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Introduction

Currently, urbanization is playing an increasingly important role in society. It focuses mainly on the urban population, which refers to people living in cities as defined by national statistical offices. First and foremost, one might wonder "What is a city?" How does it attract people to live in it? Essentially, a city is a "metro area" which includes the labor market and economic activities like manufacturing and services (Henderson, 2003). Some authors have used cut-off points to decide which places can be defined as cities (e.g. city population of 50,000 or more). In 1800, only 2% of the world's population was urbanized, while only 47% of the world's population was urbanized in 2000. Likely, over half of the world's population was living in urban areas by 2008; this number is expected to reach 60% by 2030.[1] At the same time, the number of cities is constantly increasing. According to Satterthwaite's (2005) research, the number of "million cities" increased from two in 1800 to 380 in 2000. In addition, various objective conditions make people choose to live in cities. Following Duranton (2014), the location of the city and commuting costs are the key factors that determine the size of a city's population. Following Rosen (1979) and Roback (1982), urban economists have paid great attention to the role of amenities in attracting people to cities. For instance, a city can provide better living conditions, housing subsidies, and more opportunities for work.

Urbanization has achieved remarkable results, especially in developed countries, even if its development time is very short. The U.K. took the lead in massive

[1] Data online, https://www.un.org/ga/Istanbul+5/bg10.htm

urbanization, followed immediately by France, Germany, Span, the United States, and other developed and developing countries. Nowadays, most developed countries have reached a high degree of urbanization, while most developing countries have just started to urbanize. Developed countries are far more urbanized than are developing ones (Black & Luisito,2004; Henderson,2010). For example, 82% of the population lives in urbanized areas in the United States, while 80% in France, 85% in Finland, 94% in Iceland, and 83% in the United Kingdom live in urbanized areas. However, most developing countries are at a low level of urbanization; for example, 59% of the population of China and 34% of the population of India live in cities.[2] By 2030, 84% of the population in developed countries will be living in urban areas, up from 75% now. The urban population of developing countries is expected to reach 50% in 2020.[3]

Economists generally argue that urbanization always accompanies with economic growth. Here, growth refers to economic increases, specifically, expressed as the growth of the gross domestic product (GDP) and GDP per capita, where GDP is a monetary measure of the market value of all the final goods and services produced in a specific time period, and where GDP per capita means the purchasing power of all the final goods divided by the population. [4] In the process of urbanization, rural lands become urban lands. Rural lands maintain mainly agricultural economies, while urban lands focus on manufacturing and services. A significant amount of data proves that, to some extent, the GDP in urban areas is higher than that in rural areas. In Prados's document "GDP and Its Composition"

[2] Data from World Bank, https://data.worldbank.org/indicator/SP.URB.TOTL.IN.ZS
[3] Data online, https://www.un.org/ga/Istanbul+5/bg10.htm
[4] Definition from Wikipedia

(2017),[5] in 1990, around 30% of the world GDP was from agriculture, 27% was from industry, and 38% was from service. However, in 2017, agriculture accounted for only 6.4% of the GDP, industry for 30%, and the service industry for 63%.[6] Agricultural industries account for a small part of the GDP, while the manufacturing and service sectors account for a significant portion of GDPs today. In Black and Bertinelli's (2004) research said that urban areas accounted for 85% of the GNP[7] of high-income countries. Therefore, in this paper, I have studied mainly one question: "What is the relationship between urbanization and economic growth?" It is significant to analyze the relationship between economic indicators and urbanization indicators year by year.

First, some stylized facts indicate that there is a growth in urbanization and there is a close relationship between urbanization and economic growth. Generally speaking, countries with high urbanization are high in economic development. Based on worldwide data, the percentage of the urban population increased from 33.61% in 1960 to 55.27% in 2018. Meanwhile, GDP rose from $1.368 trillion to $82.791 trillion and GDP per capita rose from $451.06 to $11,296.78. In highly urbanized countries like the United States, from 1960 to 1990, the urban population increased by 7%, while the GDP increased by 9.99 times and the GDP per capita increased by 6.91 times. In recent years, the growth rate in originally low-urbanized countries has been even more amazing. For instance, in the period from 1990-2018 in China, the urban population grew by 1.27 times, while the GDP

[5] Document online, https://link.springer.com/chapter/10.1007%2F978-3-319-58042-5_1#Fig7
[6] Data online, https://www.cia.gov/library/publications/resources/the-world-factbook/fields/214.html#CH
[7] Gross national product (GNP) is an estimate of total value of all the final products and services turned out in a given period by the means of production owned by a country's residents. GNP is related to another important economic measure called GDP, which takes into account all output produced within a country's borders regardless of who owns the means of production. GNP starts with GDP, adds residents' investment income from overseas investments, and subtracts foreign residents' investment income earned within a country.

and GDP per capita grew by 32.63 and 26.63 times, respectively. On the other hand, there are negative relationships, or even no relationships, between urbanization and growth in some countries or regions. According to research and world data, countries or regions in African maintain these conditions. Henderson (2003) pointed out that African countries are rapidly urbanizing, but are experiencing negative growth or low income growth. For example, in Central Africa from 1990 to 2018, the urban population increased by 11%, but the GDP increased by only 0.51 times---far less than in China. GDP per capita even presented a decrease (-6%).[8] This situation shows that imbalance of the urbanization and the economy. Although there is close link between them, the urbanization is not the cause of the economy strengthening. More facts and methods are used in chapter 1 to illustrate the issue.

In addition to these facts, some literature has conducted research and presented opinions about this relationship. In the first place, growth cannot occur without urbanization (Jacobs,1969). Furthermore, Gallup, Sacks, and Mellinger (1999) argued that urbanization may "cause" economic growth, rather than just emerge as part of the growth process. However, the limited evidence so far suggests that urbanization doesn't cause growth per se. As a result, in recent decades, people generally have thought there is no causal relationship between urbanization and growth. The truth is, urbanization is followed by economic development and economic growth may resulted from urbanization process. To

[8] All data calculated by data on https://countryeconomy.com/gdp/ and in the World Bank database. U.S. GDP: $542,400 million in 1960; $5,963,100 million in 1990. U.S. GDP per capita: $3,014 in 1960; $23,848 in 1990. U.S. urbanization: 70% urban population in 1960; 75% urban population in 1990. China GDP: $398,623 million in 1990; $13,407,400 million in 2018. China GDP per capita: $349 in 1990; $9,645 in 2018. China urbanization: 26% urban population in 1990; 59% urban population in 2018.

better analyze this problem, Henderson argued that there are relationships between urbanization and growth, but that urbanization is not the cause of growth. He illustrated that urban concentration is the cause of growth and put forward the idea that urban concentration can influence productivity growth. Henderson started from city models and proved that, at the beginning, the economy will grow as urbanization grows; however, when the city exceeds a certain city size, the economy will begin to decline. There is an optimal city size which can ensure the maximum real income. People in over-sized (above optimal city size) cities must devote excessive amounts of time to commuting and other "wasteful" activities. "Over-urbanization" has resulted in low or negative economic growth in places such as poor Sub-Saharan Africa. Black and Bertinelli noted that productivity growth depends on human capital accumulation. Rural-urban migrants can increase human capital; however, a low level of technological progress due to the existence of less human capital makes urbanization is insufficient for growth. A development trap may occur, which shows that urbanization does not necessarily lead to growth.

Because urbanization began during the Industrial Revolution in developed countries, and started in developing countries after World War II, I chose to analyze data from after World War II. This paper scientifically analyses data from throughout the world, and the relationship between urbanization and growth is viewed from a global perspective. In accordance with the definition of urbanization, I used the proportion of the urban population to represent the level of urbanization. GDP per capita is a simple and direct indicator that reflects the economic level of a country.

To complete this introduction, we would like to delineate more precisely what each chapter does. This paper is organized as follows. Chapter1 outlines the stylized facts about urbanization and growth. Chapter2 contains a literature review to explain why these facts exist. Chapter3 presents the conclusion.

Chapter 1. Some stylized facts

Overview of urbanization

Urbanization is a new concept which has emerged in the last 300 years. It reflects the change in the urban population. There are several characteristics to this population change. The first characteristic is that the urban population and the rural population are both showing increasing trends with the continuous growth of the world population. As seen in Figure 1, the world population has grown from 3 billion in 1960 to around 7.5 billion in 2017. Correspondingly, the urban population increased from 1 billion to 4.2 billion, a four-fold increase, and the rural population increased from 2 billion to 3.4 billion, an increase of about 1.5 times.

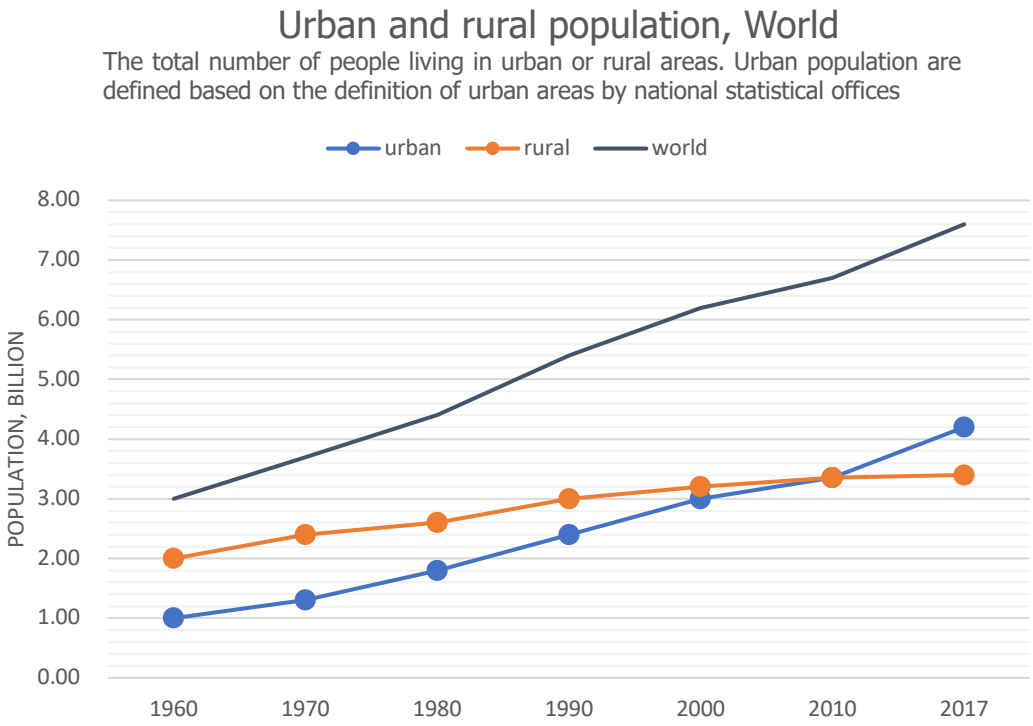
The second characteristic is that the share of the urban population and the rural population has changed. There is always a gap between urban and rural populations. From 1960 to 2010, the rural population was larger than the urban population, while the gap was also steadily decreasing to zero. After 2010, the urban population began to exceed the rural population and the gap started to widen again. In 1960, the rural population was twice as large as the urban population (2 billion vs. 1 billion). By 2017, the urban population was 1.2 times the size of the rural population (4.2 billion vs. 3.4 billion). The low growth rate of the rural population also reflects the fact that more and more rural people

migrated to urban areas. In particular, in some developing countries that are currently experiencing high-speed urbanization, such as those in Africa, the main reason for the urban population growth is urban-rural migration.

The third characteristic is the difference between developing and developed countries. So far, most developed countries have achieved "full urbanization", while many developing countries are still in the process of urbanization. In the future, urbanization will continue to develop and be a major event in developing countries. By 2050, the proportion of India's urban population is expected to exceed 50%. In China, it is expected to reach 80%, which could break the current low urbanization level. [9] Countries regard urbanization as important because the increase in the urban population has some relationship to the development of the economy. This can be seen in some regression results, which I will discuss later.

In the process of urbanization, in addition to the urban population, the number of cities is a typical characteristic. As the urban population increases, so does the number of cities. As seen in Table 1, in 1800 only two cities had populations of more than 1 million; one in Asia and one in Europe. In 1900, the number of cities had increased slightly. There were four cities in North America. This was because North American began to develop after the Industrial Revolution, relative to the Europe, and the number of cities increased from one to nine. In the next 100 years, even more earth-shaking changes took place. Cities of the world increased at a rate of 100 times. In these 100 years, the world entered the information era, science and technology developed, and the economy made breakthrough

[9] Data online, https://ourworldindata.org/urbanization



Source: World Bank database

Figure 1

Table 1: The distribution of World's largest city by region over time

Region	1800	1900	2000
Number of "million-cities"			
World	2	17	387
Africa	0	0	35
Asia	1	4	294
Europe	1	9	62
Latin American and the Caribbean	0	0	49
Northern American	0	4	41
Oceania	0	0	6

Source: from document "The scale of urban change worldwide 1950-2000 and its underpinnings"[10]

[10] http;//www.odi.org/sites/odi.org.uk/files/odi-assets/events-documents/1125.pdf.

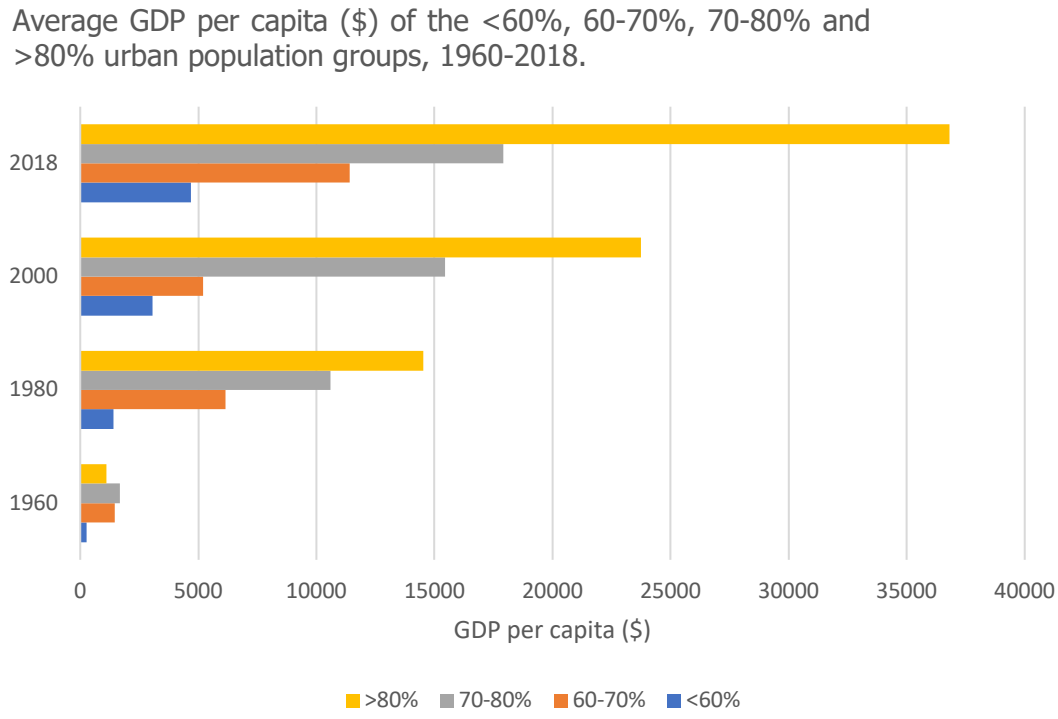
achievements. Due to the rapid urbanization of the developing countries, two-thirds of the world's cities are in Asian countries.

Urbanization level and GDP per capita

What is the relationship between urbanization and economic growth? Urbanization is inseparable from economic growth, and people have been studying the true relationship between the two. Economic growth, as measured by GDP per capita, has a strong association with urbanization, as measured by urban population percentage. Firstly, let's take a brief look at economic growth and urbanization over the years. Figure 2 demonstrates the value of GDP per capita in various urbanization level groups and years. From the perspective of groups with different urbanization levels, a high GDP per capita is always found in a high-level group.[11] Countries with an urban population of over 80% have the highest GDP per capita, while countries with an urban population of under 60% have the lowest GDP per capita. GDP per capita in countries with a 70-80% urban population is always higher than that in countries with a 60-70% urban population. In terms of the year, GDP per capita grew continuously from 1960-2018, reaching its maximum in 2018. Meanwhile, the number of countries with a high urbanization level is constantly increasing, while the number of low-urbanization countries is continuously decreasing. On the whole, the higher the level of urbanization, the higher the GDP per capita. Nevertheless, there has been a great gap in GDP per capita between different groups. In 1960, the GDP per capita of each level of group was almost the same, while since 1980, the GDP per capita gap between groups of various levels has become larger and larger. In 2000, the GDP per

[11] The ">80% UL group" had a lower GDP per capita than the "70-80% UL group" in 1960 because some data about the GDP per capita were missing in the">80% UL group".

capita of the "60-70% UL group" was much lower than that of the "70-80% UL group", because some special countries decline the average



Source: data from the World Bank database

Figure 2

GDP per capita of the "60-70% UL group".[12] By 2018, the GDP per capita of groups of all levels had shown a cliff-like decline (from high level to low level), especially between the "70-80% UL group" and the ">80% UL group". In 2018, the GDP per capita of the ">80% UL group" was over twice that of the "70-80% UL group" because some countries brought down the average GDP per capita in the "70–80% UL group". For example, Peru had a GDP per capita of $6,947.00 and Algeria had a GDP per capita of $4,278.00, while Germany's GDP per capita was $4,8195.58; both belonged to the "70-80% UL group".[13] Although the general

[12] Countries with a lower GDP per capita, where the highest GDP per capita in the 60-70% urbanization level group was $24,564.46 in Austria, while Bulgaria, Belarus, Bolivia, Ukraine, and Armenia had GDPs per capita of just $1,609.77, $1,276.28, $ 997.58, $635.71, and $622.74, respectively, in 2000.
[13] GDP per capita value of each country from the World Bank database.

trend is that the higher the urbanization level, the higher the GDP per capita, the gap in GDP per capita gap between groups with different urbanization levels indicates that some high-level urbanization countries have a low GDP per capita, which runs counter to the general trend. This complicates the relationship between urbanization level and economic growth complicated, and the urbanization level is not a key role in economic development. For the sake of researching this problem well, we concentrate on the relationship between urbanization speed and economic growth rate, which is the detailed part of the urbanization level and economic growth rate. Whether the urbanization of accelerated development is related to rapid economic development?

Urbanization speed and economic growth rate

" Figure 3: Urbanization speed and economic growth rate" in "The Global Pattern of Urbanization and Economic Growth: Evidence from the Last Three Decades"[14] by Mingxing Chen, Hua Zhang, Weidong Liu, and Wenzhong Zhang presents the results with regard to urbanization speed and economic development from 1980-2011. The global pattern of urbanization and economic growth is shown by the average value for the annual growth rate.[15] Different colors represent varying degrees of annual economic growth rate and urbanization speed. To a great extent, urbanization speed and economic growth rate vary among different regions. From the perspective of North America and Europe (areas that cover most developed countries), the speed of urbanization is the lowest in the world. Meanwhile, countries with low urbanization growth rates have not grown at a higher annual economic growth rate. For example, the urbanization speed in

[14] https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0103799
[15] For calculation methods, see Appendix 1

the United States is at the level of "less than or equal to zero". Its economic growth rate is also at a relatively low level: 0-2%. The opposite is the case for Asia, which covers most developing countries. In most countries, urbanization is growing relatively quickly and the annual economic growth rate is relatively high. For example, in South Korea, both the urbanization speed rate and economic growth rate are the second-highest level in the world, while in China, the urbanization speed and annual economic growth rate even are the highest in the world. In China, the population of 1.344 billion-which is the highest population in the world-has greatly facilitated the rapid urbanization. China's economic transformation is a remarkable achievement. It is beneficial not only to China itself but also to global economic development and urbanization. For instance, China's reformed economic system after 1978 has greatly reduced the rural population. After China joined the WTO in 2001, it began playing a very important role in global trade. With that in mind, can we can simply say that the faster the urbanization develops, the faster the economic growth rate will be? The answer may be "no". Some countries do not conform to this rule. In Africa and Latin America, countries with rapid urbanization development have low economic growth rates. For instance, in Congo, Zambia, and Saudi Arabia, the urbanization speed rate is about 0.3, yet the economy shows a negative growth trend (<= 0%). In Brazil, the urbanization rate is 0.6-0.9 (the second-highest level), but the annual economic growth rate is only 0-2%. The economic growth rate of countries with a low urbanization speed is rather high. For example, in Kazakhstan, the growth rate of urbanization is at the lowest level (<=0), but the economic growth rate can reach the global average level (2-4%). In India, urbanization is growing

at a rate of only 0-0.3, but the rate of economic growth has reached the second-highest level in the world (4-6%). It is irregular with urbanization speed and economic growth.

By summing up these intuitive data, we get more scientific and systematic results. First and foremost, we construct a linear regression model of the relationship between urbanization and GDP per capita. It can be represented as a single logarithmic regression:

$$Y = \beta_0 + \beta_1 lnX + \varepsilon, \quad (1)$$

where Y is the urbanization level or urbanization speed, X is the GDP per capita or the growth rate of GDP per capita, and β_0, β_1, ε are the factors that influence urbanization and economic growth.

In Figure 3 [16], we obtain the results of the scatter plots. There is a positive linear relationship between GDP per capita and urbanization. All countries are around the line: $Y = 11.493X - 41.18$. The urbanization level climbs at a coefficient rate of 19.849 and 11.493 by the unit growth of GDP per capita, with an adjusted R^2 (coefficient of determination) of 0.5323 in 2018, respectively. This clearly indicates a close link between urbanization and level of economic development. As GDP per capita increases, urbanization will increase as well. Although most countries follow this line, there are several points that are off-track (for example, in 2018, Ireland's GDP per capita was at the global leading level ($77,449.72), while the urbanization level was only 53% [17]), a national economy with high urbanization is not necessarily good, and the urbanization of countries with a good economy may be

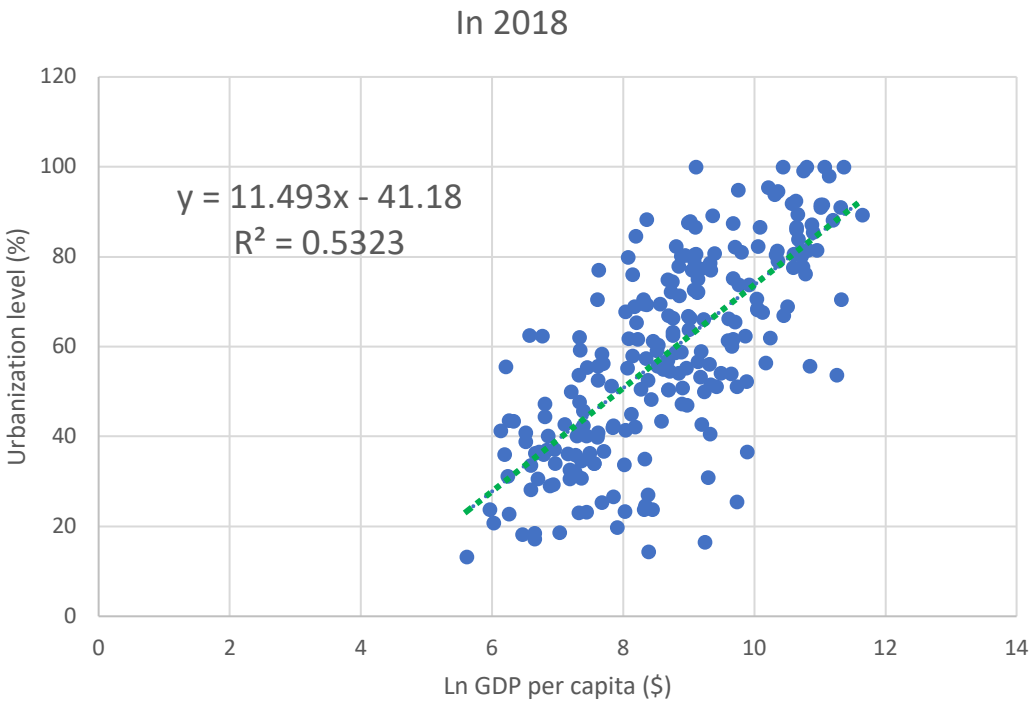
[16] For calculation details, see Appendix 2
[17] Data from world bank database

very low. Urbanization is not the cause of economic growth. We must still discover the relationship between urbanization speed and the economic growth rate.

In Figure 4, urbanization speed has nothing to do with the economic growth rate. Accelerating urbanization cannot bring about rapid economic growth. Data from the 21 years between 1980 and 2001 were studied, as indicated in Figure 4. The data from this interval were characterized by both positive and negative growth in GDP per capita. It can be seen that the four quadrants in the figure are all scatter plots, especially the second quadrant and the fourth quadrant, which is exactly the opposite of our previous findings. In the second quadrant, regardless of whether the urbanization speed is fast or slow, the country's GDP per capita has negative growth. This is because these countries are experiencing unreasonable urbanization, such as over-sized urbanization. Most of these countries are located in Africa, such as Burundi and Central Africa (which are less urbanized) and Burkina Faso, Cameroon, and Algeria (which are more urbanized). In the fourth quadrant, urbanization speed is negative in some countries with a high GDP per capita. The speed of urbanization is low because some countries, such as Australia, Austria, and Switzerland, have already entered a "full urbanized" situation or because governments, such as that in Egypt, decided to reduce urbanization by providing poor living conditions.

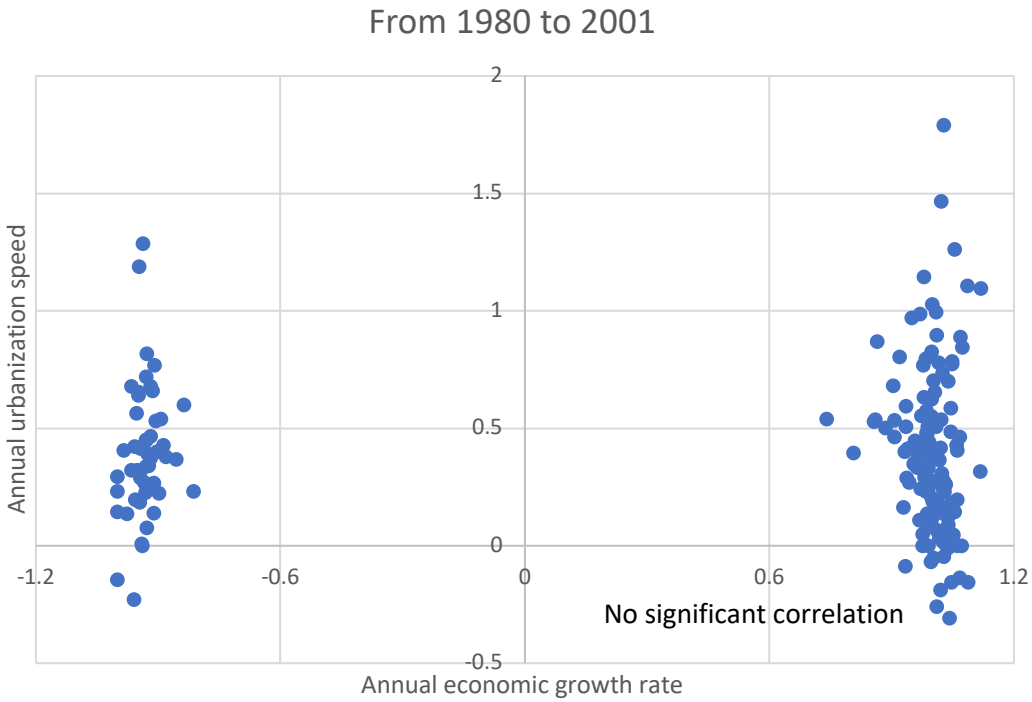
Urbanization and human capital

Urbanization can not only promote economic growth, but also promote the growth of economic indicators, such as human capital. *The term "Human Capital" first appeared in 1961 by Nobel-prize winner economist Theodore W. Schultz, in*



Source: data from the World Bank database

Figure 3 correlation of urbanization level and GDP per capita in 2018.



Source: data from the World Bank database

Figure 4 correlation of annual urbanization speed and economic growth rate during 1980-2001.

his article "Investment in Human Capital".[18] Human capital is the capital embodied in workers, such as knowledge, skills, cultural and technical levels, health status, etc. The increase in the urban population provides potential resources for human capital. Human capital also plays an important role in economic development and it is a significant factor in the function of quantity:

$Q = f(L, K \ldots) where\ L\ is\ labor, K\ is\ capital, and\ Q\ increases\ followed\ by\ increased\ K$.

In other words, human capital can promote economic productivity. The higher the human capital, the higher the productivity level and the faster the economic growth.

In addition, the human capital is mainly related to education. "*Studies proposed by Mankiw, Romer, and Weil (1992) and Lucas (1988) stress the essential role of education as the most important production factor in increasing human capital as a determinant of economic growth.*"[19] Education can improve the quality of labor, the ability of workers, and the level of technology, thereby increasing labor productivity. Its growth, especially the growth of education spending, is one of the sources of economic growth. The higher the educational level of a country, the higher the human capital level and the technical level it may produce. Advanced technology can lead laborers to be more skilled, productive, and innovative. Above all, we must have a strong understanding of education.

Evolution of education

[18] https://www.moroccoworldnews.com/2015/04/156723/role-education-human-capital-determinant-economic-growth/
[19] https://www.moroccoworldnews.com/2015/04/156723/role-education-human-capital-determinant-economic-growth/

Since ancient times, people have attached great importance to education. According to world data[20], the number of out-of-school children decreased from 380.67 million in 1998 to 262.98 million in 2014. The gap between the different education levels and genders is also different, too. From 1980-2014, the level of "primary school age, female" decreased the most (32.7 million out-of-school children), while the level of "upper secondary school age, male" declined the least (9.03 million out-of-school children). Women's education received a steady stream of attention during these years. With respect to the total overall data, most children complete lower secondary education, which can provide a large number of laborers for some low-skilled enterprises such as food processing plants. Compared to lower secondary and primary education, the share of out-of-school children in upper secondary education was still high in 2014, as primary school attendance remains a challenge in many developing countries, especially African countries such as Niger and Cote d'lovire, which had only 62.1% and 65% primary school enrollment, respectively, in 2010. Additionally, education at higher levels, mainly secondary and tertiary, is becoming increasingly important around the world. Our world will be inhabited by more and more educated people, while in 1970 there were only around 700 million people in the world with secondary or post-secondary educations. This figure is expected to increase tenfold by 2100. By 2100, only 82.63 million people will not be able to receive an education.

Growth of education and GDP per capita

The growth of education spending is a source of economic growth. Our current society is a talent-based one. Investment in education must be a perpetual

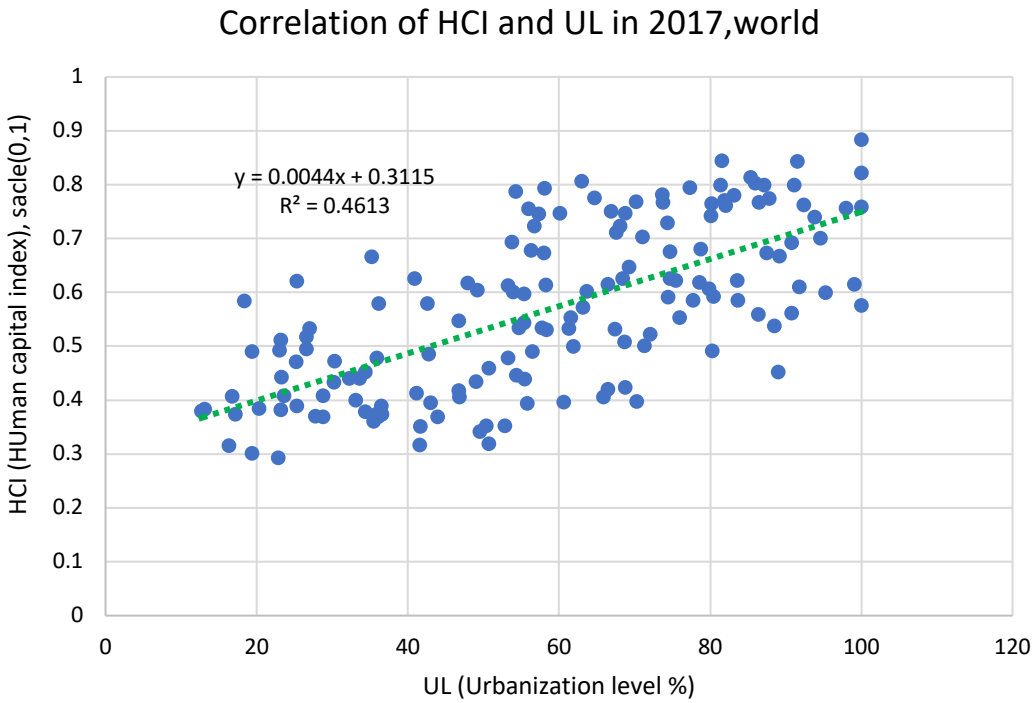
[20] Data from the Internet, https://ourworldindata.org/global-rise-of-education#school-enrollment-and-attendance, figures of number of out-of-school children, World and primary school enrollment.

process. The more prosperous the country, the more willing it is to invest in education. As we can see in the data from "Chart 1: A comparison of learning outcomes, country by country,2015" in "Global Rise of Education" written by Max Roser and Esteban Ortiz-Ospina,[21] education and GDP per capita in most countries are mutually beneficial, learning outcomes tend to be much higher in richer countries because these countries have the ability to do the job. However, differences across countries are extraordinarily large, even among countries with similar income per capita. This does not mean that the higher the GDP per capita, the higher the education level. Countries such as, Singapore, the United States, and Luxembourg all have higher national average learning outcomes and GDP per capita. However, though Singapore and Luxembourg have the same GDP per capita, average learning outcomes are higher in Singapore than they are in Luxembourg. There are 13 universities and colleges in Singapore, while there is only one university in Luxembourg. Luxembourg is located at the junction of France, Germany, and Belgium. A number of students choose to study abroad on account of the low transportation costs and high level of education; therefore, the government invests less in education. Singapore is an island country in Southeast Asia. There, the cost of studying abroad is quite high and the government invests more in education. Luxembourg spent around $2.23 billion (3.9% of its GDP) on education construction in 2015, while Singapore had already invested about $8.92 billion (2.9% of its GDP) on education in 2013.

UL and HCI

[21] Chart on https://ourworldindata.org/edu-quality-key-facts

In Figure 5, the most countries are surrounded by a line ($Y = 0.0044X + 0.3115$) which can indicate the correlation between urbanization level and human capital. Y is the urbanization level, X is the human capital index. The human capital index climbs at a coefficient rate of 0.0044 by the unit growth of urbanization level, with an adjusted R^2 (coefficient of determination) of 0.4613 in 2017. In this simple linear relationship, there is a positive relationship between urbanization level and the coefficient of human capital, but the relationship between them is not strong (R^2 is only 0.4613) and the increase in urbanization level is not necessarily accompanied by an increase in human capital. This complicates the relationship between urbanization level and the human capital index. A few countries, such as Albania and Vietnam, are far from this line; their urbanization level is lower, but their human capital index is higher. This is especially the case in Vietnam, whose superior geographical location and natural conditions are very conducive to agricultural activities. Indeed, the effective labor force is over 60%, which results in lower levels of urbanization. However, many of the current government measures are conducive to the improvement of human capital. For example, local authorities have announced new regulations that allow foreigners to hold 100% of listed companies' equity and land and home purchase rights in many industries to promote foreign investment. Also, many educational institutions can provide excellent education and training for labor in Vietnam, especially in Nghe An Province, where there are seven universities, six colleges, four professional schools, and 61 vocational training schools. These areas are also important factors in attracting foreign investment. With the February 2016 signing of the EU-



Source: data from the World Bank database

Figure 5[22]

Vietnam Free Trade Agreement (EVFTA), Vietnam and the European Union agreed to eliminate import tariffs on over 99% of various commodities within a certain period of time (Vietnam is 10 years, EU is seven years, EU depends on specific goods). In addition, Free Trade Agreements (FTAs) play a vital role in the value chain of many industries, such as the textiles and high-tech sectors (e.g., electronics), by supporting high-tech jobs and knowledge transfer. The opposite is true in some other countries, such as Gabon and Kuwait, which have high levels of urbanization but low human capital. Gabon, a typical African country, is committed to increasing the urban population through a large number of rural-urban migration and the re-division of rural cities, but it ignores the synchronization of urbanization and economic development, blindly increasing the

[22] For calculation details, see Appendix 2

urban population and, thus, damaging economic development. The government also lacks the basic economic infrastructure construction, industrialization, and cross-border cooperation, which are crucial to human capital. Therefore, Urbanization has weak link to economic indicator (i.e. human capital). The levels of human capital differ rationally in various urbanization countries. The complex relationship resulted from the investment in education during the process of urbanization.

Chapter 2. Literature review

We know that there is no correlation between urbanization speed and economic growth rate. Additionally, urbanization does not affect the economic indicator---human capital. Meanwhile, the close link between urbanization and the economy shows that urbanization is indispensable to economic development. With regard to the facts above, we must find evidence to explain why economic development is followed by urbanization. Which factor induces economic growth? Therefore, to discuss these issues, next I will focus on the following literature about urbanization in the economic field. The literature generally argues that the urbanization process has impacts on development, and why economic growth cannot result from urbanization itself.

Henderson

There is a core argument that urban concentration has a "causal" link to economic growth rather than the urbanization. Urban concentration is a key factor in boosting productivity growth. The best degree of urban concentration can induce maximum productivity growth. Over-urban concentration is very costly in

terms of productivity growth. This is because high transportation, housing, and communication costs in excessively large cities prompt people to live and work outside of those cities. Industries and companies also locate themselves in cheaper places because they cannot afford high office rents. What kind of urban concentration is best? Simply put, an urban population corresponding to the highest personal income is the most ideal city size. When the urban population is not saturated, the accumulation of human capital caused by urban population growth can accelerate economic growth and increase personal income, while an overly saturated urban population causes individuals to live at low standards due to increased urban living costs and significant amounts of traffic.

Furthermore, the best degree of urban concentration is not static. Rather, it changes with the country's level. The best degree of urban concentration declines as national land area increases. In geographically large countries, the urban population is dispersed and the density is lower, such as in the United States and China. This also reflects the fact that the population will not be concentrated only in major cities unlike small-sized countries such as Belgium, Singapore, etc. The lower the best degree of urban concentration in a geographically large country can reflect its optimal economic development and vice versa. Not all countries follow this principle. African countries do not make good use of urban concentration to develop economic growth. Egypt, the sub-Saharan African countries, etc. are geographically large, but over half of the total population is concentrated in one or two cities, and the economy definitely shows negative economic growth.

For these geographically large countries, the smartest choice is to increase the number of cities under a guarantee of economic agglomeration. An increase in the number of cities should be the inevitable result of reasonable economic development. In a city model (CBD), to improve living conditions and lower the cost of living, the surplus population of oversized cities will choose to move to urban marginalized areas to form new urban centers. The economy can achieve a perfect transfer in this process. After the Industrial Revolution, the format of the economy has undergone major changes, from a manufacturing-based economy to today's service sectors. Due to the high cost of living and working in cities, manufacturing industries that need low-skilled laborers and a significant amount of space cannot afford it. Therefore, they choose to migrate to small cities or rural areas, relative to a diseconomy trade-off. The number of cities is increasing, and different levels of cities exist. The relative cut-off point (based on the population size) is used to distinguish among large, medium, and small cities. Manufacturing decentralizes to peri-urban and suburban locations of the largest cities, small cities, or rural areas, thereby forming new industrial centers. Business and service sectors that include high-skilled workers and technologies expand in the large cities. For example, New York and London are new business centers now. Due to the high level of education and advanced technology, big cities become gathering places for business and services, while small cities are areas for manufacturing because of their cheaper labor and lower costs.

This shift in economic form has produced a major change in each proportion of the GDP. Manufacturing was undoubtedly the core industry of the past, accounting for a large proportion of the GNP. As stated previously, in the 19th century, most

of the manufacturing industry was centered in the big cities of the United Kingdom and the United States. Also, the manufacturing industry contains limited technology, low-skilled workers, and a lack of welfare. Nevertheless, in recent years, the continuous development of business services has surpassed the manufacturing industry as a core aspect of the GNP. Business services contain advanced technology, high-skilled workers, and an increased focus on welfare, which means that workers are able to earn more income under business services than under manufacturing. In 1910, manufacturing was more heavily concentrated in the largest cities in the United States, while business services were a small part of the U.S. economy. However, a greater share of business services contains high-skill laborers in the current U.S. economy. During these four decades, the U.S. economy has continued to develop, and it has long been the world's largest. The income per capita is also at the global high level. Similar to the situation in South Korea, from 1983 to 1993, the share of manufacturing employment in metropolitan areas declined nationwide, while in other cities, the share increased. Moreover, in Japan, the share of manufacturing GDP decreased in recent years.

However, the fact that we are discussing only the problem of urban concentration does not mean that urbanization and economic growth are irrelevant. Although it is difficult to directly verify the effects of urbanization in on economic growth because urbanization is also a transitory process ("from non-urbanization to fully urbanization" only experienced about 300 years) and rapid urbanization has often occurred in the face of low or negative economic growth over some decades in the development process, Luisito Bertinelli and Duncan

Black found another way to analyze economic growth according to the definition of urbanization.

Luisito Bertinelli and Duncan Black

An increased urban population is basically about rural-urban migration. The link between rural-urban migration and economic growth requires three steps to achieve. The first step is the linking of migrants to human capital, the second step is the combining of human capital with the technology process, and the third step is technology-induced economic growth. The economy has a dynamic trajectory generated by urban-rural migration. There is a gap between urban and rural income and consumption. When the level of urbanization is low or zero (less than 20%, such as among some tribes in Africa), the proportion of urban consumption is much higher than the proportion of the urban population and the gap between urban and rural consumption is large. As the degree of urbanization increases, the proportion of urban consumption approaches the share of the urban population and the gap between urban and rural consumption is small. In this case, rural-urban migration is the right choice because potential human capital has started to accumulate and there is a resource to promote the technological process. Urbanization is essential; otherwise, it is easy to cause a global development trap.

However, after that, too much invested human capital and congestion externalities decline per capita net output. Reducing the number of urban migrants will decrease congestion externalities, but it will also reduce the accumulation of human capital. Therefore, congestion externalities should be controlled within a reasonable range. Some states reduce this migration by providing poor living conditions. For example, in China, migrants to the largest cities (those who are

registered as citizens of rural areas) generally cannot gain or rent housing in the formal sector and cannot obtain a mortgage to purchase. Additionally, in terms of education, if people are not citizens but live or work in the big city, their children will have limited, expensive, or no access to the state schools. This point also explains the optimal city size proposed by Henderson. However, reasonable congestion externalities are not easily observed. For the sake of maximizing per capita net output, it is necessary to have more human capital accumulation, which can improve technological development. An equilibrium in human capital can easily be calculated by the difference of investments and outcomes of human capital.

An equilibrium in human capital can result in perfect technological development in the circumstances of partial urbanization and full urbanization. To begin with, in partial urbanization, when human capital does not reach equilibrium, workers do not invest sufficient human capital to develop technology. Thus, the economy will fall into a development trap. When human capital reaches equilibrium and develops, the development of urbanization level begins. When urbanization is excessive, it will affect the development of technology (Congestion externalities will reduce the investment of human capital or result in a decline in the returns of the human capital.) Then, if urbanization develops and reaches a steady state, economic and technological development will be perfect. Nonetheless, if urbanization is out of this steady state, the loss of congestion externalities will be higher than the per capita net output and the economy will fall into a development trap.

In the context of full urbanization, the investment of human capital directly affects the development of technology. Urbanization encourages human capital accumulation. There are dynamic benefits of static full urbanization. Two different states are included. One is that the speed of technology development is initially fast, then slows down. There is a point A where technology is sufficiently advanced such that the entire population chooses to invest in human capital and locate themselves in the urban area. On top of that point, the speed of technology development will begin to decrease, as initially there is not a lot of human capital investment, only new human capital investment. In addition, most workers do not choose to be educated. In this case, if returns on human capital are not enough to make up for the investments, the economy will again be in a development trap. On the other hand, if the returns on human capital are high enough, the second state emerges; technological development infinitely increases, which shows that in the situation of full urbanization, if the economy experiences a positive technology shock (human capital returns are greater than investments), there is no development trap.

From the perspective of Luisito Bertinelli and Duncan Black, urbanization cannot promote economic growth because blindly increasing urban populations will lead to development traps and economic recession. Because the initial investment in human capital can promote economic development, urbanization is related to economic growth. However, the researchers did not explain how these redundant rural populations should be placed. Gilles Duranton proposed some situations.

Gilles Duranton

For some big countries and large cities, with respect to cost, the economy is developing rapid and a large number of people are pouring into the cities. A city's operating and living costs are beginning to increase, which is an unfavorable factor for the manufacturing industry. As a result of high rent for housing and land, most of the manufacturing industries choose to locate themselves in small cities, which themselves undergo growth. Some special enterprises, such as food companies, must be close to the source of their raw materials, which are often produced in rural areas. Thus, these rural areas begin to transform into urban areas.

Furthermore, the environment is a major factor. With the development of the economy, heavy industry has created serious environmental pollution in many cities. People also leave cities for suburbs or other cities with better environmental conditions. For example, China and the United States are two economically strong developing and developed countries. Their urban development is affected by the weather. First, in China, Shijiazhuang is a city in the province of Hebei that has faced severe smog. Consequently, the population began to settle in Qinhuangdao, which is another city good for living in Heibei. Meanwhile, in the United States, admirable weather (mainly mild winters and less hot summers) is the main driver of population growth. This is also the main reason for the rise of South American cities.

Last but not least, urban amenities can also be obstacles to living in cities. At first, the pleasant living conditions of the city attract people. These conditions include the availability of more job opportunities and higher wages brought about by the developed economy in the city, as well as an improved urban education system, which leads parents to live and work in the urban area for their children.

By extension, the students decide to stay in the city for the better job opportunities. However, these wonderful conditions will be lost when the urban population becomes overloaded. Some people have no choice but to leave the city because they cannot enjoy the limited resources.

In some small countries, the population was originally born as an urban population. These countries are completely urbanized ones, such as Singapore, Hong Kong (China), etc. Although there are no rural-urban migrants, the increase in the birth rate has brought some population pressure to these countries. Housing is used to relieve the population pressure. The cities' high-rise buildings have a small footprint, but the capacity is large, which can lure more people and companies into the city.

Chapter 3. Conclusion

Summary of the facts

At the core of urbanization are the urban population and the number of cities, which have experienced rapid development in the preceding years. The urban population has caught up with the rural population, while the number of cities has increased by 100 times. Urbanization has become an important economic concept. The relationship between urbanization and economic growth has been studied repeatedly. Intuitive data and indicators show a close relationship between urbanization and economic growth. Economic development is inseparable from the development of the city. However, after systematic induction, statistics, and analysis, no correlation was found between economic growth rate and urbanization growth rate. Urbanization itself is not a factor affecting economic growth.

When urbanization is not directly related to economic growth, human capital and urbanization are included in the discussion, and the relationship between urbanization and human capital is not strong. Human capital is an important part of economic growth. Countries with high levels of human capital sometimes have high levels of urbanization, while countries with high levels of urbanization are not in high level of human capital. It can be reflected in several special cases, such as in some less developed countries. They are often related to national investment. The most typical can be reflected in the investment in education. The education level of rich countries is generally high. Meanwhile, poor countries often pay less attention to education. The government's emphasis on education can also make education out of economic bondage.

Summary of the review

The literature review focused on five articles, all of which were about urbanization and economic growth. Urban concentration is the main cause of economic growth. The best degree of urban concentration can maximize economic benefits. Over-urban concentration is very costly in terms of productivity growth. Labor and industries move out of the core city due to high costs. Country size affects optimal urban concentration. Geographically large countries have the opportunities and space to build more cities to relieve the high population pressure of oversized urban concentrations. The change of economic form is related to the number of cities. Manufacturing industries gather primarily in medium and small cities due to cheap labor and low costs. Meanwhile, business and service sectors develop in large cities for their human capital. The GDP value created by high-tech business sectors exceeds that created by low-tech manufacturing industries.

Urbanization cannot be the reason for economic growth. Rapid urbanization has a negative impact on the economy. If the urban population can bring about positive technology shock (human capital returns are greater than investments), there is no development trap. High costs and environmental issues arising from the process of urbanization induce surplus population to move out of the big cities.

Links between the facts and the review

There is a correspondence between the facts and the review. The review provides a theoretical basis for the facts. Meanwhile, the facts provide objective evidence for the review. In the facts, there is no causal link between urbanization and economic growth and there is no correlation between urbanization speed and economic growth rate. All of this can be reflected in the review. Urbanization itself is not the cause of economic growth, but urban concentration can influence it. The number of cities is increasing in the facts because people in over-sized urban areas choose to live in other places, where they can form new city centers, due to the high communication costs in the over-sized city. The weak relationship between human capital and urbanization was proved by the comments of Luisito Bertinelli and Duncan Black. In the early days of urbanization, an increased urban population could create a positive shock on human capital. When the outcomes of human capital in the later period are insufficient to compensate for the excessive investment of human capital, there is an urban economic recession.

The facts focus on discovering the scientific links between the urbanization and the economy, using empirical data. They are simply objective facts. It turns out that urbanization and economic growth have nothing to do with each other. The

review focused on discovering the reasons for economic growth (i.e. urban concentration) and explained the facts.

In summary, urbanization and economic growth are complex issues. Some of the data and literature studies in this paper were based on existing urbanization developments (developed countries that have completed urbanization and developing countries that are undergoing urbanization). Because most developing countries are still in the process of urbanization development, their development trajectories are not necessarily consistent with those of developed countries. Based on the national conditions of the developing countries themselves, some countries (such as China) develops well, while others (such as India and sub-Saharan Africa) do not. The future of urbanization development in developing countries deserves future study.

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