

**The Welfare (Inequality and Growth) Effects of Urbanization:
Empirical Evidence from China**

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Abstract: Combining household survey and aggregate provincial data, this paper explores the overall social welfare (growth plus inequality) effect of unprecedented urbanization in China. It is found that (1) urbanization does help raise income, particularly for rural residents and the relatively poor; (2) urbanization is one of the most important contributors to rising inequality in China. However, such adverse influence has been declining over time; and (3) the overall welfare (inequality plus growth) impact of urbanization is positive and rising. It can thus be concluded that public policy makers in China shall devote efforts to promote rather than slow down urbanization in China despite its short-run adverse distributional effect.

Keywords: social welfare, inequality, urbanization, China. JEL codes: D31, I31, O15

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1. Introduction

Since mid-1980s, China has been facing the challenge of rising Income inequality. A significant component of China's high inequality, as in other developing economies, is the urban-rural disparity (Shorrocks and Wan, 2005), which of course can be bridged by fiscal transfers. However, developing countries including China usually do not have sufficient government revenue or taxation base to finance such transfers, particularly when the poor rural population outnumber the urban counterpart. Another policy option is to promote urbanization so that the relatively poor rural residents can share the growth dividend that accrues more in the urban rather than rural sectors.

Unfortunately, urbanization could aggravate income inequality at least in the short-run, as suggested by the well-known inverted U hypothesis of Kuznets (1955) and confirmed by empirical studies such as Wan (2013) and Kanbur and Zhuang (2013). This adverse distributional effect, arising from the stylized fact that urban inequality is usually larger than rural inequality, may have contributed to the anti-urbanization stance taken by many governments (Quigley, 2009). On the other hand, also supported by ample evidences, there is a consensus that urbanization comes with growth or significant efficiency gains although it may erode equity or worsen income distribution. Taken China as an example, Figure 1 in the next Section of this paper demonstrates that unprecedented urbanization in the post-reform era has been highly and positively correlated with both remarkable growth and deteriorating income inequality. High inequality not only directly harms the well-being of the population, but also hinders sustainable economic growth, even possibly leading to economic crises (Stiglitz, 2009). Therefore, public policy making shall consider both, not either of, distribution and efficiency

effects. In other words, it is important to assess the overall (inequality and growth) impact of urbanization.

The existing literature, however, is silent on this overall effect (See the next Section for a brief literature review). To fill this gap, we use micro-survey and provincial data from China to estimate the impact of urbanization on income and then use regression-based/Shapley decomposition (Wan, 2004; Shorrocks, 2013) to gauge the impact of urbanization on income inequality. More importantly, we take advantage of the social welfare function of Sen (1976) to evaluate, possibly for the first time, the overall (inequality and growth) impact of urbanization in China. Major findings include (1) urbanization does help raise income, particularly for rural residents, the relatively poor and those from western China; (2) urbanization is one of the most important contributors to rising inequality in China. However, such adverse influence has been declining over time, as Wan (2013) found; (3) the overall welfare (inequality plus growth) impact is positive and rising. Thus, it can be concluded that public policy makers in China shall devote efforts to promote urbanization despite its short-run adverse distributional effect. At least, China shall abolish the infamous household registration system (*Hukou*) and let market forces drive the urbanization process.

The remainder of the paper is organized as follows: Section 2 provides some background information on the urbanization issue in China and briefly reviews the literature on the inequality or growth effect of urbanization. Sections 3 and 4 respectively estimate the growth and inequality effects of urbanization in China. Section 5 introduces the social welfare function of Sen (1976) which is then used to evaluate the overall social welfare impact of urbanization in China. And finally, Section 6 concludes with policy implications.

2. Background, the Literature and Data

Since the reform and opening up that began in late 1970s, China has undergone the largest and fastest urbanization process in human history, with profound implications on growth and income distribution. As Figure 1 shows, the urbanization rate was at a low level of 17.92% in 1978 and rose to 64.72% by 2021. Accompanying this process, GDP per capita rose from 385 to 11302 CNY (in 1978 prices) and income inequality as measured by the Gini index also rose from 0.28 in 1978 to 0.42 in 2019.

< place Figure 1 around here >

China's urbanization profile has been closely linked with the *Hukou* or household registration system. When introduced in 1958, *Hukou* was tied up with commodity rationing. Because rural citizens were not entitled to food coupons, they were completely prohibited from migrating to cities. As a consequence, the urbanization rate in 1978 was even lower than that in 1960 (See Figure 2). Urbanization in terms of resident population has gained pace since 1978 and particularly after 1992 when food rationing was abolished. Starting with towns and small cities and then extending to medium-sized cities, restrictions on migration have been gradually relaxed. In 2014, the central government launched the unified system of residential permit. This is a major step towards abolishing the *Hukou* system. And the urbanization rate in terms of *Hukou* population rose by a remarkable 3.3% from 2014 to 2015, reaching 46.7% in 2021. Meanwhile, urbanization in terms of residential population proceeded apace, reaching 64.7% in 2021.

< place Figure 2 around here >

There exists a large literature demonstrating the growth-enhancing effect of urbanization

(Liddle and Messinis, 2015). The mechanisms lie in sharing, matching, and learning when agglomeration takes place (Duranton and Puga, 2004). Quigley (2008) attributes the growth effect to specialization, complementarities in production, the diffusion of knowledge and mimicry, while Bertinelli and Black (2004) find that urbanization helps accumulation of human capital, contributing to growth. Such growth effects differ in low-, middle- and high-income countries (Harris, 1990). In particular, the effect is sizable and significant in developing countries but not developed economies (Daniel et al., 2010).

As the largest developing country, China gained significantly from urbanization. It can be inferred that without hundreds of millions of rural laborers migrating to the urban sectors, China would not have been able to achieve the miracle growth in the post-reform period. Wan (2011) summarizes the various effects of urbanization in China, including promotion of innovation and division of labor (Guan et al., 2016), stimulating investment and consumption (Jiang and Huo, 2014), strengthening structural transformation and industrial upgrading (Shen and Jiang, 2007), and improving industrial efficiency (Research Group on China's Growth and Macroeconomic Stability, 2009). These clearly help promote economic growth.

Relatively speaking, the literature on the distributional effect of urbanization is sparse. According to the famous hypothesis of Kuznets (1955), inequality rises first and then declines as industrialization and urbanization proceed. Although confirmed by Kanbur and Zhuang (2013) using data from Asia, and by Wu and Rao (2017) using data from China, this inverted U pattern has been a subject of countless studies, without reaching a consensus even today. Based on panel data covering 100 countries spanning from 1960-2009, Liddle (2017) finds that fast urbanization leads to rises in inequality but the relationship between urbanization and poverty

is insignificant. Angeles (2010) refutes the Kuznets hypothesis as a U-shaped relationship is found between urbanization population density and inequality. Wan (2013) estimates the contribution of urbanization to inequality in China, discovering that the contribution was positive in the early period of 1978-1994 but became negative afterwards, particularly after 2003. This is similar to Nguyen et al. (2019) who conclude that urbanization in Viet Nam helps improve income distribution in the long-run but the benign effect is negligible in the short-run.

To our best knowledge, no previous studies have attempted to coherently consider both the growth and inequality effects of urbanization, which is the focus of this paper where we use data from China to estimate the marginal effects of urbanization on growth, inequality and finally the overall (inequality and growth) social welfare effect.

The data used in our paper contain household and province level observations. The latter can be easily obtained from the National Bureau of Statistics. The former is sourced from China Family Panel Studies (CFPS). The widely used CFPS, employing a multi-stage probability sampling procedure, covers some 16,000 households in 25 provinces, municipalities, or autonomous regions in mainland China. Although there exist five waves of CFPS, the 2010 survey did not provide information on the “Respondent who is most familiar with household finance” to identify the household head, and the 2012 survey did not provide data on household migration. Both pieces of information, particularly the latter, are important for estimating our empirical model. Thus, we use the latest three waves of CFPS (2014, 2016 and 2018) in this paper where the household head is defined as the family member who provided household financial data. Income data are deflated using provincial CPI with 2010 as the base period. To minimize possible outliers in the survey data, observations for the richest and poorest 1% are

dropped. In the end, we obtained a sample of 11216 observations.

Table 1 reports the summary statistics for the main variables used in this paper. It is noted that the variable of topographical slope (denoted by TS) will be used as instrument to address the possible endogeneity issue.

< place Table 1 around here >

3. The Growth Effect of Urbanization

Driven by economies of agglomeration and other forces, urbanization essentially implies resource re-allocation, particularly labor, from the low-productivity rural sector to the high-productivity urban sector, leading to economic growth. To estimate such growth effect, one can simply add the variable of urbanization into a growth model:

$$\ln Y = f(\text{Urb}, X) + u \quad (1)$$

where Y denotes per capita income, Urb denotes urbanization usually defined as the proportion of urbanites in the total population, X denotes a vector of control variables, and u is the usual disturbance term.

Our dependent variable will be household income per capita which is defined as net income for both rural and urban households (CFPS does not differentiate urban from rural net income). And urbanization will be defined at the provincial level. It is useful to point out that rural-to-urban migrants are counted as urbanites although an absolute majority of them do not have the status of urban citizens. Under the infamous household registration system (called *Hukou*) in China, rural citizens cannot enjoy the many privileges or welfare that are enjoyed by those holding urban *Hukou*, a booklet much like an internal passport. However, these migrant

populations, almost 200 million of them, live and work in the urban sector and the GDP they produced are counted as urban output.

Regarding the control variables, human capital theory dictates the inclusion of average years of schooling of household laborers (*Aveledu*). Other control variables are added, following Li et al. (2020) and Ma (2018). They include whether household transferred out agricultural land (*Landborr*), whether receiving government assistance (*Govhelp*), whether working for others (*workout*), the ratio of laborers over household size (*worker*), and the proportion of household laborers who have urban *Hukou* (*Hukounum*). We also control for characteristics of household heads including his/her age (*Age*), age squared (*Age2*) and health condition (*Health*). Apart from the rate of urbanization (*Urban*), control variables at the provincial level include infrastructural development (*Infra*) defined as the density of highways and railways, per capita capital stock (*Avecap*) which is estimated using the perpetual inventory method, and the GDP share of the service industry (*Service*).

The baseline estimation results are tabulated in Table 2. It is clear that urbanization is positively correlated with income and the positive correlation is significant in all models, demonstrating the robustness of this result. Based on the first column, for every one percentage point increase in the rate of urbanization, household income per capita will rise by 2.715 percentage points. This is quite substantial and the results are in line with Henderson (2010) and Jones and Kone (1996), both estimating cross-country regressions and finding that urbanization is highly and positively correlated with income or GDP per capita. In passing, it is noted that the signs and significances of most control variables are largely consistent with a priori expectations. For examples, work for others helps increase income, the rate of returns to

schooling is significant (Angrist and Krueger, 1991; Heckman et.al., 2018). And the relationship between income and the age of household head is inverted U (Mahlberg et al., 2009).

< place Table 2 around here >

Since our dependent variable is household income per capita and a key independent variable is provincial urbanization, reverse causality is expected not to be present. However, endogeneity is likely to exist due to measurement errors and possibly missing variables. To address potential endogeneity, instrumental variable (IV) estimation will be undertaken where the topographical slope (*TS*) will be used as the IV. Depending on the altitude of a province, topographical slope (*TS*) is exogenous and is expected to affect urbanization: the steeper a location, the slower its urbanization process. However, topography does not change over time so we interact this variable with year dummy variables and use the interactive terms as instrument. Using the usual 2SLS estimation method, the IV modelling results are reported in column 2 of Table 2, confirming that urbanization does cause growth in terms of raising income. The validity of IVs is supported by the weak instrumental variable test which rejects the null hypothesis of weak instrument.

We also carry out heterogeneity analyses by splitting the data sample into rural vs urban households and high income (top 25% income earners) vs non-high income households. The estimation results are tabulated in Table 3 where *Rural* and *LowIncome* are the dummy variables. It is clear that the rural residents and the relative low income earners benefit more from urbanization. These are reasonable results as urbanites already live and work in the cities while rural residents can benefit from remittances as well as public transfers which depend on fiscal

revenues collected from the urban sectors. Here, it is useful to mention that agricultural taxes were abolished by 2006, so that the agricultural sector does not contribute to government revenues since then. More importantly, urbanization essentially means rural-to-urban migration, enabling the underemployed in the countryside to gain non-farm employments with higher wages. According to the National Bureau of Statistics of China (2022), in 2021 the monthly income of migrant workers averaged 4432 CNY, more than twice the income of rural residents which averaged 1578 CNY. Further, urbanization helps raise the land-labor ratio, facilitates information and knowledge transfer to the countryside, enhances affordability of rural families for better education, health and nutrition, particularly for the children, increasing the income of rural households. Results in Table 3 imply possible inequality-reducing impacts of urbanization. As urbanization proceeds, these impacts are expected to help lower income inequality.

< place Table 3 around here >

4. The Inequality Effect of Urbanization

To explore the roles that urbanization plays in contributing to inequality, we apply the Shapley decomposition to the estimated income function (Shorrocks, 2013; Wan, 2004), which involves three steps. First, we solve model (1) for income as we are interested in the inequality of income, not the inequality of log income:

$$Y = \text{Exp} [f(\text{Urb}, X) + u] \quad (2)$$

Second, taking inequality of both sides of the above equation:

$$I(Y) = I\{\text{Exp} [f(\text{Urb}, X) + u]\} \quad (3)$$

where I denote any inequality measure. Third and finally, counterfactuals are conducted to

obtain the marginal contributions of an independent variable including the residual term to total inequality: calculating the inequality when the independent variable is replaced by its mean in equation (3) (in this case, this variable is completely equally distributed and thus makes no contribution to income inequality) and then deducting this counterfactual inequality from the inequality when the independent variable takes actually observed unequal values. For technical details, see Shorrocks (2013). Unlike Fields and Yoo (2000) or Murdoch and Sicular (2000), the regression-based Shapley decomposition is most general and flexible as it can handle any functional form and any inequality measure. More importantly, the contribution of the residual term can be estimated and the contributions of the independent variables and the residual term always add up exactly to 100% (Wan, 2004).

The inequality decomposition results are reported in Table 4¹. It shows that urbanization is the second largest contributor to income inequality in China although its relative contribution declined from 20.097% in 2014 to 17.572% in 2018. In terms of absolute contributions, unequal urbanization across different provinces adds 0.064 to income inequality in 2014 and this contribution declined slightly to 0.056 in 2018. In passing, it is worth mentioning that other major contributors to income inequality include the age of the household head, working for others and ratio of laborers in the household. They consistently ranked among the top 5 contributors, respectively contributing 11.686%、 6.069% and 5.526% to income inequality.

< place Table 4 around here >

The positive contribution of urbanization appears to be consistent with Kuznets (1955), Wan (2013) and Kanbur and Zhuang (2013), which implies that urbanization does aggravate

¹The decomposition is implemented using a program developed by the third author, which is available to interested researchers upon request.

the already serious problem of high inequality in China. However, this does not mean that urbanization shall be slowed down because urbanization is inevitable for any economy to take off. Also, as urbanization proceeds to higher levels, it will slow down naturally. Further, rather than slowing down the urbanization process, public policy should help the less urbanized areas to speed up urbanization which will lead to reductions of the contribution of urbanization to income inequality and meanwhile will result in faster economic growth in the lagging areas, narrowing down regional inequality – a major component of national inequality in many economies. It is noted that the level of urbanization rate differs significantly from province to province. For examples, the 2021 urbanization rate for Shanghai reached 89.3% while that for Yunnan was only 50.0%.

A surprising result is that government subsidies or grants in 2014 and 2016 contributed positively to income inequality, implying that fiscal transfers were not really pro-poor although the contribution became negative and negligible in 2018. This finding is consistent with Milanović (2000) and Rhee et al. (2014) who discovered that government transfers benefitted the middle class more than the poor. This counter-intuitive finding arises from three facts. First, fiscal resources for transfers are more abundant in more developed regions while the poor regions are more fiscally constrained. For example, the aged pension and government contribution to health insurance differ significantly from region to region. Similarly, the 2021 local government spending on social protection in Shanghai was 4114 CNY while it was only 2127 CNY in Yunnan (National Bureau of Statistics of China, 2022). Second, social spending is known to be much higher for urban citizens who have much higher income than rural citizens or rural migrants. Taking aged pension as an example, in 2021 urban retirees received 42929

CNY on average but the national average was only 2291 CNY (National Bureau of Statistics of China, 2022). Third, even agricultural subsidies are often provided either according to land or outputs. Thus, the poorest group of small-scale farmers actually gain less than others within the rural area (Huang et al., 2011). In short, unless abolishing the *Hukou*, it would be difficult for fiscal transfers to be a policy measure to reduce inequality, as happening in most other economies.

The household fixed effects account for a quite large share of income inequality. This is understandable as they represent household characteristics that are not controlled in the income model. Some of these heterogeneous characteristics are unobservable such as efforts of household members or mentality and attitudes towards work and learning.

To examine the robustness of the inequality decomposition results, we also use the Theil-L and Theil index to measure inequality and the results are tabulated in Table 5, confirming that urbanization remains the second largest contributor to income inequality in China.

< place Table 5 around here >

5. The Overall (Inequality and Growth) or Social Welfare Effect of Urbanization

Sections 3 and 4 demonstrate that urbanization causes both growth and inequality. This presents a dilemma to public policy makers: promoting urbanization will bring about growth or economic gains but will also lead to worsening inequality. When one cannot have both growth and equality, and does not wish to overlook any one of them, a decision framework is needed to consider the trade-off between them. One way to do so is to optimize social welfare where both total or average income and income distribution enter the objective function.

Following Dollar et al. (2015), Rodríguez-Pose and Tselios (2015) and Hoover et al. (2004), we use the social welfare function of Sen (1976) to evaluate the overall impact of urbanization in China. The original form of Sen's function can be expressed as:

$$W = Y(1 - G) \quad (4)$$

where W denotes the level of social welfare, Y denotes average income and G denotes the Gini index so $(1 - G)$ denotes equality. Clearly, social welfare is a positive function of income and a negative function of inequality.

Relying on the grouped income data and the method of Shorrocks and Wan (2009), we can estimate the Gini index for each province of China and then compute the social welfare. Figure 3 plots the relationship between the urbanization rate and the estimated social welfare in China. Three main findings are discernible: (1) the urbanization rate and social welfare are positively correlated; (2) rises in the social welfare were slower in the early stages of urbanization, possibly due to the inequality-increasing effect of urbanization (Wan, 2013). In other words, in the early stages, the efficiency effect of urbanization is offset by its inequality effects; but (3) the offsetting effects become smaller as urbanization reaches a high level, so that social welfare increases faster later on.

< place Figure 3 around here >

To further confirm the above three findings, we use the CFPS data to estimate the average income and the Gini index. Meanwhile, we take the logarithm on both sides of Sen's social welfare function so that we can decompose the level of social welfare into two components: contribution of efficiency (average income) and contribution of income inequality:

$$\log W = \log Y + \log(1 - G) \quad (5)$$

The empirical results, shown in Table 6, confirms the three findings just discussed. The social welfare in logarithm in China has been increasing, from 8.594 in 2014 to 8.912 in 2018, mainly driven by the rise in the efficiency or income component (from 9.211 in 2014 to 9.551 in 2018). The inequality offsets the efficient component to some extent, eroding the social welfare by 0.627 in 2014 and 0.639 in 2018.

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As Sections 3 and 4 demonstrate, both income Y and income inequality G depend on urbanization and control variables, so does the social welfare. Thus, we can take partial derive of the social welfare function with respect to a variable X_i :

$$\frac{\partial W}{\partial X_i} = \left[\frac{\partial Y}{\partial X_i} (1 - G) - Y \frac{\partial G}{\partial X_i} \right] \quad (6)$$

When model (1) is used to explore the impacts of urbanization on the social welfare, the above expression can be expressed as:

$$\frac{\partial W}{\partial urb} = \left[a_{urb} (1 - G) - \frac{\partial G}{\partial urb} \right] Y \quad (7)$$

Thus, the impact of urbanization on the social welfare consists of two components: the growth component $a(1-G)$ which is positive as long as a is positive, and the inequality component which depends on the *changes* in the contributions of urbanization to inequality. When the change is positive or the contribution of urbanization to inequality rises over time, the inequality component is negative, offsetting the growth effect. On the contrary, if the change is negative or the inequality contribution declines over time, the inequality component of urbanization is positive, reinforcing the benign growth effect.

Equation (7) can be approximated by:

$$\frac{\partial W}{\partial urb_t} = \left[a_{urb} (1 - G_t) - \frac{G_{urb_t} - G_{urb_{t-1}}}{urb_t - urb_{t-1}} \right] Y_t \quad (8)$$

where G_{urb} denotes the contribution of the urbanization variable to the Gini inequality in different years, a_{urb} denotes the estimated coefficient of the urbanization variable in the income model. Consequently, the overall social welfare impact of urbanization can be decomposed into two parts: the efficiency impact $a_{urb}(1 - G_t)Y_t$, and the inequality impact $(-\frac{G_{urb_t} - G_{urb_{t-1}}}{urb_t - urb_{t-1}})Y_t$.

Since G_{urb} are given in Table 4, it is quite straightforward to compute the overall social welfare impact and related efficiency and inequality impacts. Table 7 tabulates the computation results. Numerically, from 2014 to 2016 urbanization led to a welfare gain of 2.143 units which largely stem from the efficiency-promoting impact of urbanization (2.074 units). The contribution of urbanization to income inequality declined from 2014 to 2016, making urbanization an equality- or welfare-rising driver but this impact is rather small (only 0.069 units). However, from 2016 to 2018, the efficiency-promoting impact remained more or less the same (2.078 units), but its equality-rising impact grew substantially to 0.24 units. Nevertheless, the equality impact is relatively small. One of the possible reasons is that rural laborers migrating to urban areas are not able to enjoy the same social benefits as urban citizens do, and they are being seriously discriminated in terms of employment opportunities, provision of health care, education and other public services. These hinder the role of urbanization in improving income distribution.

< place Table 7 around here >

Fortunately, China has embarked on reforming the infamous *Hukou* system. 2018 saw the liberalization of the household registration policy for small and medium-sized cities and towns (with resident population less than one million), and in 2022, as clearly stated in the

Implementation Plan for the New Urbanization of the 14th Five-Year Plan, restrictions on household registration will be relaxed in the future, except for several mega-cities, and that a system of registering household based on the place of habitual residence will be implemented on a trial basis. These will help improve the income distribution effect of urbanization, leading to a significant increase in its social welfare effect.

6. Conclusions Remarks and Policy Implications

The world has been confronted with the challenge of rising or high inequality which can cause crimes, hunger, sickness and so on. Meanwhile, urbanization has been proceeding in many parts of the developing world which is expected to promote growth but also bring about higher inequality (Kuznets, 1955; Wan, 2013; Kanbur and Zhuang, 2013). The perceived inequality-increasing effect of urbanization may be one of the reasons underlining the anti-urbanization practice of many governments, as documented by Quigley (2008). Since urbanization is essential for growth take off, such a practice would hurt growth. In China, anti-urbanization is instituted by the household registration system or *Hukou*, which strictly prevented labour and population movements in the pre-reform period and still plays a fundamental role in causing all kinds of discriminations against rural migrants and rural citizens. According to National Bureau of Statistics Website (2022), at the end of 2021, migrant workers in China amounted to 133 million who are not entitled to various social benefits or do not have access to most public services, and whose children and parents were mostly left behind in the countryside. These discriminations naturally slow down urbanization and contribute to the urban-rural gap which constitutes a significant share of national inequality in China (Wan, 2013)

and elsewhere (Shorrocks and Wan, 2005).

Generally speaking, both growth and distributional issues must be taken into consideration simultaneously when making public policies. Unfortunately, empirical studies focusing on the overall (inequality and growth) effects are lacking, although the literature on growth or inequality of urbanization is large. In this paper, efforts are made to estimate the social welfare impact of urbanization where both growth and inequality effects are considered. To empirically gauge such an impact, we estimate an income function with urbanization as the key independent variable. The income function provides information on the growth effect of urbanization. Subsequently, we use the Shapley decomposition to attribute the contributions of urbanization to income inequality over time, which enables estimation of the marginal effect of urbanization on inequality. Finally, the social welfare function of Sen (1976) is used to combine these two effects.

Relying on both micro-survey data at the household level and province level data, our empirical results confirm the benign effect of urbanization on growth. They also show that uneven progress in urbanization contributes to worsening the income distribution. However, the inequality-contributing effect declined from 2014 to 2018 as urbanization proceeded apace. Therefore, the marginal contribution of urbanization to inequality turns out to be benign as well, reinforcing rather than offsetting the growth effect. This finding is consistent with Wan (2013) who reveals that China's urbanization-inequality nexus exhibits an inverted U pattern. These results imply that promoting urbanization can help improve social welfare over time or dynamically although statically or for a given year unequal urbanization contributes to inequality of income.

Our findings imply that China shall consider abolishing the *Hukou*, completely removing this significant and institutional obstacle to urbanization as early as possible. Meanwhile, all discriminations against rural citizens including migrants, particularly in terms of social welfare entitlements and public services, must be gradually eliminated. In fact, urbanization is a key policy tool to address the challenges China is facing in terms of growth slowdown and high income inequality. Faster urbanization is expected to help China re-accelerate growth that has been slowing down since 2008. Public policy shall target the less-urbanized and lagging provinces in order to reduce the contribution of urbanization to income inequality, making urbanization a force or factor contributing to both growth and improvement in income distribution. Needless to say, findings and implications of this paper are of value for other developing countries that should conceive, make and implement urbanization-related policies. Finally, it is worth pointing out that our study can be easily adapted to examine the overall (inequality and growth) effects of other variable such as openness, globalization, infrastructure development, education, public health care system and so on.

References

- Angeles, L. (2010), "An Alternative Test of Kuznets' Hypothesis", *The Journal of Economic Inequality*, 8: 463-473.
- Angrist, J. D. and Krueger, A. B. (1991), "Does Compulsory School Attendance Affect Schooling and Earnings?", *The Quarterly Journal of Economics*, 106(4): 979-1014.
- Bertinelli, L. and Black D. (2004), "Urbanization and Growth", *Journal of Urban Economics*, 56(1): 80-96.
- Daniel, Y. F. L. (2010), "Urbanization and Economic Growth: Testing the Causality", Paper presented at the 16th Annual Pacific Rim Real Estate Conference.
- Dollar, D., Kleineberg, T. and Kraay, A. (2015), "Growth, Inequality and Social Welfare: Cross-Country Evidence", *Economic Policy*, 30(82): 335-377.
- Duranton, G. and Puga, D. (2004), "Chapter 48-Micro-foundations of Urban Agglomeration Economies", *Handbook of Regional and Urban Economics*, 4: 2063-2117.
- Fields, G. S. and Yoo, G. (2000), "Falling Labor Income Inequality in Korea's Economic Growth: Patterns and Underlying Causes", *Review of Income and Wealth*, 46(2): 139-159.
- Guan, W., Yao, Y., Peng, X., Wei, Y. and Zhang, H. (2016), "The Relationship of Urbanization and Economic Growth in China Based on the Provincial Panel Data in 1978-2014", *Scientia Geographica Sinica*, 36(6): 813-819. (In Chinese)
- Harris, N. (1990), "Urbanization, Economic Development and Policy in Developing Countries", *Habitat International*, 14(4): 3-42.

Heckman, J. J., Humphries, J. E. and Veramendi, G. (2018), “Returns to Education: The Causal Effects of Education on Earnings, Health, and Smoking”, *Journal of Political Economy*, 126(S1): S197-S246.

Henderson, J. V. (2010), “Cities and Development”, *Journal of Regional Science*, 50(1): 515-540.

Hoover, G. A., Formby, J. P. and Kim, H. (2004), “Poverty, Non-white Poverty, and the Sen Index”, *Review of Income and Wealth*, 50(4): 543-559

Huang, J., Wang, X., Zhi, H., Huang, Z., Rozelle, S. (2011), “Subsidies and Distortions in China’s Agriculture: Evidence from Producer-Level Data”, *Australian Journal of Agricultural and Resource Economics*, 55(1): 1-19.

Jiang, G. and Huo, Q. (2014), “Theoretical and Empirical Study on the Relationship between Urbanization and Economic Growth in China”, *Journal of Industrial Technological Economics*, 33(03): 33-41. (In Chinese)

Jones, B. G. and Kone, S. (1996), “An Exploration of Relationships between Urbanization and Per Capita Income: United States and Countries of the World”, *Pap Reg Sci*, 75(2): 135-154.

Kanbur, R. and Zhuang, J. (2013), “Urbanization and Inequality in Asia”, *Asian Development Review*, 30(1): 131-147.

Kuznets, S. (1955), “Economic Growth and Income Inequality”, *American Economic Review*, 45: 1-28.

Li, J., Ma, W., Renwick, A. and Zheng, H. (2020), “The Impact of Access to Irrigation on Rural Incomes and Diversification: Evidence from China”, *China Agricultural Economic Review*, 12(4): 705-725.

Liddle, B. (2017), “Urbanization and Inequality/Poverty”, *Urban Science*, 1(4): 35-35.

Liddle, B. and Messinis, G. (2015), “Which Comes First – Urbanization or Economic Growth? Evidence from Heterogeneous Panel Causality Tests”, *Applied Economic Letters*, 22(5): 349-355.

Ma, W., Renwick, A., Nie, P., Tang, J. and Cai, R. (2018), “Off-farm Work, Smartphone Use and Household Income: Evidence from Rural China”, *China Economic Review*, 52: 80-94.

Mahlberg B, Freund I, Prskawetz A. Firm productivity, workforce age and vocational training in Austria[J]. *Labour markets and demographic change*, 2009: 58-84.

Milanović, B. (2000), “Determinants of Cross-Country Income Inequality: An ‘Augmented’ Kuznets Hypothesis”, en V. Franičević and M. Uvalić (eds), *Equality, Participation, Transition*, London: Palgrave Macmillan, 48-79.

Morduch, J. and Sicular, T. (2000), “Politics, Growth, and Inequality in Rural China: Does It Pay to Join the Party?”, *Journal of Public Economics*, 77(3): 331-356.

National Bureau of Statistics of China. (2022), *China Statistical Yearbook-2022*. Beijing: China Statistics Press.

National Bureau of Statistics Website. (2022), *Report on Monitoring Survey of Migrant Workers in 2021*. http://www.gov.cn/xinwen/2022-04/29/content_5688043.htm.

Nguyen, M. H., Nguyen, D. L. and Pham, T. (2019), “The Impact of Urbanization on Income Inequality: A Study in Vietnam”, *Journal of Risk and Financial Management*, 12(3): 146.

Quigley, J. M. (2009), “Urbanization, Agglomeration, and Economic Development”, *Urbanization and growth*, 115: 1-36.

Research Group on China’s Growth and Macroeconomic Stability. (2009), “Urbanization, Industrial Efficiency and Economic Growth”, *The Economic Research Journal*, 44(10): 4-21. (In Chinese)

Rhee, C., Zhuang, J., Kanbur, R. and Felipe, J. (2014), “Confronting Asia’s Rising Inequality: Policy Options”, en R. Kanbur, C. Rhee and J. Zhuang (eds.), *Inequality in Asia and the Pacific: Trends, Drivers and Policy Implications*, London: Routledge, 79-100.

Rodríguez-Pose, A. and Tselios, V. (2015), “Toward Inclusive Growth: Is There Regional Convergence in Social Welfare?”, *International Regional Science Review*, 38(1): 30-60.

Sen, A. (1976), “Real national income”, *The Review of Economic Studies*, 01: 19-39.

Shen, K. and Jiang, R. (2007), “How Does Urbanization Affect Economic Growth in China”, *Statistical Research*, 06: 9-15. (In Chinese)

Shorrocks, A. (2013), “Decomposition Procedures for Distributional Analysis: A Unified Framework Based on The Shapley Value”, *The Journal of Economic Inequality*, 11(1): 99-126.

Shorrocks, A. and Wan, G. (2005), “Spatial Decomposition of Inequality”, *Journal of Economic Geography*, 5 (1): 59-81.

Shorrocks, A. and Wan, G. (2009), “Ungrouping Income Distributions: Synthesising Samples for Inequality and Poverty Analysis”, en K. Basu and R. Kanbur (eds.), *Arguments for a Better World: Essays in Honor of Amartya Sen*, Oxford: Oxford University Press, 414-434.

Solt, F. (2020), “Measuring Income Inequality Across Countries and Over Time: The Standardized World Income Inequality Database.”, *Social Science Quarterly*, 101(3): 1183-1199.

Stiglitz, J. (2009), “The Global Crisis, Social Protection and Jobs”, *International Labour Review*, 148: 1-13.

Wan, G. (2004), “Accounting for Income Inequality in Rural China: A Regression-based Approach”, *Journal of Comparative Economics*, 32(2): 348-363.

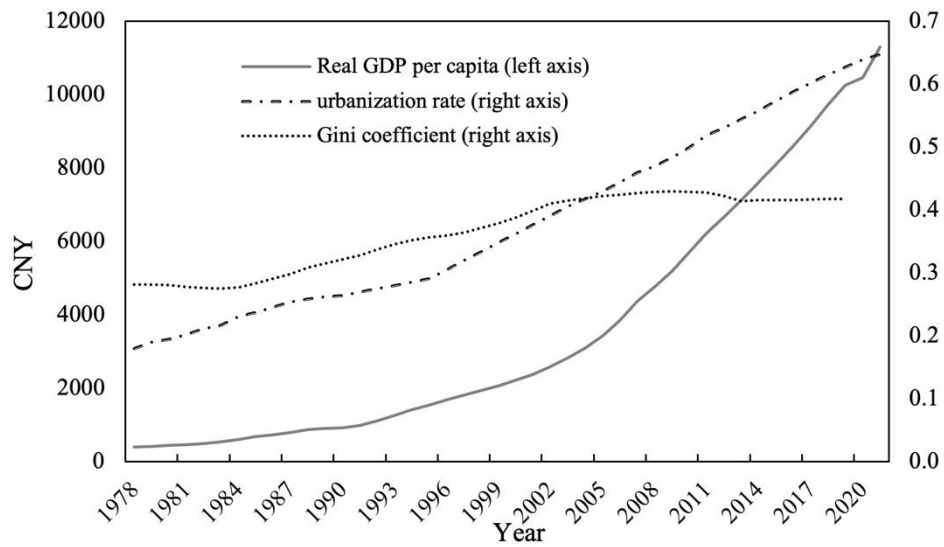
Wan, G. (2011), “China’s Urbanization by 2030”, *International Economic Review*, 06: 99-111+5. (In Chinese)

Wan, G. (2013), “The Urbanization-Inequality Nexus: Method and Application to China”, *The Economic Research Journal*, 48(05): 73-86. (In Chinese)

Wu, D. and Rao, P. (2017), “Urbanization and Income Inequality in China: An Empirical Investigation at Provincial Level”, *Social Indicators Research*, 131: 189-214.

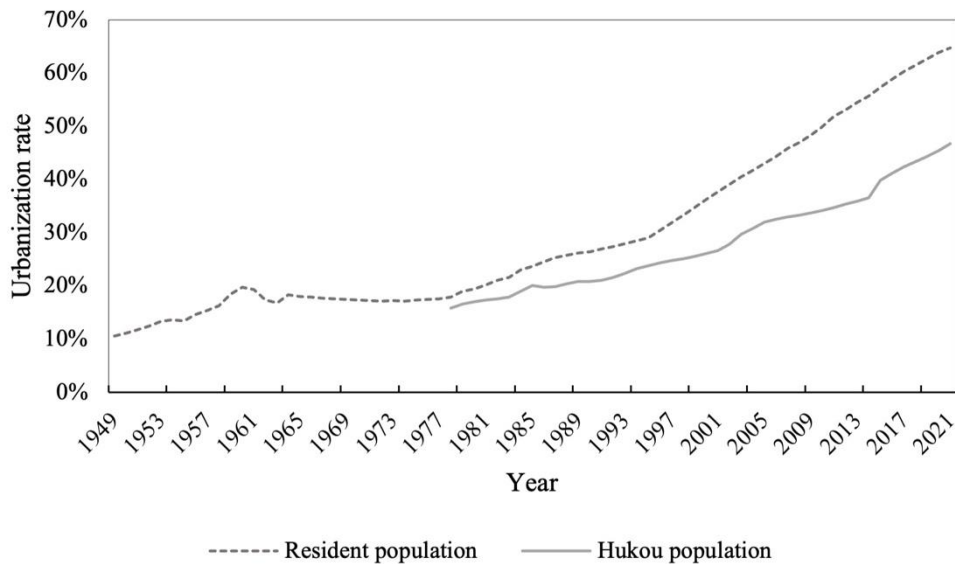
Tables and Figures

FIGURE1. GDP per capita, the Gini coefficient and the urbanization rate in China



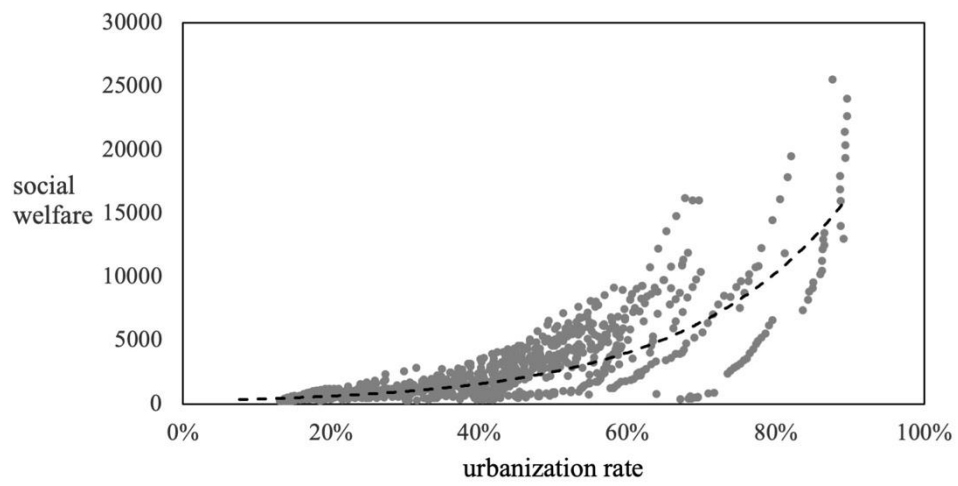
Data sources: GDP per capita and urbanization rate come from National Bureau of Statistics of China (2022), Gini coefficient come from Solt (2020). v9.4.

FIGURE2. Urbanization rate in terms of residential and Hukou Population



Data Source: National Bureau of Statistics of China (2022)

FIGURE3. Provincial Social welfare and Urbanization Rate, 1978-2018



Data Source: Social welfare come from authors' calculation, urbanization rate come from National Bureau of Statistics of China (2022)

TABLE 1. Definitions and descriptive statistics of variables (Sample Size = 11216)

Variables	Variable definitions	Mean	Standard deviation	Min	Max
Head of household variables					
Age	Age	45.643	8.462	16.000	60.000
Age2	Age Squared/100	21.549	7.275	2.560	36.000
Health	Health status: unhealthy = 1, fair = 2, average = 3, relatively healthy = 4, very healthy = 5	2.933	1.248	1.000	5.000
Household variables					
Lnincome	Log of net income per capita	8.844	1.241	0.217	13.011
Worker	Ratio of labor force	0.585	0.234	0.071	1.000
Hukou	Ratio of non-agricultural worker	0.054	0.188	0.000	1.000
Govhelp	Receipt of government grants (yes = 1, no = 0)	0.686	0.464	0.000	1.000
Workout	Work for others (yes = 1, no = 0)	0.617	0.486	0.000	1.000
Landborr	Land transfer (yes = 1, no = 0)	0.144	0.351	0.000	1.000
Aveledu	Average years of schooling of household workforce	6.750	3.558	0.000	16.000
Province variables					
Urbanization	Urbanization rate	0.539	0.094	0.400	0.896
Infra	Transport infrastructure	0.960	0.465	0.117	2.170
Service	GDP Share of tertiary sector	0.467	0.060	0.354	0.810
Avecap	Capital stock per capita	10.371	3.556	5.190	30.721
TS	Topographical Slope	1.165	1.063	0.004	3.529

TABLE 2. Regression results

Dependent Variable: income per capita	(1) Baseline	(2) IV-TS
Urbanization	2.715*** (0.865)	3.935* (2.253)
Age	0.037** (0.018)	0.037** (0.018)
Age2	-0.046** (0.022)	-0.046** (0.022)
Healthy	0.014 (0.011)	0.013 (0.011)
Workout	0.686*** (0.030)	0.686*** (0.030)
Aveledu	0.011** (0.005)	0.012** (0.005)
Hukou	0.308*** (0.102)	0.308*** (0.102)
Worker	0.537*** (0.062)	0.535*** (0.062)
Landborr	0.122*** (0.039)	0.123*** (0.039)
Govhelp	0.060* (0.031)	0.062** (0.031)
Infra	-0.076 (0.298)	-0.147 (0.352)
Service	-1.927*** (0.631)	-2.177*** (0.785)
Avecap	0.021 (0.017)	0.012 (0.021)
F-value		278.56
Kleibergen-Paap rk LM statistic		1043.71
Year Fixed Effect	Yes	Yes
Household Fixed Effect	Yes	Yes
Sample size	11216	11216
Adj R-squared	0.451	-0.419

Note: Robust standard errors are in parenthesis. ***, **, and * indicates significance level of 1%, 5% and 10%.

TABLE 3. Heterogeneity analyses

Dependent Variable: income per capita	(1)	(2)
Urbanization	0.208 (1.179)	0.514 (0.793)
Urbanization×Rural	3.188*** (0.938)	
Urbanization×LowIncome		1.439*** (0.492)
Control variables	Yes	Yes
Year Fixed Effect	Yes	Yes
Household Fixed Effect	Yes	Yes
Sample size	11156	11216
Adj R-squared	0.139	0.239

Note: Robust standard errors are in parenthesis. ***, ** and * indicates significance level of 1%, 5% and 10%.

TABLE 4. Results of the income inequality decomposition

Variables	2014			2016			2018		
	Absolute contribution	Relative contribution	Rank	Absolute contribution	Relative contribution	Rank	Absolute contribution	Relative contribution	Rank
Household Fixed Effect	0.156	49.191	1	0.175	52.570	1	0.166	52.273	1
Urbanization	0.064	20.097	2	0.062	18.599	2	0.056	17.572	2
Age	0.036	11.187	3	0.038	11.380	3	0.040	12.492	3
Workout	0.026	8.192	4	0.018	5.451	4	0.014	4.563	5
Worker	0.019	5.860	5	0.017	5.180	5	0.018	5.538	4
Avecap	0.004	1.515	6	0.005	1.556	7	0.006	1.848	7
Avededu	0.005	1.454	7	0.006	1.869	6	0.006	1.976	6
Hukou	0.003	0.845	8	0.005	1.524	8	0.006	1.837	8
Landborr	0.003	0.833	9	0.004	1.112	9	0.004	1.183	9
Infra	0.001	0.454	10	0.000	0.030	13	0.000	-0.014	12
Healthy	0.001	0.369	11	0.001	0.337	10	0.001	0.367	11
Govhelp	0.000	0.071	12	0.001	0.056	12	0.000	-0.003	13
Service	0.000	-0.066	13	0.001	0.327	11	0.001	0.469	10

TABLE 5. Robustness of the income inequality decomposition results

Variables	2014		2016		2018	
	Theil-L Rank	Theil Rank	Theil-L Rank	Theil Rank	Theil-L Rank	Theil Rank
Household Fixed Effect	1	1	1	1	1	1
Urbanization	2	2	2	2	2	2
Age	9	10	11	10	12	10
Workout	3	5	3	3	9	3
Worker	4	3	4	4	3	4
Avecap	6	6	9	9	8	9
Aveledu	8	7	6	6	5	7
Hukou	11	12	8	8	7	6
Landborr	10	9	10	11	10	12
Infra	7	8	7	7	6	8
Healthy	13	13	13	13	13	13
Govhelp	12	11	12	12	11	11
Service	5	4	5	5	4	5

TABLE 6. Social welfare and its efficiency and inequality components

Year	Ln(W)	ln(Y)	ln(1-G)
2014	8.594	9.211	-0.627
2016	8.624	9.264	-0.640
2018	8.912	9.551	-0.639

TABLE 7. Impact of urbanization on social welfare

Year	Efficient effects	Inequality effect	Social welfare effect
2014—2016	2.074	0.069	2.143
2016—2018	2.078	0.240	2.318