China's War on Poverty: Assessing Targeting and the Growth Impacts of Poverty Programs

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ABSTRACT *In this paper, we attempt to assess the effectiveness of China's Poverty Alleviation Programs in contributing to economic growth in poor areas. To meet this overall goal, we briefly describe China's poor area policy and examine how its leaders have implemented one of the developing world's largest poverty alleviation programs. Second, we examine whether or not the poverty programs have been implemented in the parts of China that are truly poor. Finally, we attempt to assess if the poverty programs have affected growth. The major findings are that China's poverty programs do get implemented in areas of the nation that are poor, but there are many poor areas that have been left out of the government's various programs. We also find that poverty programs contribute to economic growth and that economic growth promotes poverty reduction.*

Key words: China; Poverty Alleviation; Economic Growth; Targeting; Program Evaluation.

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. In the two decades since the start of reform, more than 200 million rural residents in China have escaped poverty (World Bank, 2000). The incidence of rural poverty has fallen equally fast.

But while most agree with the scope of the fall in poverty, the reasons for the decline in the rural poor is less understood. Understanding the determinants of success in poverty alleviation and the growth of the economy in poor rural areas is still important beyond its academic interest since there are still from 30 to 120 million people living below the nation's poverty line (depending on where the line is drawn). Has the reduction in poverty been due more to the growth of the rest of the economy or to the nation's poverty program? In assessing the

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record of China's poverty programs, other questions arise: have the nation's poverty programs been targeted effectively? Have the poverty programs in poor areas contributed to growth? Answers to these questions are important in designing future changes to China's poverty policy that will guide its efforts to alleviate China's remaining poverty in the coming years.

In this paper, we will attempt to answer these questions as a way of providing information to policy makers that can help guide their future decisions in improving poverty alleviation. To meet this overall goal, we will pursue several specific objectives. First, we briefly describe China's poor area policy and examine how China's leaders have implemented one of the developing world's largest poverty alleviation programs. Second, we seek to examine whether or not the poverty programs have been implemented in the parts of China that are truly poor. Finally, we attempt to assess if the poverty programs have affected growth.

To narrow the focus of such an ambitious set of objectives and to reduce the amount of data needed to examine some of these questions, we necessarily restrict the scope of our analysis. For example, we focus primarily on rural poverty. Although urban poverty is new, and is perhaps increasing, it is still small relative to rural poverty in terms of both headcount and severity. In this paper, we also focus primarily on the plight of the poor in China's officially designated poor areas and analyze the effect of the presence of a poverty program, but we are unable to isolate which grant or loan package is helping or hindering poverty alleviation efforts. Finally, we also examine poverty mainly on the basis of an income metric. While there is not a one-to-one correspondence between income and other measures of human welfare, Wang and Zhang (1999) and the World Bank (2000) show that there is a fairly high degree of correlation between areas with low income and those that do poorly on measures such as literacy and infant mortality. Because of data considerations, we restrict our attention to Sichuan province and study poverty mostly with aggregate data at the county level.

2. The Record on Poverty Alleviation

The official poverty lines in China are currently calculated by the China National Statistical Bureau (CNSB) based on their household survey data and a nutrition standard set at a daily intake of 2100 kcal and a food bundle recommended by the Chinese Nutrition Association. However, careful measurement of poverty is a relatively recent phenomenon. One of the characteristics of China's poverty line over the reform period is that different poverty lines have been used at different time periods.[1] The government's official poverty lines, according to the World Bank's calculations, are lower than the international level (which is set at one dollar per day when calculated in PPP terms – World Bank, 2001).

Estimated with China's own poverty lines, China's rural poor decreased dramatically in the past 20 years, from 260 million in 1978 to 128 million in 1984 (Table 1). After slowing in the late 1980s, the rapid fall in the poverty head count continued in the 1990s, declining to 42 million in 1998. The incidence of rural poverty (poor as a proportion of rural population) also decreased sharply during the reforms, falling from 32.9% in 1978 to 15.1% in 1984, and then to 4.6% in 1998.

Different levels, but similar trends, are found when using international standards (in the 1990s, the only years for which these measures are available). Poverty estimates based on a one dollar per day poverty line (in PPP terms) developed by the World Bank indicate substantially greater numbers of absolute poor in China

Table 1. Estimates of the Number of Poor in Rural China (1984–98)

Year	Official Government Estimates			International Standards ($1/day)	
	Poverty Line (Current Yuan)	Number of Rural Poor (million)	Share of Rural Population (%)	Number of Rural Poor (million)	Share of Rural Population (%)
1978		260	32.9		
1980		218	27.6		
1982		140	17.5		
1984	200	128	15.1		
1985	206	125	14.8		
1986	213	131	15.5		
1987	227	122	14.3		
1988	236	96	11.1		
1989	259	106	12.1		
1990	300	85	9.5	280	31.3
1991	304	94	10.4	287	31.7
1992	317	80	8.8	274	30.1
1993	350	75	8.2	266	29.1
1994	440	70	7.6	237	25.9
1995	530	65	7.1	200	21.8
1996	580	58	6.3	138	15
1997	640	50	5.4	124	13.5
1998	635	42	4.6		

Source: Poverty data for 1978–82 from World Bank (1992). Data from 1984 to 1998 are from World Bank (2000) and Wang and Zhang (1999).

in all years (Table 1, columns 4 and 5). Despite the differences, the trend of both headcount and incidence measures confirm the remarkable decline in poverty during the 1990s.

2.1. Economic Linkages or Policy?

While few observers deny that China has made remarkable progress in its war on poverty since the launching of economic reform in the late 1970s, it is still unclear what have been the main causes of the declining trend. The question we want to answer in this section is whether or not credit for poverty reduction should be attributed to the nation's poverty alleviation program or to general economic growth. In fact, the rural economy and almost all of its sub-sectors have grown quite fast, although at different rates during different sub-periods (Table 2). During the pre-reform period, per capita income growth rates increased by only 0.6% per year from a low level, and the growth of agricultural and key crops barely kept up with population growth (column 1). At the beginning of the 1980s, less than 10% of the rural population worked in the off farm sector.

The record after reform, however, changed, even though it was not always even. Immediately after the launching of the reforms, the income and the performance of almost every sub-sector of the rural economy soared (column 2). After 1985, however, the growth in different sectors of the economy differed. For example, agricultural growth was still positive, although markedly slower, in the post 1984 period (column 3). In contrast, employment in the off farm sector rose rapidly.

Table 2. Annual Growth Rates (in Real Terms) of Key Sectors in China's Rural Economy, 1970–95

	Pre-reform	Reform Period	
	1970–78	1978–84	1984–95
Per capita real income	0.6	19.1	3.2
Agricultural output, value-added basis	2.7	7.1	4.0
Agricultural output, gross value basis	2.3	7.5	5.6
Cropping output	2.0	7.1	3.8
Grain output	2.8	4.7	1.7
	1980	1990	2000
Off farm labor (percent of rural labor force)	9	21	41

Sources: Rows 1 to 5, Huang *et al.* (1998); Rows 6 and 7, deBrauw *et al.* (2002).

Table 3. National Government's Investment in China's Poor Areas by Program (Billion Yuan), 1986–97

Year	Poverty							
	Total Investments		Development fund		Subsidized credit		Food for work	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
1986	4.1	3.9	1.0	0.9	2.3	2.2	0.8	0.7
1987	4.1	3.7	1.0	0.9	2.3	2.1	0.8	0.7
1988	4.1	3.1	1.0	0.8	2.9	2.2	0.2	0.2
1989	4.2	2.7	1.0	0.6	3.0	1.9	0.2	0.1
1990	4.7	2.8	1.0	0.6	3.0	1.8	0.7	0.4
1991	8.3	4.9	1.0	0.6	3.5	2.1	3.8	2.3
1992	6.7	4.9	1.0	0.6	4.1	2.3	3.6	2.0
1993	8.7	4.8	1.1	0.5	3.5	1.7	5.1	2.5
1994	11.7	4.7	1.1	0.4	4.5	1.8	6.1	2.5
1995	11.8	3.0	0.9	0.3	4.8	1.7	6.1	1.1
1996	10.1	3.2	1.3	0.4	5.7	1.8	3.1	1.0
1997	14.6	4.5	2.8	0.9	8.7	2.8	3.1	1.0
Total	93.1	46.2	14.2	7.5	48.3	24.4	33.6	14.5

Source: Huang *et al.* (1998).

Comparing the trends of economic growth with those of the fall in poverty, one can observe a negative correlation.

However, during this time of rapid growth, the government put together a multi-dimensioned poverty alleviation program to coordinate a rising volume of the funds targeted for investment in poor areas (Table 3). Before 1986, special grants funds and initiatives to spur growth were pushed in poor areas (Tong *et al.*, 1994). Since 1986, nearly 100 billion yuan (in nominal terms), or about US$40 billion dollars (in PPP terms), have been allocated to poverty alleviation. Given the scarcity of investment funds, it is unsurprising that government officials are interested in the

impact that poverty alleviation efforts have had in solving the nation's poverty problems.

Despite the rising attention that policy makers have given to poverty alleviation, the record is unclear – both inside and outside China – whether economy-wide growth or poverty policy is the most effective means to increase the welfare of the poor. Inside China, there have been a number of critics of the nation's poverty policy (Park *et al.*, 2002; Khan and Riskin, 2001). While poverty investments have risen over time, there is no clear evidence that the different parts of the investment programs are all working. Internationally, in addition to direct intervention, there is substantial evidence that economic growth in the economy as a whole is as important, if not more important, a mechanism for alleviating poverty than poverty programs (World Bank, 2001; Fan *et al.*, 1999).

A strong case can be made for the importance of the linkages to the rest of the economy that growth has created, and the failure of poverty policy by examining the results of a set of *naive* regressions that look at the relationship between falling poverty incidence (*PI* – see Table 1) and economic growth (*Y* – CNSB, 1999) and poverty incidence and poverty investments (*PF* – see Table 3):

$$PI = 0.8 + -2.34 \times \ln(PF)$$
$$\underset{(0.86)}{}$$
$$R^2 = 0.05 \tag{1}$$

$$PI = 69 + \underset{(2.40)**}{2453/Y} - \underset{(2.78)**}{11 \times \ln(Y)}$$
$$R^2 = 0.98 \tag{2}$$

$$PI = 65 + \underset{(2.37)**}{2515/Y} - \underset{(2.60)**}{10 \times \ln(Y)} + \underset{(0.39)}{0.7 \times \ln(PF)}$$
$$R^2 = 0.98 \tag{3}$$

Although the exercise is simple (and will be looked at in greater depth in the next sections of the paper), equation (1) shows that poverty funds (transformed into natural logs of total investment) have no effect on poverty reduction. In contrast, the coefficient on the growth variable (*Y*, which is specified to allow for decreasing marginal impacts of growth on poverty reduction) demonstrates that as growth occurs, poverty has fallen sharply (although the reduction in poverty incidence per percentage point of economic growth is slowing over time). When the poverty investment variable is added to equation (2), the statistical analysis (in equation (3)) still does not find a statistically significant relationship between poverty incidence and aggregate poverty investment. In fact, the r-square statistic, a measure of the goodness of fit of the model to the data, although quite high, 0.98, is the same in equations (2) and (3) regardless of whether the poverty investment variable is included or not.

Although the simplistic nature of the analysis precludes us from drawing any firm conclusions, it does aid us in formulating several hypotheses that our subsequent analysis can examine more carefully. Economic growth appears to be one of the major determinants of poverty alleviation. In contrast, we cannot find an impact of poverty investment on poverty alleviation. Moreover, as the nation's poverty levels fall, it is becoming more difficult to increase the incomes of those remaining in poverty above the poverty line by relying on economic growth.

3. Poor Area Policy

While leaders had not formulated an explicit national policy focused on poverty alleviation prior to 1986, it did not mean that farmers in poor areas did not receive special attention. Reformers permitted poor area communes to decollectivize in the late 1970s several years ahead of the rest of China. Being of marginal importance to the economy, leaders had little to lose if the early reforms had failed. The central government was already heavily subsidizing poor areas, both through large direct budget transfers and through resold grain shipped into poor areas and sold to farmers at preferential prices (Park *et al.*, 1996).

After the first years of reform, however, national leaders began to realize that solving poverty for a whole class of resource poor households, that lived in remote, isolated regions, required more than favorable macro-economic conditions and increased decision making responsibilities. National leaders launched a poverty alleviation program that consisted of three parts: institutional development, increased investment, and targeting. Institutionally, the program established an Office of the Leading Group for Economic Development in Poor Areas at the national level to oversee the expenditure of the poverty funds, coordinate efforts to alleviate poverty across a number of sectors, and be an advocate for the poor. The national organization set up Poor Area Development Offices (PADO) at the provincial and county levels to administer funds from both national and provincial sources (Tong *et al.*, 1994).

In the 1980s, China's poverty alleviation network was empowered primarily by funding provided by the State Council, in part in the form of grants and in part as loans. In the first years, most funds came as grants from programs such as *Laoshao Bianqiong* (Old Revolutionary Base Development Funds) and *Fazhan Zijin* (Development Capital Funds for supporting the improvement of underdeveloped areas – Table 3, columns 2 and 3). Officials could use these funds in projects approved by local PADO leaders and in most cases did not have to pay back the funds. Although development grants were highly sought after, in nominal terms the level of funding remained largely unchanged between 1986 and 1993.

As the real level of grants declined due to inflation, low interest loans became the main form of poverty relief in the late 1980s (Table 3, columns 5 and 6). Making loans at preferential, below-market rates of interest, local PADO offices controlled most of the loan portfolios in its initial years (Li and Li, 1992). According to interviews with PADO officials and bankers, in these early years banks exercised little decision making authority, acting as passive conduits through which the financial resources flowed. Policies during the period 1986–88 clearly dictated that funds be used for direct poverty alleviation, mainly by channeling loans to households for use in agricultural production and other basic needs (State Council 1989, World Bank 1992). In the 1990s, however, lending preferences changed to favor investment in economic projects vested at the village and township level.

In the late 1980s, the State Council also began to fund a Food for Work (FFW) program that aimed at the construction of roads and drinking water delivery projects. In part due to the frustration experienced by some officials that believed poverty funds were not being used effectively, the state planning commission hierarchy itself began to oversee the design and implementation of Food for Work projects (Zhu, 1993). Although starting out fairly small, FFW funding has risen rapidly overtime, becoming the predominant source of poverty funding in the mid-1990s (Table 3, columns 7 and 8).

Although total funding on combating poverty (including budgetary grants, subsidized loans and FFW) was fairly stagnant in the late 1980s, it expanded rapidly after 1990 (Table 3, columns 1 and 2). From 4.7 billion yuan in 1990, poverty alleviation investments grew to 10.1 billion yuan in 1996. By 1997, more than 14 billion yuan had been spent.

4. Impact of China's Investments in Poor Areas: Targeting Success and Growth Effects

In this section, we seek answers to two sets of questions. How good have China's poverty programs been at targeting the poor? And, what has been the impact of China's poverty programs on stimulating growth?

4.1. Data

To undertake this analysis, we use county-level data from Sichuan Province, one of China's largest and poorest provinces. The analysis focuses on how well the Leading Group chose designated poor area counties in the mid-1980s and how participation in the program affected income growth. A supplemental set of county-level data set from Sichuan is used to examine the determinants of growth.

While China's data collection system is mostly reliable in the collection of most of statistics, it is unfortunate that almost all measures of income are subject to some problems (see Park and Wang, 2001, for a detailed analysis of this issue). In this analysis we use two measures of rural per capita income, gross per capita income (gross income at the county level, or the county equivalent of *guomin shouru*) and net income per capita (a direct estimate of how much the average rural resident makes after all the costs for all the household's and individual's economic activity are deducted).[2] The measures have strengths and weaknesses. Both of these measures are complete annual censuses of all villages in China, reported directly by the accountant of every village and township to their respective county statisticians. In this way, they are not subject to sample selection bias. However, since the numbers are not always based on modern sample survey methods, there is room for the figures to be influenced by more than sampling error. In particular, it has been shown in many cases (e.g. the case of livestock) that sectoral gross value products (part of income) can be overstated as leaders attempt to meet growth targets (Ma *et al.*, 2002). On the other hand, per capita income, sometimes are underreported as leaders and accountants almost invariably miss income sources in China's increasingly complex economy. In our analysis, we use both measures of income.

4.2. Selecting Program Counties in Sichuan

In 1986, the national and provincial Leading Groups designated 17 Sichuan counties as ''nationally-designated'' poor counties and 24 as ''provincially designated'' poor counties, a choice that can be seen to have successively identified many of the province's poorer counties. When compared against the provincial average and the average of non-poor counties, nationally and provincially designated counties are poor in terms of 1985 gross per capita income levels (Table 4, column 2). For example, gross per capita incomes in the 17 national poor counties was 251 yuan per capita in 1985 and that of the 24 provincial ones was 284 yuan (rows 2 and 3). The average of these counties was significantly less than the provincial

Table 4. Gross and Net Per Capita Income (deflated) in Sichuan Counties Grouped by Income Levels and Poverty Designation, 1985–95

	n	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Gross Per Capita Income												
All counties	177	384	425	457	473	441	435	489	536	639	778	822
National designated poor, 1986	17	251	273	280	298	287	301	335	359	358	393	436
Provincially designated poor, 1986	24	284	313	331	344	324	327	357	386	390	450	497
All designated poor, 1986	41	272	298	312	326	310	317	349	376	378	426	470
Not poor, 1986	83	497	556	605	622	569	579	667	748	963	1216	1291
Poor, not designated, 1986	53	297	320	338	353	302	303	322	333	330	358	377
Net Per Capita Income												
All counties	177	271	293	304	298	262	255	275	283	270	274	286
National designated poor, 1986	17	165	179	182	186	182	191	213	223	213	214	226
Provincially designated poor, 1986	24	182	199	206	208	195	197	213	221	206	214	226
All designated poor, 1986	41	175	191	196	199	190	194	213	222	209	214	230
Not poor, 1986	83	338	428	384	363	324	311	334	346	333	340	356
Poor, not designated, 1986	53	196	214	219	219	193	194	207	218	208	215	223

Data Source: Provided to authors by the Ministry of Agriculture.

average (384 yuan per capita – row 1) and even further below the average income of the 83 counties we count as ''not poor'' (497 yuan per capita – row 5).[3] Nationally and provincially poor counties also have significantly lower reported net income per capita levels (166 and 182 yuan, respectively) than the provincial average (271 yuan) and non-poor counties (338 yuan – Table 4, rows 7 to 12).

Targeting while good, however, was not perfect. Although the counties that became part of the national and provincial poverty program in 1986 were indeed poor and clearly below average, a number of counties that were equally as poor or poorer were not included. The average gross income per capita of 53 counties in Sichuan (297 yuan) was less than the income level of the income level of the most well-off poor county (Table 4, row 6). In our study, we call these the ''Poor, Not-designated'' or ''Non-program'' counties. From an analytical point of view, the presence of these counties are ''helpful,'' as they provided a yardstick to gauge the performance of those counties that were included in the poverty allevia-tion program (the ''Designated'' or ''Program'' counties). In fact, some of these non-program counties were among the poorest in the province in the mid-1980s. Of the 20 poorest counties in Sichuan in 1985, six counties were *not* chosen to be part of the national poverty program, and four of the ten poorest were *not* selected (Table 5).

4.3. Impact on Growth

The impact on the rise in income levels of participation in the national or provincial poverty program can be seen in the most simple terms (i.e. not holding other factors constant) by examining plots of income levels over time of Sichuan's Designated Poor (using the 1986 designations, unless otherwise noted), the Poor, Not-designated, and the Not Poor (Figure 1). Using gross income per capita, designated or program counties started lower in 1985 and ended higher than non-program counties. Growth of real gross per capita income in program counties

Table 5. Income Levels and Program Designation of Sichuan Province's Poorest Counties (Counties Ranked as Poorest on the Basis of Income Per Capita)[a]

Categories of poor counties	The poorest 20 counties		
	Number	Income per capita 1986	Income per capita 1995
Nationally designated poor	8	237	454
Provincially designated poor	6	243	384
Not designated poor	6	237	257
	The poorest 10 counties		
Nationally designated poor	4	224	442
Provincially designated poor	2	230	448
Not designated poor	4	230	251

Source: Based on data in Table 4.
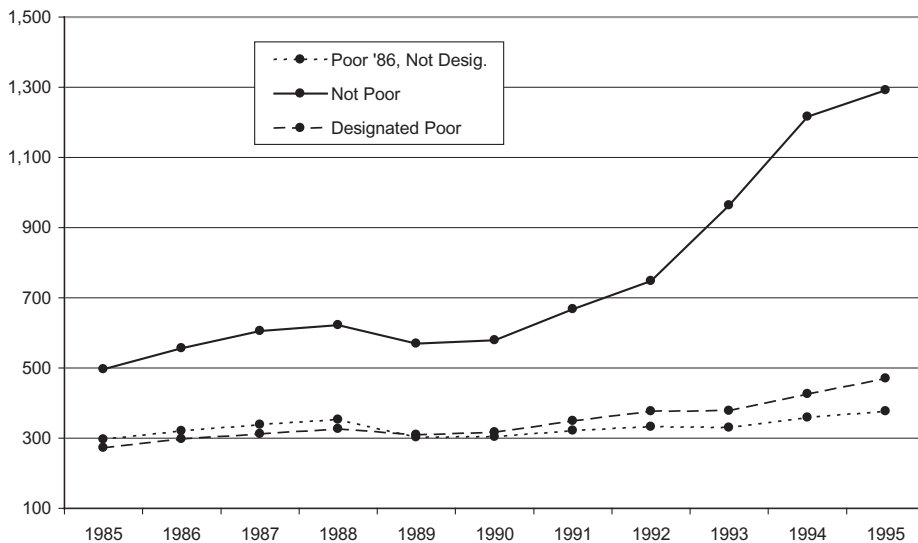[a] Program is China's 1986 national and provincial poverty program.

Figure 1. Gross per capita income (yuan) in Sichuan's poor and non-poor counties, 1985.

clearly was positive and exceeded the very small rise for non-program poor counties. Increases in gross income per capita of poor program counties, however, did not keep up with increases in the non-poor counties. Although less evident, the poor program counties also outperformed poor non-program counties in terms of net income per capita (Figure 2).

To examine the statistical significance of the differences in the growth rates among sub-groupings of counties, we regress the log of gross and net per capita income on a series of year and group dummy variables (making the coefficient on
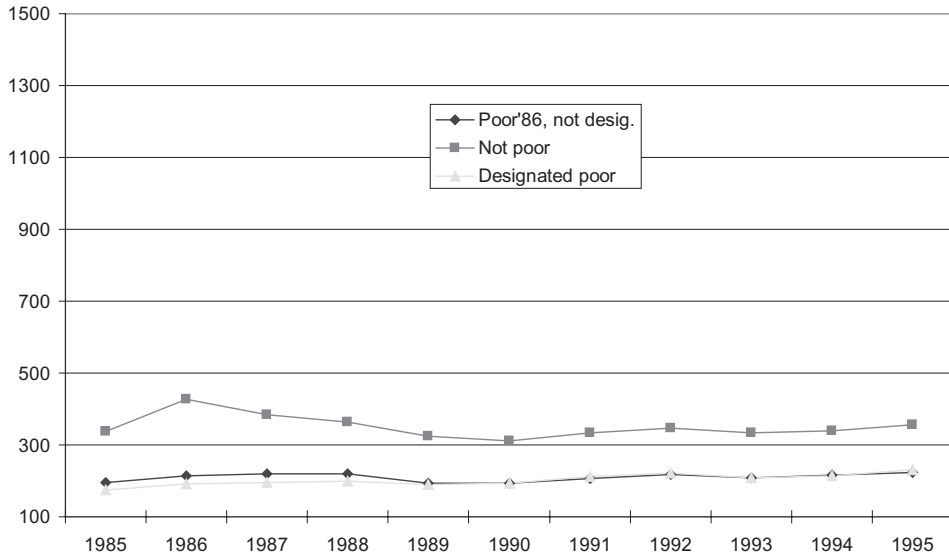
Figure 2. Net per capita income (yuan) in Sichuan's poor and non-poor counties, 1985–95.

the year variable the baseline growth rate and the coefficients on the year and group dummy interaction terms the difference in the growth rates from the baseline – Table 6). These initial growth impact results do not support the hypothesis that program participation failed to increase growth in poor counties. The results are at odds with the naïve regression results. The coefficients on the year variable in equations 1 to 5 show that there were positive growth rates in gross income per capita during the study period (1985–95). The insignificant signs on the dummy variables for nationally and provincially designated poor counties (rows 6 and 7, equations (4) and (5)) show that growth rates of poor program counties were statistically indistinguishable from non-poor counties, a result that was originally noted (although not rigorously proven) by Tong *et al.* (1994) for all poor counties in the late 1980s and by Rozelle (1996) for poor provinces. The negative and significant signs on the Poor, Not-designated and Very Poor, Not-designated variables in equations (4) and (5) (rows 4 and 5) show that those poor counties that were not included in the program had significantly slower growth. The magnitude of the coefficients means that growth in these non-program counties was between 0 and 1%. (When examining the net per capita regressions – equations (6) to (10), program and non-program poor grew faster than the average county in the province, but the larger coefficients on the program county variables mean that program counties grew faster than non-designated counties.)

4.4. Determinants of the Growth of Sichuan Provinces

A single regression explaining the growth of income in Sichuan is included to begin to use our data to identify the determinants of growth in all counties in Sichuan and to examine the impact of China's poverty programs, holding other factors constant (Table 7). Only one specification is used to explain the changes in gross county income during the study period. The growth of income is regressed on sets of independent variables representing resource endowments and the economic structure of

Table 6. Results from Growth Regressions on County Level Per Capita Incomes

	Dependent Variable: Log Gross Per Capita Income					Dependent Variable: Log Net Per Capita Income				
	Equation1	Equation2	Equation3	Equation4	Equation5	Equation6	Equation7	Equation8	Equation9	Equation10
Year	0.0352	0.0534	0.0534	0.0534	0.0384	−0.006	−0.0186	−0.0186	−0.0186	−0.0181
	(7.76)	(10.6)	(10.5)	(10.6)	(7.8)	(2.21)	(6.72)	−6.63	(6.65)	(6.57)
Interaction Dummies										
10 Poorest Counties		−0.356					0.0241			
(program and non-program–partial)		(5.06)					(5.25)			
All Poor Counties			−0.033					0.0308		
(program and non-program–all)			(4.76)					−6.97		
Poor, Not Designated in 1986				−0512					0.0207	
(non-program – all)				(6.4)					(3.5)	
Very Poor, Not Designated in 1986					−0.0292					0.0249
(non-program – partial)					(2.6)					(3.66)
Nationally Designated Poor, '86				−0.004	0.011				0.0479	0.0474
(program counties – partial)				(0.366)	(0.797)				(6.4)	(6.24)
Provincially Designated Poor, '86				−0.012	0.003				0.0312	0.0307
(program counties – partial)				(1.157)	(0.238)				(4.8)	(4.64)
N	1573	1573	1573	1573	1573	1748	1748	1748	1748	1748
R-Squared	0.037	0.456	0.442	0.453	0.304	0.003	0.427	0.41	.415	0.389

The absolute value of t-statistics are in parenthesis. Coefficients on intercepts and intercept dummies are not reported.

Table 7. Ordinary Least Squares Regression Explaining Income Growth in Sichuan Province, 1990–95[a]

	Dependent Variable: Growth in Total Income[b]
Year	0.0346
	(9.06)
Endowments and Economic Structure	
Rural Labor Force	−0.0496
	(3.0)
Sown Area	0.029
	(0.280)
TVE Labor Force	0.033
	(2.99)
Cash Crop Sown Area	0.0713
	(3.43)
Investments	
Infrastructure Expenditures	−0.00001
	(1.15)
Agricultural Expenditures	0.00003
	(2.19)
Health and Education Expenditures	0.000001
	(2.06)
Electrification	0.00002
	(1.83)
Performance of Poor Counties	
Poor, not Designated in 1986	−0.0456
	(4.21)
Designated Poor in 1986	−0.0295
	(2.54)
Per Capita Income (lagged one year)	0.000025
	(3.076)
N	859
R-Squared	0.33

[a]Regressing ordinary least squares estimators. Coefficients on constants are not reported and absolute values of t-stats are in parentheses.
[b]Dependent variable, endowment and structure variables are in logged growth form.

the county, investments (by type) made through the fiscal system (which include some but not all of poor area investments), and program participation. County-level data for the analysis come from the CNSB. Six years of data from 1990 to 1996 are used for 177 Sichuan counties, providing 859 observations when explaining year-to-year growth. In our year-to-year growth equation, endowment and structural variables are also in year-to-year form. Right-hand side investment and endowment variables are lagged one period to help avoid endogeneity problems.

The growth model performed quite well in terms of goodness of fit measures and performance of endowment and economic structure variables. The goodness of fit measure (adjusted R-square) was 0.33, acceptably high for such short time series. Holding all else constant, the positive coefficients on the year variable means that the economies have been growing quite fast (3.46% per year) during the reform era. Certainly part of this growth rate is due to the impact of reform and general market development and part to technological developments (Lin, 1992; Huang and Rozelle, 1996). Increases in endowments and economic activities that create linkages with the rest of the economy, such as the non-farm labor force

and cash cropping, add to growth in the estimated equation. Holding labor market activity and high-value agriculture (that is, orchards and other cash cropping) constant, however, further increases in population (rural labor force) and grain sown area generally either hold down income increases or do not contribute positively to growth.

In our specification, investments in agriculture, health and education, and electrification positively affect growth, although the effect on growth of some investments (e.g. those in ''other'' infrastructure projects) is not readily apparent. The positive impact of these investments provides policy makers who are interested in growth with evidence that supports the development of poverty projects that continue to emphasize these investments. The weak effect of other infrastructure investment may be due to the aggregation of the effect of transportation investments (which should be expected to have strong growth effects) with other investments, such as terracing, which when done poorly has only small impacts on agricultural output and growth and may even detract from growth due to its heavy investment on labor that involves a high opportunity cost for farmers (Li, 1994). Health and education investments also have particularly strong growth-inducing effects on overall income levels; for every dollar investment in health and education, there is a twenty-fold return.

The main finding of interest of the growth regression, however, is that the poverty program *does* positively increase growth or, more accurately, keep the growth rates of Designated Poor or program counties from falling as much as the growth rates of Poor, Not-designated counties (compare rows 10 and 11 – Table 7). The negative sign on the coefficient of the Designated Poor variable means that after accounting for endowments, structure, and beginning levels of income, poor program counties grow slower than non-poor counties (by 2.95% per year less). However, this slower growth rate was still faster than Non-program, poor counties, which experienced growth rates 4.56% slower than those if Non-poor counties. When testing the difference in the coefficients, we indeed do find a statistically significant difference in the growth rates of the program and non-program counties. From this point of view, without considering that higher fiscal investments come with being part of the national or provincial poverty alleviation program (since budgetary investments are held constant), poor program counties maintained higher growth rates than non-program poor counties. These higher rates could be due to either more effective use of poverty investments that go through the fiscal system (which might occur if they are better designed or monitored by county PADO offices than by officials in counties without PADO offices), or to FFW or other poor area programs that are not included in the fiscal investments.

In summary, the findings of our Sichuan case study analysis are clear and consistent. It is unfair to accept the results of the naïve analysis in equations (1) and (3). Poverty programs are not completely ineffective. We do find that program counties outperform counties that were not included in national programs. However, our descriptive and analytical findings cannot be said to have provided overwhelming evidence that the programs were the driving force behind the great fall in poverty in China during the 1980s and 1990s. In this way, we find a bit of corroborative support for the finding of the naïve analysis that linkages with economic growth and investments beyond the scope of those made in the poverty program had a significant effect on the growth of counties in poor provinces like Sichuan. The bottom line of our analysis is: poverty programs appear to have mattered. However, it appears that other factors, such as economic growth, linkages

to the rest of the economy, and investment in growth-oriented public investments may matter more.

4.5. *Experience in Other Parts of China*

Such a conclusion is supported by the work of others in China. For example, in a study of the effectiveness of poverty policy in Shaanxi Province, Rozelle *et al.* (1998) find that markets and certain investments matter for the growth of counties, and that, ceteris paribus, the poverty program aids the growth process in poor counties. Poverty investments centered on agriculture and those that get into the hands of farmers have positive growth impacts. In addition, projects that create an economic environment that can foster entrepreneurship and labor movement, such as increasing human capital, also affect growth. However, the study finds that the impact on growth of most of the poverty investments during the late 1980s and early 1990s (especially those targeted at publicly-run enterprises) are often either absent or even negative. In short, the findings of the Shaanxi case study are largely consistent with those of our work on the effectiveness of poverty programs in Sichuan province.

Fan *et al.* (2002) find even stronger support for the conclusion that poverty investments (measured as poverty loans) matter somewhat for growth and poverty alleviation, but not nearly as much as investments in other sectors of the economy. The study, using provincial data for the past 26 years between 1970 and 1995, shows that government spending on production-enhancing investments, such as agricultural R&D, irrigation, rural education and infrastructure (including roads, electricity, and communication) have contributed to both growth and poverty alleviation. Importantly, however, the results show that although government anti-poverty investments do help reduce poverty, these investments actually have the smallest impact on poverty reduction when compared to any of the other investment programs.

5. Conclusion: the Need for a New Strategy for Poverty Alleviation

When confronting poverty in the 21st century, one is left with some basic questions that must be answered before settling on a new strategy. To the extent that China's poverty policy and the nation's general economic development push in the past 20 years have been successful, is it the right strategy to help those remaining farming households out of poverty? What are the factors that link economic development to poverty reduction? How can the current policy framework begin to address the pockets of poverty outside of the designated poverty areas and in urban areas?

The most important thing to realize is that even with the successes to date, there are still up to 100 million rural absolute poor. And, much of the remaining poverty is both severe and subject to severe natural constraints. As we have seen, in the past, the broad incidence of poverty made it possible to achieve substantial reductions in poverty through general economic growth, establishing linkages through labor and commodity markets, and through programs that were more broadly targeted. At present, however, most of the rural poor are concentrated in resource deficient areas, and comprise entire communities located mostly in upland sections of the interior provinces of northern, northwestern and southwestern China. Although these poor have access to land, their soil is of such poor quality that it is not possible to achieve subsistence and so they, of all farming communities when it comes to

survival, are reliant on markets and outside sources of income. However, it is these poorest households that are typically most disadvantaged by high dependency ratios, ill health, poor human capital and living in such isolation that they have little information on market opportunities. Minority peoples and peoples with disabilities are known to represent a highly disproportionate share of the rural poor. Poverty also exacerbates society-wide problems of lower rates of female participation in education, higher relative female infant mortality rates, and higher rates of maternal mortality. Available evidence suggests that the severity of the remaining poverty worsened somewhat during much of the 1990s. The new World Bank report on poverty shows that the squared poverty gap index increased during the 1990s, and in 1998 remained considerably greater than in 1990.

   Hence, the old strategy, based on providing the poor with capital for creating their own economic activities and/or building them the bridges to the rest of the economy (with road projects), may not work as well and perhaps not at all. Since the educational, health and nutritional status of these remaining absolute poor is deplorable, the new strategy must address these questions. And, this is not a problem that will show an immediate success. As many as half of the boys in many of China's poorest villages and, particularly in some minority areas, nearly all of the girls do not attend school and will not achieve literacy. The World Bank reports that infant mortality rates and maternal mortality ratios in very poor counties exceed 10% and 0.3% respectively, levels that are up to 100% greater than the national average. Many still suffer from chronic nutrition and disease problems. For example, findings by Zhang and Xin (1998) suggested that more than 40% of children in China's poor areas are suffering from some form of malnutrition problem, also a number that is twice the national average. The traditional programmatic focus on hardware construction in search of immediate poverty alleviation must be replaced by a more patient effort that will invest in rural education, health, and welfare, investments that in the long run will create linkages to the rest of the economy.

   That is not to say traditional investment programs are not needed and that linkages to the rest of the economy are the only thing of importance. Indeed, although linkages ultimately may be more important, there is still a need for agricultural development and income-increasing activities that can give household's the resources to make these long-term investments and assist them in getting out of the most uninhabitable environments. In the time that rural education and other human capital enhancement programs are being run, the standard of living of those remaining in rural areas can be made less difficult with appropriate investment programs in irrigation, drinking water, roads, communication, and other rural development projects. But, it should be recognized that the regions where the poorest of the poor live are most abundantly endowed in a relative sense with labor, and poverty alleviation will most of all require an investment in that factor, providing it with the skills that allow it to increase its return in the rest of economy.

Notes

1. The poverty line were 100 yuan in 1978, 200 yuan in 1984, 300 yuan in 1990, 530 yuan in 1995 and 635 yuan in 1998.
2. China has one other source of per capita income, the figures generated by the China National Statistical Bureau. Unfortunately, these are not generated (and/or published) for every county on an annual basis. While both the measures used in our study come from the provincial year-end

reporting system (i.e. not based on survey data), it might initially appear as if there is no a priori reason to favor one measure over the other. However, the higher correlation between gross per capita income at the provincial level and SSB-reported income statistics (that are not available for each county over time), lead us to put more stock in the results of the gross income figures. We conduct all analysis with both measures, however.

3. Counties are counted as "not poor" if they are not nationally or provincially designated poor counties and are not "non-designated" poor, i.e. those counties that have incomes lower than the richest of the designated poor counties.

References

deBrauw, Alan, Jikun Huang, Scott Rozelle, Linxiu Zhang and Yigang Zhang, "The Evolution of China's Rural Labor Markets during the Reforms.," *Journal of Comparative Economics*, 2002, **30**(2) (June), pp. 329–353.

CNSB [China National Statistical Bureau] *China Statistical Yearbook, 1999*. China National Statistical Press: Beijing, China, 1999.

Fan, Shenggen, Peter Hazell, and S. Thorat, "Governmental Spending, Agricultural Growth, and Poverty 1999.

Fan, Shenggen, Linxiu Zhang and Xiaobo Zhang, "Growth, Inequality, and Poverty in Rural China: The Role of Public Investments," No.125, IFPRI Research Report, Washington, DC, 2002.

Huang, Jikun and Scott Rozelle, "Technological Change: Rediscovery of the Engine of Productivity Growth in China's Rural Economy." *Journal of Development Economics*, 1996, 49(2), pp. 337–369.

Huang, Jikun, Hengyun Ma and Scott Rozelle, "Rural Poverty and Policy in China," *Reforms*, 1998, 4, pp. 72–83.

Khan, Azizur and Carl Riskin, *Inequality and Poverty in China in the Age of Globalization*, Oxford University Press, Oxford, 2001.

Li Zhou, "Adjusting Agricultural Production Practices in Econologically Sensitive Regions," in Albert Park and Scott Rozelle, eds, *Promoting Economic Development in China's Poor Areas: A Collection of Policy Briefs*, China Poverty Research Association, Beijing, China, 1994.

Li Jianguang and Li Guo, "The Use of Poverty Alleviation Funds and Economic Development in China's Poor Areas." *Working Paper*, Food Research Institute, Stanford University, Stanford, CA, 1992.

Lin, Justin, "Hybrid Rice Innovation in China: A Study of Market-Demand Induced Technological Innovation in a Centrally-Planned Economy," *Review of Economics and Statistics*, 1992, 74(1), pp. 14–20.

Ma, Hengyun, Jikun Huang and Scott Rozelle, "An Assessment of China's Livestock Statistics: Developing an Alternative Set of Livestock Supply and Demand Numbers," Working Paper, Department of Agricultural and Resource Economics, University of California, Davis, 2002.

Park, Albert, Scott Rozelle, Christine Wong and Ren Changqing, "Distributional Consequences of Fiscal Reform on China's Poor Areas," *China Quarterly*, 1996, 147, pp. 1001–32.

Park, Albert and Sangui Wang, "China's Poverty Statistics," *China Economic Review*, 2001, 12, pp. 384–398.

Park, Albert, Sangui Wang and Guobao Wu, "Regional Poverty Targeting in China," *Journal of Public Economics*, 2002, 86(10), pp. 100–123.

Rozelle, Scott, "Stagnation Without Equity: Changing Patterns of Income and Inequality in China's Post-Reform Rural Economy," *The China Journal*, 1996, 35, pp. 63–96.

Rozelle, Scott, Albert Park, Vince Benziger and Changqing Ren, "Targeting Poverty Investments and Economic Growth in China," *World Development*, 1998, 26(12), 2137–51.

State Council, "Guanyu Jiushi Niandai Jinyibu Jiaqiang Fupin Kaifa Gongzuo De Qingshi (A proposal on the strength of Poverty Alleviation in 90's)," In *Pinkun Diqu Jingji Kaifa Wenjian Huibian (Collection of Documents on Economic Development in Poor Areas)*, People's Press: Beijing, China, 1989, p. 37.

Tong Zhong, Scott Rozelle, Bruce Stone, Jiang Dehua, Chen Jiyuan and Xu Zhikang, "China's Experience with Market Reform for Commercialization of Agriculture in Poor Areas," in Joaquim von Braun and Eileen Kennedy, eds, *Agricultural Commercialization, Economic Development, and Nutrition*, John Hopkins Press, Baltimore, MD, 1994, pp. 119–140.

Wang, Sangui and Linxiu Zhang, "Report on Poverty Alleviation in China for Common Country Assessment (CCA)," Report to UNPD Task Force Group on Poverty, UNDP, Beijing, 1999.

World Bank, *China: Strategy for Reducing Poverty in the 1990s*. World Bank, Washington, DC, 1992.

World Bank, ''China: Overcoming Rural Poverty,'' A World Bank Country Study, World Bank: Washington, DC, 2000.

World Bank, *World Development Report, 2000/2001: Attacking Poverty*, World Bank, Washington, DC, 2001.

Zhang, Linxiu and Xian Xin, Does Teaching Mothers Help Nourish Children? — Examining Links between Education and Child Health in China's Poor Area, Working Paper, Center for Chinese Agricultural Policy, Chinese Academy of Sciences, 1998.

Zhu Ze, ''The Present Condition of the 'Labor Tide' it's Elements, and Countermeasures,'' *Zhongguo nongcun jingji* [Chinese Rural Economy], 1993, 12, p. 33.