# East Asian Cities: Past Development and Onrushing Challenges

**Shahid Yusuf**

## Abstract

The East Asian export-led development model has served as a beacon for decades. For the many urbanized and rapidly urbanizing countries, the East Asian experience with and response to emerging challenges can be equally instructive. High-income East Asian economies are at or approaching peak urbanization. China is likely to catch up within the next three decades. Since the 1950s, urbanization was accelerated by industrialization, which provided a plenitude of jobs directly and indirectly. It generated the resources that helped build urban infrastructure and housing, financed essential services, and created modern, urban livability. However, East Asian cities, like cities in other high- and middle-income countries, face new challenges. Services are displacing manufacturing as growth drivers and providers of jobs; the absorption of digital technologies, urban greening and control of pollution/carbon emissions is more urgent; climate change is necessitating the upgrading of services and infrastructure to enhance resilience; climate change will also compel a managed withdrawal from some urban locations; and both services and physical facilities must adapt to meet the needs of ageing populations. Responding to these challenges calls for strategic long-range planning, technological advances, implementation capacity, and resource mobilization. By 2050, 70 percent of the global population will live in cities. Therefore, how East Asians tackle these challenges can inform and guide policymakers in developed and developing countries alike.

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For the purposes of this paper, East Asia is comprised of China, Democratic People's Republic of Korea, Hong Kong, Japan, Republic of Korea, Macau, Mongolia, and Taiwan.

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# Introduction

At the start of the 2020s, a little over one half of the world's population resided in cities. By the middle of the 21st century, close to 70 percent will have become urbanites.[1] Meanwhile, the total population is expected to increase by 2 billion from 7.7 billion in 2020 to 9.7 billion in 2050.[2] If these forecasts prove to be on the mark, the number of urban inhabitants will increase by 2.6 billion or 62 percent. In the space of a century the urban population will have risen 9-fold from 751 million in 1950 to 6.8 billion. The implications of this massive change deserve more attention than they are receiving because it will be occurring in a more troubled global environment. East Asian cities will be among the ones needing to come to grips with high rates of urbanization and can serve as a bellwether for others.[3]

High income countries in East Asia have rates of urbanization comparable to members of the European Union.[4] They ranged in 2020 from 79 percent for Taiwan, to 81 percent for the Republic of Korea and 91 percent for Japan. Virtually the entire populations of Hong Kong and Macau SARs[5] are classified as urban. China is rapidly catching up with over 61 percent of its population residing in cities in 2020 as against 26 percent in 1990. Two thirds of Mongolia's population is concentrated in cities and the share has remained stable for close to a decade. The urban population of the Democratic People's Republic of Korea also appears to have stabilized at a little over 62 percent (Figures 1&2). Looking towards 2050, the UN projects that the biggest change will be in China where the urbanization rate could reach 78 percent with the number of urban residents approaching 1.1 billion, an increase of 250 million over the level in 2020. Although this will be distributed across cities of varying sizes, the employment opportunities, services, and amenities available in large and mega cities could enable them to raise their share of the total urban population and of GDP relative to mid-sized and small cities.

Of the world's 35 mega cities—with populations exceeding 10 million—ten are in East Asia.[6] And according to Brookings Global Metro Monitor as of 2016, 103 of the world's 300 top metropolitan regions were in China. China's Pearl River Delta urban region (or Greater Bay Area) is now the world's most populous.[7] It encompasses nine cities Dongguan, Guangzhou,

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[1] https://www.un.org/development/desa/en/news/population/2018-revision-of-world-urbanization-prospects.html The global urbanization rate in 2018 was 55 percent—or 4.2 billion people. By 2050, the UN forecasts an urbanization rate of 68 percent quite likely an underestimate as climate change is likely to accelerate the transfer of people to cities.

[2] https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html

[3] For the purposes of this paper, East Asia is comprised of China, Democratic People's Republic of Korea, Hong Kong, Japan, Republic of Korea, Macau, Mongolia, and Taiwan.

[4] For the purposes of this paper, East Asia refers to the following: China, Hong Kong, Japan, Mongolia, North Korea, South Korea, and Taiwan.

[5] Special Economic Regions.

[6] Depending on source used, there were as many as 37 megacities in 2020 and as many as 12 (or 13 if Wuhan is included) were in East Asia. https://en.wikipedia.org/wiki/Megacity

[7] Allen Scott (2001) introduced the concept of a "global city region…comprised of a metropolitan area or contiguous areas…whose internal economic and political affairs are bound up in intricate ways in intensifying and far-flung extra national relationships…a symptom of globalization." Global city-regions and the new

Foshan,[8] Huizhou, Jiangmen, Shenzhen, Zhaoqing, Zhongshan, and Zhuhai with a combined population of more than 60 million in 2016.[9] Just three decades ago, the combined population of the cities in this region was barely 12 million and no one imagined that such a massive, networked agglomeration could emerge and morph into "a world class cluster of innovation."[10] The Yangtze Delta urban region and the JingJinJi (Beijing-Tianjin-Hebei) are two of the other agglomerations that have come to dominate China's urban landscape.[11] The Tokyo and the Osaka-Kobe metro regions in Japan and the Seoul metro region in Korea are of comparable demographic and economic salience.

A visitor from a developing country to any of the major cities in East Asia—North Korean and Mongolian cities excepted—is struck by the quality of the physical infrastructure, the availability of public services, by the overall orderliness and the effort made to keep cities clean, by the effective harnessing of digital technology, and the absence of crime. Air pollution is severe in many Chinese and Korean cities, but efforts are underway to ameliorate the problem and bit by bit, the situation is improving.[12] The five principal East Asian cities—Tokyo, Hong Kong, Beijing, Seoul, and Shanghai—were prominent in AT Kearney's 20 Global Cities Index (2021). Tokyo is in the top ten cities selected by Resonance Consultancy, which ranks the world's 'best' cities. And eight cities—Tokyo, Seoul, Shanghai, Hong Kong, Beijing, Osaka, Taipei, and Fukuoka—were included in the Global Power City Index for 2021.

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world system. https://www.kas.de/c/document_library/get_file?uuid=b6a4e6a8-e96a-3344-0d3e7d88dd2ee029&groupId=252038; Allen J. Scott ed. *Global City Region*. Oxford University Press. Oxford. 2001.

[8] One of these cities Foshan, was among the most dynamic and Xiao Geng (2015) explains how the private sector contributed to its rise—and of the others as well. https://fac.arch.hku.hk/creue/wp-content/uploads/2015/11/Foshan-Study-Presentation-Xiao-Geng-2015-05-06-Final.pdf

[9] Sarah O'Meara (2020) Making it in the Megacity. Nature. https://www.nature.com/immersive/d41586-020-03002-z/index.html; S. Liu and J. Parilla (2018) Meet the five urban China's. https://www.brookings.edu/blog/the-avenue/2018/06/19/meet-the-five-urban-chinas/ http://www.newgeography.com/content/006132-ultimate-city-guangdong-hong-kong-macao-greater-bay-area-with-photographic-tour

[10] Economist (2017, London) Jewel in the Crown. https://www.economist.com/asia/2005/07/14/the-jewel-and-the-crown; M. Batty (2021, p.131) *Inventing Future Cities*. MIT Press. notes that as cities fuse into one another to form vast urban regions, "the definition of cities as independent entities [is] no longer appropriate."

[11] Li et al (2021) https://www.sciencedirect.com/science/article/pii/S2405844021008896

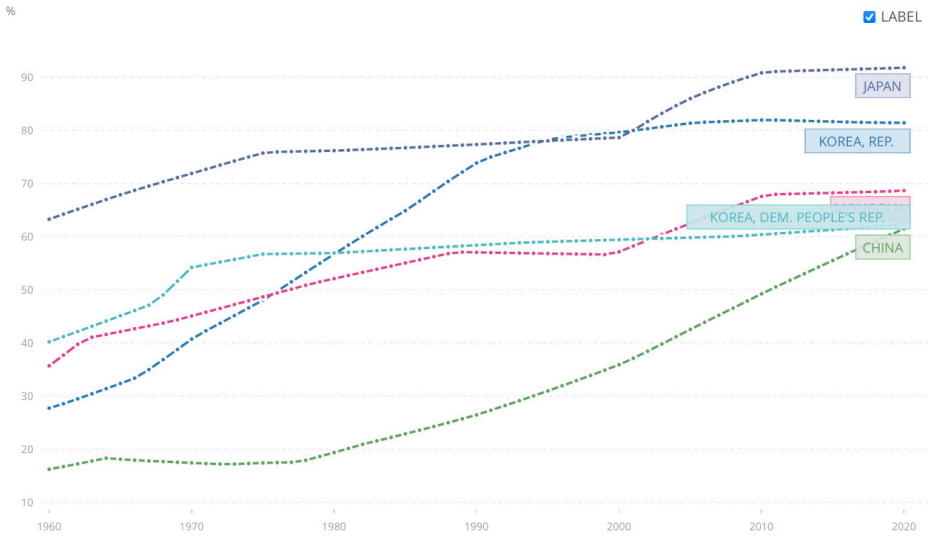
[12] The demand for cleaner air by China's urban middle class is nudging the authorities to redouble their efforts to curb air pollution with Beijing managing to make considerable headway prior to the Olympics in 2022 by imposing tighter emission standards on coal fired facilities, providing households with gas connections to replace coal fired boilers and reducing vehicular traffic. In spite of these measures, average air pollution in 2021 was six times the level recommended by the WHO. M. Kahn W. Sun and S. Zheng (2020) Clean air as an experience good in Urban China. NBER. https://www.nber.org/papers/w27790; M. Kahn and S. Zheng (2016) *Blue Skies over Beijing*. Princeton University Press. https://www.nbcnews.com/science/environment/china-got-blue-skies-time-olympics-rcna15340

**Figure 1. East Asian demographics and urbanization (in millions)**

| East Asian Demographics & Urbanization Rate (2020) | | |
|---|---|---|
| **Country** | **Population (millions)** | **Rate of Urbanization (%)** |
| China | 1,402.1 | 61 |
| Hong Kong | 7.5 | 100 |
| Japan | 125.8 | 92 |
| S. Korea | 51.9 | 81 |
| N. Korea | 25.8 | 62 |
| Mongolia | 3.3 | 69 |
| Taiwan* | 23.6 | 79 |

*Source:* World Development Indicators 2021; *https://en.wikipedia.org/wiki/Urbanization_by_country

**Figure 2. Urban population as a percentage of the total**




*Source:* World Development Indicators (2021) https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS?locations=KR-CN-JP-MN

Although cross country data shows that per capita incomes are correlated with the level of urbanization, there does not appear to be a causal relationship between these variables and between urbanization and the level and growth of GNI.[13] Nevertheless, a wealth of qualitative and quantitative evidence indicates that economies arising from agglomeration and urbanization, can promote productivity and the growth of urban GDP.[14] Past research

[13] V. Henderson (2010) Cities and Development. https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1467-9787.2009.00636.x; UNDESA (2018) https://population.un.org/wup/Publications/Files/WUP2018-Report.pdf

[14] E. Glaeser (2014) shows that countries that were more urbanized in 1960 grew somewhat faster in the subsequent fifty years although he too does not claim that there is a causal link. "A ten percent higher level of urbanization among these poor countries in 1960 is associated with .23 log points faster growth between 1960 and 2010." A world of cities. https://onlinelibrary.wiley.com/doi/abs/10.1111/jeea.12100; E. Glaeser (2011) *Triumph of the City*. PenguinRandomHouse. E. Glaeser and J.D Gottleib (2009) https://www.aeaweb.org/

indicates that urban factor productivity increases as cities become more populous because of scale economies, deepening pools of labor skills, greater innovativeness,[15] and scope for spillovers among firms.[16] Much of East Asia's innovative activity is concentrated in relatively few large cities. Chen, Hasan and Jiang (2021)[17] find that a doubling of city size increases "firms' propensity to engage in product innovation, process innovation and R&D by 4.3, 3.7, and 2.8 percentage points."

The explosion of the digital economy notwithstanding, "proximity or nearness is becoming more important as the cost and time of connecting across distance is becoming less." (Batty 2021). And according to Glaeser (2011, p.35,37), "electronic interactions and face-to-face interactions support one another …they are complements rather than substitutes… Face-to-face contact leads to more trust generosity and cooperation…[Moreover] Facebook typically connects people who have met in person…and is disproportionately used by people who are good at real life conversation." He goes on to add (2021),[18] "globalization and new technologies have radically increased the returns to being smart, and we are a social species that gets smart by being around other smart people."

There appear to be no substitutes for the "sharing, matching, and learning mechanisms" that take root in cities. Sharing mechanisms include the "indivisible facilities, sharing the gains from the wider variety of input suppliers that can be sustained by a larger final-goods industry, sharing the gains from the narrower specialization that can be sustained with larger production, and sharing risk." The matching mechanisms within agglomerations "improve either the expected quality of matches or the probability of matching and alleviate

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articles?id=10.1257/jel.47.4.983; E. Glaeser ed. (2010) *Agglomeration Economics*. U. Of Chicago Press. https://press.uchicago.edu/ucp/books/book/chicago/A/bo8143498.html; P-P Combes and L. Gobillon (2015) https://econpapers.repec.org/bookchap/eeeregchp/5-247.htm; P.C. Melo et al (2009) https://econpapers.repec.org/article/eeeregeco/v_3a39_3ay_3a2009_3ai_3a3_3ap_3a332-342.htm; R. Florida, author of the *Creative Class*, maintains that the Covid pandemic will not affect the importance of clustering and agglomeration for innovation and the knowledge economy rooted in cities. Using light signatures, he has determined that 40 mega-regions are "the real economic units of power in the world economy." https://english.phbs.pku.edu.cn/2021/news_0407/2686.html; E. Glaeser and D. Cutler (2021, p.225) point to the growing importance of collaborative tasks benefitting from face-to-face communication as problems become more complex and simpler repetitive tasks are automated. Also, "more complicated tasks often make output harder to measure, which makes proximity between manager and subordinate more valuable." *Survival of the City*. PenguinRandomHouse.

[15] E. Berkes and R. Gaetani (2017) The geography of unconventional innovation. https://cpb-us-e1.wpmucdn.com/sites.northwestern.edu/dist/4/638/files/2017/06/Berkes_Gaetani_Submission_June_2017-2ao3fck.pdf; E. Glaeser (2011) Triumph of the City; G. Carolino and W. Kerr (2014) Agglomeration and innovation. https://www.nber.org/system/files/working_papers/w20367/w20367.pdf

[16] S. Frick and A. Rodriguez-Pose (2017) show that mega cities impart greater growth impetus in countries with a large urban population where the latter exert more influence on growth. Big or small cities. https://voxeu.org/article/city-size-and-economic-growth

[17] L. Chen, R. Hasan and Y. Jiang (2021) Urban agglomeration and firm innovation. https://openknowledge.worldbank.org/handle/10986/36637

[18] Interview, Ed Glaeser. Richmond Fed (2021). https://www.richmondfed.net/publications/research/econ_focus/2021/q4_interview

hold-up problems. Finally, learning [is] based on the generation, the diffusion (spillovers), and the accumulation of knowledge." (Duranton and Puga 2003).[19]

In the East Asian context, the benefits conferred by urbanization have paralleled the emergence and flourishing of manufacturing activities. Post war Japan provided the template for South Korea, Taiwan, and China, showing how an economy could enter a virtuous growth spiral by way of a structural transformation that channeled labor and capital into urban industries.[20] By incentivizing these industries to focus on global markets, first Japan and subsequently the others, made the leading urban agglomerations into engines of growth. The utility of this model peaked for Japan in the 1980s. For South Korea and Taiwan, the growth impetus derived from urban manufacturing began weakening after the turn of the century. And with its growth trending downwards in the 2020s, China also is being compelled to rely on other urban drivers to achieve its targeted growth rates.

East Asia's industrial cities have delivered economic benefits matched by few if any cities in developing regions. Now governments are being challenged by trends in globalization and trade, by servitization, which is displacing manufacturing as the primary source of employment and growth, by demographic factors, by digital technologies, by income inequality, and environmental pressures among others to adopt strategies that will sustain and improve the economic performance, livability, and resilience of cities.

Cities were hard hit by the Covid pandemic, which erupted in early 2020, and much was made of the flight to suburbs in the United States and some European countries, the ease of working remotely (and avoiding long commutes) thanks to digital technologies. The A.T. Kearney Report and numerous other publications debate the possibility that elevated telework might persist to a degree even after Covid has become a flu like manageable, endemic disease (Barrero, Bloom and Davis 2021).[21] While earlier findings made the case for persistence, a study by the Becker Friedman Institute (Gibbs et al 2021) has shown that despite the flexibility offered by working from home arrangements, hours worked increased while productivity—in the US—declined by between 8 and 19 percent with workers suffering from a sense of isolation, feelings of loneliness and burnout as the separation from the office environment went from weeks to months.[22] Morikawa (2021)

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[19] https://www.nber.org/system/files/working_papers/w9931/w9931.pdf

[20] V. Henderson (2016) Urbanization and the geography of development. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2439698

[21] J.M. Barrero et al (2021) maintain that 20 percent of workdays will be conducted remotely because of the human and capital investment and savings accruing to employers who will need less office space. They also estimate that spending in the core city areas could decline by between 5-10 percent and that worker productivity will rise by as much as 5 percent. https://www.nber.org/papers/w28731; The OECD (2021) foresees increased teleworking by professionals with advanced degrees, by women and those working for large companies but less so for those employed by smaller companies that are less digitalized. Teleworking in the Covid 19 pandemic. https://www.oecd.org/coronavirus/policy-responses/teleworking-in-the-covid-19-pandemic-trends-and-prospects-72a416b6/; K. Behrens et al (2021) anticipate an increase in teleworking but doubt that it would exceed one or two days per week. https://voxeu.org/article/working-home-too-much-good-thing;

[22] M. Gibbs et al (2021) https://bfi.uchicago.edu/wp-content/uploads/2021/05/BFI_WP_2021-56.pdf; Total factor productivity in the US was dragged down into negative territory by the Covid pandemic in 16 of 21

found that overall 31 percent of firms adopted homeworking in Japan and the majority of those who did work from home did so less than 4 days a week. On balance, working from home was only 61 percent as productive compared to work done at the office.[23] As the pandemic abates, economic recovery is being led by the revival of urban activities.

The next chapter of East Asian cities promises to be even more eventful, and how effectively urban centers respond will determine whether they remain triumphant or whether they struggle to survive.[24]

The rest of this paper, which is divided into five parts examines the pressures likely to impinge upon East Asian cities and how this could affect performance, policies, and prospects. Part 1 examines the role of major cities in East Asia and how this has evolved particularly during the first two decades of the twenty first century. Part 2 identifies the challenges impacting the urban economy and reshaping its composition, design, and geography. Part 3 discusses the preparedness of East Asian cities to the emerging challenges and opportunities. Part 4 explores the hard decisions confronting cities and necessity for early action. Part 5 concludes.

## 1. East Asia has urbanized rapidly since the mid 20th century

East Asian economies can be divided into three groups: the early mover Japan, which had joined the ranks of the high income and highly urbanized countries by the mid 1960s; the fast followers South Korea, Taiwan, Hong Kong, and later China; and those bringing up the rear, North Korea, and Mongolia.

By the mid 1960s, Japan's industrialization was on the roll, its per capita income was approaching that of western European economies, more than two thirds of the population was classified as urban and in virtually every respect, it was far more advanced than the other East Asian countries. China, the two Koreas, Taiwan, and Hong Kong were all in the industrial catching up phase. Their per capita incomes lagged far behind Japan and Hong Kong excepted, rates of urbanization were relatively low especially in China. Mongolia was

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major industries in 2020. Only two, agriculture and utilities, registered positive outcomes. Overall, according to the Conference Board, TFP fell by 0.8 percent. However, once the economy began reviving from the fourth quarter of 2020, TFP growth resumed. It rose according to estimates by the FRBSF (2021), by 4.33 percent from the third quarter of 2020 through the third quarter of 2021 and utilization adjusted TFP rose by 2.55 percent. The Conference Board (2021) projects a 2.4 percent increase in TFP in 2021. TFP growth will most likely revert to the pre-2020 trend rate of under 1 percent once the economy regains its pre Covid stride. https://www.bls.gov/opub/ted/2021/total-factor-productivity-down-in-16-of-21-industries-in-2020.htm; https://www.frbsf.org/economic-research/indicators-data/total-factor-productivity-tfp/; https://www.conference-board.org/data/economydatabase

[23] https://voxeu.org/article/productivity-working-home-evidence-japan

[24] Borrowing from titles of two books by Edward Glaeser written ten years apart. *Triumph of the City* (2011); and *Survival of the City* (2021) co-authored with David Cutler.

the least developed economy with the bulk of its population engaged in nomadic pastoral activities.

Japan's urban infrastructure and industry suffered severe damage during the Second World War (WW2), however, because enough of the human capital survived, as in Germany, the economy quickly gathered momentum. Not only light manufacturing but also a host of more complex capital-intensive industries were restored or developed. The government's industrial policy guided and coordinated industrialization with public and private banking institutions supplying the finance and major corporations resurrected from the remnants of the prewar zaibatsu[25]—and suitably modified and relabeled as keiretsu[26]—marshalled the technical skills and provided the managerial and organizational expertise.

Japan was already the most urbanized country in East Asia prior to WW2. Unusually rapid urbanization in the immediate postwar decades and the recovery of its cities substantially facilitated industrialization (Figure 3).[27] Davis and Weinstein (2002) found that notwithstanding the enormous damage inflicted by bombing during 1945, most cities staged a powerful comeback and "returned to their relative position in the distribution of city sizes within about 15 years (p.1271)."[28] For example, Tokyo's population rose from 3.5 million in 1945 to 10 million in 1960, which was greater than that of both New York and London.[29] Urban agglomerations helped restore systems of suppliers and labor pools, and a resurfacing of the regional urban networks in the Kanto, the Kansai (Kinki) and the Tohoku regions created the concentrated market activity that strongly buttressed specialization and productivity (Davis and Weinstein 2001).[30]

Japan demonstrated the efficacy of industrial policy[31] coupled with urbanization as trade globalization was taking off from the mid 1960s onwards.[32] Urban agglomeration resulting from the concentration of population and industry in a few parts of the country appears to

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[25] Conglomerates with ownership and control concentrated in the hands of a single family.

[26] Keiretsu are comprised of several closely related companies, which own a portion of each other's shares. K. Yamamura (1964) Zaibatsu prewar and Zaibatsu postwar. https://www.jstor.org/stable/2050237; for example, after 1950 Sumitomo had a fresh start. "The use of the Sumitomo name was again permitted and 12 companies in fields spanning Japan's leading industrial sectors—including mining, metals, chemicals, steel, and finance—were born anew. This was not a resurrection of the pre-war zaibatsu: These companies formed a new Sumitomo Group, with each on an equal footing and making decisions independently of the others. Moreover, there was no central coordinating authority above the group companies." https://www.sumitomo.gr.jp/english/history/s_history/rebirth/

[27] C. Ding and X. Zhao (2012) Urbanization in Japan. https://www.researchgate.net/publication/287408219_Urbanization_in_Japan_South_Korea_and_China_Policy_and_Reality

[28] D. R. Davis and D. E. Weinstein (2002). Bones, Bombs and Breakpoints: The Geography of Economic Activity. *American Economic Review*. 92(5)1269–1289

[29] PWC https://www.pwc.com/jp/en/japan-knowledge/archive/assets/pdf/from-urbanization-to-aging-society.pdf

[30] D. R. Davis and D. E. Weinstein (2001). Market Size, Linkages and Productivity: A Study of Japanese Regions. NBER Working Paper No. 8518.

[31] T. Okazaki (2017) https://www.rieti.go.jp/en/papers/contribution/okazaki/data/06.pdf

[32] M. Okuno-Fujiwara (1991) argues that the Japanese government used industrial policy most actively in the 1950s and 1960s to develop strategic industries but thereafter, IP primarily sought to correct market failures—or

have buoyed productivity and growth led by manufacturing.[33] The (Shinkansen—new main line) high-speed rail network served to tighten the linkages among cities in key regions[34] reinforcing the benefits accruing from the concentration of activities and urban population density particularly in the Pacific coastal region.[35] The railway lines radiating out from the main cities also spurred suburban and edge city development away from the core areas while allowing residents convenient access to the central city.[36] The compressed industrialization and the accelerated pace of urbanization delivered economic gains, but urban crowding coupled with inattention to city planning gave rise to severe congestion, spiking land prices, and extreme pollution.

From the 1990s onwards, Japan's economic growth slowed to a crawl,[37] its population began stabilizing and urbanization entered a mature stage with the share of industry entering a slow downward spiral. Cities began adjusting to changes in the structure of economic activity, to make more efficient use of urban land and to give greater attention to the quality of the urban environment.

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ease the decline of sunset industries. Industrial policy in Japan. https://www.nber.org/system/files/chapters/c8667/c8667.pdf

[33] Akihiro Otsuka et al (2009) Industrial agglomeration. https://rsaiconnect.onlinelibrary.wiley.com/doi/pdf/10.1111/j.1435-5957.2010.00286.x

[34] K. Hayakawa et al (2021) HSR. https://voxeu.org/article/how-high-speed-rail-changes-spatial-distribution-economic-activity

[35] J. Wetwitoo (2019) Specialization or diversity. https://www.adb.org/publications/industrial-specialization-or-diversity-high-speed-rail-japan; P. Eggar et al (2020) https://voxeu.org/article/unbridled-transport-infrastructure-growth-china; The building of expressways further improved connectedness and starting with Tokyo, major Japanese cities began constructing subway systems that in conjunction with zoning regulations, enhanced urban mobility and contained street level congestion.

[36] In little more than a decade, China has created the world's most extensive high speed rail network-30,000 km by 2020 (HSR)—shortening commuting times between cities in urban regions and strengthening interlinkages. For distances of under 400 miles, HSR can be more cost effective than other modes of travel, however, K. Button (2017) finds that HSR infrastructure barely moves the regional growth needle, though it may diminish carbon emissions from intercity transportation. https://www.mercatus.org/publications/urban-economics/high-speed-railways; Button's research is disputed by Li et al (2020) who show that cities served by HSR achieved higher growth rates. https://www.mdpi.com/2071-1050/12/8/3176/pdf

[37] The revaluation of the yen following the Plaza Agreement in 1985, the bursting of the property bubble in 1992 and policies that permitted the post-bubble survival of zombie banks and companies, were responsible for two (so-called lost) decades of economic stagnation.

**Figure 3. Urban Japan**


Both South Korea and Taiwan had begun urbanizing during the colonial period spurred by the influx of Japanese migrants who gravitated towards urban centers large and small and initiated business activities. After a hiatus during 1940s and early 1950s, caused by war and its aftermath, urbanization picked up speed, but it surged from the 1960s. Both economies took their cues from Japan, quickly perceived the opportunities presented by the decline in barriers to world trade and introduced policies to promote industrialization.[38] The remarkable success of these policies pulled labor from rural areas into cities as jobs in industry multiplied. The almost three decades of rapid export led growth that followed was paralleled by steadily rising urbanization (Irwin 2021a; 2021b).[39]

However, the pattern of urbanization diverged. The division of the Korean peninsula into two parts assured the primacy of Seoul because it was the only major urban center in what became the Republic of Korea. This initial advantage was reinforced by the scale of industrial investment in the Seoul metro area, which gradually sprawled across Gyeonggi-do province. Other industrial cities such as Daegu, Daejeon, Ulsan, Busan, Gwangju, and Suwon also achieved industrial prominence with populations ranging from a million to over three million in 2000, but Seoul-Incheon and its several satellite cities pulled far ahead of other urban agglomerations (Figure 4). By the turn of the century, Seoul and its suburbs alone accounted for a quarter of the nation's population and the extended metro region for one half. Such primacy is unusual, but it has persisted despite efforts by successive governments to disperse the population to other parts of the country to lessen congestion and in the

[38] Import substituting industrialization was quickly seen to be counterproductive and superseded by policies promoting exports. Irwin (2020) https://www.piie.com/system/files/documents/wp20-10.pdf

[39] https://www.piie.com/publications/working-papers/hermit-kingdom-miracle-han; https://www.piie.com/publications/working-papers/how-economic-ideas-led-taiwans-shift-export-promotion-1950s

interests of security as Seoul lies a short distance from the Demilitarized Zone separating South Korea from its heavily armed and volatile neighbor to the North.[40]

**Figure 4. Major cities in the Korean Peninsula**


*Source:* Mapsland

The urbanization of Taiwan as it embarked on the road to industrialization differed from Korea's in two respects. First, the rate of urbanization, which as in Korea, moved into higher gear in the 1960s, was more dispersed.[41] Taipei the capital is not a primate city like Seoul but one among four major cities distributed across the island—the other three being Taichung, Tainan, and Kaohsiung - although it is more populous than the others (Figure 5).[42] Moreover, many urbanites reside in smaller peripheral cities and towns. A second difference that may explain the pattern of urbanization is that industrial investment was not focused on one or

[40] The rapid industrialization and growth of both Korea and Taiwan is not unrelated to the threats they faced from hostile neighbors—threats that spurred efforts to reduce vulnerability.

[41] C.H. Liao (1988) Urbanization in Taiwan. https://pubmed.ncbi.nlm.nih.gov/12222433/

[42] This distribution might have been advantageous for Taiwan because according to Frick and Rodriguez-Pose (2017) mid-sized cities with populations of less than 3 million are more growth promoting than very large ones in countries with smaller populations. https://voxeu.org/article/city-size-and-economic-growth

two large cities, instead smaller towns attracted their share.[43] This investment nourished a large and thriving SME sector, which Korea has struggled to create.[44] Taiwan's industrial policy also placed less emphasis on the heavy and chemical industries (HCI) and did not rely on large privately owned industrial conglomerates as Korea did to spearhead both exports as well as diversification into complex, capital intensive products.[45]

Fast paced and from the late 1960s, export-led industrialization guided by industrial policies, which was responsible for rising incomes, supported urbanization in both Korea and Taiwan. Each economy adopted its own variant of industrial and urbanization policies, but as they approached industrial maturity early in the twenty first century, the level of urbanization had converged although the distribution of the population among cities of different sizes varied considerably.

**Figure 5. Taiwanese cities**


Urbanization in both North Korea and Mongolia has proceeded apace since the 1990s and more than two thirds of the population are housed in cities with North Korea closer

[43] H. Hashiya (1996) Urbanization in the ROK and Taiwan, Developing Economies. http://www.ide.go.jp/library/English/Publish/Periodicals/De/pdf/96_04_05.pdf

[44] T-R Lee and I.P.J. Jioe (2017) Taiwan's SMEs https://www.asianstudies.org/wp-content/uploads/taiwans-small-and-medium-enterprises-smes.pdf

[45] The targeting of heavy and chemical industries may have contributed to the misallocation of capital. M. Kim et al (2021) https://www.nber.org/papers/w29252 This claim is disputed by J. Choi and A. Levchenko (2021) who maintain that Korea's subsidized HCI program was on of those instances when industrial policy succeeded. https://voxeu.org/article/when-industrial-policy-worked-case-south-korea

to 63 percent.[46] Pyongyang is by far the largest city in North Korea with about 3.5 million people trailed by two mid-sized cities Hamhung and Chongjin with populations in the 620–780 thousand range and a few smaller cities such as Nampo, Wonsan and Tanchon, each with populations of less than 400 thousand (Figure 6).[47]

Ulaanbaatar is the primate city in Mongolia with 40 percent of the total urban population, having grown steeply since the late 1990s once the grip of central planning was relaxed, growth that has resulted in the appearance of urban sprawl comprised largely of informal settlements and extraordinary levels of air pollution (Asia Foundation).[48] Other cities while adding to their numbers are all much smaller with fewer than 100,000 people. Neither of these countries adopted the manufacturing and export-led growth model, which contributed to the economic performance and urbanization of Japan, South Korea, Taiwan, and Hong Kong. Mongolia's GDP growth has been sourced mainly from the production and export of natural resource-based products.[49] It has been choppy and has generated relatively few, well paid urban jobs in the formal sector. Most urban employment is provided by micro-enterprises (Joffre and Luvsandorj 2020).[50] After an initial attempt at opening and at gaining international recognition in the 1960s, North Korea retreated into isolation and is arguably the last remaining hermit kingdom pursuing a self-imposed, autonomous developmental path.[51]

Because of its size and its shifting urban industrial strategy over the past seven decades, China is in a class of its own. Prior to the start of the 'reform and opening' in 1979,[52] the rate of urbanization was the lowest in East Asia—in the 17 percent range and relatively dispersed.[53] Most Chinese cities were centers of industry with highly attenuated services sectors deemed unproductive by the prevailing Maoist/Marxist frame of reference.[54] The function of cities was to "produce" rather than "consume." Urban workers enjoyed higher

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[46] Data on North Korea is sparse and laced with conjectures. See for example J.C. Cuaresma et al (2020) who use nighttime light intensity and other techniques to gauge the extent of absolute poverty. https://www.nature.com/articles/s41599-020-0417-4

[47] https://www.worldatlas.com/articles/biggest-cities-in-north-korea.html

[48] https://asiafoundation.org/2017/05/31/mongolias-capital-copes-rapid-urbanization/;Approximately 45 -60 percent of Ulaanbaatar's population lives in tents called *gers*, the traditional dwellings of nomadic tribespeople. HG. Park et al (2019) https://www.sciencedirect.com/science/article/abs/pii/S0169204618310351; https://earthobservatory.nasa.gov/images/145125/the-urbanization-of-ulaanbaatar

[49] The principal exports in 2019 were coal, copper, iron ore, gold, other minerals, and animal products such as mohair and meat.

[50] https://www.adb.org/sites/default/files/publication/662086/adb-brief-160-msmes-mongolia-covid-19-impacts.pdf

[51] Reported exports in 2019 were just $308 million mostly to China. The largest item was watch movements (16%) https://oec.world/en/profile/country/prk. D. Bandow (2021) https://www.cato.org/commentary/north-korea-truly-hermit-kingdom-thanks-coronavirus;

[52] J. Delisle and A. Goldstein (2019) take stock of what has transpired in the forty years that have elapsed since. https://www.brookings.edu/wp-content/uploads/2019/04/9780815737254_ch1.pdf

[53] Estimates of China's urban population leading up to and beyond 1979 are analyzed by R. Kojima (1995) Urbanization in China. https://www.ide.go.jp/library/English/Publish/Periodicals/De/pdf/95_02_01.pdf

[54] S. Marginson (1998) Value creation in the production of services: a note on Marx. https://www.jstor.org/stable/23600454

living standards relative to rural inhabitants because the state or state-owned enterprises (*danwei*) provided housing and most services free of charge and food products as well as other consumer goods were subsidized. To minimize the fiscal burden resulting from these entitlements, strict residency requirements (*hukou*) and restrictions on labor hiring by urban entities controlled rural-urban migration. The growth of major coastal cities was further constrained from the mid 1960s[55] by the transfer of industry and populations to cities in the deep interior (Big Third Front) or to rural areas (Small Third Fronts)[56] while the growth of medium sized cities was encouraged in provinces such as Guizhou, Shaanxi and Sichuan backed by investment in energy and transport infrastructures, which they had hitherto lacked.[57] Mao Zedong's antipathy towards urbanization also skewed government policies. His political base was primarily rural; he remained wedded to anti-urban Marxist ideology; and he feared the rise of opposition to his policies from a politically mobilized urban population.[58]

Chinese urban development since the middle of the 20th century was integrated with a strategy the objective of which was to make China industrially self-sufficient[59] and to curtail if not eliminate its reliance on external sources of raw material and manufactured products.[60] This approach plus the parallel efforts to develop, industrialize and urbanize the interior provinces and to check the growth of the major cities on the Eastern periphery, meant that China today does not have a primate city comparable to Seoul or Tokyo. For a country as large and as populous as China, it is also unlikely that a single urban hegemon could emerge and tower over the rest.

Once reform and opening received the blessing of the Chinese leadership, some of the checks on rural-urban migration were gradually scaled back and the tempo of urbanization quickened from the 1990s. The Brookings Metro Monitor divides Chinese cities into

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[55] Nevertheless, according to S. Goldstein (1985), two thirds of the urban population remained concentrated in large cities. Urbanization in China. https://scholarspace.manoa.hawaii.edu/bitstream/10125/32730/PapersOfThePopulationInstituteNo.93UrbanizationInChina1985%5Bpdfa%5D.PDF

[56] The perceived threat during the mid 1960s of invasion by the United States and its allies (when the Vietnam War was raging) was responsible for the launch of the Third Front (or Line) Program, which sought to build a self-sufficient industrial base in the deep interior to serve as "strategic reserve" if war were to break out. B. Naughton (1988) The Third Front, https://www.cambridge.org/core/journals/china-quarterly/article/abs/third-front-defence-industrialization-in-the-chinese-interior/16DF6F4BDC5398BB2C6FFAEF39AD6230; C.F. Meyskens (2020) *Mao's Third Front*. CUP. https://www.amazon.com/Maos-Third-Front-Militarization-China/dp/1108489559

[57] Several nationwide programs transferred urban residents to the villages (*Hui Xiang*); young city dwellers were "sent up to the mountains and down to the villages" (*Shang Shan Xia Xiang*). T. P. T. Bernstein (1977) Up to the Mountains and Down to the Villages. New Haven. Yale University Press.; C. Pannell and L.J.C. Ma (1983) *Urban Development. In China: The Geography of Development and Modernization*. London. Winston and Sons.

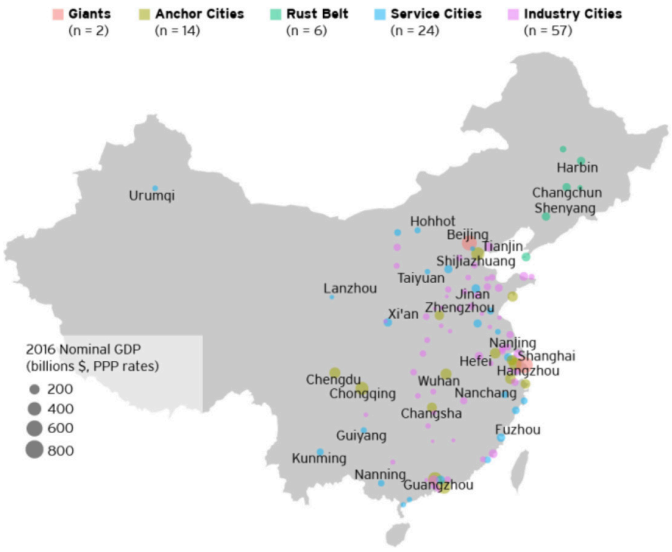
[58] https://core.ac.uk/download/pdf/56370758.pdf; R. Murphey (1980) *The Fading of the Maoist Vision*. Routledge.

[59] L. Yang (2009). Self-Reliance. The Communist Party mooted the notion of self-reliance in the 1930s and the concept evolved over time and became the PRC's official policy following the rupture with the Soviet Union in the late 1950s. https://www.jstor.org/stable/j.ctvk3gng9.40?seq=1#metadata_info_tab_contents; Wu (1981) https://www.jstor.org/stable/189055

[60] This desire for self-sufficiency is of long standing and echoes the view expressed by the Qianlong Emperor to Lord McCartney in 1793. "Our Celestial Empire possesses all things in prolific abundance and lacks no product within its borders."

five groups.[61] The two mega cities Shanghai and Beijing and 14 anchor cities such as Tianjin, Shenzhen, and Guangzhou. The populations in these two groupings range from 12 million to 23 million,[62] and individually they contribute between 1–4 percent of GDP. Rust belt metros, service cities and industrial cities comprise the remainder. Provincial level municipalities, and provincial capitals of inland provinces have emerged as major centers in their own right and are growing strongly. For example, the population of the Chongqing metro region rivals that of Shanghai and cities such as Chengdu, Wuhan, and Xian are at or approaching the 10 million mark. Others such as Zhengzhou, Changsha and Kunming are close to 5 million with many others now in the 2–3 million range. However, the urban industrial center of gravity continues to favor the cities located in the coastal provinces (Figure 6). Song (2021)[63] estimates that "of the 28 cities that have seen the greatest population growth—more than 10 percent over the past decade—12 are in the Yangtze River Delta and the Greater Bay Area…these two account for on third of the 53 growth cities…The remaining two thirds of growth cities are provincial capitals" Urban regions in five leading coastal provinces accounted for 36.5 percent of national output in 2021 a slight increase over their share in 2019 (South China Morning Post 2021).[64]

**Figure 6. Types of Chinese metro areas**




*Source:* Liu and Parilla (2018) https://www.brookings.edu/blog/the-avenue/2018/06/19/meet-the-five-urban-chinas/

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[61] S. Liu and J. Parilla (2018) Meet the five urban Chinas. https://www.brookings.edu/blog/the-avenue/2018/06/19/meet-the-five-urban-chinas/

[62] https://www.chinahighlights.com/travelguide/top-large-cities.htm

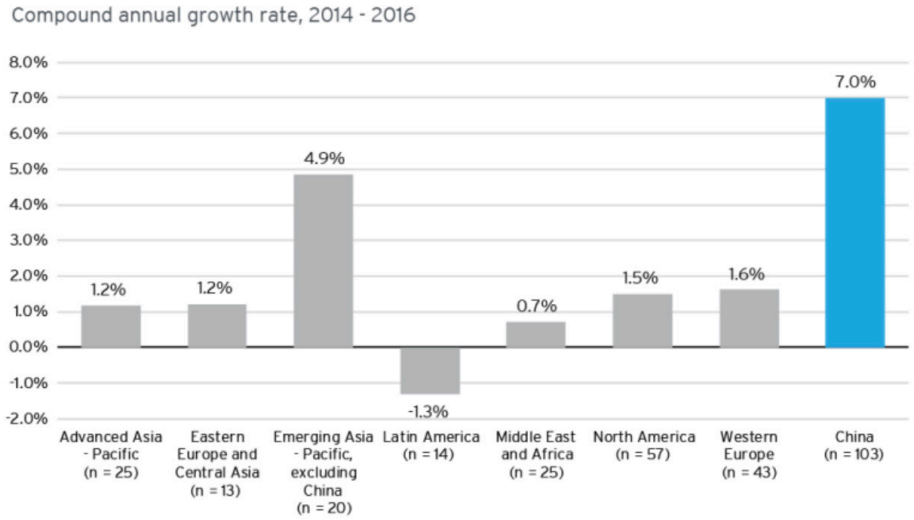
[63] https://macropolo.org/tale-of-two-types-of-cities-demographic-divergence-in-urban-china/?rp=e

[64] https://www.scmp.com/economy/china-economy/article/3142294/chinas-provincial-gdps-show-widening-gap-between-coastal-and; An IBM study of urban China found that Tier 1 cities near or on the Eastern coast generated RMB 6 trillion or about 11 percent of GDP in 2014. Tier 2 cities mostly in the east and south contributed RMB 9 trillion, while Tier 3 cities many in the interior, accounted for another 14 percent of GDP. https://www.ibm.com/thought-leadership/institute-business-value/report/growingchina

Industry was the economic motor of virtually all Chinese cities through at least the 1990s however, since then the share of services has burgeoned in the major coastal cities. It is the principal source of employment and growth (60 percent in 2020),[65] and the trend closely tracks that of cities in European countries. However, industry remains the core activity of many secondary and smaller cities and they mirror the sectoral composition of mid-sized urban centers in Korea and Taiwan.

China's metro regions have served as the sources of GDP growth and have handily outpaced metros in other parts of the world (Figure 7). Although the mega urban regions, provincial level municipalities and provincial capitals are at the forefront, several of the 87 smaller metro areas supplement the growth generated by the frontrunners, with cities where services have displaced manufacturing in the lead role doing somewhat better than industrial cities. The six rust belt metros in China's Northeast including Jilin, Shenyang, and Daqing, are the laggards with their shares of population and GDP declining as their industrial fortunes fade (Figure 8).

**Figure 7. Comparative performance of large metro areas across regions**




*Source:* Liu and Parilla (2018) https://www.brookings.edu/blog/the-avenue/2018/06/19/meet-the-five-urban-chinas/

[65] https://www.china-briefing.com/news/chinas-services-sector-expansion-beijing-9-industry-reforms/

**Figure 8. Comparative performance of China's metros**


*Source:* Liu and Parilla (2018) https://www.brookings.edu/blog/the-avenue/2018/06/19/meet-the-five-urban-chinas/

Hong Kong, a Special Autonomous Region (SAR) of China since 1997, was a charter member of the Four East Asian Tiger economies and during the "miracle" years 1965–1995,[66] it enjoyed high average rates of growth comparable to those of the other three, initially sourced from light manufacturing and logistics and after the 1980s, increasingly from financial, producer and transport services.[67] Hong Kong's population was already more than 80 percent urban in 1960 and rising. In the 1980s, the development of new towns and a mass transit system pushed the rate of urbanization close to 100 percent. As only a fifth of the region's land area (1,100 sq km) is available for urban use by a population of over 7 million, crowding and congestion is inevitable—as is air pollution some of it spreading from the Chinese Mainland (Sapru 2012).[68]

## 2. However, challenges are looming

The above encapsulates East Asia's urban development from the latter part of the 20th century to the present. In Japan, South Korea, Taiwan, and China, rapid industrialization orchestrated by industrial policies, pulled people from rural areas into the cities and their numbers were augmented by natural increase of urban populations. North Korea with

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[66] World Bank (1993) *East Asian Miracle*. https://documents1.worldbank.org/curated/en/322361469672160172/pdf/123510v20PUB0r00Box371943B00PUBLIC0.pdf

[67] P-Y Ho (2018) provides a brief account of the settlement and urbanization of Hong Kong. https://www.elgaronline.com/view/9781788117944/introduction.xhtml

[68] https://www.bsr.org/en/our-insights/blog-view/sustainable-urban-growth-is-hong-kong-a-model-for-china

its inward looking, import substituting industrialization (ISI) also urbanized albeit more slowly with the government as in China, exercising tight control on the distribution of the population between the countryside and cities. Given its history and topography, Hong Kong was already largely urban in the 1960s and within a couple of decades, the rural areas were emptied of people and absorbed into urban centers old and new with services generating much of the employment. The urbanization of Mongolia, which had passed the halfway mark in 1978, was unrelated to industrialization and strongly favored Ulaanbaatar.[69] After a decade long hiatus during the 1990s, it took off in 2000 as rising exports of commodities and government spending raised GDP growth. Since 2011, urbanization has stabilized at 68 percent.[70]

Japan, South Korea, and Taiwan are at or approaching peak urbanization. China, Mongolia, and North Korea have ground to cover. In the next three decades urbanization may be in for a makeover resulting from a geographical redistribution of urban populations especially in China, a change in the economic structure of cities and investment both in digital and physical infrastructures to make cities both "smarter" and more resilient.

Five developments will transform the urban landscape with some of what is in store already having surfaced. These are: (i) the transition from manufacturing to services as the core economic activity, which in conjunction with technology absorption, will impact employment and inequality as well; (ii) the assimilation of digital technologies, the electrification of transport and the shift to renewables as the primary sources of energy; (iii) a focus on the resilience of key services and physical infrastructure to enable cities to weather shocks; (iv) the managed relocation of populations from certain areas that are likely to be exposed to severe weather and a progressive decline in livability; and (v) the ageing of populations, which will affect the demand for housing, services and growth.

(i) For East Asia, export-led growth is a feature of the past and the dominance of manufacturing in cities is fast eroding. The emergence of Southeast Asian and other competitors and the dispersal of industries caused by FDI, transferred labor intensive processing and assembly industries to countries where wages and other costs are lower, at first from the high-income East Asian economies and more recently from China.[71] The shock administered by the Covid pandemic to supply chains could result in some reshoring of industries as countries attempt to reduce their dependence on critical imports as well as on imports from a single country,

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[69] Rural dwellers were attracted to cities by land allotments of 0.7 hectares within city limits free of charge for between 15 and 60 years, by the lure of urban amenities and services and many were forced to abandon farming because their livestock was decimated by a succession of summer droughts and severe winters (dzuds). https://asiafoundation.org/2017/05/31/mongolias-capital-copes-rapid-urbanization/

[70] Reducing the pressure on Ulaanbaatar and addressing environmental issues are among the government's priorities. OECD/ADB (2008) https://www.oecd.org/countries/mongolia/42227806.pdf

[71] K. Lee (2021) China's loss can be SE Asia's gain. https://www.project-syndicate.org/commentary/china-loss-of-production-can-be-gain-for-southeast-asia-by-keun-lee-2021-10?barrier=accesspaylog How the geography of manufacturing could evolve in China and beyond is examined by Hanson (2020) Who will fill China's shoes? https://scholar.harvard.edu/files/gordonhanson/files/eaer_-_hanson_gordon_who_will_fill_chinas_shoes.pdf

and lessen the vulnerability of supply chains, but it is unlikely that this will stem or reverse the decline of industry in major urban centers.[72]

The future of East Asian cities long reliant on manufacturing for their economic dynamism, is now hitched to services, with the larger cities such as Seoul, Tokyo, Osaka, Beijing, and Shanghai resembling services dependent European and North American cities. One consequence of the servitization of the major urban centers is that factor productivity is rising more slowly because services unlike manufacturing, have benefitted less from new technologies.[73] With exports as a share of GDP trending downward for the region since 2006[74] and the contribution of total factor productivity having weakened, GDP growth has dipped into the low single digits in the high-income economies and into the 5–6 percent per annum range in China.[75] Deeper assimilation of digital technologies could in time, accelerate growth, but long-standing expectations have yet to be realized.[76] Moreover, East Asian experience from the turn of the century suggests that as industry exits, the gain in productivity from agglomeration economies is proving to be considerably weaker. One implication is that the servitized city might not generate the growth that industrial cities delivered in their heyday.[77] If many routine, repetitive and customer facing tasks are automated and AI displaces more cognitively demanding white collar jobs as well, the service sector might also create far fewer employment opportunities than it did in the recent past.[78] New occupations, if they emerge, could require college level education and different skill sets from those of displaced workers. A widening of income inequality already a worrisome trend in advanced economies, could become a more acute social issue.

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[72] T. Stangarone (2020) https://thediplomat.com/2020/09/south-koreas-struggle-to-bring-manufacturing-home/. https://asia.nikkei.com/Business/Business-trends/South-Korean-companies-shift-production-out-of-China

[73] This is debated because digitization is results in consumer surplus that is not captured by the national accounts but the losses caused by hacking and malware are also missed out. A. Collis (2019) How should we measure the digital economy. HBR. https://hbr.org/2019/11/how-should-we-measure-the-digital-economy

[74] https://data.worldbank.org/indicator/NE.EXP.GNFS.ZS?locations=Z4

[75] L. Brandt et al (2020) estimate that China's total factor productivity has risen by just 0.7 percent per annum between 2009 and 2018. https://openknowledge.worldbank.org/bitstream/handle/10986/33993/Chinas-Productivity-Slowdown-and-Future-Growth-Potential.pdf?sequence=1&isAllowed=y; Growth is being constrained as well by industrial greening, regulation of the property sector and the reining in of online platforms. Over the longer term, an ageing and declining population will also dampen potential growth. S-J Wei (2021) https://www.project-syndicate.org/commentary/why-is-china-gdp-growth-rate-falling-so-fast-by-shang-jin-wei-2021-11

[76] The Solow Paradox is unresolved. https://www.mckinsey.com/business-functions/mckinsey-digital/our-insights/is-the-solow-paradox-back; D. Acemoglu et al (2014) Return of the Solow Paradox https://economics.mit.edu/files/10414

[77] This may not matter in a high-income country such as Japan but could be worrisome for China.

[78] https://anderson-review.ucla.edu/service-industrialization/; https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages D. Susskind (2020) *A World without Work*. Metropolitan Books. If the promise of "globotics" is realized many jobs could be transferred through digital channels to workers overseas. R. Baldwin (2019) *The Globotics Upheaval*. Oxford University Press.

(ii) Leading cities including some of the mid-sized ones (e.g. in China) are pinning their hopes on digitization.[79] Assimilating the technology and ensuring that it cost effectively delivers benefits will be a considerable endeavor. Several are at the forefront of the digital technology wave and working to create the digitally integrated, sensor studded "smart city"—a city where networked products gather, transmit via high-speed broadband, and store data thereby facilitating analysis, planning, decision-making using AI, and the efficient functioning of urban systems.[80] Songdo on the outskirts of Seoul, Masdar in Abu Dhabi and more recently the Xiongan New Area near Beijing are a few places where the concept is being put to the test.[81] As with industrial policy, governments—central and sub-national—are in the driver's seat and using a variety of levers to achieve results.[82] In making the leap to this brave new urban world, the major cities are advantaged by the concentration of talent and R&D in local institutions that are a fruitful source of technologies that can be tested and mainstreamed in the urban environment. Cities are investing in state-of-the-art public transport systems, with cameras, sensors, and intelligent traffic control systems, which use algorithms to analyze urban data to improve the flow of traffic.[83] Digital technology and robotics are

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[79] McKinsey (2021) notes that "Almost half of the world's smart cities are in China, some 500 in total. While initially smart city applications have focused on areas like security and traffic management, 5G networks and edge computing advances are likely to usher in a new era for cities as integrated digital platforms." The future of digital innovation in China. https://www.mckinsey.com/featured-insights/china/the-future-of-digital-innovation-in-china-megatrends-shaping-one-of-the-worlds-fastest-evolving-digital-ecosystems

[80] C. Ratti and M. Claudel (2016) *The City of Tomorrow*. MIT Press. Joo and Tan (2020) Smart Cities in Asia: An Introduction. https://www.researchgate.net/publication/340269606_Smart_cities_in_Asia_an_introduction; T. Campisi et al (2021)

[81] T. Naito (2021) pegged the value of the smart city market at $83.9 billion in 2019 and expects it to grow by a quarter between 2020 and 2027. Redefining the smart city. https://www.brookings.edu/book/breakthrough/; https://www.brookings.edu/wp-content/uploads/2021/12/Chapter-Nine_Breakthrough.pdf

[82] FT (2018) China's digital city showcases Xi's grand ambition. https://www.ft.com/content/f11be344-630a-11e8-90c2-9563a0613e56 To date, the smart cities have not lived up to their billing and the hype has begun fading. Masdar City ran into cost overruns and had to abandon its Master Plan. Songdo is "sometimes described as a ghost town, or, variously as cold, impersonal, homogeneous, and duly predictable." J. Robbins (2021) https://e360.yale.edu/features/why-the-luster-is-fading-on-once-vaunted-smart-cities

[83] https://www.chinadaily.com.cn/a/201812/27/WS5c24f1c7a310d91214051564.html; https://corporate-blog.global.fujitsu.com/fgb/2019-11-20/how-fujitsu-is-using-ai-to-make-japans-roads-and-rivers-safer/; https://www.traffictechnologytoday.com/news/traffic-management/korean-usa-researchers-develop-ai-system-that-predicts-real-time-traffic-conditions.html; https://www.autofutures.tv/2021/01/19/blue-signal/; CCTV security cameras, when combined with facial and gait recognition software, is also enabling governments to track the movement of people for good and ill. China's conception of "smart cities" includes "across-the-board surveillance that is partly political and partly about mechanizing ordinary street-level policing." Procurement notices reflect these dual aims: In addition to referencing "smart policing" and "smart monitoring," they also reflect officials' hopes to enact tighter social control through "smart comprehensive management." Creemers (2020), https://www.ft.com/content/46bc137a-5d27-11e9-840c-530737425559 https://www.csis.org/blogs/trustee-china-hand/coming-focus-chinas-facial-recognition-regulations; https://www.theatlantic.com/ideas/archive/2021/10/china-america-surveillance-hikvision/620404; J. Batke and M. Ohlberg (2020) State of surveillance. https://www.chinafile.com/state-surveillance-china The use of facial recognition technology augmented by AI is also being used by businesses for example to bill customers for products and by hotels to check on their guests. K. Strittmatter (2020). *We have been harmonized*. Custom House/Harper Collins. New York.

being harnessed to manage energy usage and to monitor the operation and upkeep of water, sewerage, and sanitation facilities.[84] Moreover, an increasingly tech savvy urban population armed with smartphones and enjoying easy access to affordable broadband has begun using apps for a multitude of tasks to exchange information, engage in retail and financial transactions,[85] to arrange travel, and to use public and commercial services. East Asia is taking the lead in making the switch to hybrid, electric and fuel cell powered vehicles and experimenting with autonomous vehicles (AVs) to green urbanization, cut carbon emissions, and to reduce pollution blanketing cities in China and Korea. The impending revolution in automobility once AVs come into widespread use, could begin transforming urban transportation but also the physical layout of cities by freeing the space allocated to roadways and parking for recreational purposes, to enlarge green spaces to combat the heat island effect and conserve water, and for housing or commercial use.[86] A major and difficult transformation is in store for East Asian cities that pursue digitization.

(iii) The frequency of severe weather events since the turn of the century as global average temperatures have inched upwards, have exacerbated an already burdensome problem. Their resilience is being tested by unusually heavy rainfall and flooding, by destructive hurricanes, by heatwaves, by drought, and by rising sea levels, which magnify the threat from storm surges and are salinizing the groundwater. Much of the urban infrastructure of cities becoming exposed to a new climate regime is not designed to withstand the recent battering and worse to come. Many cities have aging drainage systems and water and power infrastructures that are more vulnerable than newly built ones. Hence urban resilience is the new watchword. In coming to grips with this imperative, cities need to make water, power,[87] and road systems climate resilient for example by raising roadways, building seawalls, installing pumping stations, ensuring that the flooding of streets can be minimized, and that storms do not disable power supplies and telecommunications.

A smart city is a complex and fragile creation, which could be brought to its knees if electricity and the Internet of Things (IoT) ceased to function. Superstorm Sandy, which flooded downtown areas including some of the metro stations, taught New York a bitter lesson. Prolonged drought has uncovered the precariousness

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[84] Townsend (2013, p.42, *Smart Cities*) observes that "the power grid is the circulatory system [of the smart city] that delivers the lifeblood of electricity…data networks are their nervous systems shuttling data to and fro."

[85] Fintech has taken China and high income East Asian economies by storm. https://asiatimes.com/2021/08/asias-unstoppable-fintech-revolution-leads-the-world/; https://muse.jhu.edu/article/748993/pdf

[86] https://mobility.mit.edu/av; F. Aram et al (2019) https://www.sciencedirect.com/science/article/pii/S2405844019300702; P. Vahmani and A.D. Jones (2017) https://www.nature.com/articles/s41467-017-01346-1

[87] The Fukushima disaster in 2011 exposed the vulnerability of critical infrastructure in exposed locations. "It was the product of grossly inadequate preparation for such events—driven by a deep belief among both operators and regulators that nuclear plants were almost "absolutely safe." … Yet on the Fukushima coast, far up the hillsides, there are "tsunami stones," marking how far a devastating wave surged inland a thousand years ago. The carvings on them warn: Do not build your home below here. Unfortunately, many ignored the warning—including Tokyo Electric Power, owners of the Fukushima Daiichi plant, along with Japanese regulators." M. Bunn (2021) https://thebulletin.org/2021/03/asking-the-unasked-questions/

of California's interlinked water and power systems. An unprecedented cold snap froze Texas windfarms and pipelines transporting gas in 2021, and a decline in wind velocity cut power generation by European windfarms during the fall of 2021.[88] East Asia has not been spared. Japan was hit by record high temperatures in 2018, two powerful typhoons in 2020 causing extensive damage, and Tokyo suffered a heatwave in the summer of 2021. Over the past 40 years, the number of typhoons approaching Japan has risen by 20 percent and those impacting Tokyo by 50 percent.[89] and prolonged heavy rain across central and northern China in 2020 and 2021 was responsible for flooding forcing the evacuation of thousands. Rainstorms in July 2021 dropped a year's worth of rain on Zhengzhou over the course of three days submerging large areas, and 10 inches fell on Xinxiang within a matter of hours. Climate change and environmental degradation are also subjecting Mongolian and Chinese cities bordering the Gobi Desert to intensifying sandstorms that coat roads, airports, and power facilities, damage health, and disrupt transport.[90] The complexity of the modern city[91] and its dependence on key energy and telecommunications infrastructures has been highlighted by the disruption that can be caused by a power outage or a flood. The disabling of cell phone service by flooding in Zhengzhou deprived people who do not carry cash with means of payment.[92] The Covid pandemic revealed the importance of a variety of services particularly healthcare and of the quality of governance. Cities that have proven resilient in the face of shocks are ones that have built robust systems of governance complemented by well-equipped services run by trusted professionals. In normal times such capabilities enable a city to function efficiently; in an emergency, they contain damage and disruption and help to restore normality. In short, the likelihood that the frequency of shocks could be on the rise, means that cities that neglect their physical and social infrastructures do so at their own peril.

(iv) The faint hope that the nations of the world will cut GHG emissions by enough to prevent global temperatures from rising by more than 1.5°C is receding with every passing year.[93] In any event, the $CO_2$, which has been pumped into the

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[88] https://www.ft.com/content/d53b5843-dbe0-4724-8adf-75c66127ea80

[89] H. Gokhale (2021) Japan's carbon tax policy. https://www.sciencedirect.com/science/article/pii/S266604902100058X

[90] https://www.npr.org/sections/goatsandsoda/2021/05/30/1000530563/buried-alive-in-mongolias-worst-sandstorms-in-a-decade

[91] L. Bettencourt (2021) Introduction to Urban Science. Bettencourt maintains that "A city is first and foremost a social reactor. It works like a star, attracting people and accelerating social interaction and social outputs in a way that is analogous to how stars compress matter and burn brighter and faster the bigger they are." https://www.santafe.edu/news-center/news/science-bettencourt-cities-framework

[92] https://www.wsj.com/articles/china-flooding-exposed-risks-in-beijings-plan-to-launch-digital-currency-11634654928

[93] On the eve of the climate conference, Andrew Weaver stated. "1.5 degrees is not attainable. It never has been." https://thetyee.ca/Analysis/2021/10/28/Andrew-Weaver-Degree-Reality-Check/; COP 26 provided little reprieve, only another round of empty commitments. https://thehill.com/opinion/energy-environment/582110-cop26-was-a-cop-out-heres-why-it-gets-a-failing-grade; https://www.project-syndicate.org/bigpicture/the-great-cop-out?barrier=accesspaylog

atmosphere will persist for thousands of years and its warming effect will not abate.[94] Therefore, rising sea levels are a given.[95] The likely change and how it will affect coastal areas in different parts of the world is uncertain but coastal cities are on notice that they are in harms way. Proximity to waterways was long viewed as an advantage because it facilitated transport, met cities essential needs, and helped to flush waste. However, in earlier times major port cities were rarely built on the ocean's edge. Amitav Ghosh (2016, p.37)[96] writes that "the great port cities of Europe like London, Amsterdam, Rotterdam, Stockholm, Lisbon, and Hamburg are all protected from the open ocean by bays estuaries, or deltaic river systems… so also are old Asian ports [such as] Cochin, Surat, Guangzhou, Hangzhou and Malacca…as if…a provision had to be made for the unpredictable furies of the ocean." This cautionary principle was abandoned during the colonial era starting in the seventeenth century with the growth or founding of cities such as New York, Bombay, Madras, Charleston, Singapore, Hong Kong, and Shanghai. "Proximity to the water came to represent power and security, mastery and conquest (Ghosh 2016, p.37)." Prior to the Opium War, China's major urban centers were inland, cities such as Hangzhou and Nanjing. China's major coastal cities emerged after the Treaty of Nanjing was signed in 1842 permitting foreign powers to trade at initially five (the ceding of Hong Kong added a sixth) and later many more treaty ports and cities (Neild 2010).[97] This initial wave of colonial era port city building based on the belief that natural forces could be checked and mastered, triggered the creation of many more ocean facing cities in East Asia.[98] China, Japan, Korea, and Taiwan have together engaged in coastal urbanization because hitherto the climate in coastal locations is more benign, they are ideally suited to support the boom in marine

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[94] D. Archer (2009) *The Long Thaw*. Princeton University Press

[95] https://www.carbonbrief.org/explainer-how-climate-change-is-accelerating-sea-level-rise

[96] *The Great Derangement*. University of Chicago Press.

[97] Treaty ports and other foreign stations in China. https://www.jstor.org/stable/23891203; Keller and Shiue (2021) observe that "The nearly 100 years of semi-colonization…shaped China's economy today as one focused on the coastal areas." These ports served as a gateway for the diffusion of western ideas and institutions. "It was from these claimed areas that Western countries abolished Chinese practices in trade and reorganized them under their management…Western-style courts and legal practices were introduced in China at foreign consulates that practiced extraterritoriality…Starting in the year 1854, Westerners also managed China's customs system through the Chinese Maritime Customs Service…Western influence increased the number of banks, firm investment, as well as the adoption of steam engines and industrial machinery. Western influence also had a positive impact on local interest rates in that it significantly lowered them [in areas contiguous to 'open cities and ports'], and much of the interest rate-lowering effect is due to lower risk and security spillovers as opposed to a larger supply of capital." https://voxeu.org/article/modernisation-and-china-s-century-humiliation

[98] The history of New Orleans provides insight into why cities have sprung up and expanded in exposed and precarious locales. Despite having been subjected to destructive hurricanes with monotonous regularity, governments and publics were persuaded that with some engineering patches, New Orleans could withstand the fury of natural forces. Katrina proved them wrong as Horowitz (2020) describes in detail. And Katrina did not lead to a managed retreat, which illustrates how difficult it is to forsake endangered cities and how governments can reinforce the reluctance to abandon vulnerable coastal cities. A. Horowitz (2020) *Katrina: A History, 1915–2015*. Harvard University Press. Henry Lee (2021) rightly observes that "The incentives are clearly skewed toward investing in recovery rather than in preparation or resilience." https://www.lincolninst.edu/publications/issues/land-lines-october-2021

trade and transport, people are attracted by the scope for recreational and cultural activities, and because the interface between land and sea has a special fascination. Flourishing coastal cities have served as a magnet for migrants and consequently, millions now reside in low elevation coastal zones (LECZs) highly susceptible to the vagaries of climate. China is now one of five countries with the largest number of people living in LECZs—India, Vietnam, Bangladesh, and Indonesia are the other four.

The long running climate negotiations reveal the reluctance to accept the scientific facts and acknowledge the enormity of changes to come. Now that the failure to flatten and bend the warming trend is all too apparent, countries are willy nilly having to come to grips in particular with the implications for the geography of urbanization and of economic activity. Rising sea levels, drought and drying of soil and water bodies in inland regions, shrinking river flows and their increasing seasonality,[99] intensifying heat during the summer months, and severe weather impacting coastal and inland regions alike, suspend questions over the viability of many urban centers going forward. Experience with floods and hurricanes shows that there is great unwillingness to forsake choice locations even when they are subject to regular destructive buffeting. But history reveals that a time comes when environmental change or other developments force people to abandon cities and supporting infrastructure built at great cost over centuries. Angkor in Cambodia and the Mayan cities in the Yucatan Peninsula are just two examples of climate change—specifically prolonged droughts—disrupting urban settlements.[100]

(v) The ageing of populations will be yet another factor impinging on the geography and structure of urbanization. European and East Asian populations are greying fast. Single person households are on the rise, with the elderly a majority of those living alone.[101] A quarter of Japan's population is over the age of 65 years and single-person households accounted for 35 percent of the total in 2016, with the numbers on the rise.[102] Moreover, smaller towns are depopulating as younger workers move to larger cities and numbers shrink so do public services, accelerating the exodus.[103] This closely resembles what is happening in Southeastern Europe

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[99] https://www.sciencedaily.com/releases/2021/03/210315115027.htm

[100] https://www.nationalgeographic.com/science/article/angkor-wat-civilization-collapsed-floods-drought-climate-change; https://magazine.columbia.edu/article/what-happened-angkor; https://news.harvard.edu/gazette/story/2020/02/new-clues-about-how-and-why-the-maya-culture-collapsed/; https://www.smithsonianmag.com/science-nature/why-did-the-mayan-civilization-collapse-a-new-study-points-to-deforestation-and-climate-change-30863026/

[101] Through the 2040s, 80 percent of net new households in the United States will be of singles and couples and the over 65s will be a growing majority.A. Flint (2020) The future of density. https://www.lincolninst.edu/sites/default/files/pubfiles/land-lines-july-2020-full.pdf

[102] In Sweden over one half of all households are occupied by a single person. https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20170905-1

[103] https://www.forbes.com/sites/jennawang/2019/07/31/waiting-for-the-end-in-japans-terminal-villages/?sh=28c9975e1e03; Economist (2019) https://www.economist.com/asia/2019/06/29/rural-areas-

in countries such as Bulgaria, Albania, Rumania, and Croatia. It is what is in store for China, Korea, and Taiwan as ageing has spiraled in all three. According to the Euromonitor, half of all new single person households will appear in the Asia Pacific region between 2019 and 2040 with China leading the growth measured in absolute numbers.[104] Ageing, and the demand by the elderly for healthcare, mobility, home maintenance, delivery, retail establishments, suitable accommodation, and personal care services, can only be met adequately and cost effectively in large cities. For these reasons, as well as the ones noted earlier, the mega urban regions in geographically favored locations are ones that will grow and whether or not agglomeration economies accrue, they will serve as the growth poles for East Asian economies and the foci for technological advance.

## 3. But East Asian cities have been slow to rise to these challenges

However, the Covid pandemic and earlier economic shocks (e.g. the financial crisis of 2009), the diffusion of digital technologies and climatic pressures to come, demand a rethinking. Are East Asian cities ready for the challenges posed by the known knowns and others on the horizon, some known and others that will come as a surprise? In the past, when the pace of change was gradual, innovation could be absorbed, and cities grew organically with tinkering and refinement of design on the margins. The pell mell growth of cities in East Asia since the last quarter of the 20th century, some in areas ill-suited for habitation over the longer term (seismically active areas, floodplains and LECZs), the hurried construction of "tofu buildings,"[105] the emerging polycentric urban sprawl, the hurry to make cities smarter using digital technologies, are storing problems that will need to be tackled in the next two to three decades.[106]

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bear-the-burden-of-japans-ageing-shrinking-population; Atlantic (2017) https://www.theatlantic.com/business/archive/2017/08/japan-rural-decline/537375/

[104] https://www.euromonitor.com/article/half-the-worlds-new-single-person-households-to-emerge-in-asia-pacific

[105] The fragility of these structurally unsound builds was revealed by the damage resulting from the Sichuan earthquake of 2008. https://www.visiontimes.com/2021/07/12/dangerous-tofu-dreg-projects-remain-a-persistent-problem-in-many-parts-of-china.html; Glaeser (2011, p. 53) remarks that the urban renewal of Detroit and New York produced "shiny new buildings [which] were really Potemkin villages spread throughout America, built to provide politicians with the appearance of urban success." This is not dissimilar to what politicians and developers are doing in China. *Triumph of the City*.

[106] Beijing is a prime example of compressed urbanization going astray and it is not the only one. Dan Wang (2021) bemoans the emergence of a concrete jungle. "Everything that can go wrong in urban design has gone wrong in Beijing… Its streets are unwalkable, …its imperial heritage, made up of alley houses called hutongs, is slowly being taken over by its socialist heritage, made up of gray Soviet blocks that tower over all… [It has become] a desert steppe city with Stalinist characteristics… a concrete no-fun zone and the most restrictive city in the country." https://danwang.co/2021-letter/

Urban development has been pursued with little attention to its energy intensity.[107] Cities now account for 75 percent of carbon emissions as their architecture involving the liberal use of steel, concrete and glass is dependent on fossil fuels and much of their energy consumption is derived from fossil fuels.[108] Many of the largest emitters of GHGs are in China, cities with concentrations of industry such as Shanghai, Tianjin, Suzhou, Handan, Urumqi, Yinchuan, and Dalian.[109] The emphasis on automobility using private vehicles, the design of buildings requiring virtually year-round active climate control, the focus on heavy industry, the paucity of green spaces and tree cover to provide shade, which could moderate the heat island effect, the inattention to stormwater drainage[110] as more and more of the urban space is paved over, and the embrace of digital technologies, have increased the vulnerability of cities to severe weather, to warming as well as to risks associated with the failure of key systems e.g. electrical and telecoms. The many high rises that have mushroomed in East Asian cities, most notably in China,[111] although they do promote arguably desirable densification, may be ill-suited for an ageing population with restricted mobility.

The rush to digitize and thereby make cities "smarter" while it will enlarge access to information in real time, reduce some transaction costs, and improve governance and possibly services delivery,[112] also has its downsides. These include the loss of privacy, from machine learning enabled tracking devices, which provide seamless surveillance, risk of data theft, spiraling energy consumption by digital devices and server farms, and the grave threat to a city dependent upon the Internet of Things from cyber-attacks that could disable critical infrastructures, manufacturing facilities, and increasingly essential, interconnected devices,[113] and from natural disasters that disable cellular networks. Moreover, disruption or outages of the cloud computing infrastructure could turn cities into zombies and a transport system heavily reliant on autonomous vehicles and automated public metro systems, would grind to a standstill (Townsend 2013, pp. 262–264).[114]

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[107] Cheap energy has shaped the growth and design of cities—and industrialization. Now that dependence on fossil fuels is becoming a liability.

[108] https://www.unep.org/explore-topics/resource-efficiency/what-we-do/cities/cities-and-climate-change; According to T. Wei, J. Wu, and S. Chen (2021), 25 cities are responsible for more than half of all GHG emissions. https://www.frontiersin.org/articles/10.3389/frsc.2021.696381/full#h4; B. Calder (2021). *Architecture: From Prehistory to Climate Emergency*. Pelican.

[109] Wei, Wu, and Chen (2021) https://www.frontiersin.org/articles/10.3389/frsc.2021.696381/full#h4

[110] Cities are constructing stormwater holding tanks in anticipation of torrential downpours. Park lakes and ponds can also double as potential catchments for stormwater. The Cheonggyecheon Project in the heart of Seoul revived a river that had been paved over and created a green oasis. This now serves as an attractive recreational area and moderates the heat island effect.

[111] China can lay claim to the largest number of high rises in the world. And it is now attempting to put a stop to this runaway trend. https://www.fastcompany.com/90657442/china-is-the-capital-of-supertall-skyscrapers-why-is-it-banning-them; https://www.skyscrapercenter.com/countries

[112] https://urbact.eu/digital-transition-cities-benefit-citizens

[113] https://www.agcs.allianz.com/news-and-insights/expert-risk-articles/cyber-attacks-on-critical-infrastructure.html; https://www.cisa.gov/sites/default/files/publications/niac-securing-cyber-assets-final-report-508.pdf

[114] Townsend labels smart cities as "brittle, buggy and bugged."

East Asian cities in the forefront of digitization have been slow to factor in the implications of technological change for jobs and for income inequality in urban centers. Although new occupations could emerge to replace jobs lost because of the spread of 'intelligent' machines, there are many who doubt that jobs will be as plentiful and observe that new occupations may require specialized skills and computer literacy,[115] which the laid off and new entrants could lack (Yusuf 2021).[116] The evidence is growing that the middle class in industrialized countries is being squeezed (OECD 2019).[117] In Japan, middle income groups are experiencing a secular decline in income shares.[118] Furthermore, research conducted in the United States shows that inequality is higher in large metro areas and major cities relative to the national average (Holmes and Berube 2016; Glaeser, Resseger and Tobio 2009).[119] Geoffrey West, who co-authored a study by the Santa Fe Institute, finds that "As the city grows, there's no advantage to people in the bottom 10–20th percentiles. As you go down the income deciles, the value-added for city-dwellers got less and less in a systematic way… so much so that, in the bottom decile you get nothing at all. There's even evidence that you're losing quality of life… Here we found that rich are getting even richer than we thought and the poor are getting even poorer than we thought."[120]

An OECD report (2020)[121] on Korea states that more than one half of Korean youth in the 15–29 age range were unemployed in part because desirable jobs in large firms were scarce. Moreover, because the social safety net is weak, old age poverty is the highest in the OECD and combined with wage dispersion, has worsened inequality in urban areas. China's rapid adoption of digital technology, its large legacy workforce with limited education and skills, its already high level of income inequality, and its frugal social security system, could bring it face to face with similar issues as its growth rate regresses towards the global mean.[122]

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[115] Older workers and younger ones with high school education or less, lack such skills.

[116] S. Yusuf (2021) https://erf.org.eg/publications/digital-technology-and-inequality-the-impact-on-arab-countries/; Z. Qureshi (2020) https://www.brookings.edu/wp-content/uploads/2020/02/BBVA-OpenMind-Zia-Qureshi-Inequality-in-the-digital-era.pdf

[117] https://www.oecd.org/social/under-pressure-the-squeezed-middle-class-689afed1-en.htm

[118] S. Nagai (2021) https://blog.oxfordeconomics.com/content/japan-why-abenomics-failed-to-reflate-household-wealth; https://blog.oxfordeconomics.com/content/japan-kishida-chases-two-elusive-ends-growth-and-redistribution

[119] https://www.brookings.edu/research/city-and-metropolitan-inequality-on-the-rise-driven-by-declining-incomes/; https://scholar.harvard.edu/files/resseger/files/glaeserressegertobiojrs.pdf

[120] https://www.sciencedaily.com/releases/2021/08/210817193019.htm; Scaling of urban income inequality in the USA.
Elisa Heinrich Mora, Cate Heine, Jacob J. Jackson, Geoffrey B. West, Vicky Chuqiao Yang, Christopher P. Kempes J R Soc Interface. 2021 Aug; 18(181): 2021 0223. https://www.semanticscholar.org/paper/Scaling-of-urban-income-inequality-in-the-USA-Mora-Heine/83e5ad990a29618b8d5b8577d30b5ee70932bd5d

[121] OECD (2020) Economic Surveys: Korea. https://www.oecd.org/economy/surveys/korea-2020-OECD-economic-survey-overview.pdf

[122] High and rising housing costs are identified as one of the causes of inequality in large—superstar—cities. This is already a concern in China's major cities, many in the Eastern part of the country but some in the interior as well. Skill biased technological change and the growth of mega cities could magnify income inequality. Le Gales and Pierson (2019) https://direct.mit.edu/daed/article/148/3/46/27240/Superstar-Cities-amp-the-Generation-of-Durable Inequality is also high in Hong Kong (Gini coefficient 0.54) and partially accounts for the protests that erupted during 2019–2020. UN (2020) *World Cities Report 2020* https://unhabitat.org/sites/

For the East Asian economies, those where urbanization has peaked and others where it is ongoing, the need for cities to not just survive in the face of challenges to come but to also thrive, calls for long range planning, making hard choices regarding the geography of urbanization over the coming decades, and investing strategically, leveraging technology to render cities more productive and resilient while drastically reducing their carbon footprints. To compress the changes needed within a few decades[123] will require the mobilizing of political support for far reaching and costly measures plus a large outlay of resources in support of urban and industrial greening.

## 4. Time for hard choices and action

Forward thinking and planning for the future is always in short supply given narrow political horizons, convincing most of the public to take account of a slowly evolving peril, and awareness of sunk costs. "A process that involves…planners, designers [and many stakeholders] will certainly challenge the natural tendency of people…to resist change of any kind…human inertia will invariably reproduce the same patterns of land development and infrastructure in city after city (Suzuki et al 2020, p.31)."[124]

For most East Asian cities tipping points lie in the future and there is time for adaptation, strengthening defenses and building resilience. There are many hurdles to surmount but if they act with all due speed, many cities can shield themselves from the black swans to come. Undoubtedly, the cost of adequate precautionary measures may be too high for the most exposed ones-depending on the severity of problems that lie in the future. Vulnerability to climatic and other factors may be compounded by the erosion of the economic and fiscal bases. In fact, industrial hollowing and the closure of mines is a more immediate threat to cities in East Asia than climate change. For example, declining heavy industries in China's Northeast are creating a rust belt of fading cities. Single industry cities in the interior are facing similar hardship. These industries are losing out to competitors, to a shift in the composition of demand, and the need to reduce carbon emissions as well as other pollutants. Other cities in China and Japan are imploding or on the verge because the mineral resources, which underpinned their prosperity, are exhausted or face closure because coal and other hydrocarbons have an uncertain future.

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default/files/2020/10/wcr_2020_report.pdf; A regression towards the global mean rate of growth is a regularity observed by Pritchett and Summers (2014), which eventually brings high fliers down to earth. https://www.nber.org/papers/w20573

[123] The IPCC, the IEA and other bodies tracking climate change are of the view that the hour is late and it is only by attaining net zero carbon emissions by 2050 that the global mean temperature increase can be stabilized at close to 1.5°C. IEA (2021) https://www.iea.org/reports/net-zero-by-2050; IPCC (2018) https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/; (https://www.un.org/en/climatechange/net-zero-coalition)

[124] World Bank (2010) ECO2 Cities https://openknowledge.worldbank.org/handle/10986/2453

Soon, East Asian countries will need to make tough choices regarding the shape of urban development. Sustaining and/or growing all existing urban agglomerations may prove to be both undesirable and too costly. Hence a managed retreat and a concentration of urban populations in urban regions, which are likely to be viable over the longer term, could become a necessity. An initial step might be to scale back the expansion of the most exposed coastal cities followed by a gradual abandonment of certain locations, which cannot be adequately protected by (active and passive) barriers of various sorts. Some cities in the hot[125] and dry inland areas of China may also be difficult to maintain at current levels even with water transfer schemes (as the groundwater runs out and dust storms become fiercer)[126] and investment in cooling technologies. Deindustrialization could compel deurbanization not only in China but also in Korea. It is ongoing in Japan. Given the scale economies enjoyed by the large metropolitan regions, a concentration of population in the remaining climatic and geographical sweet spots, is where urbanization could be heading once the cost of climate proofing certain locations afflicted by a succession of disasters hits home and inertia is overcome. Climate induced migration is a given.[127] Advance planning and preemptive action where feasible could minimize future hardship.

In much of East Asia, urbanization has gone hand in hand with economic growth over the past almost five decades—more in the case of Japan. The region has prospered greatly and many of its cities large and small boast modern infrastructures with urban dwellers enjoying a vast improvement in the quality of life. This has not been costless. Cities have become energy intensive particularly the most industrialized ones, levels of pollution have risen taking a toll on health,[128] and large, tightly networked, complex urban entities dependent on digital

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[125] Temperatures in parts of Eastern China could exceed the wet bulb temperatures that human beings can endure by later in the century. Once they approach or exceed 35°C, the human body can no longer cool itself and temperature control is disrupted. Im et al (2017) https://www.science.org/doi/10.1126/sciadv.1603322

[126] Groundwater supplies 40 percent of agricultural requirements and close to 70 percent of the drinking water in northern and northwestern regions of China. This source is being exhausted with groundwater levels in the North China Plain dropping by several meters. Two thirds of China's cities are water scarce and by one estimate, by 2030, China could be consuming 90 percent of the available water resources. J. Qiu (2010). https://www.nature.com/articles/466308a; http://www.xinhuanet.com/english/2018-05/03/c_137153841.htm; The North-South water transfer has stabilized the decline in Beijing's water table and there is some recovery, but it is a holding operation. Di Long et al (2020) https://www.nature.com/articles/s41467-020-17428-6; J. Barnett et al (2015) https://www.nature.com/articles/527295a; D. Medianu and J. Whalley (2012) https://www.nber.org/papers/w18124; S. Rogers et al (2019) https://onlinelibrary.wiley.com/doi/abs/10.1111/1745-5871.12361; During the 1930s, more than 2.5 million people were forced to move out of the Dust Bowl region in the United States.

[127] J. Podesta (2019) https://www.brookings.edu/research/the-climate-crisis-migration-and-refugees/; A. Lustgarten (2020) https://www.propublica.org/article/climate-change-will-force-a-new-american-migration; World Bank (2018) https://www.worldbank.org/en/news/infographic/2018/03/19/groundswell---preparing-for-internal-climate-migration; " The window for action is closing. The world can now expect that with every degree of temperature increase, roughly a billion people will be pushed outside the zone in which humans have lived for thousands of years." A. Lustgarten (2020) The great climate migration. NYT. https://www.nytimes.com/interactive/2020/07/23/magazine/climate-migration.html

[128] Yin et al (2020) estimate that pollution from indoor and outdoor sources was responsible for the deaths of 1.24 million people in China in 2017. https://www.thelancet.com/article/S2542-5196(20)30161-3/fulltext As many as 10 million people die worldwide every year because of outdoor and indoor pollution. Wallace-Wells (2021) https://www.lrb.co.uk/the-paper/v43/n23/david-wallace-wells/ten-million-a-year; The health of

infrastructures, have become more susceptible to shocks, which can quickly engulf an entire megacity.

Major changes are in store for urban economies as well. Having reached or passed peak industrialization,[129] the economic prospects of cities depend upon or will come to depend upon tradable and non-tradable services. If digital technology delivers on its promise, the productivity of services will soar, and the economic future looks relatively secure. But governments and firms need to further incentivize innovation and the innovations must prove their worth. Japan, Korea, Taiwan, and China are among the leading investors in R&D and generating a wealth of (services/software) patents. This is encouraging because it could be good for growth and advances for example in healthcare and green technologies will be needed to cope with future outbreaks of disease, with an ageing urban population, with making cities more livable, and in sharply curbing GHG emissions. The development of vaccines against the SARS COV2 virus in record time, the amazing leap of Fintech since 2010,[130] and the progress in areas such as machine (deep) learning and power storage systems (batteries and other) all underscore the desirability of supporting research and incentivizing the uptake of commercially viable technologies, initially in some instances, with the help of subsidies (e.g. renewable energy, electric vehicles).

Cities throughout East Asia are collectively responsible for as much as 28 percent of GHG emissions,[131] with Chinese cities contributing between a fifth and a quarter of global emissions. While all cities must scale back the release of $CO_2$, China must take the lead and make the largest reductions.

It is better positioned than the other countries to curtail emissions for at least four reasons: First, China's rate of urbanization is well below that of Japan, Korea, and Taiwan and hence there is greater scope for tailoring future urbanization to reduce energy intensity and carbon release. Second, China's extraordinarily high level of domestic savings can enable it to finance the investments that will narrow the carbon footprint of its cities. Gross domestic savings were 44 percent of GDP in 2020 and gross capital formation was 43 percent (WDI).[132] With resource mobilization on this scale China has degrees of freedom no other country can claim—assuming that it can be invested efficiently.[133] Third, China's national and sub-national governments have demonstrated the capacity to implement massive projects in

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urban dwellers in Korea is compromised by ozone, sulfur dioxide and particulates. Hwang et al (2020) https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-020-09521-8

[129] The share of manufacturing in GDP is declining in all East Asian countries. https://data.worldbank.org/indicator/NV.IND.MANF.ZS?locations=CN-JP-KR

[130] Fintech has made spectacular inroads in China thanks to companies like Ant Financial and Tencent. Marsans (2021) https://www.csis.org/blogs/new-perspectives-asia/chinas-fintech-revolution Feyens et al (2021) discuss the reasons why Fintech has taken the market by storm. https://www.bis.org/publ/bppdf/bispap117.pdf

[131] https://www.ucsusa.org/resources/each-countrys-share-co2-emissions

[132] https://data.worldbank.org/indicator/NE.GDI.TOTL.ZS

[133] China's track record of investment over the past decade has been less than stellar with many infrastructure and real estate projects delivering low or negative rates of return. Th troubles besetting developers such as Evergrande have brought this to the fore.

record time with the help of a construction industry that is easily the world's most capable, and to relocate millions of people. Fourth, China is targeting net zero emissions by 2060 and is already the largest producer of renewable energy equipment. It is prioritizing the use of renewable energy and taking steps to green urban industry and transport.

However, in attempting to green urbanization and urban industry, China will be hamstrung by a number of factors. First and foremost, 58 percent of China's primary energy is derived from coal, the principal source of carbon emissions.[134] Weaning industry, the power sector, and urban users away from coal could be a slow process because of the decentralization of coal-power project authority,[135] the volume of assets that would be stranded following a break from coal (a major issue in China where most of the coal fired generating capacity was constructed during the past two decades with each plant having a useful life of 30 years or more), the opposition from coal producers and users, the cost of replacing or retrofitting equipment to use clean energy, and the vast outlay needed to increase the supply of energy from renewable sources, from fusion and from green hydrogen.[136] Furthermore, transition away from coal would be paced by the government's GDP growth imperatives[137] and to avoid compromising energy security.

Second is the concentration of population in the coastal provinces (60 percent), which are also the most urbanized and house much of the country's industry and economic assets.[138] The East is not only the most developed region it is also the magnet for migrants. Several coastal cities are in LECZs, Shanghai and Tianjin included as well as others along the Bohai Economic Rim. Two decades of construction activity has crowded the region with port infrastructures and linked industries. In other words, the Eastern region is China's economic heartland and an attempt to shift the center of gravity closer to the South-Central region sheltered from coastal furies and better supplied with water, will face fierce opposition from a variety of entrenched interests. This is no different from the resistance that would be encountered to attempts at relocating activities and infrastructures away from Osaka/

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[134] Between 2011 and 2019, China's coal usage exceeded that of all other countries combined. https://chinapower.csis.org/energy-footprint/

[135] In fact, investment in coal power projects has risen since 2019 and a large number are in the pipeline. M. Ren et al (2019) https://www.nber.org/system/files/working_papers/w25437/w25437.pdf; https://www.carbonbrief.org/analysis-will-china-build-hundreds-of-new-coal-plants-in-the-2020s; https://www.greenpeace.org/eastasia/blog/6815/24-new-coal-fired-power-projects-approved-in-china-in-first-half-of-2021-greenpeace/

[136] Investment in a smart, ultra-high voltage (UHV) grid would add to the cost.

[137] A shortage of coal in the second half of 2021, resulted in power outages and forced a cutback in industrial production. This compelled the government to ease restrictions on the production, import and usage of coal.

[138] As a result of a three-decade long spending spree, China's investments in urban and transport infrastructures not just in the coastal areas but inland as well, are vast and include ghost cities, highways to nowhere, and underutilized HSR lines. Henry Lee (2021) rightly notes (when referring to western countries, but what he says is equally applicable to East Asian countries), "Environmental considerations were ignored. Too often the infrastructure seemed to be built because it could be built." In China's case, because this was a way of mopping up excess savings and maintaining a targeted growth rate. https://www.lincolninst.edu/publications/issues/land-lines-october-2021

Kobe, Nagoya, and Tokyo/Yokohama in Japan.[139] Likewise, with more than a quarter of its population and two thirds of industry located in coastal zones, Korea would face equally hard choices.[140] According to Park and Lee (2020),[141] it is the cities on the Southern coastline that would be more endangered by climate change compared to cities along the western and eastern coastline. But the central region and Seoul are not necessarily immune to severe weather events as shown by severe flooding in 2020 affecting the cities of Daejeon and Seoul. North Korea was equally hard hit by rainstorms.

Third is the layout of cities that have proliferated since the mid 1990s. The speed with which they have been constructed has meant that insufficient attention was given to the impact of forests of high-rise buildings on congestion,[142] to heat island effects, to the elder friendliness, and walkability of urban spaces, and to the allocation of valuable urban land for green areas.[143] With temperatures on the rise, the demand for energy intensive cooling equipment has skyrocketed and this also injects more heat into the urban environment (Yusuf 2021).[144] Many Chinese cities are locked into high energy consuming mode with limited scope for change over the medium term. While buildings are generally designed to last for between 50 and 70 years, the average lifetime of buildings in China is as little as 25–30 years and even less in rural areas.[145] The construction of new buildings, the demolition of older buildings and the disposal of the waste entails a massive release of carbon. Cities in Korea and Taiwan are equally profligate users of carbon intensive construction practices. However, as noted earlier, China has some room to change tracks, "build better", build greener by reusing and adapting existing buildings[146] and building in safer locations because its urbanization rate

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[139] https://news.climate.columbia.edu/2019/10/25/rising-seas-low-lying-coastal-cities/; https://www.climatehotmap.org/global-warming-locations/osaka-japan.html; OECD (2008) https://www.oecd-ilibrary.org/docserver/011766488208.pdf?expires=1638046620&id=id&accname=guest&checksum=E98BEF8009BB90F373AB8748C8C2A791

[140] Oh et al (2019) https://link.springer.com/chapter/10.1007/978-981-15-0291-0_183

[141] https://iopscience.iop.org/article/10.1088/1748-9326/aba5b3

[142] Embracing verticality as Hong Kong has done out of necessity (triggered by the influx of migrants from China in the 1970s), does not necessarily denude street life but it can make for a crowded, poorly ventilated, unhealthy, oppressive environments. S. Lau and Q. Zhang (2015) https://global.ctbuh.org/resources/papers/download/2356-genesis-of-a-vertical-city-in-hong-kong.pdf

[143] Liu et al (2021) state that "climate change and surface warming in Eastern China (1961–2007) were induced by urbanization, with 44% of the warming in large cities due to the UHI effect…[with] urban warming accounting for about a third of the observed warming between 1961 and 2013." https://www.mdpi.com/2071-1050/13/2/762/pdf

[144] S. Yusuf (2021) https://www.cgdev.org/publication/staying-cool-climate-warms

[145] There are several reasons why buildings are so short-lived including building standards, the quality of building materials, construction techniques, lack of emphasis on maintenance and renovation, and the focus on rapid urbanization and city rebuilding that leads to excessively rapid demolition. This has greatly increased the carbon intensity of urban construction. Wei Zhou et al (2019) Estimating lifetimes and stock turnover dynamics of urban residential buildings in China. https://www.mdpi.com/2071-1050/11/13/3720/pdf China Daily (2010) Short-lived buildings create huge waste. https://www.chinadaily.com.cn/china/2010-04/06/content_9687545.htm

[146] Shenzhen is attempting to green the construction industry by instituting green building standards and regulations to conserve energy. Zhan Feng Dong (2019) Learning from the Shenzhen green development experience. https://www.greengrowthknowledge.org/blog/learning-shenzhen-green-development-experience

is the lowest in East Asia. As Calder (2021)[147] rightly states, "Net zero carbon, rigorously measured, needs to become as normal a minimum standard as structural resilience or fire escapes."

Fourth, the economic driver of Chinese cities, much like other leading East Asian cities, was industry. Services have already taken the lead in Japan and Hong Kong, are vying with industry for the pole position in Korea and Taiwan and are moving to the forefront in the major Chinese cities as well. But the productivity of services in Japan and Korea remains low despite progress in assimilating digital technology. Productivity in China and Taiwan is no better. As Japan, Korea and Taiwan are mature, high-income economies, the slowing of factor productivity is less of an issue. For China—and for North Korea and Mongolia—factor productivity is far more critical. Now that population growth has slowed to a crawl and labor supply is going into reverse, absent substantial gains in productivity, China and these other countries could "grow old before they become rich" especially so in a global environment beset with stronger headwinds. The decline in the productivity of manufacturing in Japan and other advanced economies,[148] the flagging productivity of Korea,[149] which has a manufacturing sector rivaling China's measured by the share of GDP,[150] are a warning that Chinese cities, older industrial ones, and cities where services have become dominant, may struggle to revive productivity, which in China has tracked the low rates in advanced countries since 2009.[151] The need to invest in the greening of urbanization, a managed retreat of cities, and in climate proofing could be an additional drag on economic performance, as it would divert resources from more productive uses.

## 5. Concluding observations

The coming decades will be testing times for East Asia and its cities will be the most affected. Compared with cities in other developing regions, those in Japan turned in a superior economic performance since the late 1950s; in South Korea and Taiwan from the late 1960s; Hong Kong had a good run from the 1950s; and Chinese cities began to bloom from the mid 1980s. Both North Korea and Mongolia were late starters however, by the 1990s, urbanization was catching up minus the export oriented manufacturing. All are now on the threshold of a new era. The Covid pandemic gives warning that navigating the decades

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147 Architecture. op.cit.

148 M. Baily, B. Bosworth, and S. Doshi (2020) https://www.brookings.edu/wp-content/uploads/2020/01/ES-1.30.20-BailyBosworthDoshi.pdf

149 Korea's total factor productivity growth sank to two thirds the level of the United States starting in the early 2000s. It declined further after 2010. Persistently low productivity of services is a continuing drag on potential growth. A. Swiston (2021) https://www.imf.org/en/Publications/WP/Issues/2021/03/26/Koreas-Growth-Prospects-Overcoming-Demographics-and-COVID-19-50261

150 The share of manufacturing in GDP for Korea in 2020 was 25 percent. It was 26 percent in China. https://data.worldbank.org/indicator/NV.IND.MANF.ZS

151 L. Brandt et al (2020) https://openknowledge.worldbank.org/bitstream/handle/10986/33993/Chinas-Productivity-Slowdown-and-Future-Growth-Potential.pdf?sequence=1&isAllowed=y; https://www.koreatimes.co.kr/www/biz/2021/09/488_315272.html; https://fred.stlouisfed.org/series/RTFPNAKRA632NRUG

ahead will require skillful, farsighted leadership and policymaking,[152] disaster preparedness, collective effort on the part of all nations, considerable ingenuity and marshalling of innovation, resource mobilization on a larger scale than in the recent past plus low public debt,[153] and equitably shared sacrifices by all especially if climate change accelerates and is compounded by other grey and black swan events (Odierno and O'Hanlon 2016).[154] With the bulk of the population very likely concentrating in polycentric urban regions, future prosperity and the quality of life will hinge on how these regions adapt, give greening the priority it deserves, translate the need for resilient (less brittle) systems into concrete monitorable actions, and arrive at a better social and economic equilibrium so that whatever degree of warming ensues, life does not become nastier, more brutal, and shorter.

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[152] Glaeser and Cutler (2021, p.320) warn that "Covid-19 teaches us that our globally connected world has made pandemic not only possible but probable." "Constructing social and political structures that are at least resilient and antifragile" is one piece of advice from the historian Niall Ferguson (2021), whose book *Doom: The Politics of Catastrophe* dwells at length on the repeated failures to predict disasters and to prepare for them. The belated and clumsy response to the emergence of the SARS COV 2 pathogen being a case in point.

[153] As the likelihood of natural disasters increases so does the need for greater fiscal space. T. Bayoumi et al (2021) Growth at risk from natural disasters. https://www.imf.org/en/Publications/WP/Issues/2021/09/17/Growth-at-Risk-from-Natural-Disasters-465825

[154] G. Odeirno and M.E. O'Hanlon (2017) Securing global cities. https://www.brookings.edu/research/securing-global-cities-2/