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Article

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Is Demography Destiny? Urban Population Change and Economic Vitality of Future Cities

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ABSTRACT. The growth of cities has attracted considerable scholarly attention during the last decade as it is becoming clear that powerful agglomeration forces are reinforcing the role of cities as the engines of economic growth. Close to 4 billion people live in cities, about 55 per cent of the world's population. While population growth rates are declining and the world's population is likely to level off from the middle of the 21st century, probably ending up around 10 billion, further urbanization is expected to continue. Another 3 billion people will become urban citizens this century. At the same time no corner of the world will be sheltered from sweeping demographic changes due to population ageing and increasing migration. Such changes will be amplified in cities. In this paper we combine UN population projections and migration data with our own assumptions to derive projections of age composition and birthplace composition of urban populations by continent. We also briefly address the consequences of these demographic trends for future urban economic vitality. Particular attention is paid to the impacts of demographic changes on urban creativity and innovation. We conclude that, with the right policies in place, such demographic changes enhance rather than impede the future prosperity of the urban world.

KEYWORDS. *World population projections, urbanization, ageing, migration, ethnic diversity*

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1. INTRODUCTION

The world population reached the 7 billion mark sometime between late 2011 and early 2012. Population growth rates are declining in most parts of the world and already negative in some developed countries. From 2050, when the world population is expected reach 9.3 billion, growth will gradually diminish to zero. The midpoint of a range of projections for the end of the century suggests that world population may peak by then at around 10 billion (United Nations, 2011). However, the proportion of the world population that lives in cities has been steadily increasing and already reached 50 per cent in 2008. In the future, the population of urban areas is expected to increase further from 3.6 billion in 2011 to 6.3 billion in 2050 (United Nations, 2012). In fact, cities and towns are expected to absorb *all* population growth in the future by their own natural increase and by drawing in rural population. The total number of people living in the world's rural areas may start to decline in about a decade. By 2050 there are likely to be 0.3 billion fewer rural inhabitants than at present (United Nations, 2012).

There are major differences in these demographic changes between countries and continents. In 2011, 78 per cent of the population of the more developed regions lived in urban areas, compared with 47 per cent in less developed regions. Fuelled by powerful agglomeration forces (e.g., Glaeser and Gottlieb, 2009), further urbanization is expected to continue everywhere. By 2050, urban dwellers may account for 86 per cent of the population of more developed regions and 64 per cent of less developed regions. These urban populations live in cities that vary hugely in size. United Nations (2012) expects the number of mega cities of at least 10 million inhabitants to increase from 23 in 2011 to 37 by 2025. Even though the populations of megacities grow faster than those of smaller cities, they account for only a small proportion of all urban people (a projected 13.6 per cent in 2025). By 2025, it is estimated that about 1 billion (24.3 per cent of the urban population) will live in cities of 5 million to 10 million inhabitants and another 2 billion in cities with fewer than 500,000 people.

Besides this diversity between cities, there is also considerable demographic diversity within cities. Declining fertility and increasing life expectancy lead to structural ageing of urban populations. In the developed world, this is reinforced by the bulge of large 1945-1960 birth cohorts (the baby boomers) reaching retirement ages. At the same time, geographic mobility has been increasing sharply in recent decades and is leading to an ever larger proportion of the world population living at a location which is not their place of birth.

In this paper we project forward the age distribution of the population of cities and the share of foreign born people in cities. We also consider ethnic diversity among the foreign born. While the United Nations' Population Division of the Department of Economic and Social Affairs provides projections of urban and rural populations (by age and sex), official projections of

country of birth composition of the urban population do not exist. In this paper we therefore combine United Nations data with World Bank migration data and our own assumptions to project forward the age distribution of the population of cities and the share of foreign born people in cities. To our knowledge, these are the only such combined projections currently available. Projections for net migration are issued by the United Nations, however, these data are of limited use in establishing future gross migration trends. Hence we use our own extrapolation method to project forward the share of foreign born in cities across continents. We also consider of the ethnic diversity of the urban population in terms of continent of birth. For these calculations we had to assume that all or most migrants are located in urban areas, which we consider a reasonable assumption.

We find that the share of the population aged 65 and over is increasing in cities on every continent. At the same time, cities are becoming ethnically more diverse, particularly in Europe, North America and Oceania. The paper then briefly considers the impact of these urban demographic changes for future economic vitality of cities.

This paper is organized as follows. The next section describes global trends in population growth, age structure, international migration, and urbanization, by continent. This is followed in Section 3 by a projection of future trends in urban ageing and diversity, again by continent. Section 4 briefly considers the impact of urban demographic change for future urban economic vitality. The final section provides some broad conclusions.

2. UN POPULATION PROJECTIONS

The projected population data for this paper are sourced from the Population Division of the United Nations – Department of Economic and Social Affairs and are based on the *World Population Prospects: The 2010 Revision* (United Nations, 2011). The population of each country of the world, starting with an estimated population as on 1 July 2010, is projected forward after taking into account all relevant information regarding the past demographic trends of that country or area (e.g. taking into account the impact of HIV/AIDS) and by incorporating detailed assumptions about future trends in fertility, mortality and international migration. Acknowledging the level of uncertainty associated with predicting future trends, a number of projection variants are produced, labeled as “low”, “medium” and “high”. In the 2010 revision of the world population prospects, the UN projections are based on a stochastic projections methodology. 100,000 trajectories of future fertility are drawn for each country and the median values determine the medium projection variant which has been used for all the analysis presented in this paper. Mortality is based on extrapolation of life expectancy increases up to the highly developed country “ceiling”, while projected levels of net migration are based on past levels and

the likely policy stance of each country. Projected levels of net migration are generally kept constant up to 2050 after which it is assumed that net migration will decline. The implication of this is a downward trend in global population redistribution through migration, which seems incongruent with the long-term increase in population mobility generally and temporary migration specifically (e.g., Hugo, 2009). We will return to this issue and our own migration assumptions in the next section.

Generally speaking, however, population projections at the global level are reasonably reliable with increasing uncertainty the smaller the spatial scale considered. Even though the prediction by Meadows et al. (1972) of a Malthusian collapse of the world economy in the early 21st century turned out to be too pessimistic, the expectation at that time (four decades ago) of a current world population of around 7 billion was remarkably correct. Similarly, it would be hard to imagine how global population trends could deviate greatly from the broad trends presented in this paper.

Figure 1 shows the “bottom line” for world population when combining the various assumptions in world population projections. While the figure shows the possible paths of projected world population up to 2100, in this paper we center population change on 2010 and consider projections 40 years forward (to 2050) and past experience 40 years back (to 1950). The high variant suggests a population of 10.5 billion by 2050, in contrast to 8 billion with the low variant. Levels of future population are declining in probability away from the medium projection of 9.3 billion in 2050. This compares with a world population of only 3.7 billion in 1970.

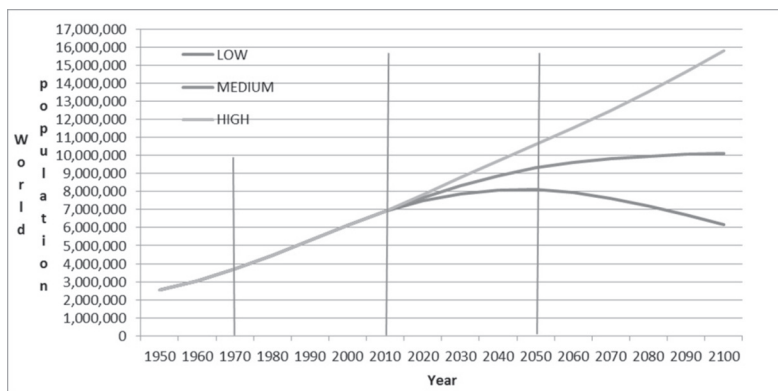


Figure 1. World population, 1950 – 2100: low, medium and high projection variants

Data source: United Nations (2011)

After a very large increase of 87 per cent in the world population over the 1970-2010 period it is projected that there will be a significant deceleration in the growth rate to 35 per cent over the forty years after 2010 (see Figure 2). The population of all the continents, except Europe, is expected to increase over the 2010-2050 period, with the greatest increase in Africa where the population is expected to more than double (114 per cent). The next highest growth is in Oceania (51 per cent). The European population is expected to decline marginally (by 2.6 per cent). This leads to a dramatic shift in the ratio of the population of Africa over that of its neighbor Europe: from 1.4 in 2010 to 3.0 in 2050. Given the large differences in standard of living between the two continents and the ageing of the European population, it is inconceivable that this will not lead to further net migration from Africa to Europe.

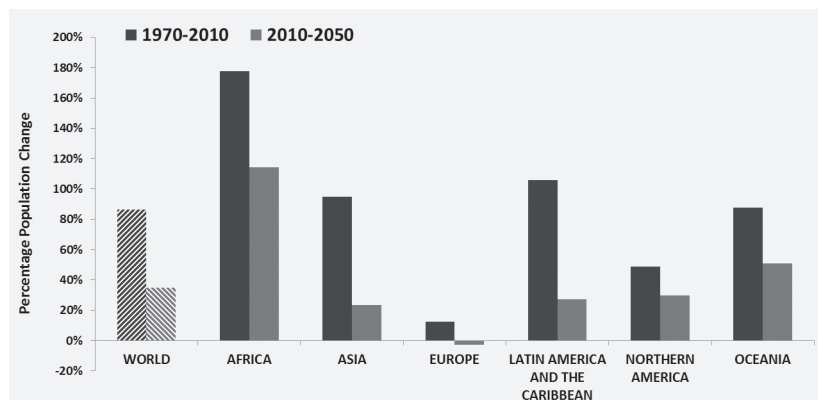


Figure 2. Population growth by continent, 1970-2010 and 2010-2050

Data source: United Nations (2011)

The changes projected in the world population are not uniformly distributed over age groups. As seen in Figure 3, over the next 40 years there is projected to be little population growth among those aged less than 25 years, while the number of older persons (65 and over) will continue to grow as fast as over the last four decades. Consequently, the world is seeing an unprecedented growth in the *absolute* number of older persons as well as in their *share* of the total population. It can also be argued that the 1970-2010 rise in the population of prime working ages (20-54), the “demographic dividend of declining fertility” has been instrumental in the industrialization and growing importance of Asia, while at the same time contributing to growing mobility and urbanization everywhere.

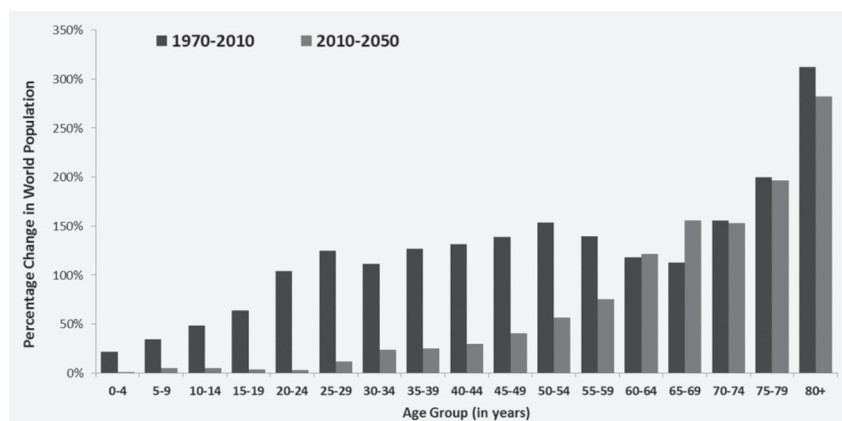


Figure 3. World population growth by age group, 1970-2010 and 2010-2050

Data source: United Nations (2011)

The changes in the age composition of the population can also be effectively summarized in demographic dependency ratios. The *total dependency ratio* is the ratio of the “dependent” population (that is, those aged 0-14 and 65+ years) to the productive population (15-64 years). An increase in this ratio indicates an increase in the transfers required from the part of the population engaged in the market economy to those who are not economically active. As shown in Figure 4, the total dependency ratio is projected to increase everywhere except in Africa over the next 40 years. This will have a major impact on the funding of social security programs and on global savings. The increase in the total dependency ratio is most significant in Europe and Northern America (the ratio increases by 63 and 37 per cent respectively). The old-age dependency ratio (population aged 65+ years divided by the population aged 15-64 years) is set to increase everywhere, while the child dependency ratio (population aged 0-14 years divided by the population aged 15-64 years) will decline everywhere except in Europe and Northern America where it is estimated to increase slightly over the 2010-2050 period. The increase in the old age dependency ratio has led to the question whether some developing countries may “grow old” before they “grow rich”.

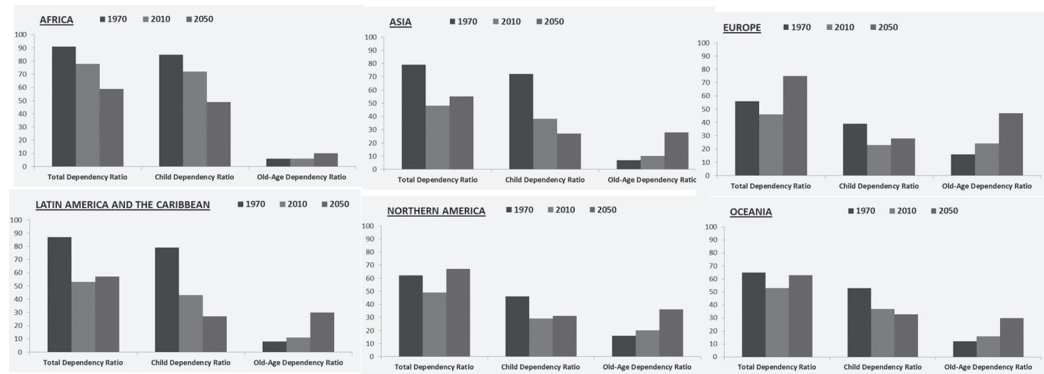


Figure 4. Demographic dependency ratios by continent: 1970, 2010 and 2050

Data source: United Nations (2011)

NOTE. The Total Dependency Ratio is the ratio of the “dependent” population (that is, those aged 0-14 and 65+ years) to the productive population (15-64 years) times 100. The Child Dependency Ratio is the ratio of those aged 0-14 over those aged 15-64 years times 100. The Old-Age Dependency Ratio is the ratio of those aged 65+ years to those aged 15-64 years times 100.

Net migration is the total number of immigrants arriving in a given area over a given period less the number of emigrants, including both citizens and noncitizens. Because every immigrant is also an emigrant, net migration for the world as a whole is zero. Therefore, Figure 5 which shows the global net migration over five year periods, is symmetric (the aggregate loss of the continents with net emigration is equal to the gain of the continents with net immigration). Intercontinental net migration was very low prior to 1985 after which it started increasing and reaching a peak after the turn of the millennium. The 2000-2010 decade was truly the ‘age of migration’ with Europe, Northern America and Oceania gaining a significantly high number of immigrants. The post 2010 projections for the number of net migrants are based on a number of factors like the past migration history of a country or area, the migration policy of a country, and the influx of refugees in recent periods. The projections suggest that there will be gradual decline in net migration over the next 40 years. Table 1 reports net migration rates for 1965-70, 2005-2010 and 2035-2040. The net migration rate in Oceania (7.54) was the highest of all continents in 1965-70 and remained the highest in 2005-2010, but is projected to decline sharply to 1.54 by 2035-2040. Europe still experienced net outward migration over 1965-1970, but experienced a net inward migration rate of 2.46 over 2005-2010 (which hides significant intra-continental migration). For all continents, net inter-continental population redistribution is expected to decline (with the largest net outward migration rate expected in Latin America and the Caribbean).

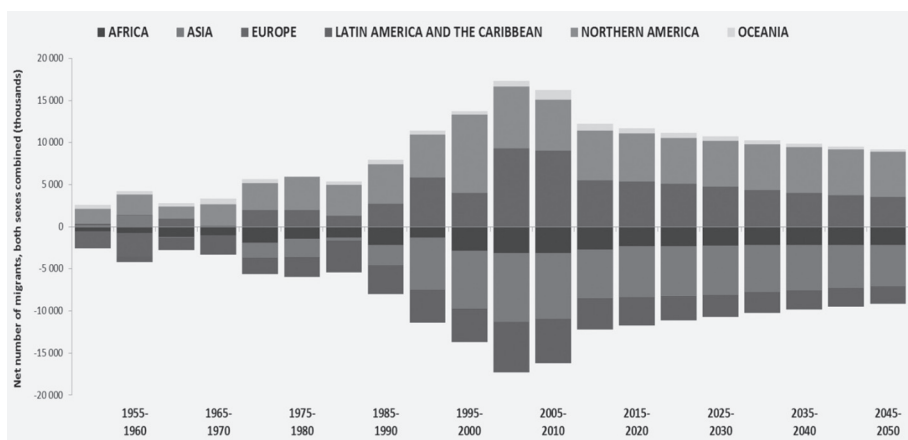


Figure 5. Global net migration: past, present and future

Data source: United Nations (2011)

Table 1. Net migration rate by continent

Continent	1965-1970	2005-2010	2035-2040
Africa	-0.57	-0.65	-0.25
Asia	0.01	-0.39	-0.21
Europe	-0.01	2.46	1.10
Latin America and the Caribbean	-1.72	-1.82	-0.63
Northern America	2.28	3.59	2.59
Oceania	7.54	6.35	1.54
World	0.00	0.00	0.00

Data source: United Nations (2011).

NOTE. The net migration rate is the number of immigrants minus the number of emigrants over the five year period, divided by the person-years lived by the population of the receiving continent over that period. It is expressed as the net number of migrants per 1,000 population.

Two caveats must be noted. The first is that intercontinental net migration hides considerable redistribution within continents, as noted above for Europe. The second is that these net migration rates are based on measures of permanent and long-term migration that exclude large flows of temporary and circular migrants. While it is very hard to obtain accurate global statistics on this phenomenon, there is no doubt that temporary (seasonal or circular) international migration is increasing faster than permanent migration. Many countries issue a growing number

of temporary work permits for international migrants to meet labor shortages, with a transition path to permanent residency built into the policy (e.g. Constant et al., 2012).

Turning now to urban populations, it should be noted that there is some variation across countries in the definition of “urban” and “rural”. The estimates and projections are based on the information provided by the statistical offices of individual countries. Currently (in 2013), close to 55 per cent of the world’s population live in urban areas and this proportion is set to increase to close to two-thirds (67.2 per cent) projected to be living in areas designated as urban by 2050 (United Nations, 2012). Figure 6 shows that the increase in urbanization is observed across all continents, but with the greatest increase in Africa and Asia. Potential future changes in rural-urban migration and in international migration are the main contributors to urban population growth uncertainty in the short to medium term. The projections of urban populations have therefore greater uncertainty attached to them than projections of total population. Another point that is important to note is that there are major differences in urbanization within continents. The greatest contrast can be found in Oceania, where the overall urban share of the population of about 70 per cent in 2000 is the composite of 87 per cent of the population of Australia and New Zealand being urban, as compared with only 23.5 per cent in the Pacific Islands (Bedford and Hugo, 2012). The Pacific Island population is expected to become more urbanized in the future however, (up to 36.3 per cent by 2050), whereas urbanization in Australia and New Zealand is expected to have reached a ceiling. In the next section we will combine future population prospects, as provided by the United Nations, with our own assumption to consider trends in the age composition of cities and the ethnic diversity of urban populations.

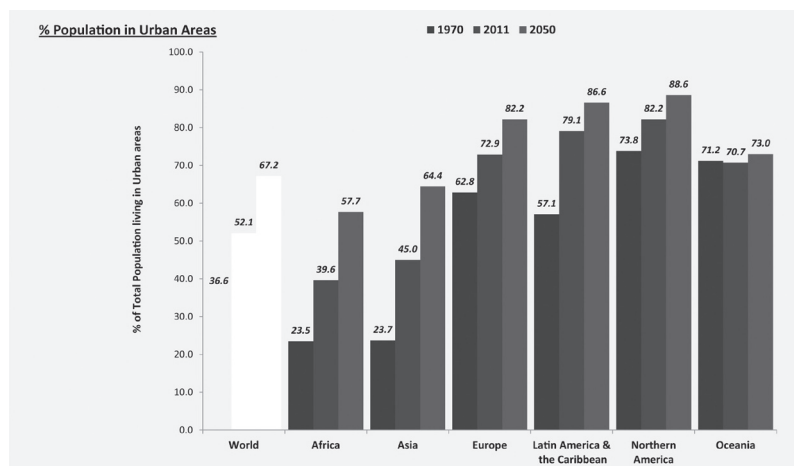


Figure 6. Percentage of world population living in urban areas: 1970, 2011 and 2050

Data Source: United Nations (2012)

3. PROJECTING FUTURE TRENDS IN URBAN AGEING AND DIVERSITY

No official projections exist of the demographic composition of the world's cities. We have therefore combined data from the United Nations with our own assumptions to project forward the age composition of cities and the ethnic diversity of the urban population. Because there is very little migration to rural areas (except for seasonal migration in agriculture, but this is of little importance for quantifying the number of long-term and permanent immigrants in cities), we firstly assume that all foreign born reside in cities. Secondly, we subjectively forecast the share of foreign born in the population. For continents with positive net migration, we have extrapolated the upward trend in the share of foreign born in the population. However, for continents with negative net migration historically – which has tended to coincide with a decline in the share of foreign born, we have assumed a floor in the share of foreign born that is consistent with the global trend in increased geographic mobility overall. Increasing global migration is expected to have been only temporarily disrupted by the Global Financial Crisis of 2008 and the subsequent recession in the developed world. Table 2 shows that on the basis of our assumptions, about 4.13 per cent of the world population is expected to live by 2050 in a country other than the country of birth, as compared with 2.86 per cent in 1970 and 3.10 per cent in 2010. It is assumed that the percentage foreign born will increase to 3 per cent by 2050 in Africa (most of this will be intra-continental migration) and 2 per cent in Asia, Latin America and the Caribbean. The greatest share of foreign born is expected to be found in Northern America, increasing to 22.5 per cent in 2050.

Table 2. The share of foreign born residents by continent

	1970	2010	2050
Africa	2.44%	1.88%	3.00%
Asia	1.60%	1.47%	2.00%
Europe	5.88%	9.46%	12.50%
Latin America and the Caribbean	2.00%	1.27%	2.00%
Northern America	6.59%	14.52%	22.50%
Oceania	15.56%	16.44%	18.00%
World	2.86%	3.10%	4.13%

To consider the future age distribution of the urban populations, we first compare the age composition of the world's rural areas and urban areas in 1970 and 2010. Figure 7 shows that the world's urban population is structurally older than its rural counterparts with smaller proportions

at younger ages and higher proportions at the productive and older ages. In 1970 about 10 per cent of the world's population consisted of rural 0-4 year olds, but this group's share declined to 5.7 per cent by 2010. In the world's cities the child, old age and total dependency ratios were 51.0, 10.5 and 61.5 respectively in 1970 and 35.6, 11.5 and 47.1 in 2010. Consequently, we see that the world's cities have experienced a demographic dividend in that the total dependency ratio in cities has declined sharply even though aged dependency has increased. This will have contributed to increasing investment, innovation and growth in cities in recent decades.

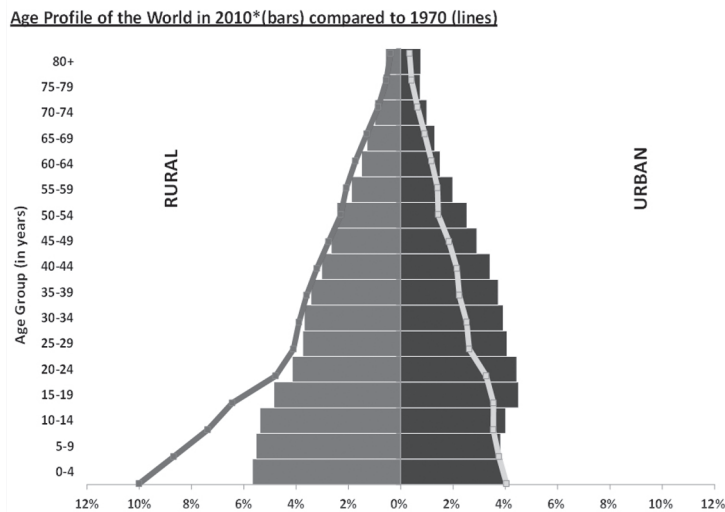


Figure 7. Changes in the age composition of the rural and urban world, 1970 and 2010

Data source: United Nations (2010)

At the continental level, the rural and urban shares of the population aged 65 and over have been very similar up to 2010 (see Figure 8). The exception is Oceania, where life expectancies are much higher in highly urbanized Australia and New Zealand than in the much less urbanized Pacific Islands. In 1970, 6.5 per cent of the world's urban population was aged 65+ years, increasing to 8.2 per cent by 2010. Using UN projections of future age composition of continents and applying this to cities, this is projected to increase to 16.2 per cent by 2050. The 'ageing' of the urban population is most significant in Europe, with more than a quarter (26.9 per cent) estimated to be aged 65 years or more by 2050, followed by Northern America (21.6 per cent) and Latin America and the Caribbean (19.1 per cent). However, even Asia is ageing remarkably fast, with a projected 18 per cent of the urban population expected to be 65+ by 2050. Consequently, particularly the cities of Latin America and Asia are growing relatively more "old"

than “diverse”. We have not projected forward the age composition of the rural population in 2050, as is strongly dependent on long-term trends in rural-urban migration, which are hard to predict.

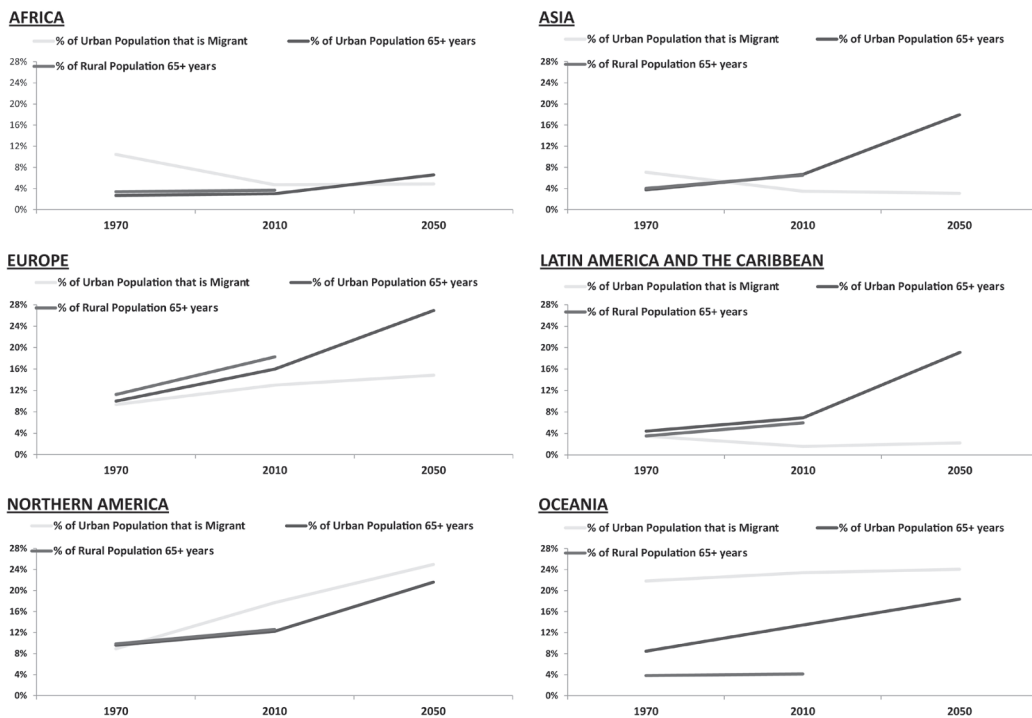


Figure 8. International migrants as shares of the urban population; and urban and rural shares of 65+ year olds, by continent: 1970, 2010 and 2050

Data source: Authors' own calculations with United Nations (2009, 2010, 2011) data.

Using the projected shares in the foreign born population given in Table 2, combined with the assumption that most immigrants are located in cities, we calculate projections of the share of the future urban population that is foreign born. This is also shown in Figure 8. We see that population ageing is the dominant global urban demographic trend everywhere which will, in turn, reinforce growth in international migration. However, foreign migration can never fully compensate for the ageing of the population when immigrant fertility rates are similar to, or converging on, those of the host population. There are major differences across continents, however. The shares of foreign born exceed those of older people in Northern America and Oceania cities. In contrast, in Asia, Africa, Latin America and the Caribbean, shares of foreign

born urban residents remain small. In Europe, ageing of cities is proceeding while growth in the share of foreign born is expected to decelerate. Once again it should be noted that the intercontinental comparisons hide major intra-continental differences.

The growth in the number of immigrants in cities around the world has contributed to growing cultural and racial diversity, which has become part of the economic “buzz” but also of social tensions in metropolitan areas. To measure ethnic population diversity it may not be very informative to simply count the number of countries of birth represented among the urban population, particularly at the aggregate level of a large city or country. Diversity can be more effectively quantified by a diversity index, such as the fractionalization index (see e.g. Ozgen et al. 2011). This index measures the relative spread of the foreign born population across the full range of countries of birth present. The index is calculated as follows:

$$Div_i = 1 - \sum_{j=1}^N s_{ji}^2$$

in which s_{ji} is the share of those born on continent j ($j=1, \dots, N$) in the total urban population of continent i . Clearly we consider continent of birth here as a rough proxy of ethnic diversity. Migrants originating from the host continent itself are excluded from this calculation. If these migrants are included in the calculation, the index is quite highly correlated with the share of foreign born in the population rather than representing a quite different measure of diversity (see also Ozgen et al. 2011). The diversity of cities increases with an increasing value of the index. The index value can range between 0 (all migrants originate from the same continent) and $1-1/N$ (there are an equal number of migrants from each of the continents).

Figure 9 shows that Africa and Asia have the lowest ‘continent of birth’ urban diversity index, with the index for Africa declining over the 1970-2000 period. This is predominantly because most migrants who are resident of cities in Africa originate from other countries in Africa, i.e. they are intra-continental migrants. The continents with net inward migration (Europe, North America, Oceania) have seen increases in diversity. The greatest increase in diversity has been in Oceania, particularly over the 1970-1990 time period, with the index doubling from 0.3 to 0.6. Diversity as measured by our fractionalization index has been declining in Northern America over 1990-2000 due to the growing impact of immigration from one country, namely Mexico, on the birthplace composition of the foreign born population of the United States.

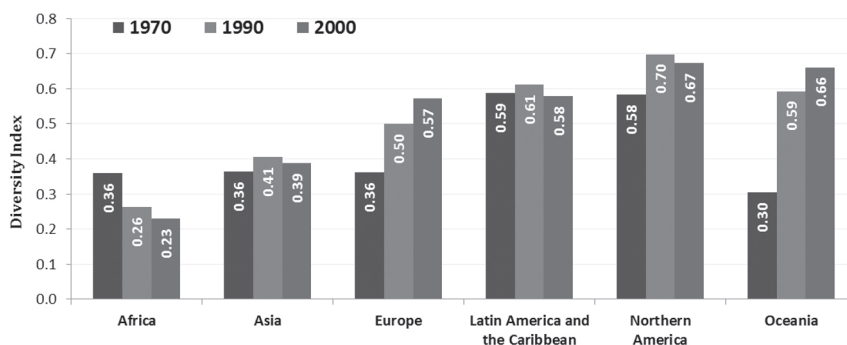


Figure 9. “Continent of Birth” diversity of the world’s urban population

Data source: Authors’ own calculations with United Nations (2009, 2010, 2011) data.

NOTE. The displayed indexes exclude diversity in country of birth of intra-continental migrants.

4. IMPLICATIONS OF URBAN DEMOGRAPHIC CHANGE FOR THE URBAN ECONOMY

The analysis of demographic trends and projections in the previous two sections shows that the demographic forecast for the future city suggests a greater prevalence of “grey” (a larger absolute number and share of the population aged 65 and over), as well a “rainbow” (greater ethnic diversity). We also saw that there are major differences between continents and countries. These demographic changes have complex and wide-ranging implications for the urban economy and for city life more generally. At the same time, urban economic change is having impacts on fertility (decreasing), mortality (decreasing) and inward migration (increasing). The bi-directional interaction between the urban population and the urban economy is complex (see e.g. Poot, 2008, for a review). Of particular interest is the impact of demographic change on agglomeration.

There are various reasons why agglomeration has been increasing in recent decades (e.g. de Groot et al., 2009, Glaeser, 2011) and many of these have direct links with demographic change. Firstly, technological change, new infrastructure and greater competition have contributed to a decline in real transportation costs, which have increased geographic mobility and made the metropolitan areas more accessible. Secondly, globalization has led to greater specialization and increasing returns to scale, reinforced by greater population diversity. The increasing complexity and services orientation of production necessitates greater sharing (infrastructure, scale of market, variety opportunities, risk pooling), matching (employee specialisation, labour pooling) and learning (through reaping the benefits of tacit knowledge exchange among “smart” people).

All these processes benefit from larger populations and greater population diversity. Additionally, migration leads to a process of self-reinforcing “sorting”: big cities attract the most productive firms (high R&D, ICT) and workers (“power couples”, see Costa and Kahn, 2000). Finally, cities are more “fun”: attractive amenities offset higher rents (lower real wages) and disamenities (e.g. pollution, congestion, crime). However, we should note that there is a great heterogeneity of change among cities. Not all cities are growing and there is an increasing concern for population decline of cities in peripheral areas, coinciding with net outward migration and population ageing (e.g., Coleman and Rowthorn, 2011).

When we consider the rapid rate of urbanization that is due to global economic transformation and strengthening of net positive agglomeration economies, it is plausible that migration reinforces this trend because of the positive impact of inward migration on productivity (e.g. Nijkamp et al. 2012). At the same time, population ageing slows down urbanization, given that geographic mobility is strongly correlated with age and older people have much lower mobility rates. Consequently, there appear to be two opposing forces: migration strengthening urbanization and ageing weakening it. However, in recent years this perspective has been challenged and, specifically, it can be argued that older people make a positive contribution to urban competitiveness and urban social capital (e.g. Kresl and Ietri, 2010).

There are many schools of thought regarding the determinants of long-run urban growth, but innovation is central to all of them (Cochrane and Poot, 2013). While the physical accumulation of production factors is subject to diminishing returns and the unlimited exploitation of finite natural resources can lead to Malthusian collapse, it is clear that ideas are ‘non-rival’ and have only limited/temporary excludability (primarily through patents). Consequently, the generation of ideas is (until now) an exclusively human activity that is most effectively undertaken in the “buzz” of cities. Cities, which host public and private R&D organizations, facilitate the generation and dissemination of ideas. In this knowledge creation and absorption is contingent on the presence and diversity of human capital.

From the perspective of demographic change, the question therefore arises to what extent “youthfulness” and “global geographic mobility” are essential for innovation. It may well be that demographic change is reinforcing a core-periphery structure of the global economy, in which the core hosts a youthful and mobile metropolitan population while the periphery is challenged by net outward migration and population aging. This perspective may, however, be too simplistic. Even though cross-sectional studies suggest that ageing regions have lower productivity growth (e.g. Poot, 2008), at the micro level it cannot be argued that older populations are less creative. Skills of younger and older workers are often complementing. Additionally, Jones (2005) found that while the age of peak physical performance is the same as it was a century ago, the age of peak mental ability is gradually increasing as life expectancies increase. In any case, by attracting

migrants, large cities remain relatively youthful and increasingly diverse, although the international competition for talent is fierce in today's global economy and may reinforce the gap between cities in core regions and those in peripheral regions.

In recent years, increasing attention has been paid to the benefit of increasing cultural diversity in cities on productivity and innovation (for reviews see Ozgen et al. 2011, 2013). This research finds that firms that employ fewer foreign workers are generally more innovative, but that diversity among a firm's foreign workers is positively associated with innovation activity. The positive impact of diversity on product or process innovations is greater among firms in knowledge-intensive sectors and in internationally-oriented sectors. The impact is robust to accounting for endogeneity of foreign employment, given that immigrants may be attracted to more innovative (and often better paying) firms.

It is tempting to argue that the benefits of immigration for the youthfulness, innovativeness and productivity of the migrant-hosting metropolis has a counterpart in the ageing, vulnerability and stagnation of the cities and regions that lose population through migration, particularly when emigrants are positively self-selected in terms of acquired skills and unmeasured ability (the 'brain drain'. The negative impacts of the brain drain have been challenged in recent years (as reviewed by e.g. Nijkamp et al., 2012). Recent studies suggest that the higher returns obtainable abroad to investments in education and training encourage a greater proportion of the work force to invest in human capital than otherwise, thereby generating a positive spillover in the source country labor market. The injection of remittances into migrants' home countries can also have positive impacts on growth.

5. CONCLUSIONS

In this paper we have analyzed past trends and future projections of population at global and continental scales in order to ask the question how the cities of the future might be affected by these demographic changes. In this context it should be noted that the population "explosion" which the world has witnessed since 1950 has been unique in the history of demographic development. This era will now be replaced by an epoch of much slower global population growth, of population ageing, and of significant spatial redistribution. We have seen that the demography of cities varies across continents and within continents. While the number of megacities will be increasing further, most of the new urban residents will be found in medium-sized cities. Other cities will face shrinking populations, with wide-ranging consequences (Coleman and Rowthorn, 2011).

We can conclude that the socio-economic aspects of urban population change have been mostly positive. There has been a remarkable increase in life expectancy, even in the least

developed countries. The benefits of agglomeration that contribute to the continued urbanization of the world's population are leading to further declines in fertility, which may in turn assist developing nations in reaching a higher standard of living. Assessments of long-run global economic trends suggest a decline in poverty everywhere, except to date in sub-Saharan Africa. So far, predictions of Malthusian gloom associated with population growth have tended to be overly pessimistic, given that real prices of many non-renewable resources are the same or less than they were 50 years ago, despite the addition of 4 billion people. With the right policies in place, the expected demographic changes should enhance rather than impede the future prosperity of the urban world.

However, it is dangerous to be complacent as market and political failures continue to contribute to excessive resource depletion and are also leading to irreversible climate change. In turn, climate change may also impact on demographic change, particularly migration (e.g. Hugo, 2012). Moreover, new population "shocks" may emerge: such as a gender imbalance among young adults in some countries and excessive depopulation in peripheral regions. Furthermore, rather than lowering mobility, population ageing may actually reinforce migration, both in terms of the movement of the "young old" to "lifestyle" countries and regions and of the "old-old" back into the metropolitan areas, attracted by urban amenities and specifically specialized healthcare. This, in turn, may also lead to further inward international migration into cities as emerging new technologies for aged care will not fully substitute for the increased demand for caregivers.

In conclusion, demographic changes will have a major impact on the performance and resilience of future cities. These impacts will vary considerably at various spatial scales. Further analysis will benefit from linking detailed demographic projections with a broad spectrum of dynamical models of long-run urban economic prospects.

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