Agricultural productivity, poverty and inequality in Indonesia

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Research questions

1. **Does agricultural productivity growth in Indonesia reduce poverty?**

2. **What are the full distributional effects?**

3. **What happens to inequality?**

Model I: ***Poverty determinants model***

- relates the rate of reduction of poverty incidence in rural areas to the rate of agricultural productivity growth.

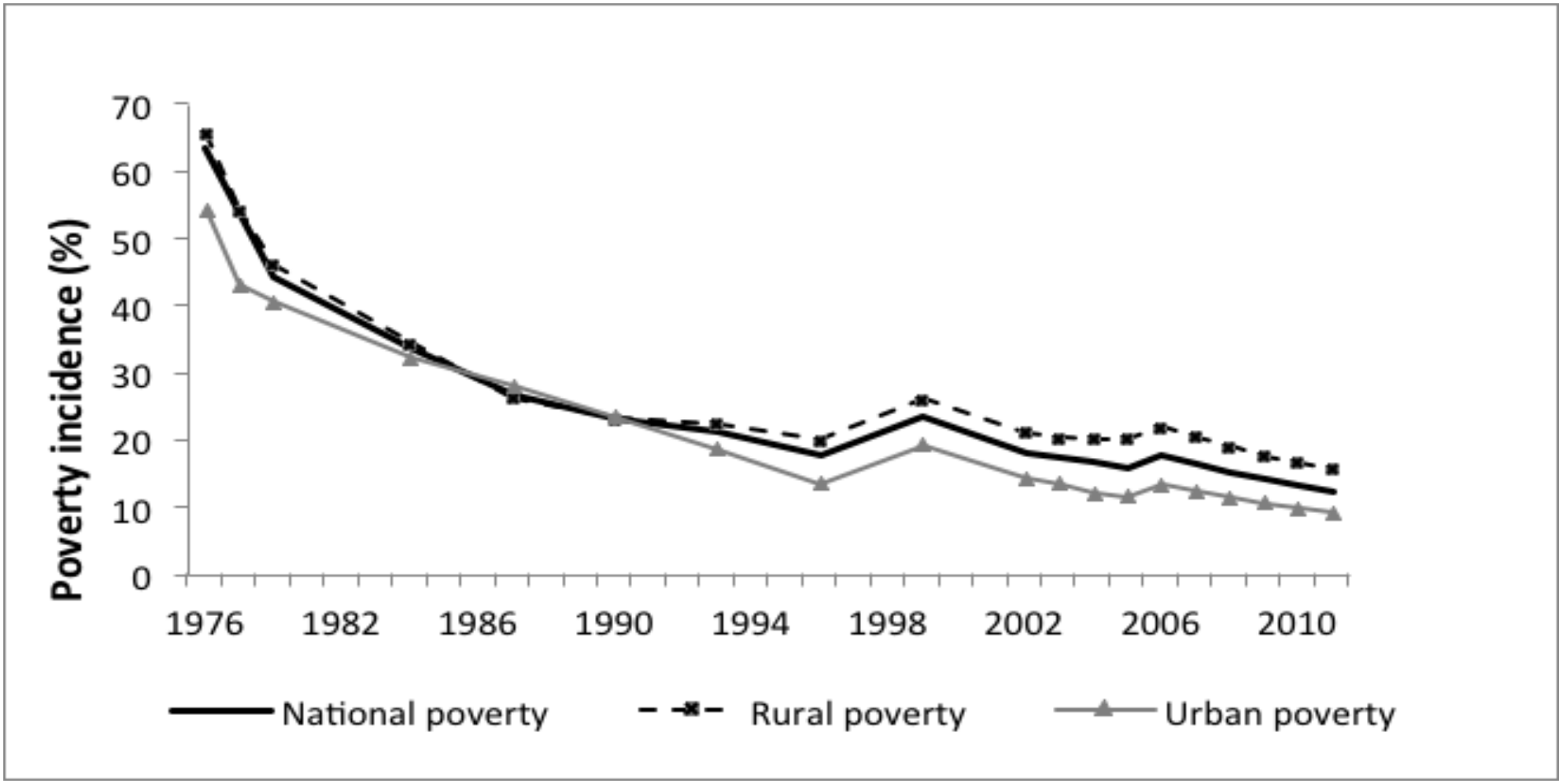
Model II: ***Inequality determinants model***

- relates changes in real household expenditures at the quintile level in rural areas to the rate of agricultural productivity growth.

Background data on agricultural productivity in Indonesia

	1975-2006
Average real GDP growth	6.0%
Average real agric VA growth	3.7%
Average share of agriculture in GDP	24%
Average contribution of agriculture growth to GDP growth	15%
Average agric factor growth rate	2.05%
Average agric TFP growth rate	1.63%
Average agric TFP contribution to agric VA growth	44%
Average agric TFP contribution to GDP growth	6.5%

Indonesia: Poverty incidence, 1976 to 2012



Data decomposition: Mean annual changes in poverty incidence

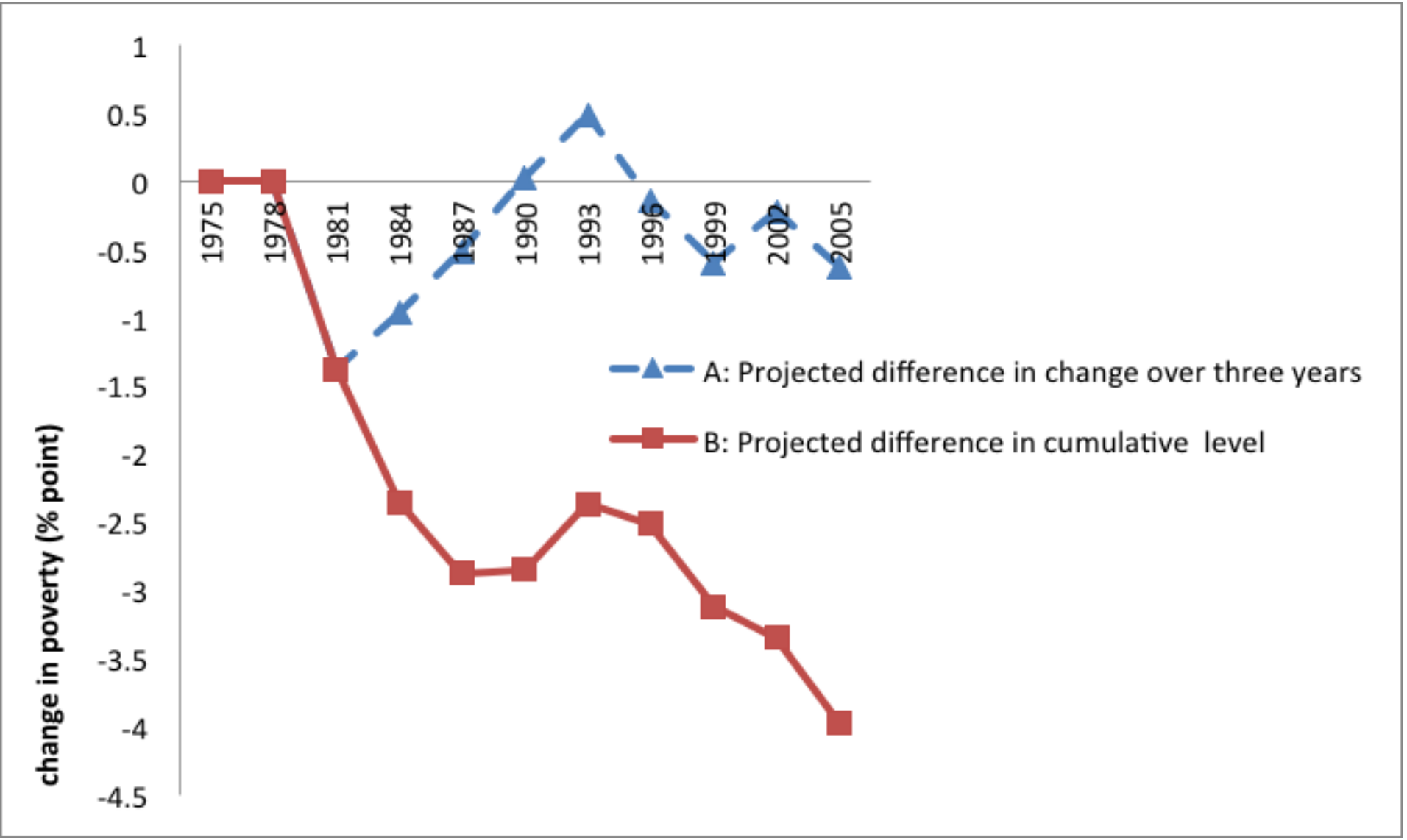
	Actual							
	Indonesia	**Laos**	**Malaysia**	**Myanmar**	**Philippines**	**Cambodia**	**Thailand**	**Vietnam**
National [a]	-1.281	-1.227	-0.932	-1.300	-0.695	-1.760	-1.301	-2.174
Urban [b]	-0.313	-0.129	-0.150	-0.305	-0.177	0.131	-0.191	-0.188
Rural [c]	-0.911	-1.051	-0.524	-0.973	-0.401	-1.357	-1.107	-1.887
Migration [d]	-0.057	-0.046	-0.259	-0.022	-0.117	-0.534	-0.003	-0.099
	Normalized (National = 100)							
National [a]	100	100	100	100	100	100	100	100
Urban [b]	24.43	10.54	16.05	23.44	25.41	-7.47	14.67	8.65
Rural [c]	71.10	85.70	56.22	74.86	57.72	77.11	85.11	86.80
Migration [d]	4.46	3.77	27.73	1.69	16.87	30.36	0.22	4.55

OLS Regression Results - Dependent variable: absolute change in poverty in rural areas

	Change in poverty in rural areas
2-Year lagged change in TFP	-0.0869**
	(0.0406)
2-Year Lagged change in Factor input per capita	0.0000
	(0.0000)
Annual change in Food Price over CPI	15.0334***
	(2.5878)
2-Year Lagged Change in per capita non-agriculture income	-0.0008**
	(0.0003)
dummyyear1996	-1.5748***
	(0.3266)
dummyyear2002	-1.2686***
	(0.4219)
_cons	0.4212**
	(0.2071)
R^2	0.42
N	100

Note: * $p<0.1$; ** $p<0.05$; *** $p<0.01$

Indonesia: Projected streams of rural poverty reduction



Indonesia: Projected changes in rural poverty incidence, 1978 to 2005

Year ending	A: Projected difference in change over three years	B: Projected difference in cumulative level
1978	0	0
1981	-1.382	-1.382
1984	-0.972	-2.354
1987	-0.523	-2.877
1990	0.026	-2.852
1993	0.483	-2.368
1996	-0.149	-2.517
1999	-0.605	-3.123
2002	-0.225	-3.348
2005	-0.627	-3.975

- **Between 1975 and 2006 the level of agricultural research in Indonesia increased by a factor of 8.2. Suppose that instead its real value had remained permanently at its 1975 level. Then by 2006 the level of rural poverty incidence would have been 26 percent of the rural population and not the 22 percent actually observed.**
- **That is, of the 32 percentage point decline in rural poverty incidence that actually occurred (from 54 percent to 22 percent of the rural population), four percentage points, one eighth of the observed decline, is attributable to government-sponsored agricultural research.**

- **Out of a rural population of 121 million in 2006, 4.8 million people were non-poor because of the increased real level of agricultural research that had occurred since 1975.**
- **It is not suggested that Indonesia's agricultural research establishment is world class. Casual inspection of the research facilities in place suggests otherwise.**
- **But the activity of taking the output of the international agricultural research community and adapting it to local circumstances is so productive that even a modest commitment of skilled professionals and research facilities can generate a high payoff.**

Quantile Regression Results – Dependent variable: real per capita expenditure, rural households

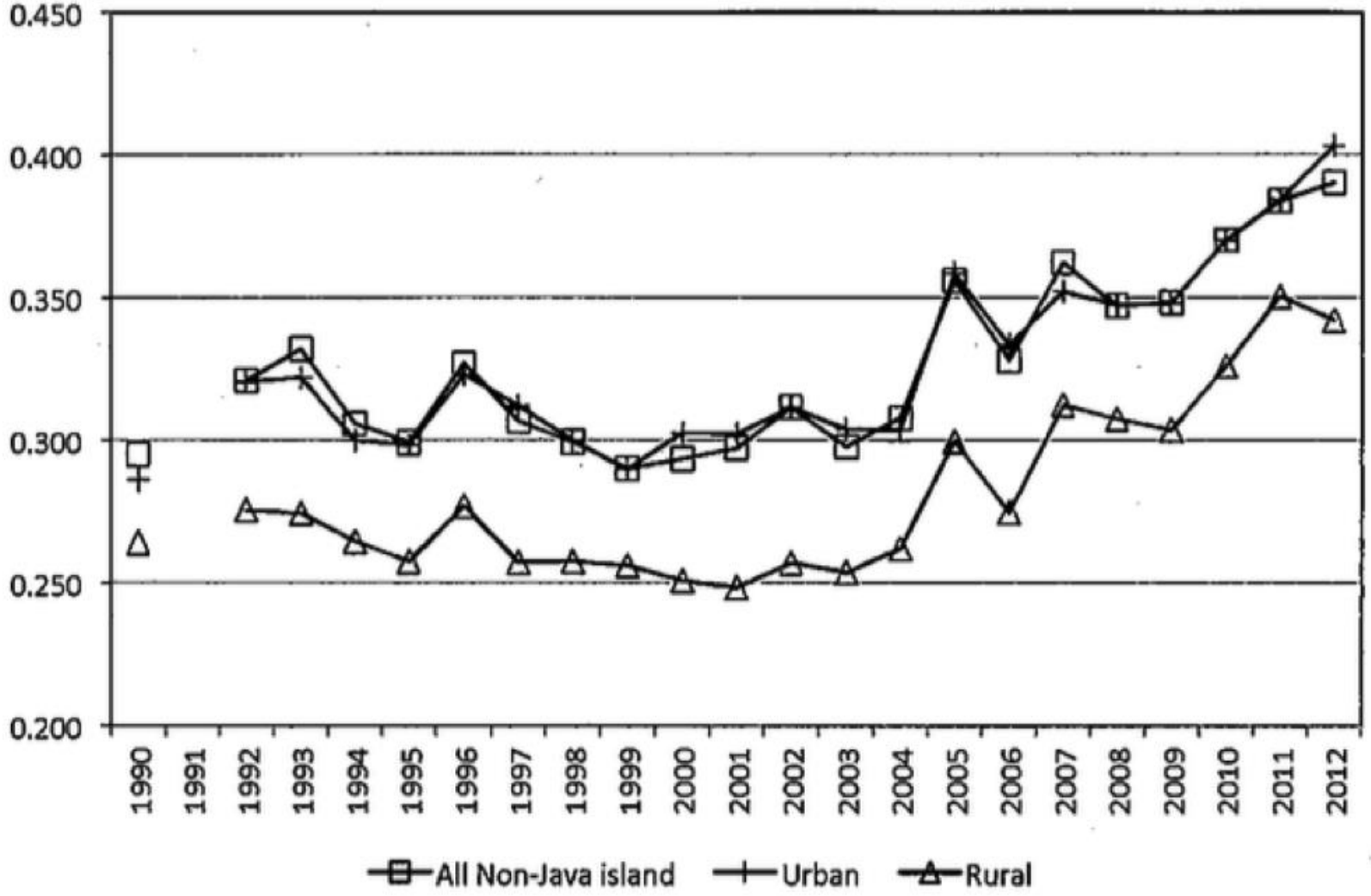
	Quantile Regression					OLS
	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	Full sample
Δ*TFP*	0.1899***	0.1458**	0.0771	0.1178*	0.3521***	0.1532***
ΔFactor input	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000
ΔFood Price/CPI	-0.0015	-3.2298	-4.5995	2.7585	5.5900	1.2444
ΔNon-agr income	0.0015	0.0015*	0.0024***	0.0019**	0.0008	0.0013*
Dummy year 1996	2.6398***	3.8390***	3.9411***	3.7061***	3.2083***	3.6103***
Dummy year 2002	-2.6846***	-1.7288***	-1.7101***	-2.2860***	-5.0134***	-2.6320***
Constant	0.0324	2.2859***	4.0566***	5.7322***	9.3117***	4.3099***
Quasi - R^2	0.1045	0.1302	0.1599	0.1627	0.1611	0.26 (R^2)
F-value	15.33	15.97	22.77	15.60	14.01	32.08
p-value	0.000	0.000	0.000	0.000	0.000	0.000

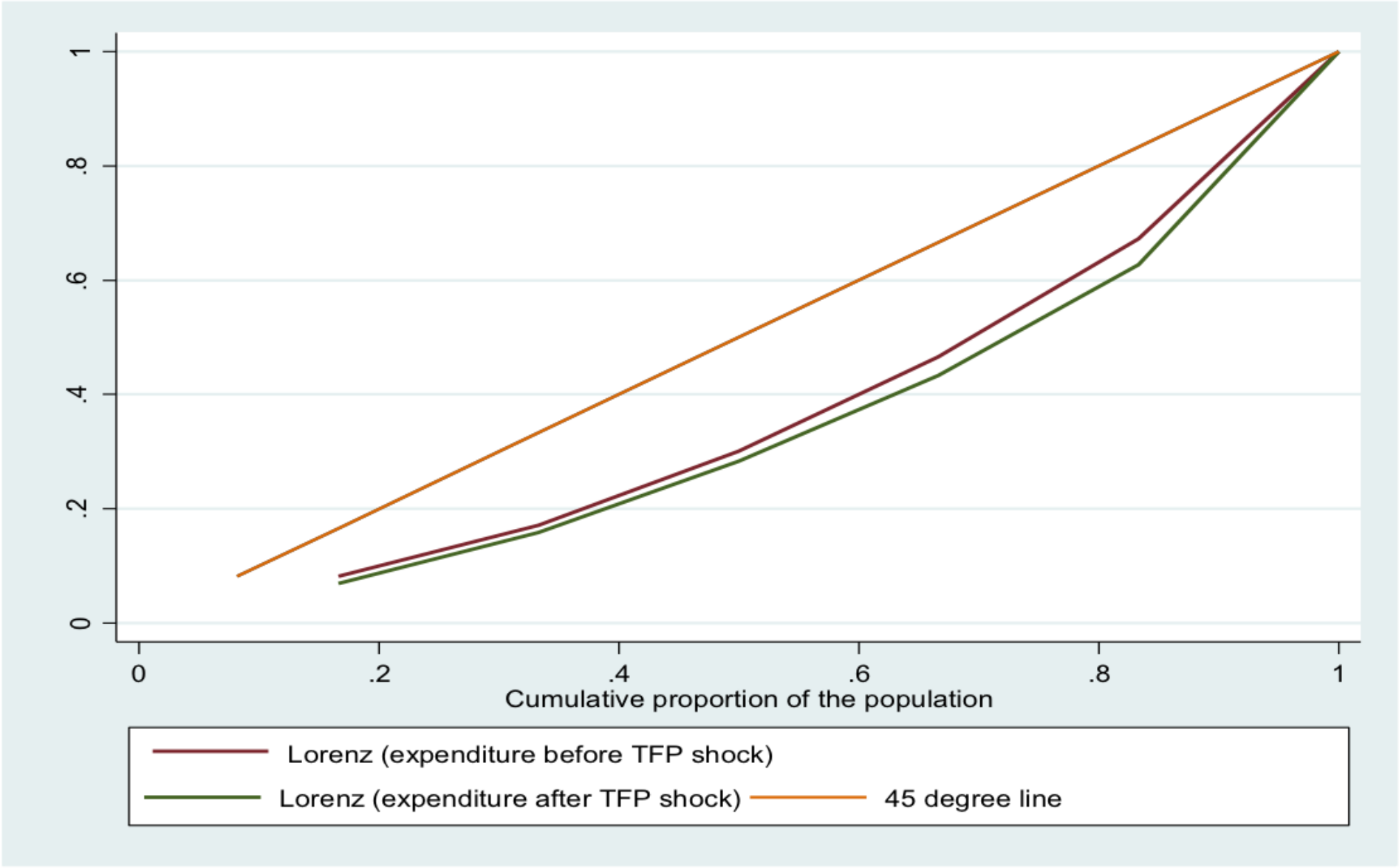
Note: Dependent variable: proportional change in real per capita expenditure in rural areas, deflated by provincial CPI. Independent variables: Δ*TFP* = 2-year lagged change in level of TFP; ΔFactor input = 2-year lagged change in factor input per capita; ΔFood Price/CPI = Annual change in Food Price over CPI; ΔNon-agr income = 2-year lagged change in per capita non-agricultural income.

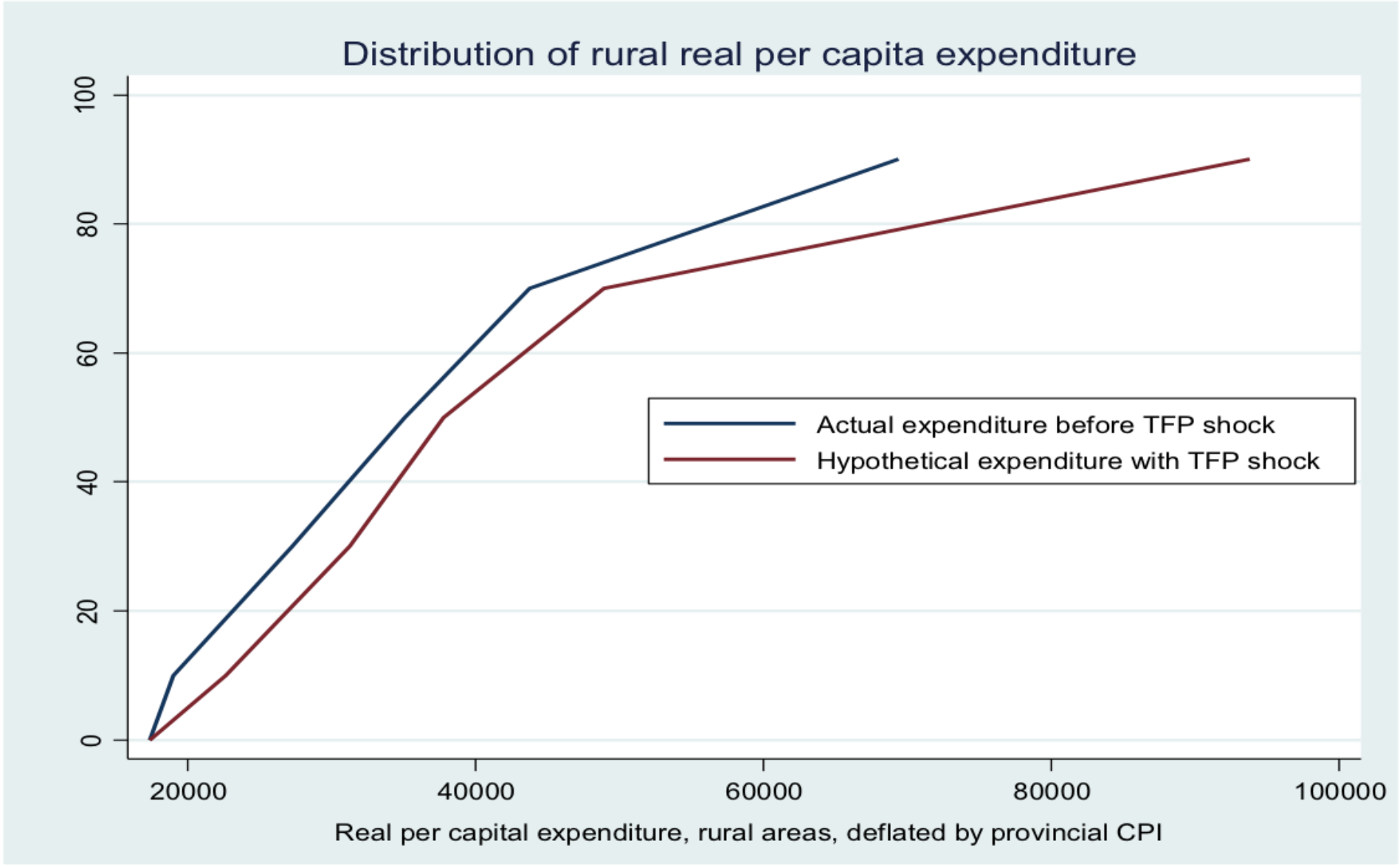
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Figure 3

Gini Coefficient by Urban and Rural Areas of Non-Java




0
.2
.4
.6
.8
1
Cumulative proportion of the population
Lorenz (expenditure before TFP shock)
Lorenz (expenditure after TFP shock)
45 degree line


Distribution of rural real per capita expenditure
0
20
40
60
80
100
20000
40000
60000
80000
100000
Actual expenditure before TFP shock
Hypothetical expenditure with TFP shock
Real per capital expenditure, rural areas, deflated by provincial CPI

	Gini index
Full distribution in 2002	0.27
Estimated from 5 quintiles	
Real expenditure before TFP shock	0.28
Real expenditure after TFP shock	0.32