
Agricultural Growth and Poverty Reduction: Additional Evidence

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Agricultural growth has long been recognized as an important instrument for poverty reduction. Yet, measurements of this relationship are still scarce and not always reliable. The authors present additional evidence at both the sectoral and household levels based on recent data. Results show that rural poverty reduction has been associated with growth in yields and in agricultural labor productivity, but that this relation varies sharply across regional contexts. GDP growth originating in agriculture induces income growth among the 40 percent poorest, which is on the order of three times larger than growth originating in the rest of the economy. The power of agriculture comes not only from its direct poverty reduction effect but also from its potentially strong growth linkage effects on the rest of the economy. Decomposing the aggregate decline in poverty into a rural contribution, an urban contribution, and a population shift component shows that rural areas contributed more than half the observed aggregate decline in poverty. Finally, using the example of Vietnam, the authors show that rapid growth in agriculture has opened pathways out of poverty for farming households. While the effectiveness of agricultural growth in reducing poverty is well established, the effectiveness of public investment in inducing agricultural growth is still incomplete and conditional on context. JEL codes: O13, I31

Poverty reduction can be achieved through two instruments: transfers and pro-poor growth. Transfers require foreign aid or taxation of the incomes accruing to the non-poor and distribution through a variety of social programs. It has been widely used, especially in dealing with emergencies or to achieve quick poverty reduction results, and to address poverty among categories of the population that could not generate autonomous incomes even under the best of circumstances. It has the appeal of relative ease of implementation compared to promoting autonomous income growth of the poor. Sustained poverty reduction through

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redistribution is, however, politically difficult to implement, particularly when poverty is a mass phenomenon, as it is in most developing countries. It can be hugely expensive if it has to be sustained year after year to reduce poverty significantly. And it is not a dignified way of dealing with poverty when the poor have the capacity to generate autonomous incomes, if they are given the chance. For this reason, pro-poor growth, that is growth that benefits the poor,¹ is the better alternative to poverty reduction for those who can work. This, however, raises the question of identifying the pathways through which growth helps reduce poverty, not surprisingly one of the most fundamental topics in development economics.

For producers, how growth helps reduce poverty depends on access to assets and on how they are able to use these assets for income generation. For rural workers, it depends on the ability to link to expanding employment opportunities in good jobs in agriculture and the rural non-farm economy. As shown by Lipton (1991), the Green Revolution in Asia increased land productivity faster than labor productivity, with the result that agriculture was able to absorb more labor and help reduce poverty. For consumers, if agriculture is incompletely tradable, growth in food production can help lower the domestic prices of consumption goods and raise real incomes. This will benefit the urban poor, landless rural workers, and the many poor net-buyers among smallholders. Recent estimates show that a majority of smallholders are in fact net buyers, benefiting more from a decline than from a rise in the price of food. The main long-run effect of growth in cereal yields on poverty reduction in India, in a context of non-tradability, was through a decline in the price of food (Datt and Ravallion 1998).

Conditions are changing, however. With increasing tradability of agriculture, productivity gains in agriculture will be transmitted increasingly less via lower food prices, and increasingly more through higher employment and wages (Valdés and Foster 2007). Growth can thus offer a multiplicity of pathways out of poverty. These pathways depend on the sector where growth occurs, broadly agriculture, industry, or services. And they depend on the structure of production, in particular asset distribution among producers (farm or firm size) and the labor intensity of production.

In this paper, we present new evidence on the capacity of agricultural growth to serve as an effective instrument for poverty reduction. We look at: the poverty reduction value of land and labor productivity growth and of GDP growth originating in agriculture versus the rest of the economy; the comparative linkage value of a quantum of sectoral growth for aggregate growth and poverty reduction; the contribution made by rural areas to aggregate poverty reduction under alternative migration scenarios; and the household pathways out of poverty in the context of aggregate growth, in particular via market-oriented smallholder farming. The key relation between public investment and sectoral growth response needs to be determined in order to decide when to use an

agriculture-first poverty reduction strategy. While this relation is central to deciding on use of agriculture for development, it remains difficult to establish and clearly conditional on the circumstances where it applies. We review evidence indicating that there are many situations where investing in agriculture for poverty reduction may be the preferred strategy.

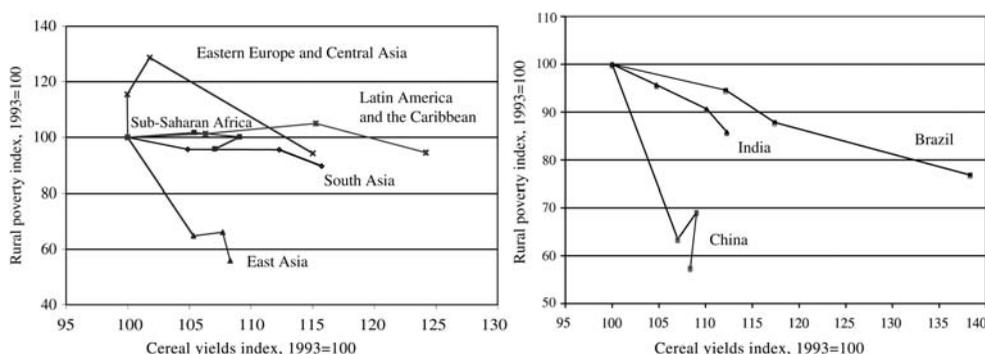
Productivity Growth and Rural Poverty: Regularities

Productivity gains are the main mechanism whereby growth is achieved. In agriculture, most important are land and labor productivity. Regularities in the productivity–poverty relation for these two types of productivity gains are suggestive of what agriculture can do for poverty reduction.

Land Productivity and Poverty

In agriculture, yield increases are the main source of output growth once the agricultural frontier has been exhausted. This is the case in East Asia where new land for area expansion is hardly available. This is also increasingly the case in Africa, where population pressure on the land and the increasing speed of rotations between cultivation and fallow periods needs to be compensated by rising yields to maintain output. Rising yields thus support output gains which in turn can increase incomes in self-employment and employment opportunities for those on the labor market. In figure 1, observations on cereal yields measuring

Figure 1. Cereal Yields and Rural Poverty



Note: Observations are for 1993, 1996, 1999, and 2002.

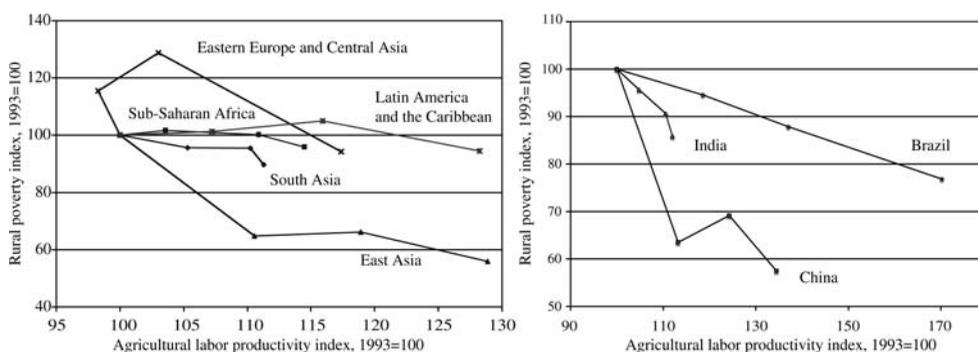
Sources: Poverty data from Ravallion, Chen, and Sangraula (2007) using a \$1.08/day poverty line in 1993 PPP; yield data from FAO (2006).

average land productivity and rural poverty indices are reported for 1993, 1996, 1999, and 2002, with a base of 100 in 1993 for each of five regions and three major countries. The expected inverse relationship between rising yields and falling rural poverty is visible. It does, however, vary widely across regions. In East Asia, a 10 percent growth in cereal yields is accompanied by a decline in rural poverty of more than 53 percent. In Eastern Europe and Central Asia, after a transition over which yields were stagnant and poverty rose, subsequent yield gains were associated with a rapid decline in rural poverty. In Latin America and the Caribbean, gains in cereal yields were very large, growing at an average annual rate of 2.5 percent, yet rural poverty hardly declined. Clearly, the way yield gains were achieved did not help reduce poverty. In Sub-Saharan Africa, yields were largely stagnant and the rural poverty rate remained unchanged. Similar patterns are observed at the country level, with elasticities of rural poverty reduction with respect to cereal yield growth equal to -5.1 in China, -1.2 in India, and -0.6 in Brazil. These are simple correlates, yet the contrast is telling of how land productivity gains can matter for rural poverty reduction, but differentially across the contexts in which they occur. The China–Brazil contrast is revealing of the importance of a more egalitarian land tenure system in transmitting land productivity gains into poverty reduction.

Labor Productivity and Poverty

Labor productivity in agriculture is also a major determinant of agricultural incomes. It can increase as a consequence of technological change in agriculture or of out-migration from agriculture. The labor productivity–poverty relation can, however, be quite different across countries according to the production structure: strong if smallholders participate in the gains in labor productivity and if agriculture is labor intensive; weak if otherwise. This is exemplified in figure 2 by the contrasts in the labor productivity–rural poverty relation over the period 1993–2002 across major regions and countries. Labor productivity is measured by the average value added in agriculture per worker in the sector. The two extreme cases are East Asia and Latin America and the Caribbean. In East Asia, labor productivity gains were large and the rural poverty rate fell sharply. Agriculture is practiced by smallholders and it is labor intensive. In Latin America and the Caribbean, labor productivity gains were very large as well, but rural poverty hardly fell. Agricultural growth in countries such as Brazil occurred mainly in mechanized large farms with little employment creation. Labor productivity was further enhanced by rapid rural–urban migration, leading to an absolute decline in agricultural labor, yet without decline in rural poverty. Other regions span the range between these two extremes. In Sub-Saharan Africa, with high population growth and limited employment opportunities, labor productivity gains in

Figure 2. Agricultural Labor Productivity and Rural Poverty



Note: Observations are for 1993, 1996, 1999, and 2002.

Sources: Poverty data from Ravallion, Chen, and Sangraula (2007) using a \$1.08/day poverty line in 1993 PPP; agricultural labor productivity data from World Bank (2006).

agriculture were low, and poverty reduction was equally low. In South Asia, India most particularly, low rural–urban migration rates and low growth in agricultural production during the period that followed the Green Revolution also atrophied productivity gains.

Permanence of rural poverty and rising disparities between rural and urban incomes as growth accelerates in other sectors of the economy are a major political issue. In Eastern Europe and Central Asia, labor productivity fell during the transition out of collective farming into a market economy, but it was subsequently followed by rapid labor productivity gains and sharp rural poverty reduction. The elasticities of poverty reduction with respect to agricultural labor productivity growth are -1.2 in China, -1.2 in India, and -0.3 in Brazil. Differences in these correlates show that labor productivity gains in agriculture can be quite effective for poverty reduction, but that the structural conditions under which agricultural growth occurs matter for the poverty reduction effect it can have. This in turns tells us that policy instruments can be used to enhance the poverty reduction value of agricultural growth.

The Power of Growth Originating in Agriculture for Poverty Reduction: Causalities

Reliable estimates of the growth–poverty relation are few as identification of causality in this relation is difficult to establish. Different studies used different indicators of outcome (income of the poor, poverty rates) and different concepts of

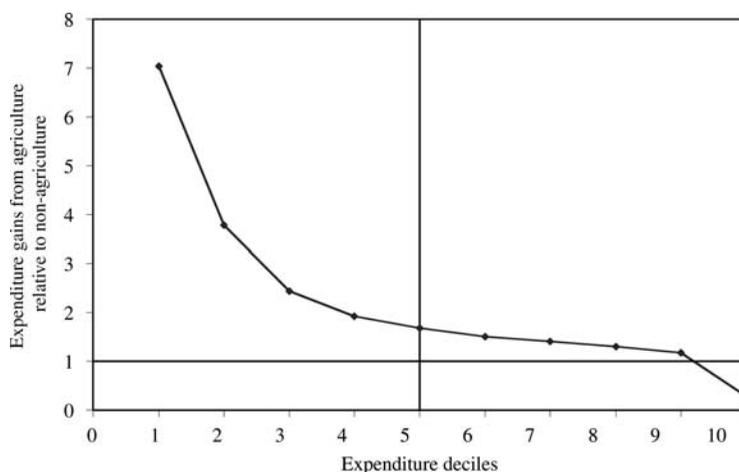
growth (agricultural labor productivity, sectoral value added). Results in general support the high poverty reduction capacity of agricultural growth. However, because concepts used are different, results are not directly comparable.

Bravo-Ortega and Lederman (2005) estimated the effect of an increase in sectoral labor productivity on GDP growth and the income of the poor. They found that overall GDP growth originating in an increase in agricultural labor productivity is on average 2.9 times more effective in raising the income of the poorest quintiles in developing countries than an equivalent increase in GDP growth originating in non-agricultural labor productivity. Christiaensen and Demery (2007) estimated the effect of sectoral growth on the headcount poverty rate rather than on the income of the poorest. They found for Africa that overall GDP growth coming from agriculture is 2.7 times more effective in reducing 1\$/day poverty in the poorest quarter of countries in their sample, and 2 times more effective in the richest quarter of countries, than growth coming from non-agriculture. Ravallion and Chen (2007) estimated the effect of sectoral growth on the headcount poverty rate in China using annual poverty data over 21 years. They find that the primary sector has a 3.5 times larger impact on poverty reduction than either the secondary or tertiary sectors. Using cross-country data for 55 countries with spells of observations, Loayza and Raddatz (forthcoming) show that what matters for the poverty reduction capacity of growth is the unskilled labor intensity of a sector. In that perspective, agriculture comes ahead of industry and services. Growth originating in agriculture is 2.9 times more poverty reducing than growth originating in manufacturing and 1.8 times that of growth originating in construction.

For the World Development Report 2008 on Agriculture for Development, Ligon and Sadoulet (2007) estimated the expenditure growth effect for each household decile in the distribution of expenditures due to GDP growth originating in the agricultural sector and to GDP growth originating in the non-agricultural sectors, respectively. These estimations are obtained from the information available in the World Bank's PovCal database (World Bank 2008) for 42 countries that have at least three expenditure surveys over the period 1978 to 2003. Estimations are done with rigorous econometric methods that ensure that the results can be interpreted as a causal effect of sectoral growth on household expenditures, and are shown to be robust to a variety of specification checks.²

Results indicate that GDP growth originating in agriculture has a much larger positive effect on expenditure gains for the poorest households than growth originating in the rest of the economy. Figure 3 shows the relative strength of these effects measured as the ratio of the estimated coefficients of agricultural and non-agricultural growth on household expenditures. Overall growth originating in agriculture is estimated to be at least three times as effective in reducing poverty

Figure 3. Expenditure Effects of GDP Growth Originating in Agriculture Relative to Non-agriculture across Expenditure Deciles, from Poorest to Richest



Source: Ligon and Sadoulet (2007).

as overall growth originating in the rest of the economy. This statement is based on the relative impacts of growth from agriculture and non-agriculture on the expenditures of the poorest four deciles which have a median value of 3.1. The relative impact is significantly different from 1 for the poorest 50 percent of the population.

Further sectoral disaggregation of non-agriculture shows that other sectors can also have high poverty reduction value, and that this varies across regions. Thus, Hasan and Quibria (2004) found that, while growth in agriculture is most effective for poverty reduction in Sub-Saharan Africa and South Asia, growth in industry is most effective for East Asia and in services for Latin America. Ravallion and Datt (1996) and Foster and Rosenzweig (2005) for India, and Suryahadi, Suryadarma, and Sumarto (2008) for Indonesia, all find that agricultural growth is key to reducing poverty in rural areas. But they also find that informal services, rural factory employment, and both urban and rural services, respectively, have important impacts on rural poverty reduction, complementing the role of agriculture.

Loayza and Raddatz (forthcoming) singled out growth in construction as the most poverty reducing sector in non-agriculture, expectedly because it is the next most intensive sector in unskilled labor after agriculture. So, while growth originating in agriculture has strong powers for poverty reduction, there are other sectors that can be quite effective as well, especially if they are intensive in

unskilled labor and are located in the rural non-farm economy. This suggests that a growth strategy for poverty reduction must focus not only on agriculture growth but on the growth of these other strategic sectors as well.

Opening the Growth–Poverty Black Box: The Role of Linkages

Agricultural growth contributes to both aggregate growth and overall poverty reduction through two effects: directly as a sector of economic activity, and indirectly through growth linkages with non-agriculture. What are the relative contributions to growth and poverty reduction of each of these two effects? In this section, we compare the aggregate growth and poverty effects of a one percent growth in both agriculture and non-agriculture. The absolute levels of these effects are obviously affected by the sizes of these sectors. However, the focus of this section is on the relative importance of the direct and linkage effects, which is not.

The role of linkages is illustrated in figure 4 with results for China over the 1980–2001 period. This was a time of rapid growth, not only for the non-agricultural sector (growing at an average 9.3 percent annual rate) but also for the agricultural sector (growing at an average 4.6 percent annual rate), where

Figure 4. Estimates of the Agricultural Growth–Non-agricultural growth poverty linkages for China, 1980–2001

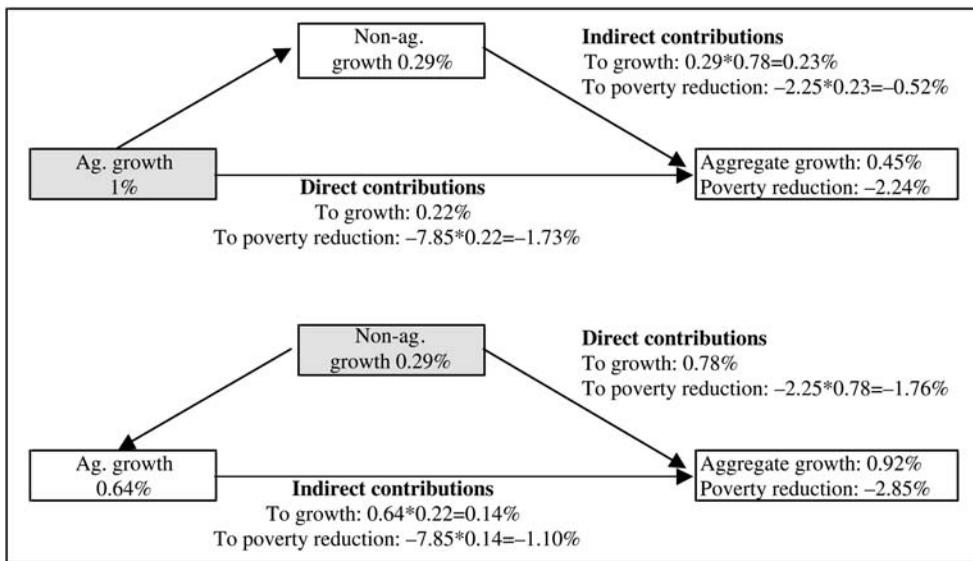


Table 1. Direct and Indirect Contributions of Sectoral Growth to Aggregate Growth and Poverty Reduction in China, 1980–2001

<i>Sectoral growth</i>	<i>Aggregate growth</i>	<i>Contributions to growth (%)</i>		<i>Poverty reduction</i>	<i>Contributions to poverty (%)</i>	
		<i>Direct</i>	<i>Indirect</i>		<i>Direct</i>	<i>Indirect</i>
Agriculture 1%	0.45	49	51	−2.24	77	23
Non-agriculture 1%	0.92	85	15	−2.85	62	38

growth was driven by improved incentives (the household responsibility system replacing collective farms, and domestic market liberalization replacing regional food self-sufficiency). During these years, the sectoral shares of GDP were on average 22 percent for agriculture and 78 percent for non-agriculture. A one percent growth of the smaller agricultural sector induces a 0.29 percent growth in the much larger non-agricultural sector.³ This growth in the non-agricultural sector amounts to 0.23 percentage points of aggregate economic growth. Conversely, a 1 percent growth of the non-agricultural sector induced a 0.64 percent agricultural growth. This added 0.14 percent points to aggregate economic growth, a smaller indirect contribution due to the lower share of the agricultural sector in GDP. Given the relative sizes of the two sectors, these multipliers can also be read as \$1 growth in agriculture inducing \$1 growth in non-agriculture, while \$1 growth in non-agriculture induced \$0.18 in agriculture, showing the very strong growth linkages arising from agriculture at that particular time in China. Combining the direct and linkage effects shows that a 1 percent growth in agriculture has an aggregate growth effect of 0.45 percent, lower than the 0.92 percent aggregate growth induced by a 1 percent growth in the 3.5 times larger non-agricultural sector.

In terms of poverty reduction, the growth elasticities were estimated by Ravallion and Chen (2007) to be -7.85 for agriculture and -2.25 for non-agriculture. As a result, a 1 percent growth in agriculture would induce a direct reduction in the poverty rate of 1.73 percent, about the same as the 1.76 percent direct contribution induced by a 1 percent increase in non-agriculture. This is despite the fact that the share of agriculture in GDP is only 22 percent. Combining the direct and indirect effects gives an overall poverty reduction of 2.24 percent following a 1 percent growth in agriculture, and 2.85 percent following a 1 percent growth in non-agriculture.

The structure of direct and indirect contributions to aggregate growth and poverty reduction coming from a 1 percent sectoral growth is presented in table 1. The remarkable feature is the large indirect contribution of agriculture to growth (51 percent of the total effect), while for non-agriculture the largest contribution is direct (85 percent). The effect is the opposite for poverty: agriculture

has a large direct contribution to overall poverty reduction (77 percent), while it is non-agriculture that has the relatively larger indirect effect (38 percent). Linkage effects of agriculture on the rest of the economy are thus important for growth; direct effects are important for poverty reduction.

Finally, if we return to a comparison of the poverty reduction value of a 1 percent GDP growth coming from agriculture versus non-agriculture, we see that the first contributes a 10.2 percent reduction in poverty while the latter contributes 3.7 percent. We thus rediscover for China during the 1980–2001 period the result obtained by Ligon and Sadoulet (2007) using cross-country data: GDP growth originating in agriculture is about three times (2.8 times for China) more effective for poverty reduction than growth originating in non-agriculture.

These particular results are specific to China in the 1980–2001 period. They show that agriculture poverty reduction effects are relatively more direct than its growth effects. The importance of the linkage effects on non-agriculture as opposed to the direct effect is largely related to the mere size of the agricultural sector that implies that most of its linkages are externalized to the other sectors. The fact that this is not so for the poverty effect reveals the fundamental poverty reduction value of agricultural growth. However, simply because of its relatively small share in aggregate GDP, a percentage point growth in agriculture can have less aggregate growth and even less poverty reduction effect than a percentage point growth in the large non-agricultural sector.

An Agriculture-first Strategy for Poverty Reduction: Piecing together the Evidence

Is it justified to invest public resources in agriculture as the most cost effective option in using growth to reduce poverty? In asking this question, we are not trying to compare the cost effectiveness of transfers versus investments in growth to reduce poverty, only of the latter across sectors of economic activity. If agriculture were the most cost effective investment, this would be the argument in support of an “agriculture-first” strategy for poverty reduction (Suryahadi, Suryadarma, and Sumarto 2008). Not surprisingly, the answer is that it depends on country context, though there are many cases where focusing on agriculture as the preferred strategy is plausible.

The empirical evidence presented above allows us to make two strong statements on the role of agricultural growth for poverty reduction. The first is that GDP growth that originates in agriculture (that is for an equal 1 percent of GDP growth) tends to be more effective for poverty reduction than growth that originates in other sectors of the economy, with unskilled labor intensive activities

located in the rural non-farm economy as strong complementary instruments. The second is that the growth of agriculture makes relatively large indirect contributions to aggregate growth, while its contributions to poverty reduction are larger via direct than indirect effects. Agriculture growth is thus a good servant of aggregate growth and a direct actor for aggregate poverty reduction.

But comparison of the poverty reduction value, neither of a given aggregate growth originating in either sector, nor of a 1 percent growth in sectors of different sizes, can answer the policy question of whether to invest in agricultural growth to maximize poverty reduction. The key question is how much growth do we get from public investment in agriculture versus investment in other sectors of the economy? This is where the information is still incomplete, due to both conceptual and econometric reasons. Conceptually, it is difficult to define sectoral investment. Most investments, such as infrastructure, health, and education, have strong intersectoral spillovers. Econometrically, it is difficult to consider investment exogenous to growth outcomes, as investments are targeted where growth potential is the highest. More effective is to go to detailed case studies. Investment in research and development (R&D) for agriculture tends to have large geographical spillovers, creating high rates of returns for such investments. While there is undoubtedly selection of successful cases in measuring rates of return from specific agricultural R&D investments, a large number of success stories shows that high returns are at least broadly possible, with an average 43 percent rate of return across 700 studies, well above the opportunity cost of public investment (Alston and others 2000).⁴ Brazil has made significant investments in a premier public agricultural research institution, EMBRAPA, and reaped spectacular land productivity gains in huge areas of the country, fueling its agro-export boom. Investment in rural roads can similarly have high rates of return, but the level of this return and the incidence of gains and losses across households depend importantly on complementary investments and on households' distance from market and asset endowments (van de Walle and Mu 2007). As should be expected, rates of return to public investment in agriculture thus vary depending on context, and the incidence of gains and losses can be quite unequally distributed.

The causal chain running from public investment to agricultural growth, overall growth, and poverty reduction thus critically depends on the investment–growth linkage which remains weakly established and conditional on circumstances that are varied and complex. There are, however, sufficient case studies of competitive returns to make the case for investing in fostering agriculture growth as an effective strategy for poverty reduction under the right conditions. This is more likely to be the case where agriculture is a high share of GDP, competitive advantage is located in agriculture, and the majority of the poor are in the rural sector. These are the defining characteristics of the “agriculture-based countries,”

mainly poor countries located in Sub-Saharan Africa and also in Central America and the Caribbean (World Bank 2007). “Agriculture-based” conditions are also found in many regions internal to large countries, making the growth–poverty role of agriculture important outside of the poor countries as well.

The Contribution of Rural Areas to the Decline in Overall Poverty

While most countries and regions of the world have experienced a decline in the rural poverty rate over the period 1993–2002, often larger in percentage points than the decline in urban poverty, this does not necessarily mean that most progress in poverty reduction came from the rural areas. Indeed, higher urban incomes have induced important rural–urban migration flows, raising the possibility that reductions in rural poverty were due to migration of the poor as opposed to a genuine decline in poverty among the non-migrants that stay in rural areas. Of interest is thus to estimate what has been the contribution of rising incomes in rural areas to overall poverty reduction, net of the role of migration. This is done using a standard decomposition of aggregate poverty reduction into sectoral changes (urban and rural) and a population shift component based on the transition of migrants from rural to urban areas. In this decomposition, the “rural contribution” is the decline in aggregate poverty that is due to the decline in poverty of the population of non-migrants that remain rural.

Performing this decomposition thus requires specifying who migrates out of rural areas among the poor and the non-poor. Not having this information on the composition of migrants, we simulate three cases that establish a range of possible values for the rural contribution. The first case consists in assuming that migration is poverty neutral, that is that the poor and non-poor migrate at the same rate out of rural areas. In this case, the decline in the poverty rate of non-migrants is equal to the observed decline in the rural poverty rate. The second case considers the extreme condition where all migrants are poor. If the poor are more likely to migrate, migration in itself contributes to the reduction of poverty in rural areas by its selection process. The “rural contribution” is due to the reduction of poverty in rural areas beyond the poverty reduction effect of migration of the poor. This case thus gives a lower bound to the genuine reduction of aggregate poverty achieved in rural areas. The third case considers the other extreme condition where it is the non-poor who are more likely to migrate, as documented for many countries. In this case, selection into migration contributes to an increase in the poverty rate in rural areas. The reduction in rural poverty among the non-migrants is even higher than the observed decline

in poverty. The extreme case where all migrants are non-poor gives an upper bound for the rural contribution.

Table 2 reports the rural contribution to poverty change under the three scenarios, which give a range for the rural contribution to poverty reduction.⁵ For the world, the aggregate poverty rate over the 1993–2002 period declined by 8.8 percentage points. Of these at least 45 percent and up to 93 percent can be attributed to the decline in poverty among the rural population, with the intermediate value of 56 percent under poverty neutral migration. These aggregate numbers are however dominated by China's extraordinary success. For the rest of the world, the decline in poverty was a modest 1.8 percentage points, of which 79 percent (using neutral migration) was due to rural areas.

Heterogeneity is seen across regions. In China, 72 percent of the population and 86.5 percent of the poor resided in rural areas in 1993. Over these ten years, China experienced a huge decline of 30 percentage points in poverty rates, with poverty declining both in the urban (25 percentage points) and rural (24 percentage points) areas. So, without migration, both sectors would have contributed to the decline in the poverty rate proportionately to their share in poverty. But a large migration (8 percent of the rural population) moved people from the high rural poverty rate (88.6 percent in 1993) to the much lower urban poverty rate (35.6 percent in 1993). This resulted in a rural contribution to the decline in poverty equal to about half of the aggregate. Since the poverty rate was so high, there is not much difference between the "neutral" migration (which assumes that 88.6 percent of migrants are poor) and the migration of poor (which assumes that 100 percent of migrants are poor) scenarios. Aggregate results for East Asia are dominated by the Chinese experience.

The situation in India is quite different. Urban and rural poverty rates are not very different (91.5 percent vs 82.3 percent in 1993), and neither one changed much over the ten-year period. In addition there was almost no migration. So aggregate poverty only declined by 3.5 percent. With a somewhat lower decline in poverty in rural areas and a small migration, the rural contribution ranges from 56 to 111 percent, and is equal to 61 percent under the assumption of neutral migration. Hence, the contributions of the rural sector is in percentage terms similar to what happened in China, but with low reductions in both sectors and low migration effects, rather than high reductions in both sectors and high migration effects. South Asia as a whole is not very different from India, with slightly lower poverty rates, and even less poverty reduction in rural areas. So aggregate poverty has declined by a very small 1.7 percentage point, and only 33 percent came from rural progress, if migration is assumed to have been neutral.

Latin America and the Caribbean is also different. It started with a large difference between rural and urban poverty rates (47 percent vs 23 percent) but with a small share of the population residing in rural areas (28 percent). Of the poor,

Table 2. Contributions of the Rural Sector to Aggregate Poverty Change, 1993–2002

Region	Rural poverty rate		Urban poverty rate		Share of rural in total population		Aggregate poverty rate			Contribution of rural sector to aggregate poverty change (%)		
	1993	2002	1993	2002	1993	2002	1993	2002	Change 1993–2002	Migration of non-poor	Neutral migration	Migration of poor
East Asia Pacific	85.1	63.2	38.6	17.8	68.9	61.2	70.6	45.6	–25.0	80	53	49
China	88.6	65.1	35.6	10.7	72.0	60.9	73.8	43.8	–30.0	81	48	44
Latin America and Caribbean	47.3	46.4	22.8	27.1	27.7	23.8	29.6	31.6	2.1	–99	–10	88
South Asia	87.6	86.8	78.0	74.6	74.3	72.2	85.1	83.4	–1.7	141	33	17
India	91.5	88.6	82.3	78.1	73.8	71.9	89.1	85.6	–3.5	111	61	56
Sub-Saharan Africa	85.2	82.4	66.9	68.5	70.2	64.8	79.8	77.5	–2.2	292	81	45
Total	78.2	69.7	39.1	33.7	61.9	57.7	63.3	54.4	–8.8	93	56	45
Less China	73.7	71.3	40.0	40.5	58.4	56.6	59.6	57.9	–1.8	153	79	52

Sources: Poverty data from Ravallion, Chen, and Sangraula (2007) using a PPP\$2.15/day poverty line; contribution of rural sector from authors' calculations.

44.3 percent resided in rural areas in 1993. Over the ten-year period, there was some migration, almost no decline in the rural poverty rate, and an increase in urban poverty. Aggregate poverty increased from 29.6 to 31.6 percent. Depending on the migrant composition, the contribution of the rural sector to changes in aggregate poverty is estimated to be an increase in poverty when only the poor migrate, giving maximal contribution to migration, or a decrease in poverty when only the non-poor migrate. With poverty-neutral migration, the rural contribution to poverty was a negative 10 percent, indicating again the Latin American exception in helping the rural poor benefit from agricultural growth.

In Sub-Saharan Africa, we observe a small decline in rural poverty but an increase in the urban poverty rate, adding up to an overall decline in poverty because the population is still predominantly rural. Because poverty rates are much higher in rural (85.2 percent in 1993) than in urban areas (66.9 percent), even under the neutral migration scenario, the urban increase in poverty rate was largely due to the in-migration of rural poor. With failing agriculture and failing aggregate growth, rural–urban migration contributed to an increase in the urban poverty rate. Rural poverty decline contributed 81 percent of aggregate poverty reduction under the neutral migration scenario.

We can thus conclude that the rural sector's contribution to aggregate poverty reduction was large overall. It accounted for more than half of aggregate poverty reduction worldwide and up to three-quarters for the rest of the world when China is excluded. Note that this is an accounting decomposition, measuring the share of the decline in poverty among the rural population in the aggregate decline in poverty, not a causal relationship between rural growth and poverty reduction. Most of this effect expectedly came from incomes generated in the rural sector, mainly from agricultural growth. Other factors that have contributed to rural income growth include public transfers and remittances received by rural households which are derived from urban and foreign income growth. Migration also contributes to rural income growth through rising wages by reducing the rural labor supply.

Household-level Analysis: Agricultural Growth Offering Pathways out of Poverty

How do different categories of farming households benefit from agricultural growth? Agriculture offers rural households a number of pathways out of poverty: they can increase their incomes by selling agricultural products on markets (market-oriented farming households), they can leave the subsistence economy and become market participants (market entrants), and they can

Table 3. Pathways out of Poverty in Vietnam, 1992/3–1997/8

	<i>Categories of farming households</i>					
	<i>Market-oriented</i>		<i>Market entrants</i>		<i>Subsistence-oriented</i>	
	<i>Base period</i>	<i>% change</i>	<i>Base period</i>	<i>% change</i>	<i>Base period</i>	<i>% change</i>
	1992/3	1992/3–1997/8	1992/3	1992/3–1997/8	1992/3	1992/3–1997/8
Share of farming households (%)	28		13		6	
Poverty outcomes						
Share of households below the poverty line (%)	64	–42	73	–35	86	–28
Income structure						
Share of agricultural income in total income (%)	83	–12	83	–20	80	–23
Share of high value and industrial crops in gross agricultural income (%)	29	34	21	49	14	–1

Source: Data from Vietnam Living Standard Surveys (World Bank 2009).

improve their well-being in the subsistence economy either through farming or through other sources of income (subsistence-oriented households). Vietnam offers a good case study, both because agricultural growth was rapid (an average annual growth in real agricultural value added of 4.1 percent in the period 1992–98) and because we have rare household panel data over that period that allow us to track what happened to different categories of households. In table 3, we look at rural farming households defined as those with more than 50 percent of their income, including home consumption, derived from agriculture, and recognize three pathways: market-oriented farming households selling more than 25 percent of their agricultural production in both the initial (1992/3) and terminal (1997/8) years; market entrants who were selling less than 10 percent in the base period and more than 25 percent in the terminal year; and subsistence-oriented farming households who were selling less than 10 percent in both initial and terminal years. These three groups constitute 47 percent of the farming households, the remaining having more mixed income strategies.

Market-oriented households benefited most from this period of rapid agricultural growth, with a 42 percent reduction in their poverty rate. While they diversified away from agriculture as a source of income, they also diversified away from staple crops (rice) toward high value and industrial crops. Among market entrants, poverty fell by 35 percent and they also importantly diversified both away from agriculture and toward high value and industrial crops in agriculture. Finally, for the subsistence farmers in the base period that remained in that

category through the period, poverty was reduced by 28 percent. They continued to produce staple crops for home consumption. Their income gains were mainly derived from diversifying away from agriculture, benefiting from employment creation in agriculture and in the rural non-farm economy driven by overall agricultural growth.

Agricultural growth can thus pull farming households out of poverty along a multiplicity of pathways. The implication is that making these pathways more effective for poverty reduction will require specific policies for specific categories of households: supporting competitiveness for market-oriented farming households; enhancing access to assets and to markets to favor market entry for subsistence households; and improving production for home consumption and entry into rural labor markets for subsistence-oriented farming households. Designing specific policies for specific categories of households is thus a very important principle in making policy in support of agriculture for development. It requires access to information about the opportunities and constraints that apply to each of these categories of households that can only be obtained through their active participation in policy design.

Policy Implications: Agriculture for Development

With two competing approaches to poverty reduction—transfers and pro-poor growth—a key policy issue is to find the right balance in allocating public resources and foreign aid budgets between the two approaches for optimum complementarity. The dilemma is particularly stark when poverty and hunger are high and time to achieve relief is short, tilting public expenditure priorities toward transfers as opposed to promoting the growth of autonomous incomes. In recent years, increased emphasis has been given to poverty reduction via transfers, sometimes conditional on behavior toward child education and health. This has contributed to the neglect of agricultural growth as an instrument for poverty reduction. This shift in emphasis has been the product of a complex set of circumstances including the urgency of addressing the poverty effects of the debt crisis and stabilization policies, low profitability of investments in agriculture due to declining commodity prices on international markets, low effectiveness of poverty reduction projects based on agriculture (using approaches such as state-led integrated rural development projects, parastatal agencies for marketing, subsidized credit, and the training-and-visit approach to extension), and perceived inevitable conflicts between agriculture and the environment.

Yet, we know that autonomous income growth is, in the long run, the better instrument for poverty reduction among those who have the potential to work. And we have seen that agricultural growth—along with the growth of unskilled

labor intensive activities in the rural non-farm economy—can be particularly effective for poverty reduction via autonomous income growth. Growth originating in agriculture can be three times more effective in reducing poverty than growth originating in the rest of the economy. Yet, not all agricultural growth is equally effective. Growth in cereal yields and in agricultural labor productivity have been associated with greater poverty reduction in East Asia than in Latin America. Agricultural growth can have not only strong direct poverty reduction effects on but also strong growth linkages to the rest of the economy. The contribution of the rural sector to aggregate poverty reduction, largely driven by agricultural growth, has been about half of total poverty reduction, even under conservative assumptions regarding the contribution of migration, and it has been particularly high in Sub-Saharan Africa, precisely where it matters the most. Heterogeneity of rural populations suggests that there exist multiple pathways for using agriculture to help rural households move out of poverty, with market-oriented smallholder farming the most effective one. Existence of multiple pathways amplifies the array of policy instruments that can be used, calling on the design of specific interventions for specific categories of rural households.

This suggests that a return to using growth in agriculture as an instrument for poverty reduction may be warranted under many circumstances. While much is still left to be researched, in particular to determine how to achieve growth in agriculture more cost effectively and how to make it more pro-poor, we now have a better understanding of how agriculture contributes to poverty reduction, and what features of the structural context can enhance this effect. Conditions to invest profitably in agriculture are currently more favorable than they have been for the last 35 years: markets are significantly less distorted, commodity prices are higher, markets for high value crops and animal products are expanding, and there are numerous technological and institutional innovations available to enhance supply response. New options to design investments in agriculture so they are more pro-poor are also emerging. This includes projects that are more decentralized; more participatory; give greater attention to not only access to assets for the rural poor but also to the role of the market, public goods, and institutional conditions for effective use of these assets; and seek to make growth more compatible with environmental protection and more resilient to climate shocks. Commitments by governments and international development agencies to place more resources in support of agriculture-based development projects have been made, in particular in response to the stress of the food crisis. Current conditions are thus generally favorable to use again agricultural growth—along with other linked sectors—as an effective instrument for poverty reduction. Realizing this potential requires careful design of investment in agriculture to achieve growth, political commitments by governments and donors, and a voice for the private sector and civil society to ensure that these commitments are implemented.

Notes

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1. Though this does not necessarily benefit the poor proportionately more than the non-poor, as in the UNDP's definition of pro-poor growth; see Ravallion (2004).

2. Details are given in Ligon and Sadoulet (2007). The expenditure equation they estimate for deciles, countries, and years uses year and country-decile fixed effects, as well as instrumentation of sectoral income growth using the average of neighboring countries' growth rates of agriculture value added as an instrument for own-country agriculture value added growth. Estimates are shown to be robust to a range of alternative specifications designed to challenge the result obtained.

3. Data from World Bank (2006). These estimates of intersectoral linkages are obtained from a vector autoregressive model with the optimal lag order. Details on the estimation are given in the Appendix to de Janvry and Sadoulet (2008).

4. This finding justifies investing in agricultural R&D even if rates of return to investment in non-agricultural R&D are high or even higher for as long as a capital market exists.

5. Details on the equations used to calculate the rural contribution are given in the Appendix to de Janvry and Sadoulet (2008).

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