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TRANSFORMATION OF RURAL ECONOMIES IN ASIA AND THE PHILIPPINES

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Abstract

Economic transformation is observed to have been the main factor behind Asia's rapid growth and development. Economic transformation is the shift of the locus of economic activities away from agriculture to industry and services. This study aims to explore the extant literature in Asia and the Philippines on the strategic processes that accompany economic transformation. These processes are the following: (I) growing profitability of staple crop, (II) development of the high-value agricultural sector and contract farming, (III) investments in human capital, (IV) availability of lucrative employment opportunities in the rural nonfarm economy and (V) rural-to-urban and overseas migration. To provide a microscopic picture of rural economic transformation, this study describes the transformation of four rice growing villages in Nueva Ecija and Panay Island using panel household-level data set that spans nearly quarter of a century.

Key words: economic transformation, population pressure, new rice technology, nonfarm sector, urbanization and commercialization, infrastructure

JEL codes: O13, O15, O17, O33, O53

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I. INTRODUCTION

Economic transformation is observed to have been accompanied by rapid growth and poverty reduction. Economic transformation is the shift of the locus of economic activities away from agriculture to industry and services. Since a large number of poor people live and work in rural areas (World Bank, 2000/2001), there is a need to investigate the strategic processes that accompany the transformation of rural economies. The purpose of this research is to identify such processes in rural economies in Asia and the Philippines. By Asia, we limit our analysis to Tropical Asia, consisting of Southeast Asia and South Asia, where rice is a major staple. The main approach is review of literature and analysis of secondary data pertinent to the issue.

The strategic processes that will be investigated are the following: (I) increasing productivity of rice farming, (II) introduction of more profitable high-value agricultural products and contract farming, (III) investments in human capital, (IV) emergence of more lucrative employment opportunities in the rural nonfarm sector, and (V) rural-to-urban and overseas migration induced by industrialization and urbanization as well as globalization.

The Green Revolution which is broadly described as the application of science and technology in agriculture (rice farming in the case of Tropical Asia), has been a major source of productivity growth in Asian agriculture. The Green Revolution started in the mid-1960s with the introduction of IR8, the very first modern variety (MV) of rice. IR8 is more high-yielding than the traditional rices, but are susceptible to pest and diseases. Since the release of IR8 a large number of MVs were introduced with better genetic characteristics. The Green Revolution is not a one-shot phenomenon, but an evolutionary process involving the replacement of older MVs with newer ones with better characteristics. The Green Revolution took off in Asia with the release of IR36, which is the first MV that incorporated resistance against pests and diseases. Rice yield and rice production rose rapidly with the spread of IR36. Rice prices and agricultural prices decline leading to the decline in the terms of trade of agriculture (i.e., the decline in the relative price of agricultural goods vis-à-vis the non-agricultural goods). This induces the release of resources including labor away from agriculture to industry and services. At the household-level, the Green Revolution is transformative because it increases household food production beyond subsistence needs and increases household income enabling rural households to invest in schooling of younger generation (Estudillo, Sawada and Otsuka, 2009).

With rising income and rapid urbanization, there is an increasing demand for high-value agricultural products such as fresh fruits and vegetables and consumer demand has been shifting towards these commodities and away from traditional staples such as rice and corn

(Fan and Otsuka, 2020). With the rise in demand for fresh fruits and vegetables, contract farming has emerged as an institutional arrangement to correct market failures in modern inputs such as improved seeds, chemical fertilizer, pesticides as well as in credit and in market of information services (Otsuka and Zhang, 2020). The evolution of high-value sector in agriculture promotes transformation by enabling households to diversify its sources of livelihood away from rice production and to high-value products. Also, the high-value sector has strong forward production linkages (e.g., packaging and processing) that creates nonfarm employment to unskilled rural labor who forms the bulk of rural poverty.

The emergence of more lucrative employment opportunities in the rural nonfarm sector is transformative and promotes poverty reduction. The landless and near-landless households that belong to the poorest segment of the rural society are those that are generally more involved in nonfarm activities. Among farm households that have access to farmland, farm households engaging in nonfarm employment tend to have higher incomes (Estudillo and Otsuka, 2016). Nonfarm jobs tend to reduce vulnerability by offering a more diversified source of livelihood to sustain household income and stabilize consumption in the midst of uncertainty in agriculture. With the increasing job opportunities in the nonfarm sector there is an option for the more educated younger generation to choose nonfarm jobs (Estudillo and Otsuka, 2016).

Rural-to-urban migration is induced by urbanization and industrialization by creating jobs and offer higher wages in urban areas attracting rural people to migrate to urban areas. Rural-to-urban migration has an impact in the rural labor market by creating relative scarcity of labor in the rural areas and induce rising wages ("rural labor market tightening"). This process is pro-poor because the poor tend to stay in rural areas unable to finance the cost of migration thereby benefitting from the rising rural wages. Migration is transformative because remittances are being used to start nonfarm business and invest in agricultural equipment that tends to raise productivity and save labor. Yang (2008) reported the remittances in the Philippines are being used for investments in schooling and health. Migration is also a risk management strategy in rural areas in the midst of large fluctuations in farm income due to weather changes.

This paper has seven remaining sections. Section II describes the conceptual framework of the linkages between farm and nonfarm sector. Section III traces the rising productivity in rice farming. Section IV explores the spread of the high-value agricultural products and contract farming. Section V describes investments in human capital and how it is connected with economic transformation. Section VI inquires on the profitable employment opportunities in the nonfarm sector. Section VII traces rural-to-urban migration and identifies its impacts on the rural labor and land market. Section VIII presents a case study

of the transformation of rural villages in Central Luzon and Panay Island. Finally, Section IX is the concluding remarks.

II. CONCEPTUAL FRAMEWORK: AN ILLUSTRATION OF FARM-NONFARM LINKAGES

Farm income is affected by modern agricultural technology, high-value agricultural products and infrastructure (Figure 1). Modern agricultural technology increases farm productivity while high-value agricultural products add value to farm production. Infrastructure enhances farming efficiency, increases farmgate prices, and reduces input prices. If the Green Revolution and high value product revolution along with good infrastructure take places, farm income improves and total income increases. The rise in total income stimulates the development of the nonfarm sectors through household investments in schooling (Otsuka, Estudillo and Sawada, 2009). In turn, the supply of an educated labor force to the nonfarm sector could contribute to its development. Schooling tends to increase the efficiency of farming (Foster and Rosenzweig, 1996) and have a positive effect on the choice of nonfarm jobs, rural-to-urban migration and nonfarm income. Thus, starting from GR, high-value agricultural products and infrastructure, there can be a virtuous circle of income growth, increased investment in human capital, and subsequent development of nonfarm sectors.

[Figure 1 around here]

At the macro level, economic transformation can be measured by the share of the gross domestic product (GDP) coming from industry and services. It is commonly observed that a higher GDP share of industry and services goes along with a higher the annual growth rate of GDP, higher household income and a lower incidence of poverty. Example of countries with high share of non-agricultural sector in its GDP that exhibited higher GDP growth rates and lower incidence of poverty are Malaysia and Thailand in Southeast Asia and Sri Lanka in South Asia.

III. RISING PRODUCTIVITY IN RICE FARMING

3.1 Population pressure

Malthus predicted that food shortages will be inevitable because population grows exponentially while food production grows only arithmetically. In this scenario, food production will not be able to catch up with population growth. However, serious famine has never taken place in Asia for the past 50 years because of rapid growth in food production.

What Malthus failed to predict was the emergence of technological change induced by population pressure.

Ester Boserup argued that population pressure on limited land tends to induce intensification of land use through the adoption of land-saving technologies and labor-using production methods that lead to increase in crop yield. Hayami and Ruttan (1985) argue further that population pressure induces, not only technological innovations, but also institutional innovations that stimulates the development and diffusion of innovations

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). Briefly, Green Revolution is the application of science and technology in agriculture. Before the Green Revolution, there was widespread fears of food shortages because of burgeoning population, stagnant yield, and increasing scarcity of farmland. What are the conditions under which the Green Revolution successfully took place in Tropical Asia? There are two important conditions: (1) severe population pressure on limited farmland and (2) technology transfer from abroad.

Figure 2 shows arable land per rural population in Tropical Asia. There was a declining trend in arable land per rural population indicating population pressure on limited farmland. Arable land was 0.33 ha per rural population at the verge of the Green Revolution in 1961. The Green Revolution in rice and wheat took place in Tropical Asia in the late 1960s when population pressure on limited farmland became so severe. While wheat is equally important, we focus on rice in this paper, because rice is a major staple in Tropical Asia. Rice production accelerated in the 1970s and 1980s following the take-off of the Green Revolution. The acceleration in rice production is largely because of yield growth while land area planted to rice did not increase substantially.

[Figure 2 around here]

3.2 Technology transfer from abroad

Otsuka (2016) argues that the most decisive determinant of the GR is technology transfer from abroad. The essence of the Asian GR in rice was the transfer of intensive rice farming systems from Japan to Taiwan and Korea and from Taiwan and Korea to Tropical Asia. This new technology is characterized by the adoption of semi-dwarf fertilizer-responsive high-yielding rices, intensified use of chemical fertilizer and application of improved management practices. The Japanese colonial government invested in irrigation and water control as well as in adaptive research to develop high-yielding varieties that are suitable to local ecological

conditions and in extension services to disseminate these new varieties to farmers. Improved agronomic practices were also transferred from Japan to Taiwan and Korea. As a result, fertilizer-responsive *ponlai* varieties were developed in Taiwan in the 1920s, which were cross-bred between Japanica and Indica rice varieties.

Hayami and Ruttan (1985) argue that the *ponlai* varieties in Taiwan were essentially equivalent to those of the modern rice varieties in the Asian tropics today. It is observed that modern rice varieties that were developed in Tropical Asia in the 1960s resemble in terms of fertilizer responsiveness and yield potential, the *ponlai* varieties in Taiwan. Technology transfer to Tropical Asia mainly came from Taiwan. This is because Korea was less successful than Taiwan in increasing rice production because of the lower levels of irrigation and water control.

The Green Revolution started in Tropical Asia in the mid-1960s with the release by the International Rice Research Institute (IRRI) of the very first modern variety (MV) of rice, IR8, which has a yield potential five times that of traditional varieties of rice. IR8 was a crossbred between Peta, a tall variety from Indonesia and Dee-Geowoo-Gen, a semi-dwarf variety from Taiwan. It appears that IR8 was modeled after the high-yielding Japanese varieties. After IR8 many rice varieties with better characteristics were released. The Green Revolution is not a one-shot phenomenon, but an evolutionary process involving the release and adoption of MVs with better characteristics.

Modern varieties (MVs) of rice can be grouped into three. The first generation MVs (MV1) are those that are high yielding. The second generation MVs (MV2) are high-yielding and resistant against multiple pests and disease resistance. The third generation MVs (MV3) are high-yielding, pests and disease resistant and have good grain quality that command a higher price in the market. In more recent years, there are rices that are fortified with micronutrients Vit A, zinc, and iron that are intended to solve malnutrition among young children and give added nutrient to lactating mothers. Hybrid rices and genetically modified rices are newest improved rice varieties. Knowledge-intensive crop management practices, such as the timely application of fertilizer and low levels of pesticide application, were introduced and started to replace chemical inputs that tend to improve input efficiency and save the environment.

3.2 Declining rice prices and economic transformation

The main impact of the GR is an increase in world rice production and a decline in rice prices (Figure 3). Rice production per capita also rose (Figure 4) indicating an improvement in food security. Rice prices declined in the late 1970s after reaching an all-time high in the early to mid-1970s due to political conflict between the US and the Soviet Union that led to

chaos in the grain market. Except for another one-time hike in 1980/81 this time due to oil price increase, rice prices were generally lower from 1980 to 2005 (hovering around US$400 per ton in 2010 US$ PPP) compared to the 1960s and 1970s. The world food crises in 2006-08 made rice prices rise again, but at a level that is substantially less than the highest peak in 1974 at US$1,374.

[Figure 3 and 4 around here]

The sharp reduction in rice prices would mean that the sure "winners" of the Green Revolution are the rice consumers including urban workers, while rice farmers who failed to adopt new rice technology were clearly the "losers" because of lower rice prices. Farmers who adopted new technology gained from yield increases, but suffered from low rice prices, so that the net benefits to them is unclear. Lower food prices due to Green Revolution may have negative effects on farm income and may serve as disincentives in generating new agricultural technology and invest in irrigation.

Since rice is the so-called wage good (a good on which nonfarm workers spend a large part of their income), declining rice prices would have contributed to the development of nonfarm sector by reducing the cost of living of nonfarm workers in urban areas. Real wages in urban areas will not increase much as food price increase is controlled. Higher rice production strengthens food security of rural households which would mean that rural labor could be released from agriculture to industry and services, facilitating the transformation of the economy.

III. DEVELOPMENT OF HIGH-VALUE AGRICULTURAL PRODUCTS AND CONTRACT FARMING

In the course of economic transformation, consumer demand shifts away from cereals to high-value agricultural products (HVAPs) such as fresh vegetables and fruits and livestock. Markets for HVAPs are characterized by a variety of market failures including the malfunctioning of markets of improved seeds, safe pesticides, and credit as well as the absence of management service providers.

Another problem is the high risk associated with HVAPs that are largely perishable and whose prices fluctuate widely and unexpectedly. Thus, sellers who can guarantee the quality and safety of such products to consumers and who can shoulder the price risk of HVAPs are indispensable for product markets to work. Contract farming (CF) offered by large supermarkets and agro-processors is an institutional arrangement to overcome these market failures.

Under CF a contractor and farmers develop an agreement with conditions for the production and marketing of a farm product. CF agreements are usually made on volume, quality, timing of delivery of product, use of inputs, and price or pricing formula, which accounts for future market prices. It is strongly believed that the emergence of CF is an important means to overcome market failures in agriculture such as information asymmetry and difficulty in accessing markets (inputs, credit, products, etc.).

There are two types of CF: production contract (PC) and marketing contract (MC). Quality control is not strictly followed under MC and most of the production processes are shouldered by the farmers. PC is often used in developing countries for high-value crops with high- quality restrictions in the export markets. Under PC, farmers are mainly responsible for land, labor, and equipment while the contractor provides key inputs such as credit and technical assistance. Under this system, contractor is guaranteed to receive farm quality products after harvest. As the contractor usually provides the key inputs and teaches management practices to farmers, it can be presumed that technology transfer from abroad to local farmers is often in place under PC than under MC.

Under MC, the autonomy of production is largely left to the growers and the contract terms specify the quantity and quality of delivered commodity at a future date, either at a predetermined price or a pricing formula. In other words, while MC is concerned only with the conditions of the delivery of products, PC also provides inputs and technical service. PC is adopted when strict quality and safety controls are required (e.g., organic fruits and vegetables).

Contract farming benefits both farmers and contractors. Setboonsarng et al. (2008) show that rice CF in rural Lao PDR has significantly improved small farmers' income and helped reduced poverty. Huddleston (2011) shows that by participating in CF, oil palm small farmers in the Philippines are able to gain access to agronomic advice, new technologies, and economic or other forms of assistance from foreign processing companies, which helped improve farm efficiency and household income. As to the benefits to contractors, Eaton and Shepherd (2001) show that, overall, contractors benefit in terms of gaining political acceptability, overcoming land constraints, achieving production reliability and sharing risk; quality consistency; and promotion of farm inputs.

It is not clear if CF contributes to poverty reduction. An important reason is that CF seems to favor large farmers than poor and small farmers. Smallholder farmers are however observed to establish producer cooperatives, which make contracts with buyers on behalf of small producers, which means that small farmers may not necessarily be excluded from CF. Producer cooperatives sometimes undertake market research to find out which products are highly demanded at the markets, introduce new profitable crops and technology to cooperative members, negotiate better prices for inputs, and guarantee the quality and safety of HVAPs producers by cooperative members.

Cahyadi and Waibel (2013) reported that the oil palm industry in Indonesia has contributed significantly to overall smallholder income, but that poorer households are often excluded from CF. Key and Runsten (1999) show that small farmers are often excluded from CF

because of the higher transaction costs associated with providing inputs, credit, extension services, product collection, and grading. Three main positive factors that influence farmers' decision to participate in CF are land ownership, land size, and education of farmers; the three main negative factors are complicated contract, lack of opportunities, and price risks.

In brief, the emergence of high-value sector in agriculture and CF could stimulate the transformation of rural economies by correcting market failures in key inputs, bring new agricultural technology and improved management technical and technical services, and introduce profitable crops that induce diversity in rural livelihood.

IV. INVESTMENTS IN HUMAN CAPITAL

My discussion on investments in human capital centers on schooling which is intricately connected with the Green Revolution. Green Revolution increased farm income stimulating investments in schooling inasmuch as schooling is a normal good . The adoption of seed-fertilizer technology increases farm income because of higher production due to higher yield and increased cropping intensity. MVs have shorter maturity period and are photo-period insensitive. Better grain quality increases farm income through higher market prices. Increases in farm income and total household income in turn stimulates investments in schooling. Schooling is known to affect farming efficiency and have a positive effect on the choice of nonfarm jobs. An educated labor force tends to choose jobs in the nonfarm sector thereby contributing to the development of the nonfarm sector. In this way Green Revolution, through its effect on household income and schooling investments, has served as an important pre-condition for economic transformation.

Table 1 shows countries in Tropical Asia that have higher gross enrollment rates in secondary and tertiary schooling tend to have a higher share of its GDP from industry and services. While causality is difficult to establish, there is a clear association between enrollment rates and GDP share of nonfarm sector.[1] Enrollment in both primary and secondary schools have risen almost everywhere in developing countries in Asia. A 100 per cent primary school enrollment rate had been achieved even as early as the 1970s in the Philippines, Vietnam and Sri Lanka. Lao PDR attained this level in 1979 and Myanmar in 1992. Almost all countries in developing Asia have implemented a universal primary education policy, which means primary education is available for free to all children. I believe the universal primary education policy is the most effective instrument in achieving a 100-percent enrollment ratio in primary school.

[1] Countries with a high share of GDP in agriculture in the 2010s are Cambodia, Lao PDR, and Myanmar in Southeast Asia and Nepal and Pakistan in South Asia while those with a low GDP share of agriculture are Malaysia and Thailand in Southeast Asia and Sri Lanka in South Asia. Service sector is now becoming the most important contributor to GDP. Malaysia, the Philippines, Thailand, Bangladesh, Nepal, Pakistan and Sri Lanka has a over 50 per cent of GDP coming from services.

Regarding secondary school enrollment rate, the Philippines and Sri Lanka had the highest rate. Sri Lanka is spectacular with nearly 100 percent ratio in the 2010s. A consistently rising trend is observed in all countries in Tropical Asia. In the Philippines, a high secondary school enrollment ratio could be partly attributed to the Republic Act 6655 of 1988 which mandates the State to provide free public secondary education to all its citizens and promote good quality education at all levels.

Enrollment in tertiary school is low but exhibits a rising trend. Countries with the highest tertiary school ratio are Malaysia and Thailand in Southeast Asia and India in South Asia. Those with the lowest enrollment ratio are Cambodia, Myanmar and Pakistan. While low enrollment rate is the norm worldwide, girls are more likely to participate than boys. Parents have been investing in tertiary schooling of girls because of three reasons: (1) rising returns to female education, (2) changing institutional constraints and (3) changing household constraints. Increasing returns to women's education increases parental investments in girls' schooling.

Regarding returns to schooling, changes in agricultural technology that employs women and a new generation of work brought out by globalization (e.g., Business Process Outsourcing or BPO) increases returns to women's education. Regarding changing institutional constraints, changes in formal institutions that decrease the costs of schooling—lower direct costs (fees and uniforms), lower indirect costs (distance to school) and lower foregone earnings while in school (wages that children could earn outside school) tend to increase investments in girl's schooling. Free primary education program reduces school fees eroding the need for family to discriminate investment schooling across children. Reduction in distance to school decreases transport fee and improves safety for girls. Regarding changing household constraints, higher and more stable household income relaxes resource constraint in education. Shocks could lead to school withdrawal particularly of girls. Conditional cash transfer program—cash is given to households only if their children attend school for a minimum number of days—tend to improve children's school attendance.

VI. LUCRATIVE EMPLOYMENT OPPORTUNITIES IN THE RURAL NONFARM SECTOR

By nonfarm sector, I shall focus almost exclusively on the rural nonfarm economy (RNFE). RNFE includes all activities in rural areas except agriculture, livestock, fishing, and hunting. Nonfarm activities include mining, manufacturing, utilities, construction, commerce, transport, and a full gamut of financial, personal, and government services. By rural areas, I mean dispersed rural settlements as well as the functionally linked rural towns where many agro-processing and ancillary non-farm service and commercial activities congregate to service surrounding agricultural settlements.

With respect to the size of RNFE, based on primary employment data, RNFE accounts for 30% of full-time rural employment in Asia and Latin America, 20% in West Asia and North Africa, and 10% in Africa. Exclusion of secondary and seasonal employment further underestimates the size of the RNFE. Women account for about 25% of employment in nonfarm activities such as household-based manufacturing and service activities. Rural landless and near-landless households depend heavily on nonfarm income sources. Rural industries, typically manufacturing, typically accounts for only 20-25% of the RNFE employment, whereas trade, transport, construction and other services account for 75-80%.

There are three strands of thought that trace the development of the rural nonfarm sector. The first strand – geography of economic development – states that rural nonfarm activities tend to proliferate in areas near urban centers and in areas where infrastructure is well developed (Haggblade et al., 2007). The second strand – role of human capital – asserts the importance of schooling in facilitating labor mobility from low productivity farm activities too high productivity nonfarm activities (Kijima and Lanjouw, 2005). The third strand – agricultural growth linkages – asserts that agricultural development through new technology could stimulate the development of the nonfarm sector through forward production linkages (e.g, fertilizer stores and machine repair) and backward production linkages (e.g., canning, processing, drying).

Regarding the role of nonfarm sector in income generation, there is a widely held belief that higher nonfarm income share is pro-poor. This is because nonfarm jobs are oftentimes held by the poorer segment of the rural community such as the landless and near-landless households who rely more on labor income than any other income source such as land rental revenue and capital income. Nonfarm employment is also a risk reduction strategy by reducing vulnerability. Nonfarm activities serve as diversification of household earnings to sustain household income and stabilize consumption in the midst of uncertainty in agriculture. The development of the nonfarm sector affects income distribution through the wage channel. The main route through which the poor benefits from the development of rural nonfarm economy is through rise in agricultural wages. The underlying process is the expansion of the casual nonfarm employment which moves labor out of agriculture to the RNFE leading to the tightening of the agricultural labor market subsequently increasing agricultural wages (Lanjouw, 2007). This is the so-called Lewis turning point. As most of the poor rely on labor income, rising real wages mean higher family income for the poor even if they work for the same amount of time.

The development of the RNFE forms the very core of economic transformation of rural economies. RNFE provides employment and income and facilitates the transformation of the rural livelihood system away from farm and to nonfarm. Lastly, RNFE has a positive effect in reducing poverty because the poor in rural communities are involved in RNFE, having no piece of land to till and with little education.

VI. RURAL-TO-URBAN AND OVERSEAS MIGRATION

Migration is a form of investment in human capital along with education and health. In the process of economic transformation, it is oftentimes observed that rural people migrate either in urban areas or overseas because of wage differential between the place of origin and destination as well as the greater probability of getting a job in the destination.

Migration could have a profound effect on the local economy. First migration can help increase the level of household consumption as migration of a family member means the number of people eating at home naturally drops increasing the available food for the remaining members. Second, remittance can be used for productive investment as capital invested in micro enterprises. In the Philippines, Yang (2008) shows that remittances particularly overseas remittances are spent on children's education and small enterprises. Yet remittance has little to do with productive investment (de Brauw and Rozelle, 2008) as people tend to reduce their work effort with the receipt of regular and large remittances. Lastly, migration facilitates land consolidation and mechanization in rural areas. With an active land market, as a famer migrates to urban areas or overseas, she/he rents out or sells the land so land size tends to go up in a community with large outflow of migration. As rural-to-urban migration proceeds, migration bids up local wages inducing farmers to use machine to substitute for the more expensive labor (Otsuka and Zhang, 2020).

VIII. A CASE STUDY OF THE TRANSFORMATION OF RICE-GROWING VILLAGES IN NUEVA ECIJA AND PANAY ISLAND

8.1 Overview

This section presents a picture of the economic transformation of four rice-growing villages in the Philippines. These villages that look dormant under the shadow of mango trees have undergone a major transformation in their economies. Such transformation is accompanied by household income growth and poverty reduction.

The first objective of this section is to describe the drivers of economic transformation in these villages from a simple rice-dependent economy to a more complex one characterized by diverse sources of livelihood. These drivers are population pressure, new rice technology, land reform, urbanization and commercialization, and infrastructure. The second objective is to explore the strategic processes that accompany such transformation, such as rising productivity of rice farming and production of high-value crops and livestock; investments in higher education; rising incidence of nonfarm work among the younger generation within the local economy; and migration to local towns, big cities, and overseas. An important finding is that in the course of transformation, participation in the nonfarm labor market and migration are the main pathways in moving out of poverty for the poor landless children.

8.2 Description of the study villages

The study villages are located in Central Luzon (CL) (CL1 representing irrigated ecosystem, CL2 representing the lowland rainfed ecosystem), and two are located on Panay Island (PI) (P1 representing irrigated ecosystem and P2 representing the upland).[2] The first surveys were done in 1985 consisting of a randomly selected subsample of households in four villages. Mahabub Hossain, with funding from the International Rice Research Institute, conducted the 1993, 1997, and 2001 surveys of CL2, P1, and P2 which were surveys of all households. Prof. Keijiro Otsuka of Kobe University and I undertook surveys in the four villages in 2004 and 2008. Our descriptive tables show data in 1985 (the first survey) and 2008 (last survey) when data are available for the four villages. The 2008 survey contained data on migrant children which is the focus of this chapter.

In 1985, we had a total of 323 households and 1,330 in 2008 (Table 2). Households were grouped into two categories: (1) farmer households consisting of owner cultivators, leaseholders, and share tenants, and (2) landless households consisting of casual agricultural workers and nonagricultural households. Household grouping was based on the occupation of the household head

[Table 2 around here]

8.3 Drivers of Transformation

Population pressure

Population pressure means a high growth rate of the labor force on a closed land frontier. One indication of population pressure is the increase in the proportion of landless households. The proportion of landless households rose more rapidly in the irrigated villages of CL1 and P1 because of the presence of greater employment opportunities in rice farming in irrigated ecosystems that attract migrant poor households. Average farm holding declined in all villages and more visibly in CL1 (Table 2). The increasing scarcity of farmland is expected to lead to impoverishment because farming is an important source of income.

[2] These villages were randomly selected from an extensive survey of 50 villages representing irrigated and lowland production environments in Luzon and Panay Island (David and Otsuka, 1994).

New rice technology

The villages are characterized by a high rate of adoption of modern rice varieties as early as 1985 in CL1, CL2, and P1 because of their favorable production environments (Table 2). CL1 and P1 are fully irrigated, while CL2 is favorable lowland, which became fully irrigated by the national irrigation system in 2008. Adoption in P2 was low in 1985 because it is in the upland, but then adoption rose to 100% in 2008 because of the release of new modern rice varieties (MVs) that can thrive in upland conditions. In CL1 and CL2, rice yield rose remarkably possibly because of higher fertilizer application (Table 2).

Land reform

The 1972 Philippine land reform program converted share tenants into leaseholders or amortizing owners, who received the Certificate of Land Transfer (CLT) title. Upon completion of the amortization fees, the CLT titleholders were conferred the Emancipation Patent (EP), a certificate of full ownership. The EP title is acceptable in outright land sales or as collateral for loans. Leasehold rent and amortization fees were set at a fixed rate at the time of the program implementation. Rice yields since then rose because of the Green Revolution, so that there was a divergence between the market rental value and actual land rent or amortization fees (Otsuka, 1991).

Pawning emerged for land under leasehold, CLT title, and EP. This is particularly observed in the irrigated villages of CL1 and P1, where rice yields rose considerably due to the diffusion of high-yielding varieties. Under the pawning arrangement, the farmer surrenders his land in exchange for money from a moneylender. The farmer usually becomes a share tenant of the moneylender in his own land until the farmer can pay off his loan.

Indeed, the pawning of land began in 1975, soon after the implementation of the land reform in the study villages in 1974. The proportion of area acquired by the respondents under pawning arrangements has since risen over time in Central Luzon. This can be traced to the rise in the pawning of land under the newly acquired EP titles. Land reform was transformative because pawning revenues were used to finance children's schooling, particularly tertiary schooling, and to finance the fixed cost of overseas migration (Estudillo, Sawada, and Otsuka, 2009). According to our village informants, farmers who pawned out their lands to finance schooling and overseas migration could repay their loans in less than five years to resume self-cultivation. The more educated children are then engaged in nonfarm work within the Philippines or migrate overseas, thereby diversifying household sources of income. Nonfarm work and migration serve as important household risk coping mechanisms in the villages to buffer the uncertainty of agricultural income.

Urbanization and commercialization

The four villages experienced the wave of urbanization through the expansion of local towns, small cities, and big cities. CL1 and CL2 saw the creation of new villages nearby and within the jurisdiction of the city of Muñoz mainly because of population growth. There was also the expansion of Cabanatuan City and San Jose City, which are nearby cities, in terms of labor-intensive industries, including garments and food manufacturing. The expansion and rehabilitation of the North Luzon Expressways made it easy for workers in CL1 and CL2 to get employed in Manila. P1 benefitted from the booming local economy of Pototan City and Iloilo City, which are fairly accessible to P1 via jeepney (a small passenger bus). In P2, villagers could find work in downtown Igbaras and Iloilo City primarily because of the newly rehabilitated bridge that connects P2 to Igbaras town proper. Cable TV and internet connection expanded, bringing new ideas and values that transform the traditional beliefs and norms in the villages.

In terms of commercialization, I witnessed the emergence of contract farming in okra production before the construction of the CASECNAN national irrigation system in CL2. Under this contract farming, the contractor provides all the inputs, such as seeds, fertilizer, and technical knowhow, while the farmer provides land and labor. Landless workers were employed in okra production, which decreased unemployment during slack periods in rice production.

Infrastructure

The villages experienced improvements in economic infrastructure, such as electricity, roads, bridges, and irrigation. The proportion of households with access to electricity in 2008 was 90% in CL1, 83% in CL2, 86% in P1, and 92% in P2. There have been improvements in road length and quality since the first survey in 1985. Village roads were extended in remote areas within the village while existing roads were upgraded from soil to asphalt in CL1, CL2, and P2. Being close to Iloilo City, P1 has had good quality roads since the 1980s. CL2 and P2 used to be isolated from the town proper by a river. A bridge was constructed in CL2 in 1992 and in P2 in 1995, making it convenient for the farmers to market their products and for others to work downtown and in nearby towns and cities. More importantly, children in CL2 and P2 were able to continue their schooling beyond the fourth grade. Before the bridge, primary schools in CL2 and P2 offered curriculum up to the fourth grade only. I noticed that with the construction of the bridges in the two villages, school enrollment in high school rose remarkably in CL2 and P2.

CL2 used to be rainfed while some farmers invested in portable water pumps to produce high-value crops, such as watermelon, onions, and other vegetables during the dry season. CL2 became fully irrigated in 2008 with the opening of the CASECNAN irrigation system. Farmers can now plant rice in the dry season, increasing the cropping intensity and total rice production per year.

8.4 Strategic Processes That Accompany the Transformation

Increasing productivity of rice farming and production of high-value crops and livestock

Rice yield rose because of the adoption of MVs and higher fertilizer application in all villages. There was an increase in total rice production in the four villages, partly because of yield increase and partly because of the adoption of shorter-duration MVs that enable farmers to have 2-3 crops per year. There was also an increase in the revenue from rice production because of the increase in rice prices due to the 2007–08 food crises. The spread of new rice technology is transformative because it enables farmers to secure food and allocate resources to children's health and schooling.

The importance of rice income has declined due to the rice sector's stagnant rice yield and declining employment opportunities because of the diffusion of labor-saving technologies. In 2008, production of high-value crops and livestock has become more common: the share of nonrice income among households of children living in the study villages was 19 percent, which is higher than the 15 percent share of rice income. So, it seems the economic importance of rice farming vis-à-vis other crops has declined in the traditional rice-growing villages.

Investments in higher education

There have been improvements in schooling attainment in the villages. Average years of schooling completed rose from around 7 years in the respondents' generation to more than 10 years in the children's generation. Estudillo et al. (2009) identified the spread of new rice technology and the implementation of land reform as important events that stimulated investments in children's schooling through an increase in farm income.

Adoption of new rice technology led to increased productivity of farmland through yield increase and higher cropping intensity. Meanwhile, the land reform program was implemented at the time when farmland productivity was rising because of the spread of new rice technology. The land reform conferred land rights to former share tenants and reduced land rental rates, which significantly transferred income from landlords to ex-share tenants. Land pawning market emerged and average pawning values of land rose. Revenues from pawned out lands were used to finance children's schooling. In earlier period, progress of children in school was significantly affected by farm income, which in turn was significantly affected by the adoption of new rice technology and access to farmland. In the later period, children's progress in school was significantly affected by household nonfarm income including remittances.

With the development of the nonfarm sector, some of the more educated children ventured into nonfarm activities in the locality while others moved to local towns, big cities, and overseas. These migrant children were able to send remittances, allowing their younger siblings to obtain higher levels of schooling. In brief, the experience in the four

villages attests to the importance of land market transactions in financing children's schooling in the earlier period, while the development of the nonfarm sector played the more important role in the later period. This is the case for the landless households, which do not have access to farmland, but was able to finance their children's schooling through participation in the nonfarm labor market.

Nonfarm work and migration[3]

Here I discuss how poverty has declined over generations in the four villages, noted in the main findings of Estudillo et al. (2014). The most important strategy to halt the transmission of poverty from parents to children is for the younger generation to take advantage of new economic opportunities within the villages' rural nonfarm economy or move out to explore job markets beyond the villages in local towns, big cities, and even overseas.

To explore whether poverty has been transmitted from parents to children, it is necessary to have socioeconomic information on pairs of parent and child spanning at least two generations. I compiled information on three generations of members belonging to the same household in the four villages. Information from the first generation (G1), consisting of respondents' parents, was taken from the 1985 survey conducted by the International Rice Research Institute (IRRI). Data for the second generation (G2) members, consisting of the respondents and their siblings, were taken from the 1989 survey conducted by Quisumbing (1994).

I constructed a specially designed questionnaire intended for personal face-to-face interviews of the third generation (G3), consisting of the daughters and sons of the respondents (G2). There were 3,218 respondents' children that were reported in the original 1985 survey. We were able to trace the whereabouts of nearly half of them (1,516 children). We gave in-house interviews to 870 out of the 1,516 children (an interview rate of 57%) in their respective current places of residence in 2008. Migrant children tend to cluster in the northern and central parts of the country, where infrastructure is more developed, and peace and order is not a problem.

We had a total of 535 individuals in G1; 1,485 individuals in G2; and 1,516 individuals in G3 (1,197 children of farmer households and 319 children of landless households). The tracking rate on the landless households was lower because landless households are geographically more mobile: many of them were not available at the time of the resurvey or were no longer residing in the study villages in 2008 with hardly any information on their whereabouts.

We categorized children into four groups based on their residential addresses at the time of the 2008 resurvey: (I) study villages, (II) local towns, (III) big cities, and (IV)

[3] Parts of this section were drawn from Estudillo et al. (2014).

overseas.[4] Local towns refer to the poblacion (town center) of the study villages, adjacent villages, towns located in the same province, small cities nearby, and cities and towns in other provinces. Big cities include Metro Manila, Metro Cebu, and Baguio.

Table 3 shows the grouping of G1, G2, and G3 based on the type of job. For G1, we had the following classifications: (I) with a job in agriculture, (II) with a nonfarm job, (III) with an overseas job, and (IV) unemployed and others. Almost all male G1 were engaged in agriculture, and almost all female parents were unemployed, mainly housekeepers. G1 were born around 1910, had very little schooling, and owned, on average, less than 1 ha of farmland per person. Fathers completed more years of schooling than mothers (3.8 years vs. 3.1 years) and inherited larger areas of farmland (1.1 ha vs. 0.56 ha), indicating a gender bias in the transfer of wealth in favor of males.

[Table 3 around here]

For G2, we had the following groupings: (I) with a job in agriculture, (II) with a nonfarm job, (III) with a job in the big cities, (IV) with an overseas job, and (V) unemployed and others. G2 were born around 1940, accomplished more than twice their parents' education (6.9 vs. 3.4 years), and inherited about half the size of their parents' farmland (0.39 vs. 0.83 ha). Brothers and sisters had about the same level of schooling, in contrast to their parents' generation when females were less favored. G2 had become engaged in more diversified occupations, including overseas work.

We categorized G3 based on the parental endowment of farmland: (I) children originating from farmer households and (II) children from landless households. These two groups were further categorized into seven groups based on current residence and occupation: (I) with a job in agriculture in the study villages, (II) with a nonfarm job in the study villages, (III) with a job in agriculture in local towns, (IV) with a nonfarm job in local towns, (V) with a job in the big cities, (VI) with an overseas job, and (VII) unemployed and others.

G3 were born around 1973, had more than 10 years of schooling (3.3 years more than their parents), and had inherited farmland of less than 0.10 ha. Farmer children completed 0.4 more years of schooling than the landless children—a statistically significant difference ($p<.05$). A larger proportion of children from farmer households opted to stay in the study villages. Landless children were geographically more mobile, residing in the big cities, local towns, and overseas.

Children working overseas had the highest income, followed by those in the big cities; children who reside in the study villages had the lowest. Accordingly, poverty incidence and depth of poverty were highest among children living in the villages. That poverty did

[4] We were able to interview 27 children who were already residing overseas, as it happened that they were visiting the study villages at the time of our survey.

not exist among overseas children, while less than 10 percent of migrants in the big cities were poor. Migrant children were deeply engaged in nonfarm work; the largest proportion of their incomes had come from nonfarm income. Surprisingly, even those children who remain in the study villages derived 65 percent of their income from nonfarm sources, including nonfarm wage income (44%) and remittances and other sources (21%). Rice income has become a much less important source of income of G3, whereas, in contrast, it was the most important source, particularly of farmer households in the G2.

The correlation coefficient of parents' and children's schooling had declined from 0.30 between G1 and G2 to 0.20 between G2 and G3. Children of lowly educated parents tended to catch up with children of highly educated parents in terms of schooling, with male children benefitting more. The correlation coefficient between parental income and children's income was close to zero. The coefficient of parental income in a regression function of children's income was statistically not significant with a value of –0.1187. Clearly, parental wealth has become weak in explaining children's economic destiny.

Now we explore whether parental wealth affected children's residential and occupational choice, which, in turn, affect children's income. Education and inherited farmland are the major forms of wealth transfers that could potentially affect children's residential and occupational preferences. For G2, we considered five alternative choices, and for G3 seven choices. Estudillo et al. (2014) performed a multinomial probit function and found that in G2 and G3 education positively and significantly affects the choice of nonfarm work and migration to the cities. Children with larger inherited farmland are significantly more likely to work in agriculture and significantly less likely to engage in nonfarm work and migrate to the cities.

For G3, the more educated children are more likely to engage in nonfarm work in the village and local towns and migrate to the big cities and overseas: they are less likely to engage in agricultural work in the village and local towns. Like G2, children with larger inherited farmland are more likely to choose farming in the village and local towns.

The main finding is that schooling has enabled G2 and G3 to explore job opportunities in the nonfarm sector in the village and local towns and has prepared them to migrate to big cities and overseas. Inherited farmland remains a decisive factor in choosing farming vis-à-vis other occupations in the village and local towns. Since landless children in G3 obtained schooling levels less than but comparable with that of farmer children, it is reasonable to expect that they are equally likely to explore job opportunities in the nonfarm labor market in the village, local towns, and the big cities. In fact, landless children have a higher propensity to migrate in search of economic opportunities elsewhere outside the village.

For G3, education significantly increases nonfarm household income, whereas the size of inherited farmland significantly increases farm income. Interestingly, inherited farmland does not affect the total household income of G3 which indicates that landless children are not necessarily worse off even if they did not inherit farmland. Education has facilitated the participation of landless children in nonfarm employment and migration to

big cities and local towns. These strategies led to an increase in income, notably earned from nonfarm labor activities. As a result, poverty has declined among landless children, and the income gap between farmers' children and landless children has declined.

8.5 Income Growth and Poverty Reduction[5]

Table 4 shows the sources of household income of G2 in 1985 and those of their children (G3) in 2008, classified as coming from farmer or landless households. Sources of household income were the following: (I) rice income, consisting of income from rice production and from off-farm wage activities; (II) nonrice farm income, coming from the production of nonrice crops, livestock, and poultry; (III) nonfarm income, consisting of wage income from nonfarm activities such as formal and informal salary work and from self-employed activities in trade, transport, and communication; and (IV) domestic and foreign remittances. Income data are in purchasing power parity (PPP) in 2005 USD prices.

[Table 4 around here]

In 1985, a substantial portion of household income of G2 (76% for the farmer households, 49% for the landless households) came from agricultural sources, such as the production of rice, nonrice crops, and livestock (Table 4). The income of farmer households was about twice the income of landless households. The major sources of disparity were rice and nonrice crop production. Nonfarm income was higher for the landless. And because the landless are land-poor, poverty was higher among the landless than among the farmer households.[6]

Interestingly, nonfarm income has become the major income source of farmer children (G3)—67 percent of their income—while it was only 12 percent of their parents' (G2). The income disparity between the farmer and landless households appears to have disappeared in G3, with nonfarm income as the major driver of income growth. Meanwhile, income from rice and nonrice farming remained significantly higher for the farmer children.

The ratio of children's and parents' income in the landless category was 7.4 times. In contrast, the corresponding ratio for the farmer was only 4.1, an indication of substantial income growth for the landless children. While children's incomes have largely equalized, poverty incidence among the landless children remained higher, but at a mere

[5] Parts of this section were drawn from Estudillo et al. (2014)

[6] Poverty measures are estimated using the FGT index (Foster, Greer, and Thorbecke 1984) with the USD 1.25 per capita per day in purchasing power parity based on private consumption as the poverty line.

8 percentage points, compared with their parents, in which poverty stood at 16 percentage points higher among the landless class. Landless children who migrated to local towns and big cities were able to increase their income vis-à-vis that of farmer children.

8.6 Summary of the findings from the Philippine villages

This section identifies the drivers of transformation and explored the accompanying strategic processes in four rice-growing villages in the Philippines. There was income growth and poverty reduction, and there was no transmission of poverty from parents to children. There was also a decline in income inequality between the rich (farming households) and the poor (landless households). Participation in the nonfarm labor market and migration to local towns and big cities are the main pathways in moving out of poverty for the landless poor. Poverty among the landless poor declined substantially because they have a higher degree of geographical and occupational mobility.

The experience of the four villages attests to the power of economic transformation to penetrate the lives and livelihood of rural people. There are no losers in four villages—"the rising tide lifted all boats"—the landless poor benefitting more. It is obvious that to improve the lot of the landless poor, they need more than just the virtue of frugality, initiative, and enterprise. The poor needed education, farmland, infrastructure, and local towns and cities, strategies that increased income, notably income earned from nonfarm labor services, that allowed them to move out of poverty.

IX. CONCLUDING REMARKS

Economic transformation is an integral part of economic development. Countries that are growing fast are those that are able to shift the locus of economic activities away from agriculture to industry and services at a faster rate. This paper explores the drivers and accompanying process of economic transformation in Asia with a special focus in the Philippines. The approach is a review of literature.

Green Revolution is by far the most important propeller of economic transformation. With the Green Revolution, the price of farm goods declines relative to the price of nonfarm goods inducing the transfer of resources away from agriculture to industry and services. Importantly, with Green Revolution food production rises, strengthening household food security and enabling households to allocate its labor away from farm to nonfarm activities. The Green Revolution was induced by increasing scarcity of farmland and borrowed technology from abroad as well as adaptive research.

Economic transformation is accompanied by the following strategic processes: (I) increasing productivity of rice farming, (II) introduction of more profitable high-value agricultural products and contract farming, (III) investments in human capital, (IV)

emergence of more lucrative employment opportunities in the rural nonfarm sector, and (V) rural-to-urban and overseas migration induced by industrialization and urbanization as well as globalization.

A microscopic view of economic transformation in four rice-growing villages in the Philippines reveals the following as drivers of economic transformation: (1) population pressure, (2) new rice technology, (3) land reform, (4) urbanization and commercialization, and (5) improved infrastructure. Strategic processes that accompany the transformation of the villages from traditional rice-growing economies to a more diversified ones are the following: (1) increasing productivity of rice farming and production of high-value crops and livestock, (2) investments in higher education, and (3) nonfarm work and migration. These strategic processes are followed by income growth and poverty reduction. Importantly, the landless poor are able to move out of poverty by investing in human capital and then participating in nonfarm labor market and migrating to local towns and big cities.

This study shows the importance of putting priority in developing agriculture first in the early stage of development, as agriculture could serve as a propeller of economic transformation and an engine of growth. My review of literature consistently shows that the Green Revolution is by far the most important underlying strategic process that induces economic transformation.

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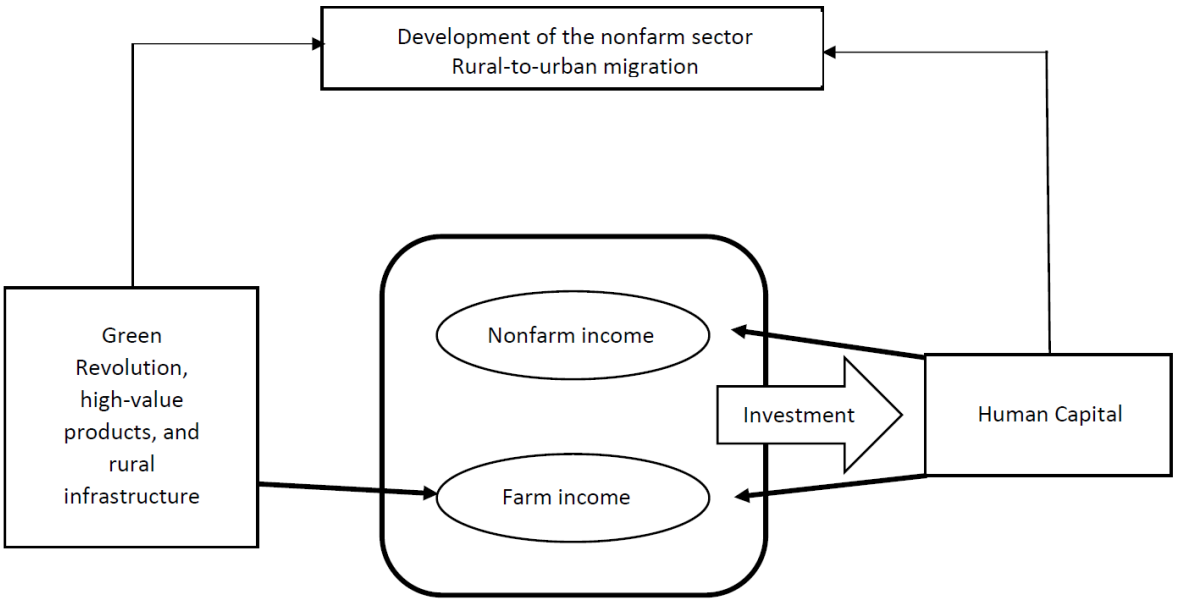
Figure 1: Linkages between farm and nonfarm sector



Note: Figure drawn based on Estudillo and Otsuka (2016) (Figure 1.6, p.18)

Figure 2: Arable land per rural population in tropical Asia, 1961-2013

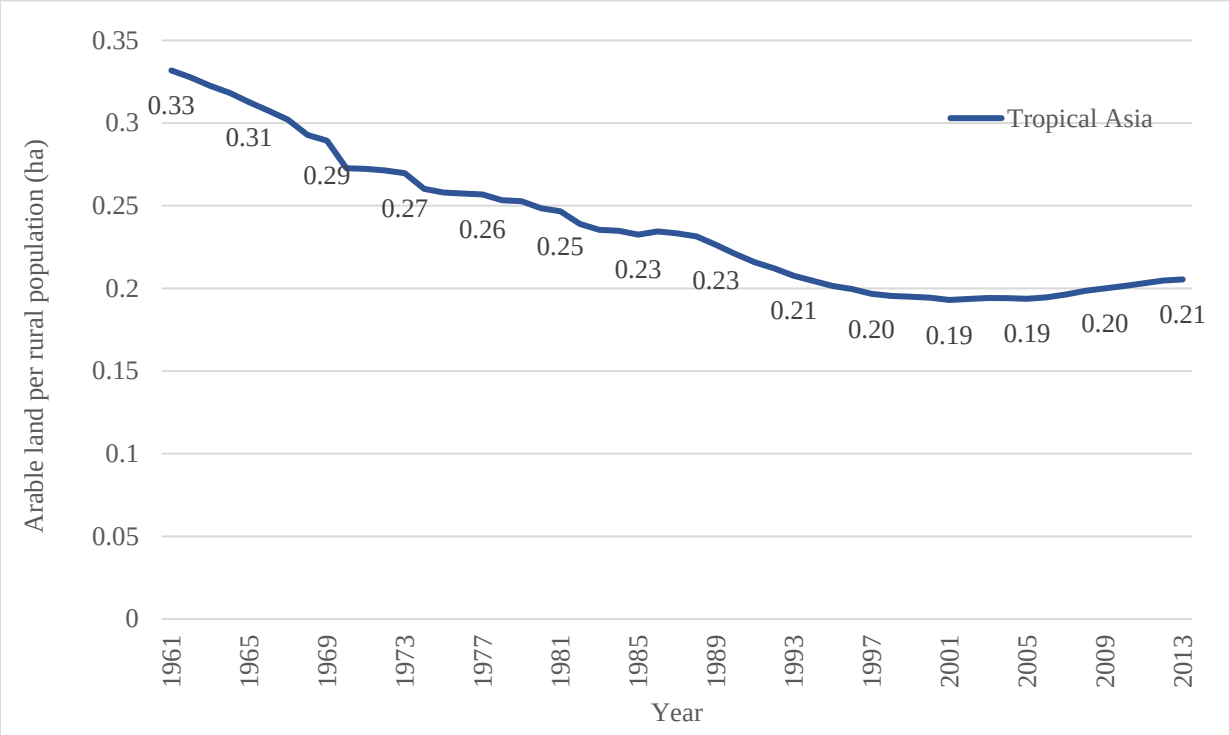
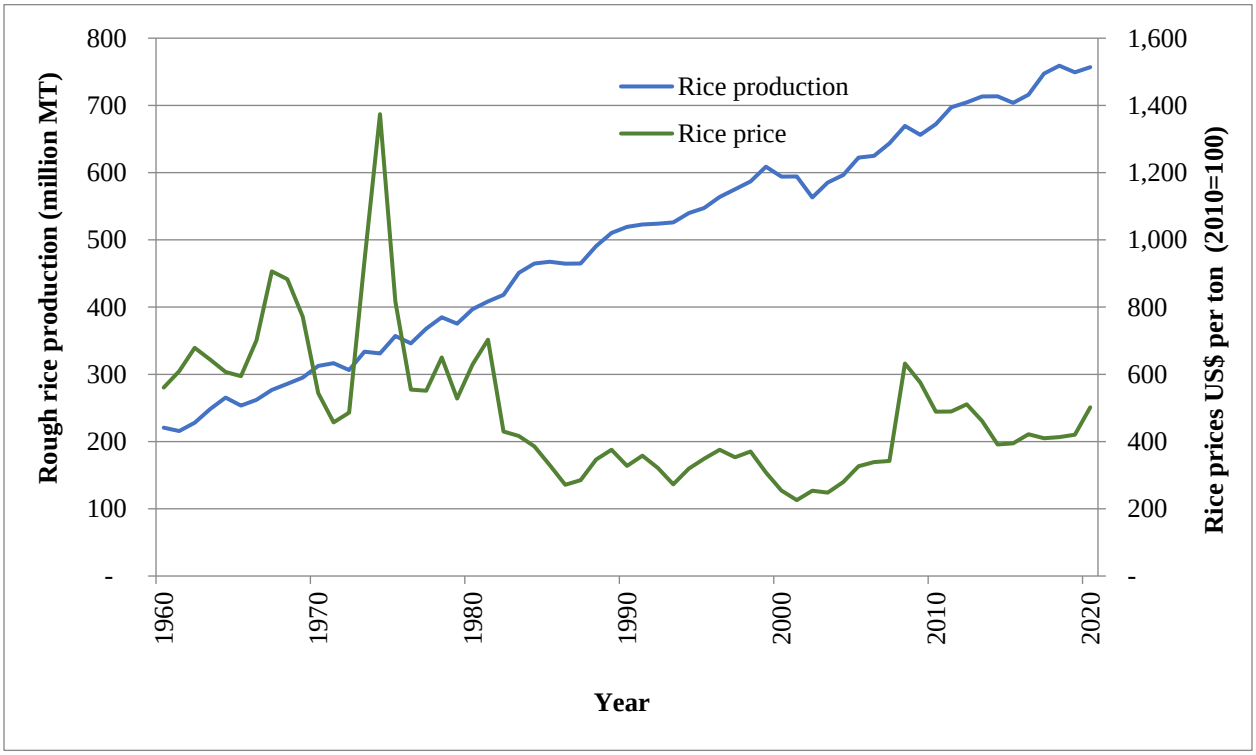


Figure 3: Rough rice production and world rice price, 1960-2020



Data: FAOStat for production and World Bank Commodity Price Data (The Pink Sheet)

Figure 4: Rice production per capita, 1960-2017

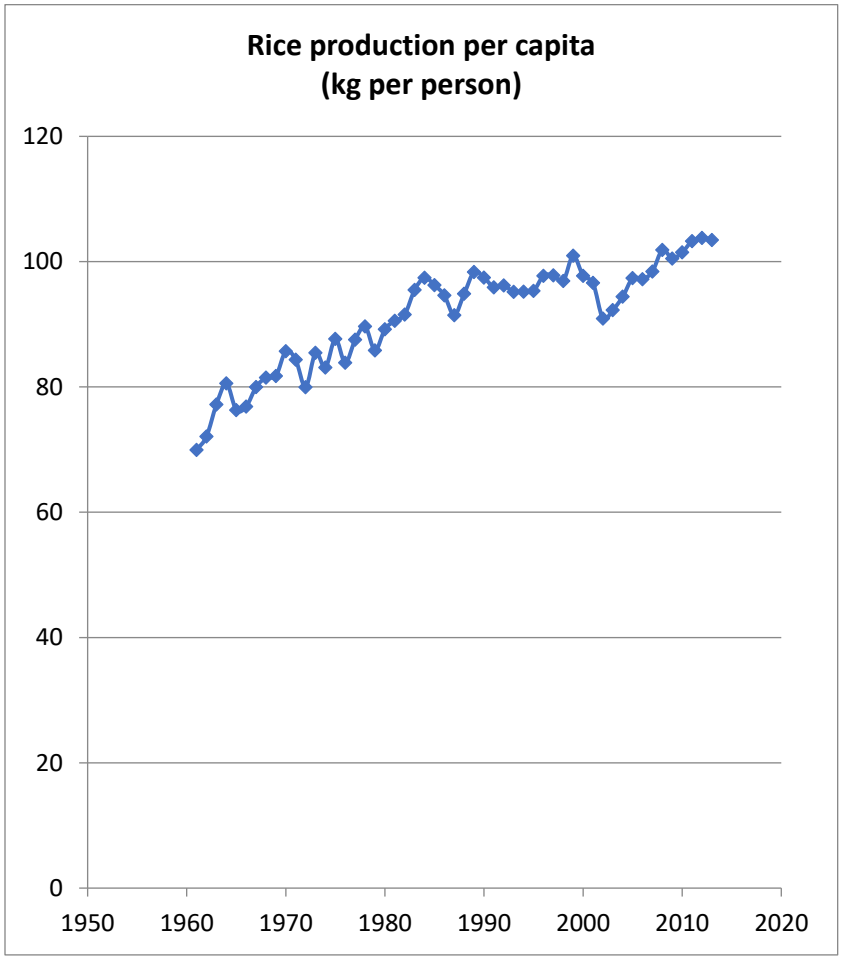


Table 1. School enrollment ratio and shares of gross domestic product in Southeast Asia and South Asia

	Gross primary enrollment ratio			Gross secondary enrollment ratio			Gross tertiary enrollment ratio		
	1990s	2000s	2010s	1990s	2000s	2010s	1990s	2000s	2010s
Southeast Asia									
Cambodia	93.15	125.02	114.76	20.60	30.70	54.83	1.14	5.04	13.93
Indonesia	111.15	108.68	107.16	48.47	62.74	83.15	11.07	17.24	31.58
Lao PDR	104.34	111.99	112.29	25.16	41.29	58.82	1.86	7.86	16.69
Malaysia	96.44	98.37	103.60	67.76	78.95	82.43	12.32	29.40	41.36
Myanmar	103.83	98.07	106.68	24.98	43.09	58.59	5.34	10.77	15.51
Philippines	108.08	106.86	107.33	74.67	81.11	87.21	27.14	28.87	32.70
Thailand	96.77	99.99	99.43	43.66	72.92	105.11	22.50	43.35	50.44
Vietnam	111.40	101.79	110.26	46.58	NA	NA	4.43	14.41	26.89
South Asia									
Bangladesh	83.80	101.63	114.25	38.13	49.23	64.58	4.92	7.24	17.21
India	92.71	102.28	107.83	45.08	52.42	71.58	6.07	11.73	25.56
Nepal	114.82	121.15	145.10	37.75	44.90	69.23	5.06	7.36	13.93
Pakistan	58.63	77.19	86.66	25.20	28.93	38.37	2.61	4.85	9.54
Sri Lanka	107.87	100.36	100.51	85.05	NA	98.68	4.76	NA	18.80
	GDP share of agriculture			GDP share of industry			GDP share of services		
	1990s	2000s	2010s	1990s	2000s	2010s	1990s	2000s	2010s
Southeast Asia									
Cambodia	44.70	31.94	27.47	15.25	23.92	27.81	35.88	38.63	38.74
Indonesia	18.35	14.71	13.35	41.91	46.20	40.96	39.74	38.84	42.59
Lao PDR	42.75	29.15	17.80	18.84	21.82	30.49	42.73	42.51	42.27
Malaysia	13.15	9.02	8.87	42.54	45.83	38.75	47.15	46.09	51.24
Myanmar	NA	47.88	27.94	NA	16.91	33.38	NA	37.22	38.68
Philippines	17.81	13.74	11.43	36.02	33.74	30.64	46.17	52.53	57.93
Thailand	10.05	9.23	9.61	37.12	38.09	36.10	54.25	52.68	54.28
Vietnam	30.24	21.14	16.82	28.90	38.27	33.29	40.86	40.59	39.55
South Asia									
Bangladesh	26.58	19.33	14.70	22.16	23.49	27.05	47.30	52.27	53.35
India	25.58	18.49	16.82	27.33	29.18	27.35	38.55	44.45	47.43
Nepal	40.94	33.84	26.62	19.68	16.75	13.26	33.49	45.24	50.13
Pakistan	23.57	23.04	23.42	22.19	19.13	19.18	44.65	52.05	52.51
Sri Lanka	23.83	14.10	7.98	26.56	28.90	27.63	49.61	57.01	56.70
Note: 1990s is the average of 1990-1999, 2000s is the average of 2000-2009, and 2010s is the average of 2010-latest									

Table 2. Description of the study villages, 1985, 2008

Description	CL1	CL2	P1	P2
Number of sample households				
1985	112	73	60	54
2008	496	360	258	216
Proportion of households				
1985				
Landless households (%)	18	26	38	7
Farmer households (%)	82	74	62	93
Total (%)	100	100	100	100
2008				
Landless households (%)	62	74	61	36
Farmer households (%)	38	26	39	64
Total (%)	100	100	100	100
Average landholdings (ha)				
1985	2.1	1.8	1.1	0.9
2008	1.1	1.2	0.9	0.7
Adoption of modern rice				
1985	100	100	100	59
2008	100	100	100	100
Rice yield (tons/ha)				
1985	4.7	4.0	3.6	2.1
2008	6.1	4.6	3.4	2.3

Note: CL1 and CL2 refers to villages in Nueva Ecija and P1 and P2 refers to villages in Panay Island

Table 3. Description of the three generations in the sample

Category	Number	%	Year of Birth	Completed Years in School	Inherited Land (ha)
Parents of respondents (G1)					
With job in agriculture	243	46	1907	3.4	1.14
With nonfarm job	38	7	1909	6.2	0.44
With overseas job	1	0	1910	n/a[1]	n/a
Unemployed and others[2]	253	47	1911	3.1	0.61
All	535	100	1909	3.4	0.83
Respondents and siblings (G2)					
With job in agriculture	680	46	1940	6.0	0.57
With nonfarm job	259	17	1943	9.0	0.23
With job in the big cities	85	6	1944	9.3	0.08
With overseas job	48	3	1949	10.1	0.51
Unemployed and others	413	28	1940	6.0	0.24
All	1,485	100	1941	6.9	0.39
Children of farmer households (G3)					
With job in agriculture in study villages	287	24	1971	8.8	0.17
With nonfarm job in study villages	202	17	1972	11.0	0.08
With job in agriculture in local towns[3]	45	4	1968	8.7	0.23
With nonfarm job in local towns[3]	76	6	1973	11.9	0.01
With job in the big cities	193	16	1973	11.1	0.03
With overseas job	78	6	1971	12.8	0.01
Unemployed and others	316	27	1972	10.2	0.02
All	1,197	100	1972	10.4	0.07
Children of landless households (G3)					
With job in agriculture in study villages	46	14	1972	8.0	0
With nonfarm job in study villages	48	15	1974	10.9	0
With job in agriculture in local	11	4	1971	6.8	0

towns					
With nonfarm job in local towns	26	8	1974	10.8	0
With job in the big cities	56	18	1975	10.6	0
With overseas job	35	11	1973	12.9	0
Unemployed and others	97	30	1973	9.4	0
All	319	100	1974	10	0

Source: Estudillo et al. (2014), Table 3

Notes: 1 n/a means data is not available

2 Includes housekeepers, discouraged workers, retired workers, and people with disability

3 Includes small cities

Table 4. Household income composition of respondents and children in the study villages in the Philippines (annual income at USD PPP 2005)

Source	Household Income of Respondents (G2) in 1985	
	Farmer households	Landless households
Rice income	1,104 (58%)	329 (36%)
Nonrice income	342 (18%)	119 (13%)
Nonfarm income	225 (12%)	369 (41%)
Remittances	224 (12%)	91 (10%)
Total income	1,895 (100%)	908 (100%)
Poverty incidence		
Head count ratio (%)	42	65
Poverty gap ratio (%)	20	26
Number of observations	230	65
	Household Income of Children of Respondents (G3) in 2008	
	Married children from farmer households	Married children from landless households
Rice income	610 (8%)	81 (1%)
Nonrice income	757 (9%)	484 (7%)
Nonfarm income	5,452 (67%)	5,372 (81%)
Remittances	1,322 (16%)	691 (11%)
Total income	8,142 (100%)	6,629 (100%)
Poverty incidence		
Head count ratio (%)	26	34
Poverty gap ratio (%)	12	16
Number of observations	527	129

	Single children from farmer households	Single children from landless households
Rice income	772 (12%)	116 (2%)
Nonrice income	545 (8%)	446 (6%)
Nonfarm income	4,144 (62%)	4,963 (71%)
Remittances	1,194 (18%)	1,443 (21%)
Total income	6,656 (100%)	6,970 (100%)
Poverty incidence		
Head count ratio (%)	25	11
Poverty gap ratio (%)	13	4
Number of observations	167	43

Source: Estudillo et al. (2014), Table 4