

# 02 | 2015

## GLOBAL TRENDS AND THEIR IMPACT ON REAL ESTATE

DISCUSSION NOTE

We review the global trends that are likely to have a significant impact on real estate markets over the coming decades.

These are: globalisation, technological progress, sustainability, demographic changes and urbanisation. We consider the consequences of the trends for future growth and the risks of obsolescence for real estate.

**Date** 06/11/2015

**ISSN** 1893-966X

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# SUMMARY

## GLOBAL TRENDS AND THEIR IMPACT ON REAL ESTATE

### **Globalisation:**

- The main impact of globalisation on real estate has been the growing importance of a relatively small number of “global cities” with transnational functions and specific real estate requirements. These markets tend to be driven more by global economic factors.
- Concentration of high-value business services and purchasing power has resulted in office and retail rents in global cities significantly above rents in other locations. For logistics properties, global transportation hubs fulfill a similar function.
- An important aspect of location in global cities or gateway markets is the continuity of demand and lower risk of obsolescence, which may impact the rent or value growth potential.

### **Technology:**

- While e-commerce is reducing the overall demand for physical retail space, it is also intensifying the “showroom” function of stores in prominent locations. Logistics space is also likely to benefit from direct delivery of goods to consumers.
- Use of communication and information technologies in offices may improve the utilisation of office space, but may also change the function of offices, giving more weight to the facilitation of human interaction. Central business district locations, which already fulfill this function to some extent, should be less affected than out-of-town office buildings, which are normally intended only to accommodate desk workers.
- New technologies are enabling an unprecedented increase in the energy efficiency of buildings, resulting in a new generation of “smart” buildings.

### **Sustainability:**

- Improving the sustainability of a building can generate a “premium”, realised in the form of higher rents, lower operating costs and higher occupancy rates.
- In addition to higher cost efficiency, demand for “green” space is being driven by considerations related to tenants’ reputation.
- Other factors affecting the growth of green building practices in the commercial real estate industry are regulatory requirements, the increasing frequency of extreme weather events, and technological progress.

**Demographics and urbanisation:**

- Among the key demographic trends are population growth, increasing average age, income and wealth shifts, the growth of the middle class, and urbanisation.
- The impact is likely to be strongest on residential markets, where significant shifts in demand can be expected. With office properties, the consequences of demographic trends for office employment are relevant, while the impact on retail is the combined effect of population growth and wealth effects.
- Overall, a considerable population growth, combined with positive wealth effects and urbanisation, appears to favour emerging markets, particularly in Asia.

# 1 Introduction

The world's population is expected to increase from around 7 billion today to between 9 billion (low variant) and 11 billion (high variant) by 2050. At the same time, global wealth inequality is expected to decline, and economic, financial and social links between different parts of the world are expected to increase. These changes will be overlaid by the impact of technological progress and increased awareness of the planet's ecology. Real estate, being present across the globe, is exposed to all of these developments. The long-term changes affect the overall levels of supply and demand for different types of real estate in different locations, but they also have a qualitative impact on the markets. In this paper, we have selected four trends which we expect to have the most profound impact in the medium and long term: **globalisation, technological progress, sustainability trends, demographic changes and urbanisation**. While formulated as separate trends, they are not fully independent and to some extent represent different aspects of high-level global developments.

The analysis focuses mainly on the impacts of the trends on the occupier markets, which drive the fundamental income characteristics of real estate. Considering the long-term effects, two aspects are of particular relevance: (i) impact on future growth potential and (ii) risk of obsolescence. The first aspect refers to growth rates as well as the uncertainty regarding future rent levels and income streams. The second point refers to the long-term consequences of missing the global trends, which can lead to a building becoming obsolete. In fixed-income terminology, the first aspect can be compared to the impact of interest rate fluctuations on value, while the second has some analogy to default risk.

Global trends can influence real estate in two ways: by affecting the implicit value of a location and by affecting the implicit value of a building. In either case, the attractiveness to users can change, which has a direct impact on the income stream and the value. The significant difference between the two types of impact is the owner's ability to react. While the quality of the building can be adjusted to some extent, albeit at a cost, a change of location is usually impossible. Due to this fact, global trends affecting location quality tend to have more severe consequences for long-term investments than those affecting the characteristics of buildings.

It is important to note that the impact of the global trends discussed in this paper is mainly on the occupier demand side – they lead to a changing level and structure of the demand for space in various regions. However, it is also important to consider the supply side of the market. In the case of real estate, supply tends to adjust to increasing demand rather slowly as the construction periods are long, but the adjustments to declining demand are even slower. Demolition of obsolete properties is relatively rare. A decline in the demand for space would therefore typically result in an increasing stock of vacant buildings. Such a situation can persist over long periods of time. If the drop in demand is structural and possibly permanent, markets can suffer oversupply for years, resulting in the vacancy of buildings that don't fully match the requirements of occupiers and limiting the growth potential for

the whole market. This asymmetry in the response on the supply side plays a significant role when assessing the consequences of major, long-term, structural changes. In particular, the risk of obsolescence appears to be more significant than the potential opportunity from strong demand. The latter can be temporary and disappear as the market adjusts by providing additional space in new buildings, but the former can persist and lead to significant long-term losses. We will be highlighting this aspect throughout the paper.

Finally, when discussing long term consequences of high-level trends, one needs to bear in mind that not all of them can be predicted with the same level of confidence. For example, many demographic changes, such as aging, are slowly evolving processes that follow nearly deterministic paths and rarely see abrupt turns, but technological progress can be very dynamic and difficult to forecast in the medium and long term. While we do not address the likelihood of different outcomes in this paper, it may have important practical implications.

## 2 Globalisation

The impact of globalisation on real estate can be viewed from two angles: convergence of global markets and the growing importance of global hubs. Our analysis indicates that the second trend has dominated over the past 20 years, with a relatively small number of cities playing the role of “global cities” with specific transnational functions. This is reflected in the specific structure of office and retail markets. The concentration of high-value business services and the function of retail units as “global display windows” has led to rent levels significantly above the levels in other locations. For logistics properties, global transportation hubs fulfill a similar function to that of global cities for office or retail properties. They are important parts of global delivery networks, and tend to be driven more strongly by global rather than regional economic factors. However, the fact of being closely linked to the global economy does not necessarily imply higher income or value growth in the long term. It appears that the main advantage of investments in global cities is the broad base of demand and the lower risk of long-term, structural vacancy.

### 2.1 Global flows and real estate

The term “globalisation” in its current meaning was popularized by Levitt (1983) and has been used in various contexts since then. In general, it refers to the increasing importance and density of links between geographically distant locations. These links emerge on a number of different levels, and one way of analysing them is in terms of global flows, in particular flows of goods, services, financial instruments, people and information (see e.g. World Bank, 2007, Chapter 2; McKinsey, 2014). Significant growth has been observed over the past decade in all these categories. The emergence of the European Economic Area as the largest free trade zone, as well as the opening of the Chinese economy, are the most visible signs of the institutional trend towards a more open global economy. Innovations in long-distance transport and relocation of production facilities away from consumers have intensified

global flows of goods. Similarly, the internationalisation of financial markets has increased the integration of national financial systems. However, McKinsey (2014) argue that the increase in data and communication was the underlying force driving globalisation on all other levels by providing access to information and means of communication. This aspect links the analysis in this section with that in Section 3.

Real estate has historically been viewed as a local phenomenon. This paradigm is gradually changing as the value drivers for properties in one location can originate from an entirely different region of the world. As remarked by some authors, real estate has in effect become both global and local at the same time (e.g. Reiss, 2002; Ehrenberg and Mallen, 2003; Bardhan and Kroll, 2007): global in the sense of being targeted by international companies, and local in the sense of micro-locational factors having a profound impact on values. The key drivers of these effects can be seen in the above-mentioned intensification of global flows. While property as such remains immobile and tied to its specific location, the demand for space can be driven by developments in other parts of the world.

Stronger links between national and regional economies can increase spill-over effects, leading to stronger convergence of geographically distant real estate markets. However, since the global flows intersect in certain nodes, globalisation can also lead to the emergence of “global hubs” with very specific functions. Such hubs will also differ in terms of the scope and character of real estate services demanded by users. These two effects appear to have opposite impacts on the evolution of real estate markets. While the first should lead to gradual equalisation of locations around the globe in terms of rent levels and tenant requirements, the second would mean stronger polarisation. Determining which effect is dominant is key to the formulation of a real estate investment strategy. We address this in the next section.

## 2.2 Convergence vs polarisation

Significant amount of research exists addressing the connections between international markets. As noted by Case et al. (2000), the fact that properties in distant parts of the world exhibit similar patterns in rents and returns can be puzzling. Real estate is not portable, and it serves predominantly the needs of local businesses. Hence, some markets could overheat while others are in recession for a prolonged period of time, as neither demand nor supply can be easily relocated. The observed co-movements should therefore be attributable to some underlying “global” factors. Case et al. (2000) identify global GDP as the connecting factor. Similar conclusions are also formulated by Goetzmann and Watcher (1996) and Quan and Titman (1998), who look at office rents, values and returns. This research indicates that increasing international economic links resulting from flows of goods, services and money lead to some degree of alignment in the behaviour of international real estate markets. Brooks and Tsolacos (2008) confirm the existence of a long-run relationship between the office market returns in three financial centres: London, New York and Tokyo. Schindler (2009) reaches a similar conclusion for public real estate, finding that international markets are integrated in the long term despite seemingly low short-term return correlations. However, as argued by Haran et al. (2013), integration of international markets is likely to be higher

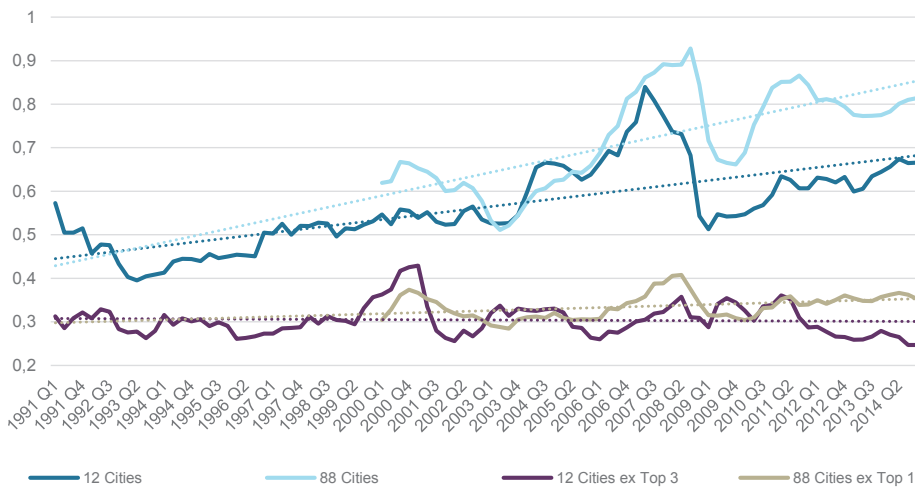
for public real estate companies than for private real estate investments, due to generally lower entry barriers for foreign investors. Indeed, Liow (2010) fails to confirm the integration of direct property markets across a number of countries. Generally, the linkages between private real estate markets are still far from perfect, and local factors play a major role, making international diversification in real estate portfolios worthwhile (Eichholtz, 1996; Worzala and Sirmans, 2003; Tyrell and Jowett, 2008). Moreover, the linkages can be distorted by major regional events.

In the context of this chapter, the stability of the links between markets is even more important than their level. Does the level of co-movement increase over time as the ongoing process of globalisation would suggest? There is little academic research addressing this question in a broader context, possibly due to the lack of long-run international return series. Most of the research in this direction concentrates on the convergence processes in Europe associated with the emergence of the European Union and the introduction of the common currency. While most researchers do find that the European real estate markets have become more similar in the course of EU integration (e.g. Worzala and Bernasel, 1996; Srivatsa and Lee, 2012), others are not able to confirm it, especially in the early period of the 1980s and 1990s (e.g. McAllister, 2001).<sup>1</sup> The convergence within the EU associated with the reduction of international barriers can be seen as a component of broader globalisation trends. Eichholtz et al. (2010) argue that increased transparency and lower institutional barriers levelled the performance of national and international property companies.

Empirical analysis of convergence trends in commercial real estate typically focuses on office markets due to better availability of data (see e.g. IMF, 2004, Chapter II). Addressing the fundamental changes in the relations between markets, we analyse office rents, which are available for more markets and with longer histories than other indicators. We look at two samples of office markets – a smaller one composed of 12 markets (six in Europe and six in the US) with 24 years of historical data, and a larger one with 88 markets (39 in Europe, 38 in the US and 11 in Asia) with 15 years of data history – and analyse cross-sectional variation of rents over time. Convergence as a consequence of globalisation would imply that rent levels, at least in the prime segment of the market, move closer over time as it becomes easier for businesses and workers to relocate. Hence, the variation of rents, as measured by the variation coefficient, should trend downwards. However, the results in Figure 1 indicate that the opposite was the case – variation in both samples trended upwards. Looking at the raw data, it becomes apparent that this result is driven mainly by a relatively small number of markets decoupling from the others, experiencing stronger growth in rents, and becoming significantly more expensive than the “broad mass”. These were in particular London, Paris, New York, Beijing and Singapore. Removing the top three and top ten most expensive markets from the respective samples led to roughly stable variation of rents in the remaining group.

<sup>1</sup> The available studies are based on data up to 2009. No research is yet available on the consequences of the divergence between northern and southern Europe following the 2008 financial crises, which could have affected the level of market integration in the European Union.

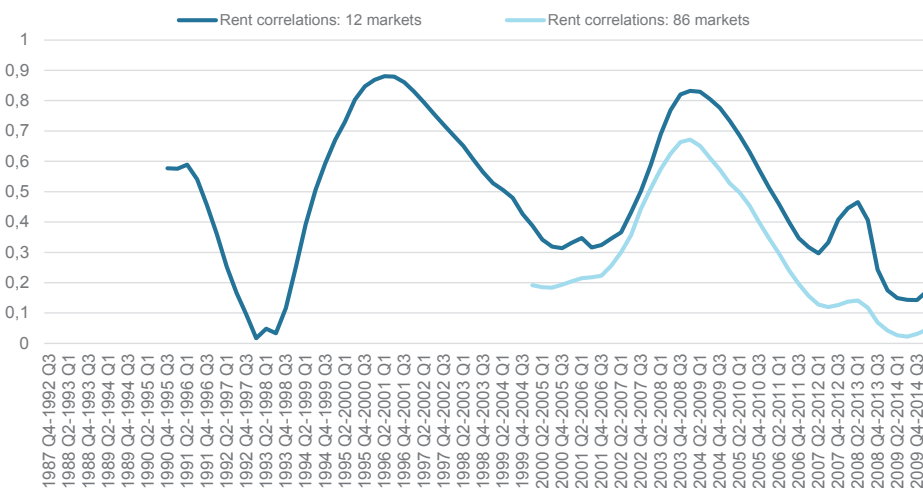
Figure 1: Cross-sectional variation of prime office rents in two samples as measured by the variation coefficient



Source: NBIM calculations based on CBRE data.

Co-movement of rents in different markets is possibly even more important than the convergence of rent levels. Increased linkages between markets should, in theory, facilitate the spill-over of rent movements across cities, as it becomes easier for tenants to move to a cheaper location when the current one becomes more expensive. To verify this hypothesis, we look at average correlations of office rents over a rolling time window of five years (20 quarters) within the two samples defined earlier encompassing 88 and 12 office markets. Figure 2 reveals significant variation of correlations over time. They appear to increase in periods of stronger market movements, and decrease in more tranquil times. However, there appears to be no clear long-term upward trend in the correlations that would indicate that markets have begun to move more strongly together as a result of the globalisation processes. While this simple analysis may be biased by various caveats, we are unable to find any increased co-movement of global property markets due to globalisation at this stage.

Figure 2: Average correlations of prime office rents in two samples over a rolling five-year window



Source: NBIM calculations based on CBRE data.



While further research would be necessary to formalise the above conclusions, the initial interpretation of these results is that a relatively small group of office markets in global cities have developed significantly differently than office markets in other cities over the past 15 to 25 years. Moreover, these most expensive locations tend to diverge from the average more strongly in periods with strong rent increases, in particular during the real estate boom of 2003-2008. On the other hand, no convergence trends can be observed across broader office markets outside of the global cities.

The above observation supports the hypothesis that globalisation trends in real estate have led to the emergence and growing importance of global hubs rather than the reduction of regional differences and alignment of market trends. This corresponds with the concept of global cities developed by researchers in the fields of sociology and urban geography, most notably John Friedman and Saskia Sassen (Friedman, 1986; Sassen, 1991). According to their work, the globalisation processes, and especially the growing role of transnational corporations, led to the emergence of a system of cities which fulfil specific pan-regional functions. They act as headquarter locations and hubs for business services. Moreover, as noted by Sassen, they are nodes of the global network in which some of the vital flows cross, in particular the flows of capital, information and people. Castells (1999) highlights the role of information technology in this context. The specific functions also impact the social and urban structures of global cities, leading in particular to stronger polarisation. Concentration of high-level services and workers drives real estate prices to levels at which local businesses and middle-income groups are unable to compete.

While there is no widely accepted definition of global cities, several attempts have been made to narrow down the criteria on which the level of "globality" can be measured. Among them are the density of transport and economic links, presence of major global companies, presence of international political institutions, and concentration of knowledge. Depending on the specific focus of each study, the selections and ranks differ, but certain cities appear in top positions in most rankings, most notably New York, London, Paris, Tokyo, Hong Kong and Singapore. While these lists have remained relatively stable over the years with respect to the top positions, a comparison with older rankings reveals that a number of cities in emerging markets have advanced significantly in the global hierarchy, in particular Chinese cities such as Beijing and Shanghai. A number of other big cities around the globe, such as Dubai, Mumbai, Moscow or Sao Paulo, have also gradually gained importance for international businesses, and the list of global cities might be seeing new additions in the coming decades given the urbanisation trends in emerging markets discussed in Section 5.3.

Table 1: Rankings of global cities by various sources

GwAC (Alpha+ Cities)	AT Kearney (Global Cities)	The Economist (Global City Competitiveness)	Global Financial Centres Index	Knight Frank (Global Cities)	Mori Memorial (Power Cities)
London	New York	New York	New York	New York	London
New York	London	London	London	London	New York
Hong Kong	Paris	Singapore	Hong Kong	Paris	Paris
Paris	Tokyo	Hong Kong	Singapore	Tokyo	Tokyo
Singapore	Hong Kong	Paris	Tokyo	Hong Kong	Singapore
Shanghai	Los Angeles	Tokyo	Zürich	Singapore	Seoul
Tokyo	Chicago	Zürich	Seoul	Sydney	Amsterdam
Beijing	Beijing	Washington	San Francisco	Washington	Berlin
Sydney	Singapore	Chicago	Chicago	Toronto	Hong Kong
Dubai	Washington	Boston	Boston	Zürich	Vienna

Sources: GwAC, AT Kearney, The Economist, The Mori Memorial Foundation, The Global Financial Centre Index 17, Knight Frank.

Looking forward, the key question relating to long-term investments in real estate is whether the trends of the past decades can be extrapolated into the future. To date, globalisation appears to have resulted mainly in the growing relevance of global hubs acting as focal points for international flows of capital, services and people. The general tone of the projections expressed by various researchers is that this trend is likely to continue, and consequently the role of the global cities is set to increase further.<sup>2</sup> Based on such predictions, it appears reasonable to focus investments in real estate on these cities as they offer a lower risk of obsolescence or severe loss due to structural weakness of demand.

### 2.3 Globalisation impact by property type

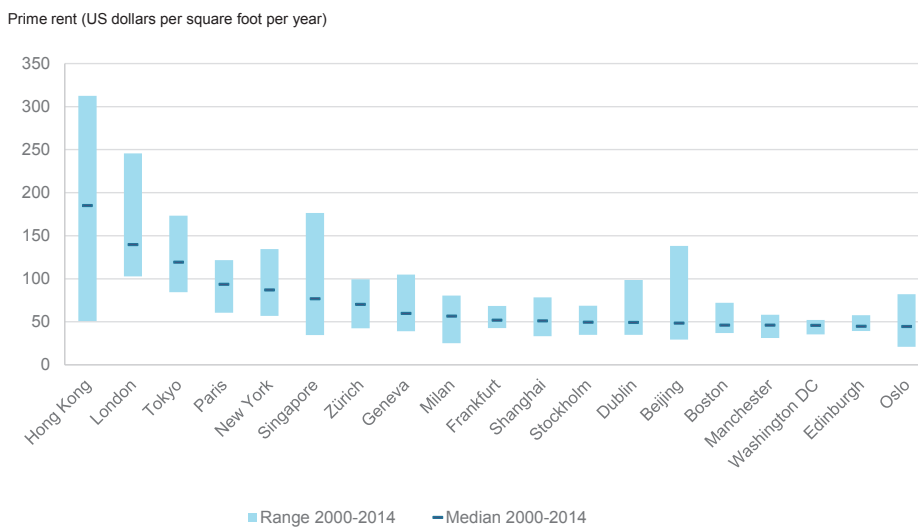
When considering the impact of globalisation on real estate, it is also necessary to note that it can differ significantly across individual property types. Office properties receive particular attention in the globalisation discussion. As businesses become active globally, office users become increasingly exposed to global trends, and so do office markets. Retail space markets are affected by the international presence of retailers and fundamental changes resulting from the popularisation of e-commerce. Finally, globalisation of supply chains has direct effects on the logistics markets.

#### 2.3.1 Office

The discussion in the previous section addressed certain aspects of globalisation with respect to office markets. It appears that convergence trends on markets for office space (leasing markets) are limited, while the focus on selected key hubs has become more apparent in recent decades. Looking at the real estate markets in the global cities, it is not surprising that rent levels are significantly higher than elsewhere (Figure 3). In terms of rents for prime office space in central locations, Hong Kong and London stand out, followed by Tokyo, New York, Paris and Singapore. This can be explained by the concentration of high-value services within relatively small geographical areas of these cities.

<sup>2</sup> E.g. Lizieri (2009), pp. 81ff.

Figure 3: Prime office rents in the most expensive markets worldwide, average levels during 2000-2014



Source: CBRE.

Other characteristics of office rents in global cities are less distinct, but historical data for the last 15 years indicate that the volatility tends to be above average and that rents are strongly driven by the global economy compared to local factors – correlation of rents with global GDP growth was mostly above 0.5. However, it is important to note that the function of a “global market” has not been associated with outperformance in terms of above-average rent or value growth. While Hong Kong has been among the top performers during the past 15 years, Tokyo has been among the weakest office markets worldwide. The advantage of investing in global hubs is therefore not necessarily superior growth, but a much wider base of demand and lower risk of long-term, structural vacancy.

### 2.3.2 Retail

The traditional retail business is by its nature local, as customers visit the shops in person and usually live in the catchment area of the retail scheme. The few exceptions to this rule are retail locations in transport nodes, such as airports and train stations or tourist-oriented locations. However, the face of the retail business is undergoing a deep structural change as a consequence of two major trends. One is the internationalisation of retail brands; the other is the emergence of alternative channels of communication with customers and distribution of goods, especially via the internet.

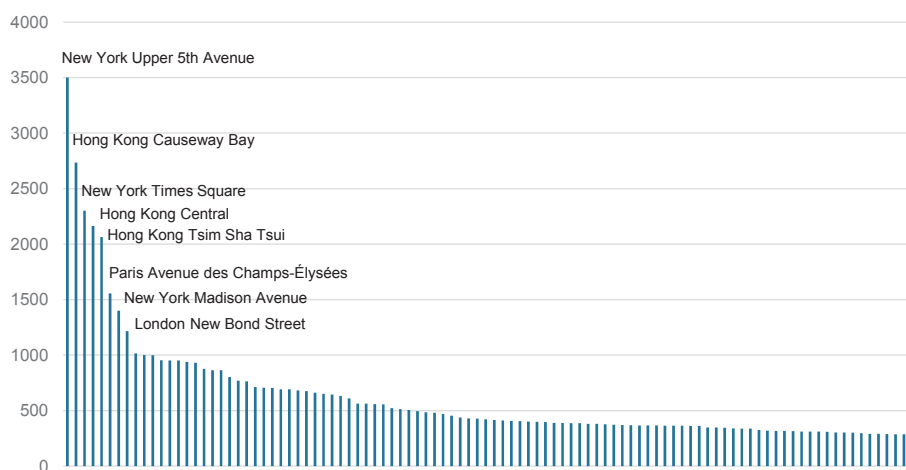
While local brands used to dominate their home markets, international and global chains have been taking over since the 1990s. This is visible in particular in the main retail locations of big cities and in shopping centres. According to a recent study by CBRE (2014), the trend is strongest in fashion retail and in the coffee & restaurant sector. The main cities in Asia and the Middle East dominate the list of target markets for international retailers. In effect, the range of products and the appearance of retail schemes worldwide are becoming more and more standardised, aligning with the requirements of the large international brands. A similar trend is observable with respect to shopping centre operators. Relatively few global players have already domi-

nated the landscape, leading to a certain level of alignment in the structure of the major shopping centre schemes worldwide.

The role of the internet in the retail business is discussed more thoroughly in Section 3, but it also has a globalisation dimension. The ease of communication enables retailers to address customers in other parts of the country or world. In effect, physical stores are becoming more strongly part of a broader multi-channel retail and branding strategy. This trend is strengthening the demand for highly visible prime locations which can fulfil a dual function: the traditional point of sale, and a “display window” with international impact. This is reflected in the rent profiles for prime locations in the global cities, which have diverged strongly from other locations in recent years. Prime retail streets in New York and Hong Kong, followed by Paris and London, clearly stand out, but also Sydney, Tokyo, Milan, Rome and Zürich display prime rents well above average levels (Figure 4).

Figure 4: Retail rents in the most expensive locations worldwide in Q4 2014

US dollars per square foot per year



Source: Cushman & Wakefield.

### 2.3.3 Logistics

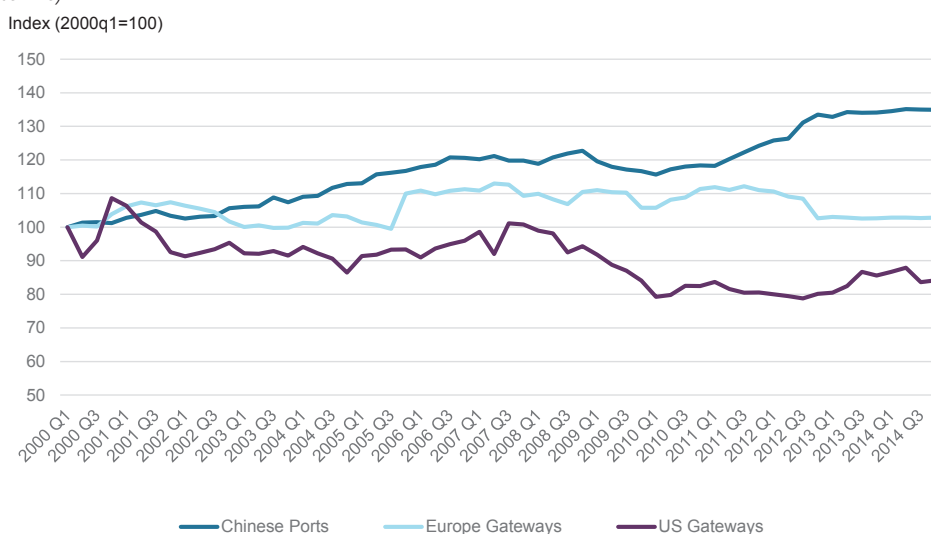
International trade has more than doubled over the past decade according to the OECD, driven especially by Asian economies, most notably China. The globalisation of production processes and the intensified flow of goods between producing and consuming countries has affected the demand structure for logistics/industrial properties. Lecomte (2008) addresses this topic and defines transnational logistics properties, which are “physically located in their domestic surroundings, but whose functional, locational and financial components are dominated by transnational activities” (p.17). Examples of such properties are import-driven warehouses, intermodal facilities with links to more than one mode of transportation, and distribution centres. The requirements for their location and technical parameters differ from those of traditional domestic warehouses in that they constitute an integral part of the global supply chain. This trend has been attributed to the increasing role of locations associated with international trade. The shift in global transport routes has also led to significant changes in the global focal points towards Asia. For example, while two out of ten of the world’s largest seaports were

located in China in 2002, six were in 2013, and Rotterdam was the only one outside the Asia-Pacific region. Moreover, as with retail, globalisation is resulting in an increasing level of standardisation of logistics properties worldwide. In order to ensure smooth operations across all regions, tenants require the same technical parameters of the buildings, which are gradually replacing old local standards.

Since reliable, long-run data on industrial properties is scarce, empirical verification of the globalisation effects is challenging. The available data for major global ports indicate that the emerging logistics locations in Asia, especially China, have experienced strong real growth in industrial rents. On the other hand, rents in the established gateways in Europe and in the US have remained flat or even declined in real terms. This highlights the fact that the performance of real estate is a combined effect of supply and demand, and the supply of logistics properties can be adjusted more quickly than the supply of most other types of real estate, due to the relatively simple and rapid construction of warehouses. These adjustment processes are smoother in established markets with existing dense transportation infrastructure than in emerging markets. In the latter, the provision of new logistics space often requires significant infrastructure investment, and the markets still need to find their equilibrium levels.

However, concentration on past performance masks an important aspect of locations in the key gateway markets – the continuity of demand. Even though location in a “global gateway” does not guarantee superior rent or value growth, the risk of obsolescence due to a structural change in the market is likely to be significantly lower. While it is generally possible for regular (local) logistics locations to become obsolete due to shifts in transport routes or the emergence of alternative locations, this is not very likely to happen in the major global hubs.

Figure 5: Warehouse/logistics rent indices for the key international gateway locations (in real terms)



Chinese ports: Beijing, Guangzhou, Ningbo, Shanghai; European gateways: Frankfurt, Hamburg, Amsterdam, London, Marseille, Rotterdam, Paris; US gateways: Houston, New York, Los Angeles, Chicago, Seattle; aggregate indices calculated as simple averages.

Source: CBRE.

## 3 Technology

Arguably, technological progress has been the driving force of the global economy since the industrial revolution. However, as the development of information technology has accelerated in recent decades, its influence on economies and societies worldwide has shifted up a gear. Although the impact on real estate markets to date has been weaker than in other areas of the economy, it is certainly one of the trends that have the potential to shape the real estate industry in the future.

Current trends receiving most attention are:

- E-commerce – rapid increase of sales via online channels and its consequences for the retail and logistics sectors
- Office technology – impact of information and communication technology on the character of office work
- Smart buildings – implementation of hi-tech solutions in buildings in order to reduce operating costs and energy consumption

Despite the notable public attention, there is still little well-founded academic research regarding the impact of technology on real estate markets. One also needs to bear in mind that the enormous pace of progress makes any long-term projections highly unreliable. In addition to the current trends, new ones are emerging constantly, and many of them could have a profound impact on real estate markets.<sup>3</sup> For example, one could consider the consequences of 3d-printing and “industry 4.0” on logistics markets<sup>4</sup>, the implications of the integration of transport and communication technologies for urban structures<sup>5</sup>, or the impact of “big data” on the functioning of real estate markets<sup>6</sup>. Since discussing all of these topics would go beyond the scope of this paper, we focus only on the abovementioned three trends. Also, to avoid far-reaching speculation, only broad consequences are outlined in this paper.

### 3.1 E-commerce

#### 3.1.1 Key trends

The sale of goods via the internet has evolved over the past decade from a niche branch of the retail sector to a large and rapidly growing distribution channel. In the US, the share of online sales has grown over the past five years from below 1 percent to 7 percent in Q1 2015 (source: US Census). However, excluding non-merchandise categories such as cars, holidays, petrol and tickets, results in a higher share of online sales in the US of over 12 percent.<sup>7</sup> In Europe, e-commerce is most advanced in the UK, where it accounts for over 15 percent of overall retail sales, followed by Germany (11.6 percent).<sup>8</sup> The average for the continent is around 8.4 percent. Participation in online retailing is also increasing quickly. According to Eurostat survey

<sup>3</sup> See McKinsey (2013a) for a broader discussion of potentially disruptive new technologies.

<sup>4</sup> See JLL (2013a) as well as DHL (2014) for a broader overview of technological trends affecting logistics.

<sup>5</sup> See WEF (2015) and Claudel and Ratti (2016).

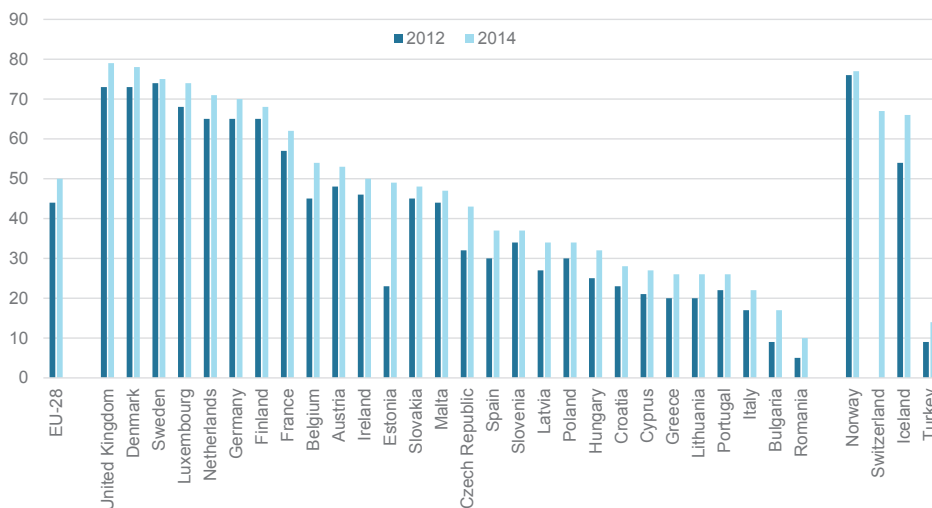
<sup>6</sup> See Catella (2015).

<sup>7</sup> Nelson and Leon (2012) argue that low-value items such as building materials, food and personal care items should also be excluded for a fair comparison; the share of online sales in overall US retail sales would then be above 15 percent.

<sup>8</sup> Source: Centre for Retail Research, <http://www.retailresearch.org/onlineretailing.php>, as at 2015.

data, 50 percent of adults aged 16-74 in the European Union have made an online purchase in the last 12 months (as at 2014). However, there remains significant variation across countries. While the ratio exceeds 75 percent in the UK, Denmark and Norway, it is below 20 percent in Bulgaria and Romania. If recent growth trends are extrapolated into the future, online retailing could become the main retail channel in the coming decades.

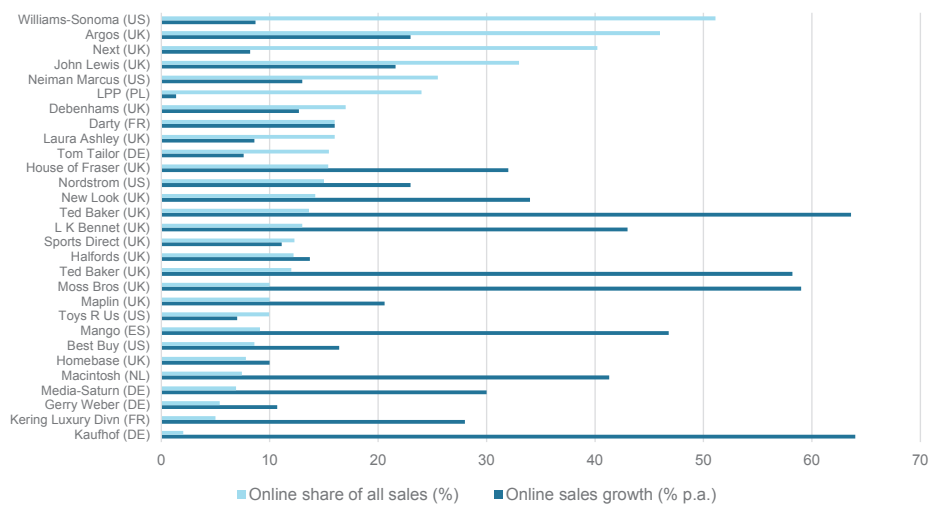
Figure 6: Individuals ordering goods or services online for private use in the 12 months prior to the survey (percentage of individuals aged 16 to 74)



Source: Eurostat.

Given the above trends, few big retailers can afford to ignore online sales. Amazon is the clear leader among pure online retailers, having entered the top 10 US retailers list in 2013 (by sales). However, most of the established “high street” retailers have opened online stores, implementing a multi-channel strategy. For some of them, in particular in the UK, online sales already account for a significant portion of total sales revenues (Figure 7). Not all segments of retail are equally affected by the trend. Electronics, media (books, movies, music), sport articles and household appliances tend to have the highest shares of online sales today, but clothing is catching up quickly (PwC, 2015; HDE, 2015; Nelson and Leon, 2012). The latter category is particularly relevant, as a significant share of high-street and shopping-centre tenants are fashion retailers. On the other hand, consumers still prefer to buy food, do-it-yourself products and furniture in physical shops, although online alternatives are also emerging in these areas.

Figure 7: Digital sales as a percentage of total sales and growth rate for selected European retailers (2014/15)



Source: PMA, based on latest full- or half-year figures as at October 2015.

Another relevant trend is the shift in online purchasing activities from desktop computers to mobile devices. The latter's share of total online sales was over 50 percent in Japan and Korea and 40 percent in the UK in 2014. The share is lower in other countries – around 30 percent in the US and Germany and 20 percent in France – but the trend is clearly increasing.<sup>9</sup> This trend bridges the gap between online shopping at home and physical sale in a store. In particular, it makes it easier for buyers to research products in-store but compare prices and buy online. Such behaviour, described as “showrooming”, has been frequently identified as a major risk for traditional retailers, but a survey by PwC (2015) indicates that the opposite trend is also present, with customers researching online in order to buy in a store (“webrooming”).

### 3.1.2 Impact on retail properties

The increasing role of online sales is having a direct impact on the market for retail space. The most immediate effect is the observed and projected decline in tenant demand due to the direct delivery of goods to the client. It appears unavoidable that physical stores will lose some of their turnover to online shops. Although detailed empirical data is difficult to obtain, there is some indication that the shift is already happening. For example, roughly 75 percent of respondents in a survey by HDE (2014) in Germany registered a reduced footfall in physical shops. In effect, HDE expects around 10 percent of retail locations in Germany to close by 2020.<sup>10</sup> The outlook from JLL (2010) is even bleaker, as it expects some 30 percent of the retail stock in developed markets to become obsolete.

While there is broad consensus that e-commerce will result in a decline in the overall demand for retail space, it is unlikely to be proportional to the shift in sales, and the impact will vary across the segments of the retail industry. Despite the increase in online sales, consumers still see physical stores as the main reference point for shopping, as evidenced by the PwC (2015) survey.

<sup>9</sup> Source: Criteo (2015).

<sup>10</sup> Derived from the expectation of 50,000 retailers possibly being forced to close by 2020. See PMA (2015).



This is also confirmed by the “webrooming” trend as well as the success of multi-channel retailing. The latter demonstrates that big traditional retailers, rather than fighting e-commerce, are including it in their business strategies. The increasing role of mobile devices makes it even easier to merge the physical and digital distribution channels. However, this also implies that the function of shops is changing. Rather than being only points of sale, they are increasingly becoming showrooms, providing clients with an opportunity to “touch” the product. Whether the effective purchase is made in the store or online becomes less relevant. This trend can be observed with the emergence of “experience shops” such as Apple Stores.

As a consequence of the structural changes, retail markets are likely to undergo sharp polarisation. As the role of retail space is changing, the value of locations needs to be judged not only by the potential to generate turnover but increasingly on the ability to facilitate online retailing by engaging the customer, demonstrating the product and building the brand. As argued by PMA (2015), the dual function is likely to boost the value of space in prominent high-street locations as well as dominant shopping centres. In the case of the latter, the entertainment component is likely to play a major role as a feature attracting consumers and intensifying the “shopping experience”. This trend is reflected in the evolution of retail rents, as the gap between prime and average has been continuously growing in recent years (based on data from CBRE and Knight Frank). Such a trend is also observable on a global scale, as rents in top retail locations in global cities have been diverging more and more from the levels observed elsewhere (see Figure 4 and the discussion in Section 2.3.2). In contrast, the outlook for smaller stores in secondary locations attempting to compete with online shops is rather bleak. Exceptions can be expected for retailers of low-value everyday goods, such as grocers, chemists and other convenience stores, which have been less affected by the e-commerce trend.

### **3.1.3 Impact on logistics properties**

The growing relevance of online sales and the continued preference of consumers for home deliveries have provided a significant boost to the logistics industry (PwC, 2015). Prologis estimates that around 10 percent of new leases on logistics properties globally were related directly to e-commerce, while in the UK, Germany, or France the share was even above 15% during the period 2012-2014. With the projected double-digit growth rates of online sales in the coming decades, their relevance for the markets for logistics and warehousing is also likely to increase. Prologis estimates that e-commerce uses three times more logistics space than the traditional retail channels, and so the declining demand for physical retail space should translate into growing demand for logistics space (Prologis, 2014 and 2015).

The additional demand for logistics properties created by e-commerce is being accompanied by structural changes in the industry. Large, specialised, pure-play retailers are developing their own distribution networks, while smaller ones are relying on third-party logistics (3PL). Even though giants such as Amazon attract public attention, the majority of online shops are small and medium-sized, supporting the business models of 3PL companies. For delivery to be efficient and quick, retailers and distributors need to be

located as close to their clients as possible. At the same time, coordination of global delivery networks requires sorting and fulfilment centres. In effect, three types of logistics properties have emerged that handle online orders (JLL, 2013b):

- large fulfilment centres holding the stock of products
- sortation centres preparing parcels for delivery
- delivery centres handling the “last mile” to the consumer

As the online retail business matures, its requirements with respect to logistics will evolve. The recent trend is towards a network of distributed fulfilment centres, which are smaller but closer to consumers and allow quicker deliveries. Hence, locations in the close vicinity of metropolitan areas are favoured. This trend supports local logistics locations, as opposed to global transportation hubs that are driven more by globalisation processes (see Section 2.3.3). Additionally, returns processing centres are emerging as a new type of logistics property, as more and more retailers allow buyers to return purchased goods if they are not satisfied. The new functions also result in specific requirements regarding the quality and fit-out of the properties.<sup>11</sup> Given the dynamics of e-commerce, the requirements of online retailers with respect to both the location and technical standards of logistics properties are likely to become the industry standard in the foreseeable future.

### 3.2 Office technology

The introduction of technology into the office environment has fundamentally changed the way office work is conducted. Despite this, measurable effects on office property markets have been limited so far, and the changes have been of a more qualitative nature. Nevertheless, a more significant impact in the future cannot be ruled out.

Technology allows a more efficient use of office space. As storage of documents has gradually moved from paper to electronic media, the amount of storage space required within office buildings has decreased. Availability of documents in any location and easy connectivity allow for more flexibility in the design of office space and organisation of office work. Since the linkage of one person to one desk has become less important, a number of companies have introduced the concept of “hot desks”, in particular those where staff travel significantly. Furthermore, the ability to work from home or any other location (telecommuting) has become a standard feature in the majority of large corporations (see surveys by WorldatWork, 2013, and CBI, 2011). Although it is still relatively little used, the trend is clearly increasing, as reported by Global Workplace Analytics, and the pressure is coming through several channels: cost cutting, sociological changes and sustainability trends.<sup>12</sup>

<sup>11</sup> See JLL (2013), CBRE (2013) or Prologis (2014) for an outline of technical requirements of logistics properties used by online retailers.

<sup>12</sup> The Survey of Income and Program Participation of the US Census reported that around 10 percent of Americans worked from home at least one day a week in 2010. On the other hand, the American Time Use Survey by Bureau of Labor statistics report that nearly 20 percent of employees perform any work from home. See also the statistics from Global Workplace Analytics at <http://globalworkplaceanalytics.com/telecommuting-statistics>.

A number of studies have argued that the above trends lead to higher utilisation of office space, reducing the effective space per employee and the overall demand for offices (e.g. West, 1998/99; Apgar, 2002). Miller (2014) models downsizing in office markets and finds out that workplace sharing, which is possible when part of the staff is working outside the office, is the single most dominant factor in the simulation model supporting downsizing results. He concludes that space per worker will continue to decline over time. However, the available data on the average office space per employee provides only limited evidence to support this hypothesis. While the office stock per employee in London's West End dropped from over 30 square metres in the early 1990s to around 17 square metres in 2014, it is less evident in the historical data for other cities in Europe and the US.<sup>13</sup> Nevertheless, the analysis of average lease sizes in the US revealed that they shrank 8.8 percent for B-quality space and 18.4 percent for C-quality space, but increased 4.4 percent for A-quality space between 2004 and 2014 (Ponsen, 2015). This can be explained by increased space efficiency in traditional offices combined with the increased role of meeting and entertainment space in top locations. This is in line with the anecdotal evidence that some of the global corporations have managed to increase the utilisation of office space from 50-60 percent to 80-90 percent. At the same time, trends reported by real estate agents are clearly in the direction of strengthening interaction and communication among the staff.

Looking forward, the impact of technology on the office markets is likely to continue. A decline in the average office space per worker as a result of flexible working models and telecommuting can be expected. However, innovation, communication and teamwork will become more important, requiring adequate facilities within corporate locations. This could also mean that the function of an office will gradually shift from being a place to perform "desktop work" to being a space of intense human interaction. Thus, the decline in desk space due to employees working remotely might be compensated by higher demand for meeting rooms and amenities that improve the communication among staff (Miller, 2013). Also, functions related to external business relations should remain unchanged. Offices are and will likely remain important as places where companies can meet their clients and business partners. It follows that CBD locations, which already fulfil these functions to some extent, should be less affected by a potential structural decline in demand than out-of-town office buildings, such as suburban call centres, which are normally intended only to accommodate desk workers.

### 3.3 Smart buildings

Technological innovation is providing new opportunities to increase the energy efficiency of buildings and respond to market demand for green buildings (see Section 4). While having the greatest impact on new buildings, these technologies are also being deployed in existing buildings in the context of equipment upgrades and deep retrofits. The declining implementation cost of hi-tech solutions accompanied by rising energy costs makes it likely that the scope of their implementation will increase over time.

Given the huge range of available options, these developments are affecting all areas of building operations. One prominent trend is towards integrated

<sup>13</sup> Based on data from PMA and CBRE.

building management systems (BMSs) used to centrally monitor and manage building operations through a data terminal. They allow more holistic management of building equipment and services by recognising that buildings are in effect dynamic systems defined by fluctuations in weather, occupancy and energy prices, and need to be dynamically managed in real time in order to optimise energy use. Another trend is the implementation of new metering technology known as “smart meters”, which is providing more granular data on energy consumption patterns in intervals of an hour or less. In addition to allowing detailed billing, they also provide a stronger basis for engaging tenants on their behaviour and identifying sources of cost savings.

The development of more sophisticated and efficient building systems has been a continuous trend in the commercial real estate industry. In the past five years, technological innovation has been particularly pronounced in the areas of lighting, insulation materials, heat pumps, cooling systems for dry climates, fuel cells, and off-grid renewable energy generation. As an example, whereas the specific energy consumption of a modern office and retail building typically ranges from 200 to 500 kWh/m<sup>2</sup>/yr including all end-uses, advanced buildings have frequently achieved less than 100 kWh/m<sup>2</sup>/yr (Lucon et al., 2014). As the cost of technologies comes down, returns on investment are likely to grow. Combined with the broader sustainability trends discussed in Section 4, “smart buildings” may become the market standard in some areas over the coming decades.

## 4 Sustainability

Recognition of the impact of economic growth on the natural environment and climate in recent decades has led to a rapid increase in public environmental awareness. An important backdrop to the recent sustainability trends is the growing attention given to how the built environment impacts, and is impacted by, global climate change and the conservation of natural resources. In 2010, buildings accounted for 32 percent of global final energy use and 19% of greenhouse gas emissions (Lucon et al., 2014). Hence, an improvement of the energy efficiency of buildings would make a significant contribution to achieving global commitments to counter climate change (McKinsey, 2009), while at the same time reducing operating cost. Other aspects of real estate sustainability refer to activities aimed at efficiently managing water and waste, but typically also include issues such as indoor environmental quality, tenant engagement, community engagement, and presence of public transportation.

This section focuses on selected factors driving the broader sustainability-related trends in commercial real estate. The main one is the demand from tenants who recognise the significant cost-saving potential of energy-efficient buildings as well as the reputational advantages of a smaller environmental footprint and the positive impact on staff satisfaction. Closely related to this factor is “green” certification of buildings, which has emerged as a significant trend in response to the challenges associated with measuring and communicating the level of sustainability for commercial properties. At the same time, following regional, national and international agendas, governments are increasingly introducing regulatory requirements for the sustainability performance of buildings and dis-

closure of information. Finally, risks to building structures arising from extreme weather effects as a result of climate change can be considered an aspect of the broader sustainability theme. Spanning all of the above topics is the impact of technological progress, discussed in Section 3.3.

#### 4.1 Tenant demand

In recent years, commercial tenants have increasingly sought office space with a variety of “green” features. This implies that such buildings should, on average, experience lower vacancy rates and higher rental levels. Recent research suggests that commercial office buildings with higher levels of energy efficiency or sustainability indeed achieve higher rents, occupancy rates and sales prices (Lyons et al., 2013; Jackson, 2009; Pivo and Fisher, 2010; Fuerst and McAllister, 2011; Eichholtz et al., 2010 and 2013; Devine and Kok, 2015).

The resulting “sustainability premium” arises from several sources. In the first place, more efficient, sustainable buildings provide tenants with lower operating costs. Many tenants are increasingly considering the total cost of occupancy when making leasing decisions. A sustainable building can significantly lower the proportion of occupancy costs not related to the base rent. For example, a survey conducted by the European Commission in 2006-2009 found that the average energy savings from sustainability-oriented improvements in existing buildings were 41 percent per year, and a similar study in the US found average whole-building energy savings of 15 percent (Mills et al., 2004). Moreover, since sustainable buildings are often monitored using sophisticated data management systems, they equip tenants with tools to better understand and manage their utility costs on an ongoing basis. This makes them particularly attractive to energy-intensive tenants whose utility costs make up a relatively large share of their total occupancy costs. For example, studies have found that financial services companies exhibited a relatively higher willingness to pay for leasing office space in sustainable buildings compared to other industry sectors (Eichholtz et al., 2013 and 2015; Wiencke, 2013).

The second source of the premium is associated with the fact that many corporate tenants have a commitment to leasing office space in sustainable buildings that goes beyond just realising cost savings (Bansal and Roth, 2000; Malkani and Starik, 2013; Mehdizadeh et al., 2013). Corporate offices, especially headquarters, are to a large extent also used for public relations and branding. As such, most tenants carefully select offices in ways that reflect the public image they wish to project to employees, clients and other stakeholders. Many corporate tenants also report publicly on how their business operations impact the environment. Since service providers mainly generate environmental impacts through their office activities, in addition to business travel, they often seek to lease office space equipped for efficient energy and water use as a means to achieve their corporate sustainability targets (Devine and Kok, 2015; Eichholtz et al., 2015).

The third factor, which has gained much attention recently, is the impact of building quality on tenant comfort and productivity (WGBC, 2014). It is intuitive that factors such as air quality, lighting or thermal comfort impact the health and well-being of employees. A European survey of motivations behind workplace strategy programmes at large companies found that attracting and

retaining talented employees was the most common, followed by increasing employee productivity and achieving cost savings (CBRE, 2014/15). The focus on employees makes sense given that employee costs – including salaries and benefits – often account for as much as 90 percent of business operating costs. Hence, only a modest improvement in employee health and productivity could have a significant financial benefit for employers. This effect would be particularly significant for companies in the international service sector, whose revenue streams depend on the productivity and retention rates of large pools of highly skilled employees. It is therefore not surprising that research has found the demand for sustainable office space to be higher in the financial services sector than in other corporate sectors (Wiencke, 2013).

#### 4.2 Green certification

Due to the high complexity of building operations, determining what constitutes a sustainable building can prove to be challenging. To address this problem, a variety of building certification schemes have been established. They are typically voluntary and can include both prescriptive standards, which identify practices that need to be followed, and performance-based standards, which identify goals that need to be met. Green certification has developed rapidly in recent years. For example, LEED, the leading green label in the US, increased its market penetration from below 1 percent in 2005 to over 5 percent in 2013 (CBRE, 2014). However, while several certification systems are used across the globe and some of them have developed an international reputation, no single international standard exists so far (see Table 2).

Table 2: Green building certification schemes in North America and Europe

	LEED	BREEAM	DGNB	HQE	GREEN STAR
<b>Country</b>	US (origin), used globally	UK (origin), used across Europe	Germany	France	Australia
<b>Certifying body</b>	US Green Building Council	BRE Group	Deutsche Gesellschaft für Nachhaltiges Bauen	Association pour la Haute Qualité Environnementale	Green Building Council of Australia
<b>Levels of certification</b>	4 (Certified, Silver, Gold, Platinum)	5 (Pass, Good, Very Good, Excellent, Outstanding)	3 (DGNB Bronze, Silver and Gold)	3 (Base, Performance, High Performance)	3 (Four Stars, Five Stars, Six Stars)
<b>Number of certification projects (excluding residential)</b>	72,000	26,442	1,146	1,775	1,266

Source: Individual certifying bodies.

Signalling the quality of the building to prospective tenants, and hence increasing its attractiveness, is typically the main motivation for owners to obtain certification. Numerous surveys confirm the effectiveness of this measure. For example, a survey by JLL (2012) found that 80 percent of US building owners that have pursued LEED certification expected to attract more tenants, and Eichholtz et al. (2013) found that rental premiums for ENERGY STAR ranged from 2 to 13 percent, and rental premiums for LEED ranged from 4 to 27 percent.<sup>14</sup> Certified buildings are also attractive due to the reputation-

<sup>14</sup> See also WGBC (2013) for a review of studies on that topic.

al benefits. Some international companies globally, and many government agencies in the US, have adopted sustainability policies that commit them to only lease office space in certified buildings. Finally, evidence suggests that tenants favour certified buildings because they provide higher-quality building services (Devine and Kok, 2015).

Given the pressure from occupiers, the role of green certification is likely to increase further. To some extent, we should expect a general convergence in approaches and higher transparency across certification schemes as demand for standardisation increases. As building certifications and labels become more prevalent, and sustainability performance data more accessible, market participants will be better equipped to integrate sustainability considerations into their decision making. At the same time, attaining certification may become standard practice in some office markets in the longer term, and so the lack of a certificate, rather than its possession, could become the (negative) differentiating factor. In addition to affecting rent levels and values of such buildings, it would greatly impair the general “leasability” of unsustainable space. Hence, disregard for certification, and sustainability standards in general, can increase the risk of obsolescence.

### 4.3 Regulatory requirements

Independent of the preferences of real estate owners and occupiers, national administrations and international bodies are pursuing broader sustainability agendas. Most countries have adopted regulations that require or encourage building owners to integrate sustainability considerations into building design, operations, renovations and marketing. Regulatory requirements may be introduced at national, regional and municipal level. Laws addressing the environmental performance of buildings can take many forms.

Energy disclosure standards require building owners to collect and report on energy performance. For example, several municipal governments in the US require the submission of energy data to a public registry for benchmarking purposes (Kontokosta, 2013). In Europe, the implementation of the Energy Performance of Buildings Directive (EPBD) in most EU member states has imposed a requirement on property owners to obtain and disclose an Energy Performance Certificate (EPC) when selling or leasing a building. Such disclosure standards are becoming increasingly common across global real estate markets.

Going beyond mere disclosure, many governments have set minimum requirements for building equipment and materials used in construction. However, they typically apply only to new buildings and buildings that are subject to major renovations, as is the case with the requirements set in the EPBD in the EU. Such standards potentially create a widening efficiency gap between the sustainability performance of new and existing buildings. Hence, the next generation of regulatory requirements is likely to include privately owned buildings in general (IEA, 2013, pp. 77). Developments in the UK have already raised the prospect of underperforming buildings facing leasing restrictions or other constraints on operations. Under the Energy Act 2011, it will be unlawful to let properties after 2018 that fail to achieve a prescribed minimum energy performance standard.

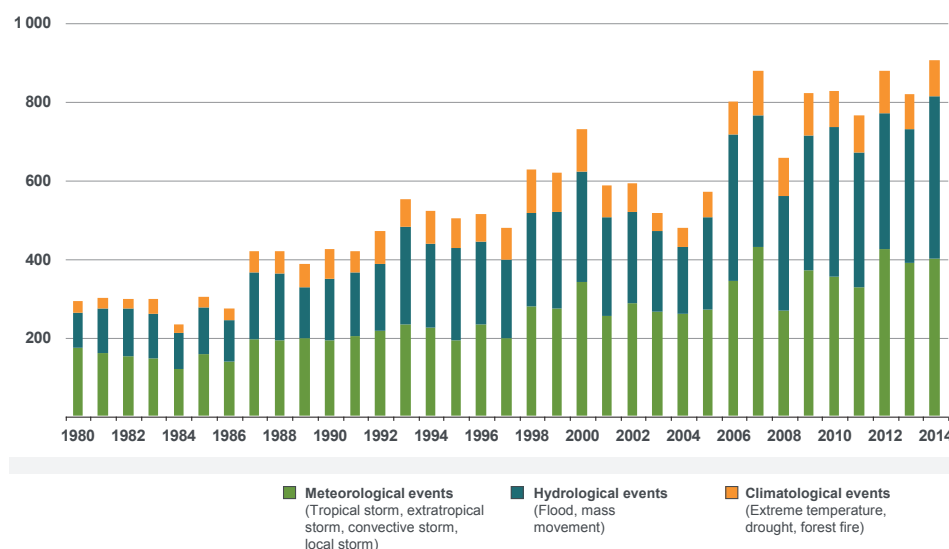
A relatively new trend is the requirement for green clauses in commercial leases. Although such clauses exist in a number of countries, they are currently mandatory only in certain leases in France (CMS, 2013). The goal is to encourage owners and tenants to integrate sustainability considerations into lease contracts. A green clause may include data sharing, cost coordination, or certification of the building. It should allow the parties to overcome the split-incentive problem that causes an overall underinvestment in efficiency upgrades in tenant spaces.

Sustainability-related regulations can affect the real estate markets in a number of ways. Most directly, minimum standards can impose significant compliance costs on underperforming buildings. In the extreme case, if a building fails to meet the standard, it could become illegal to operate. On the other hand, the disclosure requirements, along with green certification, support market trends driven by tenant demand as discussed earlier. Over time, they should enable greater market scrutiny of the sustainability performance of buildings. At the same time, international regulations related to sustainability are very dynamic, and more restrictive laws are frequently called for (see IEA, 2013). Given that most developed economies have building codes that are up for revision within the next three to five years, this creates a significant regulatory risk for less sustainable properties.

#### 4.4 Extreme weather events

Extreme weather can affect real estate directly by damaging the physical condition of buildings and their day-to-day operations. This can expose building owners and tenants to risk. Scientists predict that global climate change will increase the volatility of weather systems and patterns, including floods, droughts and storm surges, and cause sea levels to rise (Lucon et al., 2014). Extreme weather in the past three decades has gradually increased in frequency and intensity, resulting in significant economic costs (see Figure 8). This trend is consistent with scientific models of the effects of climate change on weather patterns and will likely become even more pronounced in the future.

Figure 8: Frequency of weather-related disasters globally, 1980-2014 (number of loss events)



Source: Munich Re (2015).



The exposure of an individual building to extreme weather risk is a function of its exact location, physical resilience and contingency plans. The high damage costs associated with recent extreme weather events suggest that many buildings were not originally built to withstand storms and floods of such intensity. Given the predicted changes to weather patterns resulting from climate change, investors will increasingly need to estimate the magnitude and frequency of extreme weather when deciding on new investments and deep renovations. They can also purchase insurance against associated damage, although greater volatility is affecting the ability of investors in particularly exposed areas to insure their assets at a reasonable cost (Bienert, 2014).

The physical resilience of the building can also affect the leasability of the space. While the financial consequences of physical damage to the building are most evident for owners, they equally affect the occupiers, who may face interruptions of their operations or unanticipated hikes in insurance premiums. Moreover, from the tenants' perspective, extreme weather can also inflict costs indirectly by harming the energy, water and transport infrastructure upon which buildings and their occupiers depend. While some of the direct costs can be addressed and reduced through building upgrades, indirect impacts are more difficult to prevent and are best addressed through contingency planning. In this context, the concept of resiliency to extreme weather can be applied not only to individual properties but to areas or even whole cities.<sup>15</sup>

## 5 Demographics and urbanisation

The world has seen significant changes to its demographic structure in recent decades. While concerns regarding accelerated population growth in Asia, especially in China, dominated the debate in the 1970s, the discussion has become more differentiated since then. Demographic trends that receive significant public attention are shrinking populations in some of the developed countries, rapid population aging, shifts in global wealth and social structures, especially in Asia, and the growth in urban populations worldwide, including the emergence of new mega-cities in Asia and Latin America.

Demographic patterns and the growth of cities are important drivers of long-term trends in real estate. Due to the complex and multifaceted nature of demographic changes, their impact is often ambiguous and the net effect is not always clear. Hence, the discussion in this section focuses mainly on partial effects. Moreover, not all property types are affected in the same way. The impact is likely to be strongest on residential markets, where population size, and age structure can lead to significant shifts in demand. With office properties, the consequences of population trends for regional office employment are relevant, while the impact on retail is the combined effect of population growth and wealth effects. Urbanisation is discussed separately as having a profound impact on investment grade real estate, which is typically located in cities. Overall, intensive population growth outlooks combined with positive

<sup>15</sup> See the "Resilient City" project at <http://www.100resilientcities.org/>.

wealth effects and intensive urbanisation trends appear to favour many of the emerging markets, in particular in Asia.

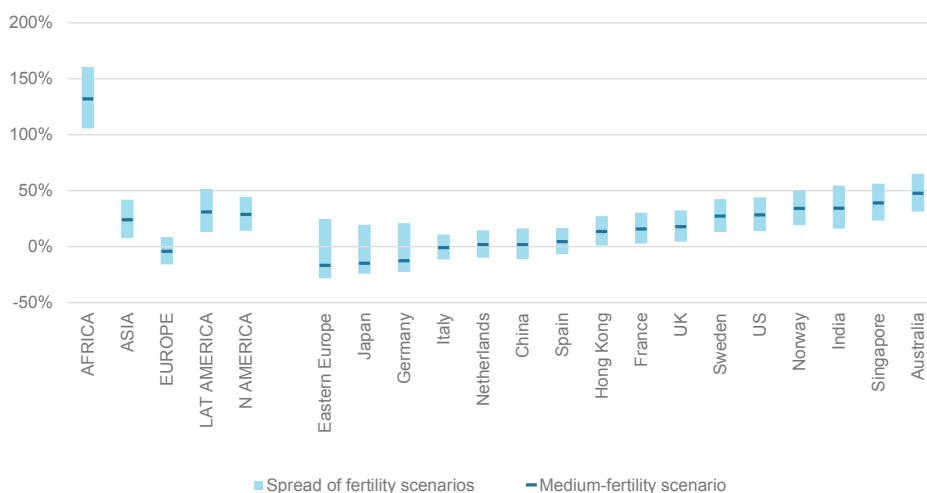
## 5.1 Key global demographic trends

### 5.1.1 Population growth

Figure 2 summarises the forecasts from the 2015 World Population Prospects (United Nations, 2015) for global regions and selected countries. Clearly, Europe is poised for the weakest growth, losing 4 percent of its population by 2050 in the “medium-fertility” scenario. Most affected by this development are Germany and Eastern Europe, which could shrink by 13 to 17 percent. Outside of Europe, only Japan has a similarly weak outlook – the Japanese population is set to shrink by around 15 percent. The effective decline will depend on the migration intensity, which can be difficult to forecast, but even moderately positive scenarios don’t foresee a reversion of the main trend.

On the other pole are emerging countries which will continue to grow. The strongest population increases in the coming decades are expected in Africa and parts of Asia, especially India, while growth in China is slowing down. Among the developed countries, growth projections are relatively strong for Australia, the Nordic region and the US; and France and the UK are also expected to see moderate population increases.

Figure 9: Population growth projections 2010-2050 in various fertility scenarios



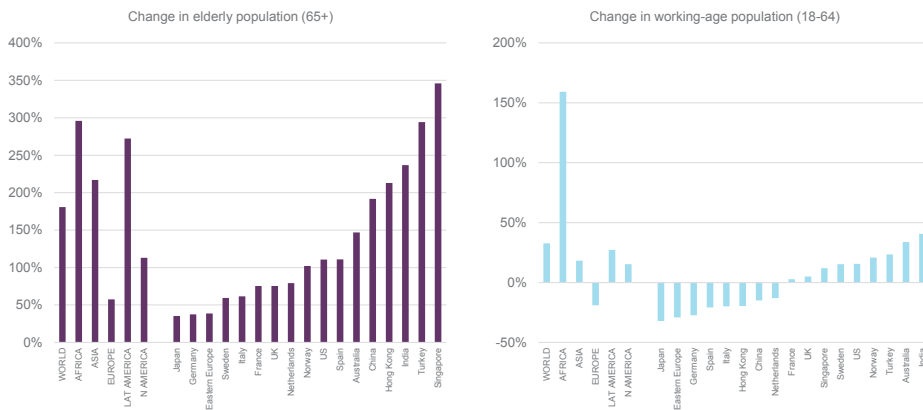
Source: United Nations (2015).

### 5.1.2 Aging

Along with diverging population growth rates and increasing life expectancy, the age structure of the population is shifting. In particular, the expected increase in the elderly population above 65 in the UN projections is striking. It is set to grow by 80 percent worldwide, and the increases are expected to be even higher in emerging markets. However, it needs to be noted that emerging markets have significantly younger populations at present, so that even by 2050 the elderly population in China or India will not exceed 20 percent, compared to 33 percent in Germany and 37 percent in Japan. Another conclusion from these projections with potentially even more severe consequences is the decline in the working-age population. The expected decrease

es in Eastern Europe, Germany and Japan are in the region of 30 percent. Strong increases are expected mainly in Africa and most emerging markets, but not in China. Among the developed countries, increases in the range of 15 to 30 percent are expected in Australia, the Nordic region and the US.

Figure 10: Population growth projections 2010-2050 by age cohort (medium-fertility scenario)

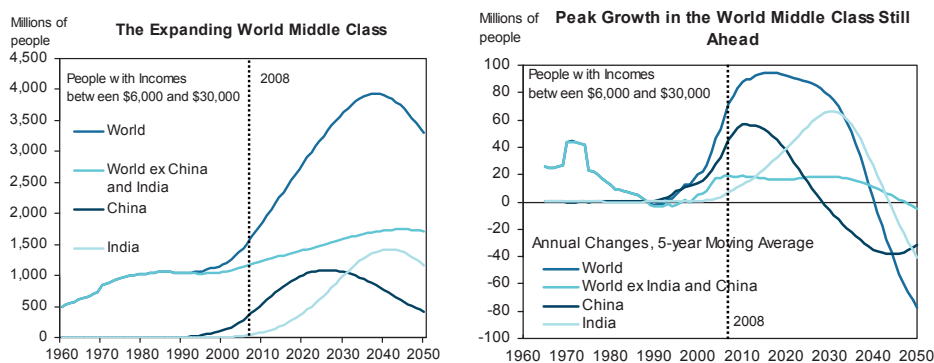


Source: United Nations (2015).

### 5.1.3 Growing middle class

The continued economic catch-up in emerging markets is increasing the wealth of their populations. This process is already under way and is expected to accelerate in the coming decades, resulting in equalisation of incomes. Projections by the World Bank (2007, Chapter 3) and Wilson and Dragusanu (2008) indicate that the global income distribution may become much more even during the coming decades, with the current gap between developed and emerging markets gradually closing. Moreover, income growth is likely to be strongest in the middle range, resulting in more than a doubling of the middle class. This increase will be driven by developments in Asia, mainly China and India, where the middle class has only started to emerge. At the same time, growth in the middle class appears to have peaked already in Central and Eastern Europe, while Africa continues to lag behind. Also, while the inequality across countries is decreasing, inequalities within countries appear to increase in a number of countries (see e.g. Alvaredo et al., 2013, and Credit Suisse, 2014, pp. 28-37).

Figure 11: "Middle class" population and growth – projections through to 2050



Source: Wilson and Dragusanu (2008).

## 5.2 Impact of demographic trends by property type

### 5.2.1 Residential

The residential sector appears to be most directly affected by demographic trends. A widely discussed paper by Mankiw and Weil (1989) formulated the hypothesis that the reduction of fertility rates in the US – the switch from baby boom to baby bust – would lead to a significant reduction of housing demand and a decline in house prices in real terms of nearly 50 percent within the next 20 years. While this forecast has not materialised, and the approach was heavily criticised by other researchers<sup>16</sup>, it appears straightforward that population growth or decline is the key driver of demand for residential properties in the long term.<sup>17</sup> It is important to consider that demand for housing is driven more strongly by the number of households rather than the total population. While both figures are related in the long term, trends can diverge strongly in the medium term. This is, in fact, the case in Japan and Germany. Despite declining populations, the number of households is still increasing in both countries, and a reversal is not expected before 2020 and 2030 respectively (Nishioka et al., 2011; Destatis, 2015).

When discussing the impact of population growth, it is also important to differentiate between national and regional trends, especially trends in urban, suburban and rural areas. In fact, while national population trends set the stage for broader economic trends, they are less directly relevant to developments on specific real estate markets, which by their nature are local. Given continued urbanisation, national projections may quickly become irrelevant when the analysis is conducted on a city level. In particular, the growth of megacities is likely to result in significant polarisation of the rent and price levels of residential properties. While growth can be expected in densely populated areas, smaller towns might even depopulate and fall off the map.<sup>18</sup>

From the investment perspective, the total demand for owner-occupied housing is less relevant than the demand for rental properties. Owner-occupancy ratios vary strongly across countries, from below 50 percent in Switzerland, Hong Kong and Germany to over 70 percent in Spain, Italy and Singapore. Most emerging markets have very high owner-occupancy – even as high as 90 percent. However, national averages mask variation within countries, which can be significant. Ownership rates also vary across age cohorts and tend to increase with age, so that renters are typically younger than owners. That means that aging could also negatively impact the overall home ownership rate.

Finally, changes in the demographic structures of societies, especially aging, are likely to affect the demand for different types of residential properties. Higher share of elderly people could not only increase the demand for smaller units with easy access to infrastructure, but also boost the demand for

<sup>16</sup> See Hendershott (1991), Engelhardt and Poterba (1991) and Swan (1995), among others, for a critical discussion of the Mankiw and Weil (1989) study.

<sup>17</sup> Nishimura and Takatas (2012) conduct a panel study of 22 countries showing the impact of demographic trends on house prices. See also Just (2013) for an extensive discussion of this topic from the German perspective.

<sup>18</sup> For example, Maennig and Dust (2008) find asymmetric medium-term house price trends in Germany; price shrink stronger in outward migration areas than they increase in inward migration areas.

related types of real estate, such as retirement villages, seniors housing, care homes, or medical real estate.

### 5.2.2 Office

The most immediate consequence of demographic trends for office markets results from the changes in the working-age population. These changes are relevant for the level of employment, which is considered to be the key driver of office demand (Wheaton et al., 1997; Hendershott et al., 1999). As indicated in Figure 10, the working-age population is expected to decline in a number of developed countries, with some notable exceptions, but increase in most emerging markets. However, it is important to note that city level trends do not always align with the national trends. While the German population is expected to decline, the major cities are expected to grow or remain stable. Same applies to Tokyo. In turn, this means the outlook for second tier cities in these countries is even bleaker.

Brounen and Eichholtz (2004) argue that a shrinking population will lead to a decline in the overall demand for office space. The authors highlight the fundamental difference between cyclical variations in office employment, which take place within an overall positive long-term trend, and the effective long-term decline due to demographic factors. In the former case, oversupply is temporary and office buildings constructed during the upswing will eventually be occupied when demand recovers from the downturn. However, if the decline in demand is structural, office space can remain vacant for a very long time. This is the consequence of asymmetric supply reactions mentioned earlier: adding new space to the market is easier than removing it. Therefore, positive demand shocks can result in a short-term boost to office rents, which reverses to the former equilibrium as new office space is completed, but the impact of negative shocks can be severe and permanent.<sup>19</sup>

In this context, it is also important to consider that trends in the major cities, where investment-grade office properties are located, might be significantly different to national trends. Moreover, the evolution of the employment structure across different economic sectors matters. Based on data from Oxford Economics, employment in office-using sectors as a share of total employment has been increasing over the past 15 years in most countries and cities, reaching over 60 percent in London, and this trend is forecast to continue. In effect, Oxford Economics expects office employment to increase in most developed countries over the next ten years, albeit more slowly than in the past two decades (Figure 12).

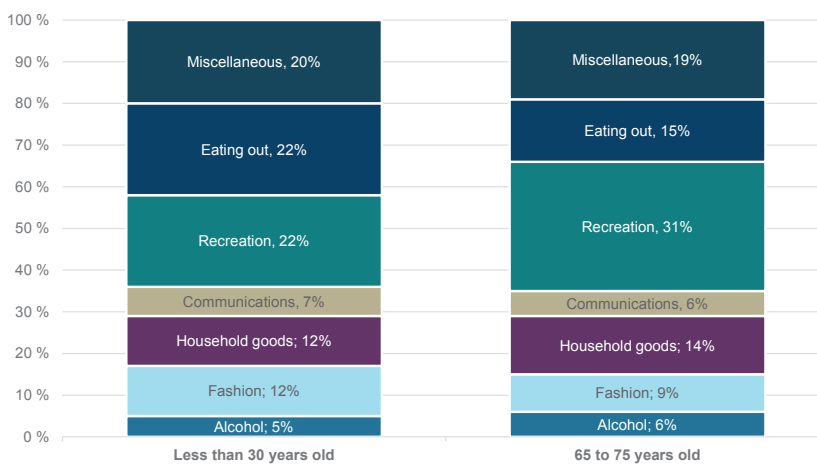
*19 Just (2008) argues similarly for the German office markets. See also the analysis of US office markets by Liang and McIntosh (1998). They find that employment growth is a significant driver of rent growth only in the short term, as long as supply cannot adjust, but becomes insignificant in the long term. Just (2008) provides similar arguments for the German office markets.*



emerging markets, which are expected to catch up with Western income levels and also see a growing middle class. The latter trend is already translating into strong retail sales growth in some parts of the world, in particular China. Moreover, since the sale of goods is inevitably associated with their delivery, the logistics sector will also benefit from this development. This is particularly relevant in the light of the growing role of e-commerce (see Section 3.1.3).

Another aspect to consider, in particular with respect to the developed countries, is the impact of a growing elderly population. On the one hand, the consumption patterns of this group tend to differ from those of younger consumers. As indicated by the example of the UK in Figure 13, people over 65 tend to spend more on recreation and less on fashion. On the other hand, this group also has other requirements regarding the accessibility of retail schemes. While this per se does not need to lead to changes in the demand for retail space, it may have consequences for the characteristics of properties demanded by retailers.

Figure 13: Consumption structure for different age groups in the UK



Source: ONS, based on Wallace and Durkin (2013).

Having discussed the potential effects of population shifts on the retail business, it is important to point out that these effects can be overridden by the technological changes discussed in Section 3. To some extent, the impact of technology also relates to the demographic changes, as younger generations – sometimes referred to as “millennials” – tend to accept technological innovations more readily. Hence, changes in the structure of the retail business might be deeper in developing countries that are expected to see population growth and a higher share of younger people quick to adopt new technologies.<sup>20</sup> This fact highlights the dependencies between the trends discussed in this paper.

## 5.3 Urbanisation

### 5.3.1 Growth of cities

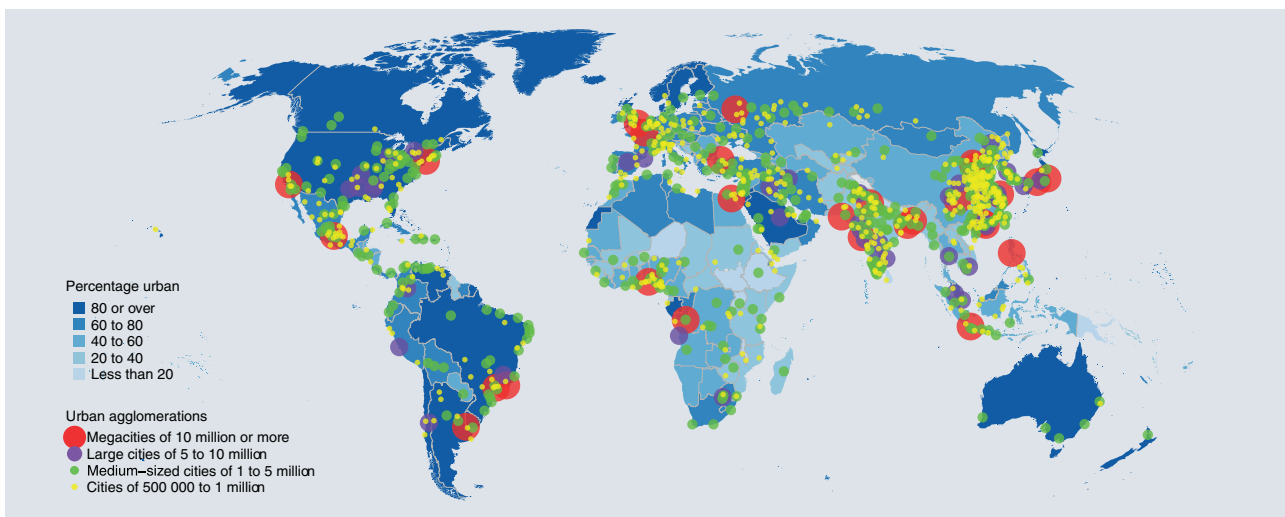
Amidst the top-level trends at both global and national level, population shifts from rural to urban areas have been observed across the globe for most of the past century. According to data and projections from the latest World Urbanisation Prospects (United Nations, 2014), this process has gradually slowed

<sup>20</sup> See also the discussion in PwC (2015).

down over the past 50 years, but is still significant and expected to continue. While 43 percent of the world population lived in cities in 1990, the share had risen to 54 percent in 2014 and is forecast to increase to 66 percent by 2050.

The pace of change is significantly higher in the developing countries than in the developed ones. In particular, China and India will contribute more than 30 percent of the total increase in the global urban population through to 2050. Moreover, the growth will mainly be in large metropolitan areas with populations above 1 million. While there were 270 such cities globally in 1990, the number is projected to reach 662 by 2050. The number of megacities with more than 10 million inhabitants is also set to increase from 10 to 41, most of them in Asia and Latin America. In the UN projections, Delhi will catch up with Tokyo as the world's most populous metropolitan region (around 35 million people), followed by Shanghai and Beijing and leaving behind New York and Osaka.

Figure 14: Projected urban population growth and largest agglomerations in 2050



Source: United Nations (2014).

While analyses of urbanisation trends often focus on the growth of cities, it is necessary to acknowledge that the process is more complex than solely the increase in population. In particular, urbanisation has far-reaching social and functional consequences. On the one hand, large cities attract poorer workers due to the easier availability of unskilled work and better transportation infrastructure (Gleaser et al., 2008; Eeckhout et al., 2014). On the other hand, large metropolitan areas also attract highly educated and wealthy individuals due to the concentration of high-income jobs and lifestyle diversity (Behrens et al., 2014; Gyourko et al., 2013; Rosen, 1981). In effect, income inequality tends to increase with the size of the population of the urban area (Madden, 2000). The scale of this inequality is likely to be higher in emerging markets than in developed countries. There are also differences in the character of urbanisation with respect to the type of growth (urban sprawl vs urban regeneration) or the quality of the urban infrastructure. As a consequence, the trends observed in the metropolitan areas of developed countries can be markedly different than in the megacities of the developing regions.<sup>21</sup>

<sup>21</sup> See UN-Habitat (2012, 2014 and 2015) for the discussion of urbanisation issues in emerging markets.



Finally, the growth of cities also has consequences for the structures of the metropolitan areas. New functional centres arise as growth thresholds are passed. While the growth of a city typically increases the relative importance of the centre, it can also lead to the creation of alternative competing centres. The structure of the transport networks is key in this regard. Relationships between and within city areas are extremely complex and beyond the scope of this paper, but their effects on the quality of micro-location can be profound.

### 5.3.2 Impact on real estate

The consequences of urbanisation for the demand for residential properties are straightforward. It will inevitably boost the demand for multifamily housing and apartments, which are more common in dense urban environments. Moreover, the increase in the demand for rented living space can be even higher than the population increase as urban areas tend to have lower ownership rates and a higher share of renters than rural areas. For example, in the US, circa 50% of households owned their residence in cities while the share was 70% outside of the metropolitan areas (US Census, as of 2013). Hence, urbanisation can also have consequences for ownership structures and the availability of income producing real estate investment products.

For office and retail space, city growth expands the demand base which is driven by employment in the services sector and the total purchasing power. The effect is likely to be particularly strong in emerging countries. McKinsey expects that 45% of Fortune 500 companies will be located in emerging regions by 2025 compared to 17% in 2010. At the same time, the global growth of the urban consumer class during 2010-2025, defined as the increase in the number of individuals living in cities with incomes of more than \$10 per day PPP, is forecast to come almost entirely from emerging cities. This is also attributed to the increasing wealth and growing middle class in these regions (McKinsey, 2012 and 2013b, Dobbs et al., 2015, p. 15ff). Should these forecasts materialise, the demand for additional office and retail floor space in emerging markets would outpace new demand in the US and Western Europe by far. Moreover, as discussed in section 2.2, emerging cities have already been moving up in various classifications of global cities in the recent years. It can be expected that the extraordinary growth of megacities in Asia and Latin America will result in at least some of them "ascending" to the status of global cities. Such a shift should provide a significant boost to the rent levels in the top office and retail locations in these cities.

Logistics properties are also expected to benefit from the urbanisation trends. Traditionally, logistics locations are focused on transportation nodes around the cities and tend to avoid more expensive, densely populated areas. However, this is not possible in very large metropolitan areas where short delivery times for day-to-day goods require vicinity to consumers. This is likely to be intensified by the e-commerce trends discussed in section 3.1.3. In addition, new retail distribution channels that rely more strongly on direct deliveries can operate more efficiently in denser urban areas.<sup>22</sup> This could have a positive impact on logistics demand and rents in attractive locations.

<sup>22</sup> See also DHL (2012) for a more detailed discussion of the implications of growing mega-cities for the logistics business.

Whilst the expected growth of cities is likely to boost the demand for real estate, it is also necessary to consider the supply side. As mentioned on several occasions throughout this paper, construction industry responds to changes in demand, albeit with a delay. If new stock is created at a similar pace as the expansion of demand, growth of rental values might be short-lived. Long term increases of real rents for offices and retail are more likely in central locations, in which new supply is more difficult to provide. However, this paradigm does not necessarily need to hold in a quickly growing city as its functional centres may evolve over time. This is significantly more likely to be the case in emerging cities, where the functional structures have not yet fully matured and the transport infrastructure is evolving. The high pace of urbanisation may in fact make it challenging for real estate investors to harvest growth in these cities and creates additional risks despite the indisputably favourable demand trends. In this context, investments associated with the growing city infrastructures might bear a relatively lower risk. However, in any case, micro-location within the city will remain the key factor determining both performance and risk.

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