Agriculture and Pro-Poor Growth: An Asian Perspective

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INTRODUCTION

Imagine a region of the world where all food and agricultural products are sourced from international markets, and domestic agricultural sectors have disappeared. This "world without agriculture" is not imaginary. For many of the world's poorest countries, especially in Africa, a future without agriculture is increasingly being urged as the efficient path to development. Mark Rosenzweig, the new Director of Harvard's Center for International Development, asks at the broadest level: "Should Africa do any agriculture at all?" (Harvard Magazine, 2004, p. 57). Adrian Wood, Chief Economist for the Department for International Development (DfID) of the United Kingdom, envisions a "hollowed out" Africa, with most of the population on the coasts where they could more effectively produce manufactured exports (Wood 2002). Many macro economists, convinced of the power of rapid economic growth to lift populations out of poverty, see resources devoted to slow-growing agriculture as wasted. In a world of ample food supplies in world markets (some of it free as food aid) and increasingly open borders for trade, what is the role of agriculture in pro-poor growth?

Historically, the answer is clear. No country has been able to sustain a rapid transition out of poverty without raising productivity in its agricultural sector (if it had one to start with – Singapore and Hong Kong are exceptions). This phenomenon involves a successful structural transformation where agriculture, through higher productivity, provides food, labor, and even savings to the process of urbanization and industrialization. A dynamic agriculture raises labor productivity in the rural economy, pulls up wages, and gradually eliminates the worst dimensions of absolute poverty. Somewhat paradoxically, the process also leads to a decline in the relative importance of agriculture to the overall economy, as the industrial and service sectors grow even more rapidly, partly through stimulus from a modernizing agriculture and the migration of rural workers to urban jobs.

Despite this historical role of agriculture in economic development, both the academic and donor communities lost interest in the sector, starting in the mid-1980s, mostly because of low prices in world markets for basic agricultural commodities. Low prices – while a boon to poor consumers and a major reason why agricultural growth specifically, and economic growth more generally, was so poor for the general population – made it hard to justify policy support for the agricultural sector or new funding for agricultural projects (World Bank 2004d). Historical lessons are a frail reed in the face of market realities and general equilibrium models that show a sharply declining role for agriculture in economic growth.

WHY AGRICULTURE IS BACK ON THE AGENDA

Three factors are renewing interest in agriculture. The first new factor is a revolution in the knowledge of basic genetic structures and mechanisms. One result of this knowledge is the development of agricultural biotechnology, but even without genetically modified organisms (GMOs), the genetic revolution will push out the frontier of agricultural productivity dramatically (Naylor and Manning 2005; FAO 2004;

Timmer 2003; Mew et al. 2003). Many of these productivity gains can be in developing countries, where they are needed most. In particular, there is a real opportunity to increase the productivity of many neglected and secondary crops that have been bypassed by mainstream agricultural research, concerned as it is with improving productivity in the main food staples such as rice, wheat, and corn. These "orphan" crops, such as millets, sorghums, cassava and other root crops, provide the main sustenance for millions of poor households, especially in Africa (Naylor, Falcon et al. 2004)

Second, even in poorer developing countries a supermarket revolution is transforming food retail markets, and the supply chains that provision them, at a faster pace than anyone imagined at the turn of the millennium (Reardon et al. 2003; Hu et al. 2004; Reardon and Timmer, forthcoming). There are important new opportunities for farmers in these countries to diversify out of low-value crops into new commodities with greater demand potential, and thus to capture some of the value-added being generated by supermarkets. The strict quality, safety, hygiene, and labor standards demanded by supermarkets are a severe challenge to the participation by small farmers and there is concern that rural poverty might worsen as supermarkets expand; on the other hand, connecting farmers more directly to changing consumer demand offers real hope as well.

Finally, the past decade has also seen a quiet revolution in the understanding of the determinants of poverty and the mechanisms for reducing it in a sustainable fashion. Part of this understanding is the recognition that economic growth is the main vehicle for reducing poverty; however, for this to work the distribution of income must not deteriorate too sharply. In many circumstances, growth in the agricultural sector has been an important ingredient in the formula that connects economic growth to the poor (Ravallion and Huppi 1991; Ravallion and Datt 1996; Ravallion and Chen 2004; Sumarto and Suryahadi 2003; Fan, Zhang and Zhang 2004; Fan, Thorat and Rao 2004; Timmer 1997, 2004a, 2005a).

Agriculture and Poverty Reduction

Earlier literature has stressed the direct impact of rising rural wages and incomes on poverty reduction. Most of the world's poor live in rural areas, or migrate from them in search of better opportunities. It seems almost obvious that growth in agricultural productivity is the surest way to end poverty. The historical evidence confirms this logic. Growth in agricultural productivity not only can increase farm incomes; it also stimulates linkages to the non-farm rural economy, causing economic growth and rapid poverty reduction, with overall growth multipliers almost always significantly greater than one (Hazell and Haggblade 1993).

Nonfarm linkages generated by technical change in agriculture can enhance both growth and its poverty-reducing effect. A growing agricultural sector demands nonfarm production inputs, and supplies raw materials to transport, processing, and marketing firms. Likewise, increases in farm incomes lead to greater demand for consumer goods and services. Besides stimulating national economic growth, these production and consumption linkages affect poverty and spatial growth patterns, particularly when agricultural growth is concentrated on small and medium-size farms (Johnston and Kilby, 1975; Mellor, 1976; and Mellor and Johnston, 1984). [Hazell and Haggblade 1993, p. 190]

But with more open trade possibilities, low prices for staple cereals in world markets, and population growth slowing, the size and relevance of these linkages are no longer so clear. Agriculture must be dynamic and profitable if it is to help reduce rural poverty, and growing staple cereals has not been a source of dynamism in rural economies for two decades. A profitable agriculture with rising productivity will now depend on diversification into crops and livestock with better demand prospects than for cereals, and into production for the agri-business sector, which can add value through processing and enhanced consumer appeal.

Rural Diversification as the Conceptual Framework

A sequence of progressively broader diversification steps defines a successful agricultural transformation (Timmer 1988). In countries where farm sizes are small and likely to remain that way for decades because of population pressures and insecure property rights, diversification from production of staple grains to higher-valued commodities will be the first step in this process. The next step will be to move beyond basic commodity production in order to access value-added supply chains for the modern retail sector, especially supermarkets, where the value-added comes in the form of quality, timeliness, food safety, and labor standards in production. These are highly management-intensive factors and may well contribute to economies of scale in production which are not seen in commodity production alone (Timmer 2004b; Reardon and Timmer, forthcoming).

The next step is the diversification of the rural economy itself, from being primarily driven by its agricultural base to depending more on industrial and service sectors as the base for rural economic growth. This step seems feasible only when population densities permit substantial clusters of activities that feed on themselves for inputs and demand for output (Hayami and Kawagoe 1993; Lanjouw and Lanjouw 2001). Thus the effectiveness of the model proposed by Mellor (1976 2000) – namely, that demand for labor-intensive, rural non-tradables be the vehicle for pro-poor growth, driven by agricultural profitability and wages from labor-intensive exports – appears conditional on good rural infrastructure and human capital, and hence seems to be limited to Asia, parts of coastal and highland Africa, and several countries in Latin America and the Caribbean. At the same time, good rural infrastructure reduces the relative importance of non-tradables in local economies and increases competitive pressures from world markets. It is precisely this tension that raises doubts about the future potential for agriculture to be an important driver in poverty reduction, even in rural areas (DfID 2004).

Where rural diversification is not economically feasible, the alternative to diversification out of agricultural commodity production will be the transition of economic activity from rural to urban areas. In this transition, the importance of migration (and remittances) will be critical. It is really quite astonishing how little attention is paid to facilitating the migration of rural workers to urban jobs when investments in the rural economy have low payoffs.[1] One of the main justifications for investing in rural schools and public health facilities is to improve the competitiveness of rural migrants to urban areas.

Whatever the stage or dimension of rural diversification, it must be driven by market demand. Since the 1970s, the development profession has identified "market demand" with border prices and international trade, on the assumption that domestic markets are saturated, politically manipulated, or not remunerative for producers of higher quality products. This focus on international trade has allowed a revolution in food marketing in developing countries – as manifested by the extensive consolidation of the food retail sector and the rapid rise of supermarkets – to go virtually unnoticed until several years ago. The revolution has already created a challenge to higher rural incomes because the process has a tendency to have such high standards for quality, safety, hygiene and farm labor practices that many of a country's own farmers are excluded from the supply chains that provision their consumers, even poor consumers (Reardon et al. 2003; Timmer 2004b).

In the ultimate stage of rural diversification, globalization permits procurement officers to source food supplies from anywhere in the world; local farmers thus compete not just against each other for local consumers, they compete against the global market. On the other hand, farmers will also have greater access to the global market if they are the low-cost producer meeting global standards. The future of agricultural development

[1] The penultimate draft of the World Bank's *Directions in Development: Agriculture and Poverty Reduction*, barely mentions the topic (World Bank 2004d).

will therefore depend on putting productive new technologies in the hands of farmers and creating an open market environment to make the resulting production as profitable to farmers as employment opportunities in other sectors. Where that development is not possible, and there will be many environments where it is not, rural poverty will only be solved by migration to alternative opportunities, usually in urban areas.

Where the strategy does work, diversifying the rural economy will be the key to increasing income opportunities. Placing rural diversification at the center of agricultural and rural development means there are two quite different tasks that need to be managed simultaneously, to wit: (a) raising the productivity of staple food crops for those farmers who continue to grow them; and (b) using the low costs of these staple foods as "fuel" for the agricultural diversification effort, including as the wage good for workers and as feed for livestock. In low-income Asia, diversification will depend on the continued availability of low-cost rice, especially in rural markets. In Africa and Latin America, having cheap corn, wheat, and rice available in rural markets will be important if diversification is to be successful. Low-cost staple foods are also important to the poor directly, because they devote such a large share of their budget to them, and indirectly, because low real wages, made possible by cheap food staples, make labor-intensive activities more profitable. Making substantial progress on both of these "rural" tasks will be among the most "pro-poor" things the development community can hope to accomplish between now and the target date for the Millennium Development Goals in 2015.

THE ROLE OF AGRICULTURE IN ECONOMIC DEVELOPMENT

The role of agriculture in economic development is complicated and controversial, despite a long historical literature examining the topic (Johnston and Mellor 1961; Hayami and Ruttan 1985; Timmer 2002). Part of the controversy stems from the structural transformation itself, which is a general equilibrium process not easily understood from within the agricultural sector (Timmer 1988). Over long historical periods, agriculture's role seems to have evolved through four basic stages, namely: the early "Mosher" stage when "getting agriculture moving" was the main policy objective (Mosher 1966); the "Johnston-Mellor" stage when agriculture contributed to economic growth through a variety of linkages (Johnston and Mellor 1961); the "T.W. Schultz" stage when rising agricultural incomes still fell behind those in a rapidly growing non-agricultural economy, inducing serious political tensions (Schultz 1978); and the "D. Gale Johnson" stage where labor and financial markets fully integrated the agricultural economy into the rest of the economy (Johnson 1997; Gardner 2002). These stages were first proposed in Timmer (1988) and are developed in the context of more recent experience in the World Bank's latest treatment of the role of agriculture in poverty reduction (World Bank 2004d). Efforts to "skip" the early stages and jump directly to a modern industrial economy have generally been a disaster.

Another reason for the controversy over the role of agriculture stems from the heterogeneity of agricultural endowments and the vastly different cropping systems seen in Latin America, Africa, and Asia (not to mention the diversity within these regions). It is unrealistic to expect much of a common role in such diverse settings. When coupled with the enormous differences in stage of development around the world, and hence the vastly different roles that agriculture plays in economies at different levels of economic maturity, it is easy to understand why there is so little common ground in academia or the donor community on the role of agriculture in economic development. Bravo-Ortega and Lederman (2004) document clearly the different contributions of agriculture to national welfare across these various categories.

There does seem to be widespread agreement in the literature on the basic linkages connecting agriculture and overall economic growth which were first articulated to a general economics audience by Lewis (1954) and Johnston-Mellor (1961). At a conceptual level, these linkages have long been part of the core of modern development theory and practice (Timmer 1988; 2002). Establishing the empirical value of these linkages in different settings has been a cottage industry

since the early 1970s (Byerlee 1973; Mellor and Lele 1973; King and Byerlee 1978; Hazell and Roell 1983; Haggblade, Hammer, and Hazell 1991; Hazell and Haggblade 1993; Timmer 1997; Delgado, Hopkins, and Kelly 1998; Fan, Hazell, and Thorat 2000; Fan, Zhang, and Zhang 2002; Fan, Thorat, and Rao 2004).

Virtually all of these studies conclude that the "agriculture multiplier" is significantly greater than one, especially in relatively closed, "non-tradable" economies of the sort found in rural Africa, where the multiplier is often between 2 and 3. But even in the more open economies of Asia, where rice was more tradable than most African staple foods and local prices more easily reflected border prices, the agriculture multiplier is close to 2 in the early stages of agricultural modernization when productivity gains are the fastest. Because economic growth usually has a direct impact on poverty, any contribution agriculture makes to speeding overall economic growth through these large multipliers will, in most circumstances, also directly contribute to reducing poverty (Dollar and Kraay 2002; World Bank 2004a).

Despite the potential impact of these large multipliers, a combination of market failures and political biases has led to a systematic undervaluation of output from rural economies. Correcting these biases can have economy-wide benefits. The historic bias against the rural sector in developing countries has left them starved for resources and discriminated against by macroeconomic and trade policies (Lipton 1977; Timmer 1993). Failures in rural credit and labor markets – some of which can cause "poverty traps" – have provided the analytical context for much of modern neoclassical development economics (Dasgupta 1993). But even global commodity markets for many products from developing countries "fail" in the sense that agricultural surpluses from rich countries are dumped there, depressing world market prices to levels below long-run costs of production.

A final set of linkages makes growth originating in the agricultural sector tend to be more "pro-poor" than it would be if the source of growth came from the industrial or service sectors (Mellor 1976; Ravallion and Datt 1996; Ravallion and Chen 2004; Timmer 1997, 2002). New agricultural technologies that improve farm productivity strengthen this connection. Separate reviews by Thirtle et al. (2004) and by Majid (2004) confirm the strong empirical link between higher agricultural productivity and poverty reduction.

Direct Contribution to Economic Growth via Lewis Linkages

The "Lewis Linkages" between agriculture and economic growth provide the non-agricultural sector with labor and capital freed up by higher productivity in the agricultural sector. These linkages work primarily through factor markets, but there is no suggestion that these markets work perfectly in the dualistic setting analyzed by Lewis (1954). Chenery and Syrquin (1975) argue that a major source of economic growth is the transfer of low-productivity labor from the rural to the urban sector. If labor markets worked perfectly, there would be few productivity gains from this structural transfer.

Indirect Contributions to Economic Growth via Johnston-Mellor Linkages

The "Johnston-Mellor Linkages" allow market-mediated, input-output interactions between the two sectors so that agriculture can contribute to economic development. These linkages are based on the agricultural sector supplying raw materials to industry, food for industrial workers, markets for industrial output, and the exports to earn foreign exchange needed to import capital goods (Johnston and Mellor 1961). Again, for the Johnston-Mellor linkages as with the Lewis linkages, it is difficult to see any significance for policy or economic growth unless some of the markets that serve these linkages are operating imperfectly (or, as with many risk markets, are missing altogether). That is, resource allocations must be out of equilibrium and face constraints and bottlenecks not immediately reflected in market prices if increases in agricultural output are to stimulate the rest of the economy at a rate that causes the "contribution" from agriculture to

be greater than the market value of the output, i.e., the agricultural income multiplier is greater than one (Timmer 1995).

Roundabout Contributions from Agriculture to Economic Growth

Writing in the mid-1960s, Mosher was able to assume that "getting agriculture moving" would have a high priority in national plans because of its "obvious" importance in feeding people and providing a spur to industrialization (Mosher 1966). That assumption has held only in parts of East and Southeast Asia, and has been badly off the mark in much of Africa and Latin America. In the latter regions, a historically prolonged and deep urban bias has led to a distorted pattern of investment. Too much public and private capital has been invested in urban areas and too little in rural areas. Too much capital has been held as liquid and non-productive investments that rural households used to manage risk. Too little capital has been invested in raising rural productivity.

Such distortions have resulted in strikingly different marginal productivities of capital in urban and rural areas. New growth strategies – such as those pursued in Indonesia after 1966, China after 1978, and Vietnam after 1989 – altered investment priorities in favor of rural growth and benefited from this disequilibrium in rates of return, at least initially. For example, in Indonesia from the mid-1960s to the mid-1990s, farm GDP per capita increased by nearly half, whereas it had declined from 1900 to the mid-1960s. In China, the increase from 1978 to 1994 was nearly 70 percent, whereas this measure had dropped by 20 percent between 1935 and 1978 (Prasada Rao, Maddison and Lee 2002). A switch in investment strategy and improved rates of return on capital has increased factor productivity (and farm income) because of greater efficiency in resource allocation.

The more rapid and pro-poor economic growth that occurs as urban bias is reduced may be explained by Mellor's model of agricultural growth, rural employment and poverty reduction which emphasizes the role of the rural non-tradables sector in pulling underemployed workers out of agriculture and into the non-agricultural rural economy. The Mellor model explicitly integrates the performance of manufactured exports (the source of much dynamism in East Asia's economies since the 1960s) and the non-tradables sector in the rural economy (which includes a wide array of local agro-processing) to account for the subsequent reductions in poverty. This model, drawing on Mellor's earlier work in India (Mellor 1976) and more recently in Egypt (Mellor 2000), explains why countries with substantial agricultural sectors that experienced rapid growth from labor-intensive manufactured exports had such good records of overall economic growth and poverty reduction.

An additional set of linkages focuses on the more nebulous and hard-to-measure connections between growth in agricultural productivity and growth in the rest of the economy. These linkages grow explicitly out of market failures, and, if they are quantitatively important, government interventions are required for the growth process to proceed as rapidly as possible. The contribution of agricultural growth to productivity growth in the non-agricultural economy stems from several sources, to wit: greater efficiency in decision-making as shown by rural enterprises claiming a larger share of output and higher productivity of industrial capital as urban bias is reduced; higher productivity of labor as nutritional standards are improved; and a link between agricultural profitability (as distinct from agricultural productivity) and household investments in rural human capital, which raises labor productivity as well as facilitates rural-urban migration.

Several of these mechanisms stand out as likely to be important (and potentially measurable) because they draw on the efficiency of decision-making in rural households, the low opportunity cost of their labor resources, the opportunity for farm investment without financial intermediaries, and the potential to earn high rates of return on public investments that correct for urban bias. Each of these factors alone, as public investments and favorable policy stimulate growth in the agricultural sector, should cause an increase in the efficiency of resource allocation. In combination, these mechanisms should translate faster agricultural growth into measurably faster economic growth in aggregate, after controlling

for the direct contribution of the agricultural sector to growth in GDP itself.

One of the most visible determinants of poverty is hunger and malnutrition. The development profession continues to argue over the causation – whether hunger causes poverty or vice versa – but hunger as a measure of poverty is widely established. Most poverty lines have an explicit or implicit food component. The evidence for nutritional poverty traps, where workers are too malnourished to work hard enough to feed themselves and their families, has strong historical roots (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 (Johnson 1997; Fox 2002). If inadequate food intake is the primary cause of poverty, the solution would be in sight (and food aid could be an important part of the answer). If, however, poverty is the main cause of inadequate food intake, hunger will be much harder to end. In most countries, the domestic agricultural sector is likely to play a key role in ending hunger (and the ready availability of food aid may well be part of the problem).

CONNECTING AGRICULTURE TO POVERTY REDUCTION: THE ASIAN EXPERIENCE

"Unity in Diversity," the national motto of Indonesia, aptly describes the Asian experience with agriculture and pro-poor growth. Despite enormous diversity in ecological settings, political histories, and economic policies, several common lessons emerge from a long-run review of Asian experience.

Four Country Studies, plus Other Asian Experiences

A close reading of the four Asian country studies for the pro-poor growth project of the World Bank (2004a) suggests three fundamentally different, and mostly inconsistent, stories about the role of agriculture in pro-poor growth. First, the Indian case study by Besley, Burgess and Esteve-Volart (BBEV 2004) argues, on the basis of an enormously rich data set and very sophisticated econometrics, that agriculture plays a minimal role at best in India's reduction of poverty. BBEV find that both the secondary and tertiary sectors contribute more to poverty reduction in the main Indian states than the primary sector, a result that directly contradicts earlier, and seminal, findings by Ravallion and Datt (1996).

Second, the Bangladesh case study (B. Sen, Mujeri and Shahabuddin 2004) and the Vietnam case study (Bonschab and Klump 2004) each argue that agriculture plays a large and crucial role in poverty reduction, but for highly idiosyncratic reasons based on unique initial conditions and domestic institutions. Agriculture is important to pro-poor growth in both countries, but that role cannot be generalized to other countries. Sen does argue that the general Bangladesh experience with economic growth and poverty reduction is relevant to other countries, including those in Africa, that are starting from extreme poverty and with few institutional resources, but Bangladesh's agricultural experience is unique to the ecological setting of the country.

Finally, the Indonesian case study (Timmer 2005b) argues that conscious policy stimulus to agriculture is the key to the country's 30-year record of rapid, pro-poor growth (from 1967 to 1997), and that the model of smallholder agricultural development used by Indonesia is quite general. The Indonesian model is explicitly set in the broader historical literature on the role of agriculture and economic development that has been generated by successful countries not burdened with highly skewed land distributions as a starting point for their development (Johnston and Mellor 1961; Johnston and Kilby 1975; Hayami and Ruttan 1985; Timmer 1988, 2002).

Unfortunately, broadening the perspective to the rest of Asia from just these four country studies, and to the longer historical record, does nothing to reconcile these three disparate interpretations of the role of agriculture in pro-poor growth. The Japanese example, long thought to be the early model of agriculture-led growth in Asia (Ohkawa 1965; Ohkawa, Johnston, and Kaneda 1969; Ohkawa and Rosovsky 1976) has been challenged by modern historians using

general equilibrium models to analyze sectoral relationships (Brandt 1993; van der Eng 1993). The result is that agriculture in post-Meiji Japan seems to have been more of a "hand-maiden" than the "engine" of economic growth, to borrow Irving Kravis's (1970) phrase.

Similarly, no clarification comes from the Korean or Taiwanese experience. Korea has long been held out as the counterexample to the important role of agriculture in economic development (Moon 1975; Ban, Moon, and Perkins 1980), with state-directed, export-led industrialization as the engine of growth and poverty reduction. Even the Taiwanese example, long cherished by agricultural development specialists as a model for rural-based poverty reduction (Oshima 1987; Lee 1971; Mellor 1976; Johnston and Kilby 1975; Ranis and Stewart 1987), has recently seen a surprising empirical rejection of that role. Warr (2003) can find no significant impact from agricultural growth on poverty reduction in Taiwan between the 1960s and the 1990s, whereas industrial growth emerges as a statistically significant and powerful driver of poverty reduction. This result is surprisingly similar to what BBEV (2004) report for India.

Finally, to add to the confusion, Ravallion and Chen (2004) report that nearly all of the remarkable reduction in poverty in China between 1980 and 2001 is the result of agricultural growth specifically, and diversified rural economic growth, more broadly. They can find very little impact from growth in urban industrial and service sectors on reductions in the headcount poverty index (or the poverty gap or squared poverty gap).

What are we to make of all this confusion? First, enforcing common data, definitions, and methodologies would help clarify the different cases considerably. For example, the panel data used by BBEV permit them to estimate a fixed-effects model that controls for state and year effects, a procedure not attempted in the other country studies. But much of the impact of agriculture on poverty is likely to be specific to states and years because of ecological endowments and annual variations in the monsoon. Removing these from the statistical discussion may be like throwing out the baby with the bathwater. Despite efforts to impose a common methodology on the country studies, it is difficult to compare them with respect to the impact of agriculture on pro-poor growth.

Second, looking beyond the "first-round" direct effects of agricultural growth on poverty reduction is crucial, because linkages and multipliers are both conceptually and empirically important in the imperfect market economies under investigation. Again, a common methodology and data structure would help enormously, especially if the careful study carried out by Fan, Thorat and Rao (2004) for India could be replicated for other Asian countries. Their dissection of the poverty impact of various agricultural investments and subsidies, disaggregated by decade from 1950 to 2000, shows clearly the mechanisms by which the multipliers work and, importantly, how their quantitative impact changes over time as the structure of the economy evolves. There is obviously no single answer to the question, "what is the size of the agricultural multiplier?"

Third, the key question is, "what would the Asian poverty record look like if these countries had ignored their agricultural sectors?" An alternative way to ask the question is "what would Asia look like now if it had followed African development strategies for the past three decades?" Posing the counterfactual in this fashion is rather sobering, for it suggests that the "agriculture does not matter" results are missing an important part of the historical story. Purging endogeneity from our econometric models and results, and concentrating analysis on only what we can measure with great precision, may also be throwing out much of what is important to the policy choices actually made by governments. The very ambitious analysis by Smith and Urey (2002) of the relationship between agricultural growth and poverty reduction in India since 1950 shows very clearly the important investments and policy attention to reaching India's rural poor through institutional and technical change in agriculture. This attention accorded to this sector before the Green Revolution established an environment in which the new technologies could have widespread impact on both the rural and urban poor.

Finally, asking about the role of agriculture in pro-poor growth seems to be asking the question in too narrow a fashion. All four of the country studies, and the Ravallion-Chen study of China,

note (sometimes, just in passing) that the rural non-farm economy has been (or in the case of Vietnam, could be) an important mechanism for connecting the poor to economic growth. It is here that the linkages among agricultural growth per se, overall economic growth, and the connection of the poor to that growth, become crucial, for most of these linkages are likely to be transmitted via the rural non-farm economy (and via changes in food prices, for economies that are not totally open to world markets or which might be "large" actors in those markets, such as the countries in Asia discussed here). The World Bank review (2004c) of the Bangladesh rural non-farm sector has an especially clear framework for understanding these linkages, and measuring their empirical relevance in Bangladesh. A similar review is just starting in Indonesia.

Still, the question for this paper is the role of agriculture in pro-poor growth, and it remains important to understand the answer because most government agencies, programs, statistical accounts, and donor assistance are organized by sector. Scientific research and technical change tend to be crop- and animal-specific, as the difficulty in improving complex cropping systems demonstrates. And, as will be argued below, it remains likely that the household incomes from a profitable agriculture, plus the market demands for inputs and output marketing and processing generated by these household enterprises, remain the "prime mover" of the overall rural economy until very late in the development process. At this point, tourism, industry, and high-value services relying on modern communications technology can be located anywhere.

THE ROLE OF THE STRUCTURAL TRANSFORMATION

Standing back from the wealth of detail available in the country studies and supporting documents listed in the bibliography, an "Asian" pattern of rural development and poverty reduction emerges. The common structure involves the evolution of the agricultural sector from a starting point of household subsistence production, through the adoption of new technologies that provide surpluses and rural food security, to more diversified farm activities driven by commercial forces, and finally to the full integration of the agricultural economy into the overall economy.

This structural pattern can be examined from two directions: first, from the perspective of the main policy concerns shown by Asian countries at each stage, and the links between these policy concerns and the key economic drivers and mechanisms for change. Asia may have been unique in its early concern for food security, including for rural households, as the main policy focus that has mobilized substantial resources on behalf of agriculture (Timmer 2005a). The importance of rice in Asian food security, and the tenuous (and tense) relationship between domestic rice economies and the world market for rice, has focused political and economic attention on agricultural productivity in ways not seen in other parts of the world.

For Asia, the Green Revolution technologies for wheat and rice transformed their potential for a domestic approach to food security. When this potential was fully realized, in Indonesia in the early 1980s, in India in the late 1980s, in Bangladesh in the early 1990s and in Vietnam in the mid-1990s, the policy concern turned to supporting farm incomes in the face of declining world prices for cereals. The "efficient" way to do this was through the next structural phase, namely, diversification and specialization, and Bangladesh seems to be moving in this direction. The more advanced regions in China are already well down this road. The alternative approach, however, is to maintain farm incomes by protecting the rice sector, using subsidies to keep inputs cheap, and thus to slow the diversification process. Both India and Indonesia are caught in this expensive and distortionary approach. It is impossible to move on to the stage of rapid productivity growth and integration into the overall economy as long as the diversification phase is postponed.

The second perspective on these structural changes is from the point of view of relations between the farm and rural non-farm sectors. None of the country papers spend much time on the rural non-farm sector, although the Indonesia paper stresses the importance of Mellor's model

of non-tradables production, mostly in rural areas, as the key to understanding the role of agriculture in pro-poor growth (Timmer 2005b, pp. 20-22). But the broader literature helps understand this role more clearly. In particular, there seems to be a structural transformation of enterprises in the rural non-farm sector that parallels that of agricultural enterprises, as they evolve from very small household-based enterprises into larger firms with "permanent" structures as the place of business. These permanent, rural non-farm enterprises were the fastest growing part of the Bangladesh economy in the 1990s (World Bank 2004c).

All of the Asian countries are having a very difficult time transitioning from the "food security" to the "farm income" and on to the "rural productivity" objective for public policy (Timmer 2005a). The difficulties are clearest in India and Indonesia, where the preferred policy mechanism is price protection and input subsidies, not diversification and commercialization. Similar pressures are evident in Bangladesh, Vietnam and China, but budget pressures and more successful diversification by the market have helped keep the structural retardation under control.

This retardation is seen most clearly in enterprise productivity in the rural non-farm sector. India and Indonesia are seriously lagging in this regard. China, because of its unique institutional history and experience with town and village enterprises (TVEs), seems to be in the vanguard of rural enterprise development. Bangladesh, because of sheer population density and shrinking agricultural land, is developing productive rural non-farm enterprises at a surprisingly rapid rate (World Bank 2004c). There is little information on the topic in the Vietnam paper, but it does suggest that rural non-farm enterprises should become the leading source of rural employment growth in that country. The problem until now has been the socialist planning legacy and restricted property rights for owners of non-farm rural enterprises. Accordingly, Vietnam has focused more on an urban growth pole model than on diversified rural enterprises. As a consequence, rural-to-urban migration is a much larger factor in the poverty reduction story in Vietnam than it seems to be in the other countries studied.

Much of India's problem stems from the "structure" of its support to the rural economy, i.e., from the relative size of subsidies compared with investments, especially in roads and agricultural research (Fan, Thorat and Rao 2004; World Bank 2004b). The political economy of agricultural subsidies in a democracy is well understood, but India is the poorest country to try them on such an extravagant scale. The cost is not just to the budget, although that is high enough. The larger costs seem to be to the agricultural transformation itself, and hence to the structural transformation, which is the only long-run hope for India's poor.

The other "large" common theme across the papers with respect to the role of agriculture in pro-poor growth is the impact of food prices on poverty. In India, Indonesia, and Bangladesh, the story is consistent and unambiguous. Higher productivity in the food crop sector, especially in domestic rice production, has led to relatively lower food prices in both rural and urban areas, with very substantial impact on the poor. The India and Bangladesh papers argue that this mechanism may have been the leading contribution of agriculture to pro-poor growth.

The impact of rice prices on the poor in Vietnam is more complex. Much of Vietnam's rapid poverty reduction was driven directly by higher incomes in rice-producing households, stimulated to a large extent by the realignment of the exchange rate and consequently greater price incentives for production and export. In some sense, Vietnam's reforms transformed rice from a non-tradable to a tradable commodity, with large gains in efficiency and output. But regions less suited to the rapid expansion of rice production, and the poor in urban areas, were probably hurt by this new economic environment. Bonschab and Klump (2004) argue that much of the widening in income inequality across regions is because of differential potential for rice exports.

The Chinese story seems to be radically different. Ravallion and Chen (2004) show that poverty rates fall dramatically when rural producer prices are higher, implying that most of the rural poor have their net incomes directly and positively affected by food prices. Because of the nature of the Chinese food marketing system however,

Ravallion and Chen argue that improving the terms of trade for farmers is equivalent to removing a tax on their incomes and does not actually have a direct impact on food prices for consumers. If this is the case, then the Chinese example also follows the more general pattern in Asia where lower food prices directly benefit the poor.

THE IMPORTANCE OF THE RURAL, NON-FARM ECONOMY

Even when comparing five of the largest countries in the world, all of them rice-based food economies in Asia (with apologies to the wheat farmers in Bangladesh, China, and India, and the maize farmers in poorer parts of most of these countries), it is striking how diverse they are, both at one time across countries and within a single country across time. This diversity extends to the role of agriculture in pro-poor growth, in three important ways.

First, the initial conditions and institutional settings for rapid gains in productivity varied enormously in the 1960s, when new rice and wheat technologies became available from the International Agricultural Research Centers (or from domestic centers in China). India had been investing heavily in irrigation, agricultural universities, land reform, and fertilizer production well before the Green Revolution, whereas Indonesia had virtually destroyed what little agricultural infrastructure remained when the Dutch were forced out. Bangladesh took over a decade to become a functioning country after independence in 1971. Vietnam was prone to famines before 1989 and imported rice to feed even its farm population. Opening its economy and stabilizing macro policy led to a surge in agriculture, but continued socialist controls on private ownership and market restrictions prevented a dynamic rural non-farm sector from emerging. Migration has become a leading source of poverty reduction in Vietnam. Despite the early success in China with TVEs, rural-to-urban migration has also been essential there to linking the poor to economic growth.

Second, despite all the temporal and cross-section diversity, a common pattern of structural transformation can be seen. The Asian experience shows clearly that this structural transformation is driven by a successful agricultural transformation. In turn, the investments in agriculture needed for this transformation, in both policy and financial terms, were driven by a deep political concern for food security (Timmer 2005a). The very integrity of the state was threatened by hunger and famine, whether in democratic India, autocratic Indonesia, or communist Vietnam or China (although the communist countries certainly held out longer in the face of hunger and famine than did the more open societies). This concern for food security drove the transition from subsistence agricultural to rural food surpluses, thus alleviating rural poverty directly, and overall poverty through lower real food prices.

Third, diversity returns again at the next stage. None of these five countries has yet managed a successful transition from rural food security to rural productivity through diversification and commercialization. Some countries are more successful than others, as parts of China, Bangladesh, and areas on Java are responding quickly to the economic signals pushing in this direction. But almost uniformly, policymakers are resisting this transition, apparently because they fear a loss of food security as measured by the relative volume of rice imports.

A reader from outside Asia, seeking lessons for Latin America or Africa from these five countries, would be excused for being totally confused. Gains in food crop production – stimulated by government investments, subsidies to inputs, and guaranteed output prices – had been the initial basis for pro-poor growth in all these countries. But now those same policy instruments are counterproductive both for growth and the poor. Agriculture needs to restructure into a diversified and commercialized sector that will have little direct impact on the poor, even through food prices. At this stage, especially in India and Indonesia, agriculture's main impact on poverty is more likely to come through its support for a dynamic rural non-farm economy, which will be a bridge for the rural poor to cross on their way to jobs in the formal economy.

This role does not show up in the econometric tests of agriculture's contribution to poverty reduction, for two reasons. First, this "new"

agriculture is still largely nascent, and hence does not appear in the statistical record very clearly. Second, the impact will be through the linkages and multipliers that have been hard to conceptualize, model and estimate, because they depend so crucially on local conditions and institutional context. That does not mean that the role of agriculture in pro-poor growth has diminished to the point of being irrelevant. It does mean that agriculture's role, as always, must be understood in the context of multi-sectoral and general equilibrium frameworks, not through a sectoral lens alone.

CONNECTING AGRICULTURE TO POVERTY REDUCTION: GENERAL LESSONS

In current strategies used by countries and donor agencies to cope with poverty, the role of agriculture has been limited, largely because of the failure to recognize the importance of direct links between agricultural development, food availability, caloric intake by the poor, and reduction in poverty. Part of the reduction in poverty is definitional because the poverty line is often measured in caloric terms. But raising the caloric intake of the poor has a positive effect on their well-being, work productivity, and investment in human capital. Empirical evidence provided by Paul Schultz (1993) and Fogel (1991) illustrates this importance, but a more general case can also be made.

The case builds on three empirical relationships: between agricultural growth and poverty alleviation; between increases in domestic food production and improvements in nutrient intake; and between agricultural productivity and productivity growth in the rest of the economy. It has long been established that, for a given level of income per capita, a higher share of GDP originating in agriculture contributes to a more equal distribution of income (Kuznets 1955; Chenery and Syrquin 1975). An agriculture-driven growth strategy, if it does not sacrifice aggregate growth, directs a greater share of income to the poor, i.e., it is more pro-poor. This is the essential first step in breaking the cycle of poverty.

Next, increases in domestically produced food supplies contribute directly to increases in average caloric intake per capita, after controlling for changes in income per capita, income distribution, and food prices (Timmer 1996). Countries with rapidly increasing food production have much better records of poverty alleviation, perhaps because of changes i.e., those not captured by aggregate statistics on incomes and prices – in the local economics of access to food. The most recent confirmation of this relationship is in Majid (2004). With the $1 per day headcount poverty rate from the ILO data set as the dependent variable, both the log of agricultural output per worker and the per capita food production index have a large and statistically significant impact on reducing poverty (controlling for per capita income and other standard variables).

Whatever the mechanisms, intensive campaigns to raise domestic food production through rural investments and rapid technical change, can be expected to have positive spillover effects on nutrient intake among the poor. This is the second step in breaking the cycle of poverty.

The third step is to ensure that these sectoral gains can be sustained without distorting the economy or destroying the environment. These dual goals can be achieved only if factor productivity increases for the entire economy. Eventually, growth in factor productivity must provide a substantial share of total growth in income per capita. When using its resource base efficiently, agriculture has a key role to play at this stage as well (Sarris 2001; Timmer 2005c).

Valuing the Poverty-Reducing Role of Agriculture

Agriculture has been seriously undervalued by both the public and private sectors in those societies in which poverty has remained untouched or even deepened. In addition to an urban bias in domestic policies, the root cause of this undervaluation is a set of market failures. Commodity prices, by not valuing reduced hunger or progress against poverty, often do not send signals with appropriate incentives to decision-makers. These inappropriate signals cause several problems, in addition to those noted above.

First, low values for agricultural commodities in the marketplace are reflected in low political

commitments. But political commitments to rural growth are needed to generate a more balanced political economy, with less urban bias than has been seen in most developing countries historically (Lipton 1977; 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 (although agricultural policies in most democracies make economists cringe).

The second problem with the low valuation of agricultural commodities is that rural labor is also undervalued. This weakens the link between urban and rural labor markets, which is often manifested 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 (Larson and Mundlak 1997).

Either way, the food security dimensions of rural-urban migration are clear. Urban markets become relatively more important in supplying the food needs of 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 policymakers and negotiators for the Doha Round of trade deliberations (Naylor and Falcon 1995; Tabor 2002; Elliott 2004). It is no accident that China, through its commitments upon entering the World Trade Organization (WTO), has decided to use world markets to provision a significant share of its basic food supply. The intent is to keep food costs low and stable and thus to provide a competitive advantage to its labor-intensive industries and producers of high-value agricultural commodities. China sees few income opportunities for small-scale producers of staple grains.

GETTING AGRICULTURE MOVING: WHAT WORKED?

There is no great secret to agricultural development. Mosher (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 complicated agricultural development and made it country-specific. The mechanisms for both technology development and provision of rural price incentives are no longer as clear as they were in the 1960s (DfID 2004). The Consultative Group for International Agricultural Research (CGIAR), the manager of such centers as the International Rice Research Institute (IRRI) in the Philippines, has produced many breakthroughs for the world's staple grains. But core funding for the system has been falling for nearly two decades as the market prices of these crops have dropped to historic lows, under the weight of productivity gains in developing countries and government-subsidized crop surpluses in rich countries.

The Basics of Agricultural Development

History does provide general insights into 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 both internal and external trade should generate a level playing field for producers and consumers alike. The need to keep these barriers low is one of the major arguments against interventionist price policies for staple foods, even when a case can be made on the basis of protecting the poor or stabilizing the economy (Timmer and Dawe 2005).

Price support and stabilization programs were ubiquitous throughout Asia during the drive to adopt "green revolution" technologies (Timmer 1991, 2005a; Dorward et al. 2004). Their continued role is questionable, however, as world rice markets are now just as stable as wheat and maize markets, and the institutional mechanisms used to implement these programs, especially parastatals with monopoly control of grain markets, have become hopelessly corrupt and ineffective (Cummings and Gulati 2004). Thus the modern judgment is that just two basic components make up the essentials of "good economic governance" that underpin modern economic growth – sound macro economic policy and an open trade policy.[2] Agricultural development strategies must work within this "neutral" policy framework.

What remains after this? The externalities from rural growth outlined above argue for a significant public role in funding agricultural research and rural infrastructure, including rural schools and public health clinics. A competitive exchange rate will tend to keep rural tradables profitable, but investments to keep marketing competitive, especially through provision of timely market information, and to lower transactions costs in local and regional markets, will enhance this profitability. In most rural environments, irrigation facilities and electrification will have a strong public component. But macro economists note that these investment funds come at high opportunity costs to other sectors, or because of the distortions caused by public taxation; therefore, providing clear benefit-cost justifications for their utilization will be important, and hence the concern for accurately valuing agricultural output.

Research and Technology

No country has successfully transformed its agricultural sector and established strong rural-urban links to economic growth without sharply improving the level of technology used on its farms. From the "agricultural revolution" in 18th century England that fueled the first Industrial Revolution, to the "green revolution" that stimulated Asia's "economic miracle," new crop and livestock technologies have raised yields and generated rapid growth in total factor productivity in rural areas (Timmer 1969, 2005; Mundlak 2000). Modern science has increasingly been the source of these crop and livestock technologies. As the skills and financial infrastructure needed to develop this science and apply it to agricultural problems outpace their availability in many poor countries, the importance of supporting basic research at international centers – as a global public good – becomes stronger (Pardey and Beintema 2001).

But equally important is the adaptive research in national research centers that translates the basic agricultural science from the international centers into locally adapted plants and animals (Hayami and Ruttan 1985). Funding for these national centers has been under pressure for the past two decades, as budgets have more or less followed world commodity prices on their downward track (see Box 1). And completely unanswered at this point is the role biotechnology and genetically modified organisms (GMOs) might play in raising agricultural productivity in poor countries (Naylor and Manning 2005; FAO 2004; Timmer 2003; World Bank 2004d). Part of this role is likely to be in the development of more productive germplasm for the so-called "orphan crops" that provide the bulk of staple foods for many poor households, especially in Africa and the highland areas of Latin America (Naylor, Falcon et al. 2004).

[2] The country case studies for "operationalizing pro-poor growth" show how difficult it has been to have a growth-oriented macro policy, especially in the context of the Dutch Disease (Cord 2004).

Box 1: Top scientific journals call for more public funding of rice research

The leading scientific journals *Nature* and *Science* have both published calls urging renewed financial support for the Philippines-based International Rice Research Institute (IRRI).

"Despite rumors to the contrary, the role of the International Rice Research Institute is as important as ever," begins the editorial in the 1 May issue of *Nature* (Vol. 423) entitled Rice institute needs strong support. However, it adds, "In the three years from 2001 to 2003, IRRI's core funding dropped by 26%, and similar cuts are expected in the future." …

In the same week, the 2 May issue of *Science* (Vol. 300) ran a broader look at the Green Revolution and the role played by IRRI and the other 15 international agricultural research centers (IARCS) in the Consultative Group on International Agricultural Research. In summarizing the findings of their book *Assessing the impact of the Green Revolution, 1960 to 2000*, R. E. Evenson and D. Gollin wrote that "the IARCS will have an important role to play in generating and sustaining future advances in agricultural technology for the developing world."

The *Science* authors add, "The budgets of many IARCS, not to mention many of their national program counterparts, have declined sharply in real terms over the past decade." This has come about, the authors surmise, in part because development agencies, "perhaps eager to find shortcuts to development, have tended to shift funding away from agricultural research and toward other priorities."

Press Release from IRRI, May 2003

From Agricultural to Rural Development

Once all these elements are in place as the basis for profitable farming, policy attention and budget priorities should turn to the rural non-tradables sector. Part of the profitability for this sector will come from a labor-intensive export sector that is successfully linked into the global economy, and in many countries this will include the agri-business sector. 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.

The rural non-farm sector is usually the bridge between commodity-based agriculture – which is often on a "treadmill" between rising productivity and falling prices (Gardner 2002) – and livelihoods earned in the modern industrial and service sectors in urban centers. Throughout Asia, most rural households earn half or more of their incomes from non-farm sources, and often this sector is the "ladder" from underemployment at farm tasks to regular wage employment in the local economy, and from there to jobs in the formal sector (Mellor 2000; Delgado, Hopkins, and Kelly 1998).

What Role for Rural Finance?

A certain enthusiasm has grown over the past decade for market-based rural finance initiatives that circumvent the problems faced by earlier efforts to provide subsidized credit to small farmers so they could adopt modern technologies (Morduch 1999). By tapping the knowledge of local villagers of each other's capacities for repayment of loans, grassroots microfinance operations have been widely established to provide vehicles for risk management and household savings. Unfortunately, there is no significant evidence that these operations actually contribute to economic growth. Somewhat more surprising, the evidence is thin that such schemes actually reduce poverty in a sustainable fashion (Zeller and Meyer 2002).

What does seem to work, but which is much more difficult to implement, is a formal system of rural-urban financial intermediation that

improves factor mobility. Linking small, rural, local savings to investment opportunities outside the rural economy is arguably an important way to help households maximize returns on their capital, create incentives to save, and smooth the flow of resources out of agriculture as part of the structural transformation. Establishing these linkages, however, requires reasonably large financial institutions, able to establish branch offices in rural areas and tap modern financial instruments in urban areas. Such institutions tend not to spring up from rural roots.

WHY IS THIS SO HARD (NOW)?

Creating a dynamic and efficient agriculture was never easy, but policymakers in the 1960s and 1970s had significant advantages over those in the 1980s and 1990s in creating the right environment for both public and private investments in their rural economies.[3] The differences fall into four basic categories: (1) "new" and more difficult initial conditions confronting policymakers; (2) rising opposition from rich countries, both in the form of protection of their own farmers and concerns over losing their export markets; (3) a relatively stagnant shelf of available agricultural technologies that could be easily borrowed and widely adopted by farmers; and (4) donors who have been distracted from their core mission by development faddism and pressures from "single-issue" interest groups.

DfID (2004) characterizes the same issues into two camps, namely, the "smallholder optimists" and the "smallholder pessimists". The debate between the two camps is sharp:

> There is probably less of a consensus now – particularly amongst development agencies – on the best (in terms of impact on poverty and hunger) agricultural development strategy than at any time over the last half-century or longer (Ashley and Maxwell, 2001). This is particularly true of Africa, where an unsuccessful model based on improving performance through technology supported by publicly owned development agencies has been replaced by the equally disappointing response of farmers to the liberalization of markets. (DfID, 2004, p. 19)

The smallholder pessimists, such as Maxwell (2004), argue that small-scale agriculture is becoming increasingly uncompetitive in the face of the revolution in supply chains and globalization of food trade. The smallholder optimists, on the other hand, led by Lipton (2004) and scholars at IFPRI, hold that the historic relationships between agriculture and economic growth still hold, especially in Africa where smallholders are "protected" by high transportation costs and the cultivation of many non-tradable food commodities. Naturally, the policy conclusions of the two camps are totally different, and depend fundamentally on whether it is possible to skip the stage of agricultural modernization in the structural transformation.

"New" Initial Conditions

The initial success of the Green Revolution, and from it of agriculture as the engine of pro-poor economic growth, was in East and Southeast Asia. Despite difficult initial conditions in the minds of many – heavy population pressures against available arable land, poorly educated and overwhelmingly rural populations, with widespread and deep poverty – these turned out to be precisely the initial conditions that made investments in new agricultural technology and rural infrastructure highly profitable. The remaining poor countries in Africa and Central Asia face low population densities in their low

[3] A similar interpretation of the problems facing policymakers in developing countries in the 1960s and 1970s, versus the problems facing policymakers now, is in Dorward, Kydd, Morison and Urey (2004). They stress the sharply different attitudes among the donors now toward governmental interventions in support of agricultural development, and are perhaps less concerned about the widespread governmental failures in those efforts. This paper is more concerned about the origins of these donor attitudes in the policies of the rich countries and their concern to protect their own farmers. In the end, we have very similar policy conclusions.

productivity areas, and hence building rural infrastructure to raise productivity in these areas is prohibitively expensive.

Second, the real prices of agricultural commodities are now very low in historical terms, thus making it difficult to justify investments whose payoff will be the increased production of exactly these low-valued commodities. The real price of rice in world markets has dropped from $1000 per metric ton to $200 per metric ton in the past quarter century, and many other agricultural commodity prices have followed a similar trend (Dawe 2001, 2002; World Bank 2004d). With average farm size decreasing in most countries due to population growth, finding a technology package and farm-gate price that will increase farm household incomes above the poverty line is more than five times harder now than in the mid-1970s.

Third, the easy investments in hospitable environments, especially for irrigation infrastructure, have mostly been made. In the same fashion, high-yielding seed technology for widely uniform planting environments has been developed. What remains are the more distant, more difficult, and less productive agricultural settings that have been bypassed by the mainstream of the Green Revolution. To add to the difficulties, the world now has more concern for environmental degradation, whether from expanding cultivated area into tropical rain forests, upstream and downstream impacts from construction of large dams, or simply the impact on fragile ecosystems of highly intensive cropping systems. These environmental concerns have substantially raised the barrier to any large-scale investment in raising agricultural output, at least with donor financing.

In combination, the initial conditions facing the currently poorest countries (and regions), precisely those bypassed by the first Green Revolution, are far more difficult than those facing the successful countries in East and Southeast Asia. The obvious question, but one without an obvious answer, is whether agricultural development is now simply too expensive, or too controversial, to pursue as the engine of pro-poor growth, even for those countries where the vast majority of the poor are farmers.

Opposition from Rich Countries

Increasingly, the rich countries are becoming part of the problem rather than part of the solution. Agricultural protection in the OECD countries remains very high, despite agreements at the Uruguay Round of trade negotiations that brought agriculture within the purview of the WTO. This protection has two pernicious effects. First, by maintaining production levels well above those that would be profitable without the subsidies and protection, global supplies are increased and world prices are lowered. The actual consequences for developing countries are mixed and controversial, as a number of countries protect themselves against these "unfair" prices. It is entirely possible that farmers and consumers in Indonesia, for example, might face lower rice prices after market liberalization because of the high protection provided now.

Second, and perhaps more important, the rich countries have reserved an increasing share of world agricultural consumption for their own protected farmers. The share of rich countries in agricultural exports has actually increased significantly in the past 30 years, contradicting everything economists think they know about comparative advantage and the structural transformation. This would simply not have been possible without the massive subsidies the rich countries devote to their farmers. The impact, of course, is to take market share away from the world's poorest farmers.

There is also a disconcerting concern in the legislatures of some rich countries, and especially in the United States, that successful agricultural development in poor countries will impair the export markets for agricultural products from rich countries. This concern is manifest in legislative directives that prohibit USAID, for example, from helping poor countries develop their soybean, sugar, or orange industries. It is manifest in the continued insistence that food aid is "development assistance", despite overwhelming evidence that food aid usually distorts market incentives for local farmers (Oxfam 2002). Cash transfers of even half the nominal value of the food aid would almost certainly do more good.

Efforts have been made over the years to build the case that agricultural development is the necessary first step from which overall economic development is built, and that richer countries quickly graduate from being aid recipients to growing commercial markets for agricultural exports. That case has strong historical precedents, and there can be little doubt that national welfare in both poor- and rich-country trading partners rises with economic growth in the poor country. But individual commodity producers in rich countries can lose in this process, and they can be powerful advocates for restrictions on how development assistance is delivered to poor countries, if the result would be to jeopardize their market access. By thwarting public-sector support for agricultural development by the rich donors, these commodity interests are also thwarting more rapid economic growth and poverty reduction.

Stagnant Technology and Much More Complicated Problems

Modern science and technology have wrought revolution after revolution in agriculture, resulting in crop yields and labor productivity so high in advanced countries that farmers are routinely paid to curb their abundance (Hayami and Ruttan 1985; Johnson 1997). The Green Revolution technologies that emerged from the CGIAR system in the 1960s provided a stimulus not just to the agricultural economies of the Asian countries able to utilize the fertilizer-responsive varieties of wheat and rice, but to pro-poor economic growth throughout the region.

But two problems loom increasingly large. First, cereal technologies for the most advanced agro-economic zones have been stagnant for a decade, and unless modern genetic technologies are brought to bear on the problem, there is little promise of a radical breakthrough in the visible future (Pingali et al. 1997). This has caused DfID to raise the following questions:

> Few doubt that achieving the MDG of halving the number of people living in absolute poverty by 2015 will require a significant improvement in agricultural performance, particularly in Africa. But in looking at the future and the likelihood of this being achieved, differences of opinion emerge around two key questions:[4]
>
> 1. Do the conditions exist for agricultural productivity to be increased where it is most needed and what part, if any, can small-scale agriculture play in achieving this?
> 2. Given quite fundamental differences in context between Asia in the Green Revolution and today's poorest countries, will the historical relationship between agricultural growth and poverty reduction continue to hold true?

Second, Africa's cropping systems and (lack of) water control make agricultural research complicated and expensive. There are few uniform tracts of mono-cropped cereals, with good water control and easy access to commercial inputs such as fertilizer, precisely the circumstances that made the Green Revolution feasible in Asia. The harsh environment, both agronomically and commercially, is one reason for the complex cropping systems and risk-averse behavior. But such cropping systems are notoriously hard to improve, because standard research methodologies seek to control all variables but the one under investigation. There are just too many variables for this approach to work very effectively in most African agricultural settings.

There have been successes (Wiggins 2000). Hybrid maize and sorghum work well in Africa when appropriate inputs are available, and markets are available for the surpluses produced. High-value crops such as green beans and flowers are

[4] In comments on an earlier draft of this paper, Derek Byerlee took strong exception to the argument that technology for basic food grains has been stagnant for a decade, or that future productivity gains are highly questionable. But grain yields in Asia and Africa have been flat since the early 1990s (DfID, 2004, p. 8) and the highest yielding experimental varieties at IRRI are no more productive than a decade ago. Still, there are many opportunities for farmers to increase cereal yields through better management practices, even if the genetic potential of their seeds is not rising steadily.

exported successfully to Europe. A number of tree crops thrive when infrastructure is available and border prices reach farmers. But the overall trend in food production per capita has been negative for two decades and there is little prospect of reversing that trend without massive investment in rural infrastructure and specialized agricultural research, neither of which seem to be on government or donor agendas. Adrian Wood, the Chief Economist for DfID, has painted a picture of an African continent "hollowed out," with most populations in the interior moving to the coasts, where they can be fed easily with imported food, and where access to ports and economies of scale in manufacturing might make the sector more competitive (Wood 2002). That is not exactly a picture of pro-poor growth led by agriculture.

Distracted Donors and Development Faddism

Development assistance is under challenge in most western societies. One set of critics argues that the funding levels are inadequate – Western European leaders are pushing for a doubling of official development assistance (ODA). In the United States, there is widespread doubt that development assistance works at all (Easterly 2004). Analysts in the World Bank have been working hard to sort out what works and what does not. Their answer, perhaps not surprisingly, is that despite mistakes in the past, the donors in general and the World Bank in particular now know how to help poor countries get on a sustainable development path. More money, they argue, can be used very productively (Collier 2002; Sachs 2005).[5]

The goals and mechanisms of development assistance have broadened considerably since the field was founded in the 1950s. From an early emphasis on growth in gross domestic product (GDP) and containing communism, the mandate of most development agencies, and especially that of USAID, grew to include, among many other things, reductions in poverty, improvements in child health, gender equity, environmental sustainability, transition to market economies, and democratization.[6]

In the early 1990s, Brian Atwood tried to sharpen USAID's increasingly blurred focus by withdrawing the Agency from its economic growth agenda and emphasizing several themes of great interest to Congress: short-run humanitarian assistance, especially food aid; health care, especially child survival and family planning programs; environmental sustainability, especially the development of agricultural technology for poor farmers, including women, working in fragile ecosystems; and gender issues, more broadly. As the challenges and opportunities presented by the collapse of communism in the former Soviet Union became apparent, democratization was added as a USAID objective.

Somehow lost in the multiple agendas and donor efforts to program effectively in the face of developmental complexity was the need for poor countries to have growing economies as the only sustainable solution to all of their broader problems. To turn on its head the title of Paul

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[5] The debate over the impact of foreign assistance has been played out recently in a series of econometric exercises that purport to show the impact, or lack thereof, of foreign assistance on economic growth in recipient countries. The current standard in this debate is Clemens, Radelet and Bhivnani (2004), who show that aid with expected impact in the "short-term," i.e. within the four-year horizon of their panel data, does indeed have a large, robust, and highly significant impact on economic growth. This short-term aid makes up about 45 percent of total aid, with another 45 percent devoted to "long-term" assistance, and 10 percent devoted to emergency and humanitarian assistance. Neither of the latter two components have a statistically significant impact on growth. Clemens, Radelet and Bhivnani also provide an extensive review of the theoretical and empirical literature leading up to their work.

[6] Many institutions involved in development activities saw similar broadening of agendas. The Development Advisory Service (DAS), founded by Harvard University in the early 1960s to help poor countries prepare economic development plans, expanded its scope in 1975 to become the Harvard Institute for International Development (HIID). New activities in health, education, and rural development were integrated into the Institute's traditional core of macroeconomists. The University's program on Women in Development was housed in HIID. An environmental program started in the late 1970s with the arrival of Theo Panayotou. Both in academia and government, development came to be seen as a multifaceted and complex process. This progress came at a cost, however. Focus was lost as agendas multiplied. Harvard closed HIID in 1999, arguing that it was managerially too complex for an academic institution.

Streeten's famous book on meeting basic needs, "first things first" means re-establishing economic growth as the foundation of development (Streeten 1986). The review by the Economist (2004) of Sebastian Mallaby's recent book (2004) on James Wolfenson and the World Bank notes this lack of focus at the Bank and attributes it to too many "one issue" voices that Wolfenson, the Bank, and the rest of the donor community, were listening to in an effort to be open and transparent to their critics. The Economist's criticism of Wolfenson is telling:

> Trying to placate the Bank's critics seemed a good idea at the time, and he has managed to build constructive relationships with the more grown-up NGOs, such as OXFAM. Yet most pressure groups "do not have an off switch," as Mr. Mallaby puts it. Nothing the Bank does will ever satisfy them, but by attaching some of the conditions that they demand to its loans, the World Bank makes those loans unattractive, despite their cheapness, to the more credit-worthy countries, such as Brazil, South Africa and China... Every infrastructure project the Bank funds must meet rich-world standards: nothing pretty may be bulldozed unless strictly necessary, and no worker may be asked to do anything that a Californian might find demeaning. As a result, fewer dams, roads and flood barriers are built in poor countries. More poor people stay poor, live in darkness and die younger (Economist, 2004, p. 99).

Partly because so many new topics are on the development agenda, and partly because there is no accepted core of development theory and only hotly contested empirical "truths," faddism has long dominated donor thinking about the appropriate development strategy. From community development in the 1950s, to import substitution in the 1960s, to reaching the poorest of the poor in the 1970s, to structural adjustment in the 1980s, to sustainable development in the 1990s, and back to community development now (in the name of "community-driven development), the search for something "new" as the answer to poverty has actually impeded the implementation of core strategies that focus on sound governance, effective macroeconomic management, and a reliance on sustained public support for private markets.

From the point of view of enhancing pro-poor growth in developing countries – that is, linking the poor to rapid economic growth – leaders of donor agencies and managers of the global economy missed three opportunities 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 visible action (Timmer 2005a).

Second, subsidies to farmers in rich countries remain extremely large, despite promises made at the Uruguay Round to reduce them significantly. 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, thus 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. Official development assistance is only one quarter of this total, and very little of it goes to rural economies. It is not a fair trade.

Third, the Cold War took a terrible toll on good governance. If we now recognize how important good economic governance is to the foundations of economic development, we are just coming to realize how the willingness of governments in the West to do business with any government ostensibly in the anti-communist camp undermined those institutional foundations. Many decades have been lost in the creation of sound economic governance and they cannot be recaptured overnight. Impatience on the part of donors will not help, and it may well impede progress.

WHAT SHOULD DONORS DO?

It would be folly, or at least presumptuous, to offer detailed recommendations on what donors, and especially the World Bank, should do to revitalize the agricultural and rural economies of the poorest countries, and to hook these economies to a broader base of pro-poor growth. The "optimism" and "pessimism" camps identified in the DfID (2004) report have starkly different policy implications, for example. But there are six tasks that are pretty obvious and need to be done, whichever perspective is right, and it is appropriate to list them here. Developing them into country programs will be, well, country-specific. But these tasks need to be done across the board.

The Obvious Steps

First, focus on the priority: economic growth that reaches the poor.

Second, invest in rural health and education, to enhance both productivity and mobility.

Third, make rural-to-urban migration easier when rural development is too expensive.

Fourth, push hard on global trade reforms to make agriculture more profitable for developing countries. This will benefit both developed and developing countries.

Fifth, make major investments in agricultural science and technology at both the global and national levels. The historic rates of return on these investments have typically been three to four times the opportunity cost of capital. The failure to invest more is one of the great public failures of our time. Raising the productivity of "orphan crops" may have especially high payoff for the poor.

Finally, develop local financing and planning mechanisms for investments in rural infrastructure. With political decentralization a reality in most developing countries, this is where the action will be in terms of investments that reach farm households.

The "Optimists" versus the "Pessimists"

Beyond these general recommendations, it seems likely that some countries probably offer hope along the optimists' line of reasoning, and some fall into the pessimists' camp. Again, which is which will be country- or at least, region-specific. But it is useful to summarize the conclusions that the DfID (2004) report offers in terms of policy approaches for each setting.

These are very different views of the world. It seems unlikely that either the optimists or the pessimists are always right in all circumstances. But admitting that the pessimists are likely to be right some of the time in some countries places the onus on supporters of agricultural-led, pro-poor growth to show that it is feasible and efficient. History has been a powerful backer of

Role for	Optimists	Pessimists
Rural human capital	Yes, for productivity impact	Yes, for flexibility of exit
Rural infrastructure	Yes, for input and output markets	Mostly wasted
Agricultural research	Yes, to raise yields and lower food costs	Private sector activity for specialized supply chains
Targeted safety nets	A productive rural economy provides this	Active government role to cushion transition to urban areas
Input subsidies	Needed to induce adoption of new technologies	Wasted
Price guarantees/stability	Needed to maintain producer incentives and food security	Difficult to implement within WTO rules

this argument, but times have changed and the argument continues to need careful analytical and empirical support.

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Determinants of Crop Choices by Bangladeshi Farmers: A Bivariate Probit Analysis

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ABSTRACT

Using a bivariate probit model, the study jointly determines the factors underlying the probability of Bangladeshi farmers adopting a diversified cropping system and/or modern rice technology. Results reveal that the availability of irrigation is the single most important determinant of the decision to adopt modern rice technology, and adoption is higher among the tenant farmers. The exact opposite is true for the likelihood of adopting a diversified cropping system, which is significantly higher in areas with no irrigation as well as among the owner- operators. Furthermore, the diversified cropping system has a significantly higher rate of adoption in regions with developed infrastructure. Farmers' education, farming experience, farm asset ownership, and non-agricultural income all positively influence crop diversification. Also, small farmers are more likely to adopt a diversified cropping system. Significant regional variation exists in the level of crop diversification as well. The decision to adopt a diversified cropping system and/or modern rice technology is significantly correlated, implying that a univariate analysis of such decision is biased. Crop diversification can be promoted by investing in farmers' education as well as rural infrastructure development. Also, land reform policies focusing on delegating land ownership to landless and marginal farmers, and tenurial reforms are noteworthy.

INTRODUCTION

The economy of Bangladesh is largely dependent on agriculture. Although rice production dominates the farming system of Bangladesh, accounting for 70% of gross cropped area (Bangladesh Bureau of Statistics [BBS] 2001), several other crops are also grown in conjunction with rice in order to fulfill a dual role of meeting subsistence as well as cash needs. Since the beginning of the 1960s, Bangladesh has pursued a policy of rapid technological progress in agriculture, leading to the diffusion of a rice-based Green-Revolution technology package. As a result, farmers have concentrated on producing modern varieties of rice all year round covering three production seasons – namely, *Aus (*pre-monsoon), *Aman* (monsoon) and *Boro (*dry winter) – particularly in areas that are endowed with supplemental irrigation facilities. This has raised the concern that the loss of crop diversity would consequently lead to an unsustainable agricultural system. For example, Husain et al. (2001) noted that "the intensive monoculture of rice led to a displacement of land under low productive non-rice crops such as pulses, oilseeds, spices and