
Agricultural Employment Trends in Asia and Africa: Too Fast or Too Slow?

Derek Headey, Dirk Bezemer, and Peter B. Hazell

Contrary to conventional economic theories, the relationship between income growth and agricultural employment is extremely diverse, even among regions starting from similar levels of development, such as Asia and Africa. Due to its labor-intensive Green Revolution and strong farm–nonfarm linkages, Asia’s development path is mostly characterized by fast growth with relatively slow agricultural exits. In contrast to Asia, urban biased policies, low rural population density, and high rates of population growth have led a number of African countries down a path of slow economic growth with surprisingly rapid agricultural exits. Despite this divergence both continents now face daunting employment problems. Asia appears to be increasingly vulnerable to rising inequality, slower job creation, and shrinking farm sizes, suggesting that Asian governments need to refocus on integrating smallholders and lagging regions into increasingly commercialized rural and urban economies. Africa, in contrast, has yet to achieve its own Green Revolution, which would still be a highly effective tool for job creation and poverty reduction. However, the diversity of its endowments and its tighter budget constraints mean that agricultural development strategies in Africa need to be highly context specific, financially sustainable, and more evidence-based. JEL codes: O13, O15, O18

Long-run economic growth has been accompanied by a significant exodus of workers out of the agricultural sector. This observation was regarded as a robust stylized fact by early development economists and was incorporated into a wide array of development theory (Lewis 1954; Hirschman 1958; Kuznets 1973; Chenery 1979). Subsequent research has added important nuances to this observation—for example many agricultural workers move into the local nonfarm economy rather than to urban areas (Anderson and Leiserson 1980)—but the basic conclusion that development entails “agricultural exits” has rarely been

The World Bank Research Observer

© The Author 2010. Published by Oxford University Press on behalf of the International Bank for Reconstruction and Development / THE WORLD BANK. All rights reserved. For permissions, please e-mail: journals.permissions@oxfordjournals.org
doi:10.1093/wbro/lkp028 Advance Access publication February 4, 2010 25:57–89

questioned. Since 1960, however, trends in economic development and agricultural employment shares have systematically diverged: most of Asia has grown quickly but many Asian workers have stayed on the farm; and most African economies have made virtually no net real-income gains in the four decades from 1960 to 2000 (especially since 1980), though large numbers have left the farm, often for burgeoning cities.

We explore the causes of this divergence between Asia and Africa, and also attempt to answer two “so what?” questions. First, does it matter that workers are leaving agriculture more or less quickly than the norm (if there is a norm)? In other words is there anything special about agriculture that makes employment outcomes in that sector an important policy objective? Second, what sorts of development strategies would promote agricultural employment or accelerate the transition out of agriculture?

Research on and around these questions has a long history in mainstream development debates. Much of the concern in the 1950s and 1960s was with over-urbanization and the emergence of megacities in Latin America and Asia. After Sovani’s (1964) balanced critique of the over-urbanization thesis, economists remained relatively quiet on the subject, although Harris and Todaro’s (1970) work was a landmark paper in demonstrating how rational migrants could induce suboptimal outcomes at the macroeconomic level by adding to the problems of urban unemployment and congestion. The early literature on Asia’s Green Revolution also demonstrated that new technologies could generate significant employment growth both in agriculture and, via spillovers, in the rural nonfarm economy (Mellor 1976). The 1979 World Development Report (WDR) on *Structural Change and Development Policy* demonstrated that while “urbanization in the industrialized countries took many decades, permitting a gradual emergence of economic, social, and political institutions to deal with the problems of structural transformation, the process in developing countries is occurring far more rapidly,” especially in Latin America and sub-Saharan Africa. And although the report argued that intra-urban population growth was the primary cause of urbanization, it did conclude that urban-biased policies were accelerating rural to urban migration. Following Lipton (1977), the urban bias hypothesis continued to be explored by researchers both within and outside the World Bank (Bates 1981, World Bank 1984, 2000; Krueger, Schiff, and Valdes 1991; Fay and Opal 1999).

Three decades on from the 1979 WDR, the 2008 and 2009 WDRs (World Bank 2008, 2009a) are also reflections on these issues, and they justifiably pose new questions in light of additional facts and new knowledge. The WDR 2008 on *Agriculture for Development* (which an earlier version of this paper contributed to as a background paper) re-examines the roles that agriculture plays in growth and poverty reduction processes, and also distinguishes between economies at different stages of urbanization and agricultural employment shares (World Bank

2008, ch. 1). But it also poses new questions about the challenges of agricultural exits (World Bank 2008, ch. 9), especially the rural employment challenge, a theme just as relevant to Asia's "slow exit" problems as it is to Africa's "fast exit" problems. The 2009 WDR on *Spatial Disparities and Development Policies* also focuses on the rural–urban transformation, as well as related issues of territorial development and regional integration.

This article very much bridges the central themes of the 1979, 2008, and 2009 WDRs. In the next section we reinvestigate the relationship between economic growth and agricultural employment, though we also question the validity of the apparent break between Asia and Africa's development paths. We then seek to account for what appears to be a genuine divergence in Asia and Africa's agricultural exit paths, before examining the possibility that Asia's surprisingly slow urbanization may be related to rising spatial inequality, shrinking farms, and increasingly jobless growth. In the next section we examine the African context, where agriculture has long been neglected and where its future is still under debate. We conclude with a discussion as to how policymakers can address these problems.

Agricultural Exits and the Growth Process: Economic Theories and "Stylized Facts"

Structural change is a broad term which covers the shift of output, employment, and livelihoods away from the rural agricultural sector toward a predominantly urban nonagricultural sector. We will primarily focus on the shift from agricultural to nonagricultural livelihoods using measures of nonagricultural employment shares, rural nonfarm employment, and urbanization.

What does economic theory lead us to expect? Although schools of thought differ as to their explanations of why structural change should accompany economic growth, all schools emphasize that structural change is intimately connected with the growth process. For example industrialization strategies emphasize a modern industrial sector as the engine of growth. In this view agriculture is largely a backward, unproductive sector in which labor operates at low levels of productivity—it may even be characterized by zero marginal productivity or surplus labor (Lewis 1954)—and agriculture has weak upstream and downstream linkages with other sectors (Hirschman 1958). In contrast modern industry is a sector with considerable technological potential, increasing returns and agglomeration externalities, high degrees of labor intensity (at low levels of industrialization), and strong linkages to other sectors. The differential economic potential between the sectors is such that a transfer of labor and capital from agriculture to nonagriculture constitutes a significant source of both structural change and economic growth.¹

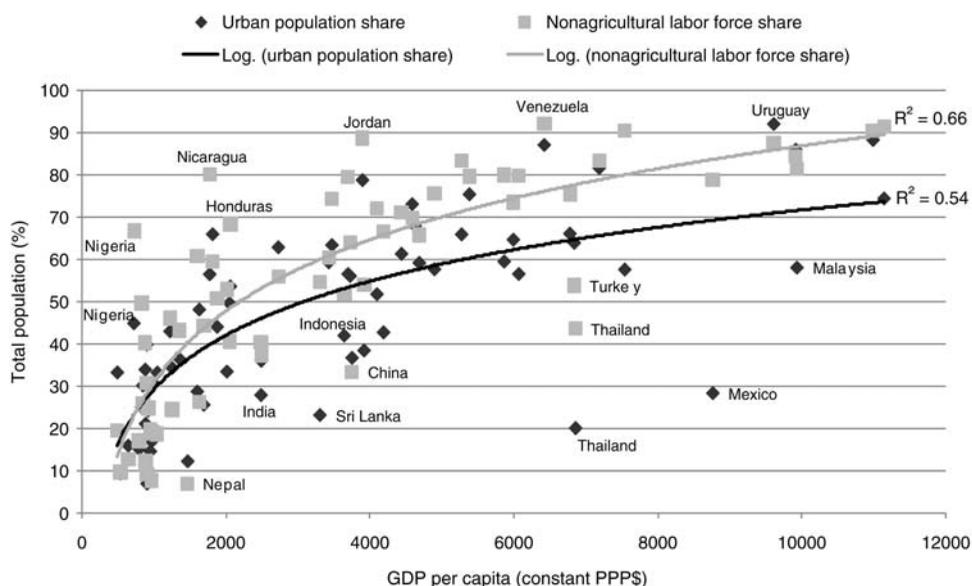
A second school of thought argues that agriculture can be an engine of growth, certainly at the early stages of development. As agriculture is often more labor intensive than nonagricultural industries (Schultz 1964), gains in agricultural productivity can contribute to higher employment and incomes, better nutrition and faster poverty reduction, and prevent distress migration from rural areas into urban unemployment. The Green Revolution demonstrated agriculture's considerable technological potential, as well as the benefits of its extensive upstream and downstream linkages to broader economic growth (Bezemer and Headey 2008). Indeed the potential of a dynamic agricultural sector to keep food prices low (and thereby curb wage inflation), to provide foreign exchange earnings via exports, and to increase rural demand for nonfarm production and consumption goods are all factors which suggest that agriculture can make substantial contributions to the industrialization process (Johnston and Kilby 1975). So this agriculture-first view *also* predicts that structural change and growth go hand in hand, but it distinguishes itself from the industry-first school by asserting that agricultural growth significantly drives nonagricultural growth, especially at the early stages of development (Hazell and Diao 2005; Diao and others 2007; Bezemer and Headey 2008).

From Theory to Experience: The Stylized "Facts" of Structural Change and Growth

Despite different assumptions and very different policy prescriptions, both views posit a strong positive association between measures of structural change and economic growth. With respect to the share of nonagricultural output in total output, this hypothesis is still well supported by the stylized facts: nonagricultural output shares rise in a fairly systematic fashion as GDP per capita rises, both in the long run and the short run (see World Bank 2008, figure 1.2).² But what about nonagricultural employment in total employment or, as a cross-check, the shares of the urban population in the total population? Are these measures just as strongly correlated with GDP per capita?

Superficially the answer is yes. Figure 1 demonstrates the conventional "long-run" association between GDP per capita, the nonagricultural labor force share, and the urban population share. Several facts are of note. First, the relationships are somewhat nonlinear, suggesting that structural change measures increase more rapidly than income in early stages of development (see also World Bank 2008, figure 1.2). Second, the nonagricultural labor force shares increase to higher levels than urbanization shares, suggesting that the rural nonfarm economy becomes increasingly important as development proceeds. Third, the relationship between sectoral employment shares and income is stronger than that of urbanization shares with income. Fourth, a number of Asian countries tend to be well under the "on average" log-linear regression lines, perhaps

Figure 1. Alternative Development Paths: Patterns of Growth and Structural Change, 1960–2000

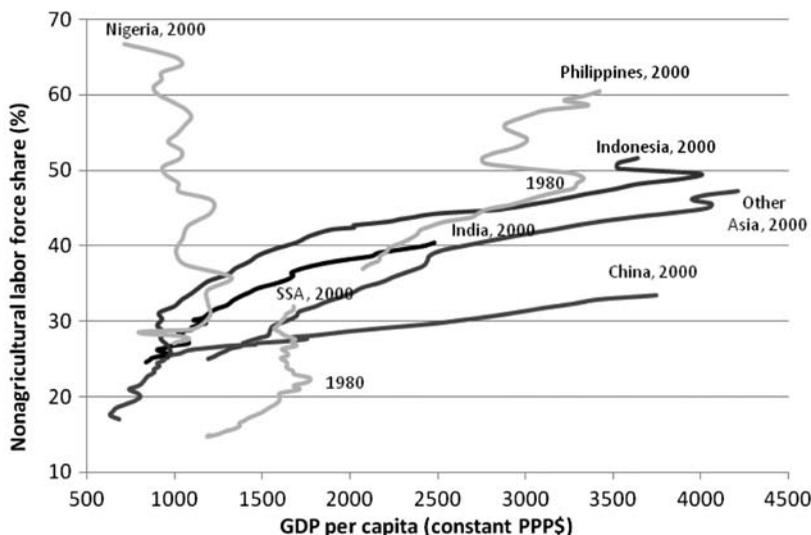


Sources: GDP data are from Summers and Heston (2002), labor force shares are from the FAO (2009), and urbanization data are from the World Bank (2009b).

suggesting some degree of under-urbanization; likewise, a number of non-Asian countries are well above the regression lines, perhaps suggesting over-urbanization. But despite these outliers, both relationships are reasonably strong; correlation coefficients with income per capita are in excess of 0.70 for both of these population measures.

On the basis of this strong “long-run” relationship one might be tempted to conclude that the stylized relationship between growth and agricultural employment remains robust. But this static snapshot largely obscures the diversity of agricultural exit paths since the end of the colonial era. In figure 2 we map out income and agricultural exit paths for various developing Asian and African countries over the period 1960 to 2000. Squared tips on these paths signify end-points for the year 2000; the opposite ends signify the starting points in 1960. The figure reveals that the trajectories for Asian and African countries are very different from each other.³ Asia—especially East Asia—has grown very quickly from a generally low base, though nevertheless experiencing surprisingly slow agricultural exits.⁴ In most Asian countries an income increase of \$1,000 per capita only resulted in a 10-point increase in the urban population share. China’s low rate of urbanization is especially well documented, but Indonesia has followed

Figure 2. Alternative Development Paths: Agricultural Exits and Economic Growth, 1960–2000



Notes: SSA = sub-Saharan Africa; Other Asia = Sri Lanka, Malaysia, Bangladesh, Thailand, Vietnam, Nepal, Pakistan.

Sources: GDP: Summers and Heston (2002); urbanization: World Bank (2009b); labor force share: FAO (2009).

a remarkably similar path, and India is on a similar trajectory despite less substantial income gains. Other Asian countries—Sri Lanka, Malaysia, Bangladesh, Thailand, Vietnam, Nepal, Pakistan—have followed a parallel route but with even lower nonagricultural employment levels. The one exception in this Asian sample is the Philippines. From 1960 to 1980 that country followed the usual East Asian path of fast growth (a gain of roughly \$1,250 per capita) and modest agricultural exits (just a 7-point increase). But a sharp growth deceleration from 1980 to 2000 left income unchanged, even though Filipinos continued to leave the farm.

Despite starting from a similar base, Africa has followed an opposite path to Asia's, although its story is more nuanced. Africa's largest country, Nigeria, has experienced 40 years of large numbers of people leaving agriculture, despite no significant GDP growth (in fact Nigeria's real GDP per capita actually declined by \$300 during 1960–2000, while the reported share of nonagricultural employment in the total population increased by almost 40 percentage points). As for the rest of Africa, this basic trajectory still holds, but not quite so dramatically, and its dynamics are more similar to those of the Philippines than to Nigeria. Other sub-Saharan African countries experienced modest rates of growth and agricultural exits from 1960 to 1980, before experiencing 20 years of stagnant income growth which coincided with a continued shift out of agriculture.

Moving beyond averages, agricultural exit rates within Africa really fall into three tiers over the 1980–2000 period. One group that experienced rapid changes in nonagricultural employment shares of 20 percentage points or more consists mostly of oil producers like Cameroon, Sudan, Angola, and Nigeria. A second group experienced shifts of 10–15 percentage points (for example Sierra Leone, Ghana, Rwanda)—which is still high compared to Asia’s trajectory. A third group witnessed changes of less than 10 percentage points (including Ethiopia, Africa’s second largest country).

These dynamic portraits of alternative agricultural exit paths therefore tell a very different story to that of the long-run snapshot in figure 1, but we need to be careful about reading too much into them. On the basis of figure 2, for example, one might conclude that since Asia has experienced the most rapid economic growth, its process of slower agricultural exits represents a “best practice” benchmark. However, employment decisions could merely be a by-product of other growth determinants, such as agricultural and industrial policies, yet not have any causal influence on growth by themselves. Even more confounding for our analysis is the possibility that these stylized facts are actually biased by some serious data issues.

Stylized Facts or Stylized Falsehoods?

Are the remarkably divergent trajectories of Asia and Africa real, or are they somehow induced by biases originating from either economic growth data or employment data? In truth, both sets of measures are far from perfect. Biases in something as commonly used as GDP data are often overlooked, but it is possible that China’s growth is somewhat overestimated (see for example Maddison 1998; Rawski 2001; Wang and Meng 2001; Holz 2004) and that Africa’s is somewhat underestimated because of a larger informal economy (Schneider 2005; Henderson, Storeygard, and Weil 2009). In other countries, such as the Philippines, the omission of overseas workers’ remittances will also lead to underestimation of real income growth. Yet biases in GDP data pale in comparison to those found in employment and urbanization data, which are flawed due to conceptual problems as well as infrequent and imprecise measurement. The UN urbanization estimates are widely contested, for example, and it is well known that definitions of ‘rural’ and ‘urban’ vary substantially across countries and, for some important countries such as China, across time (Headey, Bezemer, and Hazell 2008). Issues with employment data are much less discussed and more pertinent to this paper, so we will look at these more closely.

In table 1 we compare male nonagricultural employment shares from the standard FAO/ International Labour Organization (ILO) data to estimates derived from the Demographic Health Surveys (DHS). In principle, both purport to measure the

Table 1. Alternative Estimates of Male Nonagricultural Employment Shares (%), circa 2000–2005

<i>Region/country</i>	<i>No. obs.</i>	<i>FAO</i>	<i>DHS</i>	<i>Difference</i>
Central America	6	51.6	51.5	–0.2
East Africa	8	23.3	31.4	8.0
Central Asia ^a	6	76.8	54.6	–22.2
South America	4	61.9	64.4	2.5
Other South Asia	4	30.7	46.8	16.0
Southern Africa	23	39.3	34.7	–4.7
West Africa Sahel	12	22.2	32.9	10.7
West Africa Coastal	19	42.0	39.8	–2.3
Nigeria	1	70.3	66.4	–3.9
Philippines	1	53.8	56.4	2.6
Indonesia	2	55.9	61.2	5.3
	<i>No. obs.</i>	<i>FAO</i>	<i>National source</i>	<i>Difference</i>
China ^b	1	35.7	53.1	17.4
India	1	55.9	52.1	–3.8

^a For simplicity, Central Asia includes the Ukraine and Turkey, which are not normally regarded as Central Asian countries.

^b Chinese data relates to both male and female employment for both FAO and the national source.

Notes: For Nigeria the DHS estimates were sensitive to treatment of unemployment data. Excluding all unemployment lowered Nigeria's nonagricultural employment share, but we opted to distribute the rural unemployed to the agricultural and nonagricultural sectors based on the (non)agricultural employment shares of the employed rural male population.

Sources: FAO (2009) and DHS (2009). Indian and Chinese data are drawn from their respective national statistical agencies.

same thing: the primary occupation of adults, both male and female. ILO data are based on official labor force surveys and population censuses, but the ILO faces a number of challenges in deriving internationally comparable data. First, the paucity of survey/census data is serious indeed, so much so that reported ILO labor force participation data are actually extrapolations from an econometric model, with only about 20–30 percent of the full panel data pertaining to actual survey/census data (ILO 1996, 2008). For African countries, however, this ratio is only 6.5 percent. Second, labor force surveys are known to be both urban biased and gender biased, with women's participation in agriculture often under-reported for cultural reasons (on urban biases in labor force surveys, see Timmer and de Vries 2007; on gender biases see ILO 2008). In comparison, while the DHS do not have the objective of measuring occupational data or other economic variables, the fact that the surveys cover nearly all African countries in a nationally representative fashion suggests that they make a useful benchmark. Moreover all the DHS data are drawn from surveys carried out in the late 1990s or 2000s, and are thus very recent. Note, however, that DHS are not carried out for China,

so we use Chinese Bureau of Statistics data for the comparison of Chinese statistics. We also do the same for India because national sources are probably more reliable there than those of the DHS.

Table 1 suggests that there are some large differences between the two sources, especially in particular regions. FAO/ILO nonagricultural employment shares look relatively low for East Africa, other South Asia, and the West African Sahel, but much too high in Central Asia. Also of interest are some of the larger countries in East Asia as well as Nigeria. We find that the FAO/ILO may slightly overstate nonagricultural employment in Nigeria, although the DHS estimate still suggests that two-thirds of Nigerian men have already left agriculture as a primary occupation.⁵ In the Philippines and Indonesia the differences are not large, but DHS puts nonfarm employment at over 60 percent in Indonesia. More disconcertingly the data suggest that the ILO may be substantially underestimating nonagricultural employment in China, for which we report both male and female employment together. FAO/ILO estimates put this figure at just 36 percent, while national data sources put it at 53 percent. Of course this is still considerably lower than Nigeria, even though average Chinese incomes are five times higher than Nigerian incomes. As with China our Indian benchmark comes from a national source, although in this case the estimate matches the FAO estimate quite closely.

Another important issue is the extent to which individuals adopt diversification strategies, working in both agriculture and nonagriculture on either a part time or seasonal basis. The primary employment data in table 1 obviously completely bypass this important issue. Of particular interest is the hypothesis that while rural Asians may not have moved to cities in huge numbers, they have had the opportunity to diversify into the rural nonfarm economy. Data issues again pose a challenge to assessing this bias given differing definitions of 'rural' and other comparability issues. What data there is also show a nuanced message on differences between Asia and Africa. On the one hand, DHS data for the late 1990s and 2000s indicate that Africa's rural nonfarm employment shares average around 27.5 percent once some small countries are excluded (Lesotho, Swaziland), while Asia's is around 36.8 percent (and just 33 percent if the Philippines is again excluded as an outlier). However, income data show a larger gap. Winters and others (2008), for example, use 15 household surveys to show that rural nonagricultural income shares range from 34–81 percent in five Asian countries, but are under 50 percent in four African countries; and earlier evidence in Haggblade, Hazell, and Reardon (2007b) show that manufacturing is a much more important rural nonfarm activity in Asia than it is in Africa. Hence the usual conclusion is that Asia has a much more vibrant rural nonfarm economy, a topic we take up in subsequent sections.

In summary, we find that although various biases in employment and demographic data might explain some of the divergence in employment trends between

Asia and Africa, they don't eradicate the difference altogether. For the most part, Asia really has grown quickly, but it has experienced a surprisingly slow exodus from agriculture, though balanced to some degree by a higher diversification into the rural nonfarm economy. Africa, in contrast, has witnessed a large exodus from agriculture, often to burgeoning cities (some 10,000 people are estimated to migrate to Lagos every day), despite virtually no real income gains. So whilst the rapidly divergent trajectories between Asia and Africa might be partially closed by better data, the large residual divergence still presents us with a set of stylized facts worthy of further investigation.

Explaining the Divergence between Africa and Asia

Why have so many Africa countries experienced a significant structural shift in employment in the absence of significant economic growth? And why have most of Asia's fast-growing economies not experienced larger structural shifts? Whilst employment shifts and migration have complex country-specific determinants (Karp 2007; de Brauw and Carletto 2008), we focus on the principal factors that would seem to explain this broad divergence across Africa and Asia.

Specifically, we argue that the slower than expected employment exit in Asia can be attributed to at least six factors. First, Asia's Green Revolution catalyzed rapid growth in farm incomes and labor productivity, making it more attractive for workers to stay in agriculture. Second, the Green Revolution technologies were, initially at least, highly labor intensive, creating many additional productive jobs. Third, the rural nonfarm economy (RNFE) grew more rapidly in Asia—driven initially by increases in agricultural income, dense population, and settlement patterns—enabling many farm households to diversify their incomes whilst still relying on agricultural activities for their principal livelihood. Fourth, dense settlement patterns also meant that rural people had relatively good access to public services in rural areas and didn't need to migrate to cities to improve the basic quality of life. Fifth, many farmers cannot easily exit farming and it is instead their children who leave the farm. Farm exits simply take time—over several generations in today's industrial countries—and Asia's unprecedented rates of growth in per capita GDP could well be building up a backlog of potential exits for the future. Sixth, in some countries there have been barriers to rural–urban migration (for example China) that have made agricultural employment exits more difficult.

An important point is that many of these drivers reflect Asia's aggressive investment in agricultural and rural development over the past five decades, as well as accelerating rates of national economic growth. Asian governments have consistently expended 10–15 percent of their total budget on agriculture. During the

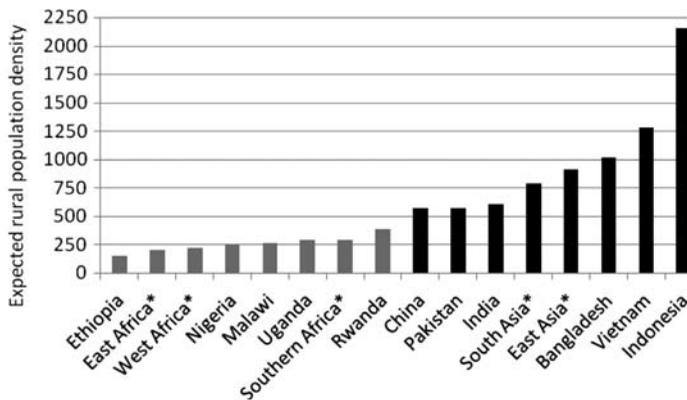
Green Revolution era most of this went into agricultural R&D, irrigation, and rural roads. Asian governments also provided direct policy support to agriculture by shoring up farm credit systems, subsidizing key inputs—especially fertilizers, power, and water—and intervening in markets to ensure that farmers receive adequate and stable prices each year, and that small farmers were not left behind. (Djurfeldt and others 2005). Many Asian governments directly promoted rural nonfarm activities (Mukherjee and Zhang 2007; Otsuka 2007), while rural–urban inequality in the supply of public health, education, and social services has also been relatively low in Asia.

Africa, in contrast, has pursued a very different pathway that has encouraged rapid rural–urban migration. African governments essentially failed to induce a Green Revolution. The adoption of modern techniques has been much lower there compared to all other developing regions (see World Bank 2008, figures 2.1 and 2.2), and per capita agricultural output stagnated and even declined over much of Africa since 1960. Stagnating farm incomes, weak growth in productive farm jobs, and rapid population growth have all contributed to encouraging workers to seek alternative livelihoods in the cities. Poor infrastructure, more dispersed settlement patterns, and slow growth in agricultural incomes have also contributed to a low return RNFE sector that encourages rural–urban migration over rural income diversification (Reardon 1997).

The reasons for the underlying failure of agricultural and rural development in Africa are complex, but they can broadly be grouped into exogenous factors (that is endowments) and endogenous policy-related factors (Johnson, Hazell, and Gulati 2003). In terms of the former, Africa is exogenously constrained by its geography. It possesses much more diverse agricultural conditions and outputs than Asia. FAO data suggest that in 1980 about a quarter of total crop land in Asia was devoted to rice, wheat, and maize—the first crops to benefit from high yielding varieties—whereas just 11 percent of Africa’s cropped area was devoted to these crops, and most of this was maize. Sustained R&D has produced high-yielding African crop varieties, such as the International Institute for Tropical Agriculture (IITA)’s improved cassava varieties, but producing and disseminating these varieties has taken longer, and R&D and extension activities have long been underfunded in Africa.

Rural population density in Africa is also much lower than it is in Asia. Using geospatial mapping, figure 3 reports estimates of the population density experienced by the average rural African. The figure indicates that most rural Africans live in areas that are much less densely populated than rural Asia. Low population density implies land abundance and isolation from large urban markets, which constrain the demand for technologies that would more intensively utilize existing land as techniques like fallow farming (rotating fields) are an alternative to fertilizers for the maintenance of soil fertility (Binswanger and McIntire 1987).

Figure 3. Population Densities Experienced by an Average Rural Person, Africa and Asia, 2000



* These population densities are calculated for the region as a whole.

Notes: This measure of “expected” rural population density is the sum of populations in square kilometer grids in a country, weighted by the population shares of the grids within the total country population. This measure is therefore “population-weighted population density,” and it reflects the population density experienced by an average rural person.

Source: Authors’ calculations from the Global Rural–Urban Mapping Project (GRUMPS 2008).

Moreover isolation from large urban markets keeps land prices low and encourages the persistence of low value crops, raises the costs of inputs, and reduces the prices farmers receive for outputs. Finally, low population density constrains the growth of the rural nonfarm economy (Haggblade, Hazell, and Reardon 2007b) and makes the provision of economic infrastructure and social services more costly (Hewett and Montgomery 2001).

With regard to policies, African governments generally discriminated against both agriculture and rural populations through biases in macroeconomic policies and public investments (Lipton 1977; Bates 1981; Krueger, Schiff, and Valdes 1991; Hazell and Diao 2005). As Bezemer and Headey (2008) discuss, urban biased development policies partly arose because of historical and ideological forces dating back to colonial policies, the import-substitution-industrialization strategies of the 1950 s and 1960 s, and the neglect of agriculture among foreign aid donors. But such biases are also institutionalized by the political disenfranchisement of the rural poor (and in some cases disenfranchisement of particular rural ethnic groups), who lack the economic and political conditions for effective political action (Binswanger and Deininger 1997).

How important are these policy factors today? With the structural adjustments of the 1980 s and 1990 s, macroeconomic distortions against African agriculture have indeed declined—but so have public investment and foreign aid to the sector.

Welfare measures also still indicate very high differences between rural and urban populations. The World Bank's *Rural Poverty Report* (2003), for example, finds that access to safe water, improved sanitation, and education and health services is generally 20 to 30 percentage points higher in urban than in rural areas. Hewett and Montgomery (2001) find that 88 percent of Africa's urban households receive electricity, as compared to just 5 percent of rural households. Consistent with this welfare gap, Africa's rural poor seem to be increasingly migrating to urban areas (Ravallion, Chen, and Sangraula 2007).

Asia's Slower Exit out of Agriculture: A Successful Strategy Now Running out of Steam?

In the previous section we told an Asian story that bore all the hallmarks of an economically successful development path in which agriculture served as the principal engine of national poverty reduction. Much of Asia thereby mitigated many of the problems associated with rapid agricultural exits and urbanization, especially rising urban unemployment and its related problems. But despite their previous success, Asian economies arguably face a number of challenges. Although parts of East Asia will experience an aging of their populations over the next few decades (see below), much of South and Southeast Asia will still experience a sharp rise in the number of working age adults. It is already clear that Asian agriculture has limited prospects for absorbing the majority of these new workers. Declining yield growth, shrinking farm sizes, decreasing labor intensity, demographic change, and "brain drain" are all major challenges for Asian agriculture, as is the persistence of poverty among particular social groups and geographically disadvantaged regions that were largely bypassed by the Green Revolution. Urbanization projections (for what they are worth) suggest that there will be about 8 million new urbanites per year in China, 11 million per year in India, and 16 million per year in the rest of Asia (Bocquier 2004). In this section we assess the hypothesis that Asia does indeed have a growing backlog of agricultural workers who require more employment opportunities outside of agriculture. Specifically, we look at three significant pieces of evidence consistent with this conjecture.

Diminishing Returns in Asian Agriculture

Asia's Green Revolution began over four decades ago, and in almost all instances resulted in rapid growth in yields over a number of years. Maintaining high growth rates has proved increasingly difficult, however, such that yield growth in key staples has declined from 2–3 percent per annum in the 1970s to around

1 percent per annum in the last decade or so (World Bank 2008, pp. 66–7). This is partly the result of inevitable technological barriers, but is also due to unsustainable policies that encouraged the wasteful use of fertilizers, electricity, and irrigation. Water, especially, is becoming an increasingly large constraint on yields, with the ground water overdraft rate estimated to exceed 25 percent in China and 56 percent in India's north-west breadbasket, while absolute water scarcity is thought to affect over 850 million people in developing Asia (IWMI 2007).

An additional constraint is farm size. Principally because of rural population growth, average farm sizes in Asia are shrinking markedly (table 2). In India they fell from an average of 2.3 hectares in 1971 to 1.4 hectares in 1995/96; in Pakistan from 5.3 to 3.1 hectares; and in Bangladesh from 1.3 to just 0.6

Table 2. Changes in Average Farm Size and Number of Small Farms

Country	Census year	Average farm size (ha)	Number of small farms* (millions)
India	1971	2.3	49.11
	1991	1.6	84.48
	1995/96	1.4	92.82
Bangladesh	1977	1.3	—
	1996	0.6	17.03
Nepal	1992	1.0	2.41
	2002	0.8	3.08
Pakistan	1971/73	5.3	1.06
	1989	3.8	2.40
	2000	3.1	3.81
Indonesia	1973	1.1	12.71
	1993	0.9	17.27
Philippines	1971	3.6	0.96
	1991	2.2	3.00
Vietnam	2001	—	10.13
Lao PDR	1999	—	0.49
Myanmar	1993	—	1.66
Thailand*	1978	3.6	—
	1993	2.9	1.86
China	1980	0.6	—
	1990	0.4	—
	1997	—	189.38
	1999	0.4	—
Total	c. 2000		340.53

* The definition of a small farm is 2 hectares for all countries except Thailand, where Anriquez and Bonomi (2007) define small farms as less than 1.6 hectares.

— Not available.

Source: The majority of the data are from Nagayets (2005), although much of the data on the number of small farms are from Anriquez and Bonomi (2007).

hectares. We estimate that in 2000 there were roughly 340 million farms in developing Asia smaller than 2 hectares.

Whether these smallholders are microeconomically inefficient has been a subject of perpetual debate since Berry and Cline (1979), if not earlier. Reviews of the issue by Fan and Chan-Kang (2005) and Anriquez and Bonomi (2007) suggest that small farm productivity varies over regions, over levels of development, and over how one defines 'efficiency' (for example as 'land productivity,' 'labor productivity,' or 'total factor productivity'). What is not in dispute, however, is that the successful adoption of modern technologies by Asian smallholders has resulted in significant poverty reduction, an outcome which is difficult to envisage being achieved through allocating resources to large farms. But can this process be sustained? Two more contemporary concerns must now enter this debate. The first is whether the economic viability of smallholders is declining because of the growth of agribusiness and globalization processes (Joshi, Gulati, and Cummings 2007). The second is whether Asian farm sizes are now declining to the point where they will be inefficient, even if they were not so in the past. Many small farmers are now part-time, for example, and may not be as driven by efficiency concerns as before. Shrinking farm sizes may also explain why the rural nonfarm (RNF) sector appears to have been considerably more vibrant than the farm sector in many parts of rural India (Foster and Rosenzweig 2004).

Persistent Rural Poverty and Rising Rural–urban Inequality

Despite a history of high agricultural growth rates and rural income diversification, Asia is still characterized by large numbers of people who have not significantly benefited from rapid economic growth (Fan and Hazell 2001). The poorest of the poor are often concentrated in geographically adverse regions (for example isolated mountainous regions in Eastern India, Western China, Northern Thailand, and Vietnam), in tribal regions or among low caste groups, and in areas with particularly poor governance or political instability (for example India's Bihar state). Absolute poverty numbers are also a significant problem in Asia, especially in rural areas. Whilst China made great strides in reducing rural poverty in the 1980s, absolute numbers of poor people have remained stubbornly high in many other parts of Asia (World Bank 2008, p. 3) and may even have increased in absolute numbers in India during the 1990s (Deaton and Kozel 2005).

Part of the rising inequality may be connected to the feminization and aging of rural labor forces (Buvinic, Gwin, and Bates 1996; Mehra and Gammage 1999), which may impede labor force mobility. But this is still uncertain, as solid evidence for agricultural labor force feminization is scarce to date. De Brauw's (2002) empirical study for China actually finds the opposite: the

proportion of farm work being done by women was *declining* over the late 1990 s, and future feminization of agriculture in China is judged unlikely. Anriquez and Bonomi (2007) collate data from various agricultural censuses and find that feminization of the rural labor force is only a concern in Africa, and that rural aging issues are not of pervasive concern in any country in their sample. However, that sample did not include China, where increasing numbers of older rural people are being left behind by economic growth (Benjamin, Brandt, and Giles forthcoming).

Somewhat surprisingly, however, rural–urban inequality shows no signs of having systematically increased in Asia (Eastwood and Lipton 2004), although spatial inequality has risen markedly in China, India, and Indonesia (Milanovic 2005), again reinforcing the importance of lagging regions. China is a significant case in that both spatial inequality and rural–urban inequality have been rising rapidly. In China, rural–urban inequality was relatively high in the pre-1978 period (especially given that overall inequality was very low), but it decreased markedly during the period of major agricultural reforms in the early 1980 s (due to the household responsibility system and the dual track price mechanism). However, from 1985 to 1999 China’s income distribution changed along a number of different dimensions: rural–urban inequality increased back to its 1978 level, spatial inequality rose markedly (Kanbur and Zhang 2005; Milanovic 2005), and overall income inequality has risen from an admittedly very low Gini coefficient of 0.22 in 1978 to a relatively high 0.45 in 2003 (Chotikapanich and others 2007). With the exception of Vietnam, China’s structural features are quite unique, so it is not clear that other Asian countries are as vulnerable to rising inequality as China has been. Nevertheless China’s experience demonstrates some of the costs of restrictive migration policies and spatially biased reform strategies (Kanbur and Zhang 1999), which have brought rapid growth at the cost of rising inequality.

The Threat of Jobless Growth

The aforementioned factors suggest that Asia’s agricultural sector will still need to shed many more workers in years to come. A preliminary sign of that problem is that output-employment elasticities (OEEs) in Asian agriculture have declined over much of the 1990 s (Bhalla and Hazell 2003; Bhattacharya and Sakthivel 2004; Khan 2007). Ultimately the greatest challenge for Asia’s vast population will be creating enough nonagricultural jobs, and at a fast enough rate. Recent evidence suggests that the labor intensity of manufacturing growth is declining over most of Asia, including Asia’s largest countries, China and India. Khan’s (2007) comprehensive review of a series of United Nations Development Programme (UNDP) country studies on employment and output growth are

Table 3. Trends in Output-employment Elasticities (OEEs) in Seven Asian Countries

<i>Country</i>	<i>Trend</i>
China	Agriculture started shedding labor from the early 1990 s, but this was reversed for a period starting in 1997. Industries and services experienced sharply falling OEEs. Overall employment performance has been poor. The problem appears essentially to be one of poor management of transition.
Indonesia	Employment performance was good prior to the crisis. OEE in manufacturing fell sharply in the recovery period. There was a reversal of the long-term reduction in agriculture's share of employment. On balance employment performance has been poor in the recovery period.
Malaysia	OEEs have shown no trend reduction. Growth has been employment friendly overall.
Philippines	Estimates of employment intensity in the case study are inadequate to arrive at a firm judgment although it appears, from findings of other studies, that there were institutional obstacles to labor absorption in agriculture and manufacturing.
Thailand	OEEs were higher for the nonagricultural sectors in the 1990 s (until 1996) than in the 1980 s but the overall OEE was lower due to the fact that agriculture's OEE turned from a positive value in the 1980 s to a highly negative value in the 1990 s. In the recovery period the OEE for manufacturing fell somewhat but the same for construction and services rose. The Lewis transition in agriculture of the 1990 s was reversed.
India	In the post-reform period the OEEs fell and employment growth fell as compared to pre-reform period. But real wages rose presumably due to a supply-induced tightening of the labor market.
Sri Lanka	With the exception of a few subsectors of industries and services OEEs were reasonably high and growth was employment intensive.

Source: Adapted from Khan (2007).

presented in table 3. These studies confirm a tendency toward declining employment intensity in agriculture, but they also suggest declining employment intensities in manufacturing. In India, capital-biased industrial policies and prohibitive labor regulations have led to an economic structure ill-suited to India's labor abundance (Besley and Burgess 2004; Kochhar and others 2006). China's story is more complex as it partly relates to the varying fortunes of China's Town and Village Enterprises (which were a source of significant labor absorption in the 1980 s before credit constraint slowed their growth), and partly to the gradual shedding of surplus labor from state-owned enterprises (Khan 2007). Prior to the recent financial crisis, rural–urban migration in China looked set to add further pressure on nonagricultural labor markets, but this trend will mostly like resume once the short-term effects of the crisis abate. Between 1999 and 2003, for example, the number of internal migrants in China roughly doubled, from 52 to 98 million, and China's 2000 census indicated annual migration rates of 8.5 percent of the workforce, with roughly 30 percent heading to local townships, 30 percent to other counties in the same province, and 40 percent representing movement across provinces (Du, Park, and Wang 2005).

To summarize, we know that most of developing Asia has achieved remarkable feats of growth and poverty reduction with relatively little urbanization, largely through a combination of rapid agricultural growth and spatially dispersed industrial growth. However, the potential of Asian agriculture to keep people on the land has diminished markedly in recent decades, and there are justified concerns that the sheer number of jobs that need to be created outside of Asia's agricultural sector will impose a daunting challenge on the region. Such challenges would be large for any economy, but they are now magnified because the same problem is emerging simultaneously for a number of very populous Asian countries. Previous research has attempted to assess what the implications are of cheap and abundant Asian labor on labor markets in other regions of the world, such as Latin America (Wood 1997). But one might also ask whether large Asian countries will also experience lower employment growth as a result of increased competition from each other (that is in export markets).⁶

Agricultural Employment and Agricultural Potential in Sub-Saharan Africa

The exodus of so many African people from agricultural activities, in spite of minimal or even negative economic growth, potentially poses a serious challenge to the conventional thinking that structural transformation is part and parcel of economic development. The 2008 *World Development Report*, for example, distinguishes between agriculture-based, transforming, and urbanized economies, but the extreme case of Nigeria seems to be one of transformation without development. Moreover, African agriculture's poor performance has induced pessimism in some quarters with regard to the sector's capacity to achieve rapid growth and poverty reduction. Hence in this section we revisit the ongoing debate as to whether African agriculture really has the potential to achieve the kind of job creation, poverty reduction, and structural transformation that the Green Revolution achieved for Asian economies.

The Case for Agriculture-based Development Strategies in Sub-Saharan Africa

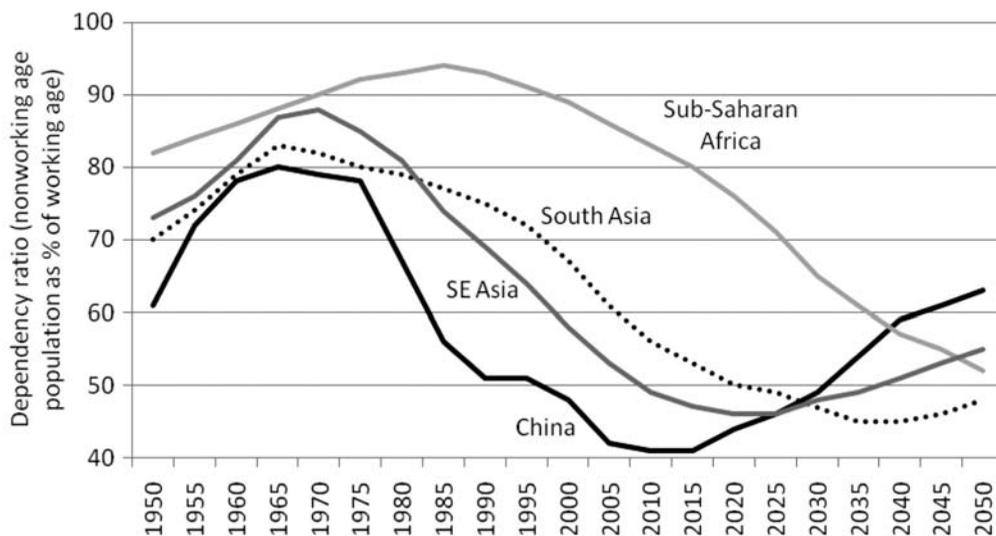
One of the reasons agricultural growth is thought to be so important at initial stages of development—especially for poverty reduction—is simply one of arithmetic. Consider a stylized economy in an early stage of development: the majority of the population is rural and mostly engaged in the production of a few staple crops; most rural people are poor and typically more so than urban people (Sahn and Stifel 2003; World Bank 2003); and food consumption is a large share of a

typical household's budget (50 percent or more). In this kind of economy the potential for a given growth rate in food production to raise the incomes and nutrition levels of most of the population, including the poorest, is tremendous (Diao, Headey, and Johnson 2008). The single most important commodity group for poverty reduction and nutritional improvements— (staple foods) —becomes cheaper for both the rural and urban populations, and the two most important assets that the poor own—their labor and their land—are suddenly in much greater demand (Lipton 2009).

There are some qualifications to this stylized model, of course. First, the more food prices fall, the weaker is the incentive farmers have to increase agricultural production (Diao, Headey, and Johnson, 2008). Second, if the addition to farmers' incomes is also spent on food, demand for nonfarm labor may be limited (Dercon and Zeitlin 2009). Third, if unskilled wages do go up (or if food prices don't fall), other sectors may become less competitive, which could inhibit rather than promote structural transformation (Lewis 1954). Because of these tradeoffs there is potentially a role for strategic trade and pricing policies aimed at redistributing the effects of agricultural production growth across consumers, producers, unskilled workers, and the domestic and world economy. However, the basic reasoning of this simple model is sound, and there is also ample historical, econometric, and household modeling evidence to confirm these basic intuitions (Ravallion and Datt 1996; Djurfeldt and others 2005; Chen and Ravallion 2007; Ravallion, Chen, and Sangraula 2007; Christiaensen, Demery, and Köhl 2006; Ivanic and Martin 2008; World Bank 2008).

Perhaps the most important aspect of this model, especially in the current context, is the extent to which a given agricultural growth rate raises the demand for labor. This channel is especially important because Africa is undergoing the early stages of the so called demographic transition in which the working age population becomes large relative to the dependent population (the very young and very old). Figure 4 shows that since 1985 Africa's age dependency ratio has started declining, and that it is expected to decline at a faster rate until at least 2050. The "demographic window" presented by this decline in age dependency ratios presents Africa with both an opportunity and a threat. The opportunity arises because the increasingly larger share of productively employed adults in a population raises incomes per capita, which in turn creates opportunities for increased investments in human and physical capital for the next generation. As figure 4 shows, age dependency ratios started declining in Asia in the early 1970s, and previous research has shown that the region's unusually fast demographic transition accounted for one-third to one-half of East Asia's dynamic growth rates during the period 1965–1990 (Bloom and Williamson 1998). However, that research also suggested that the benefits of the transition are not inevitable. If African economies cannot create sufficiently productive

Figure 4. Trends in Age Dependency Ratios: Africa's Demographic Window Is Opening Up



Source: Authors' calculations from UN (2009) data.

employment—as East Asia did—these countries will end up bypassing this unique growth opportunity. Worse still a large population of underemployed young men greatly raises the threat of conflict: one study estimates that the risk of civil war is increased from 4.7 to 31 percent if the share of young men in the population doubles (Collier, Hoeffler, and Rohner 2007).

This reasoning suggests that the goal of creating productive employment should be much higher on Africa's development agenda. Existing evidence also suggests that smallholder-based agricultural growth could be an engine of job creation in predominantly rural economies, and that it should generally be preferred to largeholder-based growth because of small farmers' greater use of both family labor and hired labor (Hazell and Diao 2005; Lipton 2009). As for nonagricultural sectors, data on labor intensity are far too scarce and labor intensities vary so much that we are reluctant to generalize. However, we do know that many leading nonagricultural sectors in Africa, such as mining, are much less labor intensive than agriculture. This means that in a typical agriculture-based economy a purely nonagricultural growth strategy is overburdened from an employment perspective. Turning back to the stylized agriculture-based economy we considered above, let us assume that the agricultural population share is around 70 percent, the growth in the labor force is around 3 percent per annum (an average for developing countries in the 1990s), and that agricultural growth is at least somewhat more labor intensive than nonagricultural growth

(for example a growth elasticity of 0.5 versus one of 0.3 for nonagriculture). If an industry-first strategy implies that agricultural production only keeps up with population growth, then a simple back-of-the-envelope calculation suggests that nonagriculture would have to grow by over 20 percent per year to absorb surplus labor (Headey, Bezemer, and Hazell 2008).⁷ It is also significant that while East Asian countries like China and Vietnam have achieved remarkable rates of industrial growth in the last few decades (typically in excess of 10 percent per annum), they still would have incurred significant unemployment problems had agriculture also not grown by 4–6 percent per annum. So from a job creation perspective, smallholder agriculture-based growth looks the best bet.

Limitations of the Agriculture-first Model in Sub-Saharan Africa

However, most critics of agriculture-first models do not contest the labor-intensive nature of smallholder-based growth. Instead they argue, for various reasons, that agriculture-based growth prospects in Africa are simply very limited. One potentially very important criticism is that Asian experiences cannot simply be transplanted to Africa. And indeed, as we noted above, Africa's agronomic endowments are very different to those of Asia, especially in terms of the diversity of crops produced, the extent of irrigation, the diversity and quality of soil and climate types, and the generally lower population density. This implies that more locally adapted high-yielding varieties (HYVs) must be produced, while greater land availability in some parts of Africa suggests that the demand for HYVs and other land-intensive technologies may be more limited than was the case in population-dense Asia (Binswanger and McIntyre 1987). Yet despite these limitations Africa does have a number of both experimental and localized R&D success stories (Haggblade and Gabre-Mahdin 2004), such that the real question is arguably why these success stories are so rarely scaled up. Agroclimatic diversity could partly explain the poor uptake, but low R&D expenditures, pricing biases, insufficient investments in complementary investments (for example infrastructure), and unfavorable political economy factors also seem explain to the divergence between African and Asian agriculture (Djurfeldt and others 2005; Bezemer and Headey 2008).

A second problem with an agriculture-based strategy for Africa is that, relative to Asia, many African economies are abundant in oil or other mineral resources (Nigeria, Angola, Cameroon), and the group seems to be getting larger as countries like Chad, Ghana, and Uganda have recently started to develop large oil deposits. This naturally prompts some economists to argue that the comparative advantage endowed by resource abundance implies that agriculture has diminished in importance in Africa (Collier 2007; Dercon 2009). However, this argument seems to rely on some implicit assumptions that are questionable at best.

First, even if growth is regarded as the sole economic objective, the general equilibrium implications of oil revenues are not very favorable because oil sectors have weak and potentially negative linkages to other sectors (because of the inflationary effects of “Dutch Disease”). Second, if governments are trying to reduce poverty, then job creation is of the utmost importance. However, by themselves the oil and minerals sectors have very limited employment potential because they are capital intensive sectors. In other words, oil *might* have a comparative advantage in growth, but it certainly does not have a comparative advantage in poverty reduction.

A second weakness with the conventional comparative advantage viewpoint is that much of agriculture’s economic potential lies in the African market where there is ample scope to substitute food imports with domestic food production (Diao, Headey, and Johnson 2008). Even oil-rich Nigeria’s recent economic success has been predominantly driven by agriculture. From 2000–07 agricultural GDP growth in Nigeria accounted for almost half of the impressive doubling of national GDP, while the industrial sector accounted for just one-quarter. Hence over 2000–07, a period of rising oil prices, it looks like agriculture was the leading growth sector, not oil.⁸ Moreover, it so happens that many of Africa’s most mineral-rich countries are also those with tremendous biophysical potential for agricultural production. Nigeria has very good rainfall, relatively good soils, attractively large urban markets, good access to export markets via its coastal ports and its northern borders into the Sahel, and—despite high levels of population density in some parts of the country—large tracts of unexploited but fertile land. The Democratic Republic of Congo has similar if not greater biophysical potential, but larger infrastructure constraints (Ulimwengu and others 2009), and Angola is in a similar situation. Cameroon, which is gradually running out of oil, is probably Africa’s best example of strong agricultural growth in recent years, although it too has yet to fulfill its true potential in agriculture. The message here is that mineral abundance does not rule out an important role for agriculture. Indeed, one of the primary uses of increased oil revenues in Africa should be the promotion of agricultural and rural development.

A third objection often raised in the African context is that even if agriculture-based strategies were a good idea 50 years ago, it may now be too late to pursue this strategy because so many Africans have already left depressed rural areas in search of jobs in big cities (Bryceson 2002). Indeed our own results above might seem consistent with the conjecture. However, a closer look at the data suggests that this argument is probably overstated. In table 4 we again examine the arguably more reliable 2003 DHS data on employment for Nigerian men and women, since Nigeria is the most urbanized country of any size in sub-Saharan Africa. Several facts stand out. First, the proportion of the urban population share is probably exaggerated in Nigeria and perhaps elsewhere in Africa (Headey,

Bezemer, and Hazell 2008). The nationally representative DHS survey puts the rural population share at around 60 percent, which is consistent with a recent study that uses the spatially disaggregated data of GIS-type techniques to improve upon the UN's widely criticized urbanization estimates (Uchida and Nelson 2008). Hence, more accurate data would imply that there is still a large rural population in Nigeria and other African countries that may not need any significant relocation in order to participate in agricultural activities. Recent in-depth studies suggest that participation in the agricultural labor market in rural Africa are far greater than large-scale household surveys suggest (World Bank 2008).

A second fact discernible from table 4 is that a large proportion of Nigeria's male labor force in rural areas is unemployed (24 percent) or employed in low skilled nonfarm sectors, while most rural women are typically in low skilled services (55.7 percent). In conjunction with significant tracts of unused fertile land, these figures would imply that the prospects for a growing agricultural sector to provide meaningful employment for rural Nigerians stuck in low return nonfarm activities look favorable, especially since there are typically very few barriers to entry in agricultural labor markets. And in most other African countries the rural population share is much higher than in Nigeria. In short the vast majority of Africans (especially the poor) still live in rural areas and have adequate access to land. On these grounds, at least, agriculture-based strategies are certainly not redundant.

A fourth objection to agriculture-based development strategies in Africa is that they ignore endogenous growth processes, including the economies of scale associated with manufacturing, and the agglomeration externalities that come with urbanization (Krugman 1991; see Henderson 2003 and Quigley 2008 for excellent reviews). These arguments merit further research because the size of agglomeration economies are particularly hard to estimate. However, on the basis of existing evidence and theory, their existence would only seem to qualify marginally the importance of agriculture in Africa, especially in the medium term (see Headey, Bezemer, and Hazell 2008 for a fuller discussion). This is because

Table 4. DHS-based Estimates of Occupation Shares in Nigeria, 2003

		<i>Not employed</i>	<i>Agriculture</i>	<i>Professional</i>	<i>Sales, services</i>	<i>Skilled manual</i>	<i>Unskilled manual</i>	<i>Rural</i>
Men	Rural	24.0	40.5	9.7	10.8	11.3	3.6	100.0
	Total	27.1	27.8	12.5	13.5	15.2	3.8	62.8
Women	Rural	n.a.	27.9	5.7	55.7	7.7	1.9	100.0
	Total	n.a.	20.4	9.6	56.6	9.6	2.5	64.5

n.a. Not applicable.

Notes: Data are the percent distribution employed in the 12 months before the survey. Key statistics are highlighted in italics.

Source: DHS (2009).

rapid urbanization is generally associated with rising urban unemployment for the reasons listed above, as well as significant problems with public service delivery (Hewett and Montgomery 2001). African experiences like Nigeria's show that urbanization alone is simply not enough to sustain durable and widely shared growth. Moreover, agricultural development should not always be thought of as competing with nonagricultural growth processes. Agriculture can actually support the growth of cities by increasing demand for nonfarm services, by keeping food prices low (which in turn keeps real urban wages competitive), and by freeing up scarce foreign exchange for industrial imports rather than food imports. Because of these spillovers it is no coincidence that Asia turned into the world's factory *after* experiencing a smallholder-based Green Revolution, and that the reverse is true in sub-Saharan Africa where urban food prices are often surprisingly high and manufacturing is generally uncompetitive (Headey, Bezemer, and Hazell 2008).

Finally, most of the existing arguments about the sectoral role of policies relate to comparisons of the expected benefits of agricultural and nonagricultural growth in terms of growth and poverty reduction. But in theory an optimal development strategy requires allocating investments until marginal cost–benefit ratios are equalized across sectors. In reality, however, we have very little data on the returns to various public expenditures, especially in Africa. What data there are generally indicate high social returns to agricultural R&D and rural infrastructure (see Fan 2008 for various case studies in Asia and Africa), but against this evidence runs a significant tide of mostly anecdotal assessments of the weakness of Africa's agricultural ministries (Headey, Benson, and Kolavalli 2009) and the poor state of its agricultural R&D institutions (Pardey and others 2006).⁹ Perhaps the only encouraging view *vis-à-vis* these assessments is that Asia's Green Revolutions were primarily driven by government elites rather than their own poorly regarded agricultural ministries (World Bank 2008).¹⁰ In this view the binding constraint is not the capacity of agricultural ministries but the political will of the governing elite.

Development Strategies for Managing the Transition out of Agriculture

This article has identified a startling divergence in the agricultural exit paths of developing countries. While economic growth is traditionally accompanied by more rapid agricultural exits, fast-growing East Asian countries have generally only experienced modest ones. Slow-growing Africa, in contrast, has often witnessed surprisingly rapid agricultural exits, and in some oil-rich countries—Nigeria, Cameroon, Gabon—extremely rapid ones. To some extent these different

paths are the result of different endowments, but very different policy regimes also explain the divergence, especially the success of the Green Revolution in Asia and its failure in Africa.

Despite this historical divergence, we have argued in this paper that Asia is still facing some daunting employment problems. In Asia there is a paradoxical food situation today. On the one hand, there are millions of increasingly affluent Asians who are rapidly diversifying and enriching their diets. Yet despite this growing food affluence for many, about 800 million Asians still live in abject poverty, and hunger and malnourishment are surprisingly persistent. These people desperately need better livelihood opportunities. In the nonfarm sector, rural–urban migration (especially from less favored areas) could often be the best solution, but recent evidence suggests that Asia’s manufacturing sectors are struggling to create enough jobs (Khan 2007). This suggests that Asia’s rural economies need to continue providing new job opportunities. In agriculture the most promising prospect for poor Asian farmers is to tap into urban-led economic growth, particularly the shift toward more affluent Asian diets. Yet the key lesson of the Green Revolution is that, if left to market forces alone, many poorer regions and poor people are likely to be left behind in modernization processes (Rosegrant and Hazell 2000). Asia’s high population density also implies that the RNF sector may have a comparative advantage in employment creation because transaction and labor costs in rural Asia are generally low. Yet Asia’s RNF sector is still been hindered by the neglect of government policies, especially those relating to rural credit, education, and infrastructure (Haggblade, Hazell, and Reardon 2007a). So for all their success to date, Asian governments have unfinished business in the war against rural poverty.

In Africa, this war has scarcely begun. Despite rapid urbanization in a few countries, most of Africa’s poor still reside in rural areas and still rely on agriculture to eke out a living. Even in Nigeria, Africa’s largest economy and the one in which the agricultural exodus is starkest, agricultural growth still has considerable potential to reduce rural and urban poverty. So the real question in Africa is arguably not whether agriculture has potential, but how that potential can best be exploited. The main lesson Africa can learn from East Asia is that labor-intensive agricultural growth in egalitarian tenure systems is extremely pro-poor and can provide the foundation for successful nonfarm diversification (Bezemer and Headey 2008).

Yet Africa’s capacity to simply transplant the Asian Green Revolution model is limited. Africa is not only geographically more diverse, its political economy is also different. Asia’s agricultural initiatives were sparked by a combination of famines, higher food prices, and nationalist politics. In most of Africa’s more fertile countries the production of food staples has often been ignored because basic food security was less of an issue historically, because natural resources and

traditional cash crops offered more lucrative earnings for government coffers, and because nationalist tendencies were undermined by ethnic conflicts. For these and other reasons food security has typically only been regarded as a high priority in drought-prone areas such as Ethiopia, Malawi, and the Sahelian countries. However, one of the few beneficial effects of the global food crisis of 2007–08 is that the political support for improving national food security has undoubtedly been reinvigorated in a number of African countries. The question is whether this political momentum will last and whether agriculture's champions in the continent can use that momentum to develop more coherent and more sustainable agricultural development strategies.¹¹

Notes

Derek Headey is Research Fellow at the International Food Policy Research Institute (IFPRI), 2033 K Street NW, Washington, DC 20006-1002, USA; phone: +1 202-862-8103; fax: +1 202-467-4439; email address: d.headey@cgiar.org. Dirk Bezemer is Assistant Professor at the Faculty of Economics & Business, University of Groningen, The Netherlands. Peter B. Hazell is Visiting Professor at Imperial College, Wye Campus, London, UK. The authors would like to thank Jose Funes for excellent research assistance, as well as participants at a seminar given at IFPRI, particularly Xinshen Diao, Shenggen Fan, and Xiaobo Zhang.

1. See Temple and Woessman (2006) for a review.

2. Note, however, that GDP data is biased by the omission of the informal economy, which seems to be predominantly in the nonfarm sector. For example, despite no economic growth over 1960–2000, Nigeria appears to have experienced a large exodus of workers out of agriculture, but relatively little decline in agriculture's share in GDP. Much of this could be attributed to the informal sector. See Headey, Bezemer, and Hazell (2008) for further discussion.

3. Other developing regions are also of interest, although the Middle East and North Africa and most Latin American countries generally started from higher income levels. However, many of these countries appear to have urbanized very quickly. Whilst comparisons between Latin America 30 or 40 years ago and Africa today would make for interesting research, in this paper we focus on the starker contrast between Africa and developing Asia.

4. South Korea is not included: it did not follow the standard Asian path in that it urbanized very quickly, partly because of a weaker nonfarm sector relative to comparable countries such as Taiwan (Otsuka 2007).

5. We also note that Nigerian data is complicated by the high rates of unemployment reported in both urban and rural areas (above 20 percent). We have allocated unemployment according to the nonfarm shares of the remaining categories.

6. An obvious caveat to this concern is that supply begets its own demand. However, Asia's growth model has heavily relied on external demand, which is not inelastic. Moreover, the least developed Asian countries are facing a challenge that previous Asian Tigers did not encounter because the latter tended to grow in sequential phases with quite complementary shifts in economic structures—the so called 'flying geese' phenomenon—and among them only Japan could truly be called populous by Asian standards. In contrast developing Asia is now characterized by a large number of countries—China, India, Indonesia, Pakistan, Vietnam, Bangladesh—that are highly populous, at similar stages of development, and all in need of significant job creation outside of agriculture.

7. Specifically we assume a two-sector economy with agriculture (A) and nonagriculture (N). By definition, the annual growth in employment (g^E) equals the annual growth rates in output of agriculture (g^A) and nonagriculture (g^N), multiplied by their initial employment shares (s^A , s^N), and

their (full) employment elasticities with respect to output ($\varepsilon^A = 0.5$; $\varepsilon^N = 0.3$). Rearranging this identity, we can derive the nonagricultural growth required to achieve full employment based on three key characteristics of the economy: (1) the relative labor intensities of agriculture and nonagriculture; (2) the share of agricultural employment (=70 percent); and (3) the agricultural growth rate (which is set equal to population growth rate, assumed to be 2.9 percent). The full employment nonagricultural growth rate is then given by:

$$g^N = \frac{(g^t - s^A \varepsilon^A g^A)}{s^N \varepsilon^N}.$$

8. Of course this statement ignores the role of linkages. It is possible that exogenously determined oil revenue might have caused increased demand for agricultural produce or increased prices, hence stimulating agriculture. But it is difficult to imagine that when industry grows by 25 percent, it causes agriculture to grow by 50 percent, implying a multiplier of two.

9. Much of the quantitative evidence on expenditure effectiveness relates to budgetary measures, such as the ratio of actual expenditures to planned expenditures for various ministries. By this measure public expenditure reviews in Africa typically reveal that ministries of agriculture fair poorly relative to many other key ministries such as health and education. See Headey, Benson, and Kolavalli (2009) for some discussion.

10. Background research on agricultural ministries for the 2008 WDR was conducted by Regina Birner and colleagues at the International Food Policy Research Institute, but these authors could not find a single example of a reformed agricultural ministry that was widely regarded as a success story (personal communication). This state of affairs is reflected in the common joke that if you removed the agricultural ministry, the rural population wouldn't notice—and vice versa.

11. For a number of examples of recent work on agricultural strategies in Africa see International Food Policy Research Institute's (IFPRI) publications homepage (<http://www.ifpri.org/pubs/pubs.htm>), the World Bank's Agricultural and Rural Development website, as well as the recent review of Ethiopia's Agricultural Demand-Led Industrialization (ADLI) strategy by Dercon and colleagues, summarized in Dercon and Zeitlin (2009).

References

- Anderson, Dennis, and Mark Leiserson. 1980. "Rural Nonfarm Employment in Developing Countries." *Economic Development and Cultural Change*, 28(2): 227–48.
- Anríquez, Gustavo, and Genny Bonomi. 2007. "Long-Term Farming and Rural Demographic Trends." Background Paper for World Development Report 2008. The World Bank, Washington, DC.
- Bates, Robert H. 1981. *Markets and States in Tropical Africa: The Political Basis of Agricultural Policies*. Berkeley, CA: University of California Press.
- Benjamin, Dwayne, Loren Brandt, and John Giles. Forthcoming. "Income Inequality During China's Economic Transition." In Loren Brandt, and Thomas Rawski eds., *China's Economic Transition: Origins, Mechanisms, and Consequences*. Cambridge: Cambridge University Press.
- Berry, R. Albert, and William Cline. 1979. *Agrarian Structure and Productivity in Developing Countries*. Baltimore: Johns Hopkins University Press.
- Besley, Timothy, and Robin Burgess. 2004. "Can Labour Regulation Hinder Economic Performance? Evidence from India." *The Quarterly Journal of Economics*, 119(1): 91–134.
- Bezemer, Dirk, and Derek D. Headey. 2008. "Agriculture, Development and Urban Bias." *World Development*, 34(8): 1342–64.

- Bhalla, G.S., and Peter B. Hazell. 2003. "Rural Employment and Poverty Strategies to Eliminate Rural Poverty within a Generation." *Economic and Political Weekly*, 38(33): 3473–84.
- Bhattacharya, B.B., and S. Sakthivel. 2004. "Economic Reforms and the Jobless Growth in India in the 1990s." Working Paper E/245/2004, Delhi University Institute of Economic Growth, Delhi.
- Binswanger, H.P., and K. Deininger. 1997. "Explaining Agricultural and Agrarian Policies in Developing Countries." *Journal of Economic Literature*, 35(4): 1958–2005.
- Binswanger, Hans P., and John McIntire. 1987. "Behavioral and Material Determinants of Production Relations in Land-Abundant Tropical Agriculture." *Economic Development and Cultural Change*, 36(1): 73–99.
- Bloom, David E., and Jeffrey G. Williamson. 1998. "Demographic Transitions and Economic Miracles in Emerging Asia." *World Bank Economic Review*, 12(3): 419–55.
- Bocquier, Philippe. 2004. "World Urbanization Prospects: An Alternative to the UN Model of Projection Compatible with Urban Transition Theory." DIAL Working Paper DT/2004/08. Developpement Institutions & Analyses de Long terme.
- de Brauw, Alan. 2002. "Are Women Taking over the Farm in China?" Department of Economics Working Paper 199. Williams College.
- de Brauw, Alan, and Gero Carletto. 2008. "Improving the Measurement and Policy Relevance of Migration Information in Multi-topic Household Surveys." Unpublished manuscript. Washington, DC: International Food Policy Research Institute.
- Brockerhoff, Martin, and Ellen Brennan. 1998. "The Poverty of Cities in Developing Regions." *Population and Development Review*, 24(1): 75–114.
- Bryceson, D.F. 2002. "The Scramble in Africa: Reorienting Rural Livelihoods." *World Development*, 30(5): 725–39.
- Buvinic, Mayra, Catherine Gwin, and Lisa M. Bates. 1996. *Investing in Women: Progress and Prospects for the World Bank*. Washington, DC: Overseas Development Council in cooperation with the International Center for Research on Women and Johns Hopkins University Press.
- Chen, Shaohua, and Martin Ravallion. 2007. "China's (Uneven) Progress against Poverty." *Journal of Development Economics*, 82(1): 1–42.
- Chenery, Hollis B. 1979. *Structural Change and Development Policy*. New York: Oxford University Press.
- Chotikapanich, Duangkamon, D.S. Prasada Rao, and Kam Ki Tang. 2007. "Estimating Income Inequality in China using Grouped Data and the Generalized Beta Distribution." *Review of Income and Wealth*, 53(1): 127–47.
- Christiaensen, Luc, Lionel Demery, and Jesper Kühl. 2006. "The Role of Agriculture in Poverty Reduction: An Empirical Perspective." World Bank Policy Research Working Paper Series 4013. The World Bank, Washington, DC.
- Cohen, B. 2004. "Urban Growth in Developing Countries: A Review of Current Trends and a Caution Regarding Existing Forecasts." *World Development*, 32(1): 23–51.
- Collier, Paul. 2007. *The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done about It*. New York: Oxford University Press.
- Collier, P., and Venables, A. 2007. "Rethinking Trade Preferences: How Africa Can Diversify its Exports." In D. Greenway ed., *The World Economy: Global Trade Policy 2007*. Hoboken, NJ: Wiley.
- Collier, P., A. Hoeffler, and D. Rohner. 2007. *Beyond Greed and Grievance: Feasibility and Civil War*. Oxford: CSAE.
- Deaton, A., and V. Kozel. 2005. "Data and Dogma: The Great Indian Poverty Debate." *The World Bank Research Observer*, 20(2): 177–99.

- Dercon, S. 2009. "Rural Poverty: Old Challenges in New Contexts." *World Bank Research Observer*, 24(1): 1–28.
- Dercon, S., and A. Zeitlin. 2009. "Rethinking Agriculture and Growth in Ethiopia: A Conceptual Discussion". Paper prepared as part of a DFID study on Agriculture and Growth in Ethiopia. Centre for the Study of African Economies (CSAE), Oxford University. (http://www.economics.ox.ac.uk/members/stefan.dercon/policy_ethiopiaagriculturework.htm).
- Djurfeldt, G., H. Holmen, M. Jirstrom, and R. Larsson. (eds). 2005. *The African Food Crisis: Lessons from the Asian Green Revolution*. Wallingford, CABI.
- DHS (Demographic Health Surveys). 2009. *Measure DHS Stat-Compiler*. Demographic Health Surveys, sponsored by USAID. (<http://www.statcompiler.com>).
- Diao, Xinshen, Peter Hazell, Danielle Resnick, and James Thurlow. 2007. "The Role of Agriculture in Development: Implications for sub-Saharan Africa." International Food Policy Research Institute. (<http://www.ifpri.org/publication/role-agriculture-development-0>).
- Diao, X., D. Headey, and M. Johnson. 2008. "Toward a Green Revolution in Africa: What Would It Achieve, and What Would It Require?" *Agricultural Economics*, 39(supplement):539–50.
- Du, Yang, Albert Park, and Sangui Wang. 2005. "Migration and Rural Poverty in China." *Journal of Comparative Economics*, 35:688–709.
- Dudley, Kirk, and Bernard Pillet. 1998. "Fertility Levels, Trends, and Differentials in Sub-Saharan Africa in the 1980s and 1990s." *Studies in Family Planning*, 29(1): 1–22.
- Eastwood, Robert, and Michael Lipton. 2004. "Rural–Urban Dimensions of Inequality Change." In Giovanni Andrea Cornia ed., *Inequality, Growth, and Poverty in an Era of Liberalization and Globalization*. Oxford: Oxford University Press.
- Fan, Shenggen. 2008. *Public Expenditures, Growth, and Poverty: Lessons from Developing Countries*. Baltimore, MD: Johns Hopkins University Press.
- Fan, Shenggen, and Connie Chan-Kang. 2005. "Is Small beautiful? Farm Size, Productivity, and Poverty in Asian Agriculture." *Agricultural Economics*, 32(1): 135–46.
- Fan, Shenggen, and Peter Hazell. 2001. "Returns to Public Investments in the Less-favored Areas of India and China." *American Journal of Agricultural Economics*, 83(5): 1217–22.
- Fan, Shenggen, Connie Chan-Kang, and Anit Mukherjee. 2005. "Rural and Urban Dynamics and Poverty: Evidence from China and India." FCND Discussion Papers 196. International Food Policy Research Institute, Washington, DC.
- FAO (Food and Agriculture Organisation). 2009. *AGROSTAT* Rome: Food and Agriculture Organization.
- Fay, M., and C. Opal. 1999. "Urbanization without Growth: A Not-so-uncommon Phenomenon." World Bank Policy Research Working Paper 2412. Washington, DC: The World Bank.
- Foster, A., and M. Rosenzweig. 2004. "Agricultural Productivity Growth, Rural Economic Diversity, and Economic Reforms: India, 1970–2000." *Economic Development and Cultural Change*, 52(3): 509–42.
- GRUMPS (Global Rural–Urban Mapping Project). 2008. *Global Rural–Urban Mapping Project (GRUMP): Urban/Rural Population Grids*. Center for International Earth Science Information Network, Columbia University; International Food Policy Research Institute; the World Bank; and Centro Internacional de Agricultura Tropical.
- Gugler, Josef. 1982. "Overurbanization Reconsidered." *Economic Development and Cultural Change*, 31(1): 173–89.
- Haggblade, S., and E. Gabre-Mahdin. 2004. "Success in African Agriculture: Results of an Expert Survey." *World Development*, 32(4): 745–66.

- Haggblade, S., P.B.R. Hazell, and T. Reardon. 2007a. "Strategies for Stimulating Equitable Growth in the Rural Nonfarm Economy." In Steven Haggblade, P.B.R. Hazell, and T. Reardon eds., *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.
- . 2007b. *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.
- Harris, J.R., and M.P. Todaro. 1970. "Migration, Unemployment and Development: A Two-Sector Analysis." *American Economic Review*, 60(1): 126–42.
- Hazell, Peter, and Xinshen Diao. 2005. "The Role of Agriculture and Small Farms in Economic Development." Presented at The Future of Small Farms workshop, Wye College, United Kingdom, June 26–29.
- Headey, Derek D., Todd Benson, and Shashidhara Kolavalli. 2009. "Why African Governments Under-invest in Agriculture: Results from an Expert Survey." Conference paper presented at the International Association of Agricultural Economists Conference, Beijing, China. (<http://ageconsearch.umn.edu/handle/51818>).
- Headey, Derek D., Dirk Bezemer, D., and Peter B. Hazell. 2008. "Agricultural Exit Problems: Causes and Consequences." Discussion Paper 802, International Food Policy Research Institute, Washington, DC. (www.ifpri.org/pubs/dp/ifpridp00802.asp).
- Henderson, Vernon. 2003. "The Urbanization Process and Economic Growth: The So-What Question." *Journal of Economic Growth*, 8(1): 47–71.
- Henderson, Vernon, Adam Storeygard, and David N. Weil. 2009. "Measuring Economic Growth From Outer Space." Working Paper 15199. National Bureau Of Economic Research, Cambridge, MA. (<http://www.nber.org/papers/w15199>).
- Hewett, P.C., and M.R. Montgomery. 2001. "Poverty and Public Services in Developing-country Cities." Policy Research Division Working Papers 154. Population Council, New York.
- Hirschman, Albert O. 1958. *The Strategy of Economic Development*. New Haven: Yale University Press.
- Holz, C.A. 2004. "China's Reform Period Economic Growth: Why Angus Maddison Got It Wrong and What that Means." Social Science Division Working Paper 0504012, Hong Kong University of Science & Technology.
- ILO (International Labour Organization). 1996. *FAO Estimates Derived from Population Data and Economically Active Population 1950–2010: 4th Revision*. Geneva: International Labour Organization.
- . 2008. *Methodological Description of ILO Estimates and Projections of the Economically Active Population: 1980–2020*, 5th edn. Geneva: International Labour Organization. (http://laborsta.ilo.org/applv8/data/EAPEP/EAPEP_methodology.pdf).
- Ivanic, M., and W. Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." *Agricultural Economics*, 39(supplement):405–16.
- IWMI (International Water Management Institute) and Earthscan. 2007. *Water for Food, Water for Life: A Comprehensive Assessment of Water Management in Agriculture*. London and Colombo: Earthscan and International Water Management Institute.
- Johnson, Michael, Peter Hazell, and Ashok Gulati. 2003. "The Role of Intermediate Factor Markets in Asia's Green Revolution: Lessons for Africa?" *American Journal of Agricultural Economics*, 85(5): 1211–16.
- Johnston, Bruce F., and P. Kilby. 1975. *Agriculture and Structural Transformation: Economic Strategies in Late-developing Countries*. London: Oxford University Press.
- Joshi, P.K., Ashok Gulati, and Ralph Cummings, Jr. 2007. *Agricultural Diversification and Smallholders in South Asia*. New Delhi: Academic Foundation.

- Kanbur, Ravi, and Xiaobo Zhang. 1999. "Which Regional Inequality: Rural–Urban or Coast–Inland? An Application to China." *Journal of Comparative Economics*, 27(1999): 686–701.
- . 2005. "Fifty Years of Regional Inequality in China: A Journey Through Central Planning, Reform and Openness." *Review of Development Economics*, 9(1): 87–106.
- Karp, Larry. 2007. "Managing Migration from the Traditional to Modern Sector in Developing Countries." Background Paper for World Development Report 2008. The World Bank, Washington, DC.
- Kelley, Allen C., and Robert Schmidt. 2003. "Economic and Demographic Change: A Synthesis of Models, Findings, and Perspectives." In Nancy Birdsall, Allen C. Kelley, and Steven Sinding eds., *Population Matters*. New York: Oxford University Press.
- Khan, Azizur Rahman. 2007. *Asian Experience on Growth, Employment and Poverty*. Geneva: UNDP and ILO.
- Kherallah, Mylene, Christopher Delgado, Eleni Gabre-Madhin, Nicholas Minot, and Michael Johnson. 2002. *Reforming Agricultural Markets in Africa*. Baltimore, MD: Johns Hopkins University Press.
- Kochhar, Kalpana, Utsav Kumar, Raghuram Rajan, Arvind Subramanian, and Ioannis Tokatlidis. 2006. "India's Patter of Development: What Happened, What Follows?" IMF Working Paper 06/22. Washington, International Monetary Fund.
- Krueger, Anne O., Maurice Schiff, and Alberto Valdes. 1991. *Political Economy of Agricultural Pricing Policy*. Baltimore, MD: Johns Hopkins University Press.
- Krugman, Paul R. 1991. "Increasing Returns and Economic Geography." *The Journal of Political Economy*, 99(3): 483–99.
- Kuznets, Simon. 1973. "Modern Economic Growth: Findings and Reflections." *American Economic Review*, 63(3): 247–58.
- Laidlaw, Karen A., and Edward G. Stockwell. 1979. "Trends in the Relationship between Urbanisation and Development in Africa." *The Journal of Modern African Studies*, 17(4): 687–94.
- Lewis, Arthur W. 1954. "Economic Development with Unlimited Supplies of Labour." *The Manchester School*, 28(2): 139–91.
- Lipton, M. 1977. *Why Poor People Stay Poor: A Study of Urban Bias in World Development*. London: Temple Smith.
- . 2009. "Can Small Farmers Survive, Prosper, or Be the Key Channel to Cut Mass Poverty?" *Electronic Journal of Agricultural and Development Economics*, 3(1): 58–85.
- Maddison, Angus. 1998. *Chinese Economic Performance in the Long Run*. Paris: Development Centre of the Organisation for Economic Co-operation and Development.
- Malthus, Thomas R. 1798. *An Essay on the Principle of Population and A Summary View of the Principle of Population*. Harmondsworth: Penguin.
- Mehra, Rekha, and Sarah Gammage. 1999. "Trends, Countertrends, and Gaps in Women's Employment." *World Development*, 27(3): 533–50.
- Mellor, J.W. 1976. *The New Economics of Growth: A Strategy for India and the Developing World*. Ithaca, NY: Cornell University Press.
- Milanovic, Branko. 2005. "Half a World: Regional Inequality in Five Great Federations." World Bank Policy Research Working Paper 3699. The World Bank, Washington, DC.
- Mukherjee, Anit, and Xiaobo Zhang. 2007. "Contrasting Rural Nonfarm Policies and Performance in China and India: Lessons for the Future." In Steven Haggblade, Peter Hazell, and Thomas Reardon eds., *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.

- Munshi, Kaivan, and Mark Rosenzweig. 2005. "Why is Mobility in India so Low? Social Insurance, Inequality, and Growth." CID Working Paper 121. Centre for International Development, Harvard University.
- Nagayets, Oksana. 2005. "Small Farms: Current Status and Key Trends." Information brief prepared for the IFPRI/ODI/Imperial College Research Workshop on "The Future of small farms," Wye, UK, June 26–29.
- Otsuka, Keijiro. 2007. "The Rural Industrial Transition in East Asia: Influences and Implications." In Steven Haggblade, Peter Hazell, and Thomas Reardon eds., *Transforming the Rural Nonfarm Economy*. Baltimore, MD: Johns Hopkins University Press.
- Pardey, P.G., N. Beintema, S. Dehmer, and S. Wood. 2006. "Agricultural Research: A Growing Global Divide?" Agricultural Science and Technology Indicators Initiative. Washington, DC, International Food Policy Research Institute.
- Quigley, John M. 2008. "Urbanization, Agglomeration and Economic Development." In Michael Spence, and Robert M. Buckley, and Patricia Clarke Annez eds., *Urbanization and Growth*. Washington, DC: World Bank Publications.
- Ranis, Gustav, and John C.H. Fei. 1961. "A Theory of Economic Development." *American Economic Review*, 51:533–65.
- Ravallion, Martin, and Gaurav Datt. 1996. "How Important to India's Poor Is the Sectoral Composition of Economic Growth?" *World Bank Economic Review*, 10(1): 1–25.
- Ravallion, Martin, Shaohua Chen, and Prem Sangraula. 2007. "New Evidence on the Urbanization of Global Poverty." World Bank Working Paper WPS4199. The World Bank, Washington, DC.
- Rawski, T.G. 2001. "What Is Happening to China's GDP Statistics?" *China Economic Review*, 12(4): 347–54.
- Reardon, Thomas. 1997. "Using Evidence of Household Income Diversification to Inform the Study of the Rural Nonfarm Labor Market in Africa." *World Development*, 25(5): 735–47.
- Rodrik, D. (2007). *One Economics, Many Recipes: Globalization, Institutions and Economic Growth*. Princeton, NJ: Princeton University Press.
- Rosegrant, Mark, and Peter Hazell. 2000. *Transforming the Rural Asian Economy: The Unfinished Revolution*. Oxford, New York: Oxford University Press on behalf of the Asian Development Bank.
- Sahn, D.E., and D.C. Stifel. 2003. "Urban–Rural Inequality in Living Standards in Africa." *Journal of African Economies*, 12(4): 564–97.
- Schneider, Friedrich. 2005. "Shadow Economies around the World: What Do We Really Know?" *European Journal of Political Economy*, 21:598–642.
- Schultz, Theodore W. 1964. *Transforming Traditional Agriculture*. New Haven: Yale University Press.
- Sen, Amartya K. 1967. "Surplus Labour in India: A Critique of Schultz's Statistical Test." *The Economic Journal*, 77(305): 154–61.
- Smith, Adam. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: Methuen and Co.
- Sovani, N.V. 1964. "The Analysis of 'Over-Urbanization.'" *Economic Development and Cultural Change*, 12(2): 113–22.
- Summers, Robert, and Alan Heston. 2002. *Penn World Table Version 6.1*. Pennsylvania: Center for International Comparisons at the University of Pennsylvania.
- Temple, Jonathan, and Ludger Woessman. 2006. "Dualism and Cross-Country Growth Regressions." *Journal of Economic Growth*, 11(3): 187–228.
- Timmer, C.P. 2002. "Agriculture and Economic Development." In B. Gardner, and G. Rausser eds., *Handbook of Agricultural Economics*, vol. 2A. Amsterdam: Elsevier.

- Timmer, M.P., and G.J. de Vries. 2007. "A Cross-Country Database for Sectoral Employment and Productivity in Asia and Latin America, 1950–2005." GGDC Working Paper, Groningen Growth and Development Centre, University of Groningen. (www.ggdc.net/databases/10_sector.htm).
- Todaro, Michael P. 1997. "Urbanization, Unemployment, and Migration in Africa: Theory and Policy." PDR Working Paper 104. Population Development Council, New York.
- Uchida, H., and A. Nelson. 2008. "Agglomeration Index: Towards a New Measure of Urban Concentration." Background Paper for the World Development Report 2009. Washington, DC: The World Bank.
- Ulimwengu, John, Jose Funes, Derek Headey, and Liang You. 2009. "Paving the Way for Development: The Impact of Road Infrastructure on Agricultural Production and Household Wealth in the Democratic Republic of Congo." Paper presented at the 2009 Annual Meeting of the Agricultural and Applied Economics Association, Milwaukee, Wisconsin, July 26–28.
- UN (United Nations). 2009. *World Population Prospects: The 2008 Revision Database*. New York: United Nations. (<http://esa.un.org/unpp/index.asp?panel=2>).
- Wang, X., and L. Meng. 2001. "A Reevaluation of China's Economic Growth." *China Economic Review*, 12:338–46.
- Winters, P., T. Essam, B. Davis, A. Zezza, C. Carletto, and K. Stamoulis. 2008. "Patterns of Rural Development: A Cross-country Comparison Using Microeconomic Data." ESA Working Paper 08-06, Food and Agriculture Organization, Rome.
- Wood, Adrian. 1997. "Openness and Wage Inequality in Developing Countries: The Latin American Challenge to East Asian Conventional Wisdom." *World Bank Economic Review*, 11(1): 33–57.
- World Bank. 1979. *World Development Report 1979*. New York: Oxford University Press.
- . 1984. *World Development Report 1984*. New York: Oxford University Press.
- . 2000. *World Development Report 2000: Entering the 21st Century*. Washington, DC: The World Bank.
- . 2003. *Rural Poverty Report*. Washington, DC: The World Bank.
- . 2008. *World Development Report 2008: Agriculture for Development*. Washington, DC: The World Bank.
- . 2009a. *World Development Report 2009: Reshaping Economic Geography*. Washington DC: The World Bank.
- . 2009b. *World Development Indicators Online*. Washington, DC: The World Bank.
- Zhang, Xiaobo, and Xiaopeng Luo. 2007. "How to Make Pro-Poor Policy Work? Lessons from China's Rural Reform." Global Development Network Conference, Beijing.