Determinants of Rural Poverty Reduction and Pro-poor Economic Growth in China

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Abstract: China has made remarkable progress in its war against poverty since the launching of economic reform in the late 1970s. This paper examines some of the major driving forces of poverty reduction in China. Based on time series and cross-sectional provincial data, the determinants of rural poverty incidence are estimated. The results show that economic growth is an essential and necessary condition for nationwide poverty reduction. It is not, however, a sufficient condition. While economic growth played a dominant role in reducing poverty through the mid-1990s, its impacts has diminished since that time. Beyond general economic growth, growth in specific sectors of the economy is also found to reduce poverty. For example, the growth the agricultural sector and other pro-rural (vs urban-biased) development efforts can also have significant impacts on rural poverty. Notwithstanding the record of the past, our paper is consistent with the idea that poverty reduction in the future will need to rely on more than broad-based growth and instead be dependent on pro-poor policy interventions (such as national poverty alleviation programs) that can be targeted at the poor, trying to directly help the poor to increase their human capital and incomes.

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1. Introduction

Few observers deny that China has made remarkable progress in its war on poverty since the launching of economic reform in the late 1970s. China's poverty is predominantly a rural phenomenon. In the nearly three decades since the start of the reforms the rural poverty incidence (based on China's official poverty line) fell from 31.6 percent in 1978 to 2.5 percent in 2005 (NBSC, 2006). In 2006 it fell further to 2.3 percent in 2006 (LPOPAD, 2007). According to the one dollar per day (in PPP terms) international poverty line, the incidence of poor also fell sharply from 31.3 percent in 1990 (Work Bank, 2001) to less than 10 percent in recent years (estimated by the authors). The success of China's effort in poverty reduction is more impressive when compared with those of other countries. While the global poverty headcount (using the one dollar per day poverty line) fell during the 1990s by around 200 million, if China were excluded, the headcount of the poor in all the rest of the world's developing countries actually rose by 100 million (ESCAP, 2003).

Although there are almost no observers that dispute the fact that there has been a sharp fall in the rate of poverty in China during the 1980s and 1990s, there is less agreement about the causes. In particular, little is known about the linkage between the nation's rapid economic growth and the rate of poverty reduction. Little research has tried to identify the effect of the other economic forces that are driving down poverty rates. For example, what has been the effect of the pattern of economic growth? Does the growth by sector and the rate of regional economic growth or income distribution matter? What about the effect of more general rural development

policies and reforms, state enterprise reform, trade liberalization or the nation's poverty alleviation programs?

In fact, broad trends suggest that it is possible that macro-economic forces and general economic policy efforts may have been instrumental in the reduction of poverty in China. After the launching of economic reforms in the late 1970s, the growth rate of GDP has averaged about 9 percent per year for each of the years during the past three decades (NBSC, 2006). Using other sources of data, Ravallion and Chen (2004) and Zhang et al. (2003) suggest that there is a casual correlation between economic growth and poverty reduction. During the same time, however, many other indicators have been changing. For example, income disparity has widened. There have been many reform policies that have been implemented. Trade liberalization has changed China from a hermitic country to one of the more open economies in the world and during this time the proportion of total exports and imports in GDP increased from 11 percent to 64 percent (NSBC, 2006). And, the patterns of growth have changed significantly during this time. The share of agriculture in GDP declined from 31 percent in 1979 to less than 13 percent in 2005. The output of rural enterprises rose from a negligible level in the early 1980s to a level at which they were contributing more than one third of the national GDP; at the same time, the role of state-own enterprises in the economy declined substantially. At the same time, the government was making a concerted effort at promoting rural development in the poor areas through various anti-poverty programs coordinated by the Leading Group of Poverty Alleviation and Development of the State Council. Before 1986, special grants funds and initiatives to spur growth were pushed in poor areas (Park et al., 1996). After 1986 the government aimed a major set of investments on increasing growth of incomes in poor areas (Rozelle et al., 1996).

The observed relationship between rural poverty reduction trends and the growth of the economy (and as other simultaneous changes in China's economy) as well as the efforts of the government's poverty alleviation programs raise a number of important questions. Has poverty been reduced primarily as a result of the linkages that have grown between poor areas and the rest of the economy? How have patterns of growth (e.g., growth of agricultural versus non-agricultural sectors; the expansion of rural enterprise development, and other urban-biased growth trends) affected poverty reduction? How have reform policies (e.g., the rural institutional changes and trade liberalization) affected poverty alleviation—either directly or indirectly through economic growth? Which of the effects are more important? How can China continue to make progress in poverty alleviation in the coming decades? The answers to these questions have important implications for not only China's poverty reductions but also for the lessons that China's experience can provide to the rest of world and its war on poverty.

Previous studies in China have mainly focused on the nation's poverty alleviation programs and poverty investment policies. For example, there has been number of papers on the effectiveness of poverty targeting and the impacts of the poverty alleviation programs on the income of the poor (World Bank, 1992 and 2001; Park et. al., 1998a and 1998b; Rozelle et. al., 1998; Kang, 1998; Wang and Zhang, 1999). However, there has been much less research centered on undertaking a comprehensive analyses of the impacts of overall economic growth, growth patterns, reform policies, and government poverty alleviation programs on China's poverty.

Internationally, there has been growing interest in the debate on the relationship between the economic growth and poverty. Some argue that poverty reduction efforts involve nothing more than creating an environment conducive to rapid economic

growth (Bhalla, 2001). Based on cross-national regressions, Dollar and Kraay (2002) show that economic growth appears to be one of the major determinants of poverty alleviation. They find that growth benefits the poor as much as everyone else in society. However, a series of recent studies based on more sub-national data in Asian countries show that economic growth explains a lot but not all about poverty (Kakwani and Pernia, 2000; Balisacan, 2003; Balisacan and Fuwa, 2003). The nature of growth, not just its speed, matters to poverty reduction. Agricultural growth and rural development are also keys to achieving broad-based growth and rural poverty reduction.

While the debate about the relationship between economic growth and poverty has been prominent in the literature in recent years, there is less known about the linkage between trade liberalization and poverty reduction. In China, such linkages and the impacts seem obvious. Economic growth has been progressing at the same time that leaders have been reforming and liberalizing the economy. If trade liberalization is linked to growth and growth is related to poverty reduction, then there must be a positive link between trade reform and poverty reduction. However, when one looks for empirical studies that show how poverty has been affected by trade liberalization, there is a lacuna of evidence. Recent events have brought this trade issue even more to the tops of the lists of questions facing many policymakers (Huang et al., 2003). In particular, China's entry into the World Trade Organization (WTO) in 2001 promised many changes. What was their effect on poverty?

Understanding the nature of China's effort to reduce rural poverty and identifying the determinants underlying the successes (and failures) in China's war against poverty will certainly facilitate the future efforts of policy makers in their implementation of pro-poor policies. There almost certainly are lesson for policy makers in other

developing countries. China as a developing countries shares many common challenges with other developing countries—including many challenges related to the fight against poverty.

In this paper, we attempt to answer some of issues raised above based on a set of provincial level data for the period of 1985-2002. To meet this goal, we use simultaneous structural equations to identify both the direct and indirect effects of a number of different economic and policy factors on rural poverty reduction. These factors include economic growth, structural changes, income distribution, rural industrial development, and trade liberalization. Our study shows while economic growth is the most important and necessary, it is not sufficient to completely eliminate poverty. Although economic growth was key factor driving the fall of poverty in the early stages of economic development (through the mid-1990s), its impact has diminished over the past decade. Beyond general economic growth, growth of agriculture significantly contributes to poverty reduction; a growing agriculture also indirectly affects poverty through its effect on income distribution. Consistent with a recent study by Ravallion and Chen (2004), urban-biased development policies that raise urban-rural income inequality systematically lowers overall economy growth (and slows that rate of poverty alleviation indirectly). We also find that income distribution has both direct and indirect effects on rural poverty reduction.

This paper is organized as follows. Section 2 describes the recent trends in poverty numbers as well as discussing a number of the factors that might be affecting poverty, including the rate of economic growth as well as other factors that might have impacts on rural poverty. Section 3 presents the methodological approach used in this study. The econometric estimation results are presented and discussed in section 4. The last section concludes the study.

2. China's rural poverty

Economic growth and poverty reduction

China's economic growth and poverty reduction have both posted remarkable records over the past three decades. Per capita real GDP in 2005 was nearly 8 times as that in 1980 (Table 1). Such rapid economic growth was accompanied by a significant drop of rural poverty incidence (Table 2). Figure 1 demonstrates that there is an obvious negative correlation between the economic growth and poverty reduction. Although purely correlative, the trends suggest that growth indeed manifests itself as a powerful means for fighting against poverty. However, Figure 1 also shows that as income reaches certain levels the effect of economic growth diminishes. Hence, in the future it might be difficult to rely exclusively on the general economic growth to help those people who remain poor to escape poverty.

Data that are disaggregated by provinces also show that there is a relationship between economic growth and poverty reduction, although there are large variations across provinces in the extent of poverty reduction at a given economic growth rates. For example, both Yunnan province and Inner Mongolia have achieved similar annual economic growth rates during since early 1980s (about 7.5%). However, Yunnan experienced a more rapid rate of poverty reduction during these years (-1.3% annually for Yunan compared with one -0.3% in Inner Mongolia). The regional variations in the observed relationship between growth and poverty reduction among the provinces suggest that the nature of growth and other factors may also be important determinants of rural poverty reduction.

Agricultural development and poverty reduction

Beyond general economic growth, the growth of agricultural production in China has been one of the nation's major accomplishments during the reform era. The success of the rural reforms clearly laid a solid foundation for the whole economic reform and therefore the reduction of poverty (Rozelle et al., 2007). After 1978, decollectivization (the shift of production from collective production to the household responsibility system—HRS—or individual farming) and price increases on most agricultural products accompanied the take off of China's agricultural economy. Between 1978 and 1984, agricultural GDP increased by 7.1 percent per year, a period when rural poverty population fell the fastest. As the one-off efficiency gains from the shift to the household responsibility system were essentially reaped by the mid 1980s, the growth rate of agriculture sector declined. In the late 1980s, the rate of fall in the poverty headcount also attenuated (Table 2 and Figure 1).

Past studies have already demonstrated that there are a number of factors that have simultaneous contributed to agricultural production growth during the reform period. The earliest empirical efforts concluded that most of the rise in productivity in the early reform years was a result of institutional innovations, particularly HRS (McMillan et. al. 1989; Fan, 1991; Lin, 1992). Since the mid 1980s, technological change has been the primary engine of agricultural growth (Huang and Rozelle, 1996; Fan and Pardey, 1997).

There also is evidence of strong links between agricultural growth and poverty reduction when we compare the growth rates of agriculture and the changes in poverty headcounts for the entire reform period (the data are not showed here). Periods of higher growth rates in agriculture are closely associated with the periods of

poverty reduction. In fact, examination of the structure of income of poorer households should make this linkage no surprise. Poor farmers are clearly much more reliant on revenues from agriculture for their incomes (Table 3). For example, the share of agriculture in the total income of the typical (average) farmer was 45 percent in 2005. However, it accounted for more than 60 percent of income for those individuals under the nation's poverty line (i.e., those per capita income less than 683 yuan—Table 3). The agricultural share of the income of those in the top 20 percent of China's rural population is only 35 percent. Hence, because the rural poor are relatively dependent on agriculture for their livelihood, when overall GDP growth is held constant, it is not surprising to find that the poverty reduction will be greater in regions with faster growth in the agricultural sector.

In fact the role of agriculture transcends its poverty reduction function. Agricultural growth also plays a key role in facilitating the structural transformation of the whole economy (Mellor, 1995). Agricultural growth in most successfully developing countries is accompanied by an even more rapid expansion of the non-agricultural sector (Mellor, 1995). This is true, in part, because the acceleration of agricultural development will facilitate industrialization through provision of low cost food and labor as well as consume increasing volumes of industrial goods as their incomes rise. In other words, the rise of the agricultural sector—when accompanied by the right mix of other economic forces and institutions—is a key player in the growth process. Ironically, when a country is successfully developing, the faster the growth of agriculture, the more rapid is the decline of agriculture's share in the overall economy (Mellor, 1995).

Income distribution and poverty

Although it is clear that growth will generally benefit the poor, the size of the benefit depends critically on how the additional growth is distributed between the poor and the non-poor. As a consequence, it is possible that there are large variations in poverty reduction for regions/provinces with the same growth rate—if distribution is fairly equal in one place and unequally distributed in another. If economic growth is broad-based, the growth will be more likely to reduce poverty more. However, if growth occurs in the context of rising inequality, then the effect on poverty reduction is likely to be tempered.

In China, economic growth has closely accompanied by a rising income inequality. Rising income inequality can be segmented into three broad sources: within urban residents, between rural and urban, and within rural residents. The latter two ones are the main mechanisms through which inequality exerts its effects on rural poverty. Statistical figures at national level show not only that the urban-rural income gap has widened over the past two decades, the income inequality within the rural economy also became worse. The ratio of urban-rural income has risen from 2.49 in 1980 to 3.34 in 2005, the widest measured gap since the PRC was founded in 1949. In addition, the Gini coefficient measuring income inequality among rural residents also has increased, from 0.212 in 1978 to 0.374 in 2006 (NSBC, 2007).

Compared with the urban-rural income disparity, the rising inequality among farmers within rural areas to some extent indicates that economic growth largely favors of non-poor. Such a conclusion is consistent with the findings of Riskin (1993) and Rozelle (1996). They showed that between the 1980s and 1990s those farmers with access to off farm job opportunities have benefited and it has been unequal access to non-farm income that has driven the rising within rural inequality. According to more recent data, it appears as if that is still true; in 2005 those rural households that are in

the highest income brackets earn most of their incomes from non-farm activities (rural wage earnings and other non-farm earnings, including earnings from self employment—Table 3). In sum, it is clear from this discussion that changes in the incidence of poverty are not only related to overall economic growth; it also depends on the nature of the growth, including the sources of income growth and how income is distributed.

Rural enterprise development and poverty reduction

After the implementation of HRS was completed in1984, one unique feature of China's economic growth has been the emergence of a booming sector that typically have not appeared in other countries—rural enterprises (REs).[1] Starting from quite small, since the middle 1980s, the rural industrial sector has provided substantial off-farm employment opportunities for rural farmers (Jin and Qian, 1998). It is estimated that in the early 2000s about half of all non-farm employment were working in REs (as wage earning workers or as owner-operators of self-employed enterprises—Zhang et al., 2006). In no small part this was due to the large rise in output of the sector. As seen in Table 1, the gross output of rural enterprises was only about 10 percent of China's GDP in 1985; it rose to more than one third in recent years (Table 1). Given the importance of employment to income distribution and the importance of the rise in industrial output to economic growth, it is clear that there are many different avenues through which difference in intensity of RE output in any given region could affect poverty reduction.

Trade liberalization and poverty reduction

[1] Rural enterprises were called as Township and Village Enterprises, or TVEs, before the late 1990s. Since the late 1990s, TVEs have been renamed Rural Enterprises (REs) since many of them were privatized (either denovo or dejure—Li and Rozelle, 2003).

During the past two decades, China's rapid economic growth has risen hand in hand the opening up of the economy and the growth of foreign trade. Annual growth rates of foreign trade reached nearly 15 percent in both the 1980s and the early 1990s. Even in during the Asian economic crisis, which had adverse effects on China's trade within Asia, trade still grew at nearly 10 percent annually between 1996 and 2000. After China joined WTO in 2001, the growth rate of foreign trade accelerated, rising by nearly 30% annually between 2002 and 2005 (NSBC, 2006).

While rising foreign trade is closely linked to economic growth, there is less consensus about the effect of trade liberalization on poverty. While some researchers claim that China's trade reforms have helped reduce poverty (World Bank, 2002; Dollar and Kraay (2002), others argue that trade has had little impact on poverty or inequality (Ravallion and Chen, 2004). Many other believe that trade liberalization is regressive and will lead to rising poverty. With the exception of Ravallion and Chen (2004), little of the previous literature was empirically focused on the rural economy. In fact, more recent empirical studies on the effect of trade liberalization demonstrate that trade liberalization has had a number of dynamic effects on rural residents. First, the opening of trade has encouraged farmers to adjust their production structure in response to changing domestic prices that have shift due to trade policies (Huang et. al., 2003 and 2006). In doing so producers have been able to increase their output and minimize their decreases in expenditures even as aggregate prices fall. In the aggregate then as trade liberalization has unfolded there has been an increase in farming income as farmers have been induced to shift into the production of more profitable agricultural products; on average, the farming sector has benefited. However, there is an important caveat. Like in all outcomes associated with trade reform, certain groups of farmers will gain more benefits than others. Some will

always lose. Whether farmers gain or lose, of course, depends on the initial conditions—that is, what were the commodities (either those in which China has a comparative advantage or those in which China does not have a comparative advantage) that each group of farmers were producing prior to the reforms. Hence, it is possible that trade liberalization has both a positive and negative effect on poverty reduction.

National poverty alleviation program and poverty reduction

In addition macro economic forces and broader policy efforts, since that 1980s China's government has begun to take steps to directly target rural poverty problem. To do so, in the late 1980s, a ministerial-level poverty alleviation task force, the Leading Group Office of Poverty Alleviation and Development under the State Council (the Leading Group or LGOPAD), was set up to oversee the war on poverty. During the past two decades, the Leading Group has generally had three types of instruments under their control: Food for Work Investments; Low-Interest Subsidized Loans and a Poverty Alleviation Grants fund. Over time the mix of importance and the level of control by the Leading Group have shifted. Detail discussants of the anti-poverty policies can be found in Zhang et al. (2007).

In this paper, because we were unable to gain access to investment data by province and by year, we are unfortunately not able to identify empirically the poverty-reducing effects of China's National Poverty Alleviation program. Previous studies have shown that certain parts of the program have been effective in reducing poverty (Park et al., 1998). Others have argued that more efforts should put in targeting the poor (World Bank, 2001). In the recent study by the Asian Development Bank one of the main findings was that, in fact, even if China's Poverty Funds were

well targeted and effectively designed, the total amount of resources under the control of the Leading Group has been so small that there is no way that it could have made a large impact (Tan et al., 2006). While the resurgence in commitment to poverty alleviation in recent years and the adoption of a new village-targeted strategy means that future studies on poverty alleviation need to consider the effect of poverty investments (because they are mattering more and more), in the past it is possible to focus on the effects of economic forces and macro-policies without incurring too much bias.

3. Model Specifications and Data

The discussions in the previous section describe the various channels through which China's economic growth and other related economic forces and policies potentially could have affect the nation's efforts to alleviate poverty. As discussed, each factor may affect poverty through a number of different mechanisms. Some of these forces may have direct effects on poverty—either positive or negative; others may have indirect effects through their effects on growth and income distribution. Because of the complicated set of impact pathways, we believe it is necessary to devise a systematic empirical approach that can attempt to account for both the direct and indirect impacts of economic and policy variables on poverty reduction.

In order to assess these direct and indirect impacts, we need an empirical modeling framework that can account for both types of effects. Our modeling approach accounts for the *direct impacts* of general economic growth, income distribution (*URIR*) and agricultural development (*AgGDP*) on the incidence of poverty. The indirect impacts of various factors (e.g., *URIR*, *AgGDP* plus the rise of REs; trade liberalization, etc.) are accounted for through their effects on economic growth and

equity—which then directly affect the incidence of poverty.

More formally, in the rest of this paper, we use the following 3-equation system:

$$\begin{cases} (1)\ PI = f\,(PGDP,\ PGDP^2,\ URIR,\ AgGDP,) \\ (2)\ PGDP = f\,(URIR,\ RE,\ TradeLib) \\ (3)\ URIR = f\,(PGDP, P\ GDP^2,\ AgGDP,\ RE,\ TradeLib) \end{cases}$$

where the key endogenous variables, *PI*, is measured as the poverty incidence; *PGDP* is per capita GDP (measured in logarithms); and *URIR* is the income distribution variable (here we only examine income disparity between rural and urban, *URIR*). As a measure of distribution of income, we use a variable that assesses the relative levels of per capita incomes in urban and rural areas. It is defined as Ln(Urban income / rural income), or the logarithm of the ratio of urban-rural incomes. The *PGDP* square term is also included in equation 1 in order to allow for a non-linear relationship between income poverty. The variable, *AgGDP*, is defined as agricultural GDP divided by total GDP (and is in ratio form).

The model also contains a number of variables that are expected to impact China's poverty incidence indirectly through their effect on economic growth and the distribution of income. These variables appear on the right hand sides of the *PGDP* and *URIR* equations (equations 2 and 3). The variable, *RE*, controls for differences over time in the sizes of each province's rural industrial sector. It is measured as the ratio of the value added by Rural Enterprise to GDP. The variable *TradeLib* is a matrix made up of two separate variables, *Export* (which is the total value of the export volume for each province by year) and *FDI* (which is the total value of foreign direct investment for each province by year). Both variables are normalized by GDP.

The matrix *Others* includes a number of control variables to account for factors that may have their own effects on the endogenous variables, but which—because of the lack of data—cannot be explicitly specified. To account for these, we add year and provincial dummy variables in each equation.

To estimate equations 1-3, time series (1985-2002) and cross provincial (28 provinces) data are used.[2] All variables that are denominated in value terms are measured in constant 2001 prices. The three equations are estimated simultaneously as a system using an Seemingly Unrelated Regression (SUR) estimator to address the problem arising from the contemporaneous correlation of errors among the equations.

4. Results

Econometric results

Table 4 reports the results of our estimations of the system of equations (1) to (3) using a SUR approach. The signs of estimated coefficients in *PI* (poverty incidence) equation are consistent with our expectation. *PGDP* (Ln(Per capita GDP)) has a negative estimated sign and is statistically significant (column 1). Importantly, this result suggests that in provinces that experienced higher growth, its poverty incidence has dropper. However, consistent with the discussion about Figure 1, the sign on the coefficient of the $PGDP^2$ variable (the square term of *PGDP*) is positive (is significant). When combined with the negative parameter on the linear term, a positive parameter for the square term means that over time the positive impact of economic growth on poverty reduction is diminishing. It is this set of symbols which ultimately leads one to the conclusion that in order to solve the remaining poverty in China, additional effort—beyond growth—is needed. This may be because those that

[2] We only go back to 1985 since this is the first year for which there is a measure of province-specific poverty incidence. Tibet, Hainan and Chongqing, are excluded due to data availability/consistency problems.

remain in poverty do not have the skills that allow them to enjoy the benefits of rapid overall economic growth.

Beyond growth, the variable measuring the distribution of income (*URIR*) has a significant coefficient with positive sign in the *PI* equation. This result confirms our expectation that a larger urban-rural income gap is associated with a higher poverty incidence. This finding also is similar to the general findings in the international growth literature that links equal distribution of income with pro-poor growth. The policy implication of this finding is clear: given other factors equal, when income distribution is given higher priority and the nation begins to address the urban-rural income gap with more pro-rural policies, such policies should been to lower poverty incidences.

Like the coefficient on *PGDP*, the estimated coefficient on *AgGDP* (Agricultural GDP/total GDP) has a negative sign and also is statistically significant. This result suggests that after controlling for economic growth (or given the rate of expansion of the overall economy—as measured by *PGDP*), in province with more of their output that comes from agriculture, poverty rates are falling more. Such a finding is extremely important for policy makers that are considering investments into the agricultural sector and who are considering policies that can stimulate agriculture. In recent years, the central government has begun to greatly increase investment into pro-agricultural programs. To the extent that these investments and programs stimulate the growth of agriculture, according to our results, they not only should increase food production, they also will help alleviate poverty.

Our results also suggest that there are important indirect effect of a number of macro economic forces and policy efforts (Table 4, columns 2 and 3). In the *PGDP* equation, the estimated coefficient of *URID* is significantly negative. This result is not

surprising because a wider Urban-Rural income gap means slow rural income growth. When the rate of economic expansion of the rural economy is slower, this means that there less of a market in a province's rural areas for its urban products. This can obviously retard the overall GDP growth. When combined with the results from equation (1), we can conclude that income inequality has both a direct and indirect effect on the government's efforts to reduce poverty.

There are other significant indirect effects that work through overall income growth (Table 4, column 2). For example, the growth of industrial sector (outside of the state-owned sector) and the development of REs both add to overall economic growth and lead to lower rates of poverty. In this way, they have a positive indirect impact on poverty reduction. In addition, our results show that during the study period trade liberalization, which leads to higher volumes of exports, spur economic growth. Hence, in this way, trade reform indirectly has positive effects on poverty reduction.

The results in the *URID* equation show that measuring the indirect poverty effect of certain variables is complicated because of the non-linear. For example, our results show that there U-shaped relationship between income (*PGDP* and *PDGP-squared*) and income inequality. This result shows that as economic grows, the degree of urban-rural income disparity will become less; however, once the income get to a certain level, the urban-rural income gap appears to widen. Importantly, other factors held constant, the higher *AgGDP*, the lower is the urban-rural income disparity. This means that AgGDP has a double impact on poverty—through increasing overall income growth and through an inequality-reducing effect. Interestingly, the effects of trade and FDI on urban-rural disparity are not statistically significant.

Decomposition Analysis

While the findings from Table 4 provide basic parameters showing us the direction of the direct and indirect effects on growth, other macro-economic forces and policy efforts, they do not tell us which of the effects are most important. They also do not tell us the net effects of a certain variable. For example, although *PGDP* has a positive direct effect (equation 1), it might have a negative indirect effect (equation 3). In order to quantify the magnitudes of the effects of the different factors in the incidences of poverty in China, we need to conduct a decomposition analysis. To do so, we use the parameters from Table 4 and changes in the values of our independent variables from our data set. In other words, in order to measure the total net impact of each fact on poverty, we calculate an elasticity of the rate of poverty incidence for each individual explanatory variable. Two "versions" of these calculated elasticities are reported in Table 5.[3]

Table 5 demonstrates that the changes in the measures of poverty reduction (or the PI) with respect to each explanatory variables are large for per capita GDP, urban and rural income ratio and agricultural GDP share. A one percent change in per capita GDP can lead to a 0.0384 percent fall in the incidence of poverty (column 1). The effect of agriculture growth on poverty reduction also is also significant. Given overall economic growth, our results suggest that a one percent rise in agricultural GDP's share leads to a 0.046 percent fall in rural poverty incidence. Finally, the relative large change in the incidence of poverty with respect to a one percent change in the urban to rural income index is also found in our results.

[3] Because poverty incidence is inherently measured in percentage terms, we compute two separate indicators to measure the impact of each explanatory variable on the incidence of poverty. The first is change in poverty incidence ($PI_t - PI_{t-n}$) due to 1 percent change in explanatory variable. The results are reported in column 1 in Table 5. The second is the percentage change in the poverty incidence (($PI_t - PI_{t-n}$)/ PI_{t-n} x 100) due to a 1 percent change in level of the explanatory variable. These percentage changes are reported in column 2.

In order to see the magnitude of the impacts of each explanatory variable on actual (or observed) change in the incidence of poverty over time, we need to conduct a decomposition analysis. The decomposition is carried out by multiplying the parameters in column 1 of Table 5 by percentage changes (over the study period) of corresponding explanatory variable. In other words, we are calculating the net effect of each explanatory variable on the incidence of poverty over the study period by multiplying the marginal effect of the explanatory variable times the amount of the change of that variable during the study period. The results of the decomposition analyses are reported in Table 6.

The results show that while the impacts of all variables have statistically significant effects on rural poverty incidence, the magnitudes of their impacts differ. From 1980 to 2005, the incidence of poverty (or the poverty rate) fell by 25.1 percent (27.6-2.5, Table 1 and the bottom of Table 6). Table 6 shows that most of fall in China's poverty incidence was due to economic growth. Income growth alone can explain 104 percent of change in the poverty incidence during the entire period of 1980-2005. When the contribution of an explanatory variable in decomposition analysis is greater than 100 percent, it means that had there not been anything else changing, the incidence of China's poverty would have fallen even more.

The dominating effect of economic growth, however, is not true for the entire period. The main reason for this is because the elasticity of poverty reduction with respect to economic growth declined over the period as China's economy expanded (an effect that was captured by the negative coefficient on the per capita GDP squired variable). We use the estimated parameters of per capita GDP to simulate the relationship between poverty incidence and per capita GDP (Figure 2). Simulation shows that when economic growth reaches a certain level, the contribution of overall economic

growth to poverty reduction declines significantly. After per capita GDP reaches 3000 yuan or 4000 yuan, the impact of economic growth on poverty reduction became marginal.

The impact of agricultural growth on poverty reduction ranks second in its overall importance (in terms of magnitude of the effect—Table 6). The decomposition results show that, given the same growth of GDP, if the share of GDP contributed by agriculture had not declined from 29.9 percent in 1980 to 12.6 percent in 2005 (Table 1—a decrease of 57.9 percent—[12.6-29.9]/29.9), China's poverty rate would have been reduced by 2.66 percent more (column 2, Table 6). This result, however, should be expected given large share of poor's income depending on agricultural activities (Table 3). Interestingly, had there been this additional fall in the incidence of poverty, there would be almost zero poverty left in China (when using the government's poverty line).

The widening urban-rural income gap also led to a rise in poverty (Table 6, column 2). According to our results, because of China's urban-biased economic growth which was behind the rising urban to rural income gap (which rose from 2.49 in 1980 to 3.34 in 2005—Table 3), the incidence of poverty in China was 2.15 percent rise in rural poverty. While other factors, such as rural enterprise, trade liberalization and FDI also contributed to rural poverty reduction in China (see results in Table 5), their effects, based on our decomposition analysis, are minimal.

5. Conclusion

Few observers deny that China has made remarkable progress in its war on poverty since the launching of economic reform in the late 1970s. However, China's experience in past decades and our empirical analysis both show that as more and

more people have escaped from the poverty, it has become more difficult to pull the remaining poor out of their poverty traps. According to Table 2, in 2003 the headcount of the poor increased by 800 thousand despite the fact that the rate of economic growth rate was robust, about 9.1 percent. This finding indicates there are still many things needed to do in the future in terms of eliminate poverty—and the strategy that worked so well in the past (let the economy grow itself out of poverty) may no long be valid.

The policy implication of our paper is far-reaching. While economic growth is an essential and necessary condition for nationwide poverty reduction, by itself it is not enough. The nature of the growth, namely agricultural development and urban-rural income disparity also are becoming increasingly important. Declining impacts of growth on poverty reduction indicate that future efforts to reduce rural poverty cannot rely primarily on general economic growth. On one hand, future policies should give more priority to make growth more broadly based so that the poor will not be left behind during the course of growth. On the other hand, future poverty reduction may have to rely more on well-targeted, pro-poor policy interventions such as national poverty alleviation programs that are designed to reach the chronic poor. The remaining poor are obviously having trouble joining the miracle growth that is transforming the rest of the nation.

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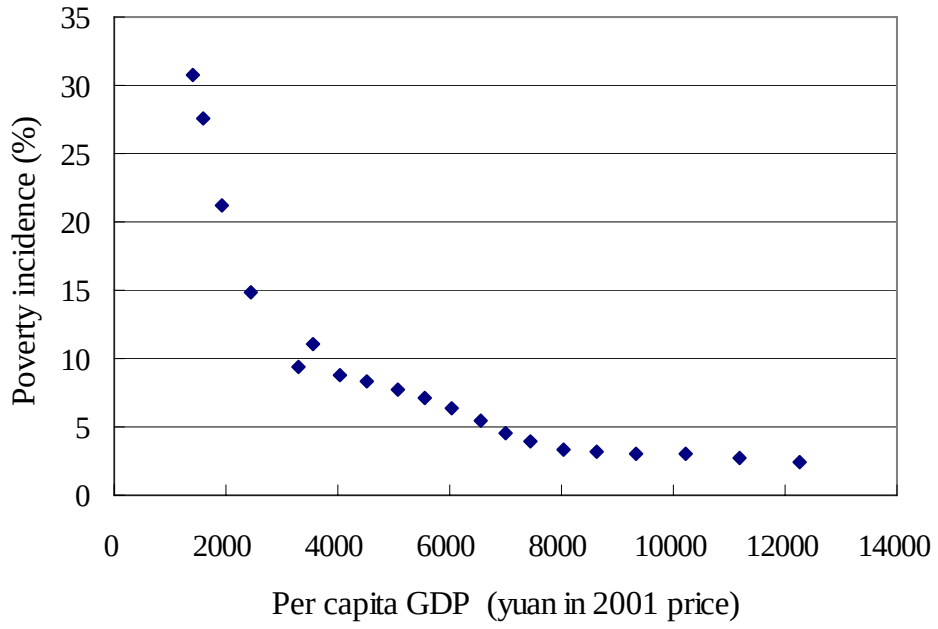

Figure 1. Per capita real GDP (in 2001 price) and rural poverty incidence (%), 1978-2005 (Source: Tables 1 and 2).

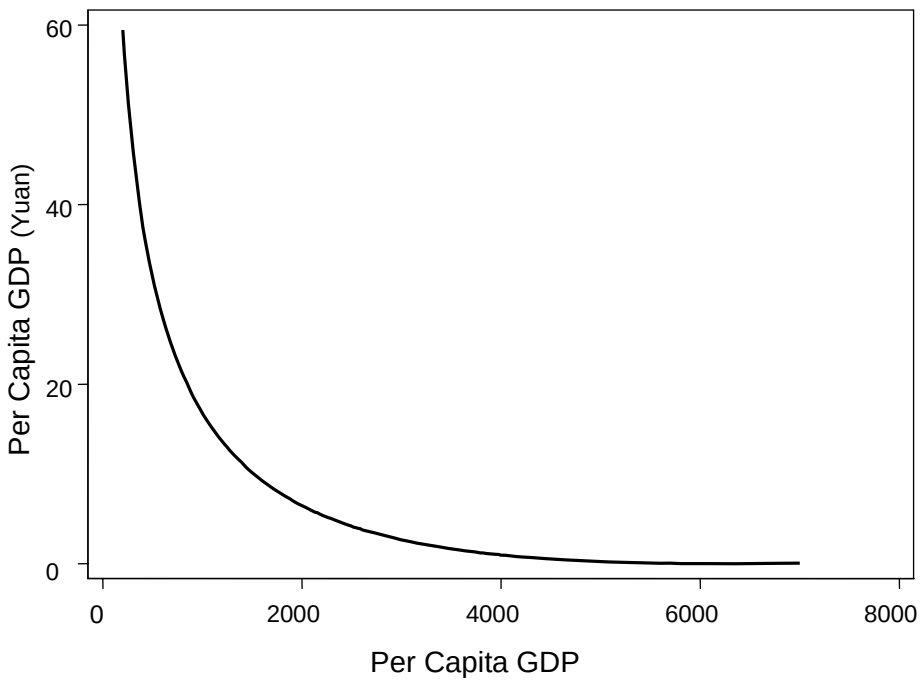

Figure 2: Simulated rural poverty incidence (%) on per capita GDP (yuan in 2001 price) based on the estimated results parameters reported in Table 4.

Table 1. Economic growth, nature of growth, and external economy in China, 1980-2005.

	Real per capita GDP (in 2001 yuan)	Agri/ GDP share	Urban-rural income ratio	Rural enterprises /GDP (ratio)	Export (Billion US$)	FDI (Billion US$ dollar)
1980	1575	29.9	2.48	6	18.12	n.a.
1985	2446	28.2	2.10	9	27.35	1.96
1990	3307	26.9	2.48	14	62.09	3.49
1991	3562	24.3	2.64	14	71.91	4.37
1992	4019	21.5	2.74	17	84.94	11.01
1993	4528	19.5	2.90	23	91.74	27.52
1994	5063	19.6	2.93	23	121.01	33.77
1995	5555	19.8	2.79	25	148.78	37.52
1996	6047	19.5	2.56	26	151.05	41.73
1997	6541	18.1	2.51	28	182.79	45.26
1998	6987	17.3	2.54	28	183.71	45.46
1999	7454	16.2	2.67	29	194.93	40.32
2000	8020	14.8	2.79	30	249.20	40.72
2001	8622	14.1	2.90	30	266.10	46.88
2002	9342	13.5	3.13	31	325.60	52.74
2003	10216	12.6	3.28	na	438.23	53.51
2004	11179	13.1	3.30	na	593.32	60.63
2005	12248	12.6	3.34	na	761.95	60.33

Source: NBSC, various issues.

Table 2. Rural poverty based on China's official poverty line in 1978-2005.

	Poverty line (yuan/year)	Number of the poor (million)	Poverty incidence (%)
1978		250.0	30.7
1980		218.0	27.6
1985	206	96.0	14.8
1990	300	85.0	9.4
1991	304	94.0	11.0
1992	317	80.7	8.8
1993	350	75.0	8.3
1994	440	70.0	7.7
1995	530	65.0	7.1
1996	580	58.0	6.3
1997	640	50.0	5.4
1998	635	42.0	4.6
1999	625	34.1	3.9
2000	625	32.1	3.4
2001	630	29.3	3.2
2002	627	28.2	3.0
2003	637	29.0	3.1
2004	668	26.1	2.8
2005	683	23.7	2.5

Sources: Data are from World Bank (China: Strategies for Reducing Poverty in the 1990s, 1992) and Rural Social and Economic Survey Service of NBSC (2003 and 2006)

Table 3. Income of poor, average and rich households in rural China in 2005.

	Under poverty (<683 yuan)	Average farmers	High income: (top 20%)
Per capita net income (yuan)	552	3255	7747
Agricultural income (%)	61	45	35
Wage income (%)	27	36	40
Other non-farm income (%)	12	19	25
Agricultural income (%)	61	45	35

Source: based on household income and expenditure survey by NSBC in 2003.

Table 4. Estimated parameters of poverty incidence rates in rural China.

	Poverty incidence	Ln(Per capita GDP)	Ln(Urban/rural income)
Ln (Per capita GDP)	-0.76***		-1.89***
	(6.57)		(11.26)
[Ln (Per capita GDP)]^2	0.05***		0.08***
	(7.88)		(9.05)
Ln(Urban income /rural income)	0.06**	-0.34***	
	(2.20)	(7.95)	
Agricultural share in GDP	-0.22**		-1.26***
	(2.16)		(8.06)
Ratio of rural enterprises to GDP		0.14***	0.02
		(3.32)	(0.33)
Export / GDP ratio		0.49***	0.10
		(7.79)	(1.55)
FDI / GDP ratio		1.22***	-0.12
		(5.69)	(0.57)
Provincial dummies included but not reported			
Year dummies included but not reported			
Observations	486	486	486
Adj-R^2	0.75	0.99	0.92

Table 5. The total impacts of each factor on poverty incidence in rural China

	Level changes in poverty incidence due to 1% change in explanatory variable	Percentage changes (%) in poverty incidence due to 1% change in explanatory variable (elasticity)
Per capita GDP	-0.0384	-0.55
Urban-rural income ratio	0.063	0.90
Agricultural GDP share	-0.046	-0.66
Rural enterprise /GDP ratio	-0.001	-0.02
Export / GDP ratio	0.000	0.00
FDI / GDP ratio	-0.0001	0.00

Table 6. Decomposition analysis of poverty incidence changes in China in 1980-2005

	Percentage change in variables (%)	Poverty incidence changes due to changes in explanatory variables (%)	Contribution (%) by each explanatory variable (%)
	(1) (most from Table 1)	(2) =(1)*column 1 of Table 5	(3) =(2)/(4)
Per capita GDP	677.7	-26.02	104
Urban-rural income disparity	14.4	2.15	-9
Agricultural GDP share	-57.9	2.66	-11
Rural enterprise /GDP ratio	433.3	-0.43	2
Export/GDP ratio	473.5	0.00	0
FDI/GDP ratio	1343.2	-0.13	1
Residue			13
Total poverty incidence (4)	-25.1		Total: 100