FINAL REPORT

Fiscal Policy, Regional Disparity and Poverty in China: A General Equilibrium Approach

By

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Abstract

The main objective of this research is to analyze the effects of China’s fiscal dimension of government transfer and preferential tax policy on regional income disparity and poverty reduction. Using a computable general equilibrium model with a 3 region component, we find that preferential tax policy to eastern coastal region of China has significant effect on household income, as well as FGT indicator, while preferential government transfer to central and western region of China has almost no effect on the above indicators. The simulation results suggest that tax policy is a more effective tool to fight against China’s regional disparity than government transfer.
Introduction

China is a large country with around 1.3 billion people and composed of 31 provinces with different level of development. Since the early 1990s, China has followed Deng Xiaoping’s “let some get rich first” policy and “coastal development strategy”, which switched the national development priority from the “even” to “uneven”, from “inland” to “the eastern coastal regions”. As a consequence of difference in comparative advantage, economic structure and priority government policy to specific region, income gap widened from province to province in the past two decades. To clarify the pattern of China’s regional disparity, table 1 provides some information on these disparities among three regions which are: eastern China, central China and western China. The table shows, obviously, in the beginning of 1980s, income levels of urban household were quite similar among the regions because of the egalitarian income distribution system at the time. However, the pattern was changed thereafter. In particular, the ratio of eastern region to central region to western region increased from 1.20:1:1.18 in 1981 to 1.50:1:1.10 in 2001, at the same time, the ratio increased from 1.25:1:0.91 in 1981 to 1.64:1:0.76 in 2001 in rural China. The regional gap either in urban or in rural accelerated to widen in 1990s, but the region disparity in rural is larger than that in urban.

During 2001-2005, with China’s “Western region development strategy”, regional disparity pattern changed, while the gap between the central region and eastern region became larger, the disparity between the central and western was smaller than that of before. For example, in terms of the income level of urban household, while the ratio of eastern region to central region increased from 1.50:1 in 2001 to 1.55:1 in 2005, the ratio of central to western region decreased from 1:1.10 in 2001 to 1:1.01 in 2005.

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1 China is a country with 31 provinces and autonomous regions, which are Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, Hainan, Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

2 Eastern region includes Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Guangxi, Hainan. Central region includes Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan. Western region consists of Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shanxi, Gansu, Qinghai, Ningxia, and Xinjiang.
A recent comparison among eastern, central and western regions shows that per capita GDP of western and central China accounted for 40.7% and 52.2% respectively of that in the eastern China, and the per capita consumption expenditure of the former two accounted 57.6% and 69.6% respectively for that of the latter in 2001.

Table 1: Regional disparities: per capita income of urban household and rural household

Unit: Yuan, in current price

<table>
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</thead>
<tbody>
<tr>
<td>Urban household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Average</td>
<td>458</td>
<td>1261</td>
<td>2337</td>
<td>4377</td>
<td>5854</td>
<td>6860</td>
<td>11320</td>
</tr>
<tr>
<td>Eastern region</td>
<td>476</td>
<td>1441</td>
<td>3140</td>
<td>5371</td>
<td>7146</td>
<td>8448</td>
<td>14585</td>
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<tr>
<td>Central region</td>
<td>397</td>
<td>1084</td>
<td>2118</td>
<td>3576</td>
<td>4837</td>
<td>5641</td>
<td>9393</td>
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<tr>
<td>Western region</td>
<td>468</td>
<td>1200</td>
<td>2287</td>
<td>3733</td>
<td>5302</td>
<td>6186</td>
<td>9418</td>
</tr>
<tr>
<td>Ratio of Eastern to Central to Western</td>
<td>1.20:1</td>
<td>1.33:1</td>
<td>1.48:1</td>
<td>1.50:1</td>
<td>1.48:1</td>
<td>1.50:1</td>
<td>1.55:1</td>
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<tr>
<td></td>
<td>1.18</td>
<td>1.11</td>
<td>1.08</td>
<td>1.10</td>
<td>1.10</td>
<td>1.10</td>
<td>1.01</td>
</tr>
<tr>
<td>Rural Household</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average</td>
<td>134</td>
<td>398</td>
<td>784</td>
<td>1578</td>
<td>2210</td>
<td>2366</td>
<td>3142</td>
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<tr>
<td>Eastern region</td>
<td>164</td>
<td>513</td>
<td>1156</td>
<td>2346</td>
<td>3237</td>
<td>3542</td>
<td>6226</td>
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<tr>
<td>Central region</td>
<td>132</td>
<td>380</td>
<td>712</td>
<td>2058</td>
<td>2058</td>
<td>2155</td>
<td>4051</td>
</tr>
<tr>
<td>Western region</td>
<td>120</td>
<td>323</td>
<td>619</td>
<td>1520</td>
<td>1520</td>
<td>1640</td>
<td>3646</td>
</tr>
<tr>
<td>Ratio of Eastern to Central to Western</td>
<td>1.25:1</td>
<td>1.35:1</td>
<td>1.62:1</td>
<td>1.65:1</td>
<td>1.57:1</td>
<td>1.64:1</td>
<td>1.54:1</td>
</tr>
<tr>
<td></td>
<td>0.91</td>
<td>0.85</td>
<td>0.87</td>
<td>0.78</td>
<td>0.74</td>
<td>0.76</td>
<td>0.90</td>
</tr>
</tbody>
</table>


Increasing income disparity result in high poverty rate in the central and western areas of China, where poverty population is the most concentrated and the poverty degree is the
deepest across the country. In 2000, only 10%\(^3\) of poverty population is distributed in the eastern regions; 28% of that is distributed in the central regions; and 62% of the poor live in western areas.

Why is China’s regional disparity widen in the past 20 years? Beside the regional nature advantages, are China’s tax preferential policy and government transfer that are implemented in the past 20 years the main reasons of the pattern of disparity? These are the core questions that we try to answer in the following parts. The paper is organized as follows. Section 2 introduces the determinants of China’s regional disparity. Section 3 is the CGE framework to mimic policy shocks on China’s regional disparity and poverty. Section 4 is the simulation results and section 5 is the conclusion remarks.

2. **Determinants of China’s regional disparity**

2.1 Factor market distortion and initial conditions

Factor market distortions and difference in some initial economic conditions at the beginning of the reform, including physical and human capital stocks could be the first determinant that contribute to China’s regional disparity. Advantageous geographic factors in coastal regions\(^4\) of China reduce transportation and communication costs, this in turn may attract more foreign direct investments and migrant labor\(^5\). Besides, China’s labor market distortion such as Hukou system is also widely considered as one of the reason on regional disparity\(^6\). Due to immobility of the labor among different regions, less developed region could not get the needed technique to upgrade their level of industries, management etc., on the other hand, developed region could not get the needed unskilled labor to lower their costs in some industries, which in turn, could bring back relative advantage technique to less developed regions.

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\(^3\) Sources: The Rural Research Office of National Statistics Bureau, “A Monitoring Report on China’s Rural Poverty” (2001). Note: Definition of eastern region, central region and western region is little different from the regions in table 1.

\(^4\) Most provinces and cities of eastern region are located in coastal region of China.

\(^5\) See Demurger et al. (Demurger et al., 2002) and Yao and Zhang (Yao and Zhang, 2001).

2.2 China’s planning style price system

The second determinant is China’s planning style price system. As is well known, there is big difference on industrial structure between eastern coastal region and interior region in China mainly because of the nature resource advantages and historical reasons. While the manufacturing industry is the back-bone industry for eastern China, mining industry shared a big part for interior region because this region is rich in raw material and nature resources. This pattern might not be the cause for regional disparity if China had a market mechanism. However, although economic reform has been implemented since 1978, the planning ideology was still there, especially the commodity pricing system, which is highly controlled by the government during 1978-1991. Under this circumstance, price for raw material and nature resources were set much lower than that of the market price, while the price for manufacturing products were set higher than the products in the market system, on the opposite. This distorted price system make the eastern region benefit from both buying the raw material and from the selling the manufacturing products, while interior region such as central region and western region got the “double loss”. Similarly, agriculture goods also subsidized the manufacturing goods through planning price, and this is also one of the reasons for the disparity between rural area and urban area in China as well.

2.3 Policy relevance to regional disparity

2.3.1 China’s regional development strategies

China’s regional development strategies since reform is another factor that contributed directly to the widening income variations. As early as 1980, China formally established four special economic zones in the coastal provinces of Guangdong and Fujian, and in

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7 Yang (Yang, 2002) emphasized fiscal and credit policies, regional development strategy as the main causes of rising regional inequality in China. Kanbur and Zhang (Kanbur and Zhang, 2002) show empirical evidence that fiscal centralization and trade liberalization have also systematically affected regional inequality. Besides, as a component of government transfer, urban price subsidy and the government subsidies to the urban-based, lossmaking SOEs, as well as preferential credit allocations to the state sector contributed also significantly to the increase in rural–urban household income gap (Yang and Cai, 2000).
1984, another 14 coastal cities were opened in order to attract foreign direct investment and trade. These special economic zones and coastal open areas had considerable autonomy, enjoyed superior tax treatments, and received preferential resource allocations. As part of the Coastal Area Development Strategy, the government gradually extended these special policies to all coastal areas in the late 1980s. Although many cities in the interior regions were eventually opened in 1994, these time lags may have differential effects on attracting investments and generating growth, putting the non-coastal provinces at significant disadvantages. Throughout the 1980s and early 1990s, the coastal provinces attracted disproportionately high shares of foreign investments and trade and became the cradle of rural enterprises, which have been the deriving force behind China’s income growth. During this period, the income levels of interior and coastal regions diverged.

2.3.2 Preferential taxation policy to eastern coastal regions during 1990-2000

Followed “let some get rich first” strategy in the beginning of the reform, the central government granted preferential treatment to coastal regions with respect to foreign investment and taxation. In particular, while state-owned enterprises pay their income tax at 33%, foreign investment enterprises pay only 15% on average. These policies resulted in a rapid income convergence among coastal regions that were allowed to integrate with the outside world, but the consequences were uneven foreign and private investment enterprise regional distribution and a widening income gap between coastal and interior regions. Up to 2005, FDI in eastern region shared about 87% of China’s total FDI, while central and western region share only 9% and 4%. Besides, collective investment to coastal region shared 74.6% of the total collective investment in China in 1997, while only 25.4% of China’s collective investment went to central and western region. These private investments greatly promoted the effectiveness and the production structure of the enterprises located in coastal region, and thus enlarged the development level of different regions in China.
2.3.3 Preferential taxation policy to western regions during 2000-2005

As pointed above, preferential policies to the eastern coastal area China's widened the income disparity between coastal and western region during 1990–2000. To reduce the gap, the government started to adjust the regional structure of the allocation of the state poverty relief funds in 1994 and to formulate preferential policies to actively promote a balanced development between the eastern and western regions. This was achieved by offering tax concessions and exemptions, which is “tax exemptions for two years and tax concession for 3 years” to local joint venture and foreigner-owned enterprises, as well as to the key investment projects in the western regions. In 2001, as means of supporting enterprise in western region, enterprise income taxes reduction to 15 % for the next 10 years, which cover the sector in resource development, tourism development and banking, and channels as build operate- transfer (BOT) pilot projects, transfer-operate-transfer (TOT) projects, mergers and acquisitions, stock markets.

2.3.5 Transfer payment

Transfer payment9 has been playing an important role in China’s governments’ budget and also acts as the most important tool in dealing with regional disparity and poverty in government view per se. During 1980s and early 1990s, China’s fiscal system was decentralized, and regional governments were required to finance themselves. Most of the transfers are purely redistribution of tax revenues among the central and local governments as a result of implementing the tax sharing system. Since 1994, the central Government has increased fiscal transfer payments to the central and western areas and implemented transitional measures for fiscal transfer payment. But country has not reached the basic goal of the tax-sharing system, i.e., increasing fiscal transfers to balance public finance among regions. As the consequence of tax-sharing system, rich regions rather than poor region receive more transfers in the form of returned tax revenues. Only

8 See Jian etc. (Jian, Sachs, and Warner, 1996)
9 In the existing fiscal system, transfer payment items from the central government to local governments include tax refunds, fixed subsidies of the original system, transfer payments, and funds raised by government bonds.
a very small proportion of the transfers are dedicated to improve the regional disparity. Table 2 shows the structure of China’s government transfer in year 1997, 2000, 2002 and 2006, in which tax rebates plus specific purpose grants that favor eastern region shares around 80% of the total government transfer. Transition transfer, which is the only transfer arrangement that aims at narrowing the regional gap, shares a small part of the total transfer as has shown in the table. Although the total amount of this part of transfer payments to the central and western regions are, respectively, double and three times of the amount to the eastern regions in some year after 2000. Due to the small share of transition transfer to the total transfer, the effect of the government transfer on regional disparity is regarded small. However, as a tool of equalized regional gap, Chinese government plan to gradually increase the transfer to central and western region in the future.

Table 2   Structure of government transfer               unit: billion RMB and %

<table>
<thead>
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<tbody>
<tr>
<td></td>
<td>%</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td>Total</td>
<td>285.4</td>
<td>100</td>
<td>466.8</td>
<td>100</td>
</tr>
<tr>
<td>Tax rebates</td>
<td>201.2</td>
<td>70.5</td>
<td>220.7</td>
<td>54.4</td>
</tr>
<tr>
<td>Quota subsidies</td>
<td>11.2</td>
<td>3.9</td>
<td></td>
<td>32.3</td>
</tr>
<tr>
<td>Specific purpose grants</td>
<td>51.6</td>
<td>18.1</td>
<td>89.9</td>
<td>22.2</td>
</tr>
<tr>
<td>Transition transfers</td>
<td>5.0</td>
<td>18.1</td>
<td>89.9</td>
<td>22.2</td>
</tr>
<tr>
<td>Transition transfers</td>
<td>5.0</td>
<td>18.1</td>
<td>89.9</td>
<td>22.2</td>
</tr>
<tr>
<td>Final account subsidies</td>
<td>11.1</td>
<td>3.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (residual)</td>
<td>5.4</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: MOF.
3. Analytic framework

Numerous papers try to adapt CGE models to analyze income distribution and poverty issues\(^\text{**}\) such as Decaluwe, Patry, Savard, and Thorbecke (Decaluwe, Patry, Savard, and Thorbecke, 1999) etc., among which a CGE micro-simulation approach by Cockburn (Cockburn J, 2001) is a quite plausible method. The preliminary analytic framework of Chinese CGE with 3-region model has a similar structure of Cockburn’s model. The differences lie in that we focus on effect of China’s preferential tax policy and government transfer to the poverty rather than tariff.

China has 31 provinces and autonomous regions. Just some of them have their own input-output table, not all of them. These tables and data are created and compiled by department of Statistics in each region separately. In 2005, China’s first “Multi-regional Input-Output Model” was published by Social Sciences Academic Press. In this book, China is divided into 8 regions. In our model, we will divide China into 3 regions basically because this classification can fit the China’s preferential taxation relative to the regional disparity. Also simplification our calculation procedure is another consideration since China’s multi-regional input output model is not a standard SAM, to put the data into the CGE, we need to revise the data structure firstly. Similar considerations are also taken into account when we selected the sectors.

We divide China into eastern China, central China and western China as illustrate in the above section. Eight sectors are agriculture, mining industry, light industry, heavy industry, power industry, construction, trade and transportation industry and other service sectors. We also have rural household and urban household in each region.
3.1 Macro CGE framework

The model to be used in this study was based on a CGE model developed by John Cockburn for analyses of the impact of Nepal’s trade liberalization on Nepal’s economy. The CGE model in this proposal will be a static CGE model with three region (western China, eastern China and central China), 8 sectors and 3 primary factors. It consists of also 2 groups of household in each region in order to mimic shocks on poverty index. The equilibrium is general in the sense that it concerns all the market (goods market, factors’ market and international markets) simultaneously.

The representative producer in each region maximizes profit by optimally using composite factors and inputs, given their market prices. By producing the most profitable combination of goods and services, their products are sold in the domestic market and exported to the rest of the world by CET function given the different market prices. Consumers or individual households in each region receive income from the firm and other source such as government transfer, and then consume goods and services according to maximized utility. The government collects taxes and also consumes. Prices and wages are determined to clear commodity and factor markets.

The model in this project will consist of eight blocks: price block, firm behavior block, household behavior block, government behavior block, trade block, investment demand block, general equilibrium condition block. The core equations of firm behavior, household behavior, government behavior, trade demand and calibration of poverty index are explained as follows. Function relates to the poverty issue FGT which is separate from the CGE model.

The output function is set up according to national level and regional level. Firstly, the national sectoral total output is a CES composite of sectoral output by the region. Regional sectoral output is Leontief function of value-added and intermediate input of

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10 8 sectors and 3 factors see appendix 1.
each sector. Regional sectoral value-added is a CES composite of primary factor. Sector output is sold on domestic market and exports to the international market through the Constant Elasticity of Transformation (CET) function.

In many CGE models, representative household expenditure behavior functions are derived from the maximization of the Cobb-Douglas or Constant Elasticity of Substitution (CES) utility. The limitation of using these functional forms for consumption is that they imply unitary income elasticity of demand. This fails to account for the way changes in income affect the structural adjustment of the economy to exogenous shocks. In order to avoid such drawbacks, consumption demand in our model will be determined by using the utility function associated with the linear expenditure system (LES). Income of rural (urban) household in different regions is the sum of wage income of unskilled labor (skilled labor), return to capital and government transfer. After paying income tax, the household use disposable income to save and to consume.

Similar as the conventional government consumption definition, in this model, government gets income from taxes such as capital income tax, household income tax and tariffs. Government consumption function will simplify as proportion function of the total output.

Total national domestic demand includes household consumption, government consumption, intermediate input demand, and investment demand, which have been discussed above.

3.2 Functions relate to poverty issue

Following Cockburn’s (Cockburn, J, 2001) method, we calculate FGT index to mimic the policy shock on poverty.

In brief, function of calibration FGT is follows.
\[ P_a = \frac{1}{N} \sum_{j=1}^{N} (z - y_j)^{\alpha} \]

where \( j \) is a sub-group of individuals with income below the poverty line \((z)\), \( N \) is the total number of adult equivalents in the sample, \( y_j \) is the income of individual \( j \) and \( \alpha \) is a parameter that allows us to distinguish between the alternative FGT indices.

4. Simulation Results

First, we assume that China’s preferential taxation policy is one of the reasons of China’s regional disparity and expect that if the preferential taxation policy to eastern coastal region is eliminated, China’s regional disparity could be improved. Since core content of the preferential taxation policy is to give income tax reduction to specific firm such as FDI enterprise and other private enterprise, if the preferential taxation for the eastern region is eliminated and the firm income tax rate is the same as that of in central and western region, sell price for the products produced in eastern region will increase, the output in three regions and government revenue will change, finally, household income and consumption will also change. The resulting income and consumption effects will, in turn, feed back into the model and influence the overall results. For this consideration, we begin with the initial preferential tax rates for the eastern region and trace the impacts of elimination this kind of preferential tax for the eastern region through the model\(^\text{11}\).

Then, we examine if China’s current government transfer is an effective tool to narrow the regional disparity. Similar as the first simulation, we initial the government transfer

\(^{11}\) To simulate the relatively real effect of this kind of policy, we need the actual enterprise income tax rate for foreign investment enterprise and other private type enterprises. However, due to lack of the relative data by region, by type of the enterprise (for instance, state-owned enterprise, private owned enterprises etc) and by sectors, we only classify the products by region and sector in our model. In 1997, the total output of China’s FDI enterprise shares 18.57% of the total output of all types of enterprise. By region, the FDI enterprise produce 23.29% of the total output in eastern region, 9.52% and 11.0% in central and western region. By sector, total China’s FDI distribute 1.89% to agriculture, 0.39% to mining industry, 63.85% to manufacture industry, 1.1% to power industry, 2.05% to construction, 2.82% to trade and 29.95% to other service sector. In simulation, when nominal preferential tax rate is 15%, the change in tax should be 15% (30%-15%=15%), however, taking into consideration on the real tax change, we put 0% change in agriculture, mining sector, power sector and construction sector. 3.49% (23.29%*15%) tax reduction for eastern region in manufacture sector (light and heavy manufacturing industry), trade sector and service sector.
the same as that of in 1997, then we increase the government transfer to central and western region by 40%\textsuperscript{12}. Theoretically, more government transfer increase government expenditure to the household and household income will thus increase as a result. The household income and consumption effects will feed back into the model and influence the overall results.

We examine firstly scenario 1 to mimic the effect of China’s preferential tax policy to eastern region, where enterprise income tax increase by 3.49% in light industry, heavy industry, trade industry and service industry. From this simulation, we try to find if the tax preferential policy is one of the reasons of China’s regional disparity and the plausible strategy to fight against regional disparity. Then we simulate scenario 2, in which government transfer increases by 40% in western and central regions. From this examination, we try to answer if China’s government transfer could be an effective tool on narrowing regional disparity.

Table 3 presents sectoral supply and demand effects under 2 scenario designs. From the simulation results, we find when enterprise income tax increase by some amount (see footnote 11) in light manufacturing sector, heavy manufacturing sector, trade and service sectors, we find that the output for domestic use in agriculture, mining sector, construction sector and power sector increase, while output in other 4 sectors decrease. However, when we examine the government transfer exercises, we find, although there are different effects on sectors, due to the small change in percentage, we could get that government transfer has a weak effects on sector output.

\textsuperscript{12} Average nominal growth rate of government transfer during 1997-2002 is 37.8%. In category of the government transfer, only transition transfer aims at eliminate regional disparity, and this part of transfer were all transferred to
Table 3  Effect on total supply and total demand, export and import unit:%

<table>
<thead>
<tr>
<th>Sector</th>
<th>Total supply domestic market</th>
<th>Total supply export</th>
<th>Total demand Domestic demand</th>
<th>Total demand import</th>
<th>Government transfer to central and western region increase by 40% Total supply domestic market</th>
<th>Total supply export</th>
<th>Total demand domestic produced</th>
<th>Total demand import</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>0.23</td>
<td>0.16</td>
<td>0.23</td>
<td>0.12</td>
<td>0.07</td>
<td>0.01</td>
<td>0.07</td>
<td>-0.01</td>
</tr>
<tr>
<td>Mining</td>
<td>2.38</td>
<td>0.36</td>
<td>2.38</td>
<td>-0.93</td>
<td>-0.02</td>
<td>0.01</td>
<td>-0.02</td>
<td>0.00</td>
</tr>
<tr>
<td>Light industry</td>
<td>-0.49</td>
<td>-0.27</td>
<td>-0.49</td>
<td>-0.30</td>
<td>0.11</td>
<td>-0.02</td>
<td>0.11</td>
<td>0.00</td>
</tr>
<tr>
<td>Heavy industry</td>
<td>-0.34</td>
<td>-0.16</td>
<td>-0.34</td>
<td>-0.14</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Power</td>
<td>0.39</td>
<td>-0.58</td>
<td>0.39</td>
<td>1.59</td>
<td>0.01</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Construction</td>
<td>0.27</td>
<td>0.98</td>
<td>0.27</td>
<td>-0.86</td>
<td>0.03</td>
<td>0.00</td>
<td>0.03</td>
<td>0.00</td>
</tr>
<tr>
<td>Trade and transportation services</td>
<td>-0.28</td>
<td>0.34</td>
<td>-0.28</td>
<td>0.24</td>
<td>0.08</td>
<td>0.00</td>
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<tr>
<td></td>
<td>-0.79</td>
<td>-0.09</td>
<td>-0.79</td>
<td>1.76</td>
<td>0.06</td>
<td>0.00</td>
<td>0.06</td>
<td>0.00</td>
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</tbody>
</table>

Table 4 reports some result of breakdown the value-added output by region and sector so that we could find the regional effects. With the increasing enterprise income tax in some sectors in eastern region, value-added output increase in agriculture, mining, power, and construction and decrease in light and heavy manufacturing industry, trade and transportation and service sectors. Compared with the decreasing output in some sectors in eastern region, output increases in central region and western region in the correspondent sectors. The main reason may be that when the enterprise capital tax rate increases, the relative price for capital increases, thus, product price is higher relative to the products that have no such change, this may decrease the output of the former product, meanwhile, changing factor price reallocate the factors among 3 regions, and thus result in the change in output of different sectors.
As we have expected in the beginning of the report, effect of government transfer has weak effects on value-added output, and this result has been tested in some papers written in Chinese (Zhang, 2005).

Table 4  Sectoral value-added output effects in different region  

<table>
<thead>
<tr>
<th>Eliminating preferential tax policy to eastern region</th>
<th>Government transfer to central and western region increase by 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eastern region</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.63</td>
</tr>
<tr>
<td>Mining</td>
<td>2.93</td>
</tr>
<tr>
<td>Light industry</td>
<td>-4.21</td>
</tr>
<tr>
<td>Heavy industry</td>
<td>-4.94</td>
</tr>
<tr>
<td>Power</td>
<td>1.62</td>
</tr>
<tr>
<td>Construction</td>
<td>0.78</td>
</tr>
<tr>
<td>Trade and transportation</td>
<td>-4.23</td>
</tr>
<tr>
<td>services</td>
<td>-3.58</td>
</tr>
</tbody>
</table>

Policy effects on household income are the major concern in our report. Table 5 and table 6 reports the simulation results on change in household income. When we elimination preferential tax policy to eastern region, we find either rural household or urban household in eastern region have been negative effected by the shock. In the contrary, households in western and central region benefit significantly from the policy. However, when government transfer to households in the central and western region by 40%, no significant changes appear in household income in eastern region, relatively bigger positive changes happen for households in western and central regions.
Table 5  Effects on household income  

<table>
<thead>
<tr>
<th>Region</th>
<th>Household Type</th>
<th>Eliminating preferential tax policy to eastern region</th>
<th>Government transfer to central and western region increase by 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern region</td>
<td>Rural household</td>
<td>-2.32</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>-2.73</td>
<td>-0.07</td>
</tr>
<tr>
<td>Central region</td>
<td>Rural household</td>
<td>3.63</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>3.66</td>
<td>0.32</td>
</tr>
<tr>
<td>Western region</td>
<td>Rural household</td>
<td>3.36</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>3.41</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Table 6  Effects on source of household income  

<table>
<thead>
<tr>
<th>Region</th>
<th>Household Type</th>
<th>Wage</th>
<th>Capital</th>
<th>Other income</th>
<th>Wage</th>
<th>Capital</th>
<th>Other income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern region</td>
<td>Rural household</td>
<td>-2.55</td>
<td>-2.26</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
<td>-0.01</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>-2.43</td>
<td>-2.89</td>
<td>0.0</td>
<td>0.00</td>
<td>0.00</td>
<td>0.0</td>
</tr>
<tr>
<td>Central region</td>
<td>Rural household</td>
<td>3.81</td>
<td>3.17</td>
<td>0.0</td>
<td>0.28</td>
<td>0.12</td>
<td>0.51</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>3.57</td>
<td>3.86</td>
<td>0.0</td>
<td>0.31</td>
<td>0.28</td>
<td>0.35</td>
</tr>
<tr>
<td>Western region</td>
<td>Rural household</td>
<td>3.39</td>
<td>3.25</td>
<td>0.0</td>
<td>0.35</td>
<td>0.12</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Urban household</td>
<td>3.68</td>
<td>3.24</td>
<td>0.0</td>
<td>0.32</td>
<td>0.17</td>
<td>0.28</td>
</tr>
</tbody>
</table>
In terms of the welfare, Hicksian EV increases by 0.58% and 0.07% under the above two scenarios. Finally, following Cockburn (Cockburn, J, 2001), we calculate FDT poverty index using the household data sourced from NBS in 1997 and DAD software. Table 7 reports the results.

Table 7 Change in FGT poverty index (%)

<table>
<thead>
<tr>
<th>Index</th>
<th>Eliminating preferential tax policy to eastern region</th>
<th>Government transfer to central and western region increase by 40%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Eastern region</td>
<td>Central region</td>
</tr>
<tr>
<td>Head count ratio</td>
<td>-0.11</td>
<td>-1.05</td>
</tr>
<tr>
<td>(α= 0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty gap</td>
<td>-0.07</td>
<td>-0.50</td>
</tr>
<tr>
<td>(α= 1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poverty severity</td>
<td>-0.05</td>
<td>-0.11</td>
</tr>
<tr>
<td>(α= 2)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. Conclusion

Regional disparity has a direct relationship with the poverty, fighting against poverty has significant positive effects on the welfare of the whole society, and thus an unavoidable obligation of the government. As has illustrated in this article, anti-poverty strategies since the middle of 1980s in China has characterized as regionlism, from the preferential tax policy to eastern coastal region from the end of 1970s to western region development strategies since the begining of this centary.

Using some statistic data and a computable general equilibrium model with a 3 region component, we find that preferencial tax policy to specific region could be an important
reason of China’s regional disparity and has significant effect on household income, as well as FGT indicators. On the other hand, government transfer has little effect on both income of households and FGT indicator. The simulation results suggest that tax policy is a more effective tool to fight against China’s regional disparity than government transfer.

To effectively use government transfer against poverty, Chinese government should either need to use more money for transferring to the poor region or poor people, or change its old transfer structure in order to really benefit the poor region and poor people. Other strategies are also discussed and some of them are already implemented recently, such as reform its pension system, social insurance system and unemployment system to protect the low-income population, and these live in rural area. Regional disparity and poverty problem are expected to be improved for approaching the “homonomous society” in China.
References


Zhang, Qichun (2005), “China’s regional disparity and government control”, The Commercial Press, PRC
Appendix 1  The core equations in CGE model for China

*Firm behavior*

Figure 1 shows the structure of production as have been described above.

Figure 1  Structure of production
Suppose:

\( i = \) Agriculture, Mining industry, Light industry, Heavy industry, Power industry (Electrics, Gas and water), Construction, trade and transportation, Other service sectors

\( h = \) Rural households in different regions \((u)\), Urban households in different regions \((s)\)

\( f = \) Capital, Unskilled labor, Skilled labor

**Total national output (or CES composite of sectoral output by each region)**

\[
QT_i = \sum_r (\alpha_{ir} \times YT_{ir}^{\alpha})
\]

(1)

in which, \( QT_i \) : Total output of sector

\( YT_{ir} \) : Sector output in region \( r \)

\( \alpha_{ir} \) are parameters

**Regional sectoral output**

\[
YT_{ir} = VA_{ir} / v_{ir}
\]

(2)

in which, \( YT_{ir} \) : Sector output in region \( r \)

\( VA_{ir} \) : Variable sector production cost in region \( r \)

\( v_{ir} \) : Leontief coefficient of value-added in region \( r \)

**Regional Value-added**

\[
VF_{(f \in F)} = \frac{1}{B_{fr}} (\beta_{fr} \times PV_{ir}^{\alpha_f}) \times VA_{ir} \sum B_{fr} = 1
\]

(3)

\( F \in (\text{skilled labor, unskilled labor, capital}) \)

in which, \( VF_{fr} \) : Factor demand in region \( r \)

\( PF_{fr} \) : Factor price in region \( r \)

\( B_{fr}, \beta_{fr} \) are parameters
domestic market supply and export to international market

\[ SE_i = \frac{1}{C_i} \left[ \gamma_{ie} \frac{PE_i}{PT_i} \right]^{\sigma_i} * QT_i \]  

(4)

\[ SD_i = \frac{1}{C_i} \left[ \gamma_{id} \frac{PD_i}{PT_i} \right]^{\sigma_i} * QT_i \]  

(5)

In which: QT_i: total production

SD_i: local market sales

SE_i: sales at international market

PT_i: output price after tax

PE_i: Price of goods for export

PD_i: Price of goods sold at home region

C_i, \gamma_i are parameters

**Household behaviour block**

**Rural household consumption function**

\[ HC_{ur} = \eta_{ur} + \frac{\mu_{ur}}{PC_{ur}} (HD_{ur} - \sum PC_{ur} \cdot \eta_{ur}) \]  

(6)

in which, HC_{ur}: consumption of rural household in region r

PC_{ur}: consumer price in region r

HD_{ur}: disposable income of rural household in region r

\eta_{ur}: minimum subsistence requirements for rural household in region r

\mu_{ur}: Marginal propensity to consume for rural household in region r

**Urban household consumption function**

\[ HC_{sr} = \eta_{sr} + \frac{\mu_{sr}}{PC_{sr}} (HD_{sr} - \sum PC_{sr} \cdot \eta_{sr}) \]  

(7)

in which, HC_{sr}: consumption of urban household in region r

PC_{sr}: consumer price in region r
HD_{sr}: disposable income of urban household in region r  
\eta_{sr}: minimum subsistence requirements for urban household in region r  
\mu_{sr}: Marginal propensity to consume for urban household in region r

Rural household income function

\[ HI_{ur} = \sum_{f \in F_1} (PF_{f_{ur}} \times VF_{f_{ur}}) + Trans^{por}_{rh} \quad F_1 \in (unskilled labor) \]  \hspace{1cm} (8)

in which, HI_{ur}: rural household income  
Trans^{por}_{rh}: government transfer to the rural household

Urban household income function

\[ HI_{sr} = \sum_{f \in F_2} (PF_{f_{sr}} \times VF_{f_{sr}}) + Trans^{n-por}_{rh} \quad F_2 \in (skilled labor) \]  \hspace{1cm} (9)

in which, HI_{sr}: urban household income  
Trans^{n-por}_{rh}: government transfer to the urban household

Household disposable income function

Rural household disposable income is rural household income minus income tax of the household.  
\[ HD_{ur} = HI_{ur} - TXH_{ur} \]  \hspace{1cm} (10)

in which, TXH_{ur}: rural household income tax

Urban household disposable income is urban household income minus income tax of the household.  
\[ HD_{sr} = HI_{sr} - TXH_{sr} \]  \hspace{1cm} (11)

in which, TXH_{sr}: urban household income tax

Definition of household saving
\[ HS_{ur} = HD_{ur} - HC_{ur} \]  
\[ HS_{sr} = HD_{sr} - HC_{sr} \]  

in which: \( HS_{ur} \) is rural household saving in region \( r \)  
\( HS_{sr} \) is urban household saving in region \( r \)

**Government behavior block**

*government total spending function*

\[ GE = \sum \left( \sum \text{GC}_{ir} + \text{trans}_{rk}^{por} + \text{trans}_{rk}^{n-por} + \text{Trans}^{ent}_{rk} \right) \]  

in which, \( GE \): government expenditure in region \( r \)  
\( \text{GC}_{ir} \): government consumption in region \( r \)  
\( \text{Trans}^{ent}_{rk} \): government transfer to enterprise or export subsidy

*government consumption function*

\[ \text{GC}_{ir} = \omega_{ir} \times YT_{ir} \]  

in which: \( \omega_{ir} \): The share of government consumption in output

*government revenue function*

\[ GR = \sum_i \text{TARRIF}_i + \sum_h \sum_r \text{TXH}_{rh} + \sum_r \sum_i \text{TXP}_{ir} \]  

in which, \( GR \): government revenue  
\( \text{TARRIF}_i \): tariff  
\( \text{TXH}_{rh} \): household income taxes in region \( r \)
TXP_{ir}: indirect tax in region \( r \)

**Tariff**

\[
TARRIF_i = tm_i \times pm_i \times im_i
\]  \hspace{1cm} (17)

in which, \( tm_i \): tariff rate of commodity \( i \)

\( TARRIF_i \): tariff revenue

\( pm_i \): world price of commodity \( i \)

\( im_i \): import good (quantity) \( i \)

**capital income tax function**

\[
TXP_{ir} = tp_{ir} \times VF_{ir} \times PF_{ir}
\]  \hspace{1cm} f=capital \hspace{1cm} (18)

in which, \( TXP_{ir} \): capital income tax

\( tp_{ir} \): capital income tax rate in region \( r \)

**household income tax function**

\[
TXH_{ur} = th_{ur} \times HI_{ur}
\]  \hspace{1cm} (19)

\[
TXH_{sr} = th_{sr} \times HI_{sr}
\]

in which, \( TXH_{ur} \): rural household income tax

\( th_{ur} \): rural household income taxes rate in region \( r \)

\( TXH_{sr} \): urban household income tax

\( th_{sr} \): urban household income taxes rate in region \( r \)

**Other demand function**

Figure 2 shows the structure of demand in the model. Total domestic demand includes household consumption, government consumption, intermediate inputs demand, and investment demand. Consumption functions for different agents (household and
government) have been discussed as the above, as well as the intermediate inputs demand equation. Investment demand is simply defined as a portion of total output.

On the other hand, from the supply side of these demand points of view, total demand is sourced from domestically produced goods and imported goods.

Figure 2   Structure of demand

Investment demand function

\[ DI_i = \sigma_i \times AD_i \]  

(20)

In which, \( DI_i \): investment demand

\( \sigma_i \): Share of investment in total demand
**Import demand function**

\[ IM_i = \frac{1}{E_i} \left[ (1 - \phi_i) \frac{PA_i}{PM_i} \right]^\theta_i * AD_i \]  \hspace{1cm} (21)

In which, \( IM_i \): Aggregate import
\( AD_i \): Total demand
\( PM_i \): Aggregate import price
\( E_i, D_i \) and are parameters

**Intermediate input demand function**

\[ IND_{ir} = io_{ind} * YT_{ir} \]  \hspace{1cm} (22)

\( IND_{ir} \): intermediate input demand
\( io_{ind} \): intermediate input coefficient

**General equilibrium and model closure**

**Equilibrium in goods market**

Total demand=goods supplied by domestic market + goods supplied by import

\[ AD_i = \sum (HC_{ir} + GC_{ir}) + \sum IND_{ir} + DI_i \]  \hspace{1cm} (23)

**Equilibrium in factor market**

Total factor demand =total factor supply

\[ \sum VF_{fr} = FS_{fr} \]  \hspace{1cm} (24)
in which, \( FS_{fr} \): factor supply of region \( r \)

*Equilibrium in government account*

\[
GR = GE + GS
\]

(25)

in which, \( GS \): central government saving

*Equilibrium of total investment and saving*

\[
\sum DI_i = \sum HS_{(u,s)r} + GS + ES + BOT
\]

(26)

in which, \( ES \): enterprise savings

\( BOT \): Balance of trade
Appendix 2 Data and parameters

Source of the SAM

As in any general equilibrium model applied, the main source of database is the Social Accounting Matrix (SAM). SAM for eastern China, western China and the rest of China in this project will be based on “China’s multi-regional input-output table”\(^{13}\) published in 2005. The structure of I-O table see table 8. Our aim of applying this I-O table is to get a standard SAM (see table 9) that can be used in our CGE model.

Table 8 China’s multi-regional I-O table

<table>
<thead>
<tr>
<th>Intermediate Input</th>
<th>Intermediate demand</th>
<th>Final demand</th>
<th>export</th>
<th>Import</th>
<th>errors</th>
<th>Total output</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Region 1…Region 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate Input</td>
<td>Region 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Region 8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value-added</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total input</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^{13}\) See China Information Centre (2005), “Multi-regional Input-output Model for China”, Social Sciences Academic Press. In China, the National Bureau of Statistics (NBS) of China began to compile national income accounts from 1952 to 1984 according to Material Product System (MPS). From 1985 to 1992, national account featured the coexistence of MPS and the System of National Accounts (SNA). Since 1993, the SNA has been the sole basis of the national accounts system. Every five years the NBS has published a new I-O table. At present, although it was not really a SAM according to an SNA system in developed countries, it was very similar.
Table 9  SAM structure in Chinese CGE model with 3 region model

| Expenditures | Receipts factors | household Labour income | firm Capital income to firm | government Income tax | the rest of the world imports | activity Value-added | commodity Domestic supply, export supply | investment Intermediate input | Total Total sales | savings Household savings | savings Firm savings | commodity Government consumption | savings Government savings | savings Trade balance | savings Total cost | savings Total absorption | savings Total investment |
|--------------|------------------|-------------------------|-----------------------------|------------------------|-------------------------|--------------------------|------------------------|--------------------------|----------------|-------------------------|------------------------|--------------------------|------------------------|----------------|-------------------------|------------------------|
| factors      | Labour income    | Government transfer     | Firm income                 | Government            | Domestic supply, export supply | Investment              | Total sales             |                          |                | Total savings            |                       |                          |                        |                |                         |                        |

**Source of the elasticity**

Elasticity of the substitution in the model includes elasticity of substitution between primary factors, elasticity of transformation between domestic sales and exports. The best way to get the elasticity is to estimate it using either econometric approach or “validation” procedure. To make the work easier and reasonable, the author will borrow these elasticity from the GTAP database directly otherwise estimated them by herself.

Besides some elasticity, before solving the CGE model, a so-called parameter calibration procedure must be undertaken so that the values of some key parameters (except elasticity of substitution) are directly calculated from the model equilibrium conditions. Such methodology is widely used in CGE models. Further, we use equilibrium data to find the values of the share and scale parameters in the production functions, CET function, as well as parameters in the LES functions.
Source to classify household

It is clear that data on households’ behaviour is a crucial part for analysing the impact of policies on income distribution and poverty. We draw data on this issue directly from the “Multi-regional I-O Model for China” to disaggregate household in 2 different groups in each region (1 group is for rural area and another group is for urban area)\textsuperscript{14}.

\textsuperscript{14} Actually, in China Statistical Yearbook, NBS classifies 7 groups of urban household and 5 groups of rural household.