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Growing (Un)equal: Fiscal Policy and Income Inequality in China and BRIC+

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Growing (Un)equal: Fiscal Policy and Income Inequality in China and BRIC+

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Abstract

This paper investigates the empirical characteristics of income inequality in China and a panel of BRIC+ countries over the period 1980–2013, with a focus on the redistributive contribution of fiscal policy. Using instrumental variable techniques to deal with potential endogeneity, we find evidence supporting the hypothesis of the existence of a Kuznets curve—an inverted U-shaped relationship between income inequality and economic development—in China and the panel of BRIC+ countries. In the case of China, the empirical results indicate that government spending and taxation have opposing effects on income inequality. While government spending appears to have a worsening impact, taxation improves income distribution. Even though the redistributive effect of fiscal policy in China appears to be stronger than what we identify in the BRIC+ panel, it is not large enough to compensate for the adverse impact of other influential factors.

JEL Classification Numbers: O1, H5

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I. INTRODUCTION

China represents an important case to analyze the long-term evolution of household income inequality. Since the first wave of economic liberalization in the late 1970s, China has grown at an astonishing rate of almost 10 percent per year, raising 660 million people out of poverty. Per capita income increased from \$320 in 1980 to about \$5,500 in 2012, and the number of people living on less than \$1.25 a day declined from 85 percent of the population in 1980 to 11 percent by 2012, according to the World Bank. But the fruits of the transition from a system of centrally planned socialism to a market-oriented economy are not being widely shared across the society. Income inequality—as measured by the Gini coefficient for pre-tax market income—has exhibited an increasing trend from 0.28 in 1980 to 0.44 in 2000 and 0.52 by 2013. There is also significant within-China variation in income inequality at the regional level. This widening in the gap between rich and poor shows China’s transition from a relatively egalitarian society to one of the most unequal countries in the world.¹

The sharp increase in income inequality over the past three decades appears to be a result of China’s investment and export-led development model.² The growth incidence curve—the extent to which each quintile of households benefits from growth in real terms—indicates a cumulative increase of 331 percent for the lowest-income quintile between 1980 and 2012, but 1,042 percent for the highest-income quintile. As a result, the top quintile now captures 47 percent of total income (up from 38 percent in 1980), while the lowest quintile accounts for only 4.7 percent (down from 8.7 percent).³ In other words, China’s widening income inequality is largely a reflection of faster income growth among the rich, rather than stagnant living standards among the poor. The Chinese economic reform (*gaige kaifang*) started in 1978 by decollectivizing agricultural land and allocating to individual households and then expanded in the early 1980s to industrial development in coastal urban areas with greater openness to international trade and finance. This reform strategy implied aiming for high aggregate growth rates at the expense of an increase in income inequality.⁴ There is, however, mounting evidence that income disparities become detrimental to economic growth over the long term, with significant social consequences, especially in a country like China

¹ There are various methods of estimating the Gini coefficient, resulting in significant differences. For example, the China Household Finance Survey conducted by Texas A&M University and Southwestern University of Finance and Economics in Chengdu, estimated that the overall Gini coefficient was 0.61 in 2010.

² Lee, Syed, and Wang (2013) provide a detailed account of China’s development model and its potential effects on income distribution.

³ According to the Chinese Family Panel Studies, conducted by Peking University and covering 14,960 households in five province-level areas, the top 5 percent bracket earned 23 percent of total household income, while the households in the lowest 5 percent bracket accounted for just 0.1 percent of total income.

⁴ At the beginning of *gaige kaifang*, Deng Xiaoping’s popular slogan was “We should let some people get rich first, both in the countryside and in the urban areas” (Shawki, 1997).

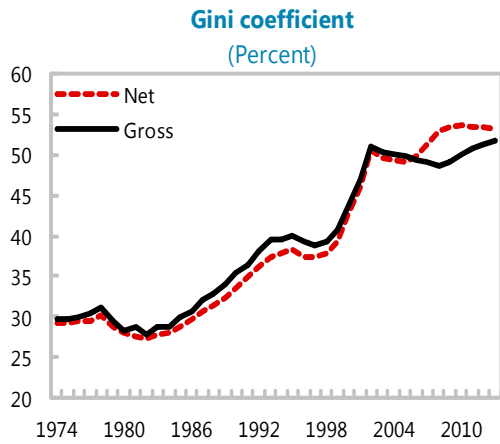
aiming to move beyond the “middle income” status. Berg and Ostry (2011), among others, show that income inequality is a key determinant of the pace and sustainability of economic growth, even after taking into account other economic and institutional factors.

Income distribution depends on a complex array of factors including the design of fiscal policy instruments. In the case of China, according to the Standardized World Income Inequality Database (SWIID), the Gini coefficient market income (before taxes and transfers) increased by 82 percent between 1980 and 2013, whereas the *net* Gini coefficient (after taxes and transfers) increased by 90 percent (Figure 1). This indicates erosion in the redistributive impact of fiscal policy. While fiscal redistribution—defined as the difference between *market* and *net* Gini coefficients—amounted to an average of 1.7 Gini-index points in the 1990s, it turned negative with an average of 1.1 Gini-index points over the period from 2000 to 2013. Fiscal policy, however, can matter not just for redistribution (defined as the difference between *market* and *net* Gini coefficients), but also for market income inequality. This is of course a function of the level and composition of taxation and spending as well as their distribution across income groups. The distribution of taxes in China, for example, remains regressive, with taxes accounting for 10.8 percent of annual income among the bottom decile households (and 13.3 percent among the bottom five percent) compared with 8.7 percent among the top decile households.

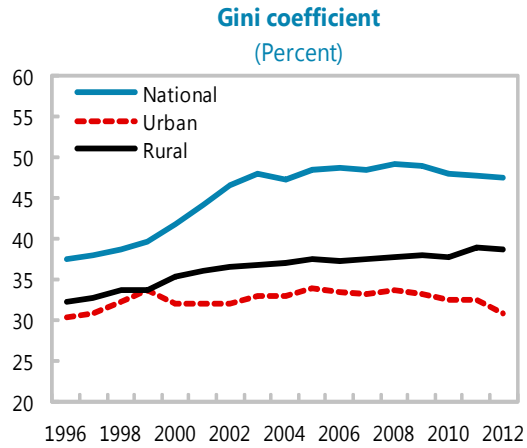
The aim of this paper is to single out the distributional effects of fiscal policy in China during the period 1980–2013. The empirical objective of this paper is to identify the proximate determinants of income inequality, with a focus on the distributional effects of fiscal policy. From an econometric point of view, there are two significant challenges. Firstly, potential endogeneity (or reverse causality) between inequality and growth is a problem. Secondly, time-series analysis based on a small sample may degrade the quality of estimations and lead to misleading conclusions. To deal with the potential endogeneity of economic growth to income inequality, we use the number of international tourist arrivals as an instrumental variable (IV) for real GDP per capita and utilize the IV estimation via the two-stage least squares and the Generalized Method of Moments (GMM) estimators. To overcome the data constraint of time-series approach in a single-country case, we undertake a panel data analysis of income inequality in the context of BRIC+ countries (Brazil, Russia, India, and China, *plus* 30 other emerging market economies), using the IV- GMM estimator. This allows us to present a more vigorous empirical analysis including a broader set of explanatory variables.

The empirical results support the hypothesis of an inverted U-shaped relationship between income inequality and growth. In the case of China, we find that government spending and taxation have opposing effects on income inequality in the short run as well as over the long term. While government spending appears to be associated with worsening income inequality, taxation improves the distribution of household income. The results of the panel data analysis of BRIC+ countries are broadly consistent with our China-specific

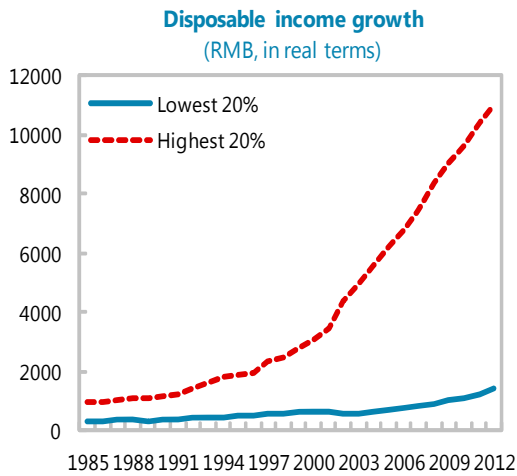
Figure 1. Income Inequality and Fiscal Redistribution in China



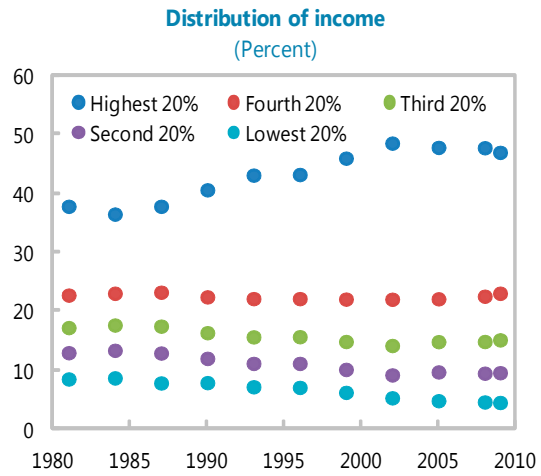
Sources: SWIID.



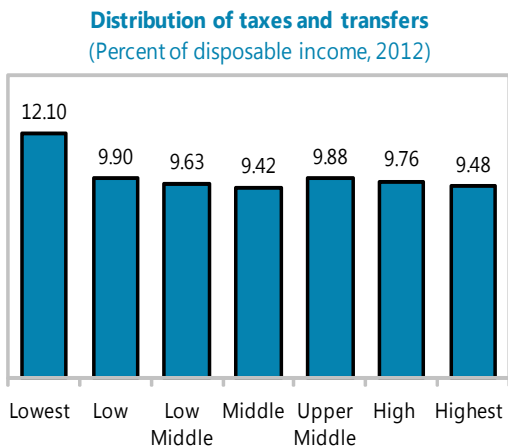
Sources: OECD Economic Surveys, China 2013.



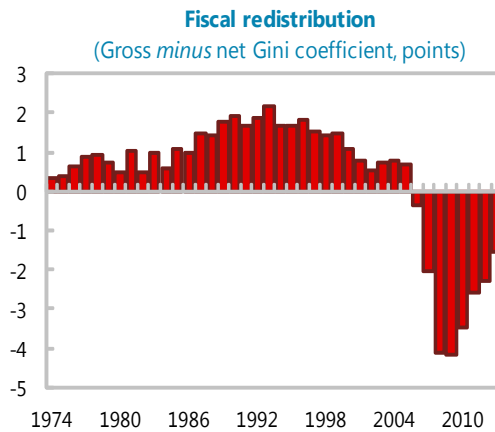
Sources: CEIC China database.



Sources: World Bank WDI database.



Sources: National Bureau of Statistics.



Sources: SWIID; Author's calculations.

findings, with one important exception. Both government spending and taxation have the desired redistributive effect, albeit statistically insignificant. Although the redistributive impact of fiscal policy in China appears to be stronger, the “net” effect is still not enough to compensate for the adverse impact of other influential factors identified in the analysis.

Appropriate fiscal redistribution can bring about balanced and sustainable growth by reducing *net* income inequality.⁵ Empirical findings presented in this paper have important policy implications. Fiscal policy in China and in BRIC+ countries can be re-designed to foster inclusive growth and to reverse the pattern of widening income inequality, without undermining fiscal sustainability and causing distortions and efficiency losses. First, there is a need to broaden the tax base and make the tax system more progressive with a shift from indirect to direct taxation to help narrow income inequality. Second, there is great scope for improving progressivity through well-targeted spending programs that champion greater access for the poor to education, healthcare and other social services, particularly in rural areas who account for over 95 percent of poor households in China.

The remainder of this paper is organized as follows. Section II puts China’s experience in a comparative perspective. Section III provides a brief overview of the literature on income inequality, while Section IV outlines China’s fiscal policy space. Sections V and VI describe data sources and the salient features of our empirical strategy, respectively. The econometric results are presented in Section VII, followed by concluding remarks in Section VIII with a focus on broad fiscal policy implications.

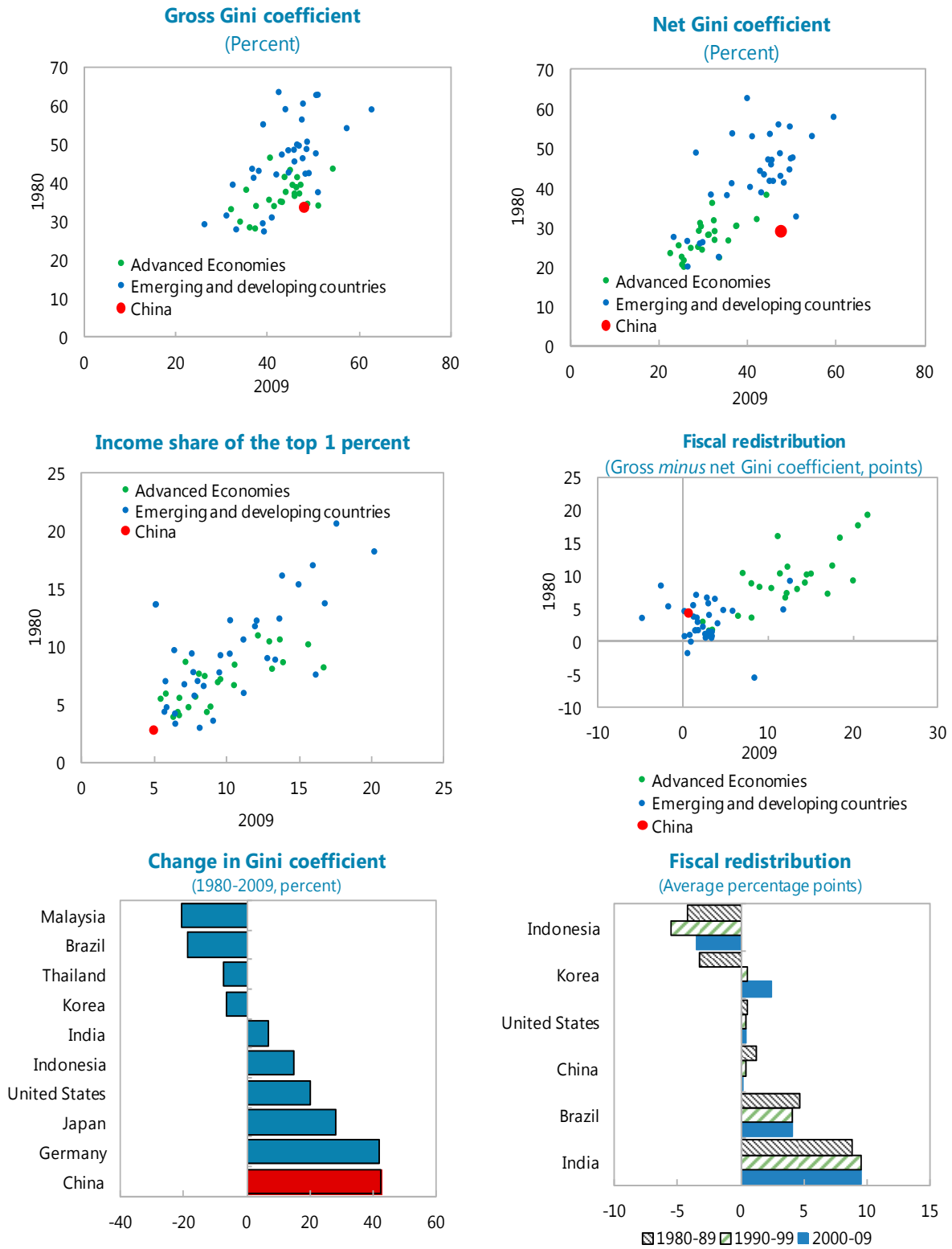
II. CHINA’S EXPERIENCE IN THE GLOBAL CONTEXT

How does China’s experience look in a comparative perspective? Across the world, intra-country income inequality has widened since the 1980s to levels unprecedented in the post-war period, with some exceptions in Latin America and Sub-Saharan Africa (Figure 2). The gap between rich and poor households within a country has widened despite a significant degree of convergence in per capita income levels between countries. The unweighted ‘world average’ *market* Gini coefficient increased from 0.41 in the 1980s to 0.43 by 2007 and, after the recent global crisis, to 0.45 in 2013. Even after accounting for taxes and social transfers, income inequality widened in a similar trend, with the unweighted ‘world average’ *net* Gini coefficient increasing from an average of 0.36 in the 1980s to 0.38 by 2013.

These averages, however, mask significant differences in inequality across countries and over time. They reflect country-specific demographic, institutional and economic characteristics and varying degrees of progressivity in taxation and expenditure policies. At

⁵ Ostry, Berg, and Tsangarides (2014) find that lower *net* income inequality is robustly correlated with faster and more durable growth.

Figure 2. China and the Rest of the World



Sources: SWIID; Author's calculations.

the one end of the spectrum, there are countries such as Bulgaria and Belgium with traditionally low levels of income inequality. At the other end, there are countries such as Kenya and Indonesia with income inequality significantly above the average. Within this global context, while achieving an exceptionally high rate of economic growth and a remarkable progress in poverty reduction, China is one of the countries that recorded a significant deterioration in income inequality, with the *market* and *net* Gini coefficients rising from an average of 0.30 and 0.29 in the 1980s, respectively, to 0.52 and 0.53 by 2013. Similarly, the income share of the top one percent of households in China increased from 2.8 percent in 1980 to 4.9 percent in 2009. This ratio is relatively low compared to that in many other countries (such as 7.2 percent in South Korea and 19 percent in the U.S.), but it is still significantly higher than the total income share of the lowest quintile of households in China.

Fiscal policy has contributed to changes in income inequality in most countries. On average, the decrease in income inequality brought about by tax and transfer policies was greater in economies with higher inequality of pre-tax income. The redistributive effect of fiscal policy, as measured by the difference between *market* and *net* Gini coefficients, diminished from an unweighted ‘world average’ of 7.1 Gini-index points in the 1980s to 6.3 Gini-index points in the 1990s, but recovered to an average of 6.9 Gini-index points in the 2000s. Against this global background, fiscal policy in China has been much less effective at decreasing income inequality. The extent of fiscal redistribution declined from an average of 1 Gini-index points in the 1980s and 1.7 Gini-index points in the 1990s to -1.1 Gini-index points over the period 2000–13.

III. AN OVERVIEW OF THE LITERATURE

There is a vast literature on income inequality, but most of these studies focus on the relationship between income inequality and economic development. In a seminal paper, Kuznets (1955) advanced the conjecture that a country’s income distribution becomes less egalitarian as its level of economic development increases, and that growth brings about more equality only after the level of income reaches a threshold. In other words, the evolution of income distribution follows an inverted U-shaped curve: growth results in relatively more inequality in the initial stages of economic development, and greater equality at advanced stages. Greenwood and Jovanovic (1990), Banerjee and Newman (1993), Galor and Zeira (1993), Perotti (1993) and Barro (2000) found a positive correlation between growth and income inequality in a cross-section of international data. This hypothesis, however, has been challenged by other studies. Adelman and Robinson (1989), Anand and Kanbur (1993) and Ravallion (1995), among others, showed that there is no empirical support for Kuznets’ conjecture.

A strand of the literature has looked beyond the Kuznets’ hypothesis, aiming to identify the fundamental determinants of income inequality. There is extensive evidence suggesting that high inflation tend to depress income growth for the poor and lead to greater

income inequality (Datt and Ravallion, 1998; Ferreira, Leite, and Litchfield, 2007). One of the most debated issues is, however, the role of globalization—the increased openness to foreign trade and investment. From a theoretical point of view, the impact of trade openness on income inequality depends on factor endowments—leading to an increase (decrease) in inequality in countries with higher (lower) level of human capital. In the empirical literature, on the other hand, some scholars, such as Dollar and Kraay (2004), argue that globalization benefits the poor, while others like Barro (2000) and Milanovic (2005) show that greater openness leads to an increase in inequality, especially in countries with a higher level of income. Similarly, the relationship between foreign direct investment (FDI) and income inequality has been extensively investigated and found to be positive. While Evans and Timberlake (1980) argued that dependence on FDI tend to exacerbate income inequality by altering the occupational structure of developing economies and producing highly paid elite and large groups of marginalized workers, Alderson and Nielson (1999) showed an inverted-U-shaped relation between income inequality and the stock of FDI per capita.

Financial development is shown to affect the distribution of income through multiple channels. A plethora of studies has shown that financial development affects income equality through enhancing human capital accumulation, improving the access to capital for entrepreneurial activity, and changing the sectoral composition of employment (Beck, Demirguc-Kunt, and Levine, 2007; Demirguc-Kunt and Levine, 2009). Most of the empirical literature reaches the conclusion that financial development lowers income inequality over the long term (Galor and Zeira, 1993; Banerjee and Newman, 1993; Clarke, Xu, and Zou, 2006), except at the very early stages of development (Greenwood and Jovanovic, 1990). However, since the distribution of capital income is significantly more unequal than the distribution of labor income, the concentration of wealth could become one of the root causes of income inequality over time (McKenzie and Woodruff, 2006; Rajan, 2010).⁶

The literature has also focused on the relationship between demographic and social characteristics and income inequality. Population growth is found to be critical, mainly through its effect on the demographic composition. First, while an increase in the supply of unskilled young workers may depress income growth (Alderson and Nielsen, 1999), an increase in the share of population over 65 years of age tends to worsen income inequality (Deaton and Paxson, 1997). Second, as pointed out by Kuznets (1955), the process of urbanization becomes decisive, especially in the initial stage of economic development, as the evolution from an agrarian economy to industrialization leads to significant income

⁶ In this paper, we do not explore wealth inequality, because of data constraints. Cross-country data, however, indicate that wealth inequality tends to be worse than income inequality and has a significant bearing on income inequality through non-labor income accrued to the asset-rich bracket of households. In the case of China, available data based on the China Household Income Project surveys show that the share of asset income increased from 8 percent of total household income in 2002 to 15 percent in 2007, contributing to 13 to 19 percent of income inequality (Li and Sicular, 2014).

disparities between and within rural and urban areas. Third, education forms a vital link between the pace and quality of growth and income distribution, although the relationship is not straightforward. While cross-country studies indicate that a higher level of educational attainments bring about greater equality in the distribution of income, the type, quality and distribution of education result in an intricate effect on income inequality, particularly in connection with skill-biased technological change (Barro, 2000; Checci, 2000).

Another critical dimension of income inequality is related to the distributional effects of fiscal policy. Although fiscal policy is traditionally assigned a limited role focusing on the provision of public goods and services and long-run fiscal sustainability, without directly taking into account distributional considerations, Musgrave (1959), among others, showed that fiscal policy can have an activist role in achieving an equitable distribution of income among households. The large extent of variation in *net* income inequality across countries, however, indicates that fiscal policy can influence the distribution of income (Feenberg and Poterba, 1993; Auten and Carroll, 1999; Benabou, 2000; Muinelo-Gallo and Roca-Sagales, 2011). The key consideration is the level and progressivity of taxation and expenditure policies. Well-targeted public spending can improve income distribution by providing greater equality in access to education and healthcare and thereby redistributing ownership of the factors of production.⁷ Taxation plays an important role in attaining greater equity in the distribution of income through the progressivity of the tax system and by generating sufficient revenues to fund public spending on social programs. Although taxation, especially of the top-earning bracket, is presented as an obstacle to growth and an ineffective tool for fiscal redistribution (Bird and Zolt, 2005), Bastagli, Coady, and Gupta (2012) show that direct income taxes and cash transfer schemes reduced the average Gini coefficient by about one-third in OECD countries over the period 1985–2005.

In China, uneven educational attainments and large geographical disparities are shown as the primary causes of inequality.⁸ Ping (1997), Knight and Song (1999), Sicular, Yue, Gustafsson, and Li (2006), and Whyte (2010) identify the rural-urban income gap—driven by a secular decline in agricultural prices and rapid urbanization—as the key determinant of income inequality. In particular, the *hukou* (household registration) system is identified to have contributed to the rural-urban income inequality by restricting internal migration (Herd, Koen and Reutersward, 2010). Walsh and Yu (2012) find that inflation exacerbates income inequality, Xu and Zou (2000) show that the increase in income inequality is associated, besides high inflation, with the decline in the share of state-owned enterprises and, to a lesser extent, trade openness. With regards to the relationship between financial development and income distribution in China, the empirical evidence is not conclusive. While most studies

⁷ In general, social spending such as pensions and unemployment benefits transfer resources to groups of the population who do not earn labor income and whose risk of falling into poverty would otherwise be large.

⁸ Knight (2014) provides a comprehensive overview of the literature on income inequality in China.

identify an adverse effect, Deng and Su (2012) find that financial deepening contributes to income growth among the poor and thereby to reducing income inequality. Taken together, the findings in the literature suggest that income inequality in China appears to be intimately linked to the state-engineered export-led development model that has reshaped the opportunity landscape and the rates of return on human, financial and physical capital.

IV. A SYNOPSIS OF CHINA'S FISCAL POLICY

China has reformed its fiscal policy framework to improve revenue collection and enhance the effectiveness of public spending. One of the key components of fiscal reform is the devolution of authority for fiscal policymaking from the central government to provincial governments, which now account for 53 percent of general government revenues and 85 percent of expenditures. Another strategic development has been a range of tax policy and administration reforms, including the introduction of the value added tax (VAT) regime that replaced the wholesale turnover tax. Although the VAT still suffers from a narrow tax base that is confined to goods and a few services, the system has helped remove tax-induced distortions and provided a significant and stable source of revenue.

China's tax-to-GDP ratio doubled from less than 10 percent in the early 1990s to 19 percent in 2013. It is, however, still significantly below an average of about 35 percent in the OECD countries. Furthermore, China collects more than half of its revenues from indirect taxes. Personal income taxes amount to 6 percent of total tax revenues (and 1.1 percent of GDP), while indirect taxes on goods and services account for over 50 percent of total tax revenues (and about 10 percent of GDP). Even though China has a progressive personal income tax rate schedule with a top rate of 45 percent, its broad tax brackets and generous allowance schedule result in a very low ratio of personal income taxes to indirect taxes, which is a rough measure of the overall progressivity of taxation.⁹

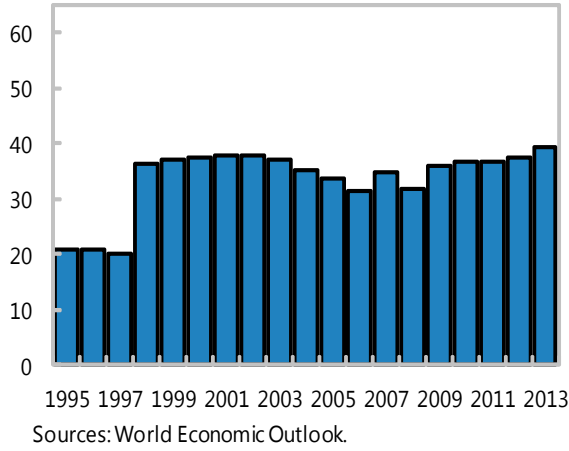
China's government spending has grown steadily from 18 percent of GDP in 1990 to 29 percent in 2013, but it remains below the OECD average of 45 percent. Off-budget spending by local governments, however, is substantial and amounts to about 15 percent of GDP.¹⁰ This increase in government spending is largely due to higher outlays to infrastructure investment and public administration, while social spending accounts for about 6 percent of GDP. Although the government has recently expanded the minimum subsistence allowance (*dibao*) system and introduced a new pension scheme in rural areas, but these programs have limited coverage and provide a low level of income compared to urban

⁹ The effective number of personal income taxpayers in China is less than 3 percent of the working population.

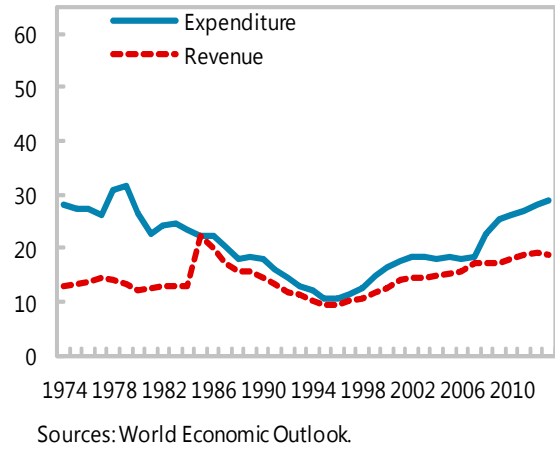
¹⁰ Zhang and Barnett (2014) provide an extensive analysis of off-budget activity in China.

Figure 3. Evolution of Fiscal Policy in China

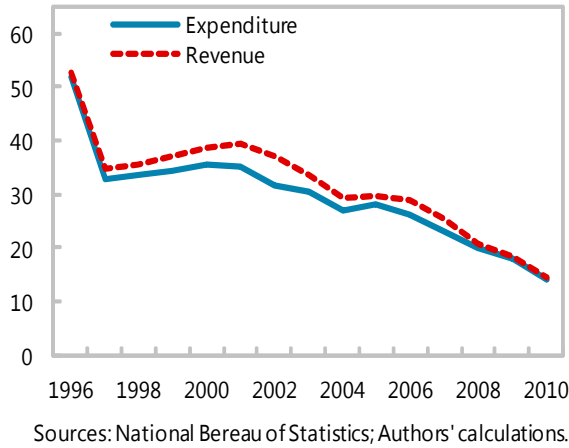
General Government Gross Debt



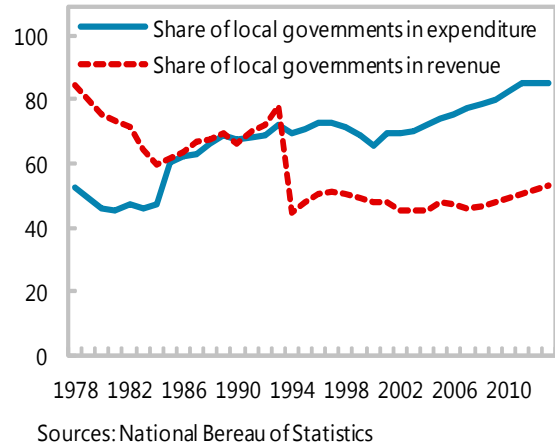
General Government Expenditure and Tax Revenue



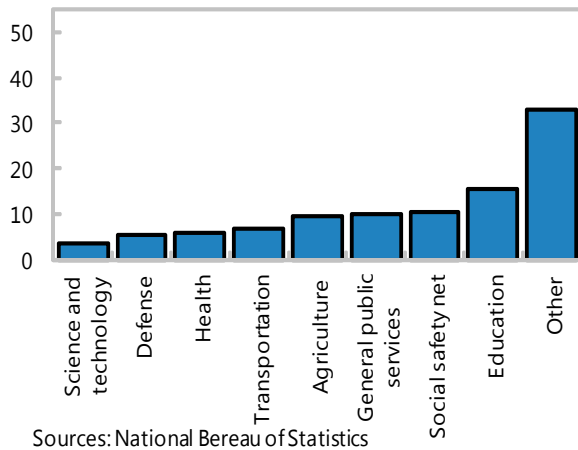
Extrabudgetary Expenditure and Revenue



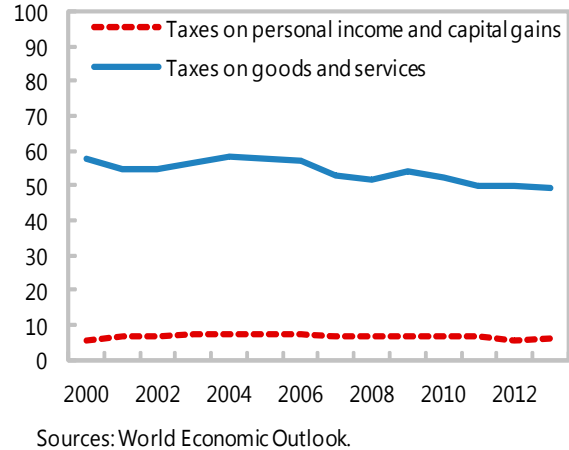
Fiscal Decentralization



Composition of Expenditure



Composition of Taxes



workers.¹¹ An additional complication is the existing system of fiscal relations between the central government and subnational governments. Although subnational governments are responsible for more than half of total spending, they have limited revenue-raising capacity and experience substantial differences in per capita allocations for basic public services.

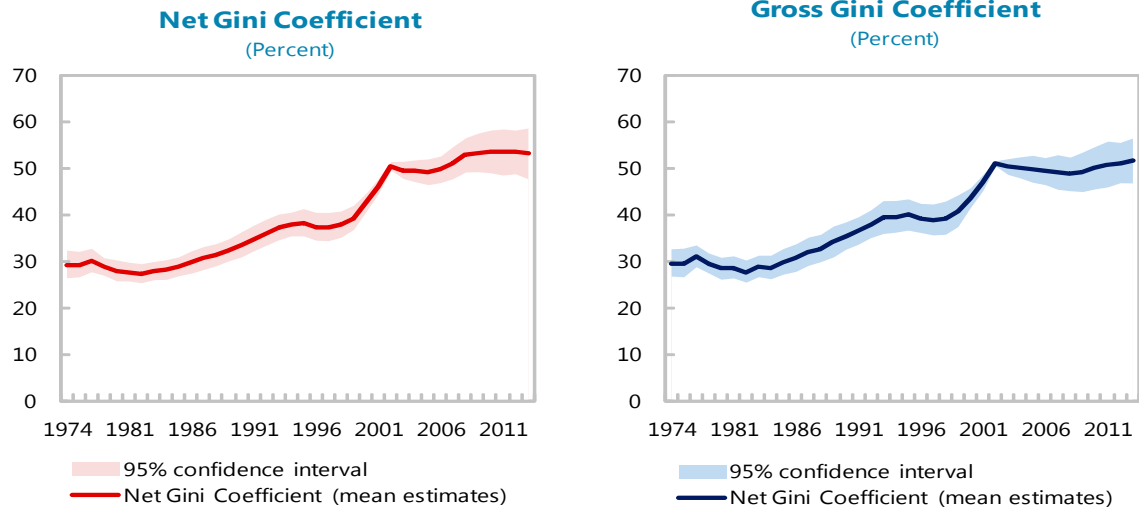
V. DATA DESCRIPTION

The empirical analysis is based on annual data spanning 1980–2013, covering a panel of 33 countries along with China. The dependent variable is income inequality as measured by the *net* Gini coefficients for China and our panel of BRIC+ countries, which are drawn from the SWIID, constructed by Solt (2009) using the Luxembourg Income Study as the harmonized benchmark for comparable estimates. The SWIID provides two definitions of the Gini coefficients—based on *market* income and *net* of taxes and transfers—on an annual basis, using a custom missing-data multiple-imputation algorithm to standardize observations collected from various sources.¹² The SWIID is our preferred source of data on income inequality as it provides comparable figures across countries and over a longer span of time. Nevertheless, although these series allow us to better identify the sources of income inequality and the redistributive impact of fiscal policy, they are still subject to measurement uncertainty as depicted in Figure 4. This is why we limit our analysis to the *net* Gini coefficient, which describes income distribution across size-adjusted households after taxes and transfers taken into account.

Drawing on the literature and facing data constraints, we focus on a list of key explanatory variables. In China-specific regressions, we include real GDP per capita (instrumented by the number of international tourist arrivals), tax revenues as a share of GDP and government spending as a share of GDP as the variables of interest. In panel data estimations, we broaden the list of explanatory variables and include real GDP per capita (instrumented by the number of international tourist arrivals), tax revenues as a share of GDP, government spending as a share of GDP, trade openness, financial development, and index of human capital, urbanization, and old-age dependency. Economic and financial statistics are compiled from the IMF’s *Government Finance Statistics*, *International Financial Statistics* and *World Economic Outlook* databases, the World Bank’s *World Development Indicators* database, and the National Bureau of Statistics of China. We present descriptive statistics for the key variables of interest in Table 1 for China and in Table 2 for the panel dataset for BRIC+ countries.

¹¹ According to the China Household Finance Survey in 2010, the retirement insurance coverage was 34.5 percent in rural areas, compared to 87 percent in urban areas, while annual pension income was 12,000 yuan for rural households, compared to 33,000 yuan for urban households.

¹² The latest version (5.0) of the SWIID database is available at <http://thedata.harvard.edu/dvn/dv/fsolt>.

Figure 4. Confidence Intervals of Gini Coefficients in China

Source: SWIID.

Before proceeding with the estimations, it is important to analyze the time-series properties of the data to avoid spurious results. The Augmented Dickey-Fuller (ADF) test is commonly used in the literature to investigate the integration order, but it may suffer from size distortions and fail to differentiate between a highly persistent stationary series and a non-stationary process. Accordingly, we also perform the Ng-Perron (Ng-P) test to ensure the robustness of the empirical results.¹³ The unit-root results, available upon request, indicate that the variables used in the analysis are stationary after logarithmic transformation.

Table 1. Descriptive Statistics: China

Variable	Obs.	Mean	Median	St. Dev	Minimum	Maximum
	34					
Net Gini coefficient	34	40.3	37.9	9.5	27.3	53.6
Real GDP per capita	34	4440.3	3229.0	3640.9	806.6	13164.4
International tourist arrivals (Millions)	34	27.8	23.3	18.2	5.7	57.7
Government spending (percent of GDP)	34	19.4	18.4	5.2	10.7	29.1
Tax revenue (percent GDP)	34	14.6	14.6	3.2	9.3	22.2

Source: Authors' calculations.

¹³ Regarding the optimal lag order selection for the ADF test, we use the modified Schwarz information criteria. For the Ng-P test, we use the Quadratic Spectral kernel-Andrews bandwidth combination to take into account the sample characteristics such as size and possible existence of structural breaks.

Table 2. Descriptive Statistics: BRIC+ Countries

Variable	Obs.	Mean	Median	St. Dev	Minimum	Maximum
Net Gini coefficient	1012	40.0	40.8	9.2	19.2	62.6
Real GDP per capita (usd dollars)	1073	3492.6	2867.4	2443.4	221.7	11533.8
International tourist arrivals (Millions)	792	6.8	3.3	8.8	0.0	57.7
Government spending (percent of GDP)	665	28.1	26.6	9.7	0.0	55.4
Tax revenue (percent GDP)	563	18.5	17.9	7.9	3.9	50.0
Trade openness (percent of GDP)	963	62.1	53.4	37.8	11.5	321.1
Domestic credit to private sector (percent of GDP)	1031	39.8	28.0	32.3	1.2	167.5
Index of human capital per person	920	2.3	2.4	0.5	1.3	3.3
Urban population (percent of total)	1156	57.5	57.6	18.7	18.3	95.0

Source: Authors' calculations.

Notes: A country is classified as BRIC+ if belongs to "Emerging Market and Middle Income Economies" country group classification which includes Algeria, Angola, Argentina, Azerbaijan, Belarus, Brazil, Chile, China, Colombia, Croatia, Dominican Republic, Ecuador, Egypt, Hungary, India, Indonesia, Iran, Kazakhstan, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Sri Lanka, Thailand, Turkey, Ukraine, Uruguay and Venezuela.

Source: Authors' calculations.

VI. EMPIRICAL STRATEGY AND RESULTS

We investigate the determinants of income inequality in China, with a particular focus on the redistributive contribution of fiscal policy. In view of data constraints and the need to have sufficient degrees of freedom, only a limited number of explanatory variables can be considered in our specification. Accordingly, using the IV regression via the two-stage least squares and GMM estimators, we estimate the following equation:

$$(1) \quad \ln(GINI_t) = \beta_0 + \beta_1 \ln(GDPPC_t) + \beta_2 (\ln GDPPC_t)^2 + \beta_3 \ln(EXP_t) + \beta_4 \ln(TAX_t) + \varepsilon_t$$

where $GINI_t$ is the *net* Gini coefficient at time t ; β_0 is the intercept term; $GDPPC_t$ is real GDP per capita; EXP_t and TAX_t are government spending and tax revenues as a share of GDP, respectively; and ε_t is the error term.

To control for potential reverse causality, we use international tourist arrivals as an instrument for real GDP per capita. The relationship between economic growth and income inequality may exhibit contemporaneous reverse causation, as income inequality influences the pace of growth. The challenge is to find a robust time-varying IV, which needs to be correlated with real GDP per capita and exogenous with respect to real GDP per capita, but have no effect on income inequality, except through its effect on per capita income. Although several empirical studies have used variations in rainfall and international commodity prices as IVs for economic growth, these may not be plausible in the case of China and most of our sample of BRIC+ countries. First, these countries are no longer highly dependent on the agriculture sector. Second, economic developments in these countries may likely influence the behavior of international commodity prices. Alternatively, we introduce the number of international tourist arrivals as our IV for real GDP per capita. According to

the test statistics, this is a robust IV for per capita income with no direct effect on income inequality in the case of China. However, while the number of international tourist arrivals is also a plausible IV for BRIC+ countries as a group, it should be noted that strict exogeneity assumption may not hold in some countries where tourism plays a more significant role in economic activity.

The panel data analysis in the context of BRIC+ countries allows us to overcome data constraints and include a broader set of control variables. The cross-country analysis for a panel of BRIC+ countries over the period 1980–2013 is conducted with the following specification:

$$(2) \quad \ln(GINI_{i,t}) = \beta_0 + \beta_1 \ln(GDPPC_{i,t}) + \beta_2 (\ln GDPPC_{i,t})^2 + \beta_3 \ln(EXP_{i,t}) + \beta_4 \ln(TAX_{i,t}) + \alpha_i X_{i,t} + \eta_i + \nu_t + \varepsilon_{i,t}$$

where $GINI_{i,t}$ is the *net* Gini coefficient in country i at time t ; $GDPPC_{i,t}$ is real GDP per capita instrumented by the number of international tourist arrivals; and $EXP_{i,t}$ and $TAX_{i,t}$ are government expenditures and tax revenues as a share of GDP, respectively. $X_{i,t}$ is a vector of control variables including trade openness, financial development, human capital accumulation, and urbanization. The η_i and ν_t coefficients denote country and time specific effects, while $\varepsilon_{i,t}$ is an idiosyncratic error term that satisfies the standard assumptions of zero mean and constant variance.

Since panel data tend to have complex error structures, standard estimation techniques are likely to yield inefficient estimates with biased standard errors. We perform the Wooldridge-Drukker test and indeed detect the presence of first-order serial correlation in the panel data used in this analysis.¹⁴ To account for persistency in income inequality, we apply the IV-GMM estimator in a dynamic model including lagged values of the dependent variable as a regressor. The GMM approach takes into account unobserved country effects and possible endogeneity of the explanatory variables, providing more robust and consistent parameter estimates. This method also allows us to use a dynamic specification with the lagged dependent variable as an explanatory variable and thereby take into account persistency in income equality over time.

A. Instrumental Variable Models—China

In Table 3, we present the IV estimation results for China, relating income inequality to the principal explanatory variables. Below each coefficient, we report the robust standard

¹⁴ Implementing an idea originally proposed by Wooldridge (2002), Drukker (2003) developed an easy-to-use test for serial correlation in panel data based on the OLS residuals of the first-differenced model.

errors that account for heteroskedasticity and first-order autocorrelation in the error terms.¹⁵ Model (1) regresses the *net* Gini coefficient on real GDP per capita—instrumented by the number of international tourist arrivals—and its square term, while Models (2) incorporates government spending and taxation as a share of GDP.¹⁶ The results indicate that an increase in per capita income leads to a worsening in income inequality, while its square term lowers inequality. The coefficients on both real GDP per capita and its square term are statistically highly significant, and support the hypothesis of the existence of a Kuznets curve—an inverted U-shaped relationship between income inequality and economic development.

Table 3. China: IV Estimation

Variable	(1)	(4)
Log (Real GDP per Capita)	0.682*** (0.208)	1.396*** (0.461)
(Log (Real GDP per Capita) (squared)	-0.025* (0.013)	-0.069** (0.028)
Log (Government spending as percent of GDP)		0.152** (0.070)
Log (Tax revenue as percent of GDP)		-0.085* (0.043)
Adjusted R ²	0.959	0.963
HAC score Chi 2	5.058*	6.197**
HAC regression F	27.084***	39.810***

Note: Real GDP per Capita is instrumented using the number of international tourist arrivals. The sample period is 1974-2013. Heteroscedasticity and autocorrelation consistent standard errors are reported in parenthesis. ***, ** and * denote significance at the 1,5 and 10 percent, respectively.

Source: Authors' calculations.

We find that government spending is a statistically significant factor with a worsening effect on the distribution of household income. This reflects the fact that government spending in China is low and dominated by infrastructure investment and public administration. Taxation, on the other hand, appears to have the desired negative coefficient and comes out to be statistically significant. This suggests a redistributive effect of taxation in China, where the tax-to-GDP ratio almost doubled over the past two decades, even though it still remains significantly below the OECD average. The adjusted R^2 of this model is

¹⁵ The results presented in Table 3 are based on the two-stage least squares approach. The instrumental variable estimator using the GMM yields similar findings, which are available upon request.

¹⁶ Although collinearity between government spending and tax revenue is potential problem that may lead to unstable parameter estimates, collinearity diagnostics yield a variance inflation factor of 1.24, which is significantly less than the critical threshold of 10.

slightly higher, and the coefficients on per capita income and its square term are larger than when considering the impact of economic development separately.

B. Instrumental-Variable Panel Data Analysis—BRIC+

The results of the panel estimations, presented in Table 4, are broadly consistent with the findings of our time-series analysis of China. The IV-GMM estimations indicate a high degree of persistency in income inequality. The coefficient on the lagged *net* Gini coefficient is positive and statistically significant across all specifications, although it becomes marginally smaller with the inclusion of other explanatory variables. We find that the level of per capita income, instrumented by the number of international tourist arrivals, widens income inequality, while its square term has a narrowing effect. Both of the estimated coefficients are statistically significant across all specifications, confirming the existence of the Kuznets curve in the BRIC+ panel. With regards to the impact of fiscal policy on inequality, we find that the coefficient on government spending has the desired negative sign, indicating that higher government spending lowers the *net* Gini coefficient. The magnitude of this effect, however, is small and statistically insignificant. Similarly, taxation comes out to be a statistically insignificant factor and appears to have a redistributive impact.

Table 4. BRIC+ Panel: IV-GMM Estimation

Variable	Log (Net Gini Coefficient)		
	(1)	(2)	(3)
Log (Net Gini Coefficient) _{t-1}	0.919*** (0.010)	0.874*** (0.050)	0.894*** (0.031)
Log (Real GDP per Capita)	0.194*** (0.027)	0.322* (0.177)	0.210*** (0.070)
(Log (Real GDP per Capita) (squared))	-0.013** (0.002)	-0.020* (0.010)	-0.014*** (0.005)
Log (Government spending as percent of GDP)		-0.009 (0.014)	-0.001 (0.015)
Log (Tax revenue as percent of GDP)		-0.004 (0.016)	-0.013 (0.018)
Log (Trade openness as percent of GDP)			-0.003 (0.008)
Log (Domestic credit to private sector as percent of GDP)			0.005 (0.005)
Index of human capital per person			-0.034 (0.036)
Log (Urban population as percent of total)			0.064 (0.040)
Wald X^2	10352.73***	3429.81***	3408.46***

Note: Real GDP per Capita is instrumented using the number of international tourist arrivals. The sample period is 1980-2013. Heteroscedasticity and autocorrelation consistent standard errors are reported in parenthesis. ***, ** and * denote significance at the 1, 5 and 10 percent, respectively.

Source: Authors' calculations.

The empirical findings of the baseline IV-GMM model remain robust to the inclusion of various control variables. In line with the literature, we find that trade openness and human capital accumulation improve the distribution of household income in the BRIC+ panel, but the estimated coefficients do not reach the threshold of statistical significance. Financial development, on the other hand, has a worsening effect on income inequality, as expected, but statistically insignificant. The results suggest that an increase in the share of urban population worsens income distribution, but this effect is not statistically significant in our panel of BRIC+ countries.

VII. CONCLUDING REMARKS AND POLICY ISSUES

China has made remarkable progress in reducing poverty, but this achievement has been accompanied by widening income disparities across the society. While this reflects an intricate array of developments, including the country's investment and export-led growth model as well as socioeconomic, financial and institutional undercurrents, fiscal policy appears to have played an important role through the impact of taxes and transfers on income distribution. Both the *market* and *net* Gini coefficients increased by 82 percent and 90 percent, respectively, over the period from 1974 to 2013. In other words, the egalitarian effects of fiscal policy diminished from an average of 1.7 Gini-index points in the 1990s to -1.1 Gini-index points during the period 2000–13.

China's tax-to-GDP ratio almost doubled over the past two decades to 19 percent, but it remains significantly below the OECD average of about 35 percent. This effectively sets a limit on public expenditures, including redistributive measures. Furthermore, China's system of taxation distributes the tax burden in a regressive manner across income groups, largely because China collects more than half of its revenues from indirect taxes. Personal income taxes amount to 6 percent of total tax revenues, while indirect taxes on goods and services account for over 50 percent of total tax revenues. Although China has a progressive personal income tax rate schedule with a top rate of 45 percent, its broad tax brackets and generous allowance schedule diminish the effective progressivity of the tax regime, resulting in a very low ratio of personal income taxes to indirect taxes.

While government spending has grown from 18 percent of GDP in 1990 to 29 percent in 2013, it is still significantly below the OECD average of 45 percent. This increase in government spending, however, is largely due to higher outlays to infrastructure investment and public administration, while social protection and healthcare accounts for only about 6 percent of GDP (compared to an average of 15 percent in OECD countries and 9 percent in upper-middle income countries). In other words, excluding social protection and healthcare, China's non-redistributive government spending is comparable to that in OECD countries. Furthermore, the incidence of benefits from public services and transfers is shown to favor

high-income groups in urban areas.¹⁷ For example, the top quartile of households received about 80 percent of pension spending, compared with only 2 percent for the bottom quartile. As a part of the “harmonious society” strategy, the government has expanded the minimum subsistence allowance system and introduced a new pension scheme in rural areas, but these programs have limited coverage and provide a low level of income compared to urban workers. An additional complication is the existing system of fiscal relations between the central government and subnational governments. Although subnational governments are responsible for more than half of total spending, they have limited revenue-raising capacity and experience substantial differences in per capita allocations for basic public services.

The empirical findings presented in this paper are consistent with the stylized facts of China. First, we show that an increase in real GDP per capita—instrumented by the number of international tourist arrivals—leads to an increase in the *net* Gini coefficient, while its square term lowers income inequality. This confirms the existence of an inverted U-shaped relationship between income inequality and economic growth. Second, we show that government spending and taxation have opposing effects on income inequality. While government spending appears to worsen inequality, taxation improves the distribution of household income. The results of the panel data analysis are broadly consistent with the findings of the time-series analysis of China, with one important exception. Both government spending and taxation have the desired redistributive effect, albeit statistically insignificant. Altogether, even though the redistributive impact of fiscal policy in China appears to be stronger than what we identify in the BRIC+ panel, the “net” effect is still not enough to compensate for the adverse impact of other influential factors identified in the analysis.

Fiscal policy can be re-designed to have a greater redistributive effect, especially over the long term. On the taxation front, the system needs to be broadened in a more progressive way to help narrow income inequality. The effective number of personal income tax payers is less than 3 percent of the working population is an indication of high degree of informality and tax avoidance. Strengthening tax administration and broadening the personal income tax including capital gains—that would increase effective taxation of the rich—and imposing VAT on services—that tend to be consumed more by the rich—would make the tax regime more progressive and also create additional fiscal space. In particular, China has room to lower high labor taxation that hurts the low- and middle-income brackets more than the rich, while increasing direct taxes on capital and wealth, especially through more effective land and property taxation. The planned extension of a recurrent property tax from pilot implementation to the rest of the country is a step in the right direction to generate additional

¹⁷ Using the framework of the National Transfer Accounts Project and household-level data, Shen and Lee (2014) provide an analysis of the benefit incidence of public spending across socioeconomic groups in 2009 and conclude that (i) education spending was equally distributed at the primary and secondary level, but favored high-income urban households at the tertiary level; (ii) healthcare spending skewed toward high-income urban households; and (iii) pension spending was far more favorable to high-income urban households.

revenues and improve the progressivity of the tax regime. On the expenditure side, there is scope for making public spending a more effective tool by improving progressivity through well-targeted programs that champion greater access for the poor, particularly in rural areas who account for over 95 percent of poor households in China. To this end, given the decentralized nature of China's fiscal system, it is necessary to realign expenditure assignments with revenue sources across all layers of government. It is critical to expand the social safety net including means-tested income support to the poor and unemployment insurance, while reducing untargeted energy subsidies that tend to benefit the rich more than the poor.¹⁸ Reforming the pension system, including a redesign of eligibility criteria for the basic retirement pension, could have a positive redistributive impact, but it needs to be accompanied by structural and parametric changes (i.e. pooling of provincial-level pension funds and adjusting the retirement age and replacement rates) to ensure long-term sustainability, especially in view of the rise in China's old-age dependency ratio.¹⁹

Fiscal policy should take into account its distributional effects, but redistributive measures need to be consistent with the objective of fiscal sustainability. In particular, the expansion of social assistance programs needs to take into account the fiscal cost of the rapid population aging. Ultimately, fiscal policy is only one aspect of an inclusive growth strategy that requires a comprehensive range of structural reforms aiming to sustained economic growth as well as to provide greater access to every segment of the society to emerging opportunities.

¹⁸ As of 2011, post-tax subsidies for petroleum products, electricity, natural gas and coal accounts for over 3.8 percent of GDP in China—almost four times the amount of healthcare spending.

¹⁹ Dunaway and Arora (2007) provide a new approach to strengthen the pension system and deal with the “legacy costs” associated with the relatively more generous benefits provided under the old system.

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