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## **Agriculture and Poverty**

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## **Abstract:**

How does growth in the agricultural economy help reduce poverty? In a global economy with open commodity markets, the answer is different from that of a generation ago. Then, large Asian economies needed to produce their own food. Higher agricultural productivity impacted the poor directly through lower food prices. Their food intake increased significantly. The availability of cheaper food also stimulated investments in labor-intensive industries, speeding economic growth and raising real wages. Both contributed to reductions in poverty.

Globalization changes the story in important ways, but does not alter the importance of gains in agricultural productivity to reductions in poverty. The linkages are less direct, however. Stimulating them requires a far more subtle role for government. Attention is more on the rural economy broadly than on food crop production *per se*. Rural-urban linkages, including migration and remittances, are a major part of the story. Prices for staple grains in world markets are low, and emphasis has turned to diversification and access to supply chains that provide middle class (and foreign) consumers with fruits, vegetables, processed foods, and livestock products. Connecting the poor to growth in agricultural productivity is more complicated than during the first decades of the Green Revolution.

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# **Agriculture and Poverty**

by

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Most of the world's poor live in rural areas, or migrated from them in search of better opportunities. Many of these poor are farmers. It seems obvious that improving agricultural productivity should raise farmers' incomes and reduce the incidence of poverty. Further, more food means fewer poor people because poverty lines are usually defined with reference to the adequacy of food intake. Growth in agricultural productivity should be the surest way to end poverty.

Of course, the world is not so simple. In many circumstances, the poor do not have access to the returns from higher agricultural productivity. In many other environments, higher agricultural productivity leads to lower food prices. Consumers benefit, particularly poor consumers who spend a large share of their budget on food. But farmers can end up worse off. So using agricultural technology to solve problems of rural poverty is complicated at best.

In an era of global markets and open economies, the connections between agricultural growth and reductions in poverty are even more tenuous. But in the right policy environment, the connections remain powerful. Indeed, in most circumstances there is still no alternative to "getting agriculture moving" if poverty is to be reduced significantly. The task of agricultural development was much easier under the impetus of the first Green Revolution, when the need for greater cereal output was met by new seed-fertilizer technologies. Now, with staple cereal prices at all-time lows in world markets, a dynamic agriculture will depend on diversification into crops and livestock with better demand prospects, such as fruits, vegetables, and a variety of livestock products.

Connecting the poor to this more diversified agricultural growth will be more difficult than during the first Green Revolution. But it remains important because in many countries, the poor are more numerous than ever. Even in countries with sharply reduced numbers of poor, such as China and Indonesia, poverty remains as an urgent problem, especially in rural areas. If the first generation Green Revolution did not solve these problems of poverty, hope must now fall on the far more complex mechanisms that will link the poor to the productivity gains of the next generation of agricultural innovations.

These mechanisms fall into three basic categories. First are the basic linkages that connect faster agricultural growth to faster growth in the overall economy. First articulated to a general economics audience by Johnston and Mellor (1961), these linkages have long been part of the core of modern development theory and practice (Timmer, 2002b). Recent research has established that economic growth usually has a direct impact on poverty (Deininger and Squire, 1996; Ravallion, 2001). So any contribution agriculture makes to speeding overall economic growth will, in most circumstances, also be a direct contribution to reducing poverty.

The second mechanism enables agriculture to make economic growth even more “pro-poor” than it would be if the source of growth came from the industrial or service sectors. There is growing evidence that the “elasticity of connection” between the poor and overall economic growth depends in important ways on the sector of growth, along with initial conditions in the economy, including the distribution of assets and income (Timmer, 1997; Ravallion and Datt, 1996, 2002). New agricultural technologies that improve farm productivity seem to play an important role in improving this elasticity of connection.

The third mechanism linking agricultural growth to poverty reductions is both more direct and more subtle. In a wide variety of circumstances, the array and diversity of foods available in local markets have a direct impact on the *quality* of diets consumed by rural households. In rural markets, most of these foods come from local farms. Dietary quality is reflected in a number of ways, including the starchy staple ratio, the amount and quality of protein, and the availability of such critical micronutrients as iron, Vitamin A, and iodine. Micronutrient deficiencies in particular, often called “hidden hunger” because availability of micronutrients in foods is not apparent without specific training and knowledge, can be reduced sharply by consumption of appropriate vegetables and livestock products. Having these products available in local markets, and cheap enough for the poor to have reliable access, can make a significant contribution to lowering the welfare consequences of poverty (Block, 2002).

This paper addresses each of these three mechanisms, focusing especially on the latter two as representing newer, and more controversial, roles for agriculture in reducing poverty. The next section reviews the literature on the causes and consequences of poverty, in order to establish the validity of instruments to reduce it. After that, the specific role of agriculture is addressed. Some brief comments on policy implications and the role of government conclude the paper.

## Reducing poverty

Defining poverty, establishing its causes, and finding mechanisms to reduce its incidence are major conceptual and empirical undertakings, the results of which can only be highlighted here. Fortunately, the literature is vast and easily accessible. This literature is not, however, easily summarized because the messages are contentious and overlaid with ideology and political rhetoric. Still, several robust themes can be noted here.

First, how poverty is defined matters to such elemental issues as whether the numbers of poor are increasing or decreasing, in absolute terms or relative to population. When life expectancy and literacy, for example, are included with income in defining poverty, then unambiguous progress at a global level has been made in the past several decades in reducing the numbers of the population defined as poor (Fox, 2002). By contrast, if poverty lines are established in U.S. dollars at market exchange rates, even the share of the population defined as poor seems to have risen in recent years (Wade, 2001).

The confusion resulting from such disparate measures and results is important because the mechanisms by which poverty can be reduced are obscured. Is income growth everything? It is, if it is all that counts. Or can initiatives to direct health and education programs to the poor substitute effectively for the more difficult task of getting economic growth going? This debate easily leads to paralysis of action. Another form of paralysis stems from the rather sterile debate over global trends in poverty and income distribution. The important action is at the country level, or within, because that is where national policies can be effective. There are few global policy instruments for reducing poverty. "Globalization" is not a strategy for poverty reduction.

Still, the very complexity of country-specific determinants of poverty can mask the powerful but indirect impact of macroeconomic forces, trends in commodity prices, or evolving demands for skill levels in labor markets. These factors are the ultimate mechanisms for an escape from poverty.

In nearly all circumstances, low economic productivity of poor households is the proximate cause of poverty. Behind this low productivity can lie supply factors, such as limited availability of land, skills, or appropriate technology. Demand factors, such as prices for commodities grown and sold, availability of productive jobs, and access to urban markets for handicrafts can also sharply influence the incidence of poverty in any given setting. Key to both supply and demand factors is the importance of local markets to provide a low-cost and convenient arena of exchange for the goods and services

produced by the poor. *It is virtually impossible to escape from poverty except through market exchanges.*

The importance of market exchange illuminates the role of governance in causing and reducing poverty. Bad governance means poorly defined property rights, high transaction costs, large economic risks, and outright theft. Markets disappear in such environments and with them the hopes of the poor for an escape route from poverty. With lost hope often comes despair and fatalism. Sometimes it leads to migration to better opportunities, whether legal or not. On occasion, it breeds violence (Collier, 2001).

One of the most visible determinants of poverty is hunger and malnutrition. The development profession continues to argue over which causes which, but hunger as a *measure* of poverty is widely established. Most poverty lines have an explicit or implicit food component. Preventing famines, children from becoming acutely malnourished, and mothers from delivering underweight babies has motivated much of the humanitarian assistance delivered around the world. With abundant food in rich countries, it seems a tragic waste not to feed the hungry in poor countries. With powerful political forces aligned behind this reasoning and much popular support for foreign assistance driven by television images of starving children, it would be foolish, even dangerous to ignore the link between hunger and poverty.

And yet the link is more tenuous than supposed. The evidence for nutritional poverty traps, where workers are too malnourished to work hard enough to feed themselves and their families, has strong historical dimensions (Fogel, 1991, 1994; Bliss and Stern, 1978; Strauss, 1986; Strauss and Thomas, 1998). But simple energy shortages cannot account for very much of the chronic poverty observed over the past several decades because the cost of raw calories, in the form of staple foods, has fallen too sharply relative to wages for unskilled labor (Fox, 2002). If inadequate food intake is the primary *cause* of poverty, the solution would be in sight. If, however, poverty is the main cause of inadequate food intake, hunger will be much harder to end.

### **How Well Do the Poor Connect to the Growth Process?**

The publication by the World Bank in 1996 of the Deininger-Squire data set on income distribution and levels of poverty allowed preliminary testing of many theoretical models that attempted to explain links between economic growth and reduction in poverty. At one level, the new data have supported a very comforting story. There is no longer room to doubt that rapid economic growth reduces poverty. Even cursory analysis of the Deininger-Squire data set on changes in income distribution over time reveals only a small handful of examples where economic growth on average failed to increase per

capita incomes in the bottom twenty or forty percent of the income distribution. But additional insights are possible from more sophisticated examination of the empirical growth record, using the Deininger-Squire data set to understand the relationship between reductions in poverty and changes in income distribution and how to improve the connection between economic growth and poverty alleviation revealed by this record.

Income distribution matters because it affects how well the poor connect to the growth process. Society might care little about income distribution *per se*, but a great deal about those living in absolute poverty. Analyzing the prospects of these families requires data on their circumstances, such as from the Deininger-Squire data set, as well as an understanding of the economic and political mechanisms that connect the poor to economic growth. One of these connection mechanisms is *mediated* by income distribution, as the following analysis indicates.

Following on a burgeoning literature using the Deininger-Squire data set (reviewed in Gugerty and Timmer, 1999), Timmer (1997) examined the question of how well the poor share in economic growth by directly estimating the “elasticity of connection,” or the degree to which a percentage increase in overall per capita incomes translates into a percentage increase in the per capita income of the poorest quintile. In addition, this analysis addressed the question of whether the sectoral composition of growth matters for the incomes of the poor, thus moving beyond *absolute* connections to *conditional* ones.

### **The Impact of Income Distribution on the “Elasticity of Connection”**

The necessary technical details of this analysis are shown in Appendix 1. The conclusions, challenging as they are for the “growth-is-all-that-matters school,” are easy to summarize. Both the sector in which growth originates and the initial distribution of income matter greatly to how well the poor connect to overall economic growth. Indeed, two fundamentally different growth processes seem to be at work with respect to the roles of labor productivity in agriculture and non-agriculture, and how these affect incomes in each of the five quintiles of the income distribution. In countries where the gap between the incomes of the bottom quintile and the top quintile is less than twice as large as average per capita income—that is, where the income gap is relatively *small*, labor productivity in agriculture is slightly but consistently *more important* in generating incomes in each of the five quintiles than growth in labor productivity in the nonagricultural sector.

Furthermore, agricultural productivity has a noticeable “anti-Kuznets” effect in these countries, i.e. *economic growth actually improves income distribution rather than worsens it*. A similar “anti-Kuznets” effect is seen from the non-agricultural sector and this impact is

even more important to the poor in the long run because the non-agricultural sector makes up, on average, 75 percent of the overall economy. It also has the capacity to grow significantly faster than the agricultural economy over sustained periods of time. When the starting point for economic growth is a reasonably even distribution of income, the growth process itself reaches the poor in an effective manner. Agricultural growth is more effective than nonagricultural growth in such circumstances.

The contrast with countries where the relative income gap is large--more than twice the average per capita income--is striking. In the poorest quintile, workers are virtually disconnected from the national economy (see Figure 1 in Appendix 1). The impact of growth in either agriculture or nonagriculture is the same for the poor, a statistical disconnect. *In economies with sharply unequal distributions of income, the poor do not participate significantly in economic growth.* However, the elasticity of connection rises sharply by income class and exceeds one for the top quintile. There, agricultural productivity growth is especially favorable to the rich, no doubt because of unequal asset distribution, particularly of land. These results show the importance of understanding the impact of asset distributions on income prospects of the poor.

### ***Asset Distribution and Poverty***

It is virtually impossible to understand the impact of economic growth on income distribution and of income distribution on the rate and distribution of economic growth without incorporating the distribution of assets held by the society. Assets are important because they are a measure of the capital available to an individual, or society, for the production of goods and services. Assets are likely to be distributed even more unequally than income. In a world of perfect data, one would rather examine the distribution of assets than income, but in reality, data on the distribution of assets are almost non-existent, particularly for developing countries.

What empirical evidence there is, however, suggests important linkages between assets and incomes of the poor. Deininger and Squire (1998) find that initial income inequality and initial land inequality both have negative impacts on the incomes of the poor, but not on the rich. Using the initial distribution of land as a proxy for the distribution of assets, they find that asset inequality has a significant negative effect on subsequent growth and this effect is stronger in low-income countries than in high-income countries. In addition, initial land inequality has a negative effect on rates of schooling, suggesting that the link between inequality and growth for the poor is mediated through credit rationing; the poor are unable to borrow to make investments in human capital.

Birdsall and Londono (1997) also examine the impacts of asset inequality on the income of the poor using the Deininger and Squire data. They find that inequality in the distribution of land and education negatively impact income growth of the poor. Datt and Ravallion (1997) examine the effects of inequality on the elasticity of poverty reduction in India using a model similar to Timmer (1997). They conclude: “[c]ertain inequalities can severely impede the prospects for poverty reduction through non-farm growth...Initial inter-sectoral disparities in earnings...influence how much non-farm economic growth reduces the incidence of poverty. In addition, the higher the initial poverty rate, the less effective is non-farm economic growth in reducing poverty.” Non-farm productivity is less effective in poverty alleviation in states with “poor” initial conditions.

Additional research extends this result. Ravallion and Datt (1996) have shown that the sectoral composition of growth matters to poverty reduction in India: poverty measures in India have responded far more to rural economic growth than urban economic growth. In addition, their work indicates that the connection of the poor to rural economic growth is quite robust over time, at least in India.

Both theoretical and empirical work, then, suggest that inequalities may persist over time, and that certain inequalities particularly penalize the poor. The next step in the research agenda is to better understand the underlying distribution of wealth in an economy and its implications for the economic and political sustainability of growth (Alesina and Perotti, 1993; Anand and Kanbur, 1993). There are virtually no data available on asset distribution in developing economies, but it is possible to use the Deininger and Squire data on income distribution to develop a simple, stylized model of asset distribution and its evolution over time. The details of this model are illustrated with an example in Appendix 2. The underlying framework and the key results are discussed here.

For the analysis here, capital assets are divided into four categories: physical labor, human capital, financial capital, and social capital. Some simple assumptions are made about the returns to these various forms of capital to generate several striking lessons.

1. **Physical labor** is what an individual can exert without using any other form of capital to raise productivity. Somewhat arbitrarily, this physical labor is valued at \$365 per year in terms of purchasing power parity (PPP), which is simply one of the World Bank's poverty lines. If a worker's income depends entirely on competing with a horse, tractor, or bulldozer, by expending physical energy, the expected income is likely to be low indeed. Incomes below \$365 per year reflect significant poverty and the likely depletion of human capital in the form of reduced health and nutritional status.

2. **Human capital** comes from education and on-the-job training (in addition to physiological contributions from health and nutrition). It is useful to consider three categories of human capital: (a) that arising from literacy and numeracy, both of which should result from a primary education; (b) more formal analytical and reasoning skills that result from a high school education; and (c) advanced professional skills and research training that come from college and post-graduate education.

Again, somewhat arbitrarily, primary education in a developing country is assumed to generate \$1,000 per year (in \$PPP) for the holder, whereas finishing high school results in an additional \$5,000 per year in earnings. Thus, by assumption, a worker with a completed high school education, or the equivalent in on-the-job training, is expected to earn \$6,365 per year (\$365 for physical labor returns, \$1,000 for primary school returns, and \$5,000 for high school returns). *This simple assumption about returns to human capital has powerful implications for the distribution of assets, including financial assets.* Because earnings from college and post-graduate education vary so widely, and are often seen as a return on financial investment, they are included in the financial category.

3. **Financial capital** permits ownership of land, industrial plant and equipment, and other financial assets. This category, of course, is what most people think of as “assets,” and determining their distribution has bedeviled both theorists and empiricists for decades. As a simple example of an age-old controversy in economics, should capital assets be valued at what they cost, minus depreciation, or at market value as determined by the discounted flow of income? The market value approach has the obvious merit of putting all assets on a similar valuation basis, and of linking directly income flows with asset values. The disadvantage is the near tautology implied between incomes and asset values. The link can be altered only when the discount rate changes.

The empirical work reported in Appendix 2 does not break down financial capital into more workable components, especially land, industrial capital, and financial assets, *because this whole category of capital does not become important to income generation until well into the development process.* Lack of access to land, or industrial jobs, will obviously reduce the earnings of the poor with no other capital at their disposal. But the surprising fact is that variations in human capital seem able to account for most of the differences in income distribution among poor countries, at least when income is disaggregated only to the quintile level. This fact opens important policy opportunities.

4. **Social capital** has taken the economic development profession by storm (Woolcock, 1998, 1999). By various measures, it seems to account for order-of-magnitude differences in incomes among individuals in African villages (Narayan and Pritchett, 1999), as well as similarly large differences in incomes among countries

(Knack, 1999). The social networks, institutional infrastructure, and level of trust among economic agents that might account for these differences in productivity are the subject of major research efforts, much of it in the field of economic history (North, 1992). Without a consensus yet on how to define social capital or attribute productivity differences to it, this paper merely observes that there are likely to be at least two different levels at which social capital operates, with substantially different policy implications.

First, social capital seems to exist at the micro level, connecting individual villagers whose knowledge of each other can be turned into collateral for loans, for example. An entire microfinance industry is growing around this realization (Morduch, 1999). At the other end of the spectrum, social capital in the form of deeply-rooted institutions that support property rights and rule by law also seem to have macro level implications for productivity and economic growth (Olson, 2000). Indeed, North argues that these institutions fully account for the differences in welfare levels between rich and poor countries. Empirical analysis of the lasting effects of different types of institutional investments by colonial powers shows both the huge quantitative impact of institutions on income growth as well as their lasting footprints to the present (Acemoglu, Johnson, and Robinson, 2001; Easterly, 2002). Consequently, it does not seem outlandish to suggest that societies with a full “portfolio” of social capital might have labor productivity that is twice as high as in a similar society with serious shortfalls in social capital, *holding other forms of capital constant*. Translating this reality into effective development policy is well beyond the scope of this paper, but the historical perspective it requires is an important lesson in itself.

## The special role for agriculture in poverty reduction

The agricultural sector specifically, and the rural economy more broadly, are uniquely important to connecting the poor to the economic growth process, because so many of them live in or come from rural areas. Further, growth in agricultural productivity has demonstrable economy-wide benefits, many of which receive no value in commodity markets where farmers sell their output. The case for developing an agricultural strategy as part of any poverty reduction strategy is clear. Still, such a strategy must be carefully constrained by market realities and institutional capabilities. This case, summarized here, is presented in detail in Timmer (2002b).

## **Agriculture and Economic Growth**

Agricultural development has made important and direct contributions to the historical rate of economic growth in nearly all countries. As stressed by Lewis (1954) analytically and by Johnson (1997) empirically, lower food prices stimulated by rapid technological change in agriculture have contributed substantially to higher living standards directly, especially for the poor who spend a large share of their budget on basic foodstuffs, and indirectly by keeping real wage costs low in the industrial sector, thus fostering investment and the structural transformation. It is argued, however, that these benefits of low food prices are as easily accessed by trade as by investing in the domestic agricultural sector (Sachs, 1997). What is the significance of other contributions from agricultural modernization that would be missed with a pure trade strategy?

Plausible candidates include the loss of backward and forward linkages that connect cities with the countryside. Without these linkages, societies risk greater vulnerability to fluctuations in world markets, inequities between rural and urban inhabitants, more underemployment in rural areas, and excess migration. The returns to good rural-urban linkages include a relatively smooth structural transformation, as seen in Taiwan, in contrast to the difficulties seen in Thailand (Tabor, 2002; Timmer, 1988).

Surprisingly, in view of the length of time the discussion has been going on, there are still no satisfactory tests of the impact of changes in agricultural productivity on the value of good rural-urban linkages. There is evidence generated from a large data-gathering project at the World Bank led by Don Larsen, Will Martin, and Yair Mundlak, that total factor productivity in agriculture tends to grow faster than in manufacturing (Martin and Mitra, 1996). This result alone argues that past investments in agriculture have had large economic returns (Mundlak, 2001).

Still, the questions remain--how does agriculture affect economic growth and how much should governments invest to make it happen? First, there is the obvious national income accounting identity: the change in national income is equal to the growth rates in the agricultural and nonagricultural sectors, weighted by their respective shares in aggregate GDP. It is worth noting that where the agricultural share is large, the direct contribution of agriculture to total economic growth can also be substantial. This obvious but often forgotten fact is also an ingredient in the fast growth of city-states such as Singapore and Hong Kong, which never faced the drag of a large, slow-growing agricultural sector or the need to make large infrastructure investments to modernize that sector.

For countries where the share of agriculture is still significant, changes in agricultural productivity can also influence the growth process through a set of indirect and roundabout linkages. These linkages can be categorized by each of the variables in a standard production function used by neoclassical economists to describe quantitatively the relationship between inputs and output. These “input variables” include the location of the local technological frontier; the rate of physical capital deepening; the rate of human capital deepening; and any changes in the economic or institutional “environment” that influences how efficiently an economy operates relative to its local technological frontier (Timmer, 2002b; Mundlak, 2000, 2001).

**Impact on the Rate of Shift in the Local Technological Frontier.**--Increases in agricultural value added can generate exports (or substitute for imports) and earn foreign exchange that permits imports of foreign technology, where new technology, embodied in physical capital, determines the location of the local technological frontier. It should be noted that agricultural exports have a very high ratio of value added, unlike many manufactured exports that rely heavily on imported materials and components. On the other hand, there may be few knowledge spillover effects from exporting traditional agricultural products, thus forgoing one of the main growth stimulants from foreign trade specified in the endogenous growth literature (Romer, 1990). Earning foreign exchange is one of the standard Johnston-Mellor linkages (Johnston and Mellor, 1961). There is, however, evidence that very heavy dependence on primary exports is a significant factor influencing the probability of violent conflict within a country (Collier, 2001).

**Impact on the Rate of Physical Capital Deepening.**--Savings from the agricultural sector are a function of agricultural value added, and in a semi-closed economy, or one with imperfect capital markets, higher savings translate into faster physical capital deepening (Feldstein and Horioka, 1980). The sector in which the investment takes place will depend on financial intermediaries (for private savings), or mechanisms of savings extraction (for example, taxation or pricing policy). This is a standard Lewis linkage (Lewis, 1954). Even in a global economy with open financial markets, most investment in developing countries comes from their own domestic savings.

Savings may be less productive for growth if in government hands rather than private hands, after minimum government revenues are available to fund affairs of state. It should be recognized, however, that these public revenues can have very high productivity when invested in public goods and infrastructure that raise the profitability of private sector investment in agriculture (Teranishi, 1997). If agriculture is more easily

taxed than nonagriculture in the early stages of development, perhaps by border taxes on exports, the agricultural sector may well provide revenue for this important, initial stage of public sector investment. No country has been able to develop successfully without making these public sector investments.

**Impact on the Rate of Human Capital Deepening.**--Rural education levels can be influenced by growth in agricultural productivity and rural incomes (Chai, 1995; Birdsall et al., 1995). Such education can raise farm productivity directly (Jamison and Lau, 1982). It can also make the migration process much less painful and more economically rewarding for children who leave the farm (Johnson, 1997; Larson and Mundlak, 1997).

Improved nutritional intake can raise labor productivity through the processes examined in historical England and France by Fogel (1991, 1994). Although in principle staple foods are tradable, in fact there is a very high correlation between increases in food production and increases in food consumption within regions and countries. The "Fogel linkages" can thus be stimulated by growth in agricultural output, especially food output. Although the historical relevance of the Fogel linkages is usually discussed in terms of protein-energy availability, it is also possible that higher productivity in livestock operations may have contributed to micronutrient intake and improved nutritional status in that way.

**Impact on the Rate of Change in "Efficiency" Variables.**--A wide range of variables might cause economies to produce at less than their technically efficient level. Lack of economic freedom, poor institutions, ineffective economic policies, and political instability all have been shown to slow down economic growth, when controls are included for initial conditions and factor accumulation (Barro, 1997). How changes in agricultural productivity might affect these "efficiency shifters" is a matter of considerable speculation and relatively little empirical evidence. Two mechanisms for which evidence is accumulating involve price stability, because investments are more efficient when signal extraction problems are reduced (Lucas, 1973; Dawe, 1996; Rock, 2001), and political economy considerations, because restive rural populations can challenge political leaders if they are left behind during the process of rapid economic growth (Anderson and Hayami, 1986; Gardner, 2002).

Other linkages that Johnston and Mellor identified might also work through these "efficiency" variables. For example, producing raw materials for industrial processing suggests that capacity utilization in the industrial sector depends on agricultural

productivity. Earning foreign exchange might have the same impact on imported intermediate goods, which are often crucial for producing manufactured exports.

With surpluses of agricultural commodities flooding world markets, investing in agricultural development as a way of speeding overall economic growth would seem to be a hopeless cause. A key lesson of postwar economic development has been the need for agricultural development to be led by market forces that provide incentives to farmers to increase their output. With market incentives so low, depressed especially by the farm subsidies in OECD countries, what sense does it make to design strategies for further agricultural development in poor countries? Why invest in research designed to provide new, more productive technologies for their farmers? At least part of the answer lies in the realization that market prices do not always convey all the information needed to design appropriate government strategies (Timmer, 1995). This is especially true when markets place no value on dimensions of a sector's output, such as reduced poverty, greater stability, or food security, that matter greatly to a country's policy makers. The next section addresses the issue of non-market values of agricultural productivity.

### **Does Rural Growth Mediate Poverty Reduction?**

The work of Mellor, Ravallion and Timmer shows the empirical role of rural growth in connecting the poor to economic growth, both within and outside the rural economy. Without firm theoretical underpinnings, however, these empirical observations provide only casual guidance to policy makers seeking to make the growth process more pro-poor. It would be better to understand the mechanisms at work as well as the facts (Sarris, 2001).

Fortunately, much progress has been made in the past decade in identifying these mechanisms. Foremost in this effort is the recent model of agricultural growth, rural employment and poverty reduction that emphasizes the role of nontradables in pulling underemployed workers out of agriculture into the nonagricultural rural economy (Mellor, 2000). This model, drawing on Mellor's earlier work in India (Mellor, 1976), shows the importance of rural incomes as the driver of demand for the goods and services produced in the nonagricultural rural economy and how this economy links to urban demand, especially when it is driven by rising incomes from workers in labor-intensive export industries. Having left their farms in search of better jobs, these workers often retain "rural" tastes in their consumption patterns.

The Mellor model is the first to explicitly recognize this connection between manufactured export performance, the role of the nontradables sector in the rural economy, and subsequent reductions in poverty. Thus the model explains why countries

with rapid growth from labor-intensive manufactured exports, that also have substantial agricultural sectors, had such good records of poverty reduction. But the nontradable sector is often ignored by policy makers and donors precisely because so much emphasis is placed on the role of exports and open-economy strategies for economic growth. Retargeting public expenditures in support of a more balanced strategy will not sacrifice overall growth performance but it will increase its impact on reducing poverty (Mellor, 2000).

Two other components of the relationship between rural growth and poverty reduction should be noted. First, political commitments to rural growth imply a more balanced political economy, with less urban bias than has been seen in most developed countries historically (Lipton, 1977, 1993; Timmer, 1993). The developing world has already seen a notable reduction in the macroeconomic biases against agriculture, such as overvalued currencies, repression of financial systems, and exploitive terms of trade (Westphal and Robinson, 2002). Further progress might be expected as democracy spreads and empowers the rural population in poor countries.

The second important component is the linkage between urban and rural labor markets, often in the form of seasonal migration and remittances. *There is no hope of reducing rural poverty without rising real wages for rural workers.* Rising wages have a demand and a supply dimension, and migration can affect both in ways that support higher living standards in both parts of the economy. Migration of workers from rural to urban areas raises other issues, of course, but those issues depend fundamentally on whether this migration is driven by the push of rural poverty or the pull of urban jobs. Either way, the food security dimensions of rural-urban migration are clear. Urban markets become relatively more important in supplying food needs for the population. Whether the country's own rural economy or the world market is the best source of this supply will be one of the prime strategic issues facing economic policy makers (Naylor and Falcon, 1995; Tabor, 2002).

### **Agriculture and nutritional quality**

The link between agricultural productivity and nutritional quality has often been weak, or even negative. The dramatic quantity impact of the seed-fertilizer revolution materialized as sharply higher cereal intake by the poor. But at least anecdotal evidence suggests that legume production, and dietary intake, declined as the new technology was more profitable for farmers.

The new emphasis on micronutrients suggests there are other dimensions to the links between agricultural productivity and nutritional well-being. Lower grain prices can

stimulate livestock production and provide local markets with high-quality animal protein and highly absorbable sources of micronutrients. Ready availability of cheap grain in local markets permits farmers to specialize in growing fruits and vegetables instead of grain, with similar nutritional impact. The stimulus to small and medium enterprises in rural areas from low nominal wages, made possible by low food prices, can speed the absorption of surplus labor and set the stage for higher real wages. Nutrition knowledge, household income, and low prices for foods with high levels of micronutrients are the major determinants of micronutrient status in rural households. Agricultural productivity can influence prices directly, incomes indirectly, and provide the local supplies to make nutrition knowledge effective.

### **Multifunctionality and agriculture**

Much of the discussion of non-market values from farm production has focused on agriculture's "multifunctionality" as the basis for domestic policies that have clear social, environmental, or security rationale. The United States especially has been reluctant to embrace this concept, seeing it as a disguised mechanism for agricultural protection in Europe, Japan and Korea. But the above discussion highlights the importance of non-market values from the agricultural sector in developing countries, where the sector's role in stimulating economic growth and reducing poverty should win U.S. applause.

Thus it would be sensible for the United States to take the lead in the Doha Round of WTO negotiations to design rules explicitly recognizing what reasonable "multiple" functions might be for agriculture in different countries and at different stages of development. For example, environmental protection would be an acceptable role for domestic agricultural policies in all countries, whereas policies to stimulate basic grain production to enhance domestic food security would be restricted to countries with limited access to world markets or poorly developed internal marketing systems. Diversification efforts to broaden the base for improving rural productivity and reducing poverty would also be permissible where rural poverty remains a priority.

### **Policy approaches and the role of government**

This perspective on the connections linking agriculture, economic growth and poverty reduction suggests two policy arenas where government actions might strengthen the connections even when the starting point with respect to income and

asset distribution is unfavorable. In turn, we discuss the mechanisms for “getting agriculture moving,” to use Arthur Moshier’s memorable phrase (Moshier, 1966), and initiatives to develop human capital, especially for the rural population.

## **Getting Agriculture Moving**

There is no great secret to agricultural development. Moshier (1966) and Schultz (1964) had identified the key constraints and strategic elements by the mid-1960s. New agricultural technology and incentive prices in local markets combine to generate profitable farm investments and income streams that simultaneously increase commodity output and lift the rural economy out of poverty (Hayami and Ruttan, 1985). The process can be speeded up by investing in the human capital of rural inhabitants, especially through education, and by assistance in the development of new agricultural technology, especially where modern science is needed to play a key role in providing the genetic foundation for higher yields.

Beyond this level of general understanding, however, the diversity of rural circumstances has sharply impeded its implementation. At the regional level, for example, neither the agricultural technology nor the incentive prices in rural markets have been reliably available in Sub-Saharan Africa. In Asia, success in linking the nontradable sector in rural areas to urban markets and labor-intensive export growth has been mixed at best. And in Latin America, extreme rural poverty has largely migrated to urban areas, so the poverty problem is now primarily an urban problem (Painter, 2001; Haddad, Ruel and Garrett, 1999). Central America and Mexico continue to face acute rural poverty, however, and rural strategies will be needed to reduce it (de Janvry and Sadoulet, 2000, 2001).

The mechanisms for both technology development and provision of rural price incentives are no longer as clear as they were in the 1960s. The CGIAR system has a laudable record of important breakthroughs for many of the world’s staple foods. But funding for the system has been threatened as the market prices of these crops have dropped to historic lows, under the weight of productivity gains in developing countries and publicly subsidized crop surpluses in rich countries. Few countries have the scientific resources to conduct basic crop research on their own; so a large question looms. Where will agricultural technology come from for the additional 3 billion people expected in the next 50 years? Biotechnology holds out both promise and concern; even in the best of circumstances it is largely a product of scientific enterprise, public and private, in advanced countries.

There is an obvious role for the rich countries in answering this question. First, starving the CGIAR centers of funding to pursue essential and basic crop research with spillovers to many countries is very short-sighted. OECD leadership in restoring budgets could have major add-on effects. Second, the Western research university system is the best in the world at training scientists in basic biology and applied agricultural fields. The opportunity exists to provide the next generation of these scientists for the entire world.

Apart from its indirect impact on funding for the CGIAR system, the sharp drop in commodity prices in world markets also has a more immediate impact (Fox, 2002). Open borders and flexible markets for foreign exchange transmit these low prices directly into the markets of poor countries, often with devastating impact on local farmers (Dawe, 2001; Tabor, 2002). Rich countries find ways to protect their farmers against such low prices, but poor countries cannot afford the subsidies, or defend the trade interventions, that would be needed to do the same. *“Agriculture-led economic growth” is impossible unless it is profitable.*

Instability in food prices also remains a concern, especially with open borders and the possibility of sharp movements in exchange rates (Islam and Thomas, 1996). In 1998, for example, the collapse of the Indonesian rupiah during the financial crisis caused the landed price of imported rice to increase more than four-fold. Indeed, for a time, it was profitable to export rice in the same year as one of the worst el Nino-induced droughts in history! In open economies, food price instability has macroeconomic roots as well as local supply and demand roots. If some degree of food price stability is a political imperative, new tools will be needed to provide it (Timmer, 1989).

Many place their hopes for solving the problems of price levels and price instability on new rules regulating agriculture in the WTO. But negotiations leading to useful new rules are likely to be very difficult, with Europe and Japan still extremely reluctant to abandon their farmers to free markets. The United States, under great pressure from Congress not to give away its subsidy tools as mechanisms to keep U.S. farming profitable, actually *increased* the level of farm subsidies in the 2002 Farm Bill. But even within the Bush Administration there are other perspectives. The U.S. Department of Agriculture (USDA), for example, has taken a clear stance in favor of reduced subsidies and freer trade in agriculture.

Lowering tariffs and other barriers to trade is fundamental to expanding exports. The average food and agricultural tariff is 62 percent, much higher than tariffs on manufactured items. Both developed and developing countries have high tariffs. Exports to the large potential markets in South Asia (including India) and to South America must overcome tariffs of 113 and 40 percent, respectively. The United States has one of the lowest food and agricultural tariffs, at 12 percent, and thus stands to gain immensely from

ambitious tariff cuts. However, the United States still maintains some high tariffs that protect specific commodities.

In addition to tariffs, high levels of domestic support for agriculture and export subsidies distort agricultural markets. In contrast to tariffs that are applied by almost all countries, developed countries account for virtually all domestic support and export subsidies. The Organization for Economic Cooperation and Development (OECD) estimates that in 2000, developed countries' total support for agriculture was \$327 billion. In that same year, total production supports by the European Union were \$90.2 billion, compared to \$49 billion by the United States. The European Union dominates use of export subsidies, accounting for approximately 90 percent of total annual spending since the Uruguay Round Agreement on Agriculture (URAA) took effect.

USDA research shows that removing all forms of agricultural protection and support could raise world prices 12 percent, over half of this from removing tariffs alone. Our producers and the industries they support could see the value of U.S. agricultural exports grow 19 percent. Global economic welfare would increase by \$56 billion annually by removing existing distortions (USDA, 2001, p. 40).

The way forward on these negotiations is badly in need of leadership. The United States is increasingly seen as a hypocritical voice in this effort, emphasizing narrow domestic political interests. The developing world itself will probably have to provide a united front on liberalizing agricultural trade if any progress is to be made in the Doha Round.

In the end then, what are the components of an agricultural development strategy? First, obviously, is a supportive macroeconomic policy, one that yields low inflation, a reasonably stable exchange rate, positive real interest rates, and perhaps some monitoring of disruptive short-run capital flows. Second, "getting prices right" extends good macro policy to the trade arena, where an open economy with low barriers to internal and external trade should generate a level playing field for producers and consumers alike.

What remains after this? The externalities from rural growth outlined above argue for policy attention and budget priorities for the rural nontradables sector, once agricultural technology is in place as the basis for profitable farming. Part of the profitability for this sector will come from a labor-intensive export sector that is successfully linked into the global economy. Rapid growth in this export sector creates demand for labor directly as well as for the goods and services of the rural economy that raise demand for labor indirectly.

Improving the rural financial system, both to permit farmers to make long-run investments and as a vehicle for handling intersectoral financial flows such as savings

and remittances, will take time, but is essential to a successful structural transformation. None of this is rocket science, but all of it requires talented policy analysts and government administrators.

## **Investing in Human Capital**

*Investments in human capital improve the distribution of assets in the early stage of economic development*, and therein is a clear policy message. For “pro-poor growth,” a country must invest in the human capital of its poorest citizens. At the earliest stages this will involve primary health clinics, household food security, and access to rural schools. Policies that encourage the efficient functioning of rural financial markets can also play a role in increasing the poor’s access to capital. Later it will mean opportunities for high school education and on-the-job training as unskilled and semi-skilled labor. Such investments, if broad-based and of adequate quality, will keep the distribution of income from becoming highly skewed until well into the development process, *and thus lead to the near elimination of absolute poverty*. Taiwan and South Korea managed such investments until middle-income status; Brazil, the Philippines, and Thailand did not.

An optimistic policy interpretation of these results is that fiscally manageable investment strategies are available for even the poorest countries to set themselves on a growth path that includes the poor. The pessimistic interpretation suggests that political forces or bad governance will keep this from happening where the “starting point” in income and asset distribution already prevents the poor from connecting to the growth process. But surely this is a result that the donor community can grasp—it provides donors with a rationale for investing in the very people that countries’ leaders themselves might choose, or be forced, to ignore. Then the policy dialogue, and the resources that could be mobilized behind it, can have dramatic effects.

Investments can be in specific knowledge as well. If the striking results for rural Central Java are any indication, the economic and welfare returns to giving mothers knowledge about the sources and importance of micronutrients are extraordinarily high (Block, 2002). Diversifying local agricultural production will be one way to supply these micronutrients while moving farmers out of the income trap they face when producing low-value food grains. Fortification programs may also be highly cost effective.

## Reflections on missed opportunities and the role of government

Policy makers in developing countries show an understandable impatience with academic debate. While the main points of agreement are ignored as uninteresting, controversy rages over the decimal points. Some of that is on view here. Economic growth is good for the poor. But it could be better. Agricultural development is good for food security, poverty reduction, and economic growth. But, in theory, the same or larger benefits could be achieved by importing cheaper food from world markets and investing the difference in export processing zones. And so it goes, the best as the enemy of the good.

And yet. It is only from the perspective of theory that we know what is possible, what we have missed, what new opportunities await. From this perspective, the major players in the global economy missed three opportunities to assist economic development over the past several decades. First, two decades intervened between the first and the second world food conferences with little to show in terms of increased food security and reduced poverty in the most vulnerable countries--those that might have hoped that Henry Kissinger's promise in 1976 that no child would go to bed hungry within a decade actually would translate into action. Other countries, especially in East and Southeast Asia, used the two decades to improve their rural infrastructure, agricultural technology, and economic competitiveness. They were rewarded with reduced poverty, improved food security, and rapid economic growth, but the global promises figured little in this performance.

Second, subsidies to farmers in rich countries have become larger over the past two decades, not smaller, despite promises made at the Uruguay Round. The result has not just been a large budget burden in OECD countries. More importantly for developing countries, the result has been increasing surpluses dumped on world markets, depressing world prices and the incomes of farmers in poor countries who have to compete with these prices. The best guess is that every dollar of agricultural subsidies in rich countries costs farmers in poor countries a similar amount. And official development assistance is only one-quarter of this total. It is not even remotely a fair trade.

What should developing countries do about this? First, it is important to get on with the tasks of economic development, most of which involve critical *domestic* decisions about macroeconomic policy, trade regimes, and economic governance. Despite repeated calls for "new thinking" on how to design and implement these critical decisions, their basic elements have been known for a decade or more. There is no substitute for sound fiscal policy, with domestic expenditures close to domestic tax revenues. There is no substitute for sound monetary policy, with low and transparent

rates of inflation. Investments must be profitable, whether from domestic or international lenders, and they must not depend on special favors for their success. The public sector must not disappear under some mantra of “privatization.” The right kind of public investments “crowd in” private investments. As noted earlier, this is not rocket science. It does not depend on another decade of research. It does depend on connecting domestic policy makers to what is known about the development process, and adapting it to local circumstances.

Unfortunately, the gap here is enormous. The blame lies partly with domestic policy makers, who often feel that they must rely only on domestic research and analysis to justify the way forward. In fact, of course, rediscovering the wheel is a very costly exercise. But part of the blame lies with the international policy research community, which is often caught up in the publication mill and spends far too little time explaining the relevance of international experience in specific domestic settings. Finding ways to bridge this gap would pay very large dividends.

## Appendix 1

### The Elasticity of Connection Between Economic Growth and Poverty Reduction

To estimate the elasticity of connection, Timmer regressed the *level* of income of each quintile on overall per capita GDP. This “levels” estimation includes country and time fixed effects (dummy variables for each developing country included and for each decade from the 1960’s to the 1990’s). The country fixed effects allow shifts in the regression intercept for each country, but assume the same slope, or elasticity of connection, for all countries. The fixed effects for decades allow a shift in the regression intercept for each 10-year decade.

The paper also restricted the sample of countries to those that have a significant agriculture sector, are reasonably large, and are considered developing countries. For this reason, countries such as Hong Kong and Singapore were excluded, as were most countries with populations smaller than 6 million (Costa Rica and Jamaica are the exceptions to include better representation of Latin America and the Caribbean).

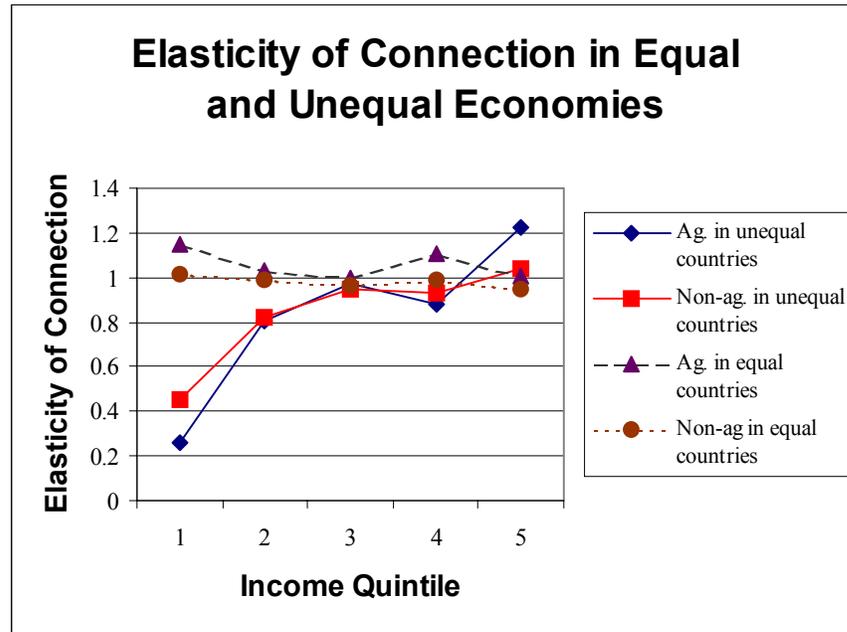
To examine the impacts of inequality on income levels of the poor, Timmer constructed a variable that measures the *relative* income gap between the rich and the poor. A dummy variable was then created that is equal to one when the gap in income between the highest and lowest quintiles is more than twice as large as average income. Timmer then disaggregated income into sectoral components from agriculture and non-agriculture in order to examine whether the sectoral composition of labor productivity matters to the incomes earned by each quintile.

Earlier results from asking a similar question had already indicated that growth in the agricultural sector seems to have a much larger impact on growth of incomes in the bottom quintile than growth in services or industry (Ravallion and Datt, 1996; Gallup, Radelet, and Warner, 1997; Mellor, 2000). The question here is framed in terms of relative labor productivities. Do the per capita labor productivities of workers in agriculture and non-agriculture have differential effects on the average earnings in each income quintile? Put another way, do the poor benefit more from growth in the agriculture or the non-agriculture sector?

Timmer found that in unequal countries, that is, where the relative income gap is large, there is a pronounced Kuznets effect: the elasticity of connection for the poorest quintile is significantly lower than for the higher quintiles; the poor appear to be nearly disconnected from the growth process in these economies. The elasticity of connection for the poorest quintile is 0.257 for agriculture and 0.449 for non-agriculture. In contrast, for those economies with better income distribution, the elasticity of connection for the

poor in the agriculture sector is 1.146 and 1.018 for non-agriculture. This is slightly higher than the elasticities for the upper quintiles, suggesting a slight but significant “anti-Kuznets” effect in these economies. These results are illustrated in Figure 1 below.

Figure 1



Source: Timmer (1997)

## Appendix 2

### An Empirical Example Comparing Brazil and Thailand

Building on the earlier analytical and empirical work in Timmer (1997), it is possible to use the definitions and returns to capital discussed in the text to construct crude estimates of the value of human and financial capital assets by income quintiles (for details, see Gugerty and Timmer, 1999). As a particularly interesting comparison over time and space, Table 1 shows these asset values by quintile for Thailand and Brazil over a three-decade period.

**Table 1**  
**Changes in income and asset distributions over a three-decade period in Brazil and Thailand**

Quintile	income per capita		Annual per capita quintile growth	human capital per capita		financial	
	(\$PPP)			(\$000)		(\$000)	
Thailand, 1962-1992		1962	1992	1962	1992	1962	1992
I	397	726	2.03%	0.64	7.22	0	0
II	427	1491		1.24	22.52	0	0
III	600	2276		4.70	38.22	0	0
IV	1066	3649		14.02	65.68	0	0
V	2470	11478	5.25%	42.10	120.00	0	102.26
RELGAP	2.089	2.740		3.470	2.431		
Brazil, 1960-1989		1960	1989	1960	1989	1960	1989
I	285	534	2.19%	0	3.38	0	0
II	614	1047		4.98	13.64	0	0
III	970	1965		12.10	32.00	0	0
IV	1700	3909		26.70	70.88	0	0
V	5331	13927	3.37%	99.32	120.00	0	151.24
RELGAP	2.835	3.135		3.306	2.223		

Both Brazil and Thailand grew fairly rapidly during this three-decade period, Brazil from per capita income of \$1,780 in 1960 to \$4,272 in 1989 (3.06% annual growth), Thailand from \$992 in 1962 to \$3,924 in 1992 (4.69% annual growth). Income distribution in both countries, as measured by RELGAP, worsened, from an average level of 2.089 in Thailand at the start to a highly unequal level of 2.740 at the end.<sup>1</sup> In Brazil, inequality

<sup>1</sup> RELGAP is defined as the average per capita income in the top quintile minus the average per capita income in the bottom quintile, divided by the average per capita income for the society. When RELGAP is greater than two, economies have a difficult time sustaining growth and connecting the poor to it (Timmer, 1997).

was already very high at the start of the period, and worsened to a level of 3.135 at the end, one of the worst distributions of income in the entire Deininger-Squire sample.

Not surprisingly, asset distributions in both countries also changed quite significantly, but not always in the expected direction. Levels of human capital increased dramatically for all income classes, but much faster for the poor than for the rich, who were already closer to the plateau levels used in this analysis. Increases of two to three times were the norm in Brazil; full order of magnitude increases occurred in Thailand. Even as income distribution worsened, *the distribution of human capital became more equal*, as the poor were finally included in the growth process to some extent.

This result is supported by empirical research that indicates that changes in primary school enrollment are strongly positively associated with growth in lower income countries (Easterly, 1997; de Gregorio and Lee, 1998). Because of the self-limiting nature of human capital accumulation, however, this dimension of asset distribution is also limited in its potential contribution to future earnings. In addition, given the constraints on investment in human capital by the poor suggested by the theoretic literature, it is clear that government policy will play an important role in human capital accumulation at lower levels of development.

The open-ended nature of *financial assets* avoids the ceilings inherent in accumulation of human capital. If the distribution of financial assets is or becomes highly skewed during the growth process, at some point the income-earning potential of these assets will lead to a self-reinforcing skewing of incomes. Both Brazil and Thailand seem to have reached such a point by around 1990. In Brazil, a simple dynamic calculation shows that if all incomes above the human capital level of \$6365 are saved and invested in financial assets that earn the assumed five percent per year, within a decade the upper quintile of income earners will receive the entire additional income generated by an economy growing at five percent per capita per year.

At some point in the development process, concentration of ownership of financial assets can lead to sharply skewed income distribution as an inevitable result of economic growth, a result that is not typically seen in the early stages of growth when the dependence on investments in human capital are far more important for the distribution of income and for lifting the poor out of absolute poverty (Ravallion, 1996).

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