In praise of megacities in a global world*

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Abstract. This paper argues that in the historical evolution of cities, large-scale urbanization is not only a fact, but a necessary outcome of the forces of globalization and competition. The current trend towards large cities and megacities in a complex global urban system, operating and interacting at a local to global multi-layer scale, is inevitable. However, their dynamics is as yet a poorly understood phenomenon that deserves full-scale policy action and research attention in our highly diversified space-economy.

JEL classification: O1, O2, O3, O4, R0, R1, R2, Y1

Key words: Megacities, global urban system, cities, urbanization, globalization, global competition, multi-layer scale, space-economy, location systems, mega-trend, settlement patterns, socio-economic externalities, urban population, migration, urban efficiency and performance

1 Space in transition

I dream’d in a dream,

I saw a city invincible to the attacks

of the whole of the rest of the earth:

I dream’d that was the new city of Friends (Whitman cited in O’Neill 2008, p. 124).

I dream’d that was the new city of Friends (Whitman cited in O’Neill 2008, p. 124).

Cities are the abyss of the human species (Rousseau 1762, p. 59)

Almost half a century ago Gould (1963) wrote an interesting article in which he argued that the long-run location patterns of human activity were the result of a rational choice process in the struggle of man against the environment. He used a game-theoretic framework to demonstrate the emergence of robust location systems under conditions of spatial choice uncertainty.

In our modern age there is still a need to trace the behavioural background of (structural changes in) locational patterns of households and firms, which manifest themselves nowadays in a long-range, persistent mega-trend towards rising urbanization and the formation of meg-
cities all over the world. Spatial locational choices are apparently realized in a complex and
dynamic force field, in which the interactions between climate and environmental change,
demography, economic motives, and social drivers play a prominent structural role within the
new global economic landscape (see for a review Kourtit and Nijkamp 2013). Global megacities
and urban agglomerations are certainly major sources of changes in land use and land cover, and
they are major users of their resources.

In the spirit of Gould, one may argue that the structural urbanization process in our world
is the result of a ‘game strategy’ of modern mankind against external and hardly controllable
background factors with locational responses, a strategy based on learning mechanisms and
evolutionary adaptations in human spatial choice behaviour (see, e.g., Black et al. 2008). This
tendency can be exemplified in the demographic domain by current spatial movements of the
‘healthy and wealthy’ elderly (pensionados) towards climatologically pleasant areas, such as
urban sunbelts. On the other hand, in the environmental area the awareness is growing that
delta regions may increasingly become vulnerable working and living areas that are sensitive
to flood risks as a result of sea level rise or climate change, with the consequence that urban
land-use planners in these regions are more reluctant to use these areas for residential or
industrial development. Settlement patterns, demography, and climate are apparently closely
interlinked phenomena. But this force field is even much more complex, as structural eco-
nomic and social processes may also play a prominent role in spatial development and urban
growth. An interesting illustration of the above observations can be found in a recent publi-
cation by Lucassen and Willems (2011), who offer a long historical overview of the evolution
of cities. They argue that the city offers many positive amenities (e.g., shelter, a market place,
socio-economic opportunities), but also many threats and disadvantages (e.g., institutional
inertia, socio-economic externalities, inaccessibility). Apparently, urban history is a permanent
adaptive process of continuity and change, which has ultimately led to a structurally increas-
ing urbanization of the world over the course of the past centuries.

The above-mentioned observations clearly demonstrate that, in general, cities and urban
agglomerations are subject to a great variety of dynamic forces that influence their morphology,
size and multi-functionality, but many also develop opportunities for competitiveness and
cohesion in a dynamic and irreversible way. As a consequence of these mega-trends, cities and
urban agglomerations are faced with a broad spectrum of challenges of various kind, which call
for smart and sustainable responses in our urban century. This means that a shift in urban policy
and urban governance is fundamental and necessary (see e.g., Naess 2001; Tamagawa 2006;
Slavin 2011). Moving forward, with an integrative approach to the socio-economic and envi-
nronmental aspects of urban development and urban management strategies, with due regard to
multidisciplinary perspectives, calls for a better understanding of the process of urbanization
and global megacities as well as urban governance.

At present, more and more people are moving from rural areas to cities, mostly drawn by the
interaction of socio-economic dynamics as the result of a mix of various push-factors, for
example, unemployment, low standards of housing and infrastructure, lack of educational
facilities (Massey et al. 1993; EEA 2006; UNFPA 2007) and pull-factors, for example, eco-
nomic opportunities, attractive jobs, cultural attractiveness, better education, modern lifestyle
(Portes and Böröcz 1989; Portes 1995; Rodríguez et al. 1998; Deurloo and Musterd 1998;
Bodaar and Rath 2005; Lardiés Bosque and Castro Romero 2002; Favell 2002). This mega-trend
offers various great opportunities for urban development, but at the same time puts enormous
pressure on our urban areas. Currently, over 50 per cent of the world’s population lives in cities,
and an increase to over 80 per cent is predicted by 2050 (see Figure 1).

Cities are the hubs of human activity but at the same time they are places where economic,
environmental and societal demands are magnified. Consequently, the drift from rural to urban
areas plays a key role in the rapid growth of cities and will continue to grow and experience
many important and significant economic, social and demographic transformations within and across cities, regions and countries during the coming decades. Table 1 presents the likely pattern of urbanization of the continents on our planet.

The findings in Table 1 show that level of urbanization is expected to increase in all major areas worldwide, with Africa and Asia urbanizing more rapidly than the rest of the world (United Nations, Department of Economic and Social Affairs, Population Division 2011).

Fig. 1. Percentage of the population in urban areas, 2011, 2030 and 2050

However, the findings in Table 1 show that in 2050 Africa and Asia are still expected to have lower levels of urbanization than Latin America and the Caribbean, and the more developed regions such as Australia, New Zealand and Northern America (expected to be over 90 per cent urban, while Europe’s level of urbanization is expected to be lower, with 82 per cent of its population living in urban areas) (United Nations, Department of Economic and Social Affairs, Population Division 2011).

It is noteworthy that cities currently account for around 70 per cent of global emissions, and are major contributors to the overall ecological footprint. Moreover, migration and demographic change do create challenges for the future design of attractive cities that aim to provide an even higher quality of life. It is inevitable that international migration to large cities will continue in the coming decades, increasing the probability of social exclusion or even instability. The impact of climate change will present a new challenge to the living conditions in cities. However, there is no doubt that future cities will become arenas for social action, economic vitality and ecological sustainability. The expected concentration of human capital in urban agglomerations – with more skilled, creative and educated people – will make urban agglomerations power-houses of economic growth (see Hanushek and Kimko 2000; Krueger and Lindahl 2001; Castello and Domenech 2002).

Cities will – with the expected rise in population in the next decades – turn into urban agglomerations, which may then turn into megacities\(^\dagger\) or polycentric urban areas. We shall most likely witness an unprecedented urban dynamics, with a transition from early ‘island cities’ (à la Van Thünen) and hierarchical cities (central places à la Christaller or Lösch) towards global megacities, network cities, and even city networks, together with the emergence of village cities and e-cities as complementary spatial constellations (Kourtit and Nijkamp 2013).

These global megacities and urban agglomerations will generate new network constellations and will functionally connect sub-urban areas (satellites) to strengthen the interaction on an inter-cluster basis, in order to serve common interests of a broad knowledge, innovation and technology economy and to create a visible constellation of a ‘new urban world’ (see Kourtit et al. 2011). This natural increase of cities (the difference between births and shrinking of cities) may contribute significantly to urban population growth (United Nations 2010).

Against this background, the present paper aims to highlight the plausibility of the emergence of megacities in order to achieve a sustainable development of our planet. It is organized as follows. Section 2 gives an overview of urbanization trends in general. Section 3 then presents arguments for the rise of megacities from a broad urban-economic perspective, in which also

\(^\dagger\) The minimum size of a megacity is usually supposed to range from 4 to 10 million inhabitants, depending on the source (Daniels 2004).
analytical instruments for studying urban dynamics are discussed. And finally, Section 4 concludes with a number of retrospective and prospective remarks.

2 Urbanization: a global destiny

The year 2007 was an important milestone in the long history of urbanization in our world: for the first time, the city took over the ‘power’ from its hinterland, since that year marked the point, when more than 50 per cent of the world’s population lived in urban areas. In various circles today, the twenty-first century is even called ‘the urban century’. Surprisingly, only a few centuries ago approximately 20 per cent of the world’s population lived in cities. The process of structural urbanization is still continuing, with degrees already exceeding 75 per cent in various European countries and elsewhere (for details, see e.g., Mega 2010; United Nations, Department of Economic and Social Affairs, Population Division 2011), while especially rapid urbanization continues in the developing world.

The findings from Figure 2 show that major disparities in the level of urbanization exist in the more developed regions. Although in various countries the proportion of the urban population was already above 50 per cent in 1950, it will still take another century for half of the population of the less developed regions to live in urban areas.

It is noteworthy that the findings in Table 2 indicate that between 2011 and 2050 the world population will increase by 2.3 billion, rising from 7.0 billion to 9.3 billion (United Nations, Department of Economic and Social Affairs, Population Division 2011). At the same time, the

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2 In the present paper, various urban concepts such as cities, urban areas, agglomerations, etc., are used in a rather loose way. For a precise definition of such concepts, we refer to Gregory et al. (2009).
The long-term megatrend in population movement towards the city is the result of two underlying force fields, namely, the exponential growth in world population (with an average growth rate of approx. 1.2 per cent per annum) and the rural-urban drift (due to the relatively more favourable socio-economic opportunities in urban agglomerations). In this context, it is foreseen by United Nations that, by the year 2020, about 60 million people will have moved from sub-Saharan Africa to North Africa and Europe. Both natural population growth and (domestic and foreign) migration will present a formidable and unprecedented challenge to the resilience of urban systems in our world. And there is no reason to assume that the trend towards further urbanization will ever come to an end. It is anticipated that, in less than one generation, more than two-thirds of the population on our planet will live in urbanized areas. In Europe – but also in other regions of our world – the urbanization degree may well have risen to 83 per cent (557 million) by the year 2050 (European Union 2010). Most likely, non-urbanites will gradually become a minority.

The above-mentioned megatrend will result in a dramatic transformation in settlement patterns. This emerging repositioning of cities may be interpreted as a third settlement revolution. The first revolution was essentially marked by a rural to urban shift in the past (instigated by safety and political motives), which led to the first geographically demarcated cities (often with walls and fortifications). This phase is marked by the development of manufacturing tools that began to take-over from the farm and at-home employer (see Tellier 2009).
The second revolution took place in the period of the Industrial Revolution (nineteenth century) when large-scale industrialization and far-reaching labour specialization led to the emergence of unprecedented scale advantages in large urban-industrial agglomerations. This phase created the growth of our modern cities: for many firms it was cost-efficient to locate in cities to gather cheap labour where people searching for jobs had move to. And nowadays, we witness the rise of urban networks and mega-cities – comprising not only urban centres and suburban areas, but also edge cities, suburban areas, new towns, and urban sprawl areas – that all together form spatially-connected and urban network agglomerations (see also Castells 1996). The trend towards global city networks is even imminent (see Sassen 1991, 2010; Scott 2001).

In less than a century, the urban landscape in Europe and elsewhere has completely changed. Until the mid-1850s, many of today’s cities in Europe (Madrid, Lyon, Vienna, Paris, Torino, Stockholm, Frankfurt, Brussels and Amsterdam) were still relatively small. They turned into urban agglomerations with the rise of the Industrial Revolution which affected rural households and small-scale farming and continued to grow on a structural basis (despite various ups and downs to have access to the cities’ economic activities and facilities). Clearly, urban sprawl meant, in the short run, a disruption of existing urbanization trends, but in the long run the central position of cities was even reinforced (Tellier 2009). Nowadays, metropolitan development is increasingly turning into mega-city development, and currently it is hard to find a conclusive answer to Alonso’s (1964) challenging question: “How big is big enough?” and “How big is too big?” It seems plausible that the ongoing urban dynamics will continue to be a reality in a globally-oriented, open society in the future.

It is noteworthy that modern urbanization means simultaneously a disappearance of the strict borderlines between urbanity and rurality (see also Vaz et al. 2006). While in the past, the city was clearly demarcated by city walls separating it from its hinterland, in modern times the morphology of cities has become diffuse (with urban village districts, suburbs, new towns, satellite cities, and diffuse urban sprawl) and is characterized by spatially-segmented areas (see Musterd and Van Kempen 2009).

This evolution did not only reflect a quantitative change in the share of inhabitants in urban areas in the national territory but also had qualitative impacts of both a socio-economic and political nature. Modern network cities have turned into spearheads of (supra-)regional and (supra-)national power, from a number of different perspectives: socio-economic (business, innovativeness, jobs, wealth); geo-political (‘cities as global command and control centres’: see Sassen 1991); and technological.

Consequently, modern urbanization means not only a shift from rurality to urbanity but also the emergence of large-scale urban agglomerations which ultimately turn into mega-cities (see Nijkamp 2010). Socio-demographic changes (e.g., ageing), migration and mobility, entrepreneurial dynamics, sustainability and efficiency of transport and energy systems, ICT (and other advanced technologies), and increasing returns to scale in urban agglomerations are the driving forces for new settlement patterns in our modern society. Cities have turned into force fields with both centripetal and centrifugal movements in an open world, an observation which was already made a few decades ago by Dematteis (1988). Especially the seminal work of Friedmann (1986) on world city developments – leading to an urban system as an inter-connected global system with a specific hierarchical functional structure – has inspired much research on globalization and urban development (see also Beaverstock et al. 1999; Knox and McCarthy 2005; Sassen 2006; McCann 2008; Kourtit et al. 2011).

Is it possible to map out the future of our urban world? The current level of urbanization is essentially the result of a very complex set of many socio-economic forces that are closely interwoven with demographic, socio-cultural, political, economic and technological drivers at all geographic scales (from local to global). Cities go through ‘normal’ business cycles, with
upturns leading to booming agglomerations, but also with possible downturns leading to socio-economic decay (‘shrinking cities’). A blueprint for the urban future is hard to design.

Therefore, the diversity in challenges and responses calls for a coherent approach, by means of which anchor points for effective action on sustainable urban futures can be identified. These anchor points provide smart principles for managing the increasing concentration of people in urban agglomerations, with a long-term view to the design and implementation of a liveable, sustainable, accessible, and economically-viable environment and settlement pattern for citizens. These four urban future pillars – which cover both local and global scales – are:

1. cities as sources of economic vitality for a broader (supra-)regional system or network of urban areas;
2. cities as nodes for smart logistics and sustainable mobility, at both intra-city and inter-city levels;
3. cities as seedbeds for broad socio-economic participation and cultural diversity in an ethnically and socio-culturally segmented urban system; and
4. cities as centres for sustainable ecological development and for sustainable energy production and use.

In recent decades, these four pillars have become the focal points of urban policy and research and have individually received extensive attention in various distinct disciplines, such as social and economic geography, urban and regional economics, transportation and logistics, urban demography, political science, planning theory, urban ecology, urban architecture, business administration, and environmental science. But the interfaces between these pillars have received far less attention, although it is highly likely that new research perspectives and achievements are to be found exactly on these interfaces. However, research on the edges of these four pillars is difficult, as it needs a clear interdisciplinary orientation that is centred on the future sustainability (ecological, social, economic, logistic) of urban areas. But it is likely that it is on such interfaces where one may expect breakthrough innovations which will reinforce the critical functions of cities in the future (e.g., during the period from 2020 to 2050). Scientific research in this area needs long-range strategic foresight experiments; multi-component modelling based on non-linear dynamic (complex) systems analysis; and the use of advanced research tools from different disciplines, based on solid information systems.

In addition to the strategic re-profiling of urban areas into an overall integrated network cities, we also observe a new gradual transformation of urban agglomerations into (regional, national or even global) spatial-economic networks. Worldwide, urban areas are becoming nodes in global city networks (Burger et al. 2009; Taylor 2001, 2004; Taylor et al. 2002), in which regional and national borders will play a less important role. This new development may turn into the fourth urban revolution in the history of human settlements, which may lead to the emergence of global hierarchical networks or interconnected global networks of urban agglomerations. Clearly, this may prompt new research endeavours on complex network analysis (such as the analysis of exploring and clarifying socio-economic black holes, scale-free networks, etc.). City networks will definitely become a source of creative and strategic research on the future of metropolitan areas.

Global trends, such as (rapidly) increasing urbanization, are putting pressure on the urban system, and causing negative externalities such as pollution, congestion, security issues, and social degradation. Demographic and climate change are having further impacts on this vulnerable system, making it a necessity, for scientists and policy-makers alike, to look for effective ways in dealing with a fast-changing societal, economic and environmental reality.

However, more positively, at the same time, our urban areas are also innovation hubs themselves, where knowledge, policy and practice come together to create innovative ideas,
employ new technology, and benefit from fresh insights concerning the challenges and the drivers of urban development, as well as the solutions for urban problems. Good practices can be found in various urban economies, while good practices also exist in the conservation of cultural heritage and historic landscapes, for instance, in port areas (urban rehabilitation of port areas). Many cities have in the past years developed new policy mechanisms for upgrading, such a new port brownfield design through harbour front and seafront development (e.g., the London Dockyards, the Kop van Zuid in Rotterdam, Cape Town, New York, Yokohama, Singapore, Helsinki, etc.). The two keywords in this drastic land use conversion are: sustainable development and creative sector stimulation. Therefore, the traditional roles of (port) cities are constantly being redefined, as demands for high-quality amenities and public services are subject to permanent change. A thriving urban area must be able to ensure the sustainable accessibility and mobility of urban systems (including their logistics), and simultaneously develop effective measures to minimize its ecological footprint.

To meet the challenges of structural urbanization, it is necessary to ask what form future urbanization patterns will take. In the next section, we argue that megacities will play an indispensable role in shaping our ‘urban century’.

3 The blessing of global megacities

According to recent population predictions (see United Nations 2010), our planet will have to accommodate 9 to 10 billion people by the year 2050. This would mean an average annual increase in the world’s population over the next 30 to 40 years of at least 50 million people. Most of these new citizens have to be housed in urban agglomerations; it would mean that from now onwards – particularly in the developing countries – every week a new city the size of Amsterdam has to be created. This would seem to be an impossible task. But a dispersal of these millions of people over rural areas is likely to have far more devastating effects in terms of ecological sustainability, economic efficiency, and socio-economic opportunities for the urban, regional and global development (Kraas 2006; World Bank 2006).

The world keeps on urbanising, and a greater share of the economic output will come from cities. The dynamics of urbanization and its processes differentiate in different regions. For example, Figure 3 presents the distribution of megacities for 2015. Today, there are more than 15 large metropolitan areas (United Nations, Department of Economic and Social Affairs, Population Division 2011). According to the United Nations, Department of Economic and Social Affairs, Population Division (2011) there will likely be more than 25 global megacities with a population above 10 million by mid-century.

It should be emphasized here that cities and urban agglomerations can boost an enormous rise in efficiency and productivity (Duranton and Puga, 2004), as a consequence of a wealth of various externalities; in particular, agglomeration – or Marshall-Arrow-Romer (MAR) – externalities; diversity – or Jacobs – externalities; and cluster – or Porter – externalities (see Nijkamp 2008; de Groot et al. 2009). Consequently, cities are able to create so many positive external benefits, that from an economic perspective, there will be a structural tendency for an increasing influx of people into urban areas (see also Owen 2009; Glaeser 2011).

The latter tendency has recently been empirically confirmed by Bettencourt et al. (2007), and later on by West, who demonstrated, in an interview in the New York Times (2010) the validity of the urban scaling hypothesis: he was able to show – on the basis of a very large database containing all kinds of relevant urban variables for many cities in the world – that urban efficiency and performance (both economic and ecological) rise with city size. He found that, on average, cities benefit from a 15 per cent rise in productivity for each doubling of city size.
Clearly, not all cities are growing. There are many examples of shrinking cities (e.g., Dresden, Halle), acting more as satellite cities in a broader urban system, but, nevertheless, even in countries with shrinking cities (like Germany) the overall urbanization rate at national level is still rising. Urban agglomerations appear to generate more economies of density and proximity – in combination with social learning, creativity and self-organization – than any other type of spatial configuration.

In the ‘new urban World’ (see Kourtit and Nijkamp 2013; Nijkamp and Kourtit 2013), increasing urbanization will likely continue as a robust trend, to the extent that many large cities and urban agglomerations will become nodes of global development. Cities will become the ‘home of man’ (Ward 1976), and will gradually meet strict sustainability conditions. For the time being, there is no logical or rational argument which would convincingly demonstrate that cities have a natural ecological limit in terms of population size. Nowadays, we even observe a ‘double urbanization’ phenomenon: medium-size cities turn into large cities, and large cities turn into megacities (or polynuclear agglomerations).

Managing urban development at a global scale is clearly one of the biggest challenges in the twenty-first century. Issues like housing policy, infrastructure and logistics, environmental sustainability, urban land use, smart energy use, ageing, human health, social segregation, negative urban externalities, and international migration will all require novel insights and policy strategies in order to make the future city ‘a place 4 all’. Indeed, urban productivity is key for urban performance. In an OECD study (2006) it was shown that productivity per worker outstrips all other factors in performance comparisons of cities. Besides agglomeration externalities, there are also additional drivers of a relatively high urban productivity, that is, the urban knowledge base and the level of ICT use in a city (see Henderson 2003). The complex urban dynamics of our world can be described in simple terms by means of the following circular causality model (see Figure 4).

To interpret Figure 4, three background factors deserve special attention.
3.1 Migration

Migration at a worldwide scale is a sign of an open and global economy. It enhances the efficiency in the dynamic allocation of production factors and has generally – in contrast to existing popular wisdom – a (modest) positive impact on local economies (for an overview, see Nijkamp et al. 2012). Migration is a typical urban phenomenon, and one may expect a drastic future impact of migrants on the urban economy, especially if the trend towards global knowledge migration continues (OECD 2009). It seems plausible however, that a migration influx will have a positive influence on the economy of cities and shapes life for developing countries (World Bank 2009). Urban immigration not only implies the acquisition of new skills at low costs, but also enhances socio-cultural diversity which may boost urban innovativeness, migrant entrepreneurship, and human creativity.

3.2 Ageing

The demographic trend in many countries shows a double ageing process: more people are getting older, and the share of very old people is also rising. Although a (smaller) share of the elderly may move as ‘pensionado’s’ to rural areas, it seems plausible that the majority will still continue to reside in urban areas because of the much better provision of appropriate amenities. Clearly, immigration may partly be used to counter the effects of an ageing society, but whether this would be significant to offset the economic effects of population ageing and decline remains to be seen. Kresl and Ietri (2010) list various advantages of urban ‘seniors’ for the urban economy, that is, a stable size of the urban population, a revitalization of culture and arts in the city, a significant volume of expenditures on luxury and cultural goods by ‘healthy and wealthy seniors’, and the stimulation of a considerable urban voluntary social economy.

3.3 Knowledge

In a global and open economy, knowledge circulation is an important source of progress. Since knowledge production, transfer and absorption takes place predominantly in and between urban areas, it is plausible that urban agglomerations will emerge as knowledge hubs in a worldwide knowledge network. The positive diaspora effects of international migration will be visible
particularly in urban areas. In this context, the OECD (2009) has designed five long-run global scenarios, in which the spatial allocation of talent plays an important role, namely: progress for all; OECD long boom; uneven progress; globalization falters; and decoupled destinies. Admittedly, the simultaneous occurrence of push and pull factors for knowledge and talent may lead to complex brain gain and brain drain relationships among cities in the world, but – as in international trade – there is certainly the prospect of great economic gains for successful cities all over the world.

Table 3 gives a further look at various large global megacities (with more than 10 million inhabitants) and tells us that most of them are found in Asia and Latin America. Examples are: Tokyo, Delhi, Sao Paulo, Mumbai, Mexico City, New York, Guangzhou, Seoul, Shanghai, Calcutta, Dhaka, Karachi or Manila. Their size is the result of geography, history, demography, and economics. Clearly, there are significant differences in the growth rate of large cities. For example, Chongqing (China) with a current population of about 9 million is the fastest growing city in the world, and expects to achieve a 75 per cent growth rate in the period 2005–2015, whereas Detroit (USA) with a current population of 713,000 lost 25 per cent in the period 2000–2010.

The steady rise in megacities all over the world – both in numbers and in population size – can be explained by various background factors, in particular, decline in transportation costs, development of advanced logistic systems, better accessibility of metropolitan areas, returns to scale from agglomeration advantages, risk pooling, diversity benefits, labour pooling, specialized learning mechanisms, self-reinforcing sorting, and attractive amenities. Clearly, there are certainly many negative externalities caused by the existence of large cities, such as congestion, lower health conditions and crime rates, but as long as the positives exceed the negatives, the city will continue to grow (Glaeser 2011). From that perspective, megacities are a ‘blessing in disguise’.

Any scientific assessment of this outline of the dynamics of urban processes calls for insightful instruments. The previous observations on the evolution of megacities – often in relation to large polycentric agglomerations – highlight the systemic complexity of our urban world. The global urban landscape is indeed dynamic and pluriform. It displays quite surprising dynamics in individual cases, but it also combines change with continuity. For example, individual cities in a given country may go through wild and unexpected cycles, which might nevertheless be controlled by urban morphological or functional principles (such as rank-size rules or entropy) (see Reggiani and Nijkamp 2012).

The scientific analysis of city size and land-use development may be based on a wealth of analytical tools (see, for an overview, Capello and Nijkamp 2004). An interesting study on conceptual frameworks and analytical toolboxes for studying urban dynamics is contained in a recent study by Bertuglia and Vaio (2011). They use complexity theory as a unified framework for analysing the growth and decline of urban systems which are the product of the self-organizing efforts of all stakeholders. After a broad review of urban theories in the past century – mainly sociological in nature, and less focussed on economic drivers of urban dynamics – the authors provide a useful overview of modern complexity instruments for analysing the space-time dynamics of urban systems. An example of such an operational and increasingly popular tool is agent-based modelling, an approach that uses individual interactions – through learning and social cognitive process – to map out the evolution of macro structures (e.g., at the urban systems level). It goes without saying that the complex and dynamic evolution of – modern and future – urban systems calls for new appropriate toolboxes that need to keep pace with the rapid changes in urban patterns worldwide. Such complexity instruments are an important analytical tool for studying both the evolution of the intra-urban system and the dynamic processes governing inter-urban networks (see, e.g., Tranos and Nijkamp 2012).
Retrospect and prospect

Global urbanization is on a rising edge, not only for individual cities but also for global urban networks. Consequently, we observe a great pluriformity in contemporary urban forms and developments. It is clear that the achievement of sustainable urban development will be one of the greatest global challenges in the decades to come, in both the developed and the developing world. The ‘urban way of life’ will most likely be the dominant lifestyle in this century.

### Table 3. Population of various large global megacities with more than 10 million inhabitants, 2011 and 2025 (millions)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Urban agglomeration</th>
<th>Population 2011</th>
<th>Rank</th>
<th>Urban agglomeration</th>
<th>Population 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tokyo, Japan</td>
<td>37.2</td>
<td>1</td>
<td>Tokyo, Japan</td>
<td>38.07</td>
</tr>
<tr>
<td>2</td>
<td>Delhi, India</td>
<td>22.7</td>
<td>2</td>
<td>Delhi, India</td>
<td>32.9</td>
</tr>
<tr>
<td>3</td>
<td>Ciudad de México (Mexico City), Mexico</td>
<td>20.4</td>
<td>3</td>
<td>Shanghai, China</td>
<td>28.4</td>
</tr>
<tr>
<td>4</td>
<td>New York-Newark, USA</td>
<td>20.4</td>
<td>4</td>
<td>Mumbai (Bombay), India</td>
<td>26.6</td>
</tr>
<tr>
<td>5</td>
<td>Shanghai, China</td>
<td>20.2</td>
<td>5</td>
<td>Ciudad de México (Mexico City), Mexico</td>
<td>24.6</td>
</tr>
<tr>
<td>6</td>
<td>São Paulo, Brazil</td>
<td>19.9</td>
<td>6</td>
<td>New York-Newark, USA</td>
<td>23.6</td>
</tr>
<tr>
<td>7</td>
<td>Mumbai (Bombay), India</td>
<td>19.7</td>
<td>7</td>
<td>São Paulo, Brazil</td>
<td>23.2</td>
</tr>
<tr>
<td>8</td>
<td>Beijing, China</td>
<td>15.6</td>
<td>8</td>
<td>Dhaka, Bangladesh</td>
<td>22.9</td>
</tr>
<tr>
<td>9</td>
<td>Dhaka, Bangladesh</td>
<td>15.4</td>
<td>9</td>
<td>Beijing, China</td>
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**Source:** United Nations, Department of Economic and Social Affairs, Population Division (2011).

### 4 Retrospect and prospect

Global urbanization is on a rising edge, not only for individual cities but also for global urban networks. Consequently, we observe a great pluriformity in contemporary urban forms and developments. It is clear that the achievement of sustainable urban development will be one of the greatest global challenges in the decades to come, in both the developed and the developing world. The ‘urban way of life’ will most likely be the dominant lifestyle in this century.
association with ICT developments, we will most likely increasingly witness a global lifestyle, which will be governed by interaction, evolution, and learning mechanisms.

This globalization trend will induce unprecedented urban dynamics, intensified by global migration processes and the battle for talents. In this multifaceted global urban dynamics competition, urban agglomerations will aim to act as ‘gatekeepers’ by seeking a strategic role as a global knowledge, innovation or creativity hub. It goes without saying that education will become a key variable in the battle for global urban competence, ‘knowledge is power’ (“nam et ipsa scientia potestas est”, as Francis Bacon puts it in his Meditations Sacrae 1597/1996).

The question of optimal city size will, of course, continue to be on the urban agenda. But it ought to be recognized that city size is a limited concept that does not incorporate intercity externalities, let alone global interactive forces between urban agglomerations. Most likely we will observe that ‘small is not always beautiful’, but ‘big is not always beautiful’ either. It seems likely that polynuclear urban configurations may become a meaningful intermediate structure for the ‘big size – small size’ dilemma. What counts in the end is the highest possible quality of urban life the so-called the XXQ-City 2.0 (based on the above mentioned the ‘XXQ’ principle; see Nijkamp 2008).

The rise of global megacities calls for policy guidelines. First, agglomeration advantages – of all kinds – are the essential and persistent driving force of the growth towards ever growing urban agglomerations. Wise agglomeration policy would have to follow and facilitate the ‘waves’ of agglomeration forces, in so far as they contribute to XXQ of these areas. Second, despite the generic concept of megacities, there is not a single and unambiguous policy panacea: a megacity is a species sui generis, with distinct features, a distinct cultural historical legacy, and place-specific opportunities and bottlenecks. Agglomeration policy is tailor-made, but relies on common resources offered by smart citizens, urban social capital, managerial talents, scientific skills and creative enthusiasm and ambition of all stakeholders involved, while due attention has to be paid to the city’s role in a broader, often open and global, networking context both industrial and knowledge networks). Thus, urban agglomerations have to design future strategies based on self-organizing principles in order to harness and develop indigenous strength, while obtaining a strong position on a global scale.

Global urbanization processes inevitably involve far-reaching issues relating to the governance of powerful urban mega-structures that far exceed the relevant administrative regional and national borders. New regulatory and logistic systems may be needed to fully reap the fruits of our urban century. This holds not only for migration dynamics, but also for global technology developments, human health care systems and sustainable development. Here the dilemma of self-regulation versus planning will play a critical role. The current concept of self-organizing urban complexes may provide new ideas, but it is clear that much intellectual effort and smart courageous policies are needed to effectively and efficiently govern global urban systems.

If you want to escape from society, then you better go to a city, because this is the only place where you can still find a desert (Camus 1951).

References

Alonso W (1964) Location and land use. Harvard University Press, Cambridge, MA
In praise of megacities in a global world

Camus A (1951) *L’homme révolté*. Gallimard, Paris
Resumen. Este trabajo sostiene que en la evolución histórica de las ciudades, la urbanización a gran escala no es sólo un hecho, sino el resultado necesario de las dinámicas de globalización y competencia. Es inevitable la tendencia actual hacia las grandes ciudades y megalópolis en un sistema urbano global complejo, en el estas ciudades operan e interactúan en múltiples niveles, desde lo local hasta lo global. Sin embargo, sus dinámicas son aun un fenómeno poco conocido que merece acción política a gran escala y más investigación dentro de nuestra economía espacial altamente diversificada.