



# An evaluation of the changes in wellbeing in China – 2005 to 2015: An exploratory study



Qiong Wang<sup>a</sup>, Pundarik Mukhopadhaya<sup>b,\*</sup>, Jingyi Ye<sup>c</sup>

<sup>a</sup> Institute of Economics, Chinese Academy of Social Sciences, Beijing 100836, China

<sup>b</sup> Department of Economics, Macquarie University, Sydney, NSW 2109, Australia

<sup>c</sup> School of Economics, Peking University, Beijing 100871, China

## ARTICLE INFO

### Keywords:

Wellbeing  
Multidimensional  
Fuzzy  
China  
Capability  
Rural-urban  
Region

## ABSTRACT

Using Chinese General Social Survey (CGSS) data from 2005 and 2015, this paper estimates the levels and trends of wellbeing in China. In developing the indicators and dimensions/functionings for a multidimensional measure of wellbeing, a fuzzy method is utilized that incorporates the dispersion and average levels of wellbeing for adult individuals. Using a multivariate data reduction technique, this research identifies six major functionings of wellbeing encompassing 23 indicators to evaluate the changes in wellbeing in China. It is observed that overall achievement in wellbeing has increased by 50%, reaching an *intermediate* level, while four functionings (Public Action, Learning Ability, Protective Security and Life Satisfaction, and Economic Resources) showed improvement and two (Health and Shelter) have deteriorated. Rural-urban disparity has increased particularly in Health, Shelter, and Life Satisfaction. Average overall wellbeing in the northeast region has greatly improved, followed by the central, east and west areas. The disparity between east and west and east and central has increased, while overall wellbeing in central and northeast regions surpassed that in the west in 2015 resulting in a decrease in disparity between the east and northeast. Our observations show that to achieve further equity, specific targeted policies are needed on medical services, housing, protective security and education.

## 1. Introduction

Since the reforms that led to the opening-up of China, the country has experienced dramatic economic growth. The per capita real GDP of China rose from US\$307 in 1978 to more than US\$1000 in 2001, and then to US\$7755 in 2018.<sup>1</sup> However, with these increases in per capita income levels, the income gap within households has widened. The Gini coefficient of income in China has been increasing since 1985, reaching its peak at 0.491 in 2008, and experiencing some moderation after that with a value of 0.467 in 2018.<sup>2</sup> Therefore, without a consideration of the inequality and other shortcomings of unbalanced growth, the development achievements of China would be overstated. Meanwhile, there has been concerted effort made by Chinese policy makers towards the betterment of living standards for their citizens since the beginning of this century. In 2002, the objective to build a moderately prosperous society in all respects during the first two decades of the 21st century was put forward, devoted to economic, political,

\* Corresponding author at: Department of Economics, Macquarie University, Sydney, NSW 2109, Australia.

E-mail addresses: [wangqiong@cass.org.cn](mailto:wangqiong@cass.org.cn) (Q. Wang), [pundarik.mukhopadhaya@mq.edu.au](mailto:pundarik.mukhopadhaya@mq.edu.au) (P. Mukhopadhaya), [yejingyi@pku.edu.cn](mailto:yejingyi@pku.edu.cn) (J. Ye).

<sup>1</sup> The unit is constant 2010 US\$. Data is from the website of World Bank: <https://data.worldbank.org/indicator/NY.GDP.PCAP.KD?locations=CN>.

<sup>2</sup> Please check Ravallion and Chen (2007) for the data of the Gini coefficient of income from 1980 to 2002; the Gini data after 2002 are from the National Bureau of Statistics (NBS) of China.

<https://doi.org/10.1016/j.chieco.2020.101457>

Received 26 September 2019; Received in revised form 13 March 2020; Accepted 8 April 2020

Available online 10 April 2020

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cultural, social and ecological development. In 2007, China's "Scientific Outlook on Development" was illustrated in further detail, with the basic requirement to realize comprehensive, balanced and sustainable development. Policies were implemented to favor rural as well as underdeveloped regions (for example abrogating the agricultural tax and development of the western regions), and for improving the standard of living (for example, completing a social safety net, free compulsory education, and improving redistribution policies to reduce inequality). These policies and strategies continue to be extended and improved. In 2017, China announced its entry to a new era, noting among its characteristics the contradiction between unbalanced and inadequate development with the people's ever-growing needs for a better life.<sup>3</sup> Besides improving public services, the government is also committed to alleviating poverty completely by 2020.

We observe a decrease in the Gini coefficient between 2008 and 2018 for China, along with an increase in the Human Development Index (HDI) from 0.594 in 2000 to 0.752 in 2017, indicating a progress to *high* human development from a *medium* level within a span of less than two decades.<sup>4</sup> Various other indicators provided by the United Nation Development Program (UNDP) show different aspects of development of China (for example, Inequality-adjusted Human Development Index, Gender Inequality Index, Gender Development Index etc). All these indicators, however, are mostly macro indicators and therefore quantified without any specific attention towards wellbeing at the individual level.<sup>5</sup> In this context, policy makers can make better informed assessments of economic development/wellbeing from the perspective of individual satisfaction leading to more accurate targeting of policies. Moreover, some aspects of wellbeing might be difficult to capture from macro observations, such as individuals' attitude towards public action, their perception of economic status, their health condition and general life satisfaction.<sup>6</sup>

To address this gap, the aim of this paper is to use individual survey data to shed light on changes in wellbeing in China between 2005 and 2015. To do this, two issues have been emphasized. Firstly, we consider a multidimensional concept of development/wellbeing from the perspective of individuals' perceived satisfaction and secondly, we do not neglect the role of inequality in individuals' level of satisfaction for the overall wellbeing of the country. We use the capability approach (Sen, 1999) and fuzzy set theory to assess the development/wellbeing of China by utilizing Chinese General Social Survey (CGSS) data. The capability approach is an appealing framework to use to capture the multidimensional essence of development/wellbeing, which has become increasingly prominent in academia and policymaking (Robeyns, 2006). We use fuzzy set theory with a membership function based on sample distribution as proposed by Cheli and Lemmi (1995) to compute the achievement in each functioning/dimension so that inequality is naturally considered in the assessment. We further explore and assess the nature of disparity in wellbeing across rural and urban areas and in different regions to examine the effectiveness of newly advocated development strategies.

The present study adds value to the existing literature in several respects. Firstly, although literature on the evaluation of subjective life satisfaction by people in China is abundant, those studies are unable to reach any conclusion about the changes over time. Our research provides a detailed description of changes in various indicators and dimensions of wellbeing. Secondly, all previous studies evaluate wellbeing in a limited number of dimensions or on specific population groups with a larger set of dimensions selected normatively, while we consider a comprehensive set of indicators and dimensions through a robust statistical process for the whole country and evaluate the changes over time. Consequently, the policy implication of this research is immense. Thirdly, we employ a yardstick measure to distinguish the levels of achievement at both indicator and aggregate levels (dimensions/functionings) which clearly establishes the standard of development/wellbeing in China and related changes. Fourthly, using a fuzzy approach for the first time in the literature on China, we integrate inequality of attributes due to the variation of individual levels of satisfaction, fulfilling all three "I"s (incidence, intensity and inequality) as a requirement of a good well/illbeing measure (Jenkins & Lambert, 1997). Fifthly, our study incorporates an investigation into rural-urban disparity and regional variation in the levels of wellbeing, which will help policy makers enhance the standard of development through appropriate policy prescription.

This paper is organized as follows. Section 2 discusses the background literature, Section 3 describes the data and the methodology used and identifies the dimensions/functionings and their components. Section 4 presents and discusses the pattern of overall development/wellbeing. Section 5 analyzes the differences in wellbeing between rural and urban areas, and these differences among different regions in China are discussed in Section 6. Section 7 summarizes and concludes with policy implications.

## 2. The background literature

Enhancement of wellbeing is one of the most important aims of economic policy in all countries of the world and that does not exclude China. Sen (1999) advocates wellbeing through the elimination of the source of unfreedom while the Sustainable Development Goals (SDGs) aim for a world with "no poverty", "zero hunger", "good health and wellbeing", "quality education", "gender equality", "clean water and sanitation" and "reduced inequality".<sup>7</sup> In this context, specifying how wellbeing is characterized, what its determinants are, and finding an appropriate measure all become crucial elements for the design and assessment of policies aimed at

<sup>3</sup> Report delivered by President Xi Jinping at the 19th National Congress of the Communist Party of China on October 18, 2017 ([http://www.china.com.cn/19da/2017-10/27/content\\_41805113.htm](http://www.china.com.cn/19da/2017-10/27/content_41805113.htm))

<sup>4</sup> Observation made from the "Human Development Indices and Indicators: 2018 Statistical Update" published by UNDP. Please check the website for details: [http://hdr.undp.org/sites/default/files/2018\\_human\\_development\\_statistical\\_update.pdf](http://hdr.undp.org/sites/default/files/2018_human_development_statistical_update.pdf).

<sup>5</sup> See Clarke (2002) on the importance of the inclusion of grassroots level information for measuring the overall wellbeing of a society.

<sup>6</sup> The decrease in the Multidimensional Poverty Index (MPI) of China from 0.0350 in 2010 to 0.017 in 2014 (Shen, Alkire, & Zhan, 2018), to some extent shows the economic wellbeing at the individual level. See also, Yang and Mukhopadhyaya (2016).

<sup>7</sup> For the full list see <https://sustainabledevelopment.un.org/?menu=1300>

the alleviation of these social problems (Ray, 1998). Stiglitz, Sen, and Fitoussi (2009) argue that wellbeing is a multidimensional concept and therefore the lack of wellbeing may be considered as a manifestation of the insufficiency of accomplishments in different domains (Chakravarty, 2006, 2018; Chakravarty & Lugo, 2016). On this understanding, the multidimensional nature of social development receives widespread consensus, grounded mainly on the capability approach proposed by Sen (1985, 1997, 1999, 2003, 2010), which could be regarded as the most comprehensive approach to grasping the concept of development.

Sen (2006) differs fundamentally from the welfarists because the latter convert possession of commodities directly into individual wellbeing, while he acknowledges that the achievement of wellbeing requires other factors in addition to entitlements as primary means. In this consequential relationship, ownerships allow a person to have opportunities to pursue their goals, but entitlements do not guarantee actual achievements. Personal capabilities are translated into real achievements in the functioning stage that are affected by several internal and external conditions regarding individual, social, and environmental factors. The ultimate outcomes are the states of wellbeing that result not only from entitlements, but also from personal capabilities, transformation conditions and functionings (see Jackson (2005) for a diagrammatic exploration). Sugden (1993) is highly skeptical of Sen's capability approach because it does not provide a comprehensive framework for ranking individuals' functionings.<sup>8</sup> However, Kuklys and Robeyns (2006) show that the Sen's approach is directly operational with respect to freedom of choices. They also appreciate its extendable characteristic by adding plausible functionings such as "being educated" and/or "being employed" over and above the fundamental functionings such as "being well fed", "being sufficiently sheltered". Dang (2014) supports a concentration on the achieved functionings that are more operational than on a set of capabilities in the case of inadequate information about freedom conditions. Once the objective is narrowed to the achieved functionings, the remaining jobs are to collect observed indicators representing wellbeing and then choose an appropriate overall estimation. Sen (2003) recommends a solution to choosing dimensions, indicator weightings, and methodology of a synthesis of indicators that contribute to wellbeing through a publicly democratic decision.<sup>9</sup>

To obtain an adequate direction on the measurement issue of wellbeing, Alkire (2002) asks four questions:

(i) how to identify valuable capabilities; (ii) how to make strategic economic decisions that weight and prioritise capabilities; (iii) what to do when value judgements conflict; and (iv) how capability sets may be measured, such that one can evaluate changes brought about by economic initiatives (p. 11).

She develops an operationalization of the capability in the relation to poverty analyses. Due to an absence of consensus on the extent to which wellbeing is measured by a set of capabilities, she considers a "presumption" of achieved functionings. Currently, the most influential and dominating methodology in this research is the counting approach to the measurement of multidimensional poverty proposed by Alkire and Foster (2011) (AF approach, in short), which has been applied in a considerable number of studies. The most famous application of this approach is the household-based multidimensional poverty index ("MPI", see Alkire et al., 2015), which has been included in the Human Development Report since 2010 (UNDP, 2010).

Despite its simplicity and flexibility, the AF approach has several methodological shortcomings, for instance, it does not allow any room for considering people as partially deprived because it labels people as either deprived or not, and the approach does not attend to the problem of inequality among deprived people in the society (see Rippin (2013, 2017)), which is a serious shortcoming according to Sen (1976, 1979). To avoid these problems in this paper we consider an alternative approach to measuring wellbeing, as discussed in the next section.

To evaluate the changes in wellbeing during the development phases in China, one prime question comes out from the above discussion as to what functionings we should choose as indicators for wellbeing. For the convenience of implication, Alkire (2007) proposes a mixed-method approach that includes five methods to choose functionings based on Sen's idea of public choice. These are: existing data or convention; normative assumptions; public consensus; ongoing deliberative participatory processes; and empirical evidence regarding people's values. This process may generate an unlimited list of functionings. In our study, we consider one functioning as one dimension for the measurement of wellbeing, and each dimension can be composed of several indicators. If these indicators in the functioning move in the same direction, we can easily make a judgement. However, if they move in different directions, we use a judgement on that functioning by assigning weights on them and aggregate them to get a composite index. This is the first stage of aggregation for combining indicators to dimension/functioning. As we wish to make an overall judgement of development/wellbeing for the whole country and to compare two time periods, we not only compare every functioning (dimension), but also generate a composite overall index, which needs the second stage of aggregation. In this process once again the selection of weights is a problem. It is theoretically difficult and even impossible to get a consensus about the weights. Empirically, while HDI and global MPI use fixed weights, many studies develop weights through data and statistical techniques (see, for example, Cheli and Lemmi (1995); Klasen (2000); Martinetti (2000); Balestrino and Sciclone (2001); Lelli (2001)).<sup>10</sup>

<sup>8</sup> Sugden (1993) also claims that the approach seems unable to quantify the contribution of freedom conditions to the wellbeing level, so that it is less practicable than the income approach for the perception of wellbeing.

<sup>9</sup> In fact, the selection of functionings involves value judgements in the development stage about what are important for the whole population. The functionings not selected are implicitly less important or have a zero weight. It is usually not easy to get such a functioning list, and according to Arrow's Impossibility Theorem, setting weight on functionings is more difficult even through public debate.

<sup>10</sup> For a comprehensive discussion of the general issues related to capability and functionings and the development of indicators, see Chowdhury and Mukhopadhyaya (2014).

## 2.1. The empirical techniques

The range of statistical techniques used in empirical applications based on the capability approach can be roughly classified in four groups: scaling and ranking solutions; fuzzy set theory; multivariate data reduction technique; and the regression approach (Martinetti & Roche, 2009). This study uses the fuzzy set theory and multivariate data reduction techniques (particularly principal component analysis and factor analysis).

Fuzzy set theory has advantages in simultaneously dealing with quantitative, qualitative and ordinal variables, while preserving the complexity of the capability approach. At the same time, the procedures of union and intersection in the crisp set can also be used as the aggregators. Since the aggregator and the related weight structure are explicit and can be re-implemented, intertemporal and interregional comparisons of the results are feasible (Roche, 2008). There are many empirical studies based on the capability approach that use the fuzzy set theory, such as Cheli and Lemmi (1995), Martinetti (2000), Lelli (2001), Qizilbash and Clark (2005), Vero (2006), Gao, Qiao, and Zhang (2007), Roche (2008).

Selection of a membership function is important in fuzzy set theory. The membership degree calculated by the membership function measures achievements of the related indicator/dimension or functioning or overall development.<sup>11</sup> In this study we choose one proposed by Cheli and Lemmi (1995), in which membership degrees are calculated based on the sample distribution so that inequality is reflected in the membership degree, thus eliminating the problem related to the AF approach indicated above.

Although fuzzy set theory has many practical advantages, two things are not covered. First is the identification of the component indicators of functionings: since many indicators can represent aspects of development and are related to each other, it is difficult to classify them into different groups. This identification of functionings is important for aggregation. Second is the choice of weight structure for aggregation. Although the selection of weight structure involves the researcher's value judgement, the data do contain some information of the relationship among indicators, which can naturally be used in aggregation. For the purpose of this study these two problems are handled using multivariate data reduction techniques (factor analysis and principal component analysis). This technique is used to identify the potential functionings. Moreover, the relationship among different indicators captured by this technique are used to choose the weight structure.<sup>12</sup>

Roche (2008) confirms that the combination of fuzzy set theory and factor analysis would be an appropriate way to empirically use the capability approach.<sup>13</sup> In summary, we use factor analysis to identify functionings and their component indicators, and factor scores to serve as the basis for selecting the aggregators of fuzzy set theory. We choose the aggregator with the highest correlation coefficient between factor score and membership degree obtained by that aggregator. Fuzzy set theory is used to compute the membership degree and aggregate the functionings.

## 2.2. Existing research on wellbeing evaluation in China

Most of the available studies on the evaluation of wellbeing in China are about subjective wellbeing and its trends. Subjective wellbeing is quantified by life satisfaction data such as the International Wellbeing Index (IWI). Davey and Rato (2012), in their review covering different time and space and with the use of different data bases, show that subjective wellbeing in China (measured by the personal wellbeing index score) is stable and most people are happy. Conversely, by pooling six different survey data sets in China for the period 1990 to 2011, Li and Raine (2014) investigate the time trend for life satisfaction and notice that subjective wellbeing in China is relatively low compared to other countries, and this trend is decreasing. However, the comparability of these different surveys is debatable. Liu, Xiong, and Su (2012), using five waves of CGSS (2003, 2005, 2006, 2008 and 2010), find a steadily increasing trend in life satisfaction.

Some research investigates the influence of a particular policy on specific dimensions and on their primary indicators of wellbeing. For example, Yang and Day (2015) explore the influence of the government's job resettlement programs on households' travel welfare, while Qi and Wu (2018) evaluate the policy of Minimum Living Security System on recipients' psychological health and wellbeing. Gao, Zhai, Yang, and Li (2014) study affordability of the recipient families' health and education expenditure through the support received from the government of China's *Dibao* program.

There are a few studies on multidimensional wellbeing evaluation that focus on the relationship among groups of people or those in a particular region. For example, Gao et al. (2007) study the change in wellbeing for farmers in Wuhan city resulting from the Urban Circulation of Farmland, Zhang, Zhou, and Zeng (2016) investigate changes in the wellbeing of rural migrants (using CGSS 2010–2013), while Wang and Zhong (2014) examine the same for urban residents (using CGSS of 2003, 2006 and 2008). However, the dimensions of wellbeing investigated in this research are different to those in the earlier studies.<sup>14</sup>

While none of the research mentioned above considers the inequality of individual wellbeing, some studies do incorporate that.

<sup>11</sup> Martinetti (2000) and Lelli (2001) have illustrated the advantages and disadvantages of different membership functions.

<sup>12</sup> There are many empirical studies in other countries based on capability approach using multivariate data reduction techniques, such as Schokkaert and Van Ootegem (1990), Klasen (2000), Balestrino and Sciclone (2001), Lelli (2001), Roche (2008) among others.

<sup>13</sup> Ye and Wang (2014) use this method to evaluate the welfare of rural migrants in Beijing.

<sup>14</sup> The dimensions in Gao et al. (2007) are family's economic condition, social security, dwelling condition, security situation of community, environment condition, and psychological condition, while those of Zhang et al. (2016) are economic condition, education, political freedom and civic right, health condition, social security, working condition, dwelling condition, social inclusion, and psychological identification. Wang and Zhong (2014) use the dimensions: working condition, dwelling condition, social interaction, and psychological condition.

Using the China Health and Nutrition Survey (CHNS) of 1991–2006, Jiang (2015) investigates the change to inequality in individual wellbeing by using three indicators: income, self-rated health, and educational attainment. He observes a decrease in inequality in education between 1991 and 2000 and stability between 2000 and 2006, while inequality in health and income increases in general. Using the same data source (of 2004, 2006, 2009 and 2011), Xie (2018) studies the regional disparity in wellbeing-inequality across the same three dimensions. The study reveals that the Gini coefficients of health and education in almost all three studied regions increased from 2004 to 2009 and then decreased in 2011, while that of income increased in 2004 and 2006 and decreased in 2009 and 2011. It is worth pointing out that Xie (2018) did not consider interregional inequality of wellbeing and the method used is a utility-based inequality measure not a direct inequality computation of the perceived attributes. Questions have also been raised recently on the appropriateness of traditional inequality indices (like Gini) on ordinal data (see Cowell and Flachaire (2017)).

Research on disparities between rural and urban areas or among different regions and the changing pattern of disparity in China, mostly focus on income. For example, using China Household Income Project (CHIP) data of 2007 and 2013, Luo (2017) finds that income disparity between rural and urban residents reduced, and this is the main explanatory factor for the decreasing income inequality of the whole country. However, it is worth noting that the income disparity between rural and urban residents was still very high in 2013. Moreover, Luo, Sicular, and Li (2018), using the same data source, find that the contribution of the income gap among eastern, central and western regions to the income inequality of the whole country decreased from 13% in 2007 to 8% in 2013.<sup>15</sup> Going beyond income, some researchers analyze the disparity of subjective wellbeing. Using data from the 2004 China Inequality and Distributive Justice Project, Han (2012) finds that disadvantaged rural residents and residents living in the western region have greater satisfaction with their current living standards than do privileged urbanites and residents in the coastal east. However, using CGSS data, Liu et al. (2012) find that residents with rural hukou have lower life satisfaction than those with urban hukou. Most research on subjective wellbeing does not investigate the changing pattern of disparities. Regarding the disparity in other dimensions of wellbeing, studies have usually used information from related Statistical Yearbooks to show the disparity of development and provision of public services. For example, Yang (2015) investigates the disparity of basic public services among 31 provinces between 2001 and 2012. Sixteen primary indicators related to five basic public services (basic infrastructure construction, basic education services, public employment services, public health services and social security services) are analyzed in this research. Yang (2015) finds that inequality in the provision of public services among 31 provinces is conspicuous, and that there are different trends in equalization for different indicators.<sup>16</sup>

In summary, although there is a good volume of literature evaluating wellbeing in China, it either focuses on specific dimensions, or on specific groups of people, whereas inequality in individual wellbeing is usually ignored in an integrated framework of evaluation. Our research appraises the change of wellbeing of the adult cohorts in China using CGSS data collected in 2005 and 2015. It is a multidimensional evaluation aiming to assess the recent development policies implemented in China. Inequality of individual wellbeing is considered in the evaluation through the introduction of a special membership function which directly encompasses the disparity in individuals' satisfaction rates.

### 3. Methodology

#### 3.1. The membership function

In fuzzy set theory, the membership degree is the achievement of wellbeing based on the capability approach. Every functioning and each of its component indicators has a membership degree, which has the value of 0 for the lowest achievement and 1 for the highest achievement. Martinetti (2000) suggests achievements be in the middle level if the membership degree is between 0.4 and 0.7. Following that, we will classify the achievements of wellbeing as *low* (for a value below 0.4), *middle/intermediate* (between 0.4 and 0.7) and *high* (above 0.7) in our analysis.

For this study we use the following membership function for individual  $i$  in indicator  $j$  proposed by Cheli and Lemmi (1995)<sup>17</sup>:

$$u_{ij}(X_{ij}) = \begin{cases} 0 & \text{for } k = 1 \\ u_{ij}(X_j^{(k-1)}) + \frac{F(X_j^{(k)}) - F(X_j^{(k-1)})}{1 - F(X_j^{(1)})} & \text{for } k > 1 \end{cases} \quad (1)$$

Where  $X_j^{(1)}, X_j^{(2)}, \dots, X_j^{(n)}$  are the modalities of wellbeing of indicator  $j$  for an individual  $i$ .  $F(X_j^{(k)})$  is the sampling distribution function of the indicator arranged in increasing order of wellbeing where the order is denoted by  $(k)$ .<sup>18</sup>

The smallest  $X_j$ , (that is, when  $k = 1$ ), has the worst achievement  $u_{ij}(X_{ij}) = 0$ , and the largest  $X_j$  has the highest achievement  $u_{ij}(X_{ij}) = 1$ . While the membership degree of those  $X_j$ 's with a value in the middle will depend on the sample distribution, the same value of  $X_j$  with a higher accumulative probability, which means a more equal distribution of  $X_j$ , will have a higher membership

<sup>15</sup> See Mukhopadhyaya, Shantakumar, and Rao (2011) for a comprehensive survey and list of other references related to rural-urban and regional inequality studies in China.

<sup>16</sup> For a detailed discussion on wellbeing on China see Yang and Mukhopadhyaya (2016).

<sup>17</sup> A limited number of available studies on China employs a type of fuzzy method where an arbitrary cut-off is used to find the membership. For example, Gao et al. (2007), Zhang et al. (2016), Wang and Zhong (2014). Our study overcomes the shortcomings of the arbitrary cut-off.

<sup>18</sup> In order to reflect the representativeness of the sample and to compare results between rural and urban areas and among various regions, we use sample weight to correct the sample distribution.

degree. Consequently, the membership degree that represents the worst and best achievements is fixed and not affected by the distribution, while the membership degrees with values between 0 and 1 (not inclusive) capture the distribution of the indicator, which means the worse the distribution, the smaller the membership degree.

### 3.2. Aggregation operations

Two kinds of aggregation operations are commonly used in fuzzy set theory. One is the extension of the crisp set procedures: fuzzy union and fuzzy intersection. The other kinds are the arithmetic averaging and the weighted averaging operation. These aggregation operations imply different trade-offs among the indicators or functionalities that are aggregated. Roche (2008) considers three aggregators: standard intersection, weak intersection and arithmetic averaging operation. For our analysis, along with these three, we consider a weighted averaging operation with weight structure of Cheli and Lemmi (1995) as the fourth alternative aggregator choice. The four alternative aggregators we use are the following:

Standard intersection:

$$u_{A \cap B} = \min(u_A, u_B). \tag{2}$$

Weak intersection:

$$u_{A \cdot B} = (u_A \cdot u_B) \tag{3}$$

Arithmetic average:

$$U(u_A, u_B, \dots, u_Z) = \left[ \left( \sum_{j=A}^Z u_{ij}(X_{ij}) \right) \cdot \frac{1}{Z} \right] \tag{4}$$

Weighted average:

$$U(u_A, u_B, \dots, u_Z) = \frac{\sum_{j=A}^Z w_j u_{ij}(X_{ij})}{\sum_{j=A}^Z w_j} \tag{5}$$

Where,

$$w_j = -\ln \left[ \frac{1}{n} \sum_i u_{ij} \right] \tag{6}$$

All the aggregators are meaningful and impose different weights or importance on different attributes, which highlight different value judgements. The standard intersection only focuses on the worst attribute and there is no trade-off among the attributes. The weak intersection emphasizes the concurrent deprived situation and results in a lower membership degree than the standard intersection, which means it is even worse if more than one attribute performs badly. The arithmetic average gives equal weight or importance to every attribute and trade-offs are allowed among different attributes. The weighted average gives different weights to different attributes and those with lower membership degrees will have higher weights. Since the membership function is based on the sample distribution, the weight structure is also obtained from the sample. For this study we use all four different aggregators listed above, which are commonly used in the literature. In order to decide on the appropriate aggregator, we assess the functionalities, or the composite wellbeing/development index, using the above four aggregators separately and compare the results with the factor scores in pairs. We then pick up the aggregator for our analysis that has the highest correlation coefficient with the factor score.

### 3.3. The data source

As mentioned above, for our analysis we use the Chinese General Social Survey (CGSS) data of 2005 and 2015. This survey is in the family of the world General Social Survey launched in 2003, which is the earliest national representative continuous survey project run by any academic institution in China. The survey's aim is to systematically monitor the changing relationship between social structure and quality of life in both rural and urban China, thus it is feasible to use the survey data to evaluate the progress of wellbeing in China. CGSS data is widely used for research in many areas such as sociology, economics and politics.<sup>19</sup>

We use the 2015 round of CGSS data to explore the recent achievements of development in China. Since some modules in the survey are re-implemented every 10 years, the 2005 round data are also used for comparison. The advantage of using the CGSS for our study is the availability of indicators that we are interested in using to reflect wellbeing status. Moreover, it is randomly sampled at the individual level (other surveys are usually at household level), specifically, the investigating unit is adults aged 16 and over, so it is a nationwide representative adult sample. In most studies, the empirical indices of multidimensional wellbeing (and illbeing) are computed at the level of the household (Bessell, 2015; Chiappori, 2016; Pogge & Wisor, 2016). In other words, these studies use the household as the unit of analysis to determine the status of wellbeing by equating the condition of the household with the condition of all individuals belonging to the household (Espinoza-Delgado & Klasen, 2018). This disregards existing intra-household imbalances and hides inequalities between different generations living in the same household (Atkinson, Cantillon, Marlier, & Nolan, 2002),

<sup>19</sup> For the analysis of published researches using CGSS data, see <http://cgss.ruc.edu.cn/assets/admin/org/ueditor/php/upload/20190708/15625516808383.pdf>.

**Table 1**  
Rotated factor loading matrix.

Functionings	Indicators	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Public Action	Medical Service	<b>0.74*</b>	-0.01	-0.02	0.04	0.12	0.00
	Living Security for the Elderly people	<b>0.75*</b>	-0.01	0.00	0.12	0.13	-0.01
	Basic Education	<b>0.72*</b>	-0.03	-0.03	0.03	0.07	0.02
	National Security	<b>0.65*</b>	-0.02	0.08	0.13	-0.02	0.02
	Fighting against Crime	<b>0.73*</b>	-0.03	0.03	0.10	-0.03	0.02
	Fair Law Enforcement	<b>0.80*</b>	0.00	-0.04	0.05	0.01	0.02
	Act with Justice	<b>0.80*</b>	0.01	-0.02	0.05	0.01	0.02
	Environment Protection	<b>0.69*</b>	0.01	-0.12	0.02	-0.03	-0.01
	Assist the Poor	<b>0.79*</b>	-0.01	-0.02	0.07	0.09	0.01
Health	General Health	-0.02	<b>0.81*</b>	0.14	-0.12	0.09	-0.03
	Physical Health	-0.03	<b>0.87*</b>	0.15	-0.02	0.04	-0.02
	Psychological Health	0.00	<b>0.83*</b>	0.00	0.03	0.11	0.02
Learning Ability	Educational Attainment	-0.08	0.15	<b>0.81*</b>	0.12	0.04	-0.01
	Frequency of Reading	-0.07	0.18	<b>0.59*</b>	0.16	-0.06	-0.01
	Frequency of Surfing the Net	-0.01	0.11	<b>0.81*</b>	0.15	0.08	-0.06
Protective Security	Frequency of Getting Together with Friends	0.13	0.00	<b>0.48*</b>	0.48	0.12	0.01
	Whether Have Medical Insurance	0.14	-0.06	0.19	<b>0.87*</b>	0.04	0.01
	Whether Have Pension Insurance	0.06	-0.02	0.06	<b>0.89*</b>	-0.01	0.02
Economic Resources and Life Satisfaction	Satisfaction of Life	0.16	0.30	0.04	0.30	<b>0.57*</b>	0.06
	Whether Economic Status Higher than 3 Years Ago	0.07	0.07	-0.02	-0.08	<b>0.79*</b>	-0.04
	Economic Status of Family	0.06	0.14	0.22	0.09	<b>0.67*</b>	0.20
Shelter	Property Right of Current Dwelling	0.00	-0.03	-0.33	0.07	-0.02	<b>0.75*</b>
	Number of Houses	0.03	0.00	0.15	-0.02	0.10	<b>0.84*</b>

Note: Variables marked with bold and asterisk have the highest factor loading in the respective factor. They are only included in respective functionings, and the respective factor score is used to compare with the membership degree of that functioning.

leading to bias in the estimates (Deaton, 1997; Espinoza-Delgado & Klasen, 2018; Rodríguez, 2016). Given the ultimate objective for this study of wellbeing is analysis of the satisfaction of individuals, limiting the empirical analysis to the household level is restrictive.

The number of respondents in the 2005 and 2015 CGSS are 10,372 and 10,968, respectively. We dropped the samples with missing values for variables that are used in the analysis, so the final sample size for 2005 is 10,361 and for 2015 is 10,532. The 2005 survey covers 28 of the 31 provinces in China, with only three provinces, Hai Nan, Xin Jiang and Xi Zang being excluded. The 2015 survey also covers 28 provinces, excluding Qing Hai, Ning Xia and Xi Zang. The wide coverage of these samples guarantees a good representation of adults of the whole country. All results in this study are further adjusted by the sample weight.

### 3.4. Identification of the functionings employed to compare wellbeing over time

We start with all possible indicators available in the data to capture various aspects of individual level of satisfaction, which is unlike previous studies on China that normatively selected indicators and dimensions. Since our interest is to explore the changes to those functionings between 2005 and 2015, we select only the comparable indicators that are available for both years. Accordingly, 23 indicators are chosen for our analysis (see Table 1).<sup>20</sup>

We employ factor analysis to identify functionings and their component indicators. Statistical descriptions are presented in Table 1, which also reflects the achievements of overall development. In the factor analysis, we pool the data from 2005 and 2015 and use a principal-component factor model. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.851, which indicates suitability to conduct the analysis according to the commonly used guidelines. It can be noted from Table 1 that six factors (functionings) with an eigenvalue greater than 1 are retained, which explain 61.23% of total variances. As a robustness check we also apply factor analysis to 2005 and 2015 data separately, which provides the KMO measures as 0.827 and 0.872, respectively. Six factors or functionings are retained, and the component of each factor remains the same for 2 years, as with the pooled data. The percentages of variance are explained as 62.10% and 57.61%, respectively. For the sake of brevity, we present only the results of the pooled data. Moreover, we carried out the same exercise after dropping one of the functionings and all its component indicators, which achieved the same results with respect to the remaining factors and their component indicators. This is presented as a further check of the robustness in the identification of the functionings and their indicators.

When an orthogonal transformation is applied to the estimated loadings, we get the rotated factor loading matrix (see Table 1). The numbers in Table 1 are factor loadings. In each factor, the highest factor loadings are marked with an asterisk.

In Factor 1, nine indicators that present individuals' satisfaction with the actions of the government have the highest loading. These indicators (Satisfaction With Providing Medical Care for the Ill; Providing Living Security for the Elderly People; Providing

<sup>20</sup> We eliminate the indicator of "own economic status", as there are just three options for this question, which makes the variation for this indicator small. The related question is "comparing with peers, how do you think of your economic status?" The answers are in a three-point scale as "lower", "almost the same" and "higher". This indicator is dropped as the reference group because of its inappropriateness for the disparity analysis. However, we note that the results are almost the same after dropping this indicator.

High Quality of Basic Education; Defending National Security; Fighting Against Crime; Enforcing Law Fairly; Acting with Justice; Protecting Environment; and Assisting the Poor to Maintain the Social Fairness) show the different aspects that the government of China has implemented for the wellbeing of its citizens. As the government's effort plays an important and irreplaceable role in the country's overall development/wellbeing and the increase in people's living standards, this dimension is justified as part of an evaluation of China's economic development. We name the first factor or functioning "Public Action".

In Factor 2, three indicators related to individual health have the highest factor loadings.<sup>21</sup> We name this functioning "Health". Within this functioning the three indicators are defined as follows: General Health reflects individuals' general feelings about their own health, Physical Health reflects how often health issues have affected a person's work or other daily activities in the last 4 weeks, while Psychological Health indicates how often the person may have felt depressed or desperate in the last 4 weeks. General health is a relatively subjective judgement of one's own health, while physical and psychological health are objective measures, thus these three indicators complement each other and constitute a comprehensive yardstick with which to assess the health situation. Obviously, good health is a foundation for acquiring *freedom* and an important component of a country's wellbeing.

In Factor 3, four indicators (Educational Attainment, Frequency of Reading, Frequency of Surfing the Net, Frequency of Getting Together with Friends) receive the highest factor loading. These four indicators represent learning abilities, which has an instrumental importance in a society's development. We name this functioning "Learning Ability".

In Factor 4, indicators such as whether the individual is covered by medical and pension insurance have the highest factor loading, hence this functioning is named "Protective Security".<sup>22</sup> Sen (1999) indicates that protective security is needed to provide a social safety net for preventing the affected population from being reduced to abject misery, and in some cases even starvation and death.

In Factor 5, three indicators (individuals' Life Satisfaction, Whether Economic Status is Higher than 3 Years Ago, and the Family's Economic Status) have the highest factor loading. Economic opulence is the most important component of development, especially in a developing country, as it is the economic foundation for the acquisition of other aspects of development. The indicator that shows an increase in individual's status compared to 3 years ago, denotes mobility in economic prosperity. A family's economic resources can be shared among family members, which also indicates affluence. In the CGSS, this indicator mainly reflects the degree to which an individual is satisfied with their family's economic status.<sup>23</sup> Two economic indicators and the individual's own life satisfaction are dominant in Factor 5, meaning, in the current stage of China's development, economic opulence is one of the most influential determinants of one's overall life satisfaction (Liu et al., 2012). We name this functioning "Economic Resources and Life Satisfaction".

In Factor 6, Property Right of the Current Dwelling and Number of House Property Owned by the Family each have the highest factor loading; we name this functioning "Shelter". Chinese people attach great importance to buying their own house, and renting is thought to be temporary. When people live in their own house (that is, having property rights to the dwelling) they have more freedom to deal with their house in any way they like. Number of houses owned by the family indicates another aspect of wellbeing. Moreover, the house is the main component of family assets. According to the family wealth survey, in 2018 the net value of the house property accounted for 68.07% of the family assets per capita, which means the dwelling condition also reflects a family's economic opulence, and complements the subjective economic status.

Accordingly, we identify six functionings; Public Action, Health, Learning Ability, Protective Security, Economic Resources and Life Satisfaction, and Shelter.

#### 4. Estimation and evaluation of the overall wellbeing of China

Having decided on the functionings and their indicators, this section will present the estimates of the achievement scores to demonstrate the pattern of changes in the wellbeing/development of China between the period 2005 and 2015. Further analyses on the disparities of wellbeing between rural and urban areas, and among different regions will follow in Sections 5 and 6.

##### 4.1. Descriptive statistics of indicators

Table 2 presents the descriptive statistics of each indicator, which also reflects the achievements in terms of overall wellbeing.<sup>24</sup> From Table 2 we can see that means of most indicators increased in 2015 from 2005, with exceptions being a decrease in General Health, Physical Health, Psychological Health, Frequency of Reading and Property Right of Current Dwelling, while no significant change is observed in economic status in comparison with that experienced 3 years before.

We note that all indicators in the health functioning deteriorate, which is in stark contrast with the health indicator in the Human Development Index (HDI). The HDI uses life expectancy to measure health status, which increased in China from 73.987 to

<sup>21</sup> These three indicators of health are self-reported health measures, even though they present different aspects of individual's health. More indicators such as chronic disease, ADL or BMI could add objectivity to this functioning; however, such indicators are not available in the dataset. Self-reported health measures are widely used in health economic research (see, among others, Wang, Yip, Zhang, Hsiao, and W. C. (2010), Finkelstein et al. (2012), Pan et al. (2013)). We exhibit other administrative data such as two-week morbidity rate to show the validity of our analysis.

<sup>22</sup> Both medical and pension insurance include social and commercial insurance.

<sup>23</sup> Indicator of family's economic status is obtained from the following question: which level does your family's economic condition belong to in the local area? There are five answers: "far below average", "below average", "on average", "above average", "far above average".

<sup>24</sup> The specific meaning of each indicator has already been shown in the description of identification above. The mean values in Table 2 and in the following tables are adjusted by the sample weight to represent results for the whole country.

**Table 2**  
Descriptive statistics of indicators.

Indicator or functioning	2005		2015				Change in Mean 2015–2005
	Mean	SD	Mean	SD	Min	Max	
<b>Public Action</b>							
Medical Service	2.93	0.95	3.36	0.91	1	5	0.43***
Living Security for the Elderly people	2.89	0.98	3.45	0.88	1	5	0.56***
Basic Education	3.15	0.89	3.54	0.82	1	5	0.39***
National Security	3.42	0.83	3.83	0.75	1	5	0.41***
Fighting against Crime	3.08	0.95	3.61	0.80	1	5	0.53***
Fair Law Enforcement	2.84	0.97	3.32	0.88	1	5	0.48***
Act with Justice	2.74	0.97	3.23	0.90	1	5	0.49***
Environment Protection	3.03	0.89	3.31	0.91	1	5	0.28***
Assist the Poor	2.77	0.96	3.29	0.92	1	5	0.52***
<b>Health</b>							
General Health	3.87	1.18	3.56	1.08	1	5	-0.31***
Physical Health	3.92	1.06	3.80	1.08	1	5	-0.12***
Psychological Health	3.97	1.02	3.81	0.93	1	5	-0.16***
<b>Learning Ability</b>							
Educational Attainment	2.05	1.28	2.41	1.76	1	8	0.36***
Frequency of Reading	2.42	1.63	2.23	1.40	1	5	-0.19***
Frequency of Surfing the Net	1.39	1.05	2.39	1.77	1	5	1.00***
Frequency of Getting Together with Friends	1.19	0.46	2.36	0.95	1	4	1.17***
<b>Protective Security</b>							
Whether have Medical Insurance	0.25	0.43	0.91	0.28	0	1	0.66***
Whether have Pension Insurance	0.24	0.43	0.71	0.45	0	1	0.47***
<b>Economic Resources and Life Satisfaction</b>							
Satisfaction of Life	3.41	0.76	3.83	0.85	1	5	0.42***
Whether Economic status Higher than 3 Years Ago	2.229	0.73	2.233	0.62	1	3	0.00
Economic Status of Family	2.36	0.93	2.63	0.73	1	5	0.27***
<b>Shelter</b>							
Property Right of Current Dwelling	2.56	0.70	2.50	0.74	1	3	-0.06***
Number of House Property Owned by the Family	1.00	0.48	1.08	0.57	0	11	0.08***

Note: SD is standard deviation. *t*-test of the difference of mean is conducted, and \*\*\* stands for significant results at the significance level of 1%.

76.092 years between 2005 and 2015.<sup>25</sup> Longer life expectancy for the whole country is the result of general improvement in medical and sanitary conditions, which is more obvious when life expectancy is very low. However, when life expectancy reaches a relatively high level, living a longer life is not necessarily an indicator of a healthier life. Our observation is supported by the China Health Statistics Yearbook (2018), which reports that the 2-week morbidity rate rose from 14.3% in 2003 to 18.9% in 2008, reaching 24.1% in 2013. Moreover, the morbidity rate from chronic diseases doubled from 123.3% in 2003 to 245.2% in 2013. In addition, intensifying competition for survival in a market-based economy may be an important source of anxiety leading to worse psychological health for the Chinese people. Our approach clearly indicates a shortcoming in existing macro perspectives of wellbeing measures particularly in the case of health. Analysis of individual health, as is done in this study, may be considered a complement to a macro measure such as life expectancy.

Other indicators, however, experience improvements during the study period on average (see Table 2).

## 4.2. Evaluation of overall development/wellbeing

### 4.2.1. Selection of aggregators

Since the membership function is based on the sample distribution, we compute the membership degrees for the 2 years separately to capture the difference of inequality-adjusted wellbeing over the period. To do that, we first obtain the membership degree of each elementary indicator following the method discussed above and then we aggregate the membership degree of indicators to functionings based on our four aggregators.

Table 3 presents the correlation coefficients between the functionings and factor scores. It is noted that the functionings of Learning Ability and Protective Security have the highest correlation coefficient for the aggregator-weighted average. Therefore, we choose a weighted average as the aggregator for these two functionings. For other functionings, the aggregator arithmetic average is selected, based on the results presented in Table 3. It is worth mentioning that these results are obtained from the pooled data of the 2 years, although we do find a similar association between functionings and aggregators for the individual years.<sup>26</sup>

<sup>25</sup> See <https://data.worldbank.org/indicator/SP.DYN.LE00.IN?locations=CN>.

<sup>26</sup> There is one exception; the functioning of protective security has the highest correlation coefficient on the aggregator of arithmetic average (0.97) in 2015, followed by the aggregator of weighted average (0.8862). For comparison, we use the same aggregator for both years, and the results from the pooled data are selected.

**Table 3**  
Correlation coefficient between factor scores and membership degrees.

Membership degree	Aggregator	Factor score					
		Public action	Health	Learning ability	Protective security	Economic resources and life satisfaction	Shelter
for Each functioning	Standard Intersection	0.8081	0.8745	0.7171	0.7774	0.7936	0.7369
	Weak Intersection	0.7492	0.8551	0.7075	0.7774	0.8129	0.7317
	Arithmetic Average	<b>0.969*</b>	<b>0.9701*</b>	0.8539	0.7503	<b>0.8862*</b>	<b>0.8371*</b>
	Weighted Average	0.9689	0.9697	<b>0.8617*</b>	<b>0.7812*</b>	0.8792	0.8046

Note: the highest correlation coefficient between factor scores and membership degree are highlighted with bold and asterisk, and the corresponding aggregator are chosen as the weight of the respective functioning.

**Table 4**  
Level of achievement of each indicator and functioning.

	2005		2015		Difference of means
	Mean	SD	Mean	SD	
Public Action	0.625	0.214	0.663	0.226	0.038***
Medical Service	0.620	0.301	0.652	0.318	0.032***
Living Security for the Elderly People	0.611	0.303	0.661	0.315	0.050***
Basic Education	0.645	0.299	0.681	0.318	0.035***
National Security	0.669	0.302	0.700	0.296	0.031***
Fighting against Crime	0.627	0.304	0.687	0.312	0.060***
Fair Law Enforcement	0.608	0.305	0.654	0.306	0.046***
Act with Justice	0.599	0.311	0.644	0.306	0.045***
Environment Protection	0.641	0.302	0.648	0.317	0.007*
Assist the Poor	0.604	0.313	0.643	0.312	0.039***
Health	0.639	0.284	0.630	0.260	-0.009**
General Health	0.641	0.341	0.618	0.312	-0.022***
Physical Health	0.636	0.328	0.625	0.322	-0.011**
Psychological Health	0.641	0.325	0.647	0.301	0.007
Learning Ability	0.199	0.246	0.375	0.288	0.176***
Educational Attainment	0.408	0.372	0.393	0.354	-0.014***
Frequency of Reading	0.323	0.390	0.341	0.364	0.019***
Frequency of Surfing the Net	0.093	0.252	0.301	0.429	0.209***
Frequency of Getting Together with Friends	0.159	0.351	0.560	0.327	0.401***
Protective Security	0.243	0.408	0.754	0.380	0.511***
Whether Have Medical Insurance	0.248	0.432	0.912	0.283	0.664***
Whether Have Pension Insurance	0.238	0.426	0.712	0.453	0.474***
Economic Resources and Life Satisfaction	0.464	0.192	0.514	0.161	0.05***
Satisfaction of Life	0.685	0.278	0.696	0.307	0.012***
Whether Economic Status Higher than that 3 Years Ago	0.614	0.367	0.685	0.291	0.071***
Economic Status of Family	0.556	0.376	0.676	0.317	0.120***
Shelter	0.785	0.296	0.751	0.278	-0.034***
Property Right of The Current Dwelling	0.728	0.405	0.694	0.416	-0.034***
Number of House Property Owned by The Family	0.843	0.262	0.808	0.238	-0.034***

Note: SD is standard deviation. t-test of the difference of mean is conducted, and \*, \*\*, \*\*\* stand for significant results at the significance level of 10%, 5% and 1% respectively.

#### 4.2.2. Development of the functioning levels

Table 4 shows the descriptive statistics for the membership degree of each indicator and functioning computed by membership function (see Eq. (1)). According to the characteristics of this membership function, the membership degree (which represents the achievement of wellbeing of the exact indicator) depends not only on the value of that indicator, but also on the inequality in level of satisfaction of the individuals in the society as reflected by the sampling distribution of the indicator. Therefore, in the case of an indicator with higher inequality, the mean value of membership degree will be lower, reflecting lower levels of achievement. This implies that we can make a judgement related to wellbeing by comparing the means of each indicator for the 2 years (Table 4). Furthermore, a comparison of the mean values presented in Table 2 with those in Table 4 provides information on the dispersion of the level of individual satisfaction in each indicator.<sup>27</sup>

Firstly, we note that the achievement levels for the indicators in the functioning Public Action are all in the interval of 0.6–0.7 and

<sup>27</sup> Take the indicator of education attainment as an example. The average of this indicator shows an increasing trend (Table 2), however, the average membership degree decreased (Table 4). The reason is that the inequality of education attainment increased in 2015 comparing with 2005.

have an upward trend, which means that the evaluation of Public Action is close to *high level* and is steadily improving. In these indicators, National Security has the highest level of achievement, and it already reached the critical point of *high achievement* (0.7) in 2015.

Following National Security, the achievement score of Basic Education reached 0.681 in 2015. China has always attached great importance to education, and made sustained efforts to accomplish universal compulsory education, improving education quality and realizing balanced education.<sup>28</sup> In 2000, nine-year compulsory education was popularized in high density areas, and the illiteracy rate of the young and the middle-aged decreased to 4.8%. In 2011, 100% of the population was covered by the nine-year compulsory education policy, and the corresponding illiteracy rate decreased to 1.08%. Moreover, free compulsory education was implemented across the country in 2008, and the government disburses more funds every year for educational development.<sup>29</sup>

The achievements related to Fighting Against Crime improved from 0.627 to 0.687 over the period 2005 to 2015. In recent years, through the development of internet and scientific technology and by strengthening the cooperation of crime investigation departments from different areas, several new mechanisms for fighting against crime have been created. The resulting achievement is an outcome of these initiatives.<sup>30</sup> The construction of law-based governance has also contributed to the fight against crime.

Other effects of the construction of law-based governance are the achievements in Fair Law Enforcement and Acting with Justice; both these indicators improved. In 1997, China set up a law-based governance strategy and a number of reforms and policies were carried out, which included attaching importance to both economic and social legislation, reforming the justice system, improving executive law enforcement, and reinforcing the supervision and restriction of administrative power (Yan & Li, 2018).<sup>31</sup> After 2013, the government of China established a system of inspection visits and intensified methods of anti-corruption, which further restrained administrative power. The improvement in the Public Action towards Fair Law Enforcement and Acting with Justice is consistent with the observations in this paper.

The statistically significant improvements in the achievements of Living Security for Elderly People (0.611 to 0.661), ranks second in the Public Action functioning. Major benefits were achieved through the establishment and perfection of basic pension schemes. In 1997, China built the pension insurance system for employees with the characteristics of a combination of social pooling and personal accounts. In 2009, the pilot of a New Rural Pension Insurance System began, followed by a pilot of an Urban Resident Pension Insurance System in 2011. In 2012, the pension insurance system covered the whole population, but through different pension insurance systems. In 2014, the government integrated the New Rural Pension Insurance Scheme and the Urban Resident Pension Insurance System by building a unified rural and urban resident pension insurance framework. In 2018, 942.93 million people were covered by this pension insurance, which accounts for 82.22% of the eligible people (adults aged over 16).<sup>32</sup>

The achievements in Medical Service have also increased due to the development of medical technology, medical management ability and medical security. The Healthcare Access and Quality (HAQ) index of China increased from 42.6 in 1990 to 53.3 in 2000, reaching 77.9 in 2016.<sup>33</sup>

One of the most important measures that the government of China has implemented since its early stages of development is the reduction of poverty. In the early 1980s, economic reform, especially the implementation of the Household-responsibility System, contributed to the reduction in incidence of poverty. The main reason for this reduction of poverty in the late 1980s may be attributed to the policy of large-scale development-oriented poverty alleviation. Since 1994, China has carried out three poverty alleviation programs in succession, each lasting 10 years. With improvements in poverty alleviation policies, the poverty headcount ratio decreased sharply. After 2013, the government paid further attention to poverty alleviation and offered various preferential policies towards the poor with the aim of complete poverty eradication by 2020. By 2018, the proportion of the population in rural areas deemed as poor was reduced to 1.7%. A clear reflection of these successes can be observed in the change and measure of the indicator Assist the Poor.

The achievements of Environment Protection are also at the high end of the *intermediate interval*. In recent years, the government of China has stressed the importance of prevention and control of environmental pollution, and measures implemented include environment protection legislation, industry pollution prevention and pollution abatement in the key pollution cities (Qu, 2013). Other economic tools include corrective taxes and prices, tradable pollution permits, and preferential financing policies for green enterprises. Since China is currently in the process of accelerating industrialization, despite these efforts, pollution is increasing at a faster rate than the prevention and control and the improvement of environment can deal with and is not expected to achieve the stated outcomes. In 2017, the government placed similar importance on improvement of the environment as on poverty alleviation and considered it a necessary step to building a moderately prosperous society. Our results clearly indicate that the government needs

<sup>28</sup> According to the Educational Statistical Yearbook of China, in 2004 expenditure on education was 724.26 billion yuan, accounting for 4.48% of GDP, while in 2017, the expenditure increased to 3888.84 billion yuan, accounting for 4.7% of GDP. The expenditure figures are from the Education Statistical Yearbook of China in related years, and they are nominal values.

<sup>29</sup> See the website: [http://old.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe\\_177/201209/141845.html](http://old.moe.gov.cn/publicfiles/business/htmlfiles/moe/moe_177/201209/141845.html).

<sup>30</sup> See the website: [https://www.iqiyi.com/v\\_19qrtfea7o.html](https://www.iqiyi.com/v_19qrtfea7o.html).

<sup>31</sup> In the early stages of reform and the opening-up of China, the main task for the government was to establish and improve the market-based system, and more legislation in this period focused on economic development, such as the Individual Income Tax Law first issued in 1980 and the Labor Law first issued in 1994. In 2004, the Government Work Report proposed to attach importance to legislation on social management and public services, and more legislation on social fields have been issued since then.

<sup>32</sup> See the website of the Ministry of Human Resources and Social Security: <http://www.mohrss.gov.cn/SYrlzyhshbzb/zwgk/szrs/tjgb/201906/W020190611539807339450.pdf>.

<sup>33</sup> China ranks 48 out of 195 countries in the world (Fullman et al., 2018).

to put more effort into pollution control.

Secondly, achievement in all Health indicators is over 0.6, which is at the higher end of the *intermediate* interval. However, the achievements in General Health and Physical Health experienced a subtle decrease, while the achievements in Psychological Health did not change significantly. The functioning, Health decreased overall.

The change in the health condition relates to the tendency of ageing, social and economic development, and improvements in medical technology. China is currently experiencing rapid ageing of the population. In 1999, the percentage of the population aged over 60 was more than 10%, which means that since then China has moved into being an ageing society. Wu and Dang (2014) estimate that in 2030 the population over age 60 will account for 25.3% of the total population in China. They acknowledge that the rapid ageing will counteract any positive effects in health brought on by socio-economic development, as older people would commonly have poor health compared to young adults. Smith, Strauss, and Zhao (2014) also find that older people are in worse health and that healthy and ageing do not appear together in contemporary China. According to our data, the average age of people over 16 was 44.4 years in 2005 and 52.7 years in 2015, which reflects the ageing tendency of China's population. As physical function degenerates with age, the increased percentage of aged people will worsen the health condition of the whole society. Moreover, improvements in medical technology will increase the possibility of curing otherwise fatal diseases and as a result a greater number of elderly people will live with poor health. This is reflected in our results. For the indicator General Health, the percentage of very healthy people decreased substantially, but the percentage of people with very bad health increased a little, and the trend is the same within the Physical Health indicator. The improvements in medical technology and medical services certainly help to cure common illnesses and have positive effects on health, but these effects mostly appear for those with intermediate health conditions, and the percentage of the population with intermediate conditions is also increasing. As a whole, achievements in general and physical health worsened in 2015.

The achievements of Psychological Health did not change significantly, contrasting with the mean value in Table 2, which shows a decrease in this indicator. The main reason for the difference is that the distribution of Psychological Health was more equal in 2015, that is, the proportion of people with very good and very bad psychological health decreased leading to an increase in people in the intermediate range. Intensifying competition due to the accelerated development of the economy and problems stemming from rapid social transformation in China may have led to anxiety and depression among its citizens. Ageing also has contributed to this change as people with poor physical health largely experience poor psychological health also. However, the development of a social support system has reduced the probability of very bad psychological health and that may have brought some stability in psychological health among the population.

Thirdly, the functioning of Learning Ability shows the worst performance among the six functionings in both 2005 and 2015. Achievements in Educational Attainment decreased, while the achievements of Reading, Surfing the Net and Getting Together with Friends increased; however, as a whole performance in Learning Ability functioning shows an increasing tendency.

Since the efforts by the government of China on improving basic education, especially the 9-year compulsory education plan, have been analyzed previously, we do not discuss higher education. In 1999, the government decided to expand the scale of higher education, aiming to improve innovative capability and quality in the whole nation. The gross enrolment rate in higher education more than doubled in 2010 (26.5%) from 12.5% in 2000, and had increased to 48.1% by 2018.<sup>34</sup> This means more young people now receive higher education, whereas because of the lower educational attainment of older people, the overall inequality in educational attainment increased. That is the reason for our observation of an increase in average educational attainment (Table 2), but a decrease in degree of membership in educational attainment (Table 4).

Both the achievements of Reading and Surfing the Net are under 0.4, which is *low*. This observation reflects the fact that China has made progress only recently on the elimination of illiteracy in older adults. With the improvement in education along with economic progress, the proportion of “never reading” decreased and the reading ability of Chinese people increased. However, the development of the internet and information technology, which weakened the function of traditional books, newspapers and magazines, lowered the frequency of reading, while the internet becomes a prominent way to study and acquire information. As a result, the proportion of never reading and reading frequently both decreased, as did the average frequency and inequality of achievement in reading, while reading achievements increased overall. The development of the internet naturally increased the achievements in Surfing the Net. However, the performance of this indicator is still not very high. One possible reason for this is that young people benefit more from the development of the internet and information technology, while the attainments of older people do not improve much in this aspect. The inequality between young and older people on Frequency of Surfing the Net mitigated the improvement on this indicator.

The achievements of Getting Together with Friends increased substantially from 0.159 in 2005 to 0.560 in 2015. This leisure activity is an important way to broaden one's social network and accumulate social capital. Economic development and the rise in income make it possible for people to have more time for such activities. Social capital also plays an important role in the acquisition of employment information and self-improvement (Liu & Zhang, 2007; Zhang, Li, Wang, & Chen, 2009).

Fourthly, the achievements of Protective Security functioning show the greatest improvement. In 2005, the achievements of this functioning and its component indicators were all at a *low* performance interval, while in 2015, all the achievements increased to more than 0.7 (a *high* performance interval).

Besides the development of a pension insurance system as discussed earlier, the system of Basic Medical Insurance also experienced great improvement. In 1998, the government decided to build a nationwide Employee Medical Insurance scheme with the

<sup>34</sup> See the website of the Ministry of Education: “National statistical bulletin on the development of education 2018”. [http://www.moe.gov.cn/jyb\\_sjzl/sjzl\\_ftztjgb/201907/t20190724\\_392041.html](http://www.moe.gov.cn/jyb_sjzl/sjzl_ftztjgb/201907/t20190724_392041.html).

characteristics of combining social pooling and personal accounts. In 2003, the pilot of a New Rural Cooperative Medical System began, followed by the pilot of the Urban Resident Medical Insurance in 2007. In 2010, the whole country was covered by a medical insurance system, although there were different kinds. In order to promote equity, the government decided to integrate the New Rural Cooperative Medical Insurance and the Urban Resident Medical Insurance schemes to build a basic medical insurance system in 2016. The National Healthcare Security Administration reported that 1345 million people joined the basic medical insurance in 2018, which covers more than 95% of the whole population.<sup>35</sup>

Fifthly, the achievements of Economic Resources and Life Satisfaction are in the *intermediate* level. Obvious improvements can be seen among all the indicators, and the achievements are approaching a high level of performance.

There are two indicators of economic resources that mainly reflect relative economic status. However, the increasing average judgement of the family's economic status by individuals suggests that most people benefited absolutely from the development of China's economy. Moreover, according to our data, the proportion of people with decreasing economic status compared with 3 years ago declined, which also shows better performance in economic resources. An insignificant change in the mean value of this indicator results from the decreasing proportion of people with increasing economic status. Nevertheless, this evidence reflects a fairer distribution of economic resources (comparing the estimates in Tables 2 and 4).

China experienced increasing inequality for a long period after the reform and opening-up of the country. Except for the Kuznets phenomenon arising from China's industrialization, the development idea of partial prosperity also contributed to increasing inequality. In the early period of reform and opening-up, China allowed selected regions to flourish in advance and after 2000 it attempted to solve the problem of expanding inequality. After 2002, the government changed its notion of development, and proposed a scientific development concept and harmonious society, which attached greater importance to balanced and sustainable development. Redistributive policies such as tax and social security were implemented to reduce inequality. Moreover, popularization of compulsory education and scale expansion of higher education also played important roles in reducing inequality. Because of these efforts, the Gini coefficient of income decreased gradually after 2008. Since 2013, the government reiterated the idea of common prosperity to replace partial prosperity and proposed the idea of shared development. More policies including equalization of public services have been implemented to reduce inequality. As a result, the Gini coefficient fell to 0.467 in 2017. This is reflected in our indicator Whether Economic Status Higher than 3 Years Ago.

The achievements of Life Satisfaction approached a *high* level of performance in 2015. The improvement of life satisfaction relates directly to the increase in economic resources. Liu et al. (2012) use five rounds of CGSS survey data to check the tendency for Chinese people's happiness between 2003 and 2010. They note that happiness has a conspicuous upward tendency, and variables of economic resources such as an individual's income, economic status and changes to economic status have significant positive influence on happiness. Besides economic resources, the welfare policies that the government implemented during these years also play an important role in people's happiness.

Sixthly, the achievements of Shelter decreased. The main reason for the decreasing achievements of Property Right of Current Dwelling is higher labor mobility, which leads to a rise in the proportion of people renting houses. However, the decreasing achievements of Number of Houses is a result of higher income inequality. After the house commercializing reform in 1998, China announced a plan to develop the real estate industry as a pillar industry in 2003. Since then, the supply of houses increased, which rectified the problem of shortage of houses. At the same time, the government built a house security system to solve the housing problem for people in the low- and middle-income groups. According to our data, house ownership rates increased slightly from 91.25% in 2005 to 92.24% in 2015. Although this rate and the average house number per household increased, as housing prices rose continuously, rich people invested in real estate, and the inequality in the ownership of housing worsened.

#### 4.2.3. Overall evaluation

In Table 4 we find that four of the six functionings show improvements, while achievements in two functionings, Health and Shelter decreased. In order to check overall performance, we compute four composite indices (Table 5).

Irrespective of aggregator, we notice a significant improvement between 2005 and 2015. Following the same procedure of aggregating primary indicators to functionings, we aggregate six functionings obtained from the previous step to employ factor analysis and aggregation and choose the final aggregator of the composite wellbeing. Table 5 presents the results. Ultimately the aggregator of the weighted average was selected. The estimates show that the overall performance was 0.3614 in 2005, in 2015 the achievements rose by over 50%, entering the *intermediate* level.

## 5. Changes in rural and urban disparity in wellbeing

In China, like in other developing economies, the problem of rural and urban disparity has a long history, which can be traced back to the urban preferential development policies implemented before 1978 and the development idea of partial prosperity after reform and openness. The productivity differential between manufacturing and agriculture also naturally contributed to this disparity. After 2002 the government of China developed policies in favor of rural areas. Since 2013, the government has devoted more resources to rural areas and proposed the strategy of rural vitalization, aiming to reduce the gap between rural and urban areas.<sup>36</sup> In

<sup>35</sup> See the website of the National Healthcare Security Administration: [http://www.nhsa.gov.cn/art/2019/2/28/art\\_7\\_942.html](http://www.nhsa.gov.cn/art/2019/2/28/art_7_942.html).

<sup>36</sup> Speech delivered by President Xi Jin Ping in the central rural work conference held 28–29 December 2017. For details, see: [http://www.qstheory.cn/dukan/qs/2019-06/01/c\\_1124561415.htm](http://www.qstheory.cn/dukan/qs/2019-06/01/c_1124561415.htm).

**Table 5**  
Composite measure of wellbeing (various aggregators).

Aggregator	2005		2015		Mean Difference	Correlation Coefficient
	Mean	SD	Mean	SD		
Standard Intersection	0.0644	0.1409	0.2089	0.1781	0.1444***	0.5716
Weak Intersection	0.0155	0.0479	0.0523	0.0762	0.0368***	0.5289
Arithmetic Average	0.4925	0.1303	0.6148	0.1234	0.1223***	0.5903
Weighted Average	<b>0.3614</b>	<b>0.1785</b>	<b>0.5511</b>	<b>0.1319</b>	<b>0.1897***</b>	<b>0.7643</b>

Note: SD is standard deviation. t-test of the difference of mean is conducted, and \*\*\* stands for significant results at the significance level of 1%. The aggregator selected for final analysis are highlighted in bold.

this section, we check the achievement of these policies using our framework of analysis discussed above.

It can be seen from Table 6 that both rural and urban areas have experienced considerable development in most attributes, the exceptions being Health (especially in rural areas), Educational attainment, and Shelter. However, the development tendency in rural areas is not completely consistent with that of urban areas. In the functioning of Health, the achievements in rural areas decreased, while those in urban area increased. The main reason is the different degrees in the trend of ageing in these two areas. With the development of urbanization, more capable and younger people move to the cities, and older people with poor health are left in the rural areas. According to our data, in 2005, the average ages in rural and urban areas are 45 and 44, respectively, while in 2015, these numbers grew to 55 and 51, respectively. The more visible ageing tendencies in rural areas result in a decrease in the health condition. However, the improvement in health achievements in urban areas is the outcome of disparities in the development of medical technologies and resources between rural and urban China. Concentration of superior medical resources in urban areas, especially in larger cities, plays an important role in the relative improvements of health in urban areas.

In the functioning of Learning Ability, the achievements of Educational Attainment decreased in both rural and urban areas, with this decrease being more prominent in rural areas. As previously discussed, such a decrease is mainly due to inequality in educational attainment. There were, however, opposite tendencies in “reading” achievement between rural and urban areas. The reason for this seems to be that Surfing the Net showed stronger substitutability of reading for urban residents, as it is more difficult for the old aged in rural areas to surf the net than to read, especially when accessing the internet is more costly in rural areas. The achievements in Shelter decreased for both the rural and urban areas. However, the achievements of Number of House Property Owned by the Family did not show a significant change in urban areas. The main reason for this is that urban residents benefit more from the housing commercialization policy and housing security system, while rural areas lack such security, and authorization to build houses in rural areas is even more strict and difficult. However, housing in rural areas is not a very big problem because under the residential land system in rural areas, it is relatively easy to get a house site. The problem lies in the difficulties rural migrants have with buying a house in the city.

It is worth mentioning that the disparity in Economic Resources between rural and urban areas is different from that of income disparity. There is a huge income gap between rural and urban areas in China, but this gap has narrowed in recent years (Luo, 2017). Economic Resources in our study includes two indicators: Change of Economic Status Compared with 3 years Ago, and the family's relative economic status compared with local families. Both indicators are relative in nature. In 2005, Economic Resources was substantially higher in rural areas, which meant that a higher proportion of rural residents experienced an increase in economic resources and were more satisfied with their family's economic status than were urban residents. In 2015, rural residents experienced an increase in economic resources, but this was lower than for their urban counterparts. This observation implies that Economic Resources for both rural and urban residents improved but was more in favor of the urban residents.

The results related to subjective judgement such as Public Action, are counter-intuitive, as they present better performance in rural areas than in urban areas, especially in 2005. It is possible that there is a bias in the response between the residents in rural and urban areas when making subjective judgements because, as Han (2012) mentions, rural and urban residents may have different self-identification. Rural residents are more likely to identify themselves with the fellow rural *hukou* holders and do not consider urban citizens as a relevant reference point, even though they are aware of the tremendous disadvantages that they endure compared with their urban counterparts. The difference in achievements or disparities to some extent eliminates such bias and shows development of the related aspects. We note that the achievements in Public Action and Economic Resources and Life Satisfaction have increased in both rural and urban areas, showing better wellbeing in these aspects in 2015 than in 2005.

In summary, the overall achievements of rural residents increased by 85.93% (from 0.270 to 0.502), while that of urban residents increased by 29.2% (from 0.452 to 0.584), which suggests a marked decrease in disparity between rural and urban areas.<sup>37</sup> These decreasing disparities are mainly due to the improvements in Learning Ability and Protective Security; however, some indicators still show increased disparity. Although the achievements in educational attainment decreased in both rural and urban areas, the disparity shown in this indicator is high. This result indicates that measures to equalize educational resources between rural and urban areas

<sup>37</sup> We use the ratio of rural and urban achievement to measure disparity. In this case, the change in disparity is the difference in the ratio. If the ratio moves towards to 1 in 2015, the disparity will decrease. In other words, if the ratio is larger (smaller) than 1 in 2005, a negative (positive) difference in ratio suggests a decreasing disparity, and vice versa. We also use such a difference in the ratio measure in the following section.

**Table 6**  
Wellbeing in rural and urban areas: a comparison.

	2005			2015			Difference 2005–2015
	Rural	Urban	Rural/Urban	Rural	Urban	Rural/Urban	Rural/Urban
Public Action	0.647	0.603	1.073	0.714	0.629	1.135	0.062
Medical Service	0.648	0.592	1.095	0.723	0.605	1.195	0.100
Living Security for the Elderly people	0.624	0.597	1.045	0.714	0.626	1.141	0.095
Basic Education	0.667	0.623	1.071	0.724	0.651	1.112	0.042
National Security	0.673	0.666	1.011	0.721	0.686	1.051	0.041
Fighting against Crime	0.653	0.601	1.087	0.728	0.659	1.105	0.018
Fair Law Enforcement	0.638	0.578	1.104	0.711	0.616	1.154	0.050
Act with Justice	0.623	0.575	1.083	0.690	0.613	1.126	0.042
Environment Protection	0.658	0.623	1.056	0.724	0.597	1.213	0.157
Assist the Poor	0.635	0.573	1.108	0.689	0.612	1.126	0.018
Health	0.629	0.650	0.968	0.572	0.670	0.854	−0.114
General Health	0.633	0.648	0.977	0.570	0.651	0.876	−0.101
Physical Health	0.619	0.654	0.946	0.546	0.679	0.804	−0.142
Psychological Health	0.634	0.647	0.980	0.599	0.680	0.881	−0.099
Learning Ability	0.076	0.320	0.238	0.215	0.482	0.446	0.209
Educational Attainment	0.242	0.572	0.423	0.209	0.517	0.404	−0.019
Frequency of Reading	0.118	0.525	0.225	0.176	0.452	0.389	0.165
Frequency of Surfing the Net	0.015	0.170	0.088	0.125	0.420	0.298	0.209
Frequency of Getting Together with Friends	0.050	0.266	0.188	0.487	0.609	0.800	0.612
Protective Security	0.031	0.453	0.068	0.743	0.762	0.975	0.907
Whether Have Medical Insurance	0.032	0.462	0.069	0.925	0.903	1.024	0.955
Whether Have Pension Insurance	0.030	0.444	0.068	0.693	0.724	0.957	0.890
Economic Resources and Life Satisfaction	0.486	0.442	1.100	0.506	0.520	0.973	−0.126
Satisfaction of Life	0.673	0.696	0.967	0.685	0.704	0.973	0.006
Whether Economic Status Higher Than 3 Years Ago	0.674	0.554	1.217	0.698	0.676	1.033	−0.184
Economic Status of Family	0.595	0.518	1.149	0.639	0.700	0.913	−0.236
Shelter	0.865	0.707	1.223	0.824	0.702	1.174	−0.050
Property Right of The Current Dwelling	0.821	0.636	1.291	0.798	0.625	1.277	−0.014
Number of House Property Owned by The Family	0.909	0.778	1.168	0.850	0.780	1.090	−0.079
Overall Achievements	0.27	0.452	0.597	0.502	0.584	0.860	0.262

should be further strengthened. The worsening disparity in health is mainly due to the decreasing health achievements of rural residents, which results from the more visible ageing tendency and inadequate medical resources in rural areas. Paying close attention to the health of rural elderly people and improving medical resources in rural areas will help to reduce the disparity in this aspect. Furthermore, the government of China has made substantial effort to balance the development of rural and urban areas, and the achievements in public action for both rural and urban residents increased; however, the increasing disparity in public action suggests that rural residents gain more, indicating positive effects of the balanced development policies.<sup>38</sup>

## 6. Regional variations in wellbeing

Due to the vastness of the country, regional disparity resulting from differences in geographic location and resource endowment is natural in China. However, regional disparities also exist in relation to development policies. During the main phase of development in China, only selected regions were supported in their economic progress through some preferential policies. China's opening up to the world was implemented gradually. Cities along the coast opened up first, followed by the cities along the Yangtze River, inland cities and border cities. Such gradual implementation can develop economic gaps between regions. For example, eastern coastal areas quickly became affluent, while the prosperity of the central and western regions was stagnant for a long period. The development of the northeast was very special. This area has a heavy industry base for China where many state-owned enterprises located before the reform and opening-up of the country, thus this area has a high rate of urbanization and advancement in various respects. However, industrial restructuring since 1978 and state-owned enterprise reform in the 1990s made the economy of the northeast depressed, resulting in a gradual decline of prosperity in this region. In order to narrow the gap among regions and achieve coordinated development, since 2000 China has continued to implement strategies to encourage the rise of the central area, stimulate large-scale development in the western regions, and intensify the revitalization of the old industrial bases in the northeast. Preferential development policies have been applied to these areas. In this section, we examine the effectiveness of these policies and development strategies by comparing levels of wellbeing.

In Table 7 we note that four of the six functionings in all regions experienced improvement, with the exceptions being Health and Shelter; however, discrepancies in improvements exist. Achievements in Public Action increased across all regions. The achievement

<sup>38</sup> The increasing disparity in public action does not weaken our results, as the disparity shown from overall achievement encompasses such an increase and still suggests a decreasing trend, which enhances the result of decreasing wellbeing disparity between rural and urban residents.

**Table 7**  
Measures of wellbeing in different regions in China: 2005 and 2015.

	2005				2015			
	Eastern region	Central region	Western region	Northeast region	Eastern region	Central region	Western region	Northeast region
Public Action	0.6249	0.6252	0.6410	0.5659	0.6334	0.6826	0.7064	0.6330
Medical Service	0.6370	0.6256	0.6092	0.5635	0.6087	0.6829	0.7172	0.5991
Living Security for the Elderly People	0.6326	0.6159	0.6041	0.5212	0.6263	0.6767	0.7216	0.6198
Basic Education	0.6576	0.6454	0.6444	0.5930	0.6511	0.7030	0.7239	0.6432
National Security	0.6607	0.6768	0.6889	0.6107	0.6853	0.7154	0.7011	0.7102
Fighting against Crime	0.6054	0.6183	0.6735	0.5852	0.6656	0.7055	0.7015	0.6830
Fair Law Enforcement	0.5957	0.6156	0.6376	0.5288	0.6276	0.6680	0.6966	0.6228
Act with Justice	0.5942	0.6027	0.6213	0.5270	0.6244	0.6576	0.6863	0.5982
Environment Protection	0.6355	0.6217	0.6790	0.5939	0.5969	0.6747	0.7200	0.6110
Assist the Poor	0.6057	0.6046	0.6107	0.5699	0.6145	0.6594	0.6895	0.6094
Health	0.6827	0.6363	0.6172	0.5408	0.6741	0.6210	0.5666	0.6430
General Health	0.7129	0.6163	0.6114	0.5179	0.6465	0.6229	0.5737	0.6137
Physical Health	0.6581	0.6460	0.6227	0.5583	0.6786	0.6036	0.5496	0.6559
Psychological Health	0.6770	0.6468	0.6175	0.5461	0.6971	0.6366	0.5765	0.6595
Learning Ability	0.2355	0.1700	0.1919	0.1698	0.4716	0.3177	0.2829	0.3807
Educational Attainment	0.4454	0.3856	0.3825	0.4105	0.5015	0.3274	0.2802	0.4213
Frequency of Reading	0.3860	0.2710	0.3188	0.2456	0.4452	0.2849	0.2488	0.3266
Frequency of Surfing the Net	0.1249	0.0740	0.0807	0.0640	0.4151	0.2344	0.1846	0.3217
Frequency of Getting Together with Friends	0.1835	0.1268	0.1646	0.1427	0.5889	0.5349	0.5538	0.5378
Protective Security	0.2674	0.2260	0.2371	0.2192	0.7985	0.7691	0.7405	0.6374
Whether Have Medical Insurance	0.2764	0.2289	0.2438	0.2133	0.9100	0.9337	0.9337	0.8428
Whether Have Pension Insurance	0.2587	0.2232	0.2306	0.2249	0.7683	0.7246	0.6883	0.5818
Economic Resources and Life Satisfaction	0.4958	0.4615	0.4515	0.3758	0.5242	0.5233	0.496	0.5044
Satisfaction of Life	0.7174	0.6673	0.6728	0.6449	0.7189	0.6949	0.6486	0.7238
Whether Economic Status Higher Than 3 Years Ago	0.6506	0.6255	0.5965	0.4753	0.6688	0.7123	0.7004	0.6523
Economic Status of Family	0.6152	0.5532	0.5368	0.3829	0.7091	0.6860	0.6352	0.6417
Shelter	0.7562	0.8220	0.7832	0.7887	0.7188	0.7865	0.7749	0.7346
Property Right of The Current Dwelling	0.6933	0.7717	0.7233	0.7398	0.6463	0.7334	0.7295	0.6909
Number of House Property Owned by The Family	0.8192	0.8723	0.8432	0.8377	0.7913	0.8396	0.8203	0.7784
Overall Achievements	0.3877	0.3483	0.3549	0.3171	0.5875	0.5406	0.515	0.5364

of improvement in Public Action is the lowest in the east mainly because of the decline in satisfaction with Medical Services and Environment Protection, which has led to an overall insignificant change in this functioning in the eastern area. In this region, congestion in hospitals is of great concern; the medical resources are concentrated in large cities, especially in the eastern cities, resulting in an over-crowding of patients from all over the country that creates inconvenience for the local residents. Another issue is the problem of industrial pollution, which mainly occurs in the industrialized eastern areas.

The achievements in Health decreased in the central and western regions, while it increased in the northeast and did not change significantly in the eastern region. The central and western regions are relatively underdeveloped, and many younger people from these regions migrate to the eastern coast in search of economic opportunities, which in turn leads to an increase in the proportion of the population in these places that is ageing. In contrast, younger migrants to some extent counteract the ageing tendency in the eastern region, and superior medical resources have increased wellbeing in terms of health in these areas. In the northeast the adults are much younger on average, and they also enjoy the excellent medical support available in Beijing due to its locational advantage.<sup>39</sup>

The decreasing achievements in Educational Attainment for the central and western regions also relate to the external migration of educated younger adults, as does the decline of Reading achievements in the western region. Achievement of Shelter decreased across all regions. Labor mobility has increased the probability of not living in one's own house, and the inequality of House Numbers also worsened the performance of Shelter.

Overall achievements in all regions improved but to a different extent. The average achievements in the northeast increased most; 69.16% (from 0.3171 to 0.5364), followed by the central region (by 55.21%, from 0.3877 to 0.5875), eastern areas (by 51.53%, from 0.3483 to 0.5406), and in the west (by 45.11%, from 0.355 to 0.515). As a result, the gap between eastern *vis a vis* northeastern, and eastern *vis a vis* central region narrowed, while the gap between the eastern and western regions grew. Regional disparities in

<sup>39</sup> The average age in the eastern, central, western and northeastern regions was 44.2, 44.6, 43.9, 46.2, respectively in 2005, and 52.7, 53.3, 53.2, 50.7, respectively in 2015.

achievements in Economic Resources improved, which is consistent with other research on regional income disparities (for example, Wu & Li, 2018). Larger gaps are the result of worsening disparities in Health, Learning Ability, Protective Security and Shelter, although the causes differ across regions. Specifically, the disparities in achievements between the eastern and northeastern regions decreased in all functionings except for Protective Security, especially in Pension Insurance. However, disparities between eastern *vis a vis* central, and eastern *vis a vis* western regions decreased only for functioning in Protective Securities, while it increased in the four other functionings (Public Action, Learning Ability, Health and Shelter), although with a different amount of change, which also leads to a different variation in overall disparity. It is worth mentioning that the increasing disparity in Public Action between eastern *vis a vis* central, and eastern *vis a vis* western regions suggests residents of the central and western areas felt more gain from the development policies than those in the eastern regions, as the achievements in Public Action are larger for central and western residents compared to eastern residents in 2005. Similarly, decreasing disparity in Public Action between east and north suggests that northeastern residents benefit more from the development policies than those who reside in the east. The result for Public Action in general shows the positive effects from balanced development policies in these years. However, the other results related to changing patterns in disparity also suggest that the equalization of income is not the only issue; the government needs to attend more to public services such as medical services, education, protective security and housing to reduce China's regional disparities.

## 7. Conclusion

To investigate the effects from development policies in China, we have measured the wellbeing of individuals for the years 2005 and 2015. The basic methodology used to determine the dimensions (functionings) and indicators of wellbeing follows the capability approach propounded by Sen (1999). We use Chinese General Social Survey (CGSS) data collected in 2005 and 2015 because of its comprehensive coverage and the availability of detailed information related to an individual's wellbeing. Existing literature attempts to analyze the effects of the government of China's development policies, aiming particularly at specific aspects such as housing or health. For example, Gu, Zhou, and Yan (2015) estimate the effect of the housing provident fund system on housing welfare, while Pan, Lei, and Liu (2013) assess the effect of urban residents' basic medical insurance on their health. However, it is not possible to delineate the effects of social development policies within one individual boundary because the effects are multi-faceted, and many policies are implemented simultaneously. Moreover, the changes in social structures such as the ageing population and large scale rural-urban migration also play important roles in the process of development. As many different policies interact with each other, it is difficult to distinguish the effects from the entanglements. Therefore, we evaluate the policies as a whole by evaluating their multidimensional effects.

This study evaluates six main functionings on individual achievements resulting from the development policies implemented over more than a decade. Inequality in achievement at the individual level is also introduced through a membership function proposed by Cheli and Lemmi (1995), which makes the evaluation novel. Moreover, we also demonstrate the effects of government policies on the disparities between rural and urban areas and among four regions. The main findings are listed below:

- (a) The overall achievements in wellbeing rose by more than 50%; from 0.3614 in 2005 to 0.5515 in 2015, which advances the wellbeing status to the range of the *intermediate* level.
- (b) Four of the six functionings including Public Action, Learning Ability, Protective Security, Life Satisfaction and Economic Resources improved to some extent, while two functionings, Health and Shelter worsened.
- (c) Despite a better living standard and the advancement in medical techniques and medical services, extended life plays a distinctly important role on the overall deterioration of health. At the same time, intensifying competition due to the accelerated development of the economy and the problems caused by fast social transformation could possibly lead to anxiety and depression, which may be one reason for the deterioration in physical health. Special social policies are therefore warranted for the improvement of these aspects.
- (d) The increasing inequality in house ownership is the main reason for the declining achievements in the functioning Shelter. As house property is the main component of a households' wealth, inequality in housing may be the major reason for wealth inequality and social instability. The poor achievement in Property Right of the Current Dwelling may be the result of large-scale rural migration. A concerted effort towards providing housing security for this group of people is necessary.
- (e) Improvement in Economic Resources and Life Satisfaction is a result of inclusive economic growth during this period.
- (f) Achievements in Protective Security improved the most among all the six functionings. This has also contributed to reducing disparities between rural and urban areas. However, differences in the extent of increasing coverage in Protective Security, especially pension insurance, is still a reason for the worsening disparity between the eastern and northeastern regions.
- (g) Although improvement in education has enhanced average Educational Attainment, inequality in Educational Attainment mitigated such achievements, and this was more conspicuous in underdeveloped rural, central and western regions.
- (h) There are improvements in disparities between regions and between rural and urban areas, but equalization of public services, such as medical services, education, protective security and housing needs improving.

In conclusion, the wellbeing of people in China was enhanced overall through achievements in Public Action. It is likely that as China moves forward from its transition period, inequality of Educational Attainment will improve, however, without sustained attention, decline in the health condition resulting from a rapidly ageing population may not change.

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