Sources of income in rural Philippines: the role of population pressure, urbanization and infrastructure development

Asia Pacific Journal of Multidisciplinary Research
Vol. 6 No.1, 37-45
February 2018
P-ISSN 2350-7756
E-ISSN 2350-8442
www.apjmr.com

Francis Mark A. Quimba[1], Jonna P. Estudillo[2]
[1]Supervising research specialist, Philippine Institute for Development Studies; [2]Professor, National Graduate Institute for Policy Studies
fquimba@mail.pids.gov.ph[1], jonna@grips.ac.jp[2]

Date Received: September 23, 2017; Date Revised: January 8, 2018

Abstract – *Using nationally-representative datasets from 1990 to 2012, this paper aims to identify pathways out of poverty in the rural Philippines by looking at the different sources of household income. The results show that the most important sources of income growth are nonfarm wage work, foreign remittances, and domestic remittances indicating that nonfarm work and migration are important pathways out of poverty. Households in remote areas remain engaged in agricultural wage work and in the production of high-value agricultural products. Regression results also show that electricity and roads as well as secondary and tertiary schooling haves significant positive impacts on nonfarm wage income and remittances. Overall, this study emphasizes the utmost importance of infrastructure and human capital in facilitating movements out of poverty through nonfarm wage work and migration.*

Keywords – *poverty, nonfarm sector, migration, human capital, infrastructure*

INTRODUCTION

In September 2015, the United Nations General Assembly unanimously agreed on universal development goals to be achieved by 2030. The new set of 17 goals is called Sustainable Development Goals (SDGs), which replaced the Millennium Development Goals (MDGs). While the world has met the poverty target under the MDGs—cutting the proportion of people living in extreme poverty to half the 1990 level—about one billion people in 2011 (14.5 per cent of the world's population) remained in extreme poverty, living on less than $1.25 per day [1]. Goal 1 of the SDGs is to "End poverty in all its form everywhere" particularly in developing countries where one in five people continue to live on less than $1.25 a day. Economic growth could reduce poverty through the creation of productive employment, investment in schooling, and improved infrastructure [2].

This study focuses on rural Philippines because poverty in this country remains high (one in every five Filipinos was poor in 2012) and in the same year, about 70 per cent of poor Filipinos live in rural areas. The country is also characterized by a high population growth rate, 2.1 per cent annually on the average, from 1990 to 2007 [3]; urbanization (3 per cent annually as of 2005) ; and a relatively higher level of human capital compared with that in other ASEAN countries.

There are three complementary pathways out of poverty: (1) agricultural entrepreneurship, (2) off-farm and nonfarm work, and (3) migration [4]. Increasing agriculture productivity improves rural incomes directly by increasing farmers' income and increasing opportunities to find work in the agriculture sector. For a rural household, the decision to engage in agriculture is related to access to basic assets such as agricultural land, water supply, and modern agricultural technology [5-9].

The "high-value revolution" (coined by the World Bank [10, p. 208]) in horticulture, livestock, and other high-value products offers another potential for employment growth in agriculture and poverty reduction [10]. In northern Vietnam, wives of rice farmers remain on the farms, producing fruits and vegetables, growing flowers, and raising livestock [2]. There has been increasing participation of women in export-oriented agribusiness firms including vegetables, fruits, and flowers [11]. Ownership of livestock and access to market is important in poverty reduction [12, 13].

The expansion of the rural nonfarm sector could be a way to reduce poverty [14, 15]. The sector involves a large and diverse set of activities in manufacturing, commerce, finance, construction, and community and personal services [8]. By creating employment opportunities to a wide spectrum of people, including the poor, nonfarm income has become the most important source of household income growth [16-20].

Migration is an important decision for the poor who are living in remote and vulnerable areas where employment opportunities are limited and returns to labor are low. Rural-to-urban migration decision is dictated by urban-rural real wage differential and the probability of obtaining a job in the urban area [21]. Migration may also be viewed as a strategy to diversify income portfolio [17, 22-23]. With globalization, international migration is becoming more common, and most of the international migrants are skilled workers [4]. Jobs are also migrating across international borders and across space within a country through delocalization and outsourcing of production activities. These bring in jobs to households living far from major urban areas.

OBJECTIVES OF THE STUDY

This paper aims to identify the factors underlying the choice of pathways out of poverty for rural households, with focus on the role of population pressure, urbanization, agricultural technology, infrastructure, and human capital. Specifically, this study aims to give insights on the relative importance of the development of the nonfarm sector and the high-value revolution on income growth and poverty reduction across different localities. To date, the impact of high-value revolution on poverty reduction remains unexplored presumably because of the scarcity of data across space and time.

The rest of this paper is organized as follows. The methodology is presented in the next section followed the regression model used. The results of the regression model are presented in the next followed by conclusions and policy recommendations.

MATERIALS AND METHODS

Sources of data

The major data sources are the Family Income and Expenditure Survey (FIES) of the National Statistics Office (now Philippine Statistical Authority), Labor Force Survey (LFS) and the CountryStat database of the Bureau of Agriculture Statistics (BAS). The FIES is the main source of information on sources of income and levels of living of Filipino households for a certain year. For this paper, the FIES of 1991, 1994, 1997, 2000, 2003, 2006, 2009, and 2012 were used. Various rounds of the Labor Force Survey (LFS) of the NSO were used to measure the characteristics of members of the labor force and the performance of the economy in terms of providing employment. The CountryStat by the Bureau of Agricultural Statistics (BAS) is a database maintained by the BAS to provide national and sub-national information on food and agriculture statistics. Information on volume of production of livestock and poultry are not available by province so a proxy variable was used—i.e., animals slaughtered in slaughterhouses and birds dressed in poultry dressing plants were used, respectively. Land use is captured by the area harvested or area planted.

Data from these sources were summarized at the provincial level distinguishing between provinces near a major city as against provinces far from a major city. Distance was calculated as the aerial distance from the capital city of the province to the capital city of the major urban area in the four groupings. For provinces within Luzon Island, the major is city is Metro Manila; Metro Cebu is for the Visayas; Cagayan de Oro and Metro Davao is for Mindanao I and Mindanao II, respectively. A province is considered near a major city if the distance of the capital of the province to is less than 110 kilometers (120 for those in the Visayas to take into consideration that most of the provinces are in other islands, unlike provinces in Luzon and Mindanao that are located mostly within a major island).

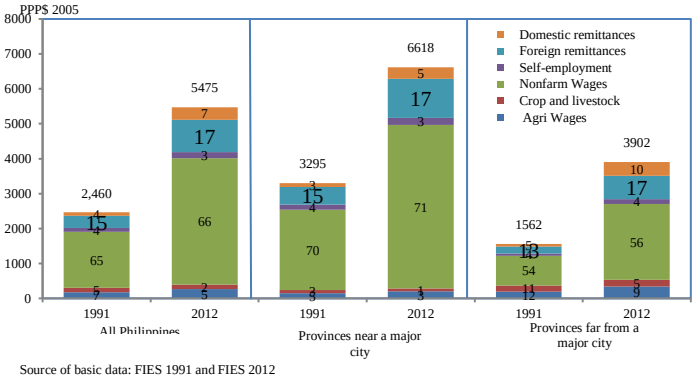
Data from the FIES show that as early as 1991, the main source of household income was nonfarm income (88 per cent of average total income), whereas agricultural income was only 12 per cent (Figure 1). Nonfarm wage income was the most important source, consisting of 65 per cent of the total, followed by foreign remittances (15 per cent), and agricultural wages (7 per cent). Clearly, the most important strategy to earn income and to fight poverty is to engage in nonfarm wage work, migration, and off-farm work in agriculture. While the structure of household income did not change much between 1991 and 2012, foreign remittances and domestic remittances became even more important, indicating that migration has become a more important strategy in recent years.

Table 1. Gross revenue (PPP$ 2005) of agriculture products, 1990 and 2012

	1991		2012	
Source	Near	Far	Near	Far
Traditional Crops	6,918	6,812	4,183	4,389
Non-traditional crops	1,580	1,197	1,726	1,110
Livestock	3,966	1,283	20,498	7,680
Poultry	4,337	123	33,994	8,912

Source: BAS

While the contribution of crops and livestock to household income has declined over time, their



Source of basic data: FIES 1991 and FIES 2012

Figure 1. Sources of income in rural Philippines, 1991 and 2012

contribution to household income growth in faraway provinces remained modest from $176 PPP 2005.

1991 to $196 PPP 2005 in 2012 (Figure 1). Agriculture income as a source of household income declined in importance as consumer demand shifted away from food to nonfood items. Yet, the high-value sector within agriculture has potential as a source of income growth. The most promising sector is livestock and poultry mainly raised in the backyard. The gross revenue from livestock production in nearby provinces rose by 5.2 times; in faraway provinces, it rose by about 6.0 times, with the volume of revenue much higher in provinces near major cities presumably because these products are perishable and are thus non-tradable in remote areas (Table 1). A greater potential for income growth lies in poultry, whose gross revenue rose by 7.8 times in nearby provinces and by 72.4 times in faraway provinces (gross revenue was much higher in nearby provinces in 2012). The value of poultry products grew by 10.54 per cent per year between 1990 and 2012 and that of livestock by 7.69 per cent, whereas, in contrast, the growth rate of traditional crop was negative in the same period. The growth rate in the value of high-value crops was modest at 1.21 per cent per year in the same period. In brief, the potential for productivity growth in agriculture lies in high-value crops, livestock, and poultry, which are labor-intensive sectors with strong forward and backward linkages in the nonfarm sector.

Other indicators were obtained from administrative data sources and published data from the Philippine Statistical Yearbook. Table 4 illustrates how the four variables of interest have changed over time in those near a major city and those far from a major city.

Table 2. Provincial indicators of population pressure, urbanization, and infrastructure in the Philippines, 1991 and 2012

	1991	2012
Population pressure (1000 hectares of land area per member of the labor force.)		
Philippines	0.58	0.45
Near	0.52	0.34
Far	0.62	0.51
Urbanization (percentage of population living in urban areas)		
Philippines	24.8	32.0
Near	34.5	46.2
Far	19.8	24.6
Infrastructure		
Electricity (percentage of households that have access to electricity)		
Philippines	50.11	84.6
Near	62.1	88.77
Far	43.9	82.45
National road (average length of national road in kilometers per 1000 hectares of provincial area)		
Philippines	1.08	1.27
Near	1.23	1.48
Far	1.00	1.17
Irrigation (proportion of harvested area of rice with irrigation to rice harvested area)		
Philippines	59.6	66.1
Near	74.3	82.0
Far	51.9	57.9
Human capital[4]		
*Secondary education (*proportion of labor force with secondary education)		
Philippines	28.9	42.4
Near	31.9	45.2
Far	27.3	40.9
*Tertiary education (*proportion of labor force with tertiary education)		
Philippines	17.9	22.3
Near	19.2	24.4
Far	17.2	21.3

Data sources: FIES, 1991 and 2012, October rounds of LFS, 1991 and 2012; CountryStat,

On the average, there was about 0.58 hectare per unit of labor force in 1990; in 2012, it went down to 0.45 hectare because of high population growth, which translates into a larger number of people in the labor force.

The proportion of people living in urban areas has also increased from 24.8 per cent in 1991 to 32 per cent in 2012 (Table 2). Urbanization is also rapidly taking

place in provinces near major cities as urban population has increased by 11.4 percentage points compared with the 4.8-percentage-point increase in provinces far from major cities.

Three important kinds of infrastructure that could have an impact on economic transformation were considered for this paper: electricity, national road, and irrigation. Electrification shows relative importance being given to provinces far from major cities (Table 2). The percentage of households with access to electricity in these provinces was about 43.9 per cent, which has just about doubled to 82.45 per cent in 2012.

On the other hand, patterns of national road construction and irrigation access have shown that provinces near major cities are given priority. Road density has increased to 1.48 kilometers per 1000 hectares of provincial area in 2012 for provinces near major cities, but, for provinces far from major cities, the corresponding figure is only 1.17 kilometers. In terms of irrigation, provinces near major cities have been prioritized. For provinces near a major city, the proportion of rice land that received irrigation has increased from 74.3 percent in 1991 to 82.0 percent in 2012 while provinces far from a major city only has 57.9 percent of irrigated rice land in 2012 (up from 51.9 percent in 1991).

Investments in human capital are also evident from the proportion of the labor force in the province with secondary education and tertiary education. For the entire country in 2012, on the average, about 42.4 per cent of the labor force had secondary education, 45.2 per cent for provinces near major cities and 40.9 per cent for provinces far from major cities. For provinces far from major cities, this figure represents a 13.6-percentage-point increase in the proportion of the labor force with secondary education, highlighting marked investments in human capital in far-off provinces. Unfortunately, these patterns were not observed in tertiary education, which slightly increased by just 4 percentage points, on the average, for the entire country.

The model

Table 3. Determinants of income in rural Philippines, 1991-2012

	All Philippines					
VARIABLES	**(1) Agricultural Wage Income**	**(2) Crop Farming and Others**	**(3) Nonfarm Wage Income**	**(4) Nonfarm Self-employment**	**(5) Abroad Remittance**	**(6) Domestic Remittance**
Harvested Area per labor force (Ha/1000 per)	86.05**	190.4*	-376.6***	-1.190	-270.0***	-2.886
	(39.20)	(113.2)	(107.5)	(56.36)	(50.27)	(15.47)
Urbanization (lagged)	0.420	-3.195**	5.562**	4.824***	-2.201**	0.184
	(0.539)	(1.323)	(2.684)	(0.902)	(0.979)	(0.318)
Electrification ratio (lagged)	168.1	-984.8***	2,681***	748.5***	640.1***	147.3**
	(109.2)	(330.1)	(617.7)	(224.7)	(206.4)	(63.82)
National Road density (lagged)	-54.50***	-51.71	317.6***	-27.86	-3.280	19.00**
	(12.41)	(31.95)	(82.47)	(20.35)	(24.49)	(7.935)
Irrigation ratio	1.595***	-0.750	-3.241**	-0.635	0.570	-0.112
	(0.313)	(0.876)	(1.305)	(0.465)	(0.526)	(0.193)
Labor force	0.0127***	-0.0213***	0.00352	0.00205	0.00204	-0.00195
	(0.00440)	(0.00667)	(0.00978)	(0.00421)	(0.00376)	(0.00145)
%female	3.077*	-15.34***	6.977	4.936*	-4.801**	1.252
	(1.777)	(4.665)	(5.537)	(2.579)	(2.408)	(0.916)
% age 25-35	-5.487**	10.05	2.246	13.05***	13.04***	-3.254**
	(2.324)	(7.152)	(9.221)	(3.704)	(4.368)	(1.304)
% age 36-45	-0.515	5.890	-8.534	6.720	3.558	-2.574*
	(2.691)	(8.077)	(10.37)	(4.892)	(3.971)	(1.484)
% age 46-60	-9.588***	-48.68***	-42.65***	-1.660	13.82***	5.060***
	(2.672)	(7.024)	(12.11)	(3.775)	(4.181)	(1.492)
% with secondary educ.	1.835	-7.537**	3.185	-2.504	7.514***	-0.412
	(1.388)	(3.195)	(4.382)	(2.019)	(1.755)	(0.720)
% with tertiary educ.	-5.605***	7.642*	42.04***	8.212***	10.90***	-1.507
	(1.709)	(4.527)	(7.047)	(2.937)	(2.756)	(0.982)
Distance to Metro Manila	0.00239	-0.0735	-0.229**	-0.115***	-0.177***	-0.0978***
	(0.0338)	(0.0793)	(0.102)	(0.0411)	(0.0381)	(0.0138)
Constant	462.8***	3,332***	1,161**	-256.3	-406.7*	162.8**
	(161.6)	(441.9)	(568.5)	(222.7)	(229.0)	(79.46)
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	511	511	511	511	511	511
R-squared	0.294	0.565	0.666	0.396	0.515	0.363

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

To assess the relationship of population pressure, urbanization, infrastructure, and human capital on sources of income, this paper used a provincial model that relates provincial average income by source to various indicators of these factors. Specifically, we modeled Equation 1.1 for each province j at time period t,

$$Y_{jt} = \alpha + \boldsymbol{X\beta} + \epsilon_{jt} \quad \text{(Equation 1.1)}$$

where Y is the average income by source, to wit, agricultural wages, crop farming and other agricultural enterprise, nonfarm wage income, nonfarm enterprise income, and remittances (abroad and domestic); X is a vector of explanatory variables and ϵ is the error term. The variables of interest would be indicators of population pressure, urbanization, infrastructure development and human capital.

Population pressure is represented by harvested area per unit of labor force. Urbanization is captured by the percentage of households living in urban areas. Infrastructure is represented by the proportion of households with access to electricity, provincial road density, and ratio of rice land with irrigation. Human capital is represented by the "quantity" of human capital (captured by the number of working-age members between 15 and 60 years old) and "quality" of human capital (captured by the proportion of working-age members grouped by gender, age, and education). Distance is defined as the aerial distance from the capital city of the province to Metro Manila. The provinces were reclassified to form a balanced panel from years 1991 to 2012.

To further investigate the correlation of these policy variables to agricultural activities, we re-estimated equation 1.1 but the dependent variable would be the indicators of agricultural activity, i.e., total revenue from traditional crops, nontraditional crops, livestock, and poultry.

For all the equations, the values for the vector of coefficients, β, were estimated using ordinary least squares with robust standard errors to correct for heteroscedasticity and serial correlation. Time-fixed effects were also included as explanatory variables. As robustness check, equation 1 was estimated using Seemingly Unrelated Regression (SUR). The results are similar to the ones presented in this paper.

RESULTS AND DISCUSSION

This section identifies the direction by which population pressure, urbanization, infrastructure, and human capital have induced households to adopt and combine various pathways out of poverty.

Population pressure

Population pressure is expected to have a positive association with agricultural wage and agricultural activity. Also, improvements in total harvested area per labor force would also drive labor away from nonfarm activities towards agricultural activities so we expect that this would have a negative correlation with nonfarm wage income

The regression results show that average income from agriculture (i.e. agricultural wage and crop farming and other agricultural activities) is positively associated with area harvested per unit of labor force (Table 3). An increase in the area planted per unit of labor force by one unit is associated with an increase in income from agricultural sources with a larger absolute value increase ($190.4 PPP 2005) for crop farming and other activities compared with that for ($86.05 PPP 2005) agricultural wages (Table 3, columns 1 and 2). On the other hand, a unit increase in area planted relative to labor force is negatively associated with other income components. The results are consistent with the household-level regression and by-island disaggregation regression results. It is clear that scarcity of farmland pushes households to pursue more on labor-based activities in the nonfarm sector.

Urbanization

Urbanization is expected to have a negative impact on agricultural wage but could increase income from crop farming and production of livestock and poultry. However, with urbanization comes the possibility of finding nonfarm work so we expect that this variable would have a positive relationship with nonfarm income.

Provinces that have higher percentage of households living in urban areas tend to have lower income from crop farming and other agricultural enterprise (Table 3). As agricultural land is converted to nonfarm uses, the province increases its urbanized areas but reduces the income opportunities that would come from agriculture. Also, in the more urbanized provinces, there would be more opportunities to engage in nonfarm activities.

Correlation between nonfarm wages and urbanization in the provinces is positive and significant indicating a one percentage point increase in the percentage of households living in an urban area is associated with $5.562 PPP 2005 increase in income from nonfarm wages (Table 3). This correlation is greater than the correlation between non-agricultural self-employment and urbanization which stands close to $4.8 PPP 2005.

Table 4. Determinants of agricultural revenue (provincial level) in rural Philippines, 1991-2012

VARIABLES	(1) Non-Trad Crop Revenue	(2) Trad. Crop Revenue	(3) Livestock	(4) Poultry
Harvested Area per Labor force	8.240	1,415	-755.3	-4,972
	(384.4)	(2,463)	(867.9)	(3,730)
Urbanization	-6.648	-110.9***	86.96***	177.8***
	(6.671)	(42.74)	(15.06)	(64.73)
Electrification Ratio (Lagged)	-12.88*	-12.01	-5.978	59.46
	(7.696)	(49.31)	(17.38)	(74.68)
National road density (Lagged)	-502.0***	779.6	692.0**	-1,227
	(147.1)	(942.6)	(332.2)	(1,428)
Irrigation Ratio (Lagged)	1.486	29.07	2.453	4.063
	(3.202)	(20.52)	(7.230)	(31.07)
Labor Force	0.00169***	0.0201***	0.0195***	0.0285***
	(0.000302)	(0.00194)	(0.000682)	(0.00293)
%female	-51.32*	-43.45	-44.72	-154.9
	(28.09)	(180.0)	(63.43)	(272.6)
% age 25-35	58.83**	-200.3	187.0***	78.52
	(29.25)	(187.4)	(66.04)	(283.8)
% age 36-45	-23.16	223.1	65.62	199.0
	(32.07)	(205.4)	(72.40)	(311.1)
%age 46-60	21.25	218.1	55.10	97.92
	(39.96)	(256.0)	(90.21)	(387.7)
% with sec. educ.	71.13***	-42.43	56.52	77.86
	(16.30)	(104.4)	(36.81)	(158.2)
% with ter. Educ.	25.96	-128.2	61.11	-162.4
	(19.56)	(125.3)	(44.16)	(189.8)
distance to MM	1.882***	-0.461	-6.228***	-3.336
	(0.322)	(2.062)	(0.727)	(3.123)
Constant	-3,137**	-2,858	-7,896**	-8,225
	(1,499)	(9,605)	(3,385)	(14,547)
Year dummies	Yes	Yes	Yes	Yes
Observations	511	511	511	511
R-squared	0.224	0.215	0.849	0.404

Robust standard errors in parenthesis; *** p<0.01, ** p<0.05, * p<0.1
Source: Author's calculations

With urbanization comes a large number of opportunities for nonfarm wage work or self-employment especially since urbanization is related to the presence of industries or establishments and different kinds of public infrastructure which can support the establishment of businesses. Urbanization is negatively correlated to remittances from abroad and not statistically correlated with domestic remittances (Table 3) which may imply that urbanization creates forces that discourages international migration.

Table 4 provides additional insight on the relationship of urbanization and agricultural income. While the relationship is negative for traditional crop farming, it is positive for livestock and poultry supporting the theory that urbanization promotes diversity of diet which leads to a greater demand for high value products.

In brief, urbanization in general encourages nonfarm work and discourages migration.

Human Capital

As the ratio of female members in the household increases, it is expected that income from nonfarm activities (wages and self-employment), and remittances (domestic and abroad) would also increase. We also expect the same relationship for secondary and tertiary educational attainment.

In general, younger members of the households between 15 and 25 years old (control) are associated

more with engaging in nonfarm work while the older ones (between 46 and 60 years old) are associated less with engaging in any economic activity; retirement age in the country is 60 years old. Provinces with a greater proportion of working members with tertiary education tend to have a positive and significant correlation with income from nonfarm wages and self-employment and overseas remittances (Table 3).

Agricultural wage income tends to decrease with the rise in the proportion of household members with tertiary education indicating that the most educated members tend to engage more in activities outside farming (Table 3). Yet surprisingly, the coefficient of tertiary schooling is positive in crop production and livestock and poultry production indicating that the most educated are associated with agricultural activities presumably in high-value products which need judgment in timing of post-production activities (e.g., packaging, refrigeration, and shipping) requiring higher education and specific skills.

Overall, it is clear that while the quantity of labor resource (number of working members) tend to be positively associated to incomes from many sources the quality of labor resources has differential correlations on various income sources with the females and secondary and tertiary education having greater positive correlations on nonfarm wages and remittances. This may mean that households with more female workers and more educated working members will tend to choose to allocate labor resources to nonfarm work and to migration. There is clear indication that the less educated (who comprise the larger segment of the poor in rural communities) remain engaged in agriculture in agricultural wage work. Regression of provincial agricultural revenues (Table 4) shows that higher education (secondary and tertiary education) are not associated with provincial revenues from traditional crops, livestock, and poultry (including fishing) indicating that the less educated are associated with these activities but it is associated with non-traditional crops.

Infrastructure

Infrastructure indicators are expected to have a positive impact on nonfarm incomes but would have a negative impact on agricultural income as the presence of these infrastructures would drive labor away from agricultural activities towards non-agricultural activities. For remittance incomes, it is expected that electricity would be positively correlated with foreign and domestic remittances while road density would be more associated with domestic remittances than with foreign remittances. Irrigation positively affects agricultural income. Because we used lagged values of these infrastructure variables, we can claim some form of causation exists, that is, the last period's infrastructure status impacts the current level of income.

We understandably find a negative impact of electricity access on agriculture income given that as the percentage of rural households with electricity access in the province increase, the income opportunities in other sources also increase thereby resulting into a shift of household labor resources away from entrepreneurial activities in agriculture (Table 3)

Similarly, a positive relationship between road density and domestic remittance was estimated. As road density in the province increases by one unit, average provincial income from nonfarm wage work and domestic remittances increases by $3317.6 and $19.00 PPP 2005, respectively (Table 3). On the other hand, the relationship is reversed for agricultural wages which means that as the road density in the province increases, the average income from agricultural wage in the province decreases.

Agriculture related infrastructure as captured by irrigated area is positively associated with agriculture wage work. Interestingly, the coefficient of nonfarm wage work is negative indicating a negative correlation between improvements in agricultural irrigation and nonfarm wage work. Irrigation tends to increase labor productivity and thus increases wages.

The role of irrigation in supporting agriculture income is also manifested in the regressions showing agricultural wages is positively associated with irrigation (Table 3).

CONCLUSION AND RECOMMENDATION

First, population pressure (or scarcity of farmland) induces households to be more engaged in nonfarm work, to migrate overseas and in local towns and cities and to spend less time in crop and livestock production. Second, urbanization induces households to join the nonfarm sector labor market and to establish nonfarm self-employment businesses whereas it discourages both overseas and domestic migration. Third, electricity and roads are significant factors affecting household decision to engage nonfarm self-employment activities and to be engaged in overseas and domestic migration. Fourth, irrigation by increasing cropping intensity significantly increases agricultural wage income and decreases income from

domestic migration and self-employment income indicating that irrigation creates jobs in the agricultural sector. Fifth, a rise in the number of working age members tend to encourage households to get involved in a wide variety of economic activities, most importantly, in nonfarm wage work. Sixth, households with a larger proportion of more educated members (i.e., those with secondary and tertiary schooling) allocate more of its labor resources to such activities as nonfarm work, nonfarm self-employment, and domestic and overseas migration. The impact of higher education on increasing income is highest in nonfarm wage work. Seventh, and lastly, the females and the younger cohort of rural Filipinos are more engaged in nonfarm wage work and migration after controlling for education.

The findings generate several policy implications. First, inasmuch as nonfarm wage income is the main source of income growth, rural development policies should focus, not only in agricultural modernization, but also in improving the industrial base of the country. This may mean expanding the stock infrastructure such as, but not limited to, electricity and concrete road as these infrastructures induces the evolution of industrial and service sectors. Infrastructure development has differential impacts on different income sources of rural household. Given this finding, infrastructure development policy should consider focusing on infrastructure that creates jobs employing unskilled labor which is the main asset of the poor. Needless to say, good quality of infrastructure has a longer lasting impact on creating jobs thus there should be a focus on the quality of service delivery of physical infrastructure. Second, since migration is an important pathway, there should be focus on improving the human capital base of the country. The promulgation of the Enhanced Basic Education Act that increases basic education from 10 to more than 12 years (K-12: kindergarten to 12 years of schooling), the National Health Insurance Act, and the Responsible Parenthood and Reproductive Health Act are strategies in the right direction. Finally, the government should, conditional on sound evidence of benefit-cost analysis and positive rates of return, continue to invest in agricultural development particularly on irrigation and modern rice technology as the Philippines is a major importer of rice and thus the poor are susceptible to swings of high rice prices. In addition, the rural poor remains in agriculture. The high-value revolution which can offer a new wave of employment and productivity growth appears to be on-going in areas nearby major cities because of good infrastructure such as electricity and good roads that facilitates handling and timely delivery of perishables. Expansion of infrastructure to remote areas may set a stage in transferring the high-value revolution even to further places.

This paper highlights the importance of analyzing the underlying factors affecting the income of rural households, the research might benefit from a more disaggregated composition of agricultural income focusing on different types of high-value commodities. While publicly-available income surveys only report summarized income variables, the results of this research shows there are benefits in allowing access to these kinds of data. This paper can also be expanded to incorporate government expenditure to quantify the marginal impact of specific government policies on rural income.

Acknowledgment

The researcher would like to thank the eminent writers whose works have been useful on this study. Specifically, she is indebted to the Deans of the College of Business of University of Rizal System particularly, Dr Armand Valle, Dr Joanne Concepcion, Dr Ariel Plantilla, Prof Olivia R Cababat and DrEuselle P Suarez for the accommodation and heartfelt cooperation. Mr Emmanuel M Llarenas and Prof Ferdinand C Gimeno for the support extended. Furthermore, she is also grateful to the faculties of the five colleges who contributed their effort by answering the questions without reservations and with all honesty.

REFERENCES

[1] World Bank. (2014). Global monitoring report 2014/2015: ending poverty and sharing prosperity. Washington, D.C.: World Bank.

[2] Estudillo, J. P., & Otsuka, K. (2016). Moving out of poverty: an inquiry into the inclusive growth in Asia. London and New York: Routledge Taylor and Francis Group.

[3] ADB (2009). Poverty in the Philippines Causes, Constraints and Opportunities. Asian Development Bank, Mandaluyong City, Philippines.

[4] World Bank, 2008

[5] Adams, R.H.Jr., & He, J. J. (1995). Sources of Income Inequality and Poverty in Rural Pakistan, Washington DC. International Food Policy Research Institute, research report 102.

[6] Cherdchuchai, S., Otsuka, K., & Estudillo, J. P. (2008). Income Dynamics, Schooling Investment, and Poverty Reduction in Thai Villages, 1987-2004. Rural Poverty

and Income Dynamics in Asia and Africa. Abingdon, UK: Routledge.
[7] Estudillo, J. P., & Fujimura, M. (2015). Comparative advantage in rice production: Vietnam and Myanmar.
[8] Haggblade, S., Hazell, P.B.R., & Reardon, T. (Eds) (2007) Structural Transformation of the Rural Nonfarm Economy in Transforming the Rural Nonfarm Economy Opportunities and Threats in the Developing World. The Johns Hopkins University Press, Baltimore.
[9] Winters, P., Davis, B., Carletto, G., Covarrubias, K., Quiñones, E.J., Zezza, A., Azzari, C., & Stamoulis, K. (2009). Assets, Activities and Rural Income Generation: Evidence from a Multicountry analysis in World Development Vol. 37 No. 9 pp. 1435-1452.
[10] World Bank. (2007). World Development Report 2008: Agriculture for Development, Washington, D.C.: World Bank.
[11] Lastarria-Cornhiel, S. (2006). "Feminization of agriculture: trends and driving forces," Background paper for the World Development Report 2008.
[12] Burke, William J., T.S. Jayne, H. Ade Freeman, and P.Kristjanson. (2007). Factors Associated with Farm Households' Movement Into and Out of Poverty in Kenya: The Rising Importance of Livestock. Michigan State University International Development Working Paper No. 90/2007
[13] Pica-Camarra, U., Tasciotti, L., Otte, J., & Zezza, A. (2011). Livestock Assets, Livestock income and Rural Households. Joint Paper of the World Bank, FAO, AU-IBAR, ILRI with the support of the Gates Foundation.
[14] Lanjouw, P. (2007). "Does rural nonfarm economy contribute to poverty reduction?" in S. Haggblade, P. Hazell and T. Reardon (eds) Transforming the Rural Nonfarm Economy: Opportunities and Threat in the Developing World, Baltimore: Johns Hopkins University Press, pp. 55–79.
[15] Lanjouw, J., & Lanjouw, P. (2001). "The rural non-farm sector: issues and evidence from developing countries," Agricultural Economics, 26(1): 1–23.
[16] De Janvry, A., Sadoulet, E., & Zhu, N. (2005). The role of non-farm incomes in reducing rural poverty and inequality in China. Department of Agricultural & Resource Economics, UCB.
[17] Estudillo, J.P., Mano, Y., & Seng-Arloun, S. (2013) "Job choice of three generations in rural Laos," Journal of Development Studies, 49(7): 991–1009.
[18] Krishna, A., Kristjanson, P., Radeny, M. & Nindo, W. (2004). Escaping Poverty and Becoming Poor in 20 Kenyan Villages, Journal of Human Development, 5:2, 211-226.
[19] McCulloch, N. A., Weisbrod, J., & Timmer, P. (2007). Pathways out of poverty during an economic crisis: An empirical assessment of rural Indonesia. World Bank Policy Research Working Paper, (4173).
[20] Otsuka, K., Estudillo, J.P., & Sawada, Y. (2009). Rural Poverty and Income Dynamics in Asia and Africa, London and New York: Routledge Taylor and Francis Group.
[21] Todaro, M. P. (1969). A model of labor migration and urban unemployment in less developed countries. The American economic review, 59(1), 138-148.
[22] Banerjee, A.V., & Duflo, E. (2011). Poor Economics A Radical Rethinking of the Way to Fight Global Poverty. Public Affairs, New York, USA.
[23] Stark, Q. (1980). On the Role of Urban-to-Rural Remittances in Rural Development.