of hospitals than residents in less densely populated areas.²⁷ The competition among hospitals induced by this greater choice results in better outcomes, as measured by mortality rates after specific procedures, without increasing costs.²⁸ Improved management practices among hospitals that face greater competition seem to be one reason for these results.²⁹

Inequality and social exclusion

Inequality tends to be greater in cities than in their respective countries. In 2009, 17 of the 25 largest US cities had estimated Gini coefficients in excess of the US average. Studies for Canada, the United States and Western Europe point to increasing urban inequality, as well as greater variation in inequality dynamics across the urban hierarchy since the 1970s (Figure 3.11). Across OECD countries, income inequality is higher in regions where the majority of the population lives in metropolitan areas – cities with 500 000 or more inhabitants.³⁰

Figure 3.11. Wage inequality in US cities of different sizes over time



Note: Wage inequality is measured as the variance of hourly wages. “Outside” denotes areas that are not classified as city (US Metropolitan Statistical Area). Cities are classified by decile, such that each decile contains 10% of the urban population

Source: Baum-Snow, N. and R. Pavan (2013), “Inequality and city size”, *The Review of Economics and Statistics*, Vol. 95, No. 5, pp. 1 535-1 548.

Agglomeration economies work against both income equality among people and convergence among places. People appear to sort spatially according to skill, occupation and human capital, with larger cities attracting more highly skilled people, but also low-skilled individuals. Given existing wage differentials between highly skilled and low-skilled workers, larger cities are hence bound to show a larger degree of wage inequality. Similarly, in a situation where the wage gap between highly skilled and unskilled workers increases, wage inequality in larger cities is bound to increase more strongly than in smaller cities or rural places. The trend of increasing inequality in cities in OECD countries is also likely related to deindustrialisation. Industrial cities during the last century usually had more homogenous populations, in particular with less variation in skill levels. High unionisation rates in industrial cities typically had an additional limiting effect on wage differentials.

Increased wage inequality in larger cities is balanced by other factors. For example, low-skilled workers enjoy higher wages in large cities than their peers in smaller places. Whether this translates into a higher purchasing power is unclear though, depending in large part on their exact consumption basket. As previously mentioned, bigger cities also offer more professional opportunities (including training), as well as better amenities and consumption opportunities. The more pressing problem would therefore appear to be social exclusion.

While social exclusion depends on income levels and income inequality, it is also often concentrated among certain social groups, such as immigrants, ethnic minorities or young people from low-income households. The labour-market barriers these groups face are not only economic. Decentralised education funding reinforces the problem, as does spatial sorting and low accessibility and mobility at the metropolitan level. The impact of exclusion can be highly persistent, as it is not necessarily limited to a single generation. A recent study on income mobility – the dependence of children’s income on their parents’ income – in the United States finds not only low levels of income mobility in general, but also lower levels of income mobility for workers who grew up in cities with high levels of inequality.³¹

Large cities not only have high levels of inequality, they are also often spatially stratified along socio-economic dimensions. Most large cities have poor and wealthy neighbourhoods that are clearly separated from each other. This contributes to social exclusion and inequality because the different neighbourhoods have different levels of public service provision and accessibility. Recent OECD work, for example, shows that poorly qualified young people from several poor northern suburbs of Marseille cannot get a job in booming western parts of the agglomeration because it is impossible for them to get there by public transport within a reasonable amount of time.³²

Spatial stratification into poor and rich neighbourhoods also leads to unequal access to education, even if spending on schools and other education facilities is not determined by income levels in neighbourhoods.³³ So-called peer effects are important determinants for learning students’ outcomes. In other words, the social background and skill level of classmates influences the schooling outcomes of students. For this reason, students who go to school with other students from low-income and poorly educated families are disadvantaged compared to students who go to school with other students from high-income and well-educated families. Geographical separation into wealthy and poor neighbourhoods therefore contributes to self-perpetuating patterns of inequality.

Depending on the governance arrangements, administrative fragmentation of a metropolitan area into many small municipalities can increase the consequences of inequality. The more fragmented a metropolitan area is into individual municipalities, the more likely it is that these municipalities have socially homogenous populations. This has particularly strong consequences if municipalities use own tax revenues or receive transfers that are proportional to their economic strength to pay for public services and infrastructure provision. In this case, poorer municipalities have lower tax revenues and consequently less funds for public services and infrastructure. This puts their residents at a disadvantage and reinforces socio-economic segregation because it provides incentives for those who can afford to move to wealthier municipalities.

Administrative fragmentation and the resulting split into wealthy and poor municipalities can also increase social exclusion and foster patterns of spatial inequality for reasons other than financial ones. Wealthy municipalities might use land-use restrictions as a tool to prevent inflows of poor individuals. Regulations that restrict building heights, stipulate minimum lot sizes or prohibit multi-family dwellings can make it impossible for developers to construct affordable housing. While the regulations are generally imposed to uphold neighbourhood appearance, an implicit purpose is often to preserve the social characteristics of a neighbourhood by making it impossible for poor individuals to move into the area.

Adequate metropolitan-wide governance arrangements can help to overcome these issues. Good public transport connections to more prosperous parts of a metropolitan area are especially important to residents in poor neighbourhoods who often lack private means of transport. Public transport offers them the access to jobs and amenities that their own neighbourhoods lack. Strong co-ordination mechanisms between wealthy and poor municipalities are required to build and operate public transport connections between them. Similarly, metropolitan governance arrangements can reduce other disparities in public service provision by ensuring a more equal distribution of public services. Metropolitan-wide co-ordination mechanisms also contribute to land-use and other planning policies that reduce the social stratification of neighbourhoods.

Room for policies

The question of what is the best strategy for policy makers to increase the well-being of city residents may arise. Policies to improve well-being can be aimed at increasing agglomeration benefits or reducing non-pecuniary agglomeration costs. Often, effects on well-being are likely to be higher than on economic productivity, for example, time lost in transport will typically reduce individuals' leisure time more than their effective working time. More generally, it may be easier to mitigate agglomeration costs than to foster agglomeration benefits, implying that policies may want to put stronger emphasis on the former (Box 3.2).

Box 3.2. A basic model of a city (Part 2): Targeting agglomeration benefits or agglomeration costs

Given that Cityville can make a contribution to improving well-being both by increasing agglomeration benefits and by reducing agglomeration costs, the question of which of the two options is preferable arises. Theoretically, if the costs for achieving a given increase in agglomeration benefits were the same as achieving a corresponding decrease in agglomeration costs, well-being implications should be roughly similar. However, in practice there may be differences.

For a start, it is generally less obvious which policies would be effective for increasing agglomeration benefits. Increased education levels may help, but as people are mobile, they may move away once they have completed their education. Also, if Cityville attracts students from other cities in the country, this likely will not lead to significant social benefits at the national level, even though there may be net benefits for the country if Cityville attracts high-potential individuals from abroad. Increasing innovation would certainly be useful, but while the desirability of more innovation is well understood, the concrete means of achieving it are much less obvious.

All in all, what needs to be done to decrease, in particular, non-pecuniary agglomeration costs would appear to be better understood than policies to increase agglomeration benefits. Decreasing agglomeration costs may also have a more equal distributive impact, as, for example improvements in transport, lower levels of pollution or larger green spaces benefit different income groups in broadly similar fashion (this is likely different for operas and concert houses, though). Targeting agglomeration costs also ensures that expenditures will benefit Cityville, simply as these improvements cannot move away.

Are large cities good for a country?

“We will neglect our cities to our peril, for in neglecting them we neglect the nation.”

(John F. Kennedy, 1962)

Since 2009, cities have been home to more than half of earth’s population and the trend towards greater urbanisation continues unabated.³⁴ This section considers whether cities, and especially larger ones, are good for their countries. The answer provided in this section is split into three parts. The first part argues that by concentrating both population and economic activity, cities in most OECD countries are the main contributor to their country’s income and growth. The second part considers the critical role of cities for innovation and technological progress, the main drivers of long-term growth. The third part highlights the spillovers created by cities beyond their own limits and the benefits they can provide to other parts of the country.

Concentration of activity

The vast majority of the population in OECD countries chooses to live in cities. To allow for cross-country comparison of size and economic activity in cities, the OECD and the European Union have jointly developed a coherent and comparable methodology to define the extent of cities according to their residents’ daily reality, rather than administrative boundaries.³⁵ Across 29 OECD member countries 1 179 cities with at least 50 000 inhabitants have been delineated, among them 275 metropolitan areas with more than 500 000 inhabitants. This common methodology ensures comparability across countries, but estimates might deviate from country-specific estimates or collections of data that rely on countries’ own definitions of cities, e.g. the data used for the UN World Urban Prospects.³⁶ Using the EU-OECD definition to assess urbanisation across these 29 OECD countries shows that metropolitan areas account for nearly half of the total population, with total urbanisation around two-thirds (Figure 3.12).

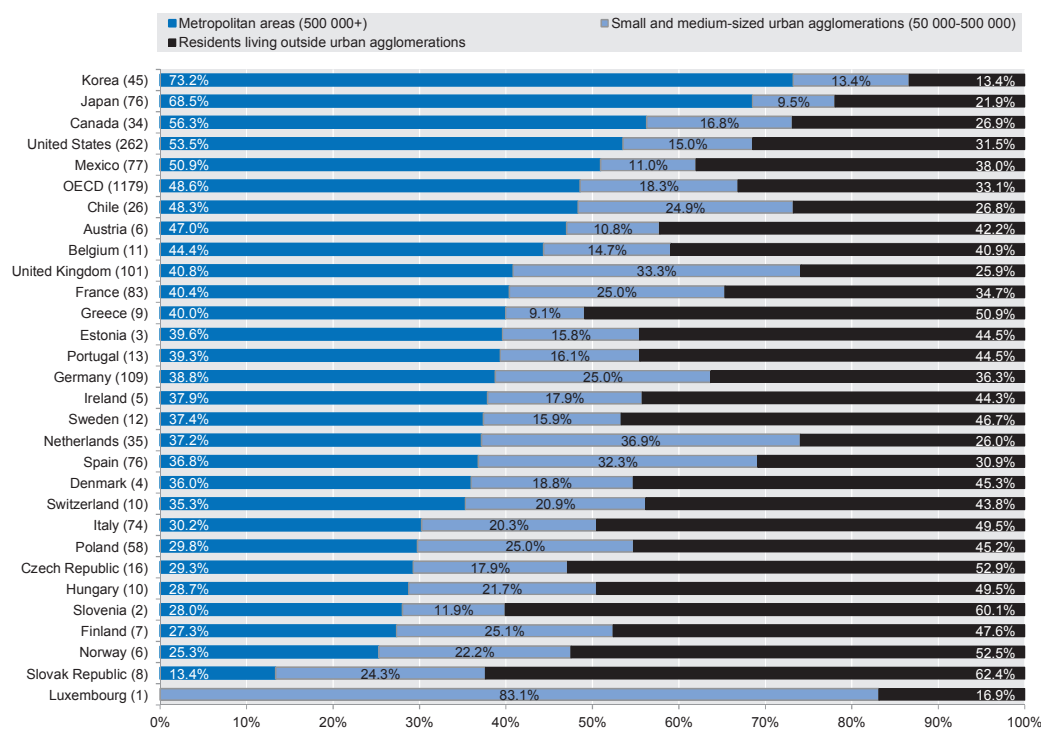
Economic activity is even more concentrated than population. The 275 metropolitan areas alone account for close to 55% of total GDP produced across these 29 OECD countries.³⁷ This reflects the fact that productivity in large cities exceeds the productivity in the rest of the country, partly due to the selection of more productive individuals into larger cities and partly due to agglomeration benefits that make both workers and businesses in larger cities more productive. The crucial role of cities for their countries’ economies is also evident when GDP growth is considered. Metropolitan areas accounted for half of OECD countries’ GDP growth between 2000 and 2010 (Figure 3.13).

It is not only the size of cities, but their spatial distribution as well that matters. Countries with more polycentric systems, i.e. systems of large cities instead of a small number of megacities, are found to have higher per capita GDP.³⁸ The reason for this could be that, with a larger number of metropolitan areas, a bigger part of the territory benefits from being close to at least one of these metropolitan areas compared to, for example, a situation where one megacity combines the population of all those metropolitan areas.

In contrast, within a region of a given country, a more dispersed structure of cities appears to be associated with lower per capita GDP than if one larger city were to combine the population of those cities. In this case, with spillovers from small cities being fairly minor – both geographically and in size – having one large city in a region rather than a network of small cities may be economically more beneficial. This may also apply to small countries.

Figure 3.12. Urbanisation levels across OECD countries, 2012

Share of population living in metropolitan areas, urban agglomerations and outside urban agglomerations.



Note: This figure depicts the share of a country's residents that lives inside and outside of cities, separated by city size. Numbers in parentheses are the total number of cities (both metropolitan areas and small and medium-sized cities).

Source: OECD calculations based on OECD (2013b), *OECD Regions at a Glance 2013*, OECD Publishing, Paris, http://dx.doi.org/10.1787/reg_glance-2013-en; OECD (2014a), "Metropolitan areas", *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/data-00531-en> (accessed 30 October 2014); and OECD (2014b) *Country Statistical Profiles* (database), <http://dx.doi.org/10.1787/20752288> (accessed 4 November 2014).

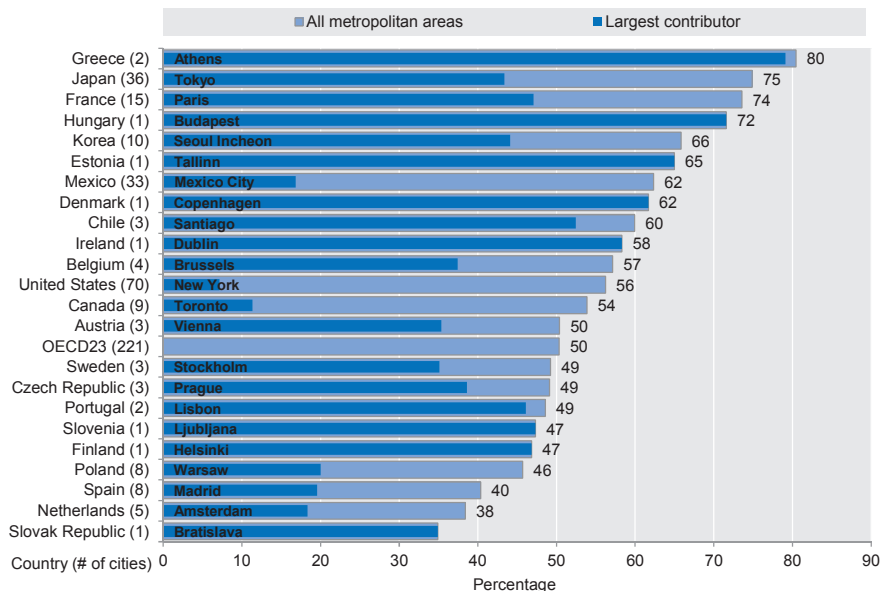
Innovation

Innovation and technological progress are generally believed to be the main drivers of long-term economic growth.³⁹ Innovation allows production factors, capital and labour, to be used in new and better combinations, thereby increasing output and ultimately well-being. For many countries and regions, the first priority is to adapt their production processes to the current state-of-the-art and to catch up with those areas at the technological frontier.⁴⁰ But for long-term growth and prosperity, advances along the technological frontier – advances that push the limits of productivity further and further out – are paramount. While innovation can happen anywhere, it tends to be concentrated in highly urbanised areas. R&D activity, patent applications and venture capital are all highly concentrated, both within countries and even within cities.⁴¹ For innovation, size matters: larger cities – on average – patent more than smaller cities across the OECD. The link between city size and patenting activity is strikingly non-linear, with the largest cities concentrating the majority of patenting (Figure 3.14).

The high degree of concentration can have different causes. For innovation, even more than for other aspects of productivity, knowledge spillovers matter. Empirical evidence suggests a strong local component in knowledge diffusion. Knowledge

spillovers – measured in terms of patent citations – are significantly higher within local clusters than outside such clusters.⁴² Another important aspect is the incentive cities provide for acquiring skills. Since agglomeration benefits increase the value of skills, residents of large cities have an incentive to invest more in their “human capital”.⁴³ Human capital is, in turn, crucial in determining the capacity of an area to create innovation and adapt to new ideas.⁴⁴

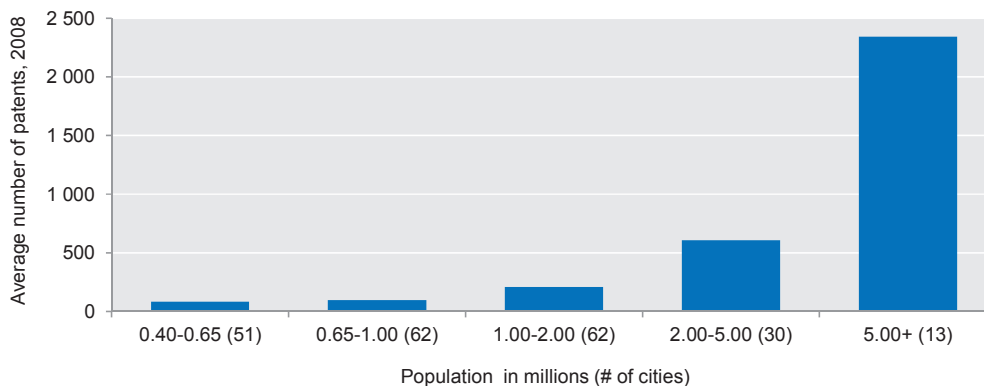
Figure 3.13. Metropolitan areas’ contribution to national growth, 2000-10



Note: Share of national GDP growth (2000-10) contributed by metropolitan areas (cities with 500 000 or more inhabitants).

Source: OECD (2013b), *OECD Regions at a Glance 2013*, OECD Publishing, Paris, http://dx.doi.org/10.1787/reg_glance-2013-en.

Figure 3.14. Concentration of patenting activity, 2008



Source: OECD (2014), “Metropolitan areas”, *OECD Regional Statistics* (database), <http://dx.doi.org/10.1787/data-00531-en> (accessed 30 October 2014) for 218 metropolitan areas (countries covered: Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Italy, Japan, Mexico, Netherlands, Norway, Portugal, Spain, Sweden, United States; excluded – for lack of data – are: Canada, Chile, Czech Republic, Greece, Hungary, Ireland, Korea, Poland, Slovak Republic, Slovenia, Switzerland, United Kingdom).

Effects beyond city limits

Cities are not only important for their residents, but also strongly affect the prosperity and well-being of other parts of the country. From the point of view of a person considering where to live and work, each city offers its own unique combination of agglomeration benefits and costs.⁴⁵ If a city invests into measures that alleviate congestion and reduce transport time, its attractiveness increases. This will lead to more people choosing to live in the city, since benefits accrue both to the current residents and new residents that move to the city from other parts of the country. The inflows into the investing city can therefore alleviate congestion and housing costs in other cities, reducing overall agglomeration costs. This means that improvements in a city create shared benefits among current and future residents of the investing city, but also benefits for residents in all other cities (Box 3.3).

Box 3.3. A basic model of a city (Part 3): A spatial equilibrium model of cities

Cityville is an open system that people can move to, or away from. People will tend to move to Cityville if this increases their well-being, with well-being determined by their wage and the benefits they draw from being in a specific place, minus the costs connected with being there. In a basic model, the benefit from being in a specific place is simply the wage that can be earned there, and the costs are the price of housing and the monetary equivalent of the disutility that individuals incur from commuting.

Given that individuals are free to move, in the long run, levels of well-being for residents need to be roughly the same in all cities and rural areas within a country. The mechanism is the following: when the well-being of Cityville's residents increases above those of other places, more people will be drawn to Cityville. This will drive up prices (in particular, but not only, housing prices/rents) in Cityville,² but will also lead to a decrease in prices in places people are leaving. Price increases in Cityville decrease the consumption possibilities of its residents, and hence their well-being. In contrast, a fall in prices in less attractive places increase the consumption possibilities of their population, and thereby their well-being. Population flows persist until well-being is roughly equal across places. This implies that cities with better amenities or cities paying higher wages because of, for example, larger agglomeration benefits, will – at least in the long run – have higher living costs that balance these advantages. This is not just a theoretical finding, it is supported by empirical evidence.

If well-being increases through improvements in Cityville's liveability ultimately result in price increases that reduce well-being, the question arises why the city should work on improving transport systems or other amenities, or try to increase agglomeration benefits. First, adjustments to improved well-being in Cityville not only occur through price increases and/or increased congestion in Cityville itself, but also through a fall in prices and/or less congestion in other cities. This implies that increases in the liveability of Cityville do result in permanent well-being increases for its population, they just indirectly also contribute to increased well-being elsewhere. Second, increases in well-being from improved transport or amenities occur right away, while adjustment mechanisms through increased prices resulting from in-migration only work very gradually over time, implying that during the adjustment period there are sizeable net well-being effects. Third, city dwellers who own their housing, or those who are on rent contracts with price increases restricted by law, fully benefit from any improvements in a city's liveability, without incurring the (full) costs, and, in the case of owners, even profit from the appreciation of their property value. If those residents account for a sufficiently large share of the electorate, improvements in Cityville's liveability certainly have strong appeal from a political economy perspective.

Box 3.3. A basic model of a city (Part 3): A spatial equilibrium model of cities (cont.)**The example of French metropolitan areas**

As previously mentioned, policies in one metropolitan area have implications for all other metropolitan areas within a country (and also possibly beyond its borders). For example, simulations on the impact of a congestion charge introduced in the Greater Paris area, with its proceeds invested in public transport, show that commuting time would be significantly reduced. This would result in an increase in both the well-being of Parisians and the attractiveness of the Paris agglomeration. People from other metropolitan areas and from the countryside will be drawn into Paris. These population shifts towards Paris alleviate the benefits provided by the policy, but do not negate them; in fact, simulations suggest substantial gains in both commuting time and overall well-being for the average Parisian. Even many of those paying the congestion charge would see their well-being increase as they would experience significant reductions in commuting time.

Exact effects obviously depend on the technical details of the policy. For example, the impact of a congestion charge somewhat below the level currently applied in London,² with proceeds used to improve public transport in less-served areas, can be simulated with the GEMSE model.³ This model allows assessing the general equilibrium effects of certain urban policies in French metropolitan areas.

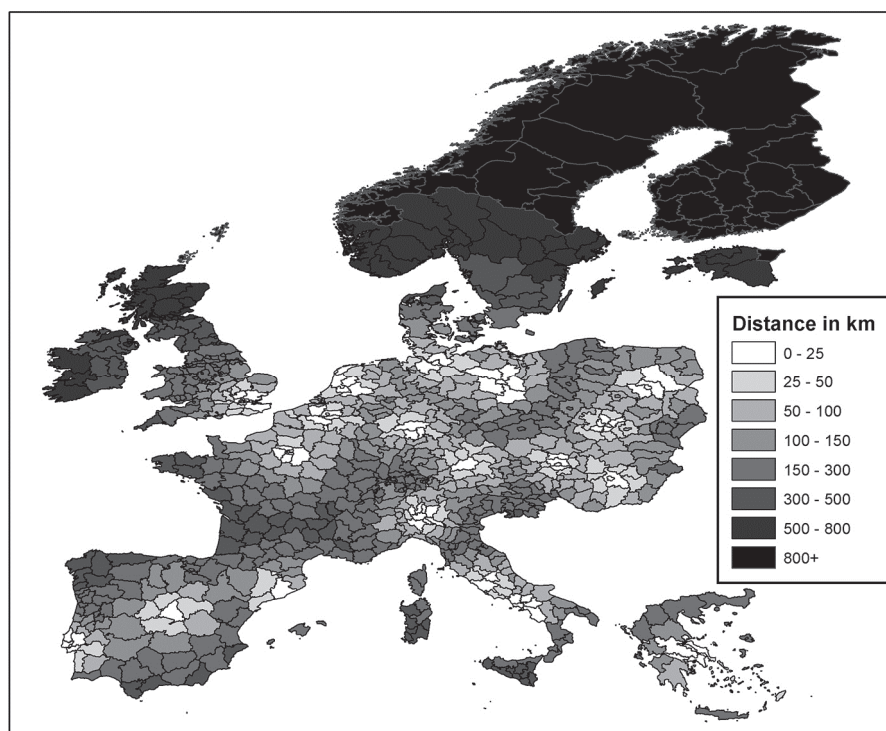
Compared to a baseline scenario, and with no changes in policies in other agglomerations, a congestion charge as described above would increase population in 2050 by roughly 0.7% in Paris, while leading to population decreases in the other French metropolitan areas in the order of 0.9%. The policy in Paris would thereby also reduce congestion levels in other cities, reducing the negative effects from congestion on well-being in those places. Should other French agglomerations put in place policies to match the increases in attractiveness of the Paris agglomeration, well-being increases across all French cities would be even greater. This would include Paris, as in the absence of population shifts between the different agglomerations, a congestion charge in Paris would decrease congestion levels in Paris – and thereby commuting times – even further.

Notes: 1. In practice, new arrivals in Cityville may lead to overly strong house price increases if unduly restrictive land-use regulation unnecessarily slows down increases in housing supply. 2. More precisely, the congestion charge is modelled to increase the costs of private car transport by 40%. 3. <http://mythesis.alwaysdata.net/gemse>.

Smaller cities can also “borrow” agglomeration from neighbouring cities. For a doubling of the population living at a given distance in urban agglomerations within a 300-kilometre radius around a city, the productivity of the city in the centre increases by 1-1.5%. This is sizeable, given that for a doubling of the population size within the urban agglomeration, productivity increases by 2-5%.⁴⁶ This may also explain why productivity in US cities generally increases more strongly with city size than in European countries. Basically, smaller cities in Europe are not that much disadvantaged, as they can simply “borrow” agglomeration from neighbouring cities. Given the lower city density, this is much harder in the United States. But even across Europe, the nearest large city might not be within easy commuting distance. If cities with more than 2 million inhabitants are considered, a core-periphery or north-south divide emerges for the regions in most countries (Figure 3.15).

Positive spillovers are not limited to cities; cities typically increase the prosperity of the whole region in which they are located (Box 3.4). Regions that include large metropolitan areas of more than half a million inhabitants grew approximately 0.2 percentage points per year faster between 1995 and 2010 than those that did not. More generally, population density of the most densely populated parts of a region is a very good predictor of per capita GDP growth, and a 100% increase in the maximum population density in a region has been associated with an increase in the annual growth rate of almost half a percentage point.

Figure 3.15. Distance to closest metropolitan area with more than 2 million inhabitants



Note: The figure shows the distance in kilometres to the closest functional urban area (FUA) with at least 2 million inhabitants. Darker colours indicate larger distances.

Source: Ahrend, R. and A. Schumann (2014), “Does regional growth depend on proximity to urban centres?”, *OECD Regional Development Working Papers*, No. 2014/07, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jz0t7fxh7wc-en>.

Box 3.4. Economic growth in regions is boosted by the presence of cities

European regions with cities with more than 500 000 inhabitants experienced significantly higher per capita GDP growth than regions without large cities once average national growth rates are taken into account. Between 1995 and 2010, the difference in annual per capita GDP growth rates between the two groups of regions was approximately 0.2 percentage points. In addition to gains in per capita GDP levels, regions with large cities also attracted new inhabitants. Therefore, growth rates of absolute GDP levels in such regions were even more above average than the growth rates of their per capita GDP levels.

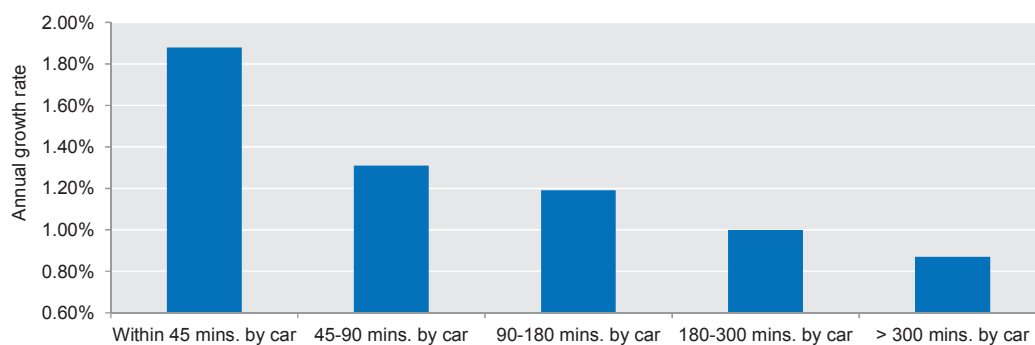
The strong economic growth of regions that contain large cities was – together with other factors – responsible for the widening gap in per capita GDP levels between the best-performing regions and those with an average performance. However, this does not imply that overall inequality in average per capita GDP levels of regions increased. Not only did the best-performing regions record above-average growth rates, regions with the lowest per capita GDP levels in 1995 also performed well in the following 15 years. This led to a shift in the distribution of cross-regional per capita GDP levels. Whereas in 1995 the distance of the worst- and the best-performing regions to the median region was approximately equal, in 2010 the distance between the median region and the best-performing regions had substantially increased. In contrast, the distance between the median region and the worst-performing regions had become smaller. In other words, there are fewer regions with per capita incomes that are substantially below average, but more regions with per capita incomes that are substantially above average.

Source: Ahrend, R. and A. Schumann (2014), “Does regional growth depend on proximity to urban centres?”, *OECD Regional Development Working Papers*, No. 2014/07, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jz0t7fxh7wc-en>.

Positive spillovers from cities do not stop at regional boundaries. Generally, regions closer to cities – especially larger cities – are more prosperous, and have experienced higher economic growth than regions that are more remote (Figure 3.16). While these positive spillovers decline with distance, large cities of, for example, more than 2 million inhabitants are found to have benefited the economic performance of regions as far as 200-300 kilometres away. The important factor is the actual travel time from a region to the nearest metropolitan area. A halving of that travel time in the region is associated with 0.2-0.4 percentage points higher annual GDP per capita growth.⁴⁷

Rural regions also benefit from proximity to urban centres. Empirical evidence for the OECD in general, and the United States in particular, suggests that rural regions close to cities, or more urbanised regions, experienced faster population growth (Figure 3.17).⁴⁸ This implies that there is not necessarily competition among neighbouring urban and rural areas but that joint growth potential exists. Formalising this partnership in a joint governing body can help harness the full benefit of the existing linkages.⁴⁹

Figure 3.16. **Economic growth increases with proximity to large cities**

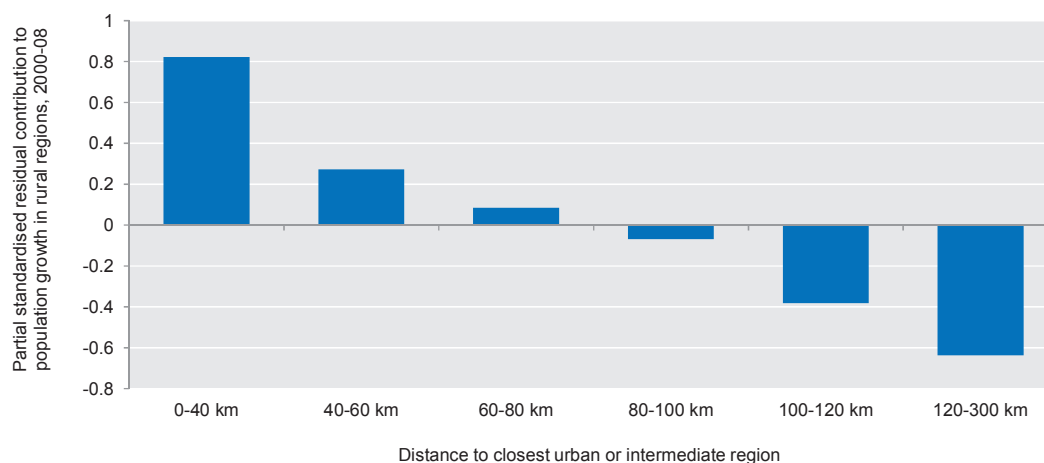


Note: Average annual per capita GDP growth rates between 1995 and 2010 controlling for country fixed effects and initial per capita GDP levels.

Source: Ahrend, R. and A. Schumann (2014), “Does regional growth depend on proximity to urban centres?”, *OECD Regional Development Working Papers*, No. 2014/07, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jz0t7fxh7wc-en>.

Finally, regions that either include large cities or are closer to them have modernised their economic structure more rapidly, as witnessed, for example, by a more rapid shift from employment in manufacturing or agriculture to the service sector.⁵⁰ There is also some evidence that proximity to smaller cities has a positive effect on growth. Being within 30 minutes of a small or mid-sized urban agglomeration seems to have a positive effect, but in contrast to larger urban agglomerations, the effect of distance is not increasing beyond the 30-minute threshold.⁵¹

Figure 3.17. Population growth in rural regions and proximity to urban or intermediate regions, 2000-08



Note: Figure depicts the residual correlation between rural regions' population growth and distance to the nearest urban or intermediate region, accounting for difference in income, industrial and demographic structure.

Source: Veneri, P. and E. Ruiz (2013), "Urban-to-rural population growth linkages: Evidence from OECD TL3 regions", *OECD Regional Development Working Papers*, No. 2013/03, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k49lcrq88g7-en>.

While proximity to large cities has been a strong factor driving regional growth, some remote regions also managed to achieve above-average growth rates. In most cases, these regions are specialised in natural resources or large-scale farming, and profited from the boom in natural resources and certain agricultural commodities during the first decade of the 21st century.

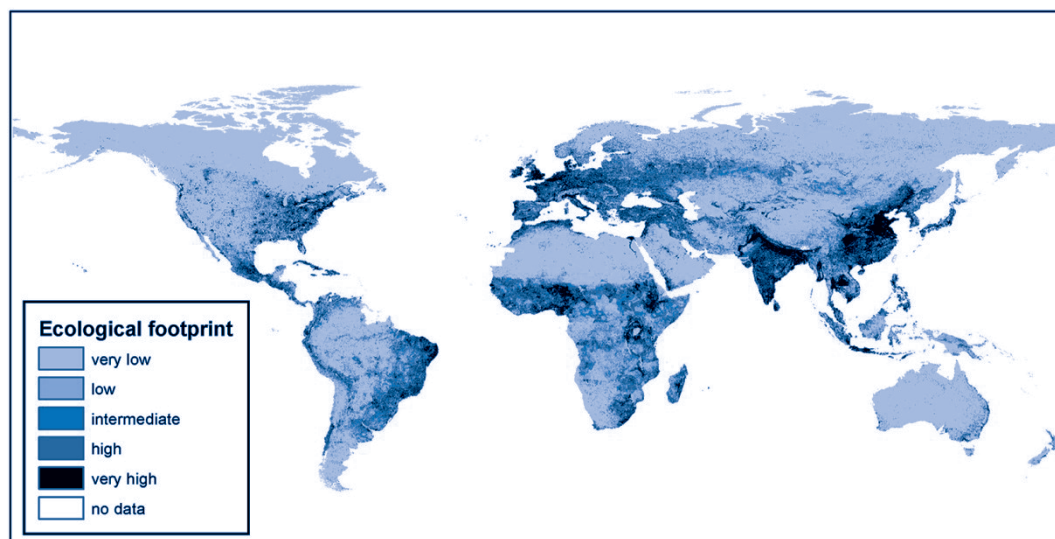
Are large cities good for our planet?

"To use a medieval distinction, we are not only patients, whose needs demand attention, but also agents, whose freedom to decide what to value and how to pursue it can extend far beyond the fulfilment of our needs." (Amartya Sen, 2004)

Having previously explored the impact of cities on their residents and their countries, this section looks at whether and how cities affect environmental sustainability.

The relationship between large cities and human-made CO₂ emissions and other effects on the environment is not as clear cut as it might appear at first sight. Urbanisation has often been described as a driving factor of climate change and other forms of environmental degradation.⁵² Transport, energy conversion, wastewater treatment, refrigerants, rural-urban land conversion, and landfill decomposition as well as the incineration of municipal solid waste in urban agglomerations lead directly to emissions of greenhouse gases (GHGs). GHGs are also emitted when producing concrete, steel, glass and other materials that are needed for the building of civil infrastructure, as well as when producing food for urban dwellers.⁵³ Absolute CO₂ emission levels of cities are indeed particularly large, as is their ecological footprint – the total area required to provide environmental goods and services for a specific region (Figure 3.18).

Figure 3.18. The ecological footprint is highest in urban agglomerations



Source: OECD calculations adapting Hammer, S., Kamal-Chaoui, L., Robert, A. and M. Plouin (2011), “Cities and green growth: A conceptual framework”, *OECD Regional Development Working Papers*, No. 2011/08, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5kg0tflmzx34-en>, based on Ewing et al. (2010), *The Ecological Footprint Atlas 2010*, Oakland, Global Footprint Network, available at: www.footprintnetwork.org/images/uploads/Ecological_Footprint_Atlas_2010.pdf.

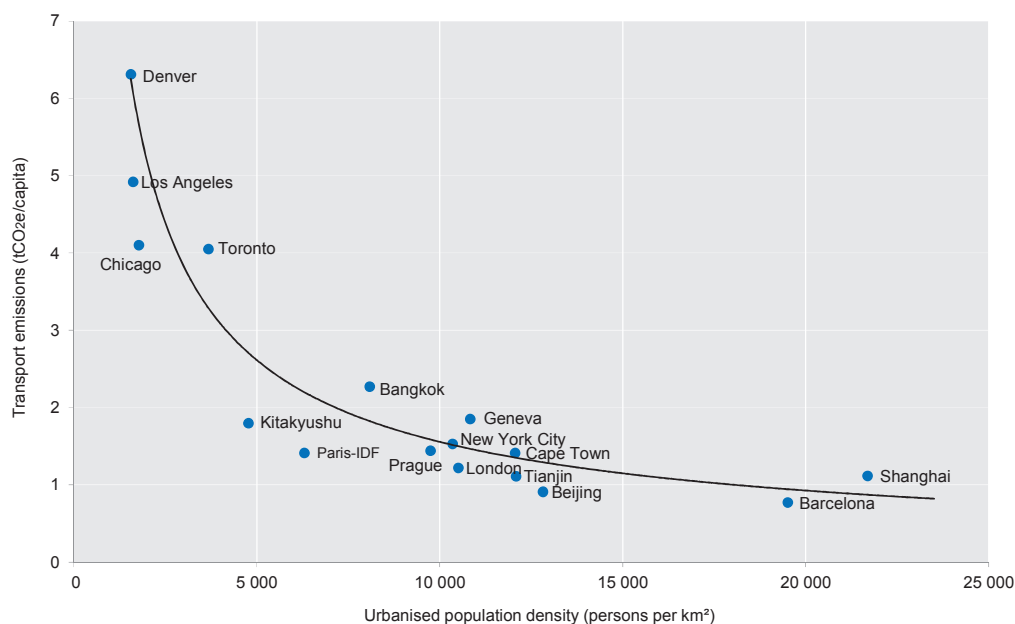
Yet, this does not imply that large cities have particularly negative effects on the environment or carbon emissions. In the absence of large cities, populations would need to live elsewhere, and environmental effects might simply be spread across larger territories or a number of smaller cities. So the question is not whether a city of 5 million inhabitants emits more greenhouse gases than a village of 500 inhabitants – obviously it does – but rather whether, other things being equal, per capita emissions are larger in one of the places. At first glance it may seem that cities contribute relatively more to CO₂ emissions. Cities account for only somewhat more than half of the world’s population, but for 60-80% of overall worldwide energy consumption, together with a roughly equivalent share of global CO₂ emissions.⁵⁴ This, however, does not take into account that, especially in emerging economies, cities account for a much larger share of industrial production (which is consumed elsewhere) than other parts of the country, and also that energy consumption rises with income. Larger cities attract more highly educated individuals, who typically have higher income and consumption levels, including of energy.⁵⁵

While in some fields city dwellers may have a larger negative environmental impact, in other areas the opposite is likely to be true. Especially where public transport is well developed, cities are likely to have lower per capita emissions from transport than more less densely populated areas. Proximity between businesses and people’s homes is likely to promote sustainable transport means like walking or cycling. City dwellers also typically live in smaller apartments or houses, and may hence need less energy for heating.⁵⁶

Figure 3.19 compares metropolitan areas with respect to population density and transport CO₂ emissions per capita. It shows that transport-related urban emissions are relatively low in fairly compact cities, such as Shanghai and Barcelona, and especially so

when public transport networks are more dense. In contrast, emissions per capita are a lot higher in spread-out urban agglomerations like Denver or Los Angeles.⁵⁷ This suggests that large cities are not high polluters per se, but rather that their impact on the climate and environment depends on urban form and the way they are organised. While urban density is neither a necessary nor a sufficient condition for attaining lower per capita emissions, it can be an important factor.⁵⁸

Figure 3.19. CO₂ emissions from ground transport tend to fall as population density rises



Notes: Area in the population density calculation excludes green space. Unit for emissions (tCO₂e) are tonnes CO₂ equivalent. Analytical units and reference years used in the calculations: Barcelona (city, 2006); Geneva (canton, 2005); London (Greater London, 2003); Paris-IDF (Île-de-France, region, 2005); Prague (Greater Prague, 2005); Chicago (Chicago Metropolitan Area, 2005); Denver (city and county, 2005); Los Angeles (county including 88 towns and cities, 2000); New York (city, 2005); Toronto (Greater Toronto, 2005); Bangkok (city, 2005); Beijing (province, 2006); Shanghai (province, 2006); Tianjin (province, 2006); Cape Town (city, 2006); Kitakyushu (city, 2007); Stockholm (city, 2011).

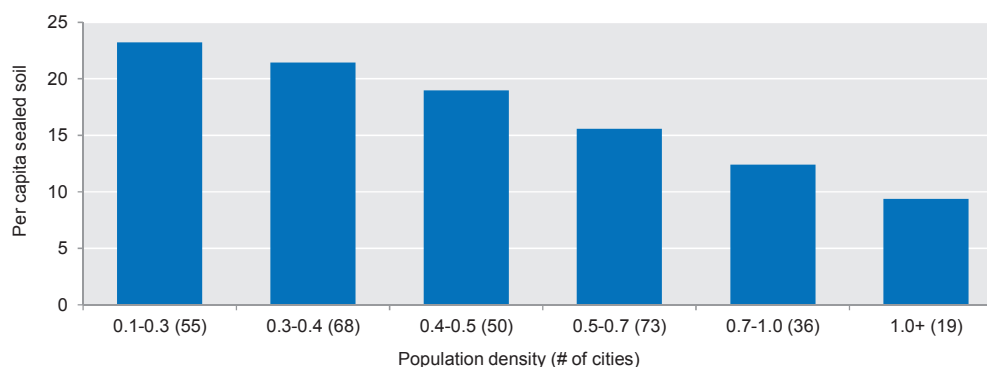
Source: OECD (2013d), *Green Growth in Kitakyushu, Japan*, OECD Green Growth Studies, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264195134-en>, p. 56; based on calculations by Kennedy, C. using the methodology from Kennedy, C. et al. (2009), "Greenhouse gas emissions from global cities", *Environmental Science and Technology*, Vol. 43, No. 19, American Chemical Society, pp. 7 297-7 302.

From the beginning of the 20th century, cities experienced a trend towards more urban sprawl and the expansion of settled areas outside their limits. Urban land area in the OECD actually doubled in the second half of the last century.⁵⁹ Nonetheless, the amount of land used per resident, in Europe, decreases with the size of cities (Figure 3.20).

The problem with sprawl is not that cities are growing. It is normal that the land covered by cities increases to a certain degree with large increases in population. Also, if newly added suburbs either are well connected to the city centre by public transport (which, however, requires a certain minimum density for efficiency reasons) or inhabitants use renewable energy for their transport needs, sprawl will not have much of a negative impact, neither on carbon emissions nor the liveability of the city. The problem is rather that with urban sprawl, the use of individual fossil fuel-based vehicles usually

risers. In a large majority of cities, negative externalities of this transport mode, such as pollution and congestion, are not (correctly) priced. This implies that transport-related policies actually incentivise sprawl. In many cities, tax and regulatory policies similarly promote sprawl – usually as an unintended side effect in the pursuit of some other policy objectives. As a consequence, people are pushed further apart than they would otherwise wish to be. Correcting such policies and setting a realistic carbon price would hence make an important contribution towards achieving more compact development and improved environmental outcomes. However, as long as these policy changes are not implemented, imposing minimum densities in land-use regulations and urban planning exercises may be a reasonable second-best policy.

Figure 3.20. Per capita sealed soil in European cities



Note: Population density is the number of inhabitants (in thousands) per square kilometre in 2006 in the (functionally defined) city.

Source: European Union (2014), “Investment for jobs and growth: Promoting development and good governance in EU regions and cities”, *Sixth Report on Economic, Social and Territorial Cohesion*, European Commission, Directorate-General for Regional and Urban Policy, Publications Office for the European Union; and Batista e Silva, F. et al. (2013) “Direct and indirect land use impacts of the EU Cohesion Policy: Assessment with the Land Use Modelling Platform”, *JRC Scientific and Policy Reports*, Report EUR 26460, Publications Office of the European Union.

In many areas where cities can undertake policies that would reduce carbon emissions (transport, land-use/urban planning), decisions are often subject to approval by a multitude of actors (e.g. all the concerned municipalities). As mentioned in Chapter 2, metropolitan areas with institutions dedicated to overcoming related co-ordination problems have experienced better outcomes in terms of urban sprawl, air pollution and public satisfaction with public transport.⁶⁰

Besides climate impacts, large cities also affect the habitats of species, which may in turn endanger biodiversity. The interplay of biodiversity and urbanisation is a highly complex field, and it is difficult to distinguish the idiosyncratic effects of large cities from those associated with economic growth and related changes in consumption patterns. Studies suggest that urbanisation leads to more biodiversity loss, in particular as both in developing and developed countries’ cities are predicted to evolve close to protected areas and areas of high biodiversity.⁶¹ Whether a specific city poses particular risks to biodiversity may hence depend both on the local environment and on how development takes place. Many studies that claim a direct link from urbanisation to biodiversity, however, fail to take into account that in the absence of urbanisation many city settlers would locate in more rural areas, where they may also contribute to substantial

biodiversity loss. Overall, it seems fair to say that there is not much conclusive evidence about the impact that urbanisation per se may have on biodiversity.

In several countries, urbanisation has certainly contributed to water pollution and scarcity. Overexploitation of water resources and the construction of dams, as well as inter-basin water transfers, have contributed to water scarcity. Between 1960 and 2000, the rate of groundwater depletion more than doubled, reaching over 280 km³ per year worldwide.⁶² However, the impact of large cities on pollution and ground water levels has largely been determined by population growth and the quality of water management in the respective areas. Fractionalization of local actors in water policy has resulted in co-ordination problems in water governance, which have a large share of responsibility for observed degradations. Also, in many places water stress has not primarily been caused by cities, but by extensive irrigation that has required unsustainably high amounts of water.

Water quality has also suffered from bad sanitation systems and insufficient wastewater clearing. Wastewater was – and in many cities still is – flowing untreated into groundwater, rivers and coastlines. In developing countries, up to 90% of all wastewater is released in an untreated form.⁶³ This reinforces water shortages as polluted water is not available for the supply of drinking water. However, while for some cities scarcity of water is a real problem, as available water resources have to be brought over fairly long distances, problems with wastewater are not genuine to large cities per se, but simply result from bad policies and often lack of co-ordination.

Finally, large cities are important actors for green growth policies. Urban policy makers are typically in charge of land-use planning, infrastructure spending on social housing or other buildings, as well as for public transport infrastructure.⁶⁴ Thus, local governments have important levers to influence outcomes with respect to urban form, energy use and connectivity within the city. The introduction of “green” policies at the city level is usually less in tension with economic growth than at the aggregate level, and there are even a number of policy complementarities that facilitate green growth. For example, while stricter emission standards may render certain industries less competitive, the connected decrease of air pollution improves health outcomes for the local urban dwellers, thereby increasing their productivity. With regard to policy complementarities, a better public transport network may not only decrease CO₂ emissions but also increase the well-being of the urban population as congestion and pollution levels decline.

Overall, it is hard to make a conclusive assessment of the environmental impact of urbanisation, but it would seem that urbanisation can, in principle, make a positive contribution. Urbanisation may negatively affect biodiversity and water resources. However, it is likely that such negative effects could be generally prevented with sufficient financial resources and under well-designed and well-functioning governance structures at the metropolitan level and beyond. While metropolitan areas might be associated with higher GHG emissions per capita than smaller cities or rural areas due to, for example, differences in production and consumption patterns, there is also evidence that suggests that residents of large cities may actually contribute less to global CO₂ emissions where they live than if they moved elsewhere. In any case, GHG emissions in cities depend on urban form and policies. This, together with their large share in global CO₂ emissions, implies that cities have a crucial role in fighting climate change (Box 3.5).

Box 3.5. Urban policies and climate change

Given emission levels and their capacity to take concrete actions, cities are a very important player for combating climate change, including through:

- Setting congestion charges, variable parking fees and toll lanes.
- Reforming local property tax provisions that favour single-family dwellings or otherwise contribute to sprawl, and greening the local tax system (e.g. in the Netherlands). Both local and national taxation policies can shape behaviour and environmental outcomes.
- Setting urban cap-and-trade mechanisms (e.g. in Chicago, Los Angeles and Santiago).
- Providing intergovernmental grants for local environmental spending (e.g. in Brazil, Germany, Portugal, Sweden and the United States).

Source: OECD (2010), *Cities and Climate Change*, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264091375-en>.

Notes

1. City sizes according to the EU-OECD definition for functional urban areas (see OECD, 2012a).
2. The indicators considered are broadly in line with indicators used to assess the quality of life across countries used by the OECD's Better Life Initiative for measuring individual well-being (OECD, 2011).
3. See De la Roca and Puga (2014) for details.
4. See Abel and Deitz (2012) for evidence on the impact on wages and Boualam (2014) for job satisfaction. A job is more likely to be perceived as professionally fulfilling when the worker's field of education and job are better matched.
5. See Bleakley and Lin (2012) for details.
6. See Costa and Kahn (2000) for details.
7. Rare properties often also have a subjective value to certain buyers that is way above expected market values. A recent example is the Korean car manufacturer Hyundai's September 2014 acquisition of a parcel of land for its headquarters in the sought-after Gangnam district of Seoul. The company was willing to pay triple the assessed land value for the property (The Wall Street Journal, 2014).
8. See Combes, Duranton and Gobillon (2012) for details.
9. Studies for France (Combes, Duranton and Gobillon, 2012), Germany (Ahrend and Lembcke, 2015) and the United Kingdom (Gibbons, Overman and Resende, 2011) find that (on average) higher prices curtail the wage increases from agglomeration economies.

10. See Handbury and Weinstein (2015) for details.
11. See Combes, Duranton and Gobillon (2012) for details.
12. See Moretti (2014) for details.
13. TomTom Traffic Index (Europe) for 2013 by TomTom International B.V., www.tomtom.com/lib/doc/pdf/2014-05-14%20TomTomTrafficIndex2013annualEur-mi.pdf.
14. TomTom Traffic Index (Europe) for 2013 by TomTom International B.V., www.tomtom.com/lib/doc/pdf/2014-05-14%20TomTomTrafficIndex2013annualEur-mi.pdf.
15. Data from ONS (Q1 2014).
16. See Ahrend and Lembcke (2015) for Germany, and Gibbons, Overman and Resende (2011) for the United Kingdom.
17. See Ahrend and Lembcke (2015) for evidence on the willingness of university educated workers to (implicitly) pay higher prices for amenities.
18. See Glaeser and Sacerdote (1999).
19. See Zenou (2003) for the concentration of crime within cities.
20. See OECD (2014c) for details. Costs are estimated in terms of people's willingness to pay to avoid death, using the value of statistical life.
21. The values are about USD 1.4 trillion in China and about USD 0.5 trillion in India in 2010 according to the best available estimates (OECD, 2014c).
22. PM₁₀ are particulates smaller than 10 microns, the WHO limit is 20 mg/m³.
23. See WHO (2011) for details.
24. For example, in 2012, 70% of Vienna's 1.7 million residents were exposed to daily road noise in excess of 55 decibels (the lower bound after which noise seems to create adverse health effects [WHO, 2011]). Data: European Environment Agency – Noise Observation and Information Service for Europe (NOISE) <http://noise.eionet.europa.eu/viewer.html> (accessed 8 October 2014).
25. See Glaeser, Gottlieb and Ziv (2014) for details.
26. See also OECD (2012c).
27. See Gaynor, Moreno-Serra and Propper (2013) for details.
28. See Cooper et al (2011) for evidence on mortality rates and Gaynor, Moreno-Serra and Propper (2013) for evidence on costs.
29. See Bloom et al. (2010) for details.
30. Average inequality increases with concentration of population in large cities. Around the average, however, regions exhibit significant heterogeneity. See Royuela, Veneri and Ramos (2014) for details.
31. See Chetty et al. (2014) for details.
32. See OECD (2013a) for details.
33. See for example Hoxby (2000) and Sacerdote (2001).
34. See UN DESA (2010 and 2014) for long-term demographic trends and forecasts.

35. See OECD (2012a) for a detailed exposition of the methodology.
36. See, e.g. UN DESA (2014).
37. See OECD (2013b) for detailed statistics.
38. See Brezzi and Veneri (2014) for details.
39. See Aghion and Howitt (2005) for details.
40. See OECD (2012d) for details.
41. See Carlino and Kerr (2015) for details.
42. See Carlino et al. (2012) for details.
43. Duranton and Puga (2014) provide a review of the literature.
44. See Rodríguez-Pose and Crescenzi (2008) for details.
45. Tiebout (1956) formalised this idea for the context of public goods provision by local governments. Sub-national governments can compete for residents by offering a basket of public goods and a price (in the form of taxes or fees); if there are enough competing governments, an optimal level of public good provision, which reflects individuals' preferences, is possible.
46. See Ahrend et al. (2014) for details.
47. See Ahrend and Schumann (2014).
48. See Veneri and Ruiz (2013) for evidence for the OECD and Partridge et al. (2008) for the United States.
49. See OECD (2013c) for details.
50. See Ahrend and Schumann (2014) for details.
51. See also World Bank (2008) for a general discussion of the relationship between urban and rural development.
52. See Dodman (2009).
53. See OECD (2010).
54. See OECD (2010).
55. See Kahn (2009).
56. OECD (2012c).
57. Large differences in per capita CO₂ emissions can even be found within countries. In Italy, for example, Genova has a smaller population size than Palermo but emits about four times more CO₂ per capita.
58. OECD (2013e).
59. See Hammer et al. (2011) for details.
60. See also Ahrend, Gamper and Schumann (2014).
61. See for example Güneralp and Seto (2013).
62. See Wada et al. (2010).
63. Corcoran et al. (2010).
64. See OECD (2013e).

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