

# Chapter 10

## Transformation of Rural Economies in Asia and Africa



Jonna P. Estudillo, Elyzabeth F. Cureg and Keijiro Otsuka

### 10.1 Introduction

Economic transformation, rapid growth, and improvements in living standards are central features of emerging economies, which are characterized by a shift away from heavy reliance on agriculture and raw materials exports towards an emphasis on the manufacturing and service sectors. Escaping from low incomes and poverty is the main motivation driving emerging states to venture into rapid industrialization and service sector development as a strategy to achieve rapid aggregate income growth.

Emerging economies are undergoing the so-called “economic transformation,” which is defined broadly as a process in which the foci of economic activities shift away from the farm and toward the manufacturing and service sectors. Economic transformation is always accompanied by aggregate economic growth, which serves as the main driver of household income growth and poverty reduction (Dollar and Kraay 2002; Zhuang and Ali 2010). Rapid economic growth is the main reason why Asia was able to reduce its proportion of poor people to less than one-half much earlier than in other regions of the world, in line with the Millennium Development Goals (United Nations 2015).

---

J. P. Estudillo (✉)

National Graduate Institute for Policy Studies, 7-22-1 Roppongi, Minato-ku,  
Tokyo 106-8677, Japan  
e-mail: [jonna@grips.ac.jp](mailto:jonna@grips.ac.jp)

E. F. Cureg

Center for Local and Regional Governance (CLRG-NCPAG),  
University of the Philippines, Diliman, Quezon City 1101, Philippines  
e-mail: [ely\\_cureg@yahoo.com](mailto:ely_cureg@yahoo.com)

K. Otsuka

Graduate School of Economics, Kobe University, 2-1 Rokkodai, Nada, Kobe,  
Hyogo 657-8501, Japan  
e-mail: [otsuka@econ.kobe-u.ac.jp](mailto:otsuka@econ.kobe-u.ac.jp)

© The Author(s) 2019

K. Otsuka and K. Sugihara (eds.), *Paths to the Emerging State in Asia and Africa*,  
Emerging-Economy State and International Policy Studies,  
[https://doi.org/10.1007/978-981-13-3131-2\\_10](https://doi.org/10.1007/978-981-13-3131-2_10)

This chapter explores the causes and consequences of the long-term process of economic transformation that triggered the evolution of emerging economies in Asia. This chapter also assesses to what extent the Asian experience is being replicated in Africa. By “evolution,” we mean sustained household income growth and poverty reduction. We explore the role of three drivers—population pressure, the development of modern agricultural technology, and human capital formation—in the process of economic transformation.<sup>1</sup> Our hypothesis is that, while human capital is a fundamental determinant of economic growth (Otsuka et al. 2017), population pressure on limited cultivable land is a major factor in the deteriorating economic wellbeing of rural populations in the early stage of economic development, which can be overcome through the development of land-saving and labor-using modern agricultural technology (Hayami and Ruttan 1985; Otsuka and Runge 2011).

We examine the Philippines, Vietnam, Myanmar, the Lao People’s Democratic Republic (Lao PDR), Bangladesh, and Sri Lanka in Asia and Mozambique, Kenya, Uganda, and Ethiopia in Africa because we have a compilation of panel datasets drawn from repeated surveys of households in Asia beginning in the mid-1980s and in Africa beginning in the early 2000s. Bangladesh, the Philippines, and Vietnam are among the so-called “Next Eleven” (N-11) countries that could exert a BRIC-like impact and rival the G7 due to their large populations (Goldman Sachs 2007).<sup>2</sup> While it is difficult to identify emerging economies or states (Tsunekawa 2017), we consider all our focus countries in this chapter as emerging economies by virtue of their rapid income growth and population size. Finally, we present a special case study of Central Luzon in the Philippines before and after the Green Revolution for a period encompassing nearly half of a century to demonstrate that agricultural development is a necessary condition for take-off into a rapid-growth era.

The rest of this chapter has four sections. Section 10.2 describes the nature and consequences of economic transformation, while Sect. 10.3 explores the role of the three drivers of economic transformation. Section 10.4 presents a comparative case study of the transformation of rural villages in our focus countries in Asia and Africa and illustrates how households in Central Luzon have changed their sources of livelihood. Finally, Sect. 10.5 presents a summary and conclusion.

---

<sup>1</sup>We consider infrastructure to be another important driver. However, reliable data on infrastructure such as electricity, roads, and telephones remain scanty in our focus countries. This issue is particularly serious in the case of roads.

<sup>2</sup>The gross domestic product (GDP) of these three countries accounted for more than 1% of the GDP of the United States in 2015.

## 10.2 Economic Transformation

### 10.2.1 Characteristic Features

Here, we discuss the size, composition, and growth rate of gross domestic product per capita (GDPPc) and labor force composition from the 1980s onward. We chose the 1980s as our benchmark because of the emergence during that period of newly industrializing economies (NIEs) in East Asia, such as Singapore, Taiwan, Hong Kong, and South Korea, which helped trigger the evolution of today's newly emerging economies. During the 1980s, the NIEs began a major shift toward the production of more sophisticated, high-value products using capital-using methods corresponding to their sharp wage increases while shifting labor-intensive industrial sectors to Southeast Asian countries, where wages were relatively low at that time.

Emerging economies are characterized by high economic growth rates, as is evident in the five focus Asian countries. The annual growth rate of real GDPPc from 2010 to 2015 is close to 5% in the Philippines, Vietnam, and Bangladesh and greater than 5% in Sri Lanka and Lao PDR (see Table 10.1). These economies started to boom in the 1990s, and many of them peaked between 2010 and 2015. Sri Lanka and the Philippines have the highest GDPPc, although Vietnam showed the greatest increase, of more than four times between 1985 and 2015 (see Table 10.1, Cols. A, B, and C), likely due to Vietnam's *Doi Moi* (or liberalization policy) implemented in 1986. Ethiopia, Mozambique, and Uganda have GDPPc rates that are only about one-sixth that of Sri Lanka. Annual real GDPPc growth rates are high in Ethiopia (7.69% from 2010 to 2015) and Mozambique (4.02%). Sustained high economic growth appears to have started in our focus Asian countries in the 1990s and in our African countries about 10 years later, in the 2000s.

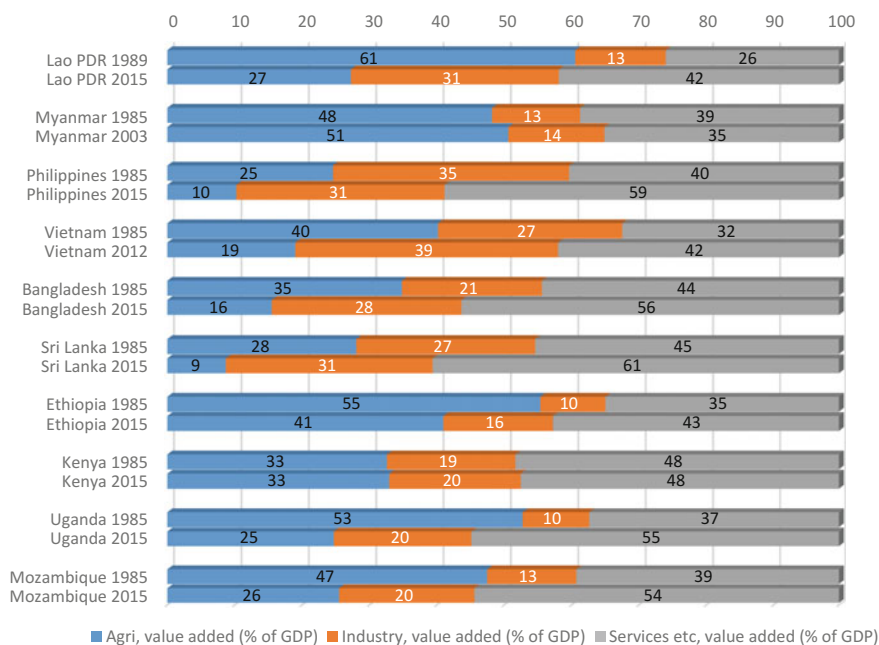
A rapid transformation away from agriculture and toward industry and services is occurring, except in Myanmar, where the agricultural share of total gross domestic product (GDP) rose (see Fig. 10.1). The GDP of the Philippines and Sri Lanka are increasingly made up of services, while manufacturing dominates in Vietnam. The agricultural share of GDP has declined furthest in Lao PDR. Similar to the situation in Asia, Africa has experienced rapid economic transformation, except in Kenya, where the GDP composition remained the same between 1985 and 2005. Agricultural GDP declined furthest in Uganda and Mozambique and declined only modestly in Ethiopia. In our focus countries in both Asia and Africa, the GDP share of the service sector is rising more than that of manufacturing.

Agriculture accounted for more than 70% of total employment in Lao PDR and close to 50% in Bangladesh in 2010 (see Table 10.2). Labor is moving out of agriculture and into the service sector in the focus Asian countries. The increasing importance of the service sector is also evident in Ethiopia, where manufacturing had a share of only about 7% of total employment in the 2000s. The agricultural labor force is expected to decline in the long run, primarily because of the low income elasticity of demand for food. To sum up, economic transformation and economic growth are faster in Asia than in Africa, though the importance of the service sector is also increasing in African countries.

**Table 10.1** Growth rate of per capita gross domestic product (GDPPc) in selected countries in Asia and Africa, 1980–2015

| Country       | Real GDPPc (constant 2010 US\$) |          |                   | Average annual growth rate of real GDPPc (constant 2010 US\$) |               |               |               |
|---------------|---------------------------------|----------|-------------------|---|---------------|---------------|---------------|
|               | 1985 (A)                        | 2015 (B) | Ratio (C = B ÷ A) | 1980–1989 (D)   | 1990–1999 (E) | 2000–2009 (F) | 2010–2015 (G) |
| <i>Asia</i>   |                                 |          |                   |   |               |               |               |
| Lao PDR       | 436                             | 1,538    | 3.52              | 1.22  | 3.74          | 5.18          | 6.14          |
| Myanmar       | na                              | na       | na                | na  | na            | na            | na            |
| Philippines   | 1,381                           | 2,635    | 1.90              | −0.70   | 0.38          | 2.56          | 4.51          |
| Vietnam       | 396                             | 1,685    | 4.25              | 2.14  | 5.63          | 5.41          | 4.88          |
| Bangladesh    | 379                             | 973      | 2.56              | 0.81  | 2.44          | 3.96          | 4.94          |
| Sri Lanka     | 1,100                           | 3,638    | 3.30              | 2.58  | 4.26          | 4.22          | 5.58          |
| <i>Africa</i> |                                 |          |                   |   |               |               |               |
| Ethiopia      | 190                             | 486      | 2.55              | −0.82   | −0.66         | 5.13          | 7.69          |
| Kenya         | 842                             | 1,133    | 1.34              | 0.44  | −0.68         | 0.92          | 3.18          |
| Uganda        | 281                             | 673      | 2.39              | −0.36   | 3.57          | 3.69          | 2.00          |
| Mozambique    | 134                             | 510      | 3.80              | −0.60   | 4.36          | 4.64          | 4.02          |

Data source World Development Indicators database



**Fig. 10.1** Sectoral composition of gross domestic product in selected countries in Asia and Africa, 1985–2015. Drawn using data from World Development Indicators database

**Table 10.2** Sectoral composition of total employment in selected countries in Asia and Africa, 1980–2014

| Country       |      | Percentage of total employment |          |          |
|---------------|------|--------------------------------|----------|----------|
|               |      | Agriculture                    | Industry | Services |
| <i>Asia</i>   |      |                                |          |          |
| Lao PDR       | 1995 | 85.40                          | 3.50     | 7.90     |
|               | 2010 | 71.30                          | 8.30     | 19.50    |
| Myanmar       | 1980 | 67.10                          | 9.80     | na       |
|               | 1990 | 69.70                          | 9.20     | na       |
|               | 1998 | 62.70                          | 12.00    | na       |
| Philippines   | 1980 | 51.80                          | 15.40    | 32.80    |
|               | 1997 | 40.40                          | 16.70    | 42.90    |
|               | 2014 | 30.40                          | 15.90    | 53.60    |
| Vietnam       | 1996 | 70.00                          | 10.60    | 19.40    |
|               | 2004 | 57.90                          | 17.40    | 24.80    |
|               | 2013 | 46.80                          | 21.20    | 32.00    |
| Bangladesh    | 1984 | 58.80                          | 11.00    | 24.20    |
|               | 2000 | 62.10                          | 10.30    | 23.50    |
|               | 2010 | 47.50                          | 17.70    | 35.30    |
| Sri Lanka     | 1981 | 45.90                          | 18.60    | 29.30    |
|               | 2002 | 34.50                          | 22.40    | 37.90    |
|               | 2014 | 30.40                          | 25.50    | 43.40    |
| <i>Africa</i> |      |                                |          |          |
| Ethiopia      | 1994 | 89.30                          | 2.30     | 7.60     |
|               | 2005 | 79.30                          | 6.60     | 13.00    |
|               | 2013 | 72.70                          | 7.40     | 19.90    |
| Kenya         | 2005 | 61.10                          | 6.70     | 32.20    |
| Uganda        | 2002 | 65.50                          | 6.50     | 22.10    |
|               | 2009 | 73.80                          | 7.10     | 19.10    |
|               | 2013 | 71.90                          | 4.40     | 20.20    |
| Mozambique    | 2003 | 80.50                          | 3.40     | 16.10    |

*Data source* World Development Indicators database

## 10.2.2 Consequences

GDPPc is greater and growing faster in emerging economies that are more diversified (e.g., Sri Lanka, Vietnam, Philippines), where the manufacturing and service sectors are more important (see Table 10.1 and Fig. 10.1). The high growth rate of GDPPc in Lao PDR is largely explained by the nation's expanding mining and quarrying sectors, whose share of GDP rose from less than 1% in 2002 to more than 6% in 2008. Poverty reduction is greater in economies with higher growth rates, indicating that economic

**Table 10.3** Poverty and inequality in selected countries in Asia and Africa, 1983–2012

|               | Year | Headcount ratio at \$1.90/day (2011 PPP) | Poverty gap at \$1.90/day (2011 PPP) | Gini index of income inequality |
|---------------|------|--|--------------------------------------|---------------------------------|
| <i>Asia</i>   |      |  |                                      |                                 |
| Lao PDR       | 1992 | 42.61                                    | 11.03                                | 34.31                           |
|               | 2002 | 42.73                                    | 11.79                                | 34.66                           |
|               | 2012 | 29.95                                    | 7.76                                 | 37.89                           |
| Philippines   | 1985 | 32.71                                    | 9.32                                 | 41.04                           |
|               | 2000 | 18.41                                    | 4.44                                 | 46.17                           |
|               | 2012 | 13.11                                    | 2.74                                 | 43.04                           |
| Vietnam       | 1992 | 49.21                                    | 14.95                                | 35.65                           |
|               | 2002 | 38.78                                    | 10.37                                | 37.32                           |
|               | 2012 | 3.23                                     | 0.58                                 | 38.7                            |
| Bangladesh    | 1983 | 69.55                                    | 22.37                                | 25.88                           |
|               | 2000 | 59.97                                    | 18.81                                | 33.06                           |
|               | 2010 | 43.65                                    | 11.15                                | 31.98                           |
| Sri Lanka     | 1985 | 13.27                                    | 2.55                                 | 32.47                           |
|               | 1995 | 8.85                                     | 1.6                                  | 35.4                            |
|               | 2009 | 2.42                                     | 0.41                                 | 36.2                            |
| <i>Africa</i> |      |  |                                      |                                 |
| Ethiopia      | 1981 | 69.26                                    | 24.32                                | 32.42                           |
|               | 1995 | 67.9                                     | 27.07                                | 44.56                           |
|               | 2010 | 33.54                                    | 9.04                                 | 33.17                           |
| Kenya         | 1992 | 23.08                                    | 7.93                                 | 57.46                           |
|               | 1997 | 21.5                                     | 5.59                                 | 46.3                            |
|               | 2005 | 33.6                                     | 11.7                                 | 48.51                           |
| Uganda        | 1989 | 87.95                                    | 53.13                                | 44.36                           |
|               | 2002 | 62.21                                    | 24.47                                | 45.17                           |
|               | 2012 | 33.24                                    | 10.13                                | 42.37                           |
| Mozambique    | 1996 | 85.36                                    | 47.28                                | 44.41                           |
|               | 2002 | 80.36                                    | 41.53                                | 47.04                           |
|               | 2008 | 68.74                                    | 31.41                                | 45.58                           |

*Data source* World Development Indicators database

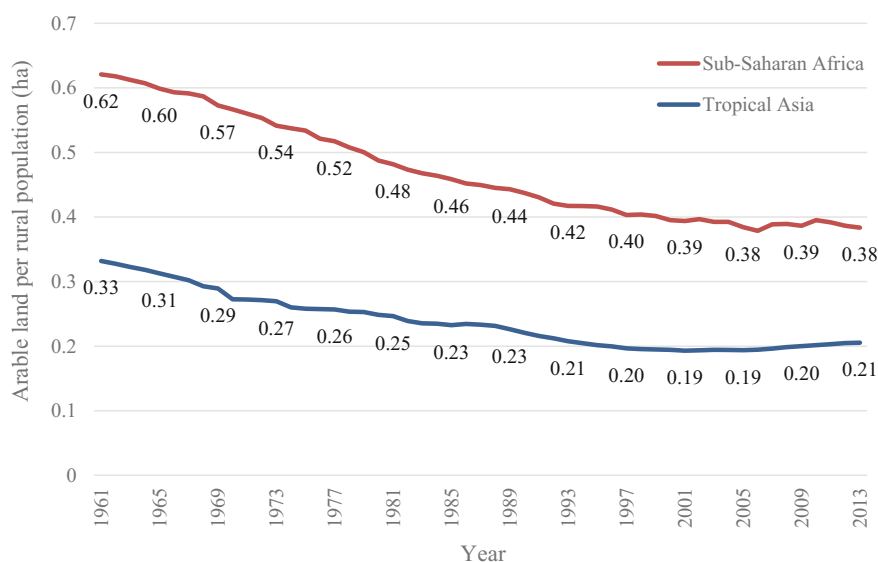
growth has benefited the poor. A high degree of poverty reduction occurred in focus countries in Asia and Africa (see Table 10.3). Ironically, the poverty headcount ratio (HCR) rose in Kenya by 10% from 1992 to 2005 because of the negative growth rate from 1990 to 1999 (see Tables 10.1 and 10.3). Poverty reduction was slow in Sri Lanka, which had the lowest HCR from the mid-1980s.

As is shown by the Gini index of income inequality reported in Table 10.3, the focus countries in Asia and Africa have experienced only a modest increase in income

inequality, which indicates that rapid growth does not necessarily promote inequality. Kenya is unusual in that, because its poverty is increasing, its inequality is declining, and economic transformation is slow. Overall, economic transformation is inclusive of the poor in emerging economies because high economic growth rates have accompanied the expansion of employment opportunities for the poor without increasing income inequality substantially, as shown by Estudillo and Otsuka (2016).

### 10.3 Drivers of Economic Transformation

We explore the impacts of three drivers of economic transformation: (1) population pressure, (2) modern agricultural technology, and (3) human capital. In the course of economic transformation, these three drivers exert their impacts sequentially, from population pressure to the development of modern agriculture technology and then to investments in human capital, which, in turn, stimulates the development of nonfarm sectors.



**Fig. 10.2** Arable land per rural population in tropical Asia and sub-Saharan Africa, 1961–2013. Figure was drawn using data from FAOStat and World Population Prospects (United Nations, Department of Economic and Social Affairs, Population Division 2015); “Tropical Asia” refers to Southeast Asia and South Asia

### 10.3.1 Population Pressure

Arable land per rural population is a crude proxy for population pressure. Arable land per rural population was about 0.6 ha in sub-Saharan Africa and about 0.3 ha in tropical Asia in the early 1960s (see Fig. 10.2). This value declined by more than one-half from 1961 to 2013 because of a population explosion, which increased the scarcity of farmland. As Table 10.4 indicates, the growth rate of the rural population has been declining in tropical Asia but not in sub-Saharan Africa. In fact, rural population growth in our focus African countries was roughly double that of the growth of arable land.

According to Chamberlain et al. (2014), while sub-Saharan Africa is typically regarded as land-abundant, the region's underutilized land resources are concentrated in a small handful of countries, many of which are fragile states. The region's surplus land is currently under forest cover and the conversion of forests to cropland could entail a serious environmental cost. People, markets, and governments seem to have been responding to the rising rural population densities with agricultural intensification, diversification to nonfarm activities, rural-to-urban migration, and reduced fertility rates, which is consistent with the Boserupian thesis (Jayne et al. 2014). The low level of industrialization coupled with population pressure in rural areas across most parts of the African continent indicate an urgent need for economic growth through diversification into industries by utilizing Africa's ample endowment of unskilled labor outside agriculture (Macmillan et al. 2014).

**Table 10.4** Growth rates of arable land and population in selected countries in Asia and Africa, 1961–2013

| Country       | Arable land (% growth per year) |           | Rural population (% growth per year) |                   |
|---------------|---------------------------------|-----------|--------------------------------------|-------------------|
|               | 1961–85                         | 1986–2013 | 1961–85                              | 1986–2013         |
| <i>Asia</i>   |                                 |           |                                      |                   |
| Lao PDR       | 1.14                            | 2.65      | 1.86                                 | 0.91              |
| Myanmar       | −0.21                           | 0.53      | 2.14                                 | 0.63              |
| Philippines   | 0.48                            | −0.04     | 2.12                                 | 0.22              |
| Vietnam       | 0.29                            | 0.82      | 2.22                                 | 0.66              |
| Bangladesh    | 0.28                            | −0.79     | 1.85                                 | 1.04              |
| Sri Lanka     | 1.2                             | 1.34      | 1.88                                 | 0.94              |
| <i>Africa</i> |                                 |           |                                      |                   |
| Ethiopia      | 0.37                            | 1.38      | na                                   | 2.53 <sup>a</sup> |
| Kenya         | 0.64                            | 0.56      | 3.17                                 | 2.39              |
| Uganda        | 1.29                            | 1.38      | 2.84                                 | 3.11              |
| Mozambique    | 1.04                            | 2.34      | 1.74                                 | 2.17              |

*Source* Growth rates of arable land are authors' calculations from the FAOStat; population annual growth rates were taken from the World Development Indicator database

<sup>a</sup>Data from 1993



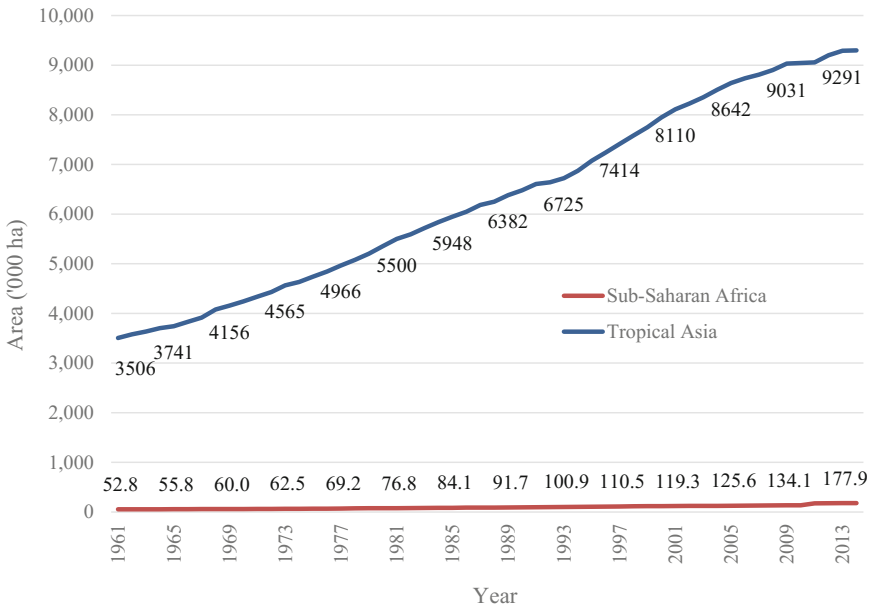
### 10.3.2 *Modern Agricultural Technology*

Hayami and Ruttan (1985) pointed out that population pressure induces not only land-saving technological innovations but also institutional innovations, which evolve because of the development of new technologies. Asia's intensification of land use started as early as the 1950s, with the closure of the land frontier and massive investment in irrigation. The Green Revolution (GR) started in 1966, when the International Rice Research Institute (IRRI) in the Philippines released IR8 (the first high-yielding variety of rice). The term "Green Revolution" is intended to express an epochal change in which "Third World agriculture was embraced in the process of modern economic growth" (Hayami and Otsuka 1994, 15). Land-saving GR technology was launched against the backdrop of a huge technology gap in agriculture between temperate and tropical countries and the fear of famine in Asia in the 1950s due to the population explosion that occurred after World War II and the region's stagnant agricultural productivity (see Chap. 2).

The four technological pillars of the GR are (1) seed-fertilizer technology, (2) irrigation systems, (3) mechanical technologies, and (4) knowledge-intensive management practices (Estudillo and Otsuka 2013). Modern rice varieties (MVs) are broadly classified into two generations: (1) first-generation MVs (MV1), which are short in stature and potentially higher yielding than traditional rice varieties (TVs); and (2) second-generation MVs (MV2), which are designed for yield stability, as they feature improved resistance to pests and diseases, better grain quality, and an early maturity period. Later MVs were designed to withstand unfavorable climatic conditions due to extreme weather events such as floods and drought. Hybrid rice and genetically modified rice are the most recent improved varieties of rice. Knowledge-intensive crop management practices, such as the timely application of fertilizer to replenish deficient nutrients, were recently introduced and have started to replace chemical inputs, thereby improving input efficiency.

In Asia, GR used to focus on irrigated rice land, as it produces 70% of the world's rice output. The GR was successful in this continent because it invested heavily in irrigation well before the advent of IR8. Fertilizer application has risen, partly because the yield of MVs is highly responsive to high fertilizer use and partly because of the use of fertilizer subsidies, which have reduced fertilizer prices in the domestic market. Yield growth has become the main source of rice production growth in Asia since the release of IR8, while the expansion of the rice-planted area has contributed modestly (see Chap. 2). The exceptions are Lao PDR and Myanmar where arable land is still expanding.

Is the Asian rice GR transferable to Africa? Irrigation investment appears to be one of the most important conditions for a successful GR. Figure 10.3 shows that tropical Asia had a large irrigated area as early as the 1960s and that its irrigated area continued to increase, while the irrigated area in sub-Saharan Africa rose only modestly. As a result, the area planted with MVs in tropical Asia rose rapidly and more visibly in the mid-1970s with the advent of IR36 (the first pest- and disease-resistant MV; see Fig. 10.4). By contrast, GR is slow to take off in sub-Saharan Africa



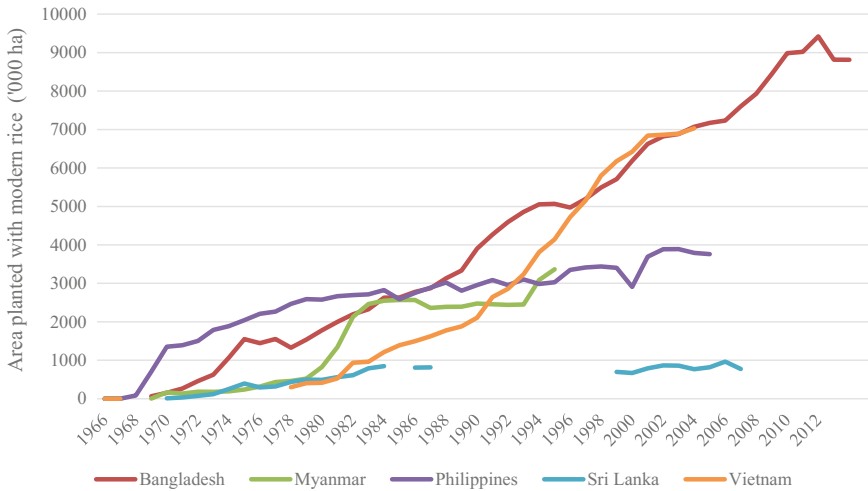
**Fig. 10.3** Total area equipped for irrigation in selected countries in Asia and Africa, 1961–2013. Drawn using data from FAOSTat; “Tropical Asia” refers to Southeast Asia and South Asia

because of the broader mix of crops grown in the region, agroecological complexities, and the region’s heterogeneity, among other factors (World Bank 2008; Otsuka and Larson 2013, 2016).

Figure 10.5 shows the yields of major staple crops, such as rice, maize, wheat, millet, cassava, and sorghum, in tropical Asia and sub-Saharan Africa. Yields in tropical Asia are higher and continuously rising, indicating a widening technology gap between the two continents. However, tropical Asia and sub-Saharan Africa have similar yields of wheat, even as early as the 1960s. Wheat is grown in only a limited area in sub-Saharan Africa, though, as it can be grown in only a temperate zone. The yield gap is high for maize, millet, cassava, and sorghum but less high for rice, indicating that the Asian GR that occurred in rice could now be in the early stage in Africa. Otsuka and Larson (2013, 2016) point out that, unlike the technology for other crops, Asian rice technology is highly transferable to Africa, including in favorable rainfed lowland areas, which are found in moist and fertile valley bottoms.

### 10.3.3 Human Capital

The adoption of seed-fertilizer technology increases farm income through higher yields and increased cropping intensity, as MVs are short-matured and photo-period



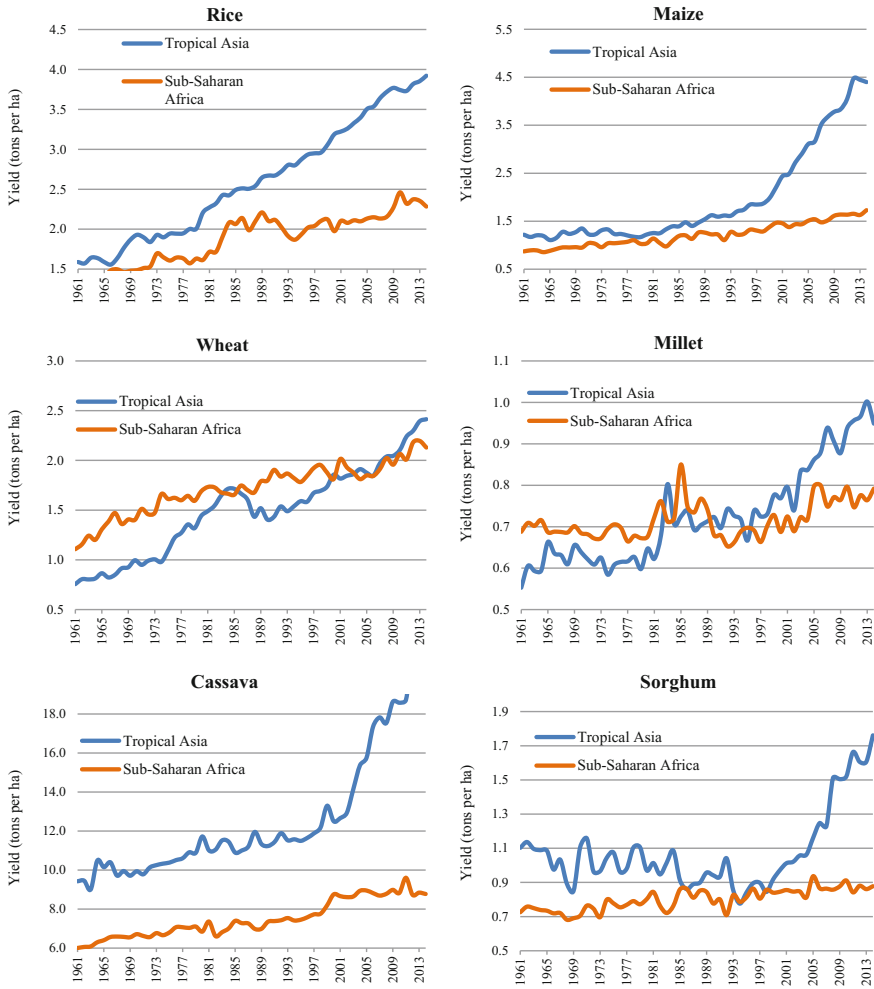
**Fig. 10.4** Area planted with modern rice varieties in selected countries in Asia, 1966–2012. Drawn using data from World Rice Statistics

insensitive. Improvements in grain quality, on the other hand, contribute to higher farm income through higher market prices. Farm income and total household income rose, leading to a greater investment in human capital [in terms of education, as was pointed out by Otsuka et al. (2009)]. The discussion below compares the trends in education outcomes between Asia and Africa.<sup>3</sup>

Enrolment in both primary and secondary schools has risen almost everywhere in the developing world. A 100% primary school enrolment rate had been attained even before the 1970s in the Philippines, Vietnam, and Sri Lanka; this was attained in 1979 in Lao PDR and in 1992 in Myanmar (see Fig. 10.6). In Africa, a 100% primary school enrolment rate was attained in 1974 in Kenya, in 1977 in Mozambique, in 1997 in Uganda, and in 2014 in Ethiopia. All our focus countries have implemented a universal primary education policy, which means that primary education is free to all. We consider that free primary education is one of the reasons primary school enrolment rose so rapidly.

Secondary school enrolment is higher in Asia, but Africa is catching up. Among Asian nations, the Philippines and Sri Lanka had the highest rate (about 80% in the 2000s); in Africa, Kenya had the highest rate, whereas Mozambique and Uganda had the lowest (less than 40% in 2012). Nevertheless, a consistently rising trend is observed in Fig. 10.7. The high secondary school enrolment in the Philippines could be partly attributable to the Republic Act 6655 of 1988, which declared that the State shall provide for free public secondary education to all qualified citizens

<sup>3</sup>While health cannot be ignored, our discussion of investment in human capital is only on education because the literature shows a strong relationship between the advent of Green Revolution and investment in child schooling.



**Fig. 10.5** Average crop yield in tropical Asia and sub-Saharan Africa, 1961–2014

and promote quality education at all levels. Mozambique is expected to increase its secondary school enrolment through the implementation of the first 12 years of public schooling at no cost and its recent increased investment in classroom construction and teachers. In 2007, Uganda’s government established a free universal secondary education (USE) policy, the first among sub-Saharan nations.

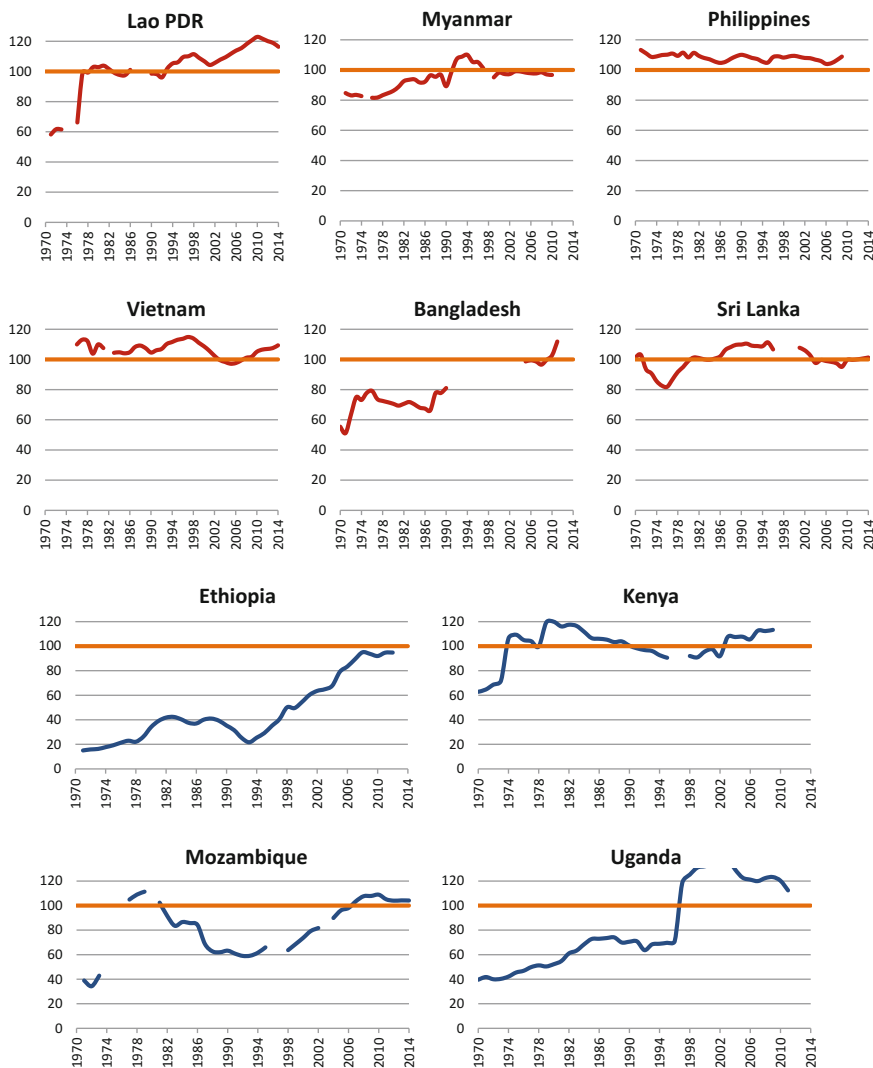


Fig. 10.6 Gross primary enrolment ratio (%) in selected countries in Asia and Africa, 1970–2014

### 10.3.4 “Push” and “Pull” Forces

The drivers of economic transformation can serve as either “push” or “pull” forces propelling the growth of emerging economies. The role of each driver as a propeller of growth appears to be fairly similar between Asia and sub-Saharan Africa.

Asia’s high population growth on a closed land frontier, coupled with stagnant agricultural productivity in the 1960s, induced technological and institutional inno-

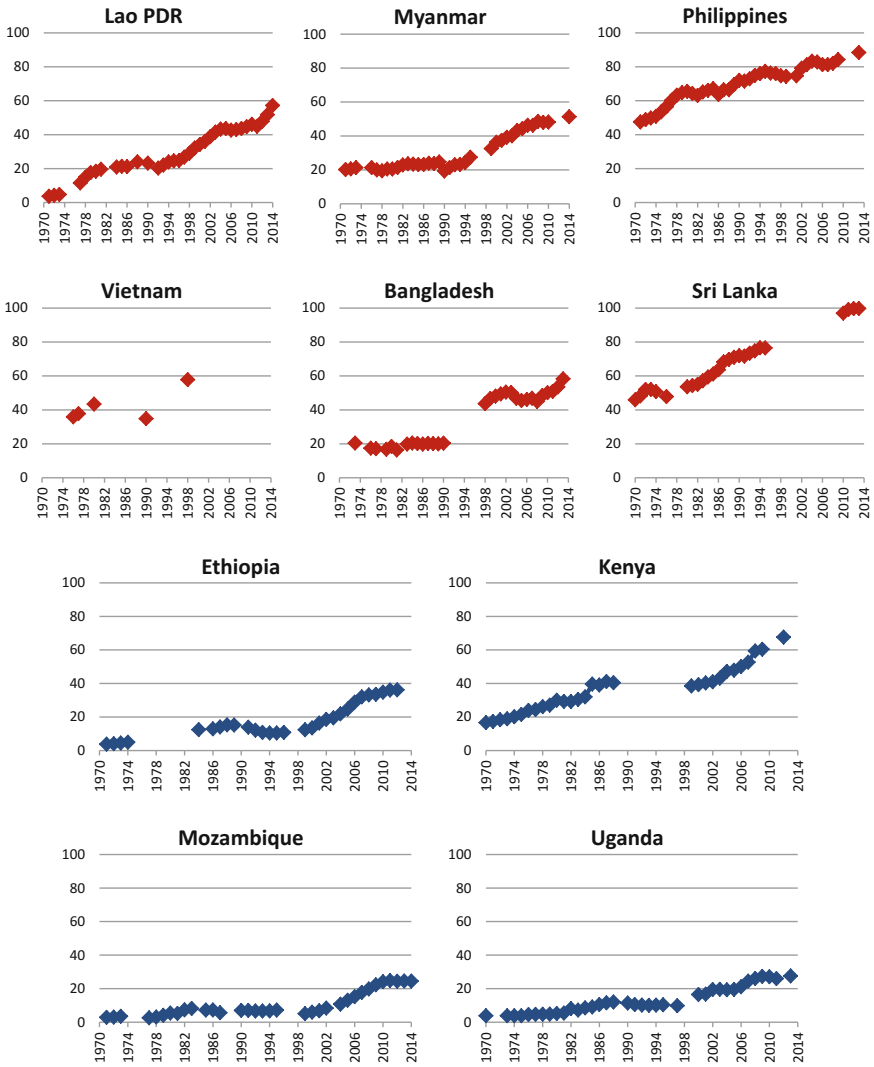
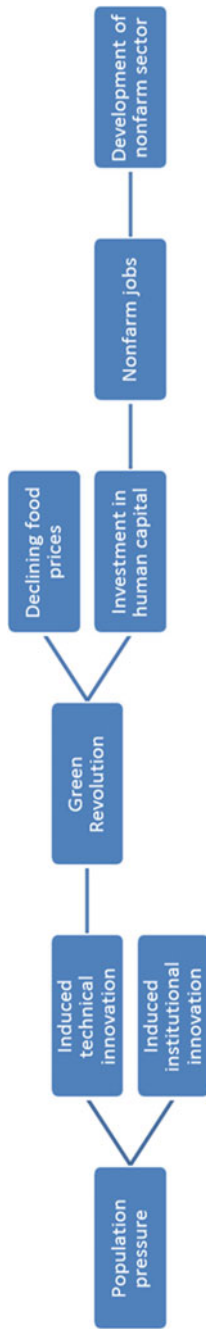


Fig. 10.7 Gross secondary enrolment ratio (%) in selected countries in Asia and Africa, 1970–2014

vation in response to changing relative factor prices (see Fig. 10.8). Since land is becoming a scarce factor in Asia, land-saving GR technology started to spread in response to the increasing price of land. Through this induced institutional innovation, institutions are changing in order to internalize the gains being made via the new technology.

The GR in rice started with the release of IR8 in 1966 and continued with the spread of newer and higher-yielding MVs in the 1970s and 1980s, which led to rapid growth in global rice production. As a consequence, rice prices



**Fig. 10.8** Interrelationship between population pressure, Green Revolution, and the development of nonfarm sector

declined in the late 1970s after reaching an all-time high in the early to mid-1970s, as political conflict between the Soviet Union and the US led to chaos in the grain trade (see Fig. 2.5). Except for a one-time increase in 1980/81 (due to an oil price increase), rice prices were generally lower from 1980 to 2005 (hovering around US\$400 per ton in 2010 US\$) than in the 1960s and 1970s. Because of the global food crises from 2006 to 2008, rice prices increased but remained substantially lower than their 1974 peak of US\$1,374. The declining rice prices from 1980 to 2005 made rice farming less lucrative. Employment opportunities in agriculture declined, as did income from rice farming.

The decline in rice prices would have served as a push factor inducing people to explore employment opportunities outside the rice industry in the nonfarm sector and to migrate to local towns and cities, or even overseas. Meanwhile, industrialization and the development of the service sector started in the mid-1970s, partly due to globalization via business process outsourcing and trade in tasks and partly due to the economic liberalization policies that began in the mid-1980s in Southeast Asian countries such as the Philippines, Lao PDR, and Vietnam. The “push” of declining rice prices and the “pull” of manufacturing and service sector development induced farm households to invest in the human capital represented by the younger generation, who prefer to work in the nonfarm sector and migrate to cities, strengthening the transformation process (Otsuka et al. 2009; Estudillo and Otsuka 2016). It thus seems reasonable to assume that population pressure and GR served as the early stimuli for the growth of emerging economies in Asia through an outmigration of the educated labor force from agriculture to nonfarm sectors (see Fig. 10.8).

Compared with Asia, population pressure in Africa was weak from the 1960s to the mid-1990s (see Fig. 10.2), which coincides with a period of low grain prices (e.g., rice and maize prices: see Fig. 2.5). In all likelihood, GR did not take off in sub-Saharan Africa primarily because of the disincentive effects of such low grain prices. Consequently, employment opportunities in agriculture declined because of stagnant technology as well as low grain prices. There was therefore a “push” to migrate from rural to urban areas. Meanwhile, the industrial sector did not develop fast enough to create jobs for the urban migrants. Industrialization was slow on the continent for a number of possible reasons: (1) a lack of human capital, (2) weak infrastructure (e.g., poor roads, congested ports, lack of electricity), or (3) regional leaders’ failure to pursue appropriate economic policies supporting the labor-intensive industry sector, which could have facilitated the transfer of advanced technology and management practices from more advanced regions (see Chap. 9; Sonobe and Otsuka 2011, 2014). As a result, African countries have striven to industrialize in recent years.

Population pressure in sub-Saharan Africa appears to have become strong in the early 2000s owing to the closure of the land frontier and high population growth. After the 2006–2008 world food crises, there was a “push” for GR as rising income and urbanization slowly and steadily increased the demand for food. A rising trend emerged in the share of African imports of rice from tropical Asia, which is expected to continue and may affect world rice prices. Strong population pressure and urbanization are creating a need for GR, which is expected to trigger investments in agricultural research and human capital, as in Asia (Otsuka and Larson 2016). Human



capital could, in turn, serve as the “fuel” for industrialization and service sector development. In brief, similar to the Asian story, population pressure and GR have the potential to serve as a strong base for the emergence of African economies. What is also needed is an appropriate strategy for African industrialization (Otsuka et al. 2018).

## 10.4 Economic Transformation in Rural Villages

We explore the features of economic transformation at the household level by analyzing the shift of household income structure away from farm toward nonfarm activities. Such a shift involves a dynamic process of labor allocation, which, interestingly, shows similar patterns across emerging economies in Asia and Africa.

### 10.4.1 *Changes in Household Income and Their Sources in Asia*

We trace changes in the sources of livelihoods among rural households in Myanmar, the Philippines, Vietnam, and Bangladesh. The datasets drawn from the Philippines, Vietnam, and Bangladesh constitute panel data with the replacement of households whose heads have died with successor households. We exclude Lao PDR in this section because its household income data were collected in 2010 only.<sup>4</sup> Data for Myanmar are repeated cross-section data from households living in the same villages. We divide the sample into farmer and landless household groups in Myanmar and the Philippines because the landless households, being the poorest in the village communities, are more geographically mobile and are more likely to have responded quickly to new employment opportunities. The sample villages in Asia were traditional rice-producing areas, and thus particularly suitable for exploring the role of modern agricultural technology during the process of “take-off” into emerging economies.

The sample villages in Myanmar are located in Ayeyawady Division (the country’s rice granary), south of the main city of Yangon. A total of 739 households were interviewed in 1996 (Garcia et al. 2000) and 900 were interviewed in 2012 (Estudillo and Otsuka 2016). Four villages were studied in the Philippines: two are located in Central Luzon (the “rice bowl” of the country) and two are in Panay Island. A total of 632 sample households in the four villages (474 farmer households, 158 landless households) were interviewed in the benchmark survey in 1985. Estudillo and Otsuka (2016) conducted a unique survey that traced the children of the original 632 households in 1985; they were able to locate 527 married children from the

---

<sup>4</sup>Cross-border migration from Lao PDR to Thailand is an interesting issue (Estudillo and Otsuka 2016, Chap. 2).

original 474 farmer households and 129 married children from the original 158 landless households. In Vietnam, the sample villages are located in Hanoi and Thai Nguyen in the north and in Long An and Can Tho in the south. We examined 376 households in 1996 and 344 in 2009, which were divided almost equally between the north and the south. Ut et al. (2000) conducted the benchmark survey in 1996, followed by a resurvey of the same households by Estudillo and Otsuka (2016) in 2009.

The Bangladesh panel data cover most parts of the country and comprise information from 1,240 randomly selected households in 1988 and 2,010 households in 2008 (Hossain and Bayes 2009). The first survey in 1988 was conducted by the IRRI when MVs had just started to spread in Bangladesh. Data for Sri Lanka come from the Household Income and Expenditure Survey (HIES), a nationally representative dataset collected by the Department of Census and Statistics of Sri Lanka. The earliest round of surveys in 1990/91 consisted of 18,246 households, and the latest round in 2006/07 consisted of 18,363 households (Kumanayake et al. 2014). The HIES classified households into urban, rural, and estate. We used only the rural households from the HIES because of our focus on agriculture.

We divided household income into farm and nonfarm sources. Farm income is obtained from farming and agricultural wage employment. Wage employment refers to off-farm labor activities, primarily in transplanting, weeding, harvesting, and threshing in rice farming; these are characterized by low remuneration and high seasonality. The major share of farm income accrues from crop production (e.g., rice, vegetables, and fruits), livestock and poultry propagation, and fishing. Nonfarm income comes from four sources: (1) formal wage employment, (2) informal wage employment, (3) self-employment, and (4) remittances and other miscellaneous income. Nonfarm self-employment income is derived from retail and trade, transport, rural restaurants, the renting of self-owned equipment and vehicles, handicraft shops, and other sources. Remittances come mainly from family members (e.g., unmarried children) working abroad or locally in big cities and towns. Other income sources include pensions, gifts, and other forms of transfer payments. In Africa, other income sources include the wages from migrant workers. Poverty measures were estimated using the FGT index, with US\$1.25 per capita per day in PPP 2005 based on private consumption used as the poverty line.

**Myanmar** Total household income (US\$ PPP in 2005) rose by about 1.8 times for farmers and 2.0 times for the landless from 1996 to 2012 (see Table 10.5). Agricultural income is becoming less important: the share of agricultural income of farmer households declined from 91 to 82% and that of the landless from 68 to 38%. The major sources of income growth were rice farming and formal wage work for farmers, as income from formal work became the dominant source of nonfarm income in 2012. Income from rice farming rose because of the increase in rice yields (which rose from 1.8 to 2.8 tons per ha) and the abolition of government production quotas (mandatory selling of 0.5 tons of paddy to the government), which increased the prices received by farmers by about 50%. Recently, nonfarm income has increased in importance because the more educated children of farm households

prefer to work in the formal wage sector in Yangon. Nonfarm informal wage work and nonfarm self-employment activities were the main sources of income growth for the landless. Landless households appear to have substituted informal wage work and self-employment activities for agricultural wage work in 2012, presumably because of the declining labor employment opportunities in rice farming due to decreasing farm size coupled with low cropping intensity. Poverty decreased moderately among both landless and farmer households, although the headcount ratio remained high for the landless (74% in 2012). Given the rising importance of nonfarm income, it is reasonable to surmise that the development of the nonfarm sector has become an important driver of household income growth and poverty reduction in rural Myanmar.

**Philippines** We have income data for two generations of households in the Philippines: respondents' generation (G1) and the married children of respondents (G2). In 1985, a substantial portion of G1 household income (76% for the farmer, 49% for the landless) came from agricultural sources (e.g., production of rice, nonrice crops, and livestock; see Table 10.5). The income of farmer households for G1 in 1985 was about twice that of landless households, and thus poverty was much higher among the landless (65%) than among the farmer households (42%). Interestingly, nonfarm income has become the major source of income for G2 (83% for farmer children and 92% for landless children in 2008). Income disparity between farmer and landless children appears to have disappeared for G2 when nonfarm income became the major driver of income growth: the ratio of farmer to landless income is only 1.22 for G2 compared with 2.10 for G1. While G2 incomes have largely equalized, poverty incidence among landless children remained higher but, with a mere eight percentage points difference, compared favorably with that of their parents, for whom poverty stood at 23% points higher among the landless class. Landless children who migrated to local towns and big cities were able to increase their income more than farmer children could. Such migration was facilitated by the earlier decision of landless parents to invest in their children's schooling. In brief, participation in the nonfarm labor market and migration to local towns and big cities are major strategies for moving out of poverty for the landless poor in the Philippines.

**Vietnam** We divided our sample villages into "northern villages" (referring to Hanoi and Thai Nguyen provinces) and "southern villages" (referring to Long An and Can Tho). Household income (US\$ PPP in 2005) in the northern villages rose from \$1,547 in 1996 to \$4,093 (2.64 times) in 2009, whereas, in the southern villages, income rose from \$2,896 to \$11,748 (4.05 times; see Table 10.5). The most important source of income growth in the northern villages was nonfarm formal wage work (which almost doubled). An interesting gender specialization can be observed: women in the northern villages are left on the farms producing high-value products (e.g., citrus, cut flowers, vegetables, tea, poultry, and pigs), whereas the men work in factories in the cities and local towns, returning home in the rural villages during weekends (Estudillo and Otsuka 2016). In the southern villages, the major source of income growth was rice farming (which rose 4.8 times) because of the increase in rice yield and, importantly, because of high rice prices in 2009, which captured the rice

**Table 10.5** Sources of rural household income in selected countries in Asia, 1985–2010

| Source  | 1996                      | 2012                        |
|---|---------------------------|-----------------------------|
| <i>Asia</i>                                       |                           |                             |
| Myanmar: Farmer households                        |                           |                             |
| Farm income                                       | 2,207 (91%)               | 3,602 (82%)                 |
| Nonfarm income                                    | 209 (9%)                  | 785 (18%)                   |
| Total annual household income (US\$ PPP in 2005)  | 2,416 (100%)              | 4,387 (100%)                |
| Poverty headcount ratio (%)                       | 51                        | 39                          |
| Poverty gap ratio (%)                             | 18                        | 19                          |
| Myanmar: Landless households                      |                           |                             |
| Farm income                                       | 736 (68%)                 | 833 (38%)                   |
| Nonfarm income                                    | 340 (32%)                 | 1,330 (62%)                 |
| Total annual household income (US\$ PPP in 2005)  | 1,076 (100%)              | 2,163 (100%)                |
| Poverty headcount ratio (%)                       | 85                        | 74                          |
| Poverty gap ratio (%)                             | 44                        | 42                          |
| Philippines: respondents' generation (G1)         | Farmer households in 1985 | Landless households in 1985 |
| Farm income                                       | 1,446 (76%)               | 448 (49%)                   |
| Nonfarm income                                    | 449 (24%)                 | 460 (51%)                   |
| Total annual household income (US\$ PPP in 2005)  | 1,895 (100%)              | 908 (100%)                  |
| Poverty headcount ratio (%)                       | 42                        | 65                          |
| Poverty gap ratio (%)                             | 20                        | 25                          |
| Philippines: Married children of respondents (G2) | Farmer households in 2008 | Landless households in 2008 |
| Farm income                                       | 1,367 (17%)               | 565 (8%)                    |
| Nonfarm income                                    | 6,774 (83%)               | 6,063 (92%)                 |
| Total annual household income (US\$ PPP in 2005)  | 8,141 (100%)              | 6,628 (100%)                |
| Poverty headcount ratio (%)                       | 26                        | 34                          |
| Poverty gap ratio (%)                             | 12                        | 16                          |
| Vietnam: Northern villages                        |                           |                             |
| Farm income                                       | 1,056 (68%)               | 1,454 (36%)                 |
| Nonfarm income                                    | 491 (32%)                 | 2,639 (64%)                 |
| Total annual household income (US\$ PPP in 2005)  | 1,547 (100%)              | 4,093 (100%)                |
| Poverty headcount ratio (%)                       | 62                        | 26                          |
| Poverty gap ratio (%)                             | 28                        | 23                          |

(continued)

**Table 10.5** (continued)

| Source   | 1996         | 2012          |
|--|--------------|---------------|
| <i>Vietnam: Southern villages</i>                |              |               |
| Farm income                                      | 2,162 (75%)  | 9,400 (81%)   |
| Nonfarm income                                   | 733 (25%)    | 2,348 (19%)   |
| Total annual household income (US\$ PPP in 2005) | 2,896 (100%) | 11,748 (100%) |
| Poverty headcount ratio (%)                      | 35           | 19            |
| Poverty gap ratio (%)                            | 19           | 11            |
| <i>Bangladesh</i>                                |              |               |
| Farm income                                      | 718 (56%)    | 1,665 (43%)   |
| Nonfarm income                                   | 555 (44%)    | 2,169 (57%)   |
| Total annual household income (US\$ PPP in 2005) | 1,273 (100%) | 3,834 (100%)  |
| Poverty headcount ratio (%)                      | 83           | 42            |
| Poverty gap ratio (%)                            | 45           | 16            |
| <i>Sri Lanka: rural households</i>               |              |               |
| Farm income                                      | 796 (34%)    | 948 (18%)     |
| Nonfarm income                                   | 1,544 (66%)  | 4,319         |
| Total annual household income (US\$ PPP in 2005) | 2,340 (100%) | 5,268         |
| Poverty headcount ratio (%)                      | 60           | 14            |
| Poverty gap ratio (%)                            | 24           | 5             |
| <i>Africa</i>                                    |              |               |
| <i>Ethiopia</i>                                  |              |               |
| Farm income                                      | 275 (90%)    | 318 (88%)     |
| Nonfarm income                                   | 31 (10%)     | 44 (12%)      |
| Total annual household income (US\$ PPP in 2005) | 306 (100%)   | 362 (100%)    |
| Poverty headcount ratio (%)                      | 82           | 76            |
| Poverty gap ratio (%)                            | 47           | 46            |
| <i>Kenya</i>                                     |              |               |
| Farm income                                      | 527 (60%)    | 665 (61%)     |
| Nonfarm income                                   | 351 (40%)    | 426 (39%)     |
| Total annual household income (US\$ PPP in 2005) | 878 (100%)   | 1,091 (100%)  |
| Poverty headcount ratio (%)                      | 42           | 40            |
| Poverty gap ratio (%)                            | 18           | 17            |
| <i>Uganda</i>                                    |              |               |
| Farm income                                      | 2003         | 2009          |

(continued)

**Table 10.5** (continued)

| Source   | 1996       | 2012       |
|--|------------|------------|
| Farm income                                      | 272 (73%)  | 431 (78%)  |
| Nonfarm income                                   | 100 (27%)  | 122 (22%)  |
| Total annual household income (US\$ PPP in 2005) | 372 (100%) | 553 (100%) |
| Poverty headcount ratio (%)                      | 78         | 57         |
| Poverty gap ratio (%)                            | 47         | 28         |
| Mozambique                                       | 2002       | 2005       |
| Farm income                                      | 565 (80%)  | 495 (71%)  |
| Nonfarm income                                   | 142 (20%)  | 203 (29%)  |
| Total annual household income (US\$ PPP in 2005) | 707 (100%) | 698 (100%) |
| Poverty headcount ratio (%)                      | 79.9       | 76.1       |
| Poverty gap ratio (%)                            | 48.3       | 48.2       |

*Data sources* Estudillo and Otsuka (2016), Table 2.4 on p. 33 for Lao PDR; Table 3.4 on p. 60 for Myanmar; Table 4.4 on p. 83 and Table 4.5 on p. 86 for the Philippines; and Fig. 5.2 on pp. 103–104 for Vietnam; Debnath (2016) and Estudillo et al. (2013, Table 3 on p. 22) for Bangladesh; Kumanayake (2011, Table 4.3 on p. 100) for Sri Lanka; Estudillo et al. (2013), Table 3 on pp. 23–24 for Kenya, Uganda, and Ethiopia; and Cunguara and Kajisa (2009), Table 8.1 on p. 177 for Mozambique

price increase during the world food crises. Concomitant with the rising household income was a remarkable decline in poverty—36% points in the northern villages and 16% points in the southern villages. Clearly, household activities are increasingly concentrated on rice farming in the southern villages, while household activities have diversified away from rice farming and toward nonfarm formal wage work in the northern villages, where farms are much smaller than in the south.

To sum up, as in the Philippines and Myanmar, the migration of rural labor has become a major strategy for income growth in Vietnam's northern villages, whereas commercial agriculture, which is linked to international rice markets, has served as the driver of household income growth in the southern villages. Modern rice technology in the southern villages and urbanization and human capital in the northern villages appear to be important motors of income growth in Vietnam.

**Bangladesh** Farm income, particularly from rice farming, was by far the most important source of income in rural Bangladesh in 1988. The share of agricultural income dropped, however, from 56% in 1988 to 43% in 2008 (see Table 10.5), partly because of the decline in casual labor employment opportunities in rice farming. The major drivers of the decline were the rapid adoption of mechanical technology for land preparation and threshing and increased employment opportunities in the rural transport sector because of the development of rural roads (Hossain and Bayes 2009). Remittance income rose because of the expansion of the garment industry and construction booms in the cities, as well as increasing overseas migration.

Incomes almost tripled, and poverty declined from 83 to 42%. Taking up jobs in the nonfarm sector has been facilitated by the earlier decisions of parents to invest in their children's schooling, particularly for their girls, which was, in turn, induced by household income increases and government policies favoring girls (e.g., food for education program, cash for education program, and scholarships for girls; Estudillo and Otsuka 2016). It seems clear that investment in human capital is an integral part of the long-term and dynamic process of household income growth in rural Bangladesh.

**Sri Lanka** Nonfarm wage income was the dominant source of rural household income as early as 1990, and its importance had increased by 2006 (see Table 10.5). This indicates that rural households are increasingly allocating labor away from agricultural activities to nonfarm wage employment in the formal wage sector. The educated children of rural households are those involved in formal wage employment, as returns to education are bound to be higher in the sector. As a result, the share of farm income among the rural households declined significantly from 1990 to 2006. Concomitant with the rise in the share of nonfarm wage income is the increase in the annual household incomes of rural households by more than 2.4 times and a decline in the poverty headcount ratio from 60% in 1990 to 14% in 2006.

Sri Lanka has households living in estates that continue to be poor, whereas rural households experienced upper economic mobility when they participated in activities that produce nonfarm formal wage income. Low and stagnant wage income in the estate sector in the face of constant cost-of-living increases is the main factor preventing estate people from moving out of poverty (World Bank 2005). Kumanayake et al. (2014) argue that remoteness is another factor, because basic infrastructure in the estates remains largely underdeveloped, preventing estate people from taking advantage of emerging economic opportunities in the nonfarm sector. In other words, people in estates are examples of “hard-to-reach groups,” those left behind in the course of the economic development of emerging economies.

To summarize, rural households in our focus countries in Asia have shifted their main livelihood sources away from farming to nonfarm work and, importantly, nonfarm formal wage work, as well as to overseas migration, as in the Philippines and Bangladesh; this shift is being accompanied by income growth and poverty reduction. This story is fairly similar across our focus countries in Asia: the development of the nonfarm sector has served as a springboard for economic mobility in rural communities.

#### ***10.4.2 Changes in Household Income and Their Sources in Africa***

Rural household surveys in Ethiopia, Kenya, and Uganda were conducted as part of a research project, the Research on Poverty, Environment, and Agricultural Technology, or RePEAT (Matsumoto et al. 2009). The benchmark survey in Ethiopia was conducted in 2004, covering 420 households from the central to the southern

region. The first survey in Uganda covered 94 local councils 1 (LC1s), the smallest administrative unit (comparable to a village in Asia), and 940 households in most of the country, except in the northern regions, where there were security concerns. The benchmark survey in Kenya was conducted in 2003 and covered 99 sub-locations, an administrative unit that may include a few villages, and 934 households in the central and western regions. Stratified random sampling of communities was used in the target regions, and about 10 households for every selected community were randomly chosen. Data on Mozambique were collected from the two rice-growing provinces of Zambezia and Sofala, extracted from the National Agricultural Survey in 2002 and 2005. There were 1,140 households in 2002 and 928 households in 2005; 928 households were included in both surveys (620 from Zambezia and 308 from Sofala; Cunguara and Kajisa 2009).

**Ethiopia** In Ethiopia, agricultural income (crop farming and livestock income) in 2006 accounted for as much as 88% of the total household income (see Table 10.5). Nonfarm income accounted for only 12% of total income, reflecting the low-return and low-productivity activities in the nonfarm sectors in this predominantly agrarian economy. Total income rose by only 1.18 times, and the poverty headcount ratio was high, declining only modestly from 82% in 2004 to 76% in 2006.

**Kenya** Farm income in Kenya accounted for 60% of the total household income in 2004. The remittances and earnings of migrant workers were an important portion of nonfarm income, comprising 40% of total income, which reflects the relatively developed nonfarm sectors in Kenya compared with other countries in Africa. This indicates the importance of migration as a strategy for increasing household income. There was a modest increase in total household income (from US\$878 in PPP in 2004 to US\$1,091 in PPP in 2007). Household incomes in Kenya are comparable to the incomes of landless households in the Philippines and Sri Lanka and those of small farmers in northern Vietnam and Bangladesh. Both the poverty headcount ratio and poverty gap ratio remained essentially the same from 2004 to 2007.

**Uganda** From 2003 to 2008, farm incomes in Uganda comprised about 70% of total household income (crop farming had a 60% share, livestock 10%), whereas non-farm income, mainly from self-employment, comprised 30%. Total annual household income rose about 1.5 times from 2003 to 2007, primarily due to crop farming. Non-farm wage employment was not very important, indicating that the nonfarm labor markets are not yet well-developed. The poverty headcount ratio declined from 78 to 59%. A more recent phenomenon is so-called “mobile money,” which, since emerging in Uganda in 2009, has been used by more than 35% of the adult population. Its rate of penetration is rapidly increasing. Mobile money enables unbanked households to have access to financial services (important for sending remittances) at a reduced cost.

**Mozambique** Farm income (mainly from crop production) is by far the most important source of household income. Partly because of a drought during the 2002–2005



survey period, the share of farm income declined from 80% in 2002 to 71% in 2005 (Cunguara and Kajisa 2009). Surprisingly, poverty declined modestly when the share of nonfarm income rose. It appears that engaging in nonfarm activities is an important risk-coping mechanism for households in this country. Migration is not common in the study sites (remittance income comprised only about 3% of total income), and income from livestock is small (only about 2%). In brief, diversification out of the farm and into the nonfarm sector appears to enable people to avoid poverty, but this opportunity is limited in Mozambique to nonfarm activities that are undertaken when agricultural labor demand is low.

To sum up, farm income remains the most important source of rural household income in Africa. Nonfarm income in Africa is increasingly made up of remittances and the earnings of migrant workers, indicating the growing economic importance of nonfarm income associated with migration. Nonfarm self-employment activities are largely informal and home-based, intricately tied up with agricultural production (e.g., brewing of homemade beverages in Mozambique). Although we found that the shift of livelihood away from farm to nonfarm activities has taken place in both Asia and Africa, it is occurring much faster in Asia. The main driver in Asia is the development of the formal nonfarm sector and migration, including overseas migration. In Africa, the main driver appears to be domestic migration coupled with employment in informal nonfarm sectors, as livelihood opportunities within the nonfarm sector are largely confined to the informal sector in urban areas, which tend to wane in the course of economic development.

### ***10.4.3 Conditions for “Take-off:” A Retrospective View from Central Luzon in the Philippines***

We discuss below the underlying mechanisms behind the rise of Central Luzon (CL) as an emerging region in the Philippines, in an analysis made possible thanks to the availability of unusually long-term household data. We describe the socioeconomic conditions before and after the GR in CL, the most progressive rice-producing area of the country. The dataset comes from periodic surveys performed at an average interval of four years beginning in 1966 conducted by the Social Sciences Division of the International Rice Research Institute. The main aim of the survey is to monitor changes in the adoption of new rice technology, land tenure, mechanization, and labor practices. The dataset is called the “Central Luzon Loop Survey” because the respondents are located along a loop of the major highways stretching north of Manila through the provinces of Bulacan, Nueva Ecija, Pangasinan, Tarlac, and Pampanga (see Fig. 10.9). These provinces are frontrunners in the adoption of modern varieties of rice in the country. CL, contiguous to the National Capital Region (where the city of Manila is located), has become one of the fastest-growing regions in the nation.

This is the only dataset drawn from tropical Asia that offers information on household socioeconomic conditions as far back as half a century ago. The original sam-



**Fig. 10.9** Location of Central Luzon, the Philippines

ple comprised 92 respondents (see Table 10.6), all rice farmers (excluding landless households). The original sample was intended to be maintained, but its size gradually declined because of retirements from farming and deaths. New samples from the same villages were added in the 1986 and 2011 surveys.

**Table 10.6** Technology adoption, demographic characteristics, and income sources of sample households in Central Luzon, the Philippines, 1966–2011

| Description  | 1966  | 1986   | 1998    | 2011 |
|--|-------|--------|---------|------|
| <i>Technology adoption</i>                                     |       |        |         |      |
| Number of sample households                                    | 92    | 120    | 79      | 93   |
| Average farm size (ha)   | 2.1   | 1.8    | 1.5     | 1.6  |
| Adoption of new technology                                     |       |        |         |      |
| Modern rice (% area)   | 0     | 100    | 100     | 100  |
| Irrigation (% area)  | 60    | 68     | 65      | 61   |
| Rice yield (tons per ha)                                       | 2.3   | 3.6    | 3.4     | 3.9  |
| <i>Demographic characteristics</i>                             |       |        |         |      |
| Average age of head (years)                                    | 46    | 49     | 58      | 59   |
| Average schooling of head (years)                              | 4.6   | 6.5    | 7.7     | 9    |
| Average schooling of children (22 years old and older) (years) | na    | 9.9    | 11.2    | 11.9 |
| Occupation of children 22 years old and older                  |       |        |         |      |
| Farmer (%)   | na    | 3      | 16      | 13   |
| Wage work in agriculture (%)                                   | na    | 2      | 1       | 1    |
| Nonfarm self-employed (%)                                      | na    | 1      | 3       | 2    |
| Nonfarm formal work (%)  | na    | 34     | 27      | 25   |
| Nonfarm informal work (%)                                      | na    | 14     | 25      | 21   |
| Housekeeping/unemployed/retired (%)                            | na    | 45     | 28      | 38   |
| Total (%)  | na    | 100    | 100     | 100  |
| <i>Sources of household income<sup>a</sup></i>                 |       |        |         |      |
| Agriculture (%)  | 73    | 62     | 37      | NA   |
| Rice (%)   | 57    | 45     | 23      | NA   |
| Nonrice (%)  | 16    | 17     | 14      | NA   |
| Nonfarm (%)  | 27    | 38     | 63      | NA   |
| Total (%)  | 100   | 100    | 100     | NA   |
| Total household annual income (pesos per year, nominal)        | 2,011 | 30,056 | 113,545 | NA   |

<sup>a</sup>Refers to June 1966 to May 1967, June 1986 to May 1987, June 1998 to May 1999, and June 2011 to May 2012

Source Authors' calculations from the Farm Household Survey Database of the International Rice Research Institute (<http://ricestat.irri.org/fhsd/>)

Our discussion on the emergence of CL revolves around a simple story that begins with population pressure as a trigger for the adoption of modern rice technology. The GR started in CL in 1966 with the release of IR8. The land reform (LR) program was implemented in the mid-1970s, when the adoption of modern rice varieties had reached high level. The LR program converted share tenants into owner cultivators or leasehold tenants while holding amortization fees and leasehold rents fixed at below the market return to land. Thus, farmers were able to internalize the gains from the rice yield growth that occurred under LR, leading to an increase in farm income. Farmers then invested the increased farm income in children's schooling induced by the growing availability of jobs for skilled and semi-skilled workers when the NIEs delocalized and outsourced some of their production processes to the Philippines. Educated children moved out of the villages and obtained nonfarm work in local towns, cities, and even overseas, while sending remittances back home. Household income from nonfarm sources has become the main contributor to sustained total household income growth and poverty reduction. The CL saga underscores the importance of modern agricultural technology as a springboard of economic transformation in the early stage of development.

**Population Pressure and Modern Agricultural Technology** The average cultivation size of farms has consistently declined from 2.1 ha in 1966 to 1.6 ha in 2011 (see Table 10.6). The decline in farm size can be partly explained by the changes in the composition of sample farms but is more fundamentally due to population pressure on the closed land frontier in CL. Inheritance is an institutional mechanism for the transfer of land across generations. It is common for parents in CL to divide the land equally among heirs or among male heirs only. Due to relatively large family sizes and, in some cases, secondary marriages, landholdings have become fragmented as an outcome of equal inheritance. When rice farming is the only source of income in a regime of small landholdings and stagnant technology, impoverishment becomes common.

In 1966, all sample farmers were planting only traditional varieties of rice. The first MV, IR8, was released in CL in November 1966. Earlier MVs released prior to the mid-1970s were the "first-generation" MVs (MV1), which are highly susceptible to pests and diseases. By 1986, all sample farmers had shifted exclusively to the "second-generation" MVs (MV2), which have strong resistance to against multiple pests and diseases. Such a shift has been facilitated by the opening of Pantabangan Dam in 1977, which provides water for irrigation and electricity via hydroelectric power generation. As a result, there was a significant increase in rice yield from 2.3 tons/ha in 1966 to 3.6 tons/ha in 1986, partly because of the shift from MV1 to MV2 and partly because of increased fertilizer application. The total irrigated area rose from 60% to around 70% between 1966 and 1998.

Over the years, the adoption of labor-saving technologies such as the use of tractors and threshers and direct seeding increased in response to increases in wages. During the 1980s, the Asian NIEs ventured into delocalization and the outsourcing of labor-intensive production processes in Southeast Asian countries to take advantage of the low wages. At the same time, there was a diversion of international division of labor

for low-technology and labor-intensive products from high-performing countries in Southeast Asia to other low-wage countries in Asia, including the Philippines. These phenomena have created jobs for the semi-skilled and skilled workers in CL, raising the returns to schooling investments. Moreover, CL saw a growth of small cities, namely Cabanatuan, San Jose, and the Science City of Munoz, and a growth in population in the so-called *poblacion* (town centers) in each municipality. Small cities emerged partly because of the relocation of industries away from Metro Manila, which has become congested, thereby pushing up production costs.

**History of Land Tenure System and Land Reform Implementation** In the 1800s, during the Spanish colonial period, three modes of land acquisition contributed to the pervasive landlordism in CL: royal grants, purchase of *realengas*, and *pacto de retroventa* arrangements (McLennan 1969). *Realengas* is the outright purchase at a low price of real estate from a badly-in-need peasant or from the public domain. Royal grants and *realengas* resulted in the proliferation of huge private *haciendas* (large blocks of consolidated landholdings) in Nueva Ecija, Tarlac, eastern Pangasinan, and northern and western Pampanga. *Pacto de retroventa* was equivalent to today's mortgage system (*sangla*), whereby a moneylender (commonly a Chinese *mestizo* or Chinese merchant) lent a peasant some money and secured protection for his loan by taking immediate control of the land, allowing the peasant to remain but as a sharecropper under the Chinese *mestizo*. Seldom able to pay the loan at the appointed time, the peasant often relinquished his claim to the land due to his debt. *Pacto de retroventa* extended landlordism in the form of the *kasamajan* (sharecropping) system, which resulted in a pattern of land ownership characterized by scattered, unconsolidated landholdings that was common throughout much of Pampanga and Bulacan, central Pangasinan, and, in the nineteenth century, in southern and central Nueva Ecija.

It was in the *haciendas*, in the growing depersonalized atmosphere of absentee landlordism (landlords lived in Manila), where peasants became discontented and began to clamor for land reform. Ferdinand Marcos issued Presidential Decree No. 27 in 1972 declaring the entire Philippines a land reform area, notwithstanding the fact that only rice and corn land was included. Under the "land-to-the-tiller" program, landholdings of more than 7 ha were to be purchased by the government and sold to individual tenants (up to 3 ha for irrigated land or 5 ha for non-irrigated land). Tenants would amortize for the value of the land over a 15-year period. Under the "operation leasehold" program, sharecroppers on holdings of less than 7 ha were to be converted to leaseholders, paying a fixed rent every cropping season.

Since the implementation of the LR program coincided with yield growth, due to the spread of modern seed-fertilizer technology, amortization fees and leasehold rents prescribed and fixed by law fell below the prevailing rental value of land, creating an economic rent that accrued to the land reform beneficiary. Indeed, according to Otsuka (1991), the LR program in the Philippines (particularly in CL) succeeded because of the heightened economic interest of tenants in land reform arising from the divergence of the rental value of land from leasehold rent and amortization fees prescribed by the LR law. Estudillo and Otsuka (1999) reported that the proportion

of land area in the sample villages in the Central Luzon Loop survey under owner cultivation increased from 12% in 1966 to 24% in 1994 while that under share tenancy declined from 75% in 1966 to only 9% in 1994, attesting to the successful conversion of share tenants to amortizing owners and leaseholders due to land reform in CL.

**Investments in Human Capital** Farm households appear anxious to invest in the schooling of their children. Household children 22 years old and above had obtained significantly longer years of schooling than the household heads had (see Table 10.6). The proportion of adult children with tertiary schooling (more than 10 years of schooling) increased from 40% in 1986 to 67% in 2011; this is an underestimation because the more educated children had migrated and were not included in the list of children living in the households. Only 13% of adult children living in the household in 2011 were engaged in rice farming, whereas 46% were engaged in nonfarm work, including work in the formal sector. The average age of household heads rose from 46 in 1966 to 59 in 2011, which indicates that the heads of selected households remained the same for many years. Clearly, farming remains the main occupation of the household head, whereas the more educated children are engaged in nonfarm work.

According to Estudillo et al. (2009), farm income in the early years of the GR were used to finance investments in children's schooling at a time when new jobs in the nonfarm sector were created in the Philippines. These new jobs raised the returns to schooling, inducing land reform beneficiaries to invest in higher levels of schooling for their children.

**Sources of Household Income** The CL respondents have shifted their main source of livelihood away from farm toward nonfarm activities, as shown by the declining income share of agriculture (from 73% in 1966 to 37% in 1998/99) and the subsequent growth in the share of nonfarm income (see Table 10.6). Remittance income is an important component of nonfarm income; it has gained importance in recent years because of the increasing participation of the younger generation in nonfarm work in cities and overseas, made possible by earlier investments in schooling. Clearly, CL has experienced the same process of economic transformation as that seen in our focus countries, but this case highlights the importance of modern agricultural technology as a force behind economic transformation in its early stage.

## 10.5 Summary and Conclusions

Emerging economies are in developing countries that are rapidly growing and gaining an increasing share of the global economy. However, little is known about the underlying mechanisms of how these economies have actually evolved. This chapter explored three drivers of the evolution of emerging economies: population pressure, modern agricultural technology, and human capital. We performed a comparison between selected countries in Asia and sub-Saharan Africa; the former is the more

dynamic region, and the latter has the potential to follow suit. The three drivers are distinct in their interaction yet define a common regional path for the emerging state, wherein agricultural development could serve as a strong stimulus for economic transformation (or the expansion of the nonfarm sector) through higher farm income and a subsequent growth in investments in human capital.

The CL case is clearly consistent with the Boserupian thesis that high population pressure can induce the adoption of labor-intensive agricultural technology. The GR and the simultaneous implementation of land reform have led to growth in the farm income of land reform beneficiaries. Meanwhile, rising wages in the newly industrializing economies in East Asia have induced the outsourcing and delocalization of labor-intensive production processes to Southeast Asia, including the Philippines, creating jobs for skilled and semi-skilled workers and opportunities for profitable investments in human capital. Farmers used their farm income to finance investments in the schooling of their children, who, upon receiving higher education, migrated out of the villages to small towns, cities, and abroad, thereby contributing to the development of nonfarm sectors and improvements in farm households' income (Estudillo et al. 2009). Nonfarm wage income and remittances became the main contributors to sustained household income growth and poverty reduction in rural areas.

What lessons can Africa learn from Asia? Our analysis shows that, to stimulate the development of the entire economy, it is necessary to first develop agriculture during the early stage of development. Following the Asian path, a robust agriculture sector in Africa is expected to stimulate the development of the nonfarm sector, which can eventually lead the entire economy into rapid growth. The Asian pathway is represented by the advent of the GR, followed by profitable investments in human capital inspired by the rising demand for semi-skilled and skilled workers as globalization proceeds. Since Africa is still in an early stage of development and population pressure has begun, agricultural development could serve as the critical first step toward sustained income growth and poverty reduction, as occurred in Asia about half a century ago.

**Acknowledgements** This work was partially supported by JSPS KAKENHI Grant Number JP25101002. The authors are grateful to Katrina Miradora for her excellent research assistance.

## References

- Chamberlain, J., Jayne, T. S., & Heady, D. (2014). Scarcity amidst abundance? Reassessing the potential for cropland expansion in Africa. *Food Policy*, 48, 51–65.
- Cunguara, B., & Kajisa, K. (2009). Determinants of household income and schooling investments in rice-growing provinces in Mozambique, 2002–5. In K. Otsuka, J. Estudillo, & Y. Sawada (Eds.), *Rural poverty and income dynamics in Asia and Africa* (pp. 174–195). London: Routledge Taylor and Francis Group.

- Debnath, D. (2016). Changing determinants of household income by source: Evidence from rural households in Bangladesh, 1988–2008. Unpublished manuscript, National Graduate Institute for Policy Studies, Tokyo, Japan.
- Dollar, D., & Kraay, A. (2002). Growth is good for the poor. *Journal of Economic Growth*, 7, 195–225.
- Estudillo, J. P., & Otsuka, K. (1999). Green revolution, human capital, and off-farm employment: Changing sources of income among farm households in Central Luzon, 1966–94. *Economic Development and Cultural Change*, 47(3), 497–523.
- Estudillo, J. P., Sawada, Y., & Otsuka, K. (2009). Income dynamics, schooling investment, and poverty reduction in Philippine villages. In K. Otsuka, J. Estudillo, & Y. Sawada (Eds.), *Rural poverty and income dynamics in Asia and Africa* (pp. 1985–2004). London: Routledge Taylor and Francis Group.
- Estudillo, J. P., & Otsuka, K. (2013). Lessons from the Asian green revolution. In K. Otsuka & D. Larson (Eds.), *An African green revolution: Finding ways to boost productivity on small farms* (pp. 17–42). New York: Springer.
- Estudillo, J. P., Matsumoto, T., Hayat, C. Z. U., Kumanayake, N. S., & Otsuka, K. (2013). Labor markets, occupational choice and rural poverty in selected countries in Asia and Sub-Saharan Africa. Background paper for the World Development Report 2013 “Jobs,” World Bank, Washington, D.C.
- Estudillo, J. P., & Otsuka, K. (2016). *Moving out of poverty: An inquiry into the inclusive growth in Asia*. London: Routledge Taylor and Francis Group.
- Garcia, Y. T., Garcia, A. G., Oo, M., & Hossain, M. (2000). Income distribution and poverty in irrigated and rainfed ecosystems: the Myanmar case. *Economic and Political Weekly*, 35(52/53), 4670–4676.
- Goldman Sachs. (2007). The N-11: More than an acronym, Global Economics Paper no. 153. Goldman Sachs Economic Research. New York, NY.
- Hayami, Y., & Otsuka, K. (1994). Beyond the green revolution: Agricultural development strategy into the new century. In J. Anderson (Ed.), *Agricultural technology: Policy issues for the international community*. Wallingford: CAB International.
- Hayami, Y., & Ruttan, V. W. (1985). *Agricultural development: An international perspective*. Baltimore: Johns Hopkins University Press.
- Hossain, M., & Bayes, A. (2009). *Rural economy and livelihoods: Insights from Bangladesh*. Dhaka: A. H. Development Publishing House.
- Jayne, T. S., Chamberlain, J., & Heady, D. (2014). Land pressures, the evolution of farming systems, and development strategies in Africa: A synthesis. *Food Policy*, 48, 1–17.
- Kumanayake, N. S. (2011). Structural transformation and poverty reduction: A view from three sectors in Sri Lanka. Unpublished Ph.D. dissertation, National Graduate Institute for Policy Studies, Tokyo, Japan.
- Kumanayake, N. S., Estudillo, J. P., & Otsuka, K. (2014). Changing sources of household income, poverty, and sectoral inequality in Sri Lanka, 1990–2006. *Developing Economies*, 52(1), 26–51.
- McLennan, M. (1969). Land and tenancy in the Central Luzon Plain. *Philippine Studies*, 17(4), 651–682.
- Macmillan, M., Rodrik, D., & Verdusco-Gallo, I. (2014). Globalization, structural change, and productivity growth. *World Development*, 63, 11–32.
- Matsumoto, T., Kijima, Y., & Yamano, T. (2009). Role of nonfarm income and education in reducing poverty: Evidence from Ethiopia, Kenya, and Uganda. In K. Otsuka, J. Estudillo, & Y. Sawada (Eds.), *Rural poverty and income dynamics in Asia and Africa*. London: Routledge Taylor and Francis Group.
- Otsuka, K. (1991). Determinants and consequences of land reform implementation in the Philippines. *Journal of Development Economics*, 35(2), 339–355.



- Otsuka, K., Estudillo, J. P., & Sawada, Y. (2009). *Rural poverty and income dynamics in Asia and Africa*. London: Routledge.
- Otsuka, K., Higuchi, Y., & Sonobe, T. (2017). Middle-income traps in East Asia: An inquiry into causes for slowdown in income growth. *China Economic Review*, 46(S), S3–S16.
- Otsuka, K., Jin, K., & Sonobe, T. (2018). (forthcoming). *Applying Kaizen in Africa: A new avenue for industrial development*. New York: Palgrave Macmillan.
- Otsuka, K., & Runge, C. F. (Eds.). (2011). *Can economic growth be sustained? The collected papers of Vernon W. Ruttan and Yujiro Hayami*. Oxford: Oxford University Press.
- Otsuka, K., & Larson, D. (2013). *An African green revolution: Finding ways to boost productivity on small farms*. Dordrecht: Springer.
- Otsuka, K., & Larson, D. (2016). *In pursuit of an African green revolution: Views from rice and maize farmers' fields*. Dordrecht: Springer.
- United Nations. (2015). *The Millennium development goals report 2015*. New York: United Nations.
- Sonobe, T., & Otsuka, K. (2011). *Cluster-based industrial development: A comparative study of Asia and Africa*. Hampshire: Palgrave Macmillan.
- Sonobe, T., & Otsuka, K. (2014). *Cluster-based industrial developments: Kaizen management for MSE growth in developing countries*. Hampshire: Palgrave Macmillan.
- Tsunekawa, K. (2017). Globalization and the emerging state: Past advance and future challenges. Paper prepared for the Emerging State Project Workshop held at the National Graduate Institute for Policy Studies, Tokyo, Japan, January 21, 2017.
- Ut, T. T., Hossain, M., & Janaiah, A. (2000). Modern farm technology and infrastructure in Vietnam: Impact on income distribution and poverty. *Economic and Political Weekly*, 35(52–53), 4638–4643.
- World Bank. (2005). *Moving out of poverty in the estate sector in Sri Lanka: Understanding growth and freedom from the bottom up*. Sri Lanka: Centre for Poverty Analysis.
- World Bank. (2008). *World development report 2008: Agriculture for development*. Washington, DC: World Bank.
- Zhuang, J., & Ali, I. (2010). Poverty, inequality, and inclusive growth in Asia. In J. Zhuang (Ed.), *Poverty, inequality, and inclusive growth: Measurement, policy issues, and country studies*. London: Anthens Press.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits any noncommercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this chapter or parts of it.

The images or other third party material in this chapter are included in the chapter's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

