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The Impact of Taxes and Transfers on Income Inequality, Poverty, and the Urban-Rural and Regional Income Gaps in China

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Keyword: Poverty and Inequality in China, Urban-Rural Gap, Regional Disparity, Taxes, Transfers, Incidence Analysis

JEL Cassification: D31, H22, I38

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Nora Lustig and Yang Wang[2]

July 15, 2020

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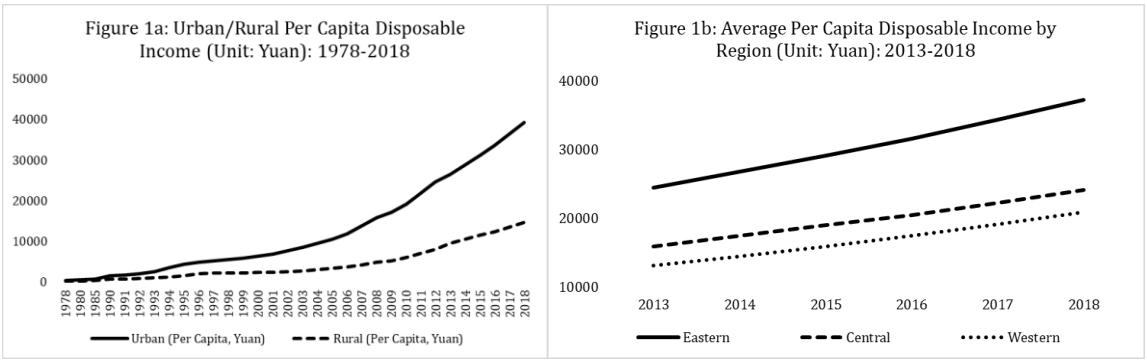
1. Introduction

After far-reaching economic reforms were introduced since 1978, China experienced fast economic growth and social development.[3] The rapid growth significantly improved the overall well-being of the Chinese population and lifted an enormous number of people out of poverty. Using the international poverty line of $1.9 PPP/day, the headcount ratio declined from 88.3% in 1978 to 0.73% in 2015 (PovcalNet, World Bank). At the same time, income inequality increased dramatically over the past three decades. The Gini coefficient rose from 0.33 in 1988 (Ravallion and Chen, 2007) to a range between 0.52 and 0.63 in 2010-2012 (Xie and Zhou, 2014). In addition to high overall inequality, there is a significant divide between urban and rural areas, as well as between regions.[4] As shown in Figure 1a, the absolute difference between urban and rural per capita disposable income has grown between 1978 and 2018. In addition to the rural-urban gap, there has been a significant and persistent disparity between the Eastern, Central and Western regions.[5] Figure 1b shows average per capita disposable income by region between 2013 and 2018.



Source: generated by authors based on data collected from China Statistical Yearbook 2019.

In this paper, we analyze the extent to which the fiscal system reduces inequality and poverty overall at the country-wide level. We also assess how much the fiscal system closes the income gap between rural and urban areas and between regions, and how much it reduces inequality and poverty within geographic locations. We do this by applying standard fiscal incidence

[3] The average annual GDP growth rate has been estimated at 9.5%, between 1978 and 2017.

[4] Rural and urban residents are kept separated by the household registration system (Hukou, see Song (2014) for more details regarding the Hukou system in China), and the main economic activities of rural and urban households are different: most urban residents participate in the production and service industries as employees, while most of the rural households rely on agricultural production. Due to migration, the proportion of rural residents has declined from 89.4% in 1949 to 41.5% in 2017 (Authors' own calculation using information from China Statistical Yearbook 2018).

[5] Provinces are classified into three regions based on level of development and geographical location. The Eastern region is the most well-developed, followed by the Central and the Western. The Eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, and Hainan; the Central region includes Shanxi, Inner Mongolia, Heilongjiang, Jilin, Anhui, Jiangxi, Henan, Hubei, and Hunan; the Western region includes Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

analysis to the China Family Panel Studies 2014 survey data. On the tax system, our analysis includes personal income tax (PIT), contributions to social security, value-added tax, and consumption tax. On the spending side, our analysis covers the social security benefits, the urban and rural minimum living standard scheme, the rural five-guarantee system, the agricultural subsidy, as well as the health and education systems.

The fiscal incidence method we apply here is described in detail in Lustig (2018, chapters 1 and 6). Known in the literature as the "accounting approach" because it ignores behavioral responses and general equilibrium effects, fiscal incidence analysis is designed to respond to the question of who benefits from government spending (social spending, in particular) and who bears the burden of taxes. With a long tradition in applied public finance, fiscal incidence analysis is considered an adequate instrument to evaluate the first-round impact of fiscal policy on inequality and poverty (Martinez-Vazquez, 2008).

In addition to measuring the impact of taxes and social spending on overall inequality and poverty, we also quantify the effect of fiscal policy on the urban-rural gap and regional inequality. In order to do this, we decompose the Gini coefficient into the contributions of "within group" inequality and "between group" inequality with the formula originally proposed by Mookherjee and Shorrocks (1982). This decomposition allows us to measure the contribution of "between-group" component to overall inequality. By comparing the "between-group" contribution to prefiscal Gini and postfiscal Gini, we can see if the fiscal system has contributed to lower the rural-urban gap and regional disparity.

Regarding inequality, the results show that the fiscal system has been effective in reducing prefiscal inequality in China, in both the rural and urban areas, as well as in each economic region, which was mainly driven by direct taxes (including personal income tax and contributions to social security), direct transfers (including direct cash transfers and contributory pensions) and in-kind (health and education) transfers. For the marginal contribution of each fiscal intervention, on the tax side, personal income tax, contributions to social security and value-added tax are equalizing for all groups, while the consumption tax is quite unequalizing for all groups. On the spending side, direct cash transfers, contributory pensions, indirect subsidies, and in-kind transfers are always equalizing for all groups. In addition, the fiscal system reduced inequality between regions primarily because the Eastern region—the richest—paid a higher proportion of taxes (25% of market income) and received the least benefits (16%), while the poorest Western region paid the smallest proportion of taxes (21%) and received the largest share of prefiscal income in transfers (direct and in-kind) and subsidies (23%).

In contrast, our results show that the fiscal system widened the urban-rural income gap. This undesirable outcome is mainly driven by the fact that the urban residents receive significantly more income from contributory pensions than rural residents. On average, urban residents receive 11% of market income in pensions, while rural residents receive only 3%. This

indicates that although the 'basic pension insurance for rural residents' has been initiated since 2009, pensions received by rural residents are still significantly lower than those received by urban residents in 2013.[6] Regarding poverty and using the headcount ratio as the indicator, we find that the fiscal system reduced poverty in the urban areas. However, for one of the poverty lines, the fiscal system increased poverty in the poorer rural areas and in all three regions, which means that the fiscal system has driven some people who were not poor into poverty in larger numbers than helping the poor escape their condition (and become nonpoor). When we use the squared poverty gap index, however, the fiscal system is poverty-reducing throughout. This is reassuring in the sense that it is telling us that the fiscal system reduces poverty for the poorest of the poor (even though it makes some of the nonpoor poor).

This paper makes three main contributions. First, while there are studies that evaluate the distributional impact of a specific fiscal instrument or part of the fiscal system, our analysis is more comprehensive. In particular, our study includes the impact of the "monetized" benefits of transfers in kind such as public spending on education and health. Second, this is the first study that assesses to what extent the tax and social spending systems reduce the urban-rural and regional gaps. Lastly, by applying a standard methodological framework developed by the Commitment to Equity Institute[7] (Lustig, 2018), our results can be compared to those of other countries with similar levels of income per capita as China.

With regards to the first contribution, most of the literature on this topic (both in English and in Chinese) has focused on analyzing the impact of either one specific policy or part of the system[8]. There are three papers that did a relatively comprehensive assessment of the Chinese fiscal system on income distribution: Wang and Lou (2017) used a computable general equilibrium (CGE) model and the 2012 social accounting matrix to assess the impact of tax,

[6] According to the 2013 Statistical Bulletin of Development of Human Resources and Social Security, coverage and total expenditure of 'pension insurance for urban and rural residents' are 497.5 million and 134.8 billion RMB, while coverage and total expenditure of 'pension insurance for employees' are 322.2 million and 1847 billion RMB.

[7] Founded in 2015 at Tulane University, the Commitment to Equity Institute (CEQI) works to reduce inequality and poverty through comprehensive and rigorous tax and benefit incidence analysis, and active engagement with the policy community. For more information, please visit http://commitmentoequity.org/.

[8] Among the English literature, Wagstaff et al. (2009) and Lei and Lin (2009) studied the impact of the New Cooperative Medical Scheme on rural residents' health service utilization and out-of-pocket payments. Alm and Liu (2013, 2014) analyzed the impact of rural Tax-for-Fee reform on rural residents' net income/welfare and village inequality. Gao et al. (2009) analyzed the effectiveness of the urban Minimum Living Standard Scheme on reducing urban poverty rate. Golan et al. (2017) studied the effectiveness of the rural Minimum Living Standard Scheme in alleviating poverty and simulated how alternative program designs can improve the poverty reduction outcome. Among the Chinese literature, Yue et al. (2011) and Xu et al. (2013) found that the PIT has been progressive, but its overall redistributive impact was small due to low tax rates; Mi et al. (2012) and Yue et al. (2014) found that the tax system has been regressive; Wang and Kang (2009) found an equalizing effect of contributory pensions; Wang et al. (2016) found the social security system had an equalizing impact, while Cai and Yue (2017) found an unequalizing impact of the social security benefits; Tan and Zhong (2010) found the New Rural Cooperative Medical Scheme had reduced inequality; Li and Yang (2009) found the Minimum Living Standard Scheme had reduced poverty incidence of the urban areas, and Chen et al. (2011) found the Minimum Living Standard Scheme had reduced inequality of urban areas as well as inequality of rural areas.

social security system and government transfers, and found the fiscal system had an unequalizing impact on the overall income distribution.[9] While the personal income tax, contributions to social security and government transfers were equalizing, the unequalizing impact of the VAT and social security benefits dominated. Li, Zhu and Zhan (2017) carried out a standard fiscal incidence analysis to assess the redistributive effect of the personal income tax, social security system, direct transfer and subsidy using the 2013 China Household Income Project Survey (CHIPS). They found that these fiscal interventions reduced poverty and inequality, with the impact being more pronounced in urban areas. Xie (2018) implemented a fiscal incidence analysis of the personal income tax, contributions to social security and government transfers to assess their impact on the distribution of income using the 2013 China Health and Retirement Longitudinal Study (CHARLS). The author found that the combination of these fiscal instruments was equalizing, with government transfers contributing more than 90% of the redistributive effect while the personal income tax and contributions to social security contributing less than 10%.

None of the above exercises include the impact of spending on education and health. Furthermore, they all focus on the distribution of income at the country-wide level. Given the large income gaps between rural and urban areas and between the richer and poorer region, the question of how much these gaps are narrowed through fiscal redistribution is also of great importance. Although China's urban-rural gap and regional disparity have been studied, the current literature focuses predominantly on documenting levels and trends of these gaps and identifying the key reasons behind them during different time periods. To the best of our knowledge, however, the impact of taxes and government spending on the urban-rural gap or regional disparity has not been analyzed before.

The rest of the paper is organized as follows. Section 2 presents the methodology. The data is described in Section 3. Section 4 discusses the main findings. Section 5 concludes. A detailed description of the fiscal system is in Appendix A. Appendix B describes how certain variables are imputed in detail. Appendix C shows the consumption tax rates by item.

2. Methodology

2.1 Fiscal Incidence Analysis: Construction of Income Concepts

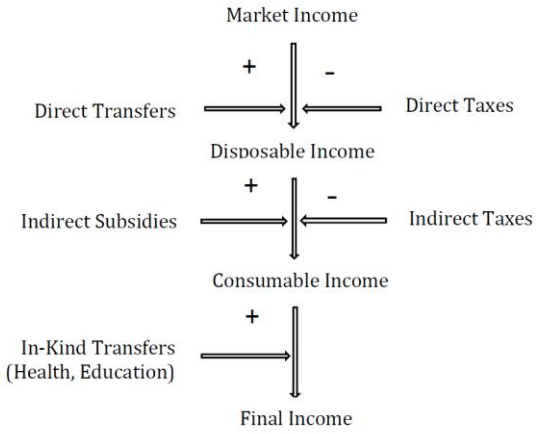
In order to estimate the distributional impact of the fiscal system in China, we apply a standard fiscal incidence analysis to the China Family Panel Studies 2014 survey data using the framework developed by the Commitment to Equity Institute (Lustig, 2018). The fiscal incidence analysis starts from a prefiscal income and constructs postfiscal income concepts by allocating taxes and transfers under analysis to each individual. Once the prefiscal and

[9] This is opposite to our finding and the other studies cited here, which might be because the CGE model employed by Wang and Luo (2017) considers not only the household sector but also the firms and, thus, corporate taxes.

postfiscal incomes are constructed, various indicators can be generated to evaluate the distributive impact, progressivity, and effectiveness of the fiscal intervention (Lustig, 2018, chapter 8). We can also observe how taxes and benefits impact different geographic groups such as the urban and rural areas as well as different regions. For the latter, we chose three main economic regions that are widely employed in China to analyze patterns of development. These are (from richest to poorest) the Eastern, the Central and the Western regions.[10]

Construction of the income concepts is the fundamental building block in any incidence analysis. In this study, we define four income concepts: market income, disposable income, consumable income, and final income (see Diagram 1). Market income includes wages and salaries, income from business operation, property income, private transfers, auto-consumption and imputed rent of owner-occupied housing.[11] We obtain disposable income by subtracting direct taxes (mainly personal income tax and contributions to social security) and adding direct transfers (mainly cash transfers and contributory pensions). Consumable income equals disposable income plus indirect subsidies and minus indirect taxes. Finally, adding the monetized value (at average cost to government) of in-kind transfers (mainly, education and health) to consumable income yields final income. The unit of analysis here is the individual and the welfare concept is income per capita.[12]

Diagram 1: Construction of Income Concepts



Source: Lustig (2018)

[10] For details, see relevant footnote in the first paragraph of the Introduction.

[11] Our analysis presents results for the scenario in which contributory pensions are treated as government transfers and contributions to social security are treated as a direct tax. For details explaining the difference between this scenario and the scenario in which pensions are treated as deferred income please see Lustig (2018), Chapter 1.

[12] Following convention, missing and zero incomes are included in the analysis as zero, except for households with a primary income reported as zero which are excluded from the analysis.

On the tax side, our analysis includes personal income tax (PIT), contributions to social security, value-added tax, and consumption tax.[13] On the spending side, our analysis covers the social security benefits, the urban and rural minimum living standard scheme, the rural five-guarantee system, the agricultural subsidy, as well as the health and education systems. When analyzing the incidence of taxes, we consider the economic incidence rather than the statutory incidence. Following conventional practice, the personal income tax is assumed to be borne entirely by the income earners in the formal sector. The value-added tax and consumption tax are assumed to be fully borne by consumers. As in any standard fiscal incidence analysis, behavioral responses and general equilibrium effects are not considered. Although these are clear limitations of any fiscal incidence analysis, if the primary interest is to assess progressivity of the overall tax and social spending system or compare the progressivity of each specific tax and social spending program, existing research indicates that not much value can be added by going beyond an accounting approach (Younger, 1997).

2.2 Decomposition of Gini Coefficient

In order to quantify the contribution of taxes and transfers to inequality between urban and rural areas and between regions, we rely on the decomposition of the Gini coefficient using prefiscal and postfiscal income concepts. The Gini coefficient can be decomposed into the contribution of "within group" inequality and "between group" inequality based on the formula originally proposed by Mookherjee and Shorrocks (1982). This decomposition allows us to measure the contribution of "between-group" component to overall inequality, by comparing the "between-group" contribution to prefiscal Gini and postfiscal Gini, we can see if the fiscal system has contributed to lower the rural-urban gap and regional disparity. In our analysis, the groups are rural/urban and three regions, thus the formula can be written as:

$G = v_U^2 \lambda_U G^U + v_R^2 \lambda_R G^R + B + L$, where *U* denotes urban and *R* denotes rural,

$G = v_E^2 \lambda_E G^E + v_C^2 \lambda_C G^C + v_W^2 \lambda_W G^W + B + L$, where *E* denotes Eastern, *C* denotes Central and *W* denotes Western,

in which $v_U = n_U/n$ is the population share of the urban group, $\lambda_U = \mu_U/\mu$ is the average income of the urban group over the average income of the overall group, $(v_R, \lambda_R), (v_E, \lambda_E), (v_C, \lambda_C)$ and (v_W, λ_W) are similarly defined for the rural areas, the Eastern region, the Central region and the Western region. The term B is the "between-group" contribution to overall inequality, and the term L is the residual term. When analyzing the urban-rural gap, the term B equals $v_U v_R |\mu_U - \mu_R|/\mu$; for regional disparity, $B = \frac{v_E v_C |\mu_E - \mu_C|}{\mu} + \frac{v_E v_W |\mu_E - \mu_W|}{\mu} + \frac{v_C v_W |\mu_C - \mu_W|}{\mu}$.

3. Data

[13] Only part of the consumption tax that is related with consumption of tobacco, alcoholic beverage and cosmetic products is included in this analysis due to data limitations, see the appendix B for details.

The primary source employed for the incidence analysis is the China Family Panel Studies (CFPS) 2014 survey data. The CFPS is a nationally representative, annual, longitudinal survey of Chinese communities, families, and individuals launched in 2010 by the Institute of Social Science Survey (ISSS) of Peking University. The CFPS 2014 dataset contains 37,147 adults and 8,616 children from 13,946 households in 29 provinces[14], in which 25,530 individuals reported living in urban areas. The survey collects necessary and important information relevant to the incidence analysis including household income, expenditure, received government transfers, and use of education and health services. In addition, when an important fiscal component is not directly identifiable in the survey, it can be imputed based on known policy rules, together with other available information in the survey and national account data (Lustig, 2018). A detailed description of how relevant income/expenditure items are imputed is provided in the Appendix B. It is also assumed that the wages/salaries and business operation income reported in the survey is the after-tax measure, thus personal income tax and contributions to social security should be added when constructing the prefiscal market income.

4. Main Findings

In this section we show the impact of fiscal policy on inequality and poverty overall, for urban and rural areas and for the three economic regions. Since the impact of fiscal policy on inequality and poverty depend on the size of fiscal interventions and their progressivity, we first present a snapshot of taxes and government spending in Tables 1 and 2. A detailed description of each item can be found in the Appendix A. In the last column of Tables 1 and 2, we indicate the taxes and spending items that were included in our fiscal incidence analysis.

Size of Taxes and Government Spending

According to data from the 2014 Statistical Yearbook of China, total government tax revenues of 2013 (not including contributions to social security) amounted to 11,053 billion Yuan RMB,[15] equal to 19.4% of China's 2013 GDP. Of the total tax revenue, 51.2% was reserved by the central government with the rest going to local governments. According to 2013 Statistical Bulletin of Development of Human Resources and Social Security, total revenue from social security programs is 3525.2 billion Yuan RMB in the year of 2013.

Table 1: China: Government Revenues, 2013
(Billion Yuan RMB (Billion US$))

Categories	Currency Amount	% of Total Gov. Revenue	% of GDP	In Analysis
Total Government Revenue	**¥12921 (US$2087.4)**	100.0%	22.7%	

[14] Hong Kong, Macao, Qinghai, Taiwan, and Tibet are not covered.
[15] Equal to 1,785.6 billion US dollars at the 2013 average exchange rate of 6.19 Yuan RMB per US dollar.

Total Tax Revenue	**¥11053.1 (US$1785.6)**	85.5%	19.4%	
Direct Taxes	¥4106.9 (US$663.5)	31.8%	7.2%	
Personal income tax	¥653.2 (US$105.5)	5.1%	1.1%	Yes
Corporate Income Tax	¥2242.7 (US$362.3)	17.4%	3.9%	No
Other Direct Taxes	¥1211 (US$195.6)	9.4%	2.1%	No
Indirect Taxes	¥6946.2 (US$1122.2)	53.8%	12.2%	
VAT	¥2881 (US$465.4)	22.3%	5.1%	Yes
Consumption Tax	¥823.1 (US$133)	6.4%	1.4%	Yes
Business Tax	¥1723.3 (US$278.4)	13.3%	3.0%	No
Other Indirect Taxes	¥1518.7 (US$245.4)	11.8%	2.7%	No
Total Non-tax Revenue	**¥1867.9 (US$301.8)**	14.5%	3.3%	

Source: China Statistical Yearbook 2014.

Note: Other Direct Taxes includes House Property Tax, Tax on Vehicles and Boat Operation, Tax on Ship Tonnage, Vehicle Purchase Tax, Deed Tax, Tobacco Leaf Tax, City Maintenance and Construction Tax. Other Indirect Taxes includes VAT and Consumption Tax on Imports, VAT and Consumption Tax Rebate on Exports, Resource Tax, Tariffs, Land Appreciation Tax, Urban Land Use Tax, Farm Land Occupation Tax, and Stamp Tax.

Currency amount in 2013 US$ is converted based on 2013 average exchange rate of 6.19 Yuan RMB per US dollar.

Memo: Total revenue from social security programs is 3525.2 billion Yuan RMB in the year of 2013 according to 2013 Statistical Bulletin of Development of Human Resources and Social Security.

As shown in Table 2, in 2013 total social spending equaled 7.3% of GDP, in which social security outlays 4.9% of GDP, in-kind education and health transfers takes 4.3% and 1.5% of GDP, respectively, and the social assistance programs (including the rural and urban Minimum Living Standard Scheme (MLSS)) accounts 0.8% of GDP.

Table 2: China: Government Spending, 2013
(Billion Yuan RMB (Billion US$))

Categories	Currency Amount	% of Total Gov. Spending	% of GDP	In Analysis
Total Government Spending	¥14021.2 (US$2265.1)	100.0%	24.6%	
Primary Government Spending	¥13715.6 (US$2215.8)	97.8%	24.1%	
Social Spending	¥4170.5 (US$673.8)	29.7%	7.3%	
Social Assistance *of which*	¥427.7 (US$69.1)	3.1%	0.8%	
Urban MLSS	¥75.7 (US$12.2)	0.5%	0.1%	Yes
Rural MLSS	¥86.7 (US$14)	0.6%	0.2%	Yes
Rural Five Guarantees	¥17.2 (US$2.8)	0.1%	0.03%	Yes
Other Social Assistance	¥248.1 (US$40.1)	1.8%	0.4%	No
Social Security	¥2791.6 (US$451)	19.9%	4.9%	Yes
In-Kind Education Transfers	¥2448.8 (US$395.6)	17.5%	4.3%	Yes
In-Kind Health Transfers	¥843.2 (US$136.2)	6.0%	1.5%	Yes

Housing	¥448.1 (US$72.4)	3.2%	0.8%	No
Non-Social Spending	¥9545.1 (US$1542)	68.1%	16.8%	No
Debt Servicing	¥305.6 (US$49.4)	2.2%	0.5%	

Source: 2014 China Statistical Yearbook; 2013 Statistical Communique of Social Service Development, Ministry of Civil Affairs of the People's Republic of China; 2014 Educational Statistical Yearbook of China; 2014 Health Statistical Yearbook of China; 2013 Statistical Bulletin of Development of Human Resources and Social Security, Ministry of Human Resources and Social Security of the People's Republic of China.

Note: Currency amount in 2013 US$ is converted based on 2013 average exchange rate of 6.19 Yuan RMB per US dollar.

Results

Table 3 presents summary statistics of household per capita income and expenditure for the overall, urban, rural, and regional (Eastern, Central, and Western) samples. As we can see, and as expected, average per capita market income is higher in urban than rural areas and in the Eastern region compared to the other two. By inspection, the table reveals that the combination of direct and indirect taxes and direct and in-kind transfers, slightly increased the urban-rural income gap, an outcome that goes in the opposite direction of the desired one if the goal is to reduce urban-rural inequality. The main factor behind this result is that urban areas receive much more income (in absolute term and in proportion to market income) from contributory pensions; we shall come to this below. In contrast, the regional income gap between the richer Eastern region and the other two is narrowed primarily as a result of the fact that the former pays much more in direct taxes.

Table 3: Household Per Capita Income by Concept (Averages & as % of Market Income)

	All	Urban	Rural	Eastern	Central	Western
Variable	***Mean***	***Mean***	***Mean***	***Mean***	***Mean***	***Mean***
Market Income (Pre-fiscal Income)	20587	24641	16352	24101	20210	15081
Of Which:						
1) Wages/Salaries After Tax	10201 (49.6%)	12456 (50.6%)	7539 (41.6%)	12542 (52.0%)	9488 (46.9%)	7179 (47.6%)
2) Business Income After Tax	2252 (10.9%)	2182 (8.9%)	2425 (14.8%)	2510 (10.4%)	2211 (10.9%)	1871 (12.4%)
3) Personal Inc. Tax + Contri. to Soci. Security	2028 (9.8%)	3083 (12.5%)	916 (5.6%)	2903 (12.0%)	1697 (8.4%)	960 (6.4%)
4) Property Income	291 (1.4%)	495 (2.0%)	94 (0.6%)	334 (1.4%)	280 (1.4%)	232 (1.5%)
5) Private Transfers	2478 (12.0%)	2457 (10.0%)	2462 (15.1%)	2831 (11.7%)	2402 (11.9%)	1976 (13.1%)
6) Imputed Rent for Owner-Occupied Housing	2807 (13.6%)	3670 (14.9%)	2132 (13.0%)	2557 (10.6%)	3659 (18.1%)	2076 (13.8%)
7) Auto-Consumption	530 (2.6%)	298 (1.2%)	784 (4.8%)	424 (1.8%)	473 (2.3%)	787 (5.2%)
Disposable Income:	20314 (98.7%)	24520 (99.5%)	16090 (98.4%)	23311 (96.7%)	20159 (99.7%)	15417 (102.2%)
Starting from Market Income:						
1) Direct Cash Transfers (Added)	140 (0.7%)	145 (0.6%)	141 (0.9%)	109 (0.5%)	126 (0.6%)	212 (1.4%)
2) Contributory Pensions (Added)	1613 (7.8%)	2817 (11.4%)	511 (3.1%)	2005 (8.3%)	1519 (7.5%)	1080 (7.2%)
3) Personal Inc. Tax + Contri. to Soci. Security (Subtracted)	2028 (9.8%)	3083 (12.5%)	916 (5.6%)	2903 (12.0%)	1697 (8.4%)	960 (6.4%)
Consumable Income:	17616 (85.6%)	21210 (86.1%)	13992 (85.6%)	20204 (83.8%)	17493 (86.6%)	13371 (88.7%)
Starting from Disposable Income:						
1) Indirect Subsidies (Added)	133 (0.6%)	75 (0.3%)	181 (1.1%)	125 (0.5%)	163 (0.8%)	104 (0.7%)
2) Indirect Taxes (VAT, Consumption Tax) (Subtracted)	2831 (13.7%)	3385 (13.7%)	2279 (13.9%)	3232 (13.4%)	2829 (14.0%)	2149 (14.3%)
Final Income:	19377 (94.1%)	22989 (93.3%)	15741 (96.3%)	21849 (90.7%)	19226 (95.1%)	15369 (101.9%)
Starting from Consumable Income:						
1) In-Kind Education Transfer (Added)	1370 (6.7%)	1382 (5.6%)	1358 (8.3%)	1253 (5.2%)	1385 (6.9%)	1549 (10.3%)
2) In-Kind Health Transfer (Added)	391 (1.9%)	396 (1.6%)	391 (2.4%)	392 (1.6%)	348 (1.7%)	449 (3.0%)
Number of Observations	45,276	19,534	22,638	19,057	13,726	12,478

Note: Author's calculation using China Family Panel Studies 2014 survey data. For each sample group, percentage of each income category with respect to market income is shown in parenthesis.

Impact on inequality

Country-wide and within Rural, Urban and Regions

Table 4 shows a set of inequality indicators for market income, disposable income, consumable income, and final income for each sample group. For market income (prefiscal income), the urban areas exhibit higher inequality compared to the rural areas, and the inequality level is the highest in the Central, followed by the Eastern and the Western regions. The inequality indicators of disposable income for each sample group decreased compared to the corresponding indicators of market income: the urban Gini declined by 0.051 Gini points and the rural Gini declined by 0.024 Gini points and the Gini coefficients for the Eastern, Central and Western regions declined by 0.045, 0.031 and 0.025 Gini points, respectively. This means that the combined effect of direct taxes and direct transfers was equalizing overall and within each geographical category. In contrast, the combined effect of indirect taxes and subsidies is unequalizing as the inequality measures using consumable income are higher—albeit slightly-- than those using disposable income. In-kind transfers (education and health spending) were equalizing for all geographic categories. In comparing the inequality indicators for final income with those of market income we can observe that the fiscal system decreased inequality in urban areas by 0.088 Gini points and in rural areas by 0.082 Gini points, and in the Eastern, Central and Western regions by 0.080, 0.079 and 0.090 Gini points, respectively.

What do these orders of magnitude mean? If we compare the change in the Gini coefficient for the whole country with that found in other countries with similar market income inequality (all in Latin America), we find that the redistributive effort is larger than in Honduras and Panama but somewhat smaller than in Brazil and considerably smaller than in Uruguay.[16]

Table 4: Inequality Indicators: China, 2013

Indicator	Market Income	Disposable Income	Consumable Income	Final Income
Overall				
Gini Coefficient	0.544	0.509	0.509	0.461
Theil Index	0.683	0.595	0.596	0.499
90/10	17.726	12.755	12.899	8.210
Urban				
Gini Coefficient	0.546	0.495	0.497	0.459
Theil Index	0.671	0.548	0.552	0.478
90/10	16.943	11.485	11.356	7.875
Rural				
Gini Coefficient	0.529	0.504	0.505	0.447

[16] The results for these other countries can be found here http://commitmentoequity.org/datacenter, see the analysis for Brazil by Higgins and Pereira (2014), Honduras by Instituto Centroamericano de Estudios Fiscales (2017), Panama by Martinez-Aguilar (2018), Uruguay by Bucheli et al. (2014).

Theil Index	0.675	0.626	0.625	0.505
90/10	17.180	13.043	13.273	7.565
Eastern				
Gini Coefficient	0.534	0.489	0.491	0.455
Theil Index	0.598	0.484	0.487	0.422
90/10	16.882	12.245	12.182	8.786
Central				
Gini Coefficient	0.537	0.506	0.506	0.458
Theil Index	0.759	0.700	0.695	0.586
90/10	16.599	11.191	11.276	7.473
Western				
Gini Coefficient	0.527	0.502	0.503	0.437
Theil Index	0.684	0.631	0.634	0.497
90/10	16.138	12.459	12.533	6.941

Note: Authors' calculation using China Family Panel Studies 2014 survey data.

Marginal contribution of specific fiscal interventions

The marginal contribution of a specific fiscal intervention measures how much it contributes to the fiscally induced changes in inequality. The marginal contribution of a certain fiscal intervention in redistributing income equals the Gini coefficient of the income measure with the intervention, minus the Gini coefficient of the income measure without the intervention (Lustig, 2018, chapters 1 and 2). A positive marginal contribution indicates an equalizing impact while a negative marginal contribution means the fiscal intervention is unequalizing.

Table 5 shows the marginal contributions of fiscal interventions in reducing inequality for the entire country as well as for each geographical category. Without considering the non-cash portion (i.e., in-kind transfers in education and health) of the fiscal system, the marginal contribution measures the impact of each fiscal intervention on the observed change from market income Gini to consumable income Gini. The results on the tax side are as follows. Personal income tax and contributions to social security are always equalizing. The value-added tax is unequalizing for the country as a whole, the urban areas and the Eastern region but is equalizing for the rest of the categories. The consumption tax is quite unequalizing for all categories. On the spending side, direct transfers and indirect subsidies are always equalizing. In order to consider both the cash and non-cash portions together, the marginal contribution measures the impact of each fiscal intervention on the observed change from the market income Gini to the final income Gini. In this case, personal income tax and contributions to social security are still always equalizing and now so is the value-added tax. The consumption tax, however, is still always unequalizing. Direct cash transfers, contributory pensions, indirect subsidies, and in-kind transfers are always equalizing.

The above results are pretty standard and similar to what one tends to find in other countries. Usually, the only unequalizing component are indirect taxes (and also subsidies), and the rest of the fiscal interventions are always equalizing.

Table 5: Marginal Contribution of Fiscal Interventions in Reducing Inequality, China, 2013

Fiscal Intervention	Overall	Urban	Rural	Eastern	Central	Western
Total From Mkt Income to Consumable Income						
All taxes and contributions to social security	0.0186	0.0168	0.0106	0.0253	0.0078	0.0093
All taxes (Direct&Indirect)	0.0014	0.0023	-0.0003	0.0023	0.0000	-0.0002
PIT	0.0036	0.0053	0.0012	0.0059	0.0013	0.0013
VAT	-0.0001	-0.0008	0.00001	-0.0011	0.0006	0.00001
Consumption Tax	-0.0019	-0.0017	-0.0017	-0.0020	-0.0021	-0.0016
All contributions to social security	0.0121	0.0093	0.0049	0.0158	0.0043	0.0057
All direct transfers incl contributory pensions	0.0306	0.0548	0.0203	0.0362	0.0362	0.0247
All contributory pensions	0.0244	0.0491	0.0131	0.0318	0.0306	0.0148
All direct transfers excl contributory pensions	0.0054	0.0046	0.0068	0.0034	0.0050	0.0093
All indirect subsidies	0.0017	0.0008	0.0010	0.0016	0.0014	0.0007
Total From Mkt Income to Final Income						
All taxes and contributions to social security	0.0214	0.0206	0.0121	0.0281	0.0105	0.0113
All taxes (Direct&Indirect)	0.0067	0.0068	0.0056	0.006	0.0051	0.0063
PIT	0.0037	0.0053	0.0013	0.0059	0.0013	0.0013
VAT	0.0047	0.0033	0.0055	0.0027	0.0053	0.0060
Consumption Tax	-0.0014	-0.0014	-0.0011	-0.0016	-0.0016	-0.001
All contributions to social security	0.0143	0.0125	0.0056	0.0181	0.0063	0.0070
All direct transfers incl contributory pensions	0.0255	0.0484	0.0167	0.0318	0.0309	0.0186
All contributory pensions	0.0204	0.0436	0.0109	0.0280	0.0264	0.0110
All direct transfers excl contributory pensions	0.0045	0.0039	0.0055	0.0030	0.0041	0.0072
All indirect subsidies	0.0012	0.0007	0.0003	0.0014	0.0010	-0.0001
In-Kind Transfers	0.0479	0.0386	0.0579	0.0360	0.0483	0.0659
Health	0.0367	0.0302	0.0434	0.0279	0.0375	0.0487
Education	0.0096	0.0073	0.0120	0.0072	0.0092	0.0138

Note: Author's calculation based on China Family Panel Studies 2014 survey data. The unit of numbers reported in the table is Gini points. The Marginal Contribution=Gini of Consumable Income/Final Income without the specific fiscal intervention-Gini of Consumable Income/Final Income with the specific fiscal intervention.

Impact on the urban-rural gap and inequality between regions

The decomposition results are shown in Table 6. As we can see, "within-urban" inequality contributes about 24.9%-25.6% (for different income measures) to overall inequality, while "within-rural" inequality contributes around 22.1%-22.4% to overall inequality for different

income measures, and the "between-urban-rural" component contributes 18.2%-20% for different income measures. Similarly, inequality within the Eastern region contributes about 19.5%-20.4% to the overall Gini index, the Central region account for around 8.9%-9.1% and the Western region contributes around 5.4%-5.7% of the total inequality, and between-group inequality accounts for 15.8% to 17.6% of overall inequality. From the decomposition results, we see that although the fiscal system decreased total inequality, within-urban inequality, and within-rural inequality, it results in an *increase* of the urban-rural gap. As we can see, the "between-urban-rural" component accounts 18.2% of overall market income Gini, while contributes 20% to the disposable income, consumable income and final income Gini. This somewhat surprising result stems from the fact mentioned above: the combination of direct taxes and direct transfers exacerbate rather than diminish the income gaps between rural and urban areas. The main driver of this undesirable outcome is the incomes from contributory pensions, much higher in urban than rural areas (see Table 3).[17]

For regional inequality, the decomposition results show the fiscal system has been effective in reducing regional inequality. As we can see, the "between-region" component accounts 17.6% of overall market income Gini, while it contributes 15.8% to the final income Gini. This would still be the case if we just considered the cash component of the fiscal system. Again, if we look at Table 3, we can notice that the richest Eastern region pays the highest proportion of taxes (25% of market income) and receives the least benefits (16%), and the poorest Western region pays the smallest tax (21%) and gets the largest benefits (23%), which suggests the possible effective role of the fiscal system in reducing regional inequality.

Table 6: Decomposition of Gini Coefficient, China, 2013

	Overall Gini	Urban Component	Rural Component	Between-Group Inequality	Residual Term
Market Income	0.549	0.104 (25.6%)	0.121 (22.1%)	0.100 (18.2%)	0.187
Disposable Income	0.513	0.128 (24.9%)	0.115 (22.4%)	0.103 (20.0%)	0.168
Consumable Income	0.513	0.128 (24.9%)	0.115 (22.4%)	0.102 (19.8%)	0.169
Final Income	0.465	0.116 (25.0%)	0.104 (22.4%)	0.093 (19.9%)	0.152

	Overall Gini	Eastern Component	Central Component	Western Component	Between-Group Inequality	Residual Term
Market Income	0.544	0.111 (20.4%)	0.048 (8.9%)	0.029 (5.4%)	0.096 (17.6%)	0.260
Disposable Income	0.509	0.099 (19.5%)	0.046 (9.1%)	0.029 (5.7%)	0.084 (16.6%)	0.250
Consumable Income	0.509	0.100 (19.6%)	0.046 (9.1%)	0.029 (5.7%)	0.084 (16.5%)	0.250
Final Income	0.461	0.091 (19.7%)	0.042 (9.0%)	0.026 (5.7%)	0.073 (15.8%)	0.230

Note: Author's calculation based on China Family Panel Studies 2014 survey data, following method for decomposing Gini coefficient proposed by Mookherjee and Shorrocks (1982). While decomposing between urban and rural, only samples with non-missing indicator of urban/rural residency are kept, while decomposing between regions, only samples with non-missing indicator of province of residency are kept, thus there are minor differences of overall Gini of each income concept.

[17] As shown in the table, the urban residents pay 13% of market income as direct taxes, and the total direct transfers they received equal to 12% of market income, while the rural residents pay 6% of market income as direct taxes and their direct transfers equal to 4% of market income.

Impact on Poverty

As shown in Table 7, based on a $1.9 PPP/Day poverty line (in 2011 PPP dollars), the headcount ratio of market income poverty in China in 2013 was 12.3%, 9.6% in the urban areas and 15.7% in the rural areas. The poverty rate was the highest in the Western region (16.3%) relative to the Central (13%) and the Eastern (9.4%) regions. In comparing poverty indicators measured based on market income and those based on disposable income, we find that direct transfers net of personal income tax and contributions to social security are poverty reducing: the headcount ratios of all groups decreased (see Table 7). When we add the impact of indirect taxes net of indirect subsidies, the headcount ratio for consumable income is *still lower* than the headcount ratio of market income in many cases and for many of the poverty lines used here but not for all. In urban areas, headcount ratio of consumable income is always lower than headcount ratio of market income.[18] However, we noticed an undesirable result: the fiscal system increases poverty in the poorer rural areas and also in the three regions, which means that the fiscal system has driven some people who were not poor into poverty in larger numbers than helping the poor escape their condition (and become nonpoor).

What drives this undesirable result? By looking at Table 3 one can observe that the main difference between the urban and rural areas is the (relative) amount of contributory pensions received by their respective residents. In urban areas, it is much higher (as a proportion of market income, 11.4% versus 3.1% in rural areas). However, it is important to notice that if one uses the squared poverty gap instead of the headcount ratio, poverty measured with consumable income is always lower than prefiscal (market income) poverty. In other words, the poorest of the poor do not appear to be harmed by the net fiscal system.

Table 7: Headcount Ratios, China, 2013

Headcount Ratios	Market Income	Disposable Income	Consumable Income
		Overall	
1.9 $PPP/Day	12.30%	9.25%	10.90%
3.2 $PPP/Day	19.97%	16.70%	19.48%
5.5 $PPP/Day	32.31%	29.30%	33.80%
National Poverty Line	11.14%	8.15%	9.73%
		Urban	
1.9 $PPP/Day	9.59%	6.05%	7.44%
3.2 $PPP/Day	16.48%	12.12%	14.39%
5.5 $PPP/Day	26.50%	21.70%	25.68%
National Poverty Line	8.68%	5.21%	6.52%
		Rural	

[18] We observe the same pattern if we use the poverty gap ratio or squared poverty gap ratio (results available upon request).

1.9 $PPP/Day	15.71%	13.04%	15.09%
3.2 $PPP/Day	24.46%	22.09%	25.42%
5.5 $PPP/Day	39.16%	37.69%	42.69%
National Poverty Line	14.24%	11.64%	13.56%
		Eastern	
1.9 $PPP/Day	9.43%	6.87%	8.21%
3.2 $PPP/Day	16.23%	13.55%	16.16%
5.5 $PPP/Day	26.91%	24.36%	28.31%
National Poverty Line	8.57%	5.99%	7.22%
		Central	
1.9 $PPP/Day	13.00%	8.84%	10.23%
3.2 $PPP/Day	19.89%	15.59%	18.62%
5.5 $PPP/Day	32.65%	28.96%	33.40%
National Poverty Line	11.77%	7.82%	9.31%
		Western	
1.9 $PPP/Day	16.26%	13.86%	16.40%
3.2 $PPP/Day	26.45%	23.59%	26.29%
5.5 $PPP/Day	41.07%	38.16%	43.69%
National Poverty Line	14.66%	12.27%	14.56%

Note: Authors' calculation using China Family Panel Studies 2014 survey data.
The National Poverty Line is 2,300 Yuan/Year in 2011 RMB.

5. Conclusion

This paper provides a comprehensive assessment of how fiscal policy affected overall income inequality and poverty, and inequality and poverty within rural and urban areas, as well as within each economic region. In addition, the paper analyzes whether the fiscal system has contributed to lowering the urban-rural income gap and regional inequality.

Our results show that the fiscal system has been inequality-reducing at the country-level and in rural and urban areas, as well as in each economic region. On the tax side, personal income tax, contributions to social security and value-added tax are equalizing for all groups, while consumption tax is quite unequalizing for all groups. On the spending side, direct transfers, indirect subsidies, and in-kind transfers are always equalizing for all groups. In addition, the fiscal system reduced inequality between regions primarily because the Eastern region—the richest—paid a higher proportion of taxes and received the least benefits, while the poorest Western region paid the smallest proportion of taxes and received the largest share of prefiscal income in transfers (direct and in-kind) and subsidies. In contrast, our results show that the fiscal system widened the urban-rural income gap. This undesirable outcome is mainly driven by the fact that the urban residents receive significantly more income from contributory pensions than rural residents.

We find that the fiscal system is poverty-reducing in the urban areas. However, for the international poverty line applicable to middle-income countries, the fiscal system increases poverty in the poorer rural areas and also in the three regions, which means that the fiscal system has driven some people who were not poor with prefiscal income into poverty in larger numbers than helping the poor escape their condition (and become nonpoor). When we use the squared poverty gap index, the fiscal system is poverty-reducing throughout. This is reassuring in the sense that it is telling us that the fiscal system reduces poverty for the poorest of the poor (even though it makes some of the nonpoor poor).

Our analysis seems to support the Chinese government's diagnostic of the limitations that prevailed in the fiscal system to address entrenched income inequality across geographic locations. In fact, as a response to rising overall and urban-rural inequality and the persistence of poverty pockets, in 2013 the government committed itself to reducing them through taxation, the social security system and cash transfers[19]. In 2014, the government launched the Targeted Poverty Alleviation which aims to lift all rural poor and impoverished counties out of extreme poverty by 2020. The Targeted Poverty Alleviation emphasizes to precisely identify the households in poverty and to customize support according to local conditions and household conditions to effectively help the households in poverty. In 2019, the government also initiated the personal income tax reform and value-added tax reform to reduce the tax burden and improve income redistribution through the fiscal system. For the personal income tax reform, higher personal deductions, adjusted tax brackets, and more deductible items were introduced, and for the VAT reform, lower tax rates were introduced. To assess how much these reforms ultimately accomplish in terms of inequality and poverty reduction goals through the fiscal system, it is important to have a benchmark against which these reforms can be compared to. Thus, the main contribution of this paper is both to estimate how much redistribution was being accomplished through the pre-reforms fiscal system and for this exercise to serve as a benchmark against which one can compare fiscal redistribution in the future using the information from new household surveys.

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[19] In particular, the government stated that it would "accelerate the improvement of the redistribution adjustment mechanism with taxation, social security and transfer payments as the main means." (translation by authors) Source: Notice of the State Council on the Approval of the Development and Reform Commission and Other Departments on Deepening the Reform of the Income Distribution System. http://www.gov.cn/zwgk/2013-02/05/content_2327531.htm

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Appendix A:

The Fiscal System in China

The main types of taxes commonly found around the world are also used in China. In particular, direct taxes equaled 37.2% of total tax revenue in 2013, of which personal income tax was 5.9% of total tax revenue. About 62.8% of the total tax revenue in 2013 was from indirect taxes, of which the value-added tax was 26.1%, the consumption tax 7.4%, and the business tax 15.6%. The taxes included in the incidence analysis shown below are personal income tax, value-added tax, and consumption tax. They are described in more detail just below.

1. Direct taxes

Personal income tax

China's personal income tax system sees different types of income subject to various gradual tax rates. Wages and salaries income are taxed monthly. Contributions to social security programs and the housing fund are deducted from earnings to obtain taxable income subject to personal income tax as are the first 3,500 Yuan of net monthly wages/salaries income, such that total taxable wages/salaries equals "wages/salaries minus payment to the five social security programs and the housing fund, then minus 3,500."[20] The following table shows the 7-level progressive tax rate on wages/salaries income:

Tax Rates on Wages/Salaries Income

[20] Source: State Administration of Taxation Announcement No. 46 of 2011.

Grade	Monthly Taxable Income, RMB (2013 US$)	Tax Rate
1	0-1,500 RMB (0-242 US$)	3%
2	1,500-4,500 RMB (242-727 US$)	10%
3	4,500-9,000 RMB (727-1,454 US$)	20%
4	9,000-35,000 RMB (1,454-5,654 US$)	25%
5	35,000-55,000 RMB (5,654-8,885 US$)	30%
6	55,000-80,000 RMB (8,885-12,924 US$)	35%
7	>80,000 RMB (>12,924 US$)	45%
Source: State Administration of Taxation Announcement No. 46 of 2011. *Note: equivalence in 2013 US$ is converted based on 2013 average exchange rate of 6.19 Yuan RMB per US dollar.*		

Individual business income (production and operation income) is instead taxed on an annual basis. The taxable income is gross income deducting costs, expenses, losses, and other taxes.[21] The 5-level tax rate is shown in the table:

Tax Rates on Individual Business Income		
Grade	**Annual Taxable Income, RMB (2013 US$)**	**Tax Rate**
1	0-15,000 RMB (0-2,423 US$)	5%
2	15,000-30,000 RMB (2,423-4,847 US$)	10%
3	30,000-60,000 RMB (4,847-9,693 US$)	20%
4	60,000-100,000 RMB (9,693-16,155 US$)	30%
5	>100,000 RMB (>16,155 US$)	35%
Source: State Administration of Taxation Announcement No. 46 of 2011. *Note: equivalence in 2013 US$ is converted based on 2013 average exchange rate of 6.19 Yuan RMB per US dollar.*		

Individual services and capital income are also subject to tax[22]. For capital gains from the transfer of property (e.g., financial securities, real estate, equipment, land use rights), original property value and reasonable fees can be deducted, and then 20% of the net gain will be taxed. Capital gains from the stock market, interest on bank deposit and government bonds are taxed at 20%. With regard to income from remunerations for services and from authorships, royalties, and income from leasing property, if a single payment is no more than 4,000 Yuan RMB, 800 Yuan RMB can be deducted; if a single payment is above 4,000 Yuan RMB, 20% of the payment can be deducted. Then, 20% of the taxable amount should be paid. When the taxable remuneration income is higher than 20,000, the excess amount is taxed based on the gradual tax rates shown in the following table. The full amount of occasional income is subject to a tax rate of 20%.

[21] Source: State Administration of Taxation Announcement No. 46 of 2011.
[22] Individual Income Tax Law of the People's Republic of China (amended version since 2011).

Tax Rates on Remuneration Income		
Grade	**Taxable Income, RMB (2013 US$)**	**Tax Rate**
1	0-20,000 RMB (0-3,231 US$)	20%
2	20,000-50,000 RMB (3,231-8,078 US$)	25%
3	>50,000 RMB (>8,078 US$)	35%
Source: Individual Income Tax Law of the People's Republic of China (amended version since 2011). *Note: equivalence in 2013 US$ is converted based on 2013 average exchange rate of 6.19 Yuan RMB per US dollar.*		

2. Indirect taxes

The two main types of indirect taxes in China are the value-added tax and consumption tax. The value-added tax applies to all sale and importation of goods and services in China. According to the Provisional Regulations on Value Added Tax of the People's Republic of China (amended version since 2008[23]), the standard VAT rate was 17% and applied to the sale and importation of most goods, the provision of processing, repair, or replacement services, and the leasing of movable and tangible assets. A reduced rate of 13% applied to certain types of goods including 1) grain, vegetable oil; 2) tap water, heating, air conditioning, hot water, gas, liquefied petroleum gas, natural gas, biogas, coal products for residential use; 3) books, newspapers, magazines; 4) feed, fertilizer, pesticides, agricultural machinery, agricultural film; 5) other goods prescribed by the State Council.[24] Since 2012, the government initiated the reform of replacing the business tax with a value-added tax: an 11% VAT rate applied to transportation services, postal services, basic telecommunication services, construction services, the leasing and sale of real estate/land use right, and a 6% VAT rate applied to value-added telecommunications services, financial services, lifestyle and other modern services, and sale of intangible assets (except land use rights).

According to the Provisional Regulations on Consumption Tax (2008 Revision), the consumption tax mainly targets 15 types of luxury goods including tobacco, alcohol, cosmetics, jewelry, fireworks, gasoline, diesel oil, tires, motorcycles, automobiles, golf equipment, yachts, luxury watches, disposable chopsticks, and wooden floorboards. The tax is computed based on sale price and/or sale volume.[25]

3. The social protection system: social security and social assistance

Social security

China's social security system consists of five social security programs (including basic contributory pensions, health insurance, unemployment insurance, on-the-job injury insurance

[23] It has been further amended in 2016.
[24] Source: State Council Order No. 538, November 2008.
[25] See Appendix C for detailed consumption tax rates.

and maternity insurance) and a housing fund. The enrollment of the "5 insurances & 1 fund" is legally required for all formal employment. Basically, urban employees, which consists the majority of the urban residents, and part of the rural residents who have a formal job, are covered by the social security system. Both employer and employee insurance premiums are tax-deductible under corporate income tax and personal income tax law. All income received by the beneficiaries of these mandatory social security programs is also tax-exempt. The contributions paid by employers and employees for each social security program varies across provinces as well as has changed with time.

The following table summarizes the contribution rates paid by employers and employees at Beijing and Shanghai[26] for the year of 2013:

Social Security Contributions as Percentage of Monthly Wages/Salaries: Beijing/Shanghai		
Social Security Type	***Employee's Contribution***	***Employer's Contribution***
Pension Insurance for Employees	8%/8%	20%/21%
Health Insurance for Employees	2%/2%	10%/11%
Unemployment Insurance	0.2%/0.5%	1%/1.5%
On-Job Injury Insurance	0%/0%	0.5%, 1% or 2%/0.5%
Maternal Insurance	0%/0%	0.8%/1%
Housing Fund	12%/7%	12%/7%
Source: Beijing/Shanghai Municipal Human Resources and Social Security Bureau, Beijing/Shanghai Housing Fund Management Center.		

Many efforts have been made to extend the social security system in order to benefit the urban unemployed and rural residents, including initiations of new rural cooperative medical insurance since 2003[27], medical insurance for urban residents since 2007, basic pension insurance for rural residents since 2009, and basic pension insurance for urban unemployed residents since 2011.

Further expansion of social security coverage remains to be achieved in China. In 2013, total social security revenue was 3,525 billion Yuan RMB (equal to 569 billion US dollars) while total social security expenditure was 2,792 billion Yuan RMB (equal to 451 billion US dollars).

[26] There are minor variations of the contribution rates across provinces, the rates of Beijing and Shanghai are reported here as representative cases.
[27] See section 2.3.4 for details.

The following table documents the coverage, revenue, and expenditure of each of the 5 social security programs.[28]

Social Security Program	Coverage (Million)	Revenue (Billion RMB)	Expenditure (Billion RMB)
Pension Insurance for Employees	322.2	2,268	1,847
Health Insurance for Employees & Urban Residents	570.7	824.8	680.1
Unemployment Insurance	164.2	128.9	53.2
On-Job Injury Insurance	199.2	61.5	48.2
Maternal Insurance	163.9	36.8	28.3
Pension Insurance for Urban &Rural Residents	497.5	205.2	134.8

Social assistance: The Minimum Living Standard Scheme (Dibao Program)

The Minimum Living Standard Scheme (MLSS) is a direct transfer program and was launched since 1993, aiming at improving the economic well-being of the new urban poor. Urban residents whose household per capita income is lower than the threshold of the local minimum living standard are eligible for basic assistance from the local government. There are two main groups of beneficiaries. One comprises those without an income source, working capability, or legal guardian, who previously were recipients of social assistance. This group can receive the full amount of benefits equal to the local assistance line. The other is made up of the new urban poor whose household per capita income is lower than the local assistance line, including families with temporary financial difficulties due to unemployment and families with limited amount of income. The benefit amount for this group is the gap between the local assistance line and their overall household income. There were 2.7 million[29] beneficiaries in 1999, a number which rose to 20.6 million (in 11million households[30]) in 2013. The average transfer amount per urban beneficiary in 2013 was 264 Yuan RMB/Month.[31]

Since 2003, the MLSS, originally aimed at the urban poor, was extended to rural areas. According to the Ministry of Civil Affairs, the system covers 29.3 million rural households, or a total of 53.9 million rural residents. It operates similarly to that described above for urban areas. Local governments are responsible for the operation and financing of the system, with

[28] Source: 2013 Statistical Bulletin of Development of Human Resources and Social Security, Ministry of Human Resources and Social Security of the People's Republic of China.
[29] China Statistical Yearbook of 2000.
[30] Source: 2013 Statistical Communique of Social Service Development, Ministry of Civil Affairs of the People's Republic of China.
[31] Source: 2013 Statistical Communique of Social Service Development, Ministry of Civil Affairs of the People's Republic of China.

subsidies from the central government. The average transfer amount per rural beneficiary in 2013 was 116 Yuan RMB/Month.[32]

The MLSS thresholds for assistance are set by local governments, according to the local minimum standard of living, local average per capita income, and local cost of basic consumption needs. These thresholds are also often set in consideration of local governments' financing capacities. As a result, the thresholds in many less developed cities are lower than actual basic needs. Gao et al. (2009) find that 2.3 percent of all urban residents are eligible for MLSS, but only slightly less than half of them are actual beneficiaries. Although the poverty rate decreased among the participants, due to limited coverage poverty is still an issue among eligible households.

Social assistance: The rural five guarantees system

In rural China, the "Five Guarantees System" aims to provide the most vulnerable rural residents (i.e., the elderly, disabled, children under 16 without any dependent, those unable to work) with basic means of support including food, clothing, housing, education (only for children), medical care and proper burial. Since the system was initiated in 1956, it has undergone several reforms, in part made necessary by the fact that it was financed by local villages, and with agricultural tax reform, it experienced a lack of funds. In 2006, the central government consequently issued the "New Guidelines on Rural Five Guarantees System," which explicitly states that the living standards of the beneficiaries of the Five Guarantees should be higher than average local villagers, local governments should include Five Guarantees expenditure in their fiscal budgets, and the central government should subsidize local governments with financial shortages. According to the Ministry of Civil Affairs, at the end of 2013 a total of 5.4 million rural citizens were covered by the Five Guarantees System, and total spending in 2013 equaled 17.2 billion Yuan. Annual expenditure per beneficiary was 4,685 Yuan for those staying in the support centers and 3,499 Yuan for those living at home[33].

4. The health system

Total government health expenditure in China during the year 2013 is 828 billion[34], which amounted to 1.5% of the total GDP. An aging population has seen a rapid increase in demand for care and has required the expansion and development of the health care system. This has been especially challenging in rural areas, revealing sharp urban-rural disparities in health insurance coverage and related healthcare services and costs. Through decades of efforts, the Chinese government has developed three health insurance systems, which provide coverage

[32] Source: 2013 Statistical Communique of Social Service Development, Ministry of Civil Affairs of the People's Republic of China.
[33] Source: 2013 Statistical Communique of Social Service Development, Ministry of Civil Affairs of the People's Republic of China.
[34] China Statistical Yearbook of 2014.

for more than 90% of the population: Basic Medical Insurance for Urban Employees was launched in 1998, Basic Medical Insurance for Rural Residents in 2003, and Basic Medical Insurance for Urban Residents in 2007.

Basic medical insurance for urban employees

This insurance is compulsory based on employment, and forms part of the social security system described earlier. It provides basic medical coverage for urban employees in both the public and private sectors. Local governments, mainly at the municipal level, set the levels for deductibles, copayments, and reimbursement caps according to local economic levels. The system is financed by premiums from both employers and employees.

Basic medical insurance for urban residents

This insurance provides medical coverage for primary and secondary school students, young children, and other unemployed urban residents on a voluntary basis. The primary purpose is to provide coverage for urban residents without formal employment, aiming to eliminate impoverishment resulting from catastrophic expenditures. This insurance system was expanded nationwide up until 2010, gradually extending to all unemployed urban residents. It is financed mostly by participant premiums, although the government also provides some subsidies. The premium of the policy is determined by local governments according to local economic and medical care expense levels.

New rural cooperative medical insurance

In 2003, the New Cooperative Medical Scheme (NCMS) was launched in rural China following a period of time (since 1985) when the majority of rural residents were not covered by any kind of health insurance. The NCMS is completely voluntary, administrated by county (which has resulted in diversified programs in terms of premiums, coverage, copayments and deductibles), and is funded by both individual contributions and government subsidies. The primary goal of the NCMS is to protect rural households from becoming impoverished due to catastrophic health expenditures. Inpatient services have been covered since its inception. More recently, general outpatient services as well as large outpatient expenses due to certain chronic diseases have started to be reimbursed from the pooling revenue. The New Cooperative Medical Scheme (NCMS) was initially implemented in several pilot counties. By 2013, 802 million rural people were enrolled in the NCMS, accounting for about 98.7% of the total rural population. In addition, average per capita funding reached 370.6 Yuan RMB per year, the reimbursement rate of inpatient expenses rose to more than 75%, and the rate of

out-patient expenditure to more than 50%. The total number of beneficiaries was 1.9 billion people.[35]

5. The education system

The school system of China includes preschool, primary school, junior middle school, senior middle school, college and graduate school. The majority of schools at and above the primary school level are public schools.

Children normally enroll in primary school at age 6 or 7 following some preschool. Primary school is normally 5-6 years long, junior middle school is normally 3-4 years, senior middle school is 3 years, college is normally 4 years long (medical school is normally 5 years), and it takes 2-3 years to get a master's degree and 3 additional years to get a doctoral degree. In parallel with senior middle schools, there are secondary professional schools: vocational schools usually provide three or four years of schooling and technical schools provide three years of schooling. Primary and junior middle schools are free and obligatory in China, known as "free 9-year compulsory education." There is, however, considerable discrepancy between urban and rural areas in terms of educational attainment. While illiteracy has been virtually eliminated in urban areas since the adoption of "free 9-year compulsory education" and the strict prohibition of child labor, a lack of satisfactory financial support and consequent insufficient educational resources has meant that illiteracy in rural China remains high.

Government Expenditure on Education (China, Year of 2013)

Level of Education	Total Enrollment	Total Expenditure (Unit: Million Yuan RMB)	Expenditure per Student (Unit: Yuan RMB)
Preschool	40,507,145	86,237.2	2,129
Primary School	95,674,926	764,219.9	7,988
Junior Middle School	43,846,297	488,232.3	11,135
Senior Middle School	24,004,723	249,962.3	10,413
Tertiary	33,855,900	493,339.1	14,572
Source: 2014 Educational Statistical Yearbook of China.			

Another reason for relatively poor scholastic attainment in rural China is that although nine-year compulsory education is basically free for all children, textbooks and miscellaneous fees associated with schooling were still unaffordable for many rural parents with multiple children. In response, the Ministry of Finance and the Ministry of Education began to jointly provide free textbooks for children from poor families. In 2001, the government started subsidizing

[35] Source: https://www.xnh.org.cn/gjzxfg/20140504/4550.html

the compulsory education of students from rural poor households with a yearly per capita income lower than 882 yuan. Fees for textbooks and supplies, as well as other miscellaneous fees (e.g., 70 yuan per student per semester for primary school and 90 yuan per student per semester for junior middle school) were exempted. In addition, boarders began to receive subsidies for their living expenditures, initially 750 yuan per student per year and then adjusted to 1,000 yuan per year for primary school students and 1,250 yuan per year for junior middle school students. In 2005, central and local governments together spent more than 7 billion yuan on funding 34 million students from poor rural families.[36] Up until 2007, all poor rural households were covered by this program.

6. Agricultural subsidy

So as to increase farmers' income levels, beyond the abolition of agricultural tax, the central government provides subsidies to farmers, which mainly include grain and agricultural input subventions. In 2002, grain subsidy policies were implemented in several major grain-producing counties including the provinces of Jilin, Anhui, Henan, and Hubei. The grain subsidy is either fixed based on historical grain plantings or tied to current market prices or yearly production. In most areas, the fixed subsidy is adopted. There is also an agricultural input subvention that subsidizes high-quality seeds and agricultural machines. The input subsidy is paid to companies selling agricultural inputs, through which the subsidies are supposed to be passed on to farmers.

Appendix B:

Simulation of In-kind Education Transfer

From the Statistical Yearbook of Education 2014, total government expenditure by education level and total number of enrollees by education level are collected, then per capita education expenditure by education level can be calculated. In the survey, available information includes "whether currently attending school", "current education level", "whether attending a public or private school". For all people attending public schools, assume the amount of in-kind education transfer he/she received equals the per-capita government education expenditure of the corresponding education level.

Simulation of In-kind Health Transfer

From the Statistical Yearbook of Health 2014, total government health expenditure by province is collected and the provincial-level per capita government health expenditure is

[36] Source: Ministry of Education of the People's Republic of China.

calculated. In the survey, each sample has a province ID, and the corresponding provincial-level health in-kind transfer is assumed for everyone who reported usage of health services.

Simulation of Personal income tax

For tax of wages/ salaries income, individual's annual wages/salaries income is reported in the survey, and it is assumed the reported measure is post-tax measure. To simulate corresponding tax, annual wages/salaries is divided by 12 to get the average monthly wages/salaries, then the progressive tax rate can be applied to the taxable monthly wages/salaries.

For tax of business operation income, the tax code can be applied directly to household annual business operation income to obtain the tax payment.

Finally, the imputed household annual payment to personal income tax is the sum of the above two.

Simulation of Employers' Contributions to social security

Assume the reported contributions to social security is the payment from employee side, contributions to social security from employer side need to be further simulated.

The required contribution by employee and employer to each social security program varies across provinces. For the year of 2013, we assume the average contribution rates is the following:

Social Security Contributions as Percentage of Monthly Wages/Salaries:		
Social Security Type	***Employee's Contribution***	***Employer's Contribution***
Basic Contributory pensions	8%	20%
Health Insurance	2%	10%
Unemployment Insurance	0%	1%
On-Job Injury Insurance	0%	1%
Maternal Insurance	0%	1%
Housing Fund		Assume the employer contributes the same as the employee.

The corresponding employer's payment to social security can be calculated using the reported employee's payment and the ratio in the above table.

Simulation of VAT and Consumption Tax

Household annual living expenditure is recorded in several categories. For each, a tax rate is assigned according to the value-added tax rate table, and then the household yearly payment on VAT can be imputed.

For consumption tax, only parts can be simulated due to limitations of expenditure data. Consumption tax of tobacco, alcohol and skin care are imputed.

For consumption of tobacco and alcohol, CFPS 2012 survey has information of whether smoke, whether drink, amount of cigarette smoked, price of cigarette chose, amount of white spirit drink, amount of wine drink, amount of beer drink. First, based on CFPS 2012 data, regress adult individuals' characteristics on drinking/smoking behaviors; then, based on estimation results and CFPS 2014 adult individuals' characteristics to estimate adults' smoking/drinking behavior in 2014; then, calculate adult individuals' consumption tax of tobacco and alcohol base on the estimation results.

For consumption tax on cosmetics, annual cosmetic expenditure is reported, thus corresponding tax payment can be calculated using the tax rate.

Imputation of Rent for Owner-Occupied Housing

The survey reports whether current housing is owned or rented, as well as the estimated market value of the housing. Annual rent for owner-occupied housing is thus imputed as 2% of the estimated market value of the house.

Appendix C:

Consumption Tax Rate:

Taxable Items	Tax Rates
Tobacco	
Grade A Cigarettes	56%+0.003 Yuan/Item
Grade B Cigarettes	36%+0.003 Yuan/Item
Cigars	36%
Cut Tobacco	30%
Wholesale process of cigarettes	5%
Alcoholic Drinks and Alcohol	
White Spirit	20%+0.5 Yuan/500ml
Yellow Wine	240 Yuan/Ton
Type A Beer	250 Yuan/Ton
Type B Beer	220 Yuan/Ton
Other Alcoholic Drinks	10%
Alcohol	5%

Cosmetics	30%
Fine Jewelry and Precious Gems	
Gold, silver and platinum Jewelry; Diamond and Diamond Jewelry	5%
Other Fine Jewelry and Precious Stones	10%
Firecrackers and Fireworks	15%
Refined Oil	
Leaded Gasoline	0.28 Yuan/Liter
Unleaded Gasoline	0.20 Yuan/Liter
Diesel, Aviation Kerosene, Fuel Oil	0.10 Yuan/Liter
Naphtha, Solvent Oil, Lubricating Oil	0.20 Yuan/Liter
Auto Tires	3%
Motorcycle	
Cylinder Capacity <= 250ml	3%
Cylinder Capacity > 250ml	10%
Automobile	
Cylinder Capacity <= 1 Liter	1%
1<Cylinder Capacity <=1.5 Liter	3%
1.5<Cylinder Capacity <=2 Liter	5%
2<Cylinder Capacity <=2.5 Liter	9%
2.5<Cylinder Capacity <=3 Liter	12%
3<Cylinder Capacity <=4 Liter	25%
Cylinder Capacity >4 Liter	40%
Light/Medium Bus	5%
Golf and Golf Club	10%
High-End Watch	20%
Yacht	10%
Disposable Wood Chopstick	5%
Hardwood Floor	5%

Note: The table reports effective consumption tax rates in the year 2013. Grade A cigarettes refers to those with a transfer price above 70 Yuan/carton. Grade B cigarette refers to those with a transfer price below 70 Yuan/carton. Type A Beer refers to those with an ex works price above 3,000 Yuan/Ton. Type B Beer refers to those with an ex works price below 3,000 Yuan/Ton. High-end watch refers to those priced above 10,000 Yuan (excluding VAT) per item.

Source: State Council Order No.539 (Regulations on Consumption Tax, revised version since November 2008); Notice on Adjusting the Consumption Tax Policy of Tobacco Products, 2009, State Taxation Administration.