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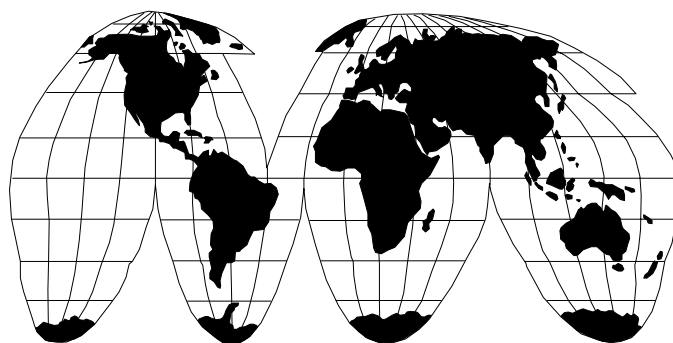
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Policy Reform, Market Stability, and Food Security

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The Macro Dimensions of Food Security: Economic Growth, Equitable Distribution, and Food Price Stability

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Famine and food security are at opposite ends of a spectrum. It is only in modern times that entire societies, as opposed to privileged members of those societies, have been able to escape from chronic hunger and the constant threat of famine (Fogel, 1989, 1991). Many countries in the developing world, especially in Africa and South Asia, have not managed this escape. In these countries, understanding the factors that cause widespread hunger and vulnerability to famines, and the mechanisms available to alleviate their impact, remain important intellectual challenges (Ravallion, 1987, 1998; Sen, 1981; Dreze and Sen, 1989).

There is a different way to pose the question, however. Rather than asking how to cope with hunger and famine, the question might be how to escape from their threat altogether. As Fogel has emphasized, this is a modern question that is only partly answered by the institutional and technological innovations that are at the heart of modern economic growth (Kuznets, 1966). Without these innovations, to be sure, the modern escape from hunger to food security would not have been possible. But the record of economic growth for the Third World since the 1950s shows that even in countries with relatively low levels of per capita income, government interventions to enhance food security can lift the threat of hunger and famine. The countries most successful at this task are in East and Southeast Asia, although the experience in South Asia has been instructive as well.

Food Security and the Escape from Hunger

That rich countries have little to fear from hunger is a simple consequence of Engel's Law; consumers have a substantial buffer of nonfood expenditures to rely on, even if food prices rise sharply. In a market economy, the rich do not starve. Wars, riots, hurricanes, and floods, for example, can disrupt the smooth functioning of markets, and all in their wake can perish. But rich *societies* usually have the means to prevent or alleviate such catastrophes, social or natural. Food security in such societies is simply part of a broader net of social securities.

Without the buffer of Engel's Law, consumers in poor countries are exposed to routine hunger and vulnerability to shocks that set off famines (Anderson and Roumasset, 1996). And yet, several poor countries have used public action to improve their food security.¹ The typical approach reduces the numbers of the population facing daily hunger by raising the incomes of the poor, while

¹ Defining food security is an exercise in itself, especially when both macro and micro dimensions are included in the definition. In a recent review, Simon Maxwell (1996) listed 32 (!) different definitions of the term used by various authors between 1975 and 1991. Each definition is sensible in some context. The goal of this essay is to understand the economic context in which food security is no longer a personal or a policy concern. Almost any definition that is intuitively plausible will do for that purpose.

simultaneously managing the food economy in ways that minimize the shocks that might trigger a famine. These countries, some of them quite poor, have managed the same "escape from hunger" that Fogel documents for Europe.

The main premise of this essay is that an early escape from hunger is not primarily the result of private decisions in response to free-market forces. Improved food security stems directly from a set of government policies that integrates the food economy into a development strategy that seeks rapid economic growth with improved income distribution (Timmer, et al., 1983). With such policies, countries in East and Southeast Asia offer evidence that poor countries can escape from hunger in two decades or less--that is, in the space of a single generation. Although two decades may seem an eternity to the hungry and those vulnerable to famine, it is roughly the same as the time between the first World Food Summit Conference in 1974 and the second one in 1996. Despite much well-meaning rhetoric at the earlier summit, including Henry Kissinger's pledge that no child would go to bed hungry by 1985, the failure to place food security in a framework of rural-oriented economic growth, in combination with policies to stabilize domestic food economies, meant that two decades have been wasted in many countries.

Food Security and Economic Analysis

The focus here is on food security as an objective of national policy. The emphasis is on food security at the "macro" level. At that level, policymakers have an opportunity to create the aggregate conditions in which households at the "micro" level can gain access to food on a reliable basis through self-motivated interactions with local markets and home resources. The perspective taken is, thus, primarily an economic one.

Surprisingly, however, recent literature on food systems and economic development makes such an *economic* assessment of food security a difficult task. Three bodies of literature are potentially relevant to an analysis of how countries can escape from hunger and provide food security for their citizens, and yet none addresses the topic directly.

First, there is a substantial literature on the achievement of rapid economic growth (World Bank, 1993; Lucas, 1988; Barro and Sala-i-Martin, 1994; Taylor, 1996). Export orientation and openness to trade tend to be the dominant policy issues in this literature. In none of this literature is food security even mentioned, and agriculture receives only passing notice. Both omissions are surprising in view of the historical links between agriculture and economic growth and the fact that no country has sustained rapid economic growth without first achieving food security at the macro level (Timmer, 1996b);

Second, agriculture is treated in the literature on rapid poverty alleviation through rural-oriented economic growth (Timmer, 1991, 1995, 1996a; Birdsall, Ross, and Sabot, 1995; Ravallion and Datt, 1996; Lipton, 1977; Mellor, 1976). But even though the agricultural sector and the rural economy are the focus of this literature, no connections are made to price stability or other dimensions of food security, and trade issues are largely ignored.

Third, there is a growing literature on stabilization of domestic food economies and the contribution of stability to economic growth (Bigman, 1985; Chisholm, 1982; Sarris, 1982; Newbery

and Stiglitz, 1981; Morduch, 1995; Timmer, 1989, 1996c; Dawe, 1996; Ramey and Ramey, 1995). But the stabilization literature is badly bifurcated into micro-based analyses of decision-maker response to risk (both consumers and producers) and macro-based assessments of the impact of instability, usually measured by rates of inflation, on economic growth. Virtually no analysis has been done to connect these two topics, which is surprising in view of the macroeconomic significance of the food sector in most developing countries. A further connection links food security to political stability, which is increasingly important as a factor influencing investment, including foreign direct investments and portfolio investments in these countries.

The Asian Approach to Food Security

Not surprisingly, food security strategies in Asia have been little influenced by this economic literature. The lack of influence stems from at least two factors. First, the dominance of rice in the diets of most Asians, coupled to the extreme price instability in the world market for rice, forced *all* Asian countries to buffer their domestic rice price from the world price. This clear violation of the border price paradigm and the accompanying restrictions on openness to trade seem to have escaped many advocates of the East Asian miracle, who saw the region's rapid growth as evidence in support of free trade (World Bank, 1993).

Second, most Asian governments have paid little attention to formal efforts to define food security as a prelude to government interventions that would be seen as their approach to "food security." Instead, the food security strategies of most countries in East and Southeast Asia have had two basic components, *neither* of which is specifically linked to any of the standard definitions of food security used by international agencies. The United States position paper for the 1996 World Food Conference, for example, uses one version of these standard definitions:

Food security exists when all people at all times have physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Food security has three dimensions:

 AVAILABILITY of sufficient quantities of food of appropriate quality, supplied through domestic production or imports;

 ACCESS by households and individuals to adequate resources to acquire appropriate foods for a nutritious diet; and

 UTILIZATION of food through adequate diet, water, sanitation, and health care.
(United States Department of Agriculture (USDA), 1996, p. 2)

This definition is obviously an ideal that no country could hope to reach in fact. By contrast, the Asian countries that have been most successful at providing food security to their citizens have based their strategies on two elements of their domestic food system over which they have some degree of policy control: the sectoral composition of income growth and food prices.

The rate and distribution of economic growth are primarily matters of macroeconomic and trade policy (once asset distributions are given as an initial condition). Although there is now widespread controversy over what role Asian governments played in stimulating growth and

channeling its distribution, there is no disagreement that high rates of savings and investment, coupled with high and sustained levels of capital productivity, in combination with massive investments in human capital, explain most of the rapid growth that occurred up to 1997 (World Bank, 1993). Growth that reached the poor was one component of the food security strategy.

In the second element of the strategy, Asian governments sought to stabilize food prices, in general, and rice prices, in particular. Engel's Law ensures that success in generating rapid economic growth that includes the poor is the *long-run* solution to food security. In the language of Dreze and Sen (1989), such economic growth provides "growth-mediated security." In the meantime, stabilization of food prices in Asia ensured that short-run fluctuations and shocks did not make the poor even more vulnerable to inadequate food intake than their low incomes required.

Economists are highly dubious that such stability is economically feasible or desirable. It is not a key element of the "support-led security" measures outlined by Dreze and Sen (1989). In a recent review of food security and the stochastic aspects of poverty, Anderson and Roumasset (1996) essentially dismiss efforts to stabilize food prices using government interventions:

Given the high costs of national price stabilization schemes (Newbery and Stiglitz, 1979, 1981; Behrman, 1984; Williams and Wright, 1991) and their effectiveness in stabilizing prices in rural areas, alternative policies decreasing local price instability need to be considered. The most cost-effective method for increasing price stability probably is to remove destabilizing government distortions. Government efforts to nationalize grain markets and to regulate prices across both space and time have the effect of eliminating the private marketing and storage sector. Rather than replacing private marketing, government efforts should be aimed at enhancing private markets through improving transportation, enforcing standards and measures in grain transactions, and implementing small-scale storage technology (Anderson and Roumasset, 1996, p. 62).

Although this condemnation of national price stabilization schemes might well be appropriate for much of the developing world, it badly misinterprets both the design and implementation of interventions to stabilize rice prices in East and Southeast Asia (Timmer, 1993, 1996c).

For food security in this region, the stabilization of domestic rice prices was in fact feasible in the context of an expanding role for an efficient private marketing sector. The resulting stability was not an impediment, but was probably conducive to economic growth. In addition, the stabilization scheme and economic growth had to work in tandem to achieve food security as quickly as possible.

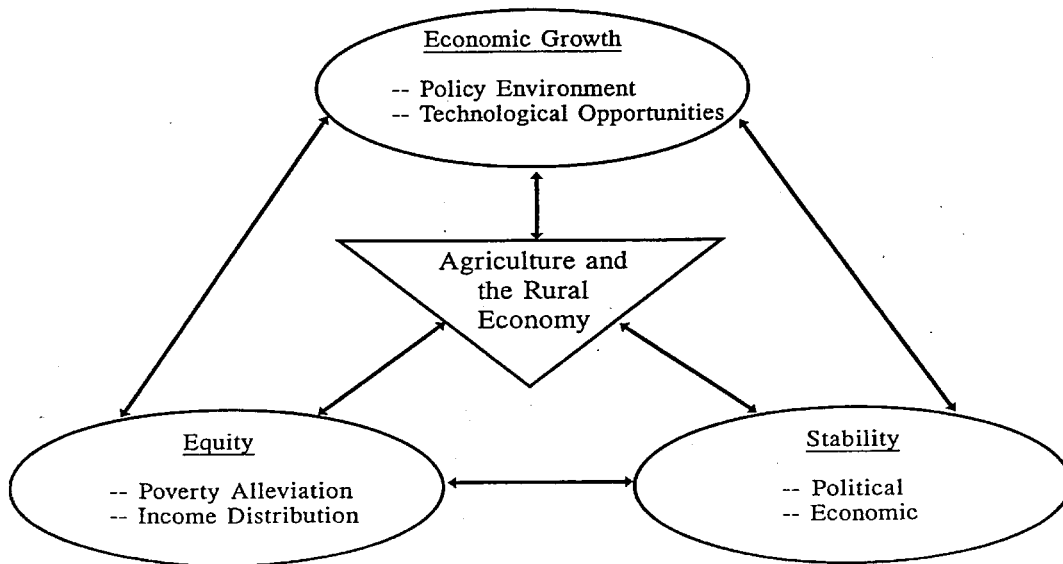
Both elements of the Asian strategic approach to food security--rapid economic growth and food price stability--address the "macro" dimensions of food security, not the "micro" dimensions found at and within the household. Governments can do *many* things to improve food security at the household and individual level, and most countries in East and Southeast Asia have programs to do so. Rural education accessible to females and the poor, family planning and child-care clinics in rural areas, nutrition education, and extension specialists helping to improve home gardens are just a few of the possibilities. Most of the literature on food security deals with approaches at this level, but problems of definition, measurement, project design, and management vastly complicate strategies that rely on household interventions (D. Maxwell, 1996).

The complications, in turn, sharply limit the number of households that can be reached with a micro approach. Without dismissing the potential effectiveness of these approaches to enhance food security in particular circumstances, it is still important to realize the scale of the problem. *Hundreds of millions* of people still do not have food security in Asia, and programs directed at households will not bring it. Only food security at the macro level can provide the appropriate facilitative environment for households to ensure their own food security.

Conceptualizing the Strategic Approach

Achieving food security through a "macro" strategic approach involves active development of the agricultural and rural economy to link and stimulate rapid economic growth, poverty alleviation, and stability (see Figure 1). In turn, each of these three elements is a primary input into food security at *both* the macro and micro levels.

Figure 1. The "Development Trilogy" and the Rural Economy



The mechanisms behind this strategic approach to food security are not well understood analytically or quantified empirically. The basic arguments, however, are straightforward. Improvements in agricultural productivity that are stimulated by government investment in rural infrastructure, agricultural research and extension, irrigation, and appropriate price incentives contribute *directly* to economic growth, poverty alleviation, and stability (Timmer, 1992, 1995).

For the large countries of Asia, investments to raise the productivity of domestic rice producers brought greater stability to the rice economy at the macro level, mostly because reliance on the world market was destabilizing in relation to domestic production. Expanded rice production

and greater purchasing power in rural areas, stimulated by the profitable rice economy, improved the stability of food intake of rural households.

The dynamic rural economy helped to reduce poverty quickly by inducing higher real wages. The combination of government investment, stable prices at incentive levels, and higher wages helped reduce the substantial degree of urban bias found in most development strategies (Lipton, 1977, 1993). Equity is nearly always enhanced when urban and rural areas compete equally for policy attention and resources.

Once the process of rapid growth is under way, political tensions are inevitably induced by a structural transformation that takes place too rapidly for resources to move smoothly from the rural to the urban sector (Anderson and Hayami, 1986; Timmer, 1993). The agricultural sector is less prone to these tensions if the gap between rural and urban incomes does not widen too much. All successfully growing countries have had to find ways to keep this gap from widening so much that it destabilizes the political economy and jeopardizes continued investment.

A third set of mechanisms connects growth in agricultural productivity with more rapid economic growth in the rest of the economy. An entire body of literature exists that analyzes the role of agriculture in economic growth (Johnston and Mellor, 1961; Eicher and Staats, 1990; Timmer, 1992, 1995). Specific linkages that have been identified in this literature work through the capital and labor markets, as analyzed by Lewis (1955); through product markets, as specified by Johnston and Mellor (1961); and through a variety of non-market connections that involve market failures and endogenous growth models (Timmer, 1995).

In turn, economic growth, poverty alleviation, and stability are linked to each other through the "virtuous circles" reviewed by Birdsall, Ross and Sabot (1995). Greater stability of the food economy contributes to faster economic growth by reducing signal extraction problems, lengthening the investment horizon, and reducing political instability (Ramey and Ramey, 1995; Dawe, 1996). In the other direction, stability contributes to equity and poverty alleviation by reducing the vulnerability of the poor to sudden shocks in food prices or availability. Greater equity also stimulates investment in human capital, especially in rural areas (Williamson, 1993; Birdsall, et al., 1995), thus speeding up economic growth.

One important outcome of the strategic approach illustrated in Figure 1 is the achievement of food security. This occurs when economic growth has raised the poor above a meaningful poverty line and when stabilization of the food economy prevents exogenous shocks from threatening their food intake. In this approach, food security is sustained by the productivity of the poor themselves, but this security continues to depend on public action to maintain a stable macro environment, including the food economy, as the precursor to that productivity.

Modeling the Strategic Approach

This strategic approach to food security can be understood more clearly if it is developed into a simple model of economic development. A framework borrowed from Reutlinger and Selowsky (1976) is used here to organize the discussion (see Figure 2). A calorie-income relationship,

illustrated in Panel A, is used to identify a "poverty line" and a "famine line" (World Bank, 1986, Annex A). The standard Engel relationship in panel A portrays a representative consumer or household whose income (Y) determines calorie intake (C) according to a semi-logarithmic function, conditional on food prices (P). When food prices are held at their "average" level (P^A), the relationship shows that individual i will be below the poverty line C^* when Y_i is below Y^* . A further reduction in income to Y^F would make the individual vulnerable to severe hunger. Famine would be widespread if individual i is representative of a broad class of individuals.²

Panel A illustrates what happens to individual i when there are exogenous shocks to the food system, shown as equally likely "good" shocks, when food prices are low (P^L), and "bad" shocks, when food prices are high (P^H). When prices are high, more income is required to stay above the poverty line or the famine line. Obviously, factors other than food prices might affect similar vulnerabilities in particular households: illness, death of a wage earner, an additional child, and so on. The framework here abstracts from such idiosyncratic shocks to focus on individual income (or household income, where unitary decision making makes that a sensible approach) or economy-wide shocks.

From Individual Behavior to National Aggregates

The translation from individual behavior to national indicators of poverty or vulnerability to famine is shown in Panel B of Figure 2, which displays the distribution of income for the society. The starting point for the discussion is $Y_0|D_0$, where average per capita income Y^A is distributed in a log linear fashion, with each income quintile having double the per capita income of the quintile below (see Table 1 for illustrative data). Such a distribution means the top quintile has a per capita income that is 16 times higher than the bottom quintile, a "poor" but not "bad" distribution of income. For comparison, Indonesia started its modern growth process in the late 1960s with a top 20/bottom 20 ratio of 7.5:1, whereas, in the 1970s, it was 15:1 in the Philippines and more than 30:1 in Brazil.

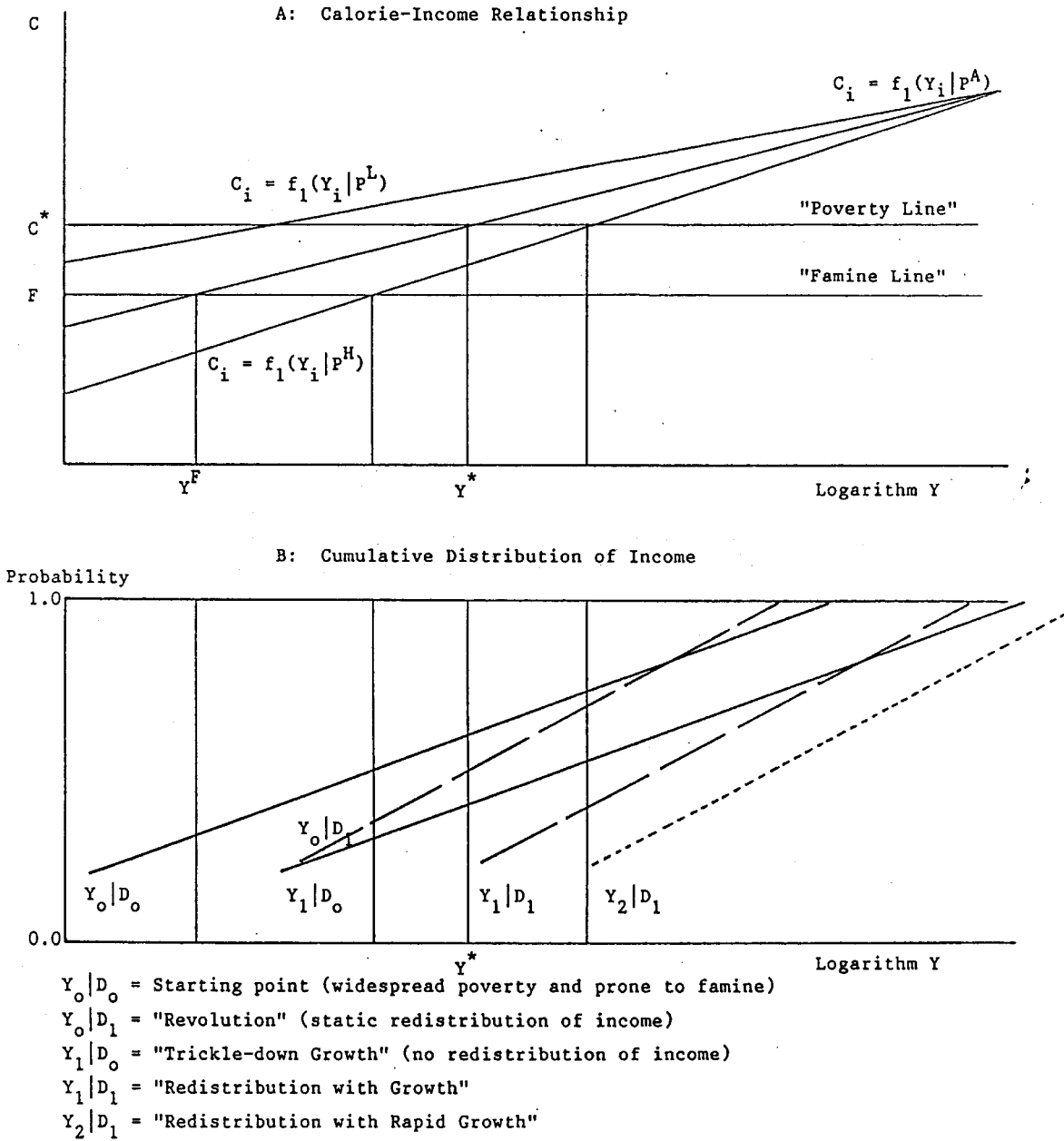
Table 1 offers a concrete idea of income levels that might be appropriate for this discussion. To start, the society has an average income per capita of \$310 per year (about the level of India in the mid-1990s), distributed in such a way that the lowest quintile has an income per capita of \$50 and the top quintile \$800. The poverty line is drawn such that $Y^* = \$200$ and C^* would be on the order of 2,100 kilocalories per capita per day.³ Panels A and B can be read in combination to

² There is an entire body of literature devoted to estimating the calorie-income relationship illustrated in Panel A of Figure 2 and to examining the significance of any relationship between calorie intake and severe health consequences, such as infant mortality or shortened life expectancy (Srinivasan, 1981, Poleman, 1981, Behrman and Deolalikar, 1988). The perspective here draws on Reutlinger and Selowsky (1976), Alderman (1986), and Alderman and Paxson (1992).

³ For convenience, all individuals in each income quintile are assumed to have the average income of that quintile. However, income distribution in Panel B is drawn continuously after the first quintile to reflect the smooth distribution likely after incomes rise above a subsistence floor.

indicate the national degree of poverty and vulnerability to famine. To start, 60 percent of the population has incomes at or below the poverty line, and 30 percent is vulnerable to famine. This is a very poor, famine-prone society. The question is, how does such a society achieve food security?

Figure 2. Poverty, Famine, and Food Security



Source: See Table 1

Table 1. Illustrative Data Showing Relationships Among Poverty, Famine, Income Levels, Income Distribution, and Food Prices

Income Quintile	Per Capita Income, US \$				
	$Y_0 D_0$	$Y_0 D_1$	$Y_1 D_0$	$Y_1 D_1$	$Y_2 D_1$
Lowest	\$50	\$100	\$100	\$200	\$320
Second	100	160	200	319	494
Third	200	254	400	508	787
Fourth	400	398	800	797	1235
Highest	800	638	1600	1276	1978
Average	\$310	\$310	\$620	\$620	\$961
Ratio: Top 20% to Bottom 20%	16:1	6.4:1	16:1	6.4:1	6.4:1

Proportion of Population Below the Poverty Line, C* (POV) or Prone to Famine, C<F (FAM), at Various Food Prices					
P=P ^A	Average price level, or stabilized prices				
POV	0.6	0.5	0.4	0.2	0
FAM	0.3	0	0	0	0
P=P ^H	High "price shock"				
POV	0.72	0.68	0.52	0.38	0
FAM	0.5	0.35	0.3	0	0
P=P ^L	Low "price shock"				
POV	0.37	0	0	0	0
FAM	0	0	0	0	0

Define food security as an environment in which the lowest income quintile has a near-zero probability of being vulnerable to famine. The "escape from hunger" has a more challenging definition; it requires a similar near-zero probability of falling below the poverty line (defined strictly in calorie terms). Within the framework presented here, the escape from hunger and famine can be accomplished through one or a combination of three approaches. First, incomes can grow with no change in income distribution. Second, income distribution can improve with no change in average incomes per capita. Third, the domestic food economy can be stabilized to eliminate shocks that result in P^H as the prevailing price environment. The argument here, following Figure 1, is that the East and Southeast Asian approach of "growth with redistribution," relying heavily on stimulation of the rural economy, in combination with a policy to stabilize domestic food prices, is the fastest approach to managing this escape (Chenery, et al., 1974; Timmer, et al., 1983; Dasgupta, 1993; Timmer, 1995; Birdsall, et al., 1995).

What is Feasible?

Both theory and the empirical record of economic growth during the second half of the twentieth century argue that only certain combinations of growth, redistribution, and price policy are feasible as long-run strategies. In particular, two appealing strategies for overcoming hunger in the short run must be ruled out. The first, a strategy of keeping food prices low (P^L) through direct subsidies and macroeconomic distortions, such as overvalued domestic currencies, eliminates all probability of famine in our illustrative society (see the bottom line in Table 1), and it ends poverty with either doubled incomes per capita (Y_1) or a sharp redistribution of income (D_1). The problem with this strategy, unfortunately, is one of incentive compatibility. The strategy is not sustainable because it fails to provide incentives to the rural sector and, consequently, it is unable to maintain levels of agricultural productivity (Timmer, et al., 1983; Nerlove, 1994; Taylor, 1996). Without this productivity, the entire growth process is threatened.

The second strategy that fails is an immediate redistribution of income, from D_0 to D_1 . In Figure 2 and Table 1, this redistribution is shown as a change in the top 20/ bottom 20 ratio from 16:1 to 6.4:1. These particular numbers result from doubling the income per capita of the bottom quintile, holding average income per capita at the initial level, and then maintaining a log linear distribution for the remaining income quintiles. This doubling accomplishes immediately what economic growth takes years to accomplish--the elimination of vulnerability to famines in an environment of price stability. Unfortunately, such revolutionary redistributions of income have carried powerful, negative consequences for economic growth because they disrupt property rights and incentives for investment. Without such investment, economic output cannot be maintained (Barrett, 1995; Levine and Renelt, 1992; Barro and Sala-i-Martin, 1994; Taylor, 1996).⁴

⁴ The extensive land reforms carried out in East Asia after World War II can be considered as a strategy of immediate income distribution. They were carried out in revolutionary circumstances or at the instigation of foreign powers, and the reforms established a distribution of assets from which equitable growth was possible. The conditions for similar reforms in other countries do not seem widely applicable in the 1990s (Tomich, et al., 1995).

"Trickle-Down Growth"

Two other strategies offer more hope. The first is economic growth with unchanging income distribution ($Y_1|D_0$). On the face of it, this strategy would seem to require a very long time to eliminate vulnerability to famine and hunger (World Bank, 1986). In the event of an adverse price shock, for example, even a doubling of income per capita in the lowest quintile leaves 30 percent of the population vulnerable to famine and more than half the population below the poverty line. In addition, with such an adverse income distribution and price instability, doubling of incomes per capita is likely to be slow, requiring 20 to 30 years (growth rates of income per capita of 2.4 to 3.6 percent per year) (Williamson, 1993; Birdsall, et al., 1995). It is not surprising that such "trickle-down growth" strategies have a poor reputation among most development specialists.

However, if the probability of P^H is reduced to near zero through public action to stabilize the food economy, even such a modest growth performance benefits the poor quite quickly by eliminating their vulnerability to famine. Many remain below the poverty line, 40 percent in the illustration, but they are protected from falling to the famine line because adverse price shocks are eliminated by the stabilization policy. This approach, in conjunction with urban food distributions to holders of ration cards, is a rough characterization of the Indian experience with food security.

The Indian experience is particularly interesting because the country started with a relatively egalitarian distribution of income. Because the country was so poor, however, absolute poverty was widespread, thus presenting a difficult dilemma. If substantial resources were used to subsidize food intake of the poor, sufficient funds would be diverted from productive investments to slow the rate of economic growth. Thus the strategic choice in much of South Asia--to opt for food security through distribution mechanisms that were built during British colonial rule to alleviate famines--may have sacrificed some of the potential for economic growth in order to provide "support-led" poverty alleviation (Dreze and Sen, 1989).

Growth With Redistribution

An alternative strategy of bringing the poor more directly into the process of economic growth offers considerably greater hope than trickle-down policies, even with effective stabilization of food prices. The alternative is, however, much more complicated to implement. Here, redistribution with growth is attempted, in order to shift from $Y_0|D_0$ to $Y_1|D_1$ in a relatively short period of time. In this strategy, incomes per capita double on average, as before, but redistribution of the increased output doubles the incomes of the poorest quintile yet again. Such a strategy, if it is possible, eliminates all vulnerability to famine, even in the face of a price shock, and nearly eliminates poverty when the growth strategy is implemented in conjunction with a policy of price stabilization. This was the Indonesian approach.

What are the barriers to such a strategy? It is clearly difficult to find a way to structure the growth process so that the poor gain in relation to the rich. Historically, the only way to do that has been a rural-oriented development strategy that raises productivity and incomes of the broad population of small farmers and other rural workers (Mellor, 1976; Tomich, et al., 1995; Timmer, et al., 1983).

Such a strategy, however, requires significant price incentives to create the rural purchasing power that, in turn, stimulates the rural growth needed to make the strategy consistent with overall macroeconomic performance. This consistency is crucial to maintaining internal economic balance (World Bank, 1993; Timmer, 1995, 1996b). Thus a growth strategy that aims at $Y_1|D_1$ is probably not feasible without a price policy that approaches P^H as an average rather than as an extreme shock. This "food price dilemma," in which poor consumers have their food intake threatened in the short run in order to fuel a long run growth process that removes them from poverty, has been emphasized before (Ravallion, 1989; Timmer, et al., 1983; Sah and Stiglitz, 1992). But experience in East and Southeast Asia since the 1970s shows that such a strategy, when implemented in the context of large-scale investments in rural infrastructure, human capital, and agricultural research, can lead to economic growth and an increase in average incomes per capita of 5 percent per year or more, with the rate of growth in the bottom two quintiles faster than that in the top (World Bank, 1993; Huppi and Ravallion, 1991; Timmer, 1995).

With doubling times of 10 to 15 years for incomes per capita and redistribution in favor of the poor, the "rural-oriented, price-led" strategy has the potential to reach outcome $Y_2|D_1$, illustrated in Figure 2 and Table 1, and shown for the 1970-1995 experience of Indonesia in Figure 3. With this strategy, the escape from hunger and famine is as complete as in the United States, Western Europe, and Japan. At the rates of growth experienced by Malaysia, Thailand, and Indonesia since the mid-1960s, the escape has been managed in less than three decades.⁵

Lessons from Asia

To achieve and sustain food security through rapid economic growth, the Asian experience suggests that the agricultural sector must be linked through three elements to food security: poverty alleviation, stability of the food economy, and growth itself. The effectiveness of these links depends critically on the initial conditions at the start of the process of rapid growth. In particular, agriculture can contribute little to equity if it is based on a "bi-modal" distribution of production or to stability if it is concentrated on a single export crop subject to substantial price fluctuations. Even in these circumstances, however, agriculture can be a significant contributor to economic growth.

Because of the dominance of rice in Asian diets, the prevalence of smallholder cultivators, the large size of many Asian countries, and the instability of the world rice market, the most successful countries in achieving food security developed effective programs and policies to raise the productivity of their own rice farmers. Many of these programs were explicitly motivated by the objective of self-sufficiency in rice, especially after the world food crisis in 1974, when the "world rice market" in Bangkok disappeared for nearly half a year. When long run costs of production are less

⁵ It should be noted that the income gap between "rich" and "poor" continued to widen in Indonesia between 1970 and 1995, despite the faster growth rate of the incomes of the poor during that period. In the bottom quintile, for example, per capita incomes increased by \$336 (in 1995 U.S. \$) in the 25-year period, whereas incomes of the top quintile increased by \$1,374. Even highly successful poverty alleviation does not necessarily solve the problems of income distribution, especially in the political arena.

than the costs of importing, such programs make economic sense, and the "self-sufficiency" slogan can be used effectively to mobilize political and bureaucratic support.

But self-sufficiency campaigns can do much mischief. Many countries have a deep aversion to international trade, an aversion seen since well before the Corn Laws debate in England in the early nineteenth century. Lindert (1991) has documented an "anti-trade bias" in agricultural pricing and trade policy that has deep historical roots. In the face of this clear political preference for self-sufficiency, Asian countries have had a difficult time distinguishing legitimate concerns for food security from a simple desire not to import anything that could be produced domestically, whatever the costs.

Even in Indonesia, which has an admirable record on stabilization of rice prices, higher productivity of rice farmers, and food security for nearly the entire population, self-sufficiency for a broad array of staple foods has become a policy objective (Timmer, 1994). An assessment of the steps needed to reach this objective concluded as follows:

If economic considerations should play a significant (but not complete) role in determining appropriate policy for rice and its contribution to Indonesia's food security, the economic arguments are even stronger for all non-rice commodities. There is simply no nutritional, political, or logistical rationale to override the long run signals from the world market on which foods Indonesia should produce domestically and which it will be more economic to import, because these economic signals are the surest indicators of where to allocate resources for increased productivity and incomes (Timmer, 1994, p. 39).

Such openness to short run price signals from world markets for all but the most important staple food, and for all commodities in the long run, will require more open and stable markets in the future than have existed in the past. One major attraction to developing countries of the Uruguay Round of the GATT negotiations was the promise that liberalized agricultural trade would result in more stable prices on world grain markets. However, this promise may have been premature (Greenfield, et al., 1996; Islam, 1996). The shortages that caused high grain prices in world markets in 1995 and 1996 renewed anxieties about future food supplies, and policy-induced reductions in grain stocks seem destined to cause greater, not less, instability in grain prices. Asia, with nearly half the world's population to feed, is understandably concerned about how much to respond with new investments in domestic production and how much to rely on privately-held stocks available in international markets for supplies of basic grains.

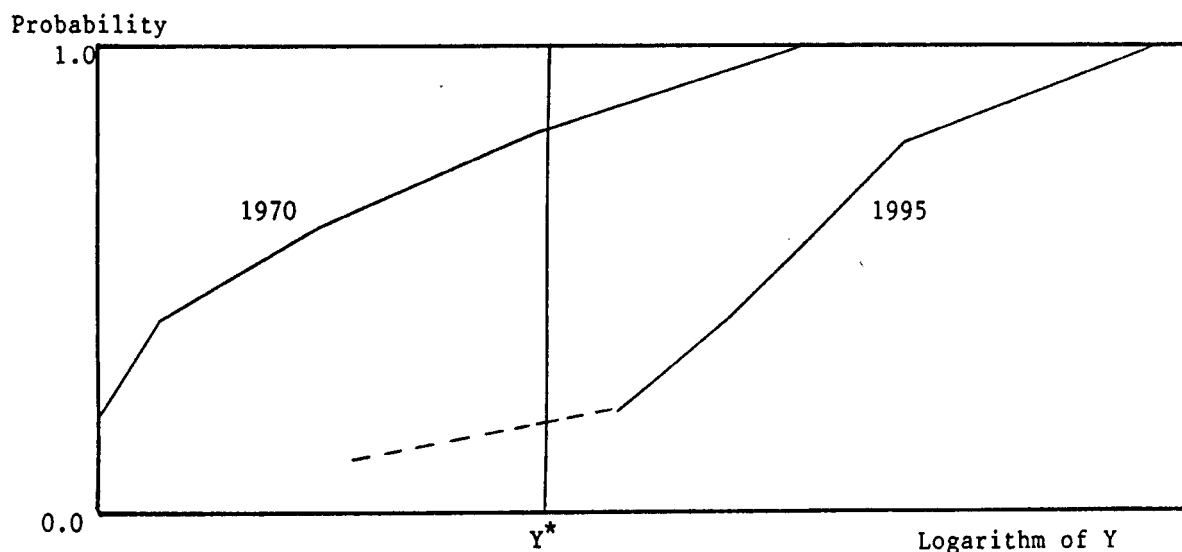
However the balance is struck on domestic versus imported supplies, the striking improvement in food security in Asia since the mid-1960s, especially in East and Southeast Asia, is not likely to be threatened. That is the advantage of "growth-mediated" food security. From this perspective, the lesson from East and Southeast Asia for achieving and maintaining food security can be summed up in this way: a growth process stimulated by a dynamic rural economy leads to rapid poverty alleviation, which, in the context of public action to stabilize food prices, ensures food security.

Figure 3. Poverty Alleviation, Income Distribution, and Income Growth in Indonesia, 1970-1995

Income Quintile	Income Shares		Per Capita Incomes		Annual Growth Rate, 1970-95
	1970	1995	1970	1995	
Lowest	6.6	8.7	\$ 99	\$ 435	6.1 %
Second	7.8	12.1	117	605	6.8
Third	12.6	15.9	189	795	5.9
Fourth	23.6	21.1	354	1055	4.5
Highest	49.4	42.3	741	2115	4.3
Ratio of Top 20% to Bottom 20%					
	7.5:1	4.9:1			
Average Per Capita Income			\$ 300	\$1000	4.9 %

Note: Income shares are based on SUSENAS data for total expenditures, and are drawn from surveys drawn in the mid-1970s and early 1990s, respectively. The per capita incomes are in 1995 U.S. dollars, and the 1995 figure is based on projections using the newly revised national income accounts.

Cumulative Distribution of Income



How General are the Lessons?

This approach might not work in other settings--for example, where the staple foodgrain is traded in more stable world markets, or where land holdings are highly skewed, or where technologies are not available to raise agricultural productivity. At least part of Africa's failure to achieve widespread food security for its population can be attributed to these factors, but part must also be attributed to differential treatment of agriculture by prevailing development strategies in Africa.

Two dimensions are important. First, because government policy makers maintained a macroeconomic environment that supported exports, Southeast Asia invested heavily in building a comparative advantage in a wide range of agricultural exports. The contrast with Africa is striking.

Much can be learned from Asia's experience of changing its long-term comparative advantage in export commodities through investments in research, training and market development over the past three decades. For example, Thailand, Pakistan and Vietnam are routinely selling rice throughout Africa by outcompeting African farmers even after international and internal transport charges are taken into account. Moreover, Nigeria, Kenya and many other countries are importing palm oil from Malaysia to meet their growing demand for cooking oil. This is especially humbling to Nigeria because at independence in 1960, it was the world's leading producer and exporter of palm oil. Today, Malaysia's production of palm oil is about ten times larger than that of Nigeria. [Eicher (1992), p. 80.]

Second, governments in Southeast Asia actively sought to provide food security to domestic consumers, both urban and rural. Their ability to do so had both economic and political roots. Because populations were large in relation to agricultural resources, and because domestic rice consumption was large in relation to supplies available in world markets, countries in Southeast Asia were forced to develop successful rice intensification programs to ensure domestic food security.

As noted earlier, this food security was implemented in the short run through policies that stabilized rice prices. But these policies would have been impossible to sustain without rising productivity in the domestic rice economy. The broader theme of this paper--that food price stabilization is a crucial determinant of investment rates and subsequent economic growth--is also, in the context of Southeast Asia, an argument for substantial investment to raise productivity in the cultivation of food staples.

However, the multi-staple food economies of Africa differ markedly from the irrigated rice economies of Southeast Asia. Thus it is important to identify the crucial linkages between stabilization of rice prices and consequent stimulus to economic growth and determine whether similar linkages can be established in the agricultural environment of Africa. If the rice economy of Asia is sufficiently different from food systems of Africa, which are based on maize, millet, sorghum, cassava, and yams, substantial doubt will be cast on the relevance to Africa of the models of food security and economic growth that propelled Southeast Asia. Unless new growth models can be discovered specifically for the African context--and, in thirty years of trying, they have not been--such doubts are very troubling. We may be in the awkward position of knowing that agricultural development and stabilization of the domestic food economy are necessary for rapid economic growth but not knowing how to do it in Africa.

In the African context there are two important questions. Does the analytical support for policies that stabilize food prices hold only for rice economies? Is the implementation of such policies inherently more difficult and expensive in multi-staple food economies? If the benefits are smaller and the costs are larger in African food systems, stabilizing food prices might not be necessary or desirable. But if food prices are not stabilized, how can the investment climate be stabilized for farmers and urban industrialists? How can consumers be assured of food security? What would stimulate the dynamic linkages between agriculture and industry that were the basis of rapid economic growth in East and Southeast Asia?

Rice Is Different

A massive literature exists on Asian rice societies and the extent to which they are culturally, ecologically, and politically unique, but there has been surprisingly little effort devoted to understanding how these unique noneconomic dimensions translate into advantages and disadvantages for economic development. Cultural and sociological aspects are treated in Geertz (1963) and Castillo (1975), ecological dimensions in Grigg (1974) and Hanks (1972) as well as Geertz, and political effects of large-scale irrigation systems in Wittfogel (1957). The Asian rice *economy* has been studied as a commodity system in the classic volume by Wickizer and Bennett (1941), an approach updated by Barker and Herdt (1985). Country or village studies that use economic methodologies to analyze rice systems are more numerous; representative examples are Mears (1981) for Indonesia, Hayami and associates (1978) for a village in the Philippines, and Croll (1982) for a household perspective in China. But apart from Bray's (1986) extensive historical treatment, and Oshima's (1987) incorporation of labor demands in wet-rice cultivation into a general explanation of Asian poverty relative to European development, the unique characteristics of rice cultivation in the Asian environment have not been examined for their direct and indirect contributions to the overall process of economic growth.

This paper can merely highlight the key linkages that are likely to mediate these contributions. The Asian rice economy can be characterized in sufficient detail to outline the story and to indicate the nature of the rice, economy, especially in economically important ways, without becoming lost in the complexity of any given specific setting. Grigg (1974) provides an excellent description of wet-rice cultivation in Asia before the advent of high-yielding varieties developed at the International Rice Research Institute (IRRI). Barker and Herdt (1985) provide the details on the post-Green Revolution rice economy.⁶

Rice in Asia is produced primarily in irrigated or rainfed paddy fields that are managed intensively in a highly labor-intensive manner. Typical management units are households that own or rent these paddy fields, and few households actively manage more than one or two hectares of irrigated paddy. The median size of management unit for rice cultivation in Southeast Asia is probably less than one hectare, with double cropping the norm if water supplies are adequate.

⁶ A less detailed set of stylized facts for Asian agriculture is developed by Haggblade and Liedholm (1991) as part of their simulation model that traces the evolution of the rural nonfarm economy under the stimulus of linkages between labor demand in agriculture and in the nonfarm rural economy.

Most households retain some rice for home consumption, but nearly all households that cultivate rice in Southeast Asia market at least small quantities after the harvest. Farmers with larger surpluses will often store rice for sale well after harvest when seasonal prices are higher. Purchased inputs are used almost universally, and nitrogen fertilizer--usually urea--is normally the single most important input bought from the market. Hired labor has become an important cash purchase as well, although exchange labor during planting and harvesting has been a feature of Asian rice cultivation for ages.

Large cash purchases of fertilizer and labor, small size of rice plantings managed by individual households, and active marketing of a significant share of output combine to make intensification of rice cultivation and the achievement of high yields an important objective of farmers and governments alike. Successful intensification has been important to farmers in order to keep their incomes on a par with opportunities elsewhere in the rural and urban economies. Likewise, intensification has been important to governments who are concerned about the availability of marketed supplies of rice that are needed to feed growing urban populations.

The very nature of irrigated rice cultivation means that farmers are not able to raise their rice yields successfully unless the government provides key ingredients in the intensification process. At the same time, governments cannot intensify rice cultivation directly--farmers are needed to make all the key managerial decisions that translate productive potential into high yields. An important symbiosis exists in the relationship between farmers and governments, even if the political system does not support a democratic voice for the rural population. Each party is dependent on the other to provide a crucial element of success.

Asian rice cultivation uses a small-farmer technology that offers high rewards to farmer knowledge and skilled management. These rewards depend on availability of high-yielding varieties, productive inputs, and incentives for their use, all of which can be delivered efficiently only through a system of competitive rural markets. Governments have had to build rural marketing systems that were able to connect farmers with local buying agents, thus transmitting market information and permitting exchange to take place, which generated gains in efficiency from trade. The marketing system serves to transform agricultural commodities at the farm gate into foods at the time, place, and form desired by consumers. An efficient marketing system has to solve the problem of price discovery, at least at the local level and seasonally, even if government price policy sets a band in which such price discovery must take place.⁷

Asian governments have also had to make large-scale investments in rural infrastructure. Managing these investments generated important opportunities for "learning by doing" on the part of government bureaucrats and policy makers. Part of this rural infrastructure supported the marketing system--roads, communications systems, market centers, and so on. But large investments were also needed in irrigation systems so that rice cultivation could be intensified successfully. Such systems have been the responsibility of governments nearly everywhere. The coordination and planning skills required to design, build, and maintain large-scale irrigation systems imposed serious

⁷ See Chapter 4 of Timmer, et al. (1983) for further analysis of the importance of an efficient marketing system and the role of price policy in developing one.

obligations on those governments that undertook the tasks successfully. On the other hand, governments that acquired these skills by learning how to manage an irrigation-based agriculture also acquired a confidence in governance that was quickly applied to other dimensions of managing economic growth.

The key steps in the argument are now in place. Food security became the principal task of Asian governments with large populations in relation to their arable land resources. Policies to stabilize rice prices were the key interventions used to provide food security at the national level. Heavy reliance on rice imports was not feasible unless the country was small--for example, Singapore, Hong Kong, and to some extent Malaysia. But the larger countries of Southeast Asia had to grow nearly all of their own rice. Inducing farmers to produce this rice, for their own needs as well as surpluses for urban consumers, required governments to pursue an agricultural development strategy that focused on small farmers, reached them via markets, and raised the productivity potential of rice cultivation through large investments in rural infrastructure, irrigation, and research on high-yielding rice varieties.

Food Security and the Government

Both tasks undertaken by Asian governments--reaching small farmers via markets and raising agricultural productivity--created positive externalities for the overall process of economic growth in addition to the direct contribution from higher output of the staple food grain and the consequent lowering of the real wage bill.⁸ First, making rural markets work is a direct lesson in the efficacy of a market-oriented economy. Building an efficient rural marketing system requires careful intervention and support from the government, but not too much if the private sector is to grow, learn how to take risks, and compete effectively. Governments must learn how to play their role in a market economy just as traders, banks, shipping companies, and supporting institutions must learn theirs. Solving the problem of food security in Asia forced governments to learn the importance of a market-oriented economy and the means to make it work.

Simultaneously, however, the need to invest in public infrastructure, irrigation, research and extension systems and to ensure the price stability that enabled the market economy to grow quickly and efficiently also forced Asian governments to develop a high degree of governmental competence in economic management. Without both components--a market economy and a competent government investing in agriculture--Asian countries could not have developed the high degree of food security that they have achieved at the national level. Not all countries have been equally successful in translating this aggregate degree of food security into equitable access to food on the part of all households. That success would require a government devoted to alleviating poverty as well as stimulating growth while maintaining political stability. Among countries of Southeast Asia, Malaysia and Indonesia have good records of achieving all three objectives of growth, stability, and improved welfare.

⁸ For a review of the importance of externalities in the development process, see Stewart and Ghani (1991).

If this argument for a market economy and competent management on the part of government is correct, the rapid economic growth in Southeast Asia since the 1960s can be traced to a considerable extent to the development of a new rice technology that greatly increased yield potential when the surrounding environment--economic, ecological, and political--was conducive to rapid adoption by farmers. The elements of this environment are well known for irrigated rice systems, but they have never been assembled successfully for the staple foods of Sub-Saharan Africa.

Africa is Different

The staple food economies of Sub-Saharan Africa are not easily described with the simplicity possible for rice cultivation in Asia. Two standard references on African food systems, Johnston (1958) and Grigg (1974), stress the heterogeneity and complexity of production systems even within small localities. The point can be made in a vivid fashion by comparing the area around Krawang in West Java, Indonesia, one of the country's major rice bowls, and the Machakos region of Kenya, home to many of the country's most progressive small farmers. A drive across Krawang reveals that irrigated rice is grown as far as the eye can see. Small home gardens surround the many villages, but farming is almost completely a matter of managing a homogeneous ecological environment to grow one crop. The relative simplicity of developing a high-yielding technology for this environment and of learning to optimize its management accounts for the nearly universal adoption of IRRI varieties and the high and stable yields produced from them.⁹

The contrast with Kenya and the rest of Sub-Saharan Africa is striking. Wherever it is possible to drive through regions of intensive food production--and the poor state of the road networks often makes driving very difficult for tourists and for trucks--an unbroken stretch of a single foodcrop is uncommon. Small patches of land with multiple and inter-cropping are the norm, and the pattern shifts radically as one crosses areas with changed altitude, soil type, or rainfall. Maize, sorghum, millet, cassava, yams, groundnuts, cowpeas, and many others are intercropped in complex combinations, which reflect the farmer's knowledge of local growing conditions, available technologies, market prices, and the family need for food.

Tasks to Modernize African Agriculture.

Raising the productivity of such complicated, multi-staple food systems requires more of agricultural scientists than improving the average yield of a single crop when grown under ideal conditions in a pure stand. As with upland regions in Asia, the farming systems research has not been extensive enough to identify the constraints facing farmers in these heterogeneous environments.¹⁰ The economic as well as the ecological interactions among various crops need to be analyzed and incorporated into the research strategy. When successful results have been achieved at the research center, they must then be transmitted back to farmers through messages that contain the same range

⁹ A drive from Jakarta to Krawang in the early 1990s also revealed a number of factories being built on former rice paddies.

¹⁰ A good review of this approach has been produced by the CIMMYT Economics Staff (1984).

of complexity that stimulated the development of new crop varieties and farming systems in the first place.

The point here is not that rice intensification is easy--that would misrepresent the hard-won achievements in Asia since the mid-1960s and the continuing challenge facing Asian researchers,, farmers, and policy makers--but it will be harder to achieve similar results in Africa. The farming systems that produce the great bulk of Africa's food staples are much more complicated, less understood by researchers, and operate under environmental stresses that vary more widely, especially moisture stress, than in the ricebased systems of Asia. A major difference between Africa and Southeast Asia is the role of women in household decision making and management of food crop production, which complicates the design of institutions that provide modern inputs, new technology, and credit to farmers. None of these difficulties is unsurmountable with appropriate investments in research, infrastructure, and incentives. It remains to be seen how much more expensive these investments will be in Africa than they were in Asia.¹¹ A serious test has yet to be made.

A multi-staple food system is more complicated to modernize not only at the farm level but also at the level of marketing inputs and output. Marketing a wide variety of different commodities with varying degrees of substitutability requires greater knowledge on the part of traders, higher storage and transactions costs because of smaller average lots handled, and far more sophisticated policy designs if governments attempt to stabilize prices for the three or four important food staples. But is this degree of intervention in pricing necessary? In the specific context of Ghana, Alderman (1992) has asked whether cross-commodity substitution in consumption, production, and storage is adequate to link prices of maize with prices of sorghum and millet. The answer is a qualified yes, with price integration requiring three months on average. Such integration offers the potential for government policy to stabilize the price of maize only, if that is desirable, while allowing market forces to transmit these stable prices to other staple foods that are close substitutes.¹²

Reliance on Imported Food.

The food economy of Africa has one other feature that distinguishes it from the rice economy of Southeast Asia: the heavy reliance on imported wheat to provision urban areas. Although wheat is an increasingly popular food in urban Asia, in none of the Southeast Asian countries does it account for as much as 10 percent of caloric intake. By contrast, in the cities of Sub-Saharan Africa, where roughly 30 percent of the population lives, an average of 50 kilograms per capita of imported grain,

¹¹ For a particularly eloquent statement of the lack of investment in African agriculture, see Eicher (1992). Block (1995) demonstrates how serious the productivity problems are in agriculture.

¹² The rather long period required for price integration to occur may be a significant impediment to such a single commodity stabilization policy. Three months of highly unstable prices for substitutes may impose very heavy burdens on consumers who depend on these commodities for most of their caloric intake. Similarly, prices can collapse at harvest for these commodities for as long as three months even if maize prices are stabilized, thus providing to producers few of the benefits of stable prices. The difficulties of stabilizing prices in the African context, and the costs of doing to, are modeled in Pinckney (1988).

most of it wheat, provides nearly 500 calories per day, or nearly 25 percent of daily energy intake. To a substantial extent, Sub-Saharan Africa is dependent on world grain markets to provision its urban (and vocal) population.

But the world market for wheat (and yellow maize) is not nearly so unstable as the world rice market. Total volumes traded are much higher--on the order of 100 million tons per year each for wheat and maize, compared with only 20 million tons for rice. The shares of production are similarly larger. Rice trade is just 5 percent of world production, whereas wheat and maize are 20 and 15 percent, respectively. The thinness of the world rice market has made it notoriously unstable, thus forcing policy makers in rice-consuming countries to insulate their domestic rice economies from the world market. Such insulation is not nearly so important for economies whose staple food is wheat or yellow maize. Many African cities depend heavily on imported wheat for their staple food supply.¹³

Compared with a rice-based, domestically supplied economy, a wheat-based, import supplied food economy does not have the same imperative to develop its domestic food production. When the domestic staples produced are root crops or specialized coarse grains not available in world markets, governments are even less inclined to invest in domestic food production. If a political economy with a powerful urban bias is superimposed on this bifurcated food economy, the neglect of African food producers is easily understandable.¹⁴ Nor is it easy to see how to end this neglect, either politically or economically. In particular, if price stabilization of staple foods is important to both consumers and producers, the nontradable status of root crops rules out the trade-oriented approach used in Southeast Asia. Price fluctuations in world markets for white maize and local varieties of sorghum and millet are similar to those for rice, and high transportation costs mean extraordinarily wide margins between c.i.f. import and f.o.b. export prices.¹⁵

Price Stability, Agricultural Productivity, and Economic Growth

Switching the role of food imports from the mainstay of food security to a vehicle for stabilizing the domestic food economy at levels that provide ample incentives to farmers to increase productivity is an enormous challenge for African governments. Cereal imports are increasing steadily, and more than one-third of them are provided as food aid. Most urban food systems are not well linked to domestic supplies but rely heavily on imports. Redressing this bias requires more than simply improving price incentives to farmers, although this step is necessary. A marketing system that is "pointing in the wrong direction" requires substantial changes in ways of doing business, infrastructure, institutions, and credit facilities before food supplies grown domestically can be the foundation of a stable and secure food system.

¹³ Imported rice is increasingly important in several West African countries.

¹⁴ The political economy dimensions of the argument are explained in Bates (1981).

¹⁵ Several countries in East Africa fluctuate around self-sufficiency for white maize, their staple grain. In good years exports are possible and in bad years imports are needed. For landlocked Malawi, the swing between the c.i.f. and f.o.b. prices can be very wide indeed--from negative prices for exports to more than \$300 per ton for imports!

Without these changes, it is difficult to see how stability in food prices and genuine food security can be achieved in Africa. Reliance on food aid and subsidized grain exports from North America and Western Europe undermines the political will needed to invest in domestic agriculture through a form of "Dutch Disease" that undervalues local food production. Such reliance is not sustainable in the long run. Even worse, it may not be stable in the short run. Africa relies heavily on exports of primary commodities to earn the foreign exchange needed to finance a food-import strategy. The prices of these commodities in world markets are highly unstable. The result is that earnings of foreign exchange are also highly unstable, thus destabilizing the entire macro economy. Research by Dawe (1996) has demonstrated that this destabilization takes a significant toll in terms of economic growth. Because it is harder to stabilize export earnings than to stabilize food prices, a switch in priority away from export crops toward domestic production of food crops is likely to improve food security as well as stimulate economic growth.

Nothing said so far suggests that such a switch will be easy. New priority will have to be placed on rural infrastructure and research on raising productivity of farming systems. Governments will have to intervene to restructure incentives in favor of food production, and these incentives will involve both stability and price levels for inputs and output. Such priorities were not so difficult to establish in the Asian context, where populations are large relative to land resources and where the density of economic activity justifies an extensive network of roads and traders who use them. Population pressures and favorable ecological settings also justified massive investment in irrigation systems that have stabilized Asian agricultural output while raising crop yields. It is easy to see how the emphasis on increasing domestic rice production evolved in the Asian context as a mechanism for stabilizing rice prices, and that this focus on production was the key to food security at the national level. It is difficult to see how a similar orientation can evolve in Africa.

The failure of African countries to look to domestic agriculture as the basic mechanism for providing food security comes at high cost in a final arena--learning how to manage the ingredients of rapid economic growth. By solving their food problems through agricultural development, Asian governments arguably learned both the appropriate role of the government in this process and the careful management of the economic environment required to bring it about.

Asian governments realized, in the words of Lee Kuan Yew, that they "must create an agricultural surplus to get their industrial sector going." Rich and industrious rice-farmers have been the foundation of Asia's industrialization. [*The Economist*, "Survey of Asia's Emerging Economies," November 16, 1991, p. 18.]

There is an obvious economic rationale to the strategy articulated by Lee Kuan Yew, even if, as Prime Minister of Singapore, he did not have to follow it for his own country. This paper explains the high level of governmental competence in Asia in managing the process of economic growth by appealing to the learning that took place from the necessity and complexity of solving their domestic food problems. The low level of competence at similar tasks demonstrated in the 1960s and 1970s in Africa can be traced to development strategies that met growing urban food needs from imports. That is, much of the explanation for the differential competence can be traced directly to how governments treated, and learned from, their agricultural sectors. The underlying political economy of the different approaches has already been explained, but the full consequences of the difference are just now being recognized.

The fundamental lesson from Asia's economic success is that there is no substitute for agricultural development in societies that have a substantial rural sector. Providing food security is an important rationale for investing in agriculture, and widespread confidence in food security--made manifest by stable food prices--can be translated through extensive externalities and linkages into rapid economic growth. There might be alternative strategies that would also generate rapid economic growth, but Southeast Asia is not the place to look for them.

References

Alderman, Harold (1986). *The Effect of Food Price and Income Changes on the Acquisition of Food by Low-Income Households*. Washington, D.C.: International Food Policy Research Institute.

_____ (1992). "Intercommodity Price Transmittal: Analysis of Food Markets in Ghana." Working Paper Series No. 884. Washington, D.C.: The World Bank, April.

_____ and Christina H. Paxson (1992). "Do the Poor Insure? A Synthesis of the Literature on Risk and Consumption in Developing Countries." Research Program in Development Studies Discussion Paper no. 164. Princeton, NJ: Princeton University.

Anderson, Jock R., and James A. Roumasset (1996). "Food Insecurity and Stochastic Aspects of Poverty." *Asian Journal of Agricultural Economics*, Vol. 2, No. I (August), pp. 53-66.

Anderson, Kym, and Yujiro Hayami (1986). *The Political Economy of Agricultural Protection*. Sydney: Allen and Unwin.

Barker, Randolph, Robert W. Herdt, with Beth Rose (1985). *The Rice Economy of Asia*. Washington, D.C.: Resources for the Future (distributed by Johns Hopkins University Press).

Barrett, Christopher B. (1995). "Idea Gaps, Object Gaps, and Trust Gaps in Economic Development." Economic Research Institute Study Paper No. 95-16. Logan, UT: Department of Economics, Utah State University; August.

Barro, Robert J., and Xavier Sala-i-Martin (1994). *Economic Growth*. New York: McGrawHill.

Bates, Robert H. (1981). *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley: The University of California Press.

Behrman, Jere R. (1984). "The Analytics of International Commodity Agreements." In Carl K. Eicher and John M. Staatz, eds. *Agricultural Development in the Third World* (Baltimore, MD: Johns Hopkins University Press).

_____ and Anil B. Deolalikar (1988). "Health and Nutrition." In Hollis Chenery and T. N. Srinivasan, eds., *Handbook of Development Economics*, Vol. 1, Amsterdam: North-Holland, pp. 631-711.

Bigman, David (1985). *Food Policies and Food Security Under Instability: Modeling and Analysis*. Lexington, MA: Lexington Books.

Birdsall, Nancy, David Ross, and Richard Sabot (1995). "Inequality and Growth Reconsidered: Lessons from East Asia." *World Bank Economic Review*, Vol. 9, No. 3, pp. 477-508.

Block, Steven A. (1995). "The Recovery of Agricultural Productivity in sub-Saharan Africa." *Food Policy*, Vol. 20, No. 5 (October), pp. 385-406.

Bray, Francesca (1986). *The Rice Economies: Technology and Development in Asian Societies*. Oxford: Basil Blackwell.

Castillo, Gelia T. (1975). *All in a Grain of Rice*. Los Barrios, Philippines: Southeast Asian Regional Center for Graduate Study and Research in Agriculture.

Chenery, Hollis, et al. (1974). *Redistribution with Growth*. Oxford: Oxford University Press for the World Bank.

Chisholm, Anthony H. (1982). "Commodity-Price Stabilization: Microeconomic Theory and Policy Issues." In Anthony H. Chisholm and Rodney Tyers, eds., *Food Security: Theory, Policy, and Perspectives from Asia and the Pacific Rim*. Lexington, MA: Lexington Books and D.C. Heath.

CIMMYT Economics Staff (1984). "The Farming Systems Perspective and Farmer Participation in the Development of Appropriate Technology." In Carl K. Eicher and John M. Staatz, eds., *Agricultural Development in the Third World*. Baltimore: Johns Hopkins University Press, pp. 362-77.

Croll, Elisabeth (1982). *The Family Rice Bowl: Food and the Domestic Economy in China*. Geneva: United Nations Research Institute for Social Development (UNRISD).

Dasgupta, Partha (1993). *An Inquiry into Well-Being and Destitution*. Oxford: Clarendon Press.

Dawe, David (1996). "A New Look at the Effects of Export Instability on Investment and Growth." *World Development*, December.

Dreze, Jean, and Amartya Sen (1989). *Hunger and Public Action*. Oxford: Clarendon Press.

The Economist (1991). "A Survey of Asia's Emerging Economies." November 16, pp. S1-S18.

Eicher, Carl K. (1992). "African Agricultural Development Strategies." In Frances Stewart, Sanjaya Lall, and Samuel Wangwe, eds., *Alternative Development Strategies in SubSaharan Africa*. London: MacMillan, pp. 79-102.

_____ and John M. Staatz, eds. (1990). *Agricultural Development in the Third World*. Second edition. Baltimore, MD: Johns Hopkins University Press.

Fogel, Robert W. (1989). "Second Thoughts on the European Escape from Hunger: Famines, Price Elasticities, Entitlements, Chronic Malnutrition, and Mortality Rates." NBER Working Paper Series on Historical Factors in Long Run Growth, No. 1. Cambridge, MA: National Bureau of Economic Research.

_____ (1991). "The Conquest of High Mortality and Hunger in Europe and America: Timing and Mechanisms." In Patrice Higonnet, David S. Landes, and Henry Rosovsky, eds., *Favorites of Fortune: Technology, Growth, and Economic Development since the Industrial Revolution* (Cambridge, MA: Harvard University Press), pp. 35-71.

Geertz, Clifford (1963). *Agricultural Involution: The Processes of Ecological Change in Indonesia*. Berkeley: University of California Press.

Greenfield, Jim, Maurizio de Nigris, and Panos Konandreas (1996). "The Uruguay Round Agreement on Agriculture: Food Security Implications for Developing Countries." *Food Policy*, Vol. 21, Nos. 4/5 (September/November), pp. 365-76.

Grigg, David B. (1974). *The Agricultural Systems of the World: An Evolutionary Approach*. Cambridge: Cambridge University Press.

Haggblade, Steven, and Carl Liedholm (1991). "Agriculture, Rural Labor Markets, and the Evolution of the Rural Nonfarm Economy." GEMINI Working Paper No. 19. East Lansing, MI: Michigan State University.

Hanks, Lucien M. (1972). *Rice and Man: Agricultural Ecology in Southeast Asia*. Arlington Heights, IL: AHM Publishing Corp.

Hayami, Yujiro, and Associates (1978). *Anatomy of Peasant Economy: A Rice Village in the Philippines*. Los Banos, the Philippines: International Rice Research Institute.

Huppi, Monica, and Martin Ravallion (1991). "The Sectoral Structure of Poverty in Indonesia During an Adjustment Period: Evidence for Indonesia in the Mid-1980's." *World Development*, Vol. 19, No. 12, pp. 1653-78.

Islam, Nurul (1996). "Implementing the Uruguay Round: Increased Food Price Stability by 2020?" 2020 Brief 34. Washington, D.C.: International Food Policy Research Institute; June.

Johnston, Bruce F. (1958). *The Staple Food Economies of Western Tropical Africa*. Stanford, CA: Stanford University Press.

_____ and John W. Mellor (1961). "The Role of Agriculture in Economic Development." *American Economic Review*, Vol. 51, No. 4, pp. 566-93.

Kuznets, Simon (1966). *Modern Economic Growth*. New Haven, CT: Yale University Press.

Levine, R., and D. Renelt (1992). "A Sensitivity Analysis of Cross-Country Growth Regressions." *American Economic Review*, Vol. 82, No. 4 (September), pp. 942-63.

Lewis, W. Arthur (1955). *The Theory of Economic Growth*. London: Allen and Unwin.

Lindert, Peter H. (1991). "Historical Patterns of Agricultural Policy." In C. Peter Timmer, ed., *Agriculture and the State: Growth, Employment, and Poverty in Developing Countries* (Ithaca, NY: Cornell University Press), pp. 29-83.

Lipton, Michael (1977). *Why Poor People Stay Poor: Urban Bias in World Development*. Cambridge, MA.: Harvard University Press.

_____ (1993). "Urban Bias: Of Consequences, Classes and Causality." In Ashutosh Varshney, ed., *Beyond Urban Bias*. London: Frank Cass, pp. 229-58.

Lucas, Robert E. (1988). "On the Mechanics of Economic Development." *Journal of Monetary Economics*, Vol. 22, No. 1, pp. 3-42.

Maxwell, Daniel G. (1996). "Measuring Food Insecurity: The Frequency and Severity of 'Coping Strategies'." *Food Policy*, Vol. 21, No. 3 (July), pp. 291-304.

Maxwell, Simon (1996). "Food Security: A Post-Modern Perspective." *Food Policy*, Vol. 21, No. 2 (May), pp. 155-170.

Mears, Leon A. (1981). *The New Rice Economy of Indonesia*. Yogyakarta, Indonesia: Gadjah Mada University Press.

Mellor, John W. (1976). *The New Economics of Growth: A Strategy for India and the Developing World*. Ithaca, NY: Cornell University Press.

Morduch, Jonathan (1995). "Income Smoothing and Consumption Smoothing." *Journal of Economic Perspectives*, Vol. 9, No. 3 (Summer), pp. 103-14.

Nerlove, Marc (1994). "Reflections on Agricultural Development, Population Growth and the Environment." Prepared for the Third Conference on Development Economics, 23-25 November, 1994, in Manila. Manila: Asian Development Bank; typescript.

Newbery, David M. G., and Joseph E. Stiglitz (1979). "The Theory of Commodity Price Stabilization Rules: Welfare Impacts and Supply Responses." *Economic Journal*, Vol. 89, pp. 799-817.

_____ (1981). *The Theory of Commodity Price Stabilization: A Study in the Economics of Risk*. New York: Oxford University Press.

Oshima, Harry T. (1987). *Economic Growth in Monsoon Asia: A Comparative Study*. Tokyo: University of Tokyo Press.

Pinckney, Thomas C. (1988). *Storage, Trade, and Price Policy Under Production Instability: Maize in Kenya*. IFPRI Research Report No. 71. Washington, D.C.: International Food Policy Research Institute.

Poleman, Thomas (1981). "Quantifying the Nutrition Situation in Developing Countries." *Food Research Institute Studies*, Vol. 28, No. 1, pp. 1-58.

Ramey, Garey, and Valerie A. Ramey (1995). "Cross-Country Evidence on the Link Between Volatility and Growth." *American Economic Review*, Vol. 85, No. 5 (December), pp. 1138-51.

Ravallion, Martin (1987). *Markets and Famines*. Oxford: Clarendon Press.

_____ (1989). "Do Price Increases for Staple Foods Help or Hurt the Rural Poor?" *Oxford Economic Papers*.

_____ (1998). "Economics and Famines." *Journal of Economic Literature*.

_____ and Gaurav Datt (1996). "How Important to India's Poor is the Sectoral Composition of Economic Growth?" *World Bank Economic Review*, Vol. 10, No. I (January), pp. 1-25.

Reutlinger, Shlomo, and Marcelo Selowsky (1976). *Malnutrition and Poverty: Magnitude and Policy Options*. World Bank Occasional Paper No. 23. Baltimore, MD: Johns Hopkins University Press for the World Bank.

Sah, Raj K., and Joseph E. Stiglitz (1992). *Peasants Versus City-Dwellers: Taxation and the Burden of Economic Development*. Oxford: Clarendon Press.

Sarris, Alexander H. (1982). "Commodity-Price Theory and Public Stabilization Stocks." In Anthony H. Chisholm and Rodney Tyers, eds., *Food Security: Theory, Policy, and Perspectives from Asia and the Pacific Rim* (Lexington, MA: Lexington Books, and D.C. Heath).

Sen, Amartya (1981). *Poverty and Famines*. Oxford: Oxford University Press.

Srinivasan, T. N. (1981). "Malnutrition: Some Measurement and Policy Issues." *Journal of Development Economics*, Vol. 8, pp. 3-19.

Stewart, Frances, and Ejaz Ghani (1991). "How Significant are Externalities for Development?" *World Development*. Vol. 19, No. 6, pp. 569-94.

Taylor, Alan M. (1996). "On the Costs of Inward-Looking Development: Historical Perspectives on Price Distortions, Growth and Divergence in Latin America from the 1930s to the 1980s." Evanston, IL: Department of Economics, Northwestern University; typescript.

Timmer, C. Peter (1989). "Food Price Policy: The Rationale for Government Intervention." *Food Policy*, Vol. 14, No. I (February), pp. 17-42.

_____ (1991). "Agricultural Employment and Poverty Alleviation in Asia." In C. P. Timmer, ed., *Agriculture and the State: Growth, Employment, and Poverty in Developing Countries*. Ithaca, NY: Cornell University Press, pp. 123-55.

_____ (1992). "Agriculture and Economic Development Revisited." In Paul S. Teng and Fritz W. T. Penning de Vries, special editors, *Agricultural Systems*, Vol. 38, No. 5 (Amsterdam: Elsevier), pp. 1-35.

_____ (1993). "Rural Bias in the East and Southeast Asian Rice Economy: Indonesia in Comparative Perspective," *Journal of Development Studies*, Vol. 29, No. 4 (July), pp. 149-76.

_____ (1994). "The Meaning of Food Self-Sufficiency," *Indonesian Food Journal*, Vol. 5, No. 10, pp. 33-43.

_____ (1995). "Getting Agriculture Moving: Do Markets Provide the Right Signals?" *Food Policy*, Vol. 20, No. 5 (October), pp. 455-72.

_____ (1996a). "Agriculture and Poverty Alleviation in Indonesia." In Ray A. Goldberg, ed., *Research in Domestic and International Agribusiness Management*, Vol. 12 (Greenwich, CT: JAI Press), pp. 205-34.

_____ (1996b). "Food Supplies and Economic Growth in Great Britain, Japan and Indonesia." Cambridge, MA: Harvard Institute for International Development, typescript.

_____ (1996c). "Does BULOG Stabilize Rice Prices in Indonesia? Should It Try?" *Bulletin of Indonesian Economic Studies*, Vol. 32, No. 2, (August), pp. 45-74.

_____ Walter P. Falcon, and Scott R. Pearson (1983). *Food Policy Analysis*. Baltimore, MD: Johns Hopkins University Press for the World Bank.

Tomich, Thomas P., Peter Kilby, and Bruce F. Johnston (1995). *Transforming Agrarian Economies: Opportunities Seized; Opportunities Missed*. Ithaca, NY: Cornell University Press.

United States Department of Agriculture (1996). "The U.S. Contribution to World Food Security." The U.S. Position Paper Prepared for the World Food Summit. Washington, D.C.: United States Department of Agriculture; July 3.

Wickizer, Vernon D., and Merrill K. Bennett (1941). *The Rice Economy of Monsoon Asia*. Stanford, CA: Food Research Institute in cooperation with the Institute of Pacific Relations.

Williams, Jeffrey C., and Brian D. Wright (1991). *Storage and Commodity Markets*. Cambridge: Cambridge University Press.

Williamson, Jeffrey G. (1993). "Human Capital Deepening, Inequality, and Demographic Events along the Asia-Pacific Rim." In Naohiro Ogawa, Gavin W. Jones, and Jeffrey G. Williamson, eds., *Human Resources in Development along the Asia-Pacific Rim* (Singapore: Oxford University Press), pp. 129-58.

Wittfogel, Karl (1957). *Oriental Despotism*. New Haven: Yale University Press.

World Bank (1986). *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*. Washington, D.C.

_____ (1993). *The East Asian Miracle: Economic Growth and Public Policy*. London: Oxford University Press for the World Bank.