OCTOBER 2022

DISCUSSION PAPER SERIES NO. 2022-28

Enhancing Profits and Incomes in Agriculture and Fisheries

Roehlano M. Briones

CONTACT US:

RESEARCH INFORMATION DEPARTMENT
Philippine Institute for Development Studies

18th Floor, Three Cyberpod Centris - North Tower
EDSA corner Quezon Avenue, Quezon City, Philippines

publications@pids.gov.ph
(+632) 8877-4000

https://www.pids.gov.ph

Enhancing Profits and Incomes in Agriculture and Fisheries

Roehlano M. Briones

PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

October 2022

Abstract

This paper seeks to assess the degree to which the modernization objective of the Agriculture and Fisheries Modernization Act (AFMA) in terms of enhanced profits and incomes in the AF sectors has been achieved. It finds that, while still low compared with the national average, per capita income for agricultural households has been rising since the late 1990s, continuing long term trends since at least the 1960s. Increases in income of agricultural households was and is largely driven by nonfarm income sources, although agricultural income has also been rising. Increases in agricultural income have been driven in part by productivity growth and increasing competitiveness of agriculture (i.e., declining cost per unit output). However, the increasing fragmentation of landholdings in recent decades is associated with lost opportunity for increased income. Nonetheless, poverty incidence among agricultural households has been falling, with an acceleration in the decline since 2012. Consistent with rising income, poverty among agricultural households has been falling, with the pace of decline accelerating from 2012 to 2018.

These stylized facts suggests several implications for policy, namely: 1) Adopt strategies to accelerate modernization by structural change, such as boosting infrastructure investment, and promotion of industrial innovation; 2) Accelerate productivity growth in agriculture by R&D and extension; 3) Undertake measures to promote structural change within agriculture; 4) Promote agri-food systems modernization by appropriate industrial policies, including operational consolidation of landholdings; and 5) Re-deploy safety nets and social protection schemes as targeted measures towards cushioning adjustment to reform.

Keywords: Farm productivity, agricultural transformation, structural change, poverty

Table of Contents

List of Tables

List of Figures

Enhancing Profits and Incomes in Agriculture and Fisheries

Roehlano M. Briones[1]

1. Introduction

The Agriculture and Fisheries Modernization Act (AFMA) aims for modernization of agriculture and fisheries (AF), not as an end in itself, but as a means towards ultimate societal goals. It therefore states, as its third objective (Section 3): "To enhance profits and incomes in the agriculture and fisheries sectors, particularly the small farmers and fisherfolk, by ensuring equitable access to assets, resources and services, and promoting higher-value crops, value-added processing, agribusiness activities, and agro-industrialization."
The statement of the objective already presupposes several intermediate outcomes that are expected to result in enhanced profits and incomes (Section 3b), namely,

- Equitable access to assets, resources, and services;
- Promoting higher-value crops;
- Value-added processing, agribusiness activities, and agro-industrialization.

Alternatively, the objective-setting may be seen as identifying an essential feature of modernization. That is, adoption of new technology, expansion of higher-value crops and value-added processing, etc. do not constitute the desired "modernization" unless it redounds to enhanced profits and incomes of small farmers and fisherfolk. This is buttressed further by listing the "principles of AFMA" (Section 2), namely:

a) Poverty Alleviation and Social Equity;
b) Food Security;
c) Rational Use of Resources;
d) Global Competitiveness;
e) Sustainable Development;
f) People Empowerment; and
g) Protection from Unfair Competition.

This paper seeks to assess the degree to which the modernization objective of enhanced profits and incomes in the AF sectors has been achieved. Specifically, it aims to review available literature and data for assessing the aforementioned AFMA Objective, and assess the extent to which profitability and incomes of agriculture and fisheries sectors have been enhanced. The assessment is based on a Theory of Change (TOC) which will serve as a framework for evaluation of the third Objective of AFMA, tracing linkages from AFMA interventions to outcomes and impacts. Based on this assessment, the study develops implications for policy towards agriculture and fisheries modernization.

2. Conceptual framework and method

2.1. Livelihood outcomes and theory of change

The fundamental unit for assessing "enhanced profit and income" is the household. The centrality of the household needs to be reiterated as the AFMA objective is stated as "enhanced profit and income of agriculture and fisheries sectors", suggesting a focus on AF profit and

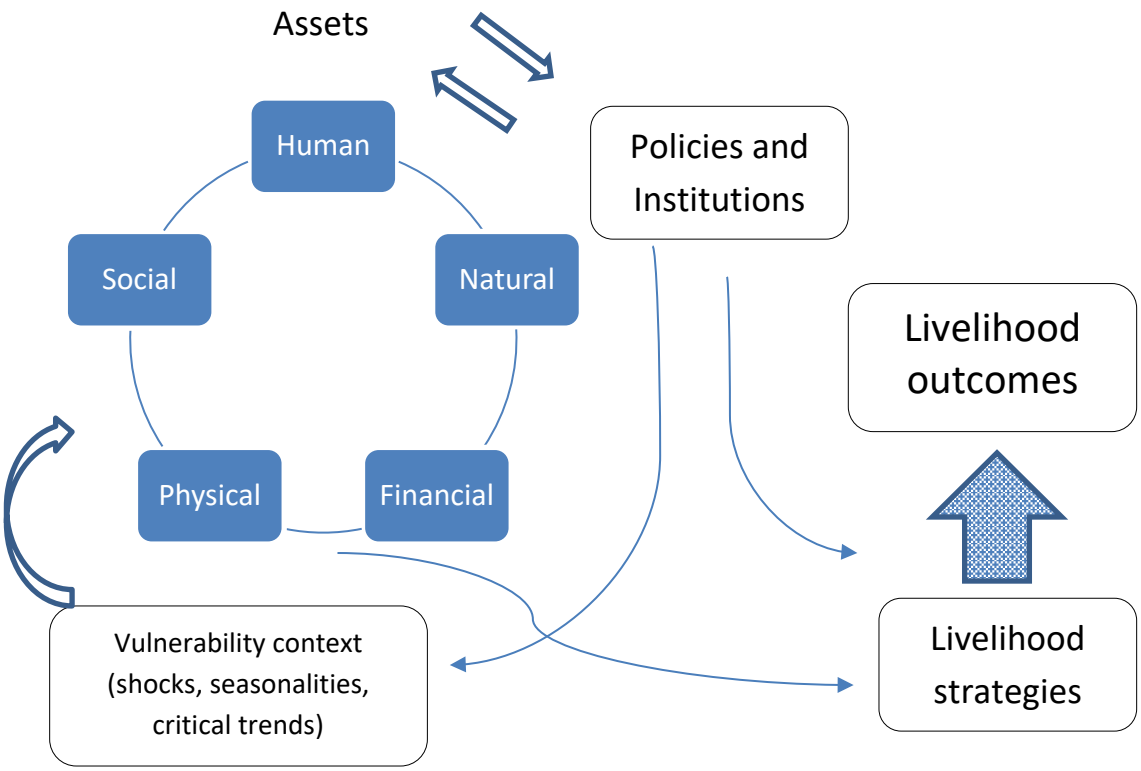
[1] Research Fellow II, Philippine Institute for Development Studies.

income at an aggregate level. However, the qualifier of "particularly the small farmers and fisherfolk" vitiates this interpretation.

The term "small farmers and fisherfolk" are defined in the law (Section 4) as "natural person[s] dependent on small-scale subsistence farming and fishing activities as their primary source of income." A standard statistical practice is to measure income at the household level, hence the focus on agriculture and fisheries households, or "agricultural households" for short.

A useful organizing framework to explain household livelihoods is the "sustainable livelihoods approach". Serrat (2017) discusses the "sustainable livelihoods approach", which "organizes the factors that constrain or enhance livelihood opportunities, and shows how they relate (p. 21)." Figure 1 shows a modified diagram of the approach. The framework is premised on assets controlled by the household, which become the basis of its livelihood strategies, which in turn determine its livelihood outcomes, as conditioned by its vulnerability context, and by policies and institutions.

Figure 1: Sustainable livelihoods framework



Source: Adapted from Serrat (2017)

Household assets are divided into several categories, namely: human, natural, financial, physical, and social. Human capital is the most fundamental asset controlled by most households, denoted by ability to render labor services, of a particular skill level. Natural capital meanwhile is most appropriate in a rural setting, where a household may have entitlement to landholdings, or access to resources such as coastal or inland waters. Natural capital usually generates earnings from own-account employment, by the net income from farming, fishing, or the like activity. Human capital mostly generates earnings from wage

employment. Financial and physical capital correspond most intuitively to the familiar concept of capital, namely cash or financial assets, as well as equipment and other fixed assets (such as standing trees). Lastly, social capital refers to the networks that a household may have access to, that embeds a particular value such as access to finance, technology, and information.
Assets translate into livelihood outcomes via policies and institutions. A key institution in livelihoods is property rights, which establishes household entitlement over assets, conferring on it the ability to benefit from the asset without conflict or dispute. Another key institution is the market, which refers to the system of exchange that allow households to generate economic value from their assets (a wage earning occupation, sale of produce to traders, etc.) The way assets are translated to livelihood outcomes is strongly determined by policy, e.g., the operation of the market may be strongly conditioned by various government policies and regulations. For example, fisherfolk income may be boosted indirectly by government intervention to prevent the entry of cheap imported fish.

Conditioning the generation of economic value and livelihood is the vulnerability context, which subjects households, especially in agriculture, to shocks and seasonality, together with underlying medium to long term trends. *Sustainability* is therefore determined by the ability of the household to sustain favorable outcomes, notwithstanding these shocks and seasonal variations, as well as consistent with underlying trends, such as integrity of natural resources.

The sustainable livelihoods framework is extended to great technical detail under the agricultural household model, which in turn leads to a theory of change. An "agricultural household" may be defined as one household whose working members include small farmers and fisherfolk; an even narrower distinction is to limit the relevant working member to the household head.[2]

Another part of the AFMA definition is "subsistence farming", which is not further defined in AFMA. A standard dictionary meaning is "a system of farming that produces a minimum and often inadequate return to the farmer" (Merriam-Webster, 2022). Another sense of the term "subsistence farming" is the growing of a food crops by a family on its own small farmholding (Bisht et al, 2014.)

A definition given by Merriam-Webster (2022) provides the link to incomes from "subsistence farming", which refers to "a system of farming that produces a minimum and often inadequate return to the farmer." However, the definition still refers to "natural persons"; closer reflection reveals that income and profits of these "natural persons" is almost impossible to measure separately from the incomes and profits received by the households in which they are members. In the field of agricultural economics, the *agricultural household model* is the standard approach to explaining this and related behavior. Box 1 provides a formal expression of this model. Essentially the agricultural household is one that simultaneously undertakes production by operating a farm enterprise, as well as sells labor services in a labor market. Farm production in turn involves a decision to produce agricultural products for a market, but also for household consumption. Based on this model, enhanced profits from farming can be due to any one or a combination of the following:

- Increase price of outputs
- Reduced prices of inputs

[2] In practice, for households with at least one member of working age with primary occupation in agriculture, the household head is almost a worker with primary occupation in agriculture.

- Increased factors owned or controlled by the household, namely land, equipment, labor
- Increased productivity due to reduced quantity of input per unit of output; for example, an increase in yield improvement implies less land input for a given unit of output

The agricultural household model also acknowledges that increases in income can also come from sale of labor to factor markets, especially with increasing investments in human capital. Moreover, the household enterprise may also opt to diversify towards a different mix of livelihood activities, which may not be otherwise available owing to some barriers (such as lack of information about market demand). These include crops other than the current crop mix; and even non-farm enterprises such as manufacturing (e.g., garments) and services (e.g., agricultural trading). AFMA implicitly hypothesizes that such alternative sources of profit are likely to come from "agriculture-adjacent" activities such as agro-processing, and other such "value adding" activities.

From these considerations it is straightforward to infer a TOC, which is already implicit in the overarching TOC discussed in Chapter 1. *Price policies* are those that seek to affect the prices paid to farmers (output price) or by farmers (input prices). For instance, direct output price support takes the form of procurement at above-market price by a state agency (the NFA in the case of the Philippines until 2019). There is also an indirect price policy, by restricting or taxing imports that may otherwise enter the country at below the support price. Price policies can also be applied on inputs and services, i.e. subsidized purchase of fertilizers, free irrigation service, and credit. The latter can be implemented by an interest rate ceiling, or extending subsidies to public or private institutions to allow farmers to obtain credit at below-market price.

Another set of interventions are administrative measures, such as regulations related to food safety, labeling requirements for food, fertilizer, and pesticide products, land market restrictions under the Comprehensive Agrarian Reform Program (CARP), restrictions on fishing fear and seasonal fishing ban, and so on. These measures directly or indirectly affect livelihood outcomes for farm and fishery households, such as raising cost (to comply with regulations), reducing or eliminating sales, such as the sale of fishery output during fishing ban, the sales of agricultural land (beyond the 5 ha ceiling), etc.

Both price policies and administrative measures overlap with *expenditure programs* which are government interventions requiring public funding, which covers a vast range of programs. These include provision of subsidized credit and other agricultural inputs and services, such as extension and irrigation, which are both offered for free in the Philippines. Direct output price support requires public funding. Other programs involve agri-fishery enterprise support, as envisioned in RA 11321, towards value adding activities (marketing, storage, processing, and the like); as well as funding for patrol boats to enforce marine protected areas and seasonal fishing bans.

2.2. Indicators of enhanced profit and incomes

The most obvious indicator for the AFMA objective on profit and income is the change in income of agriculture and fisheries households over time. Income should be measured in real terms to adjust for inflation. As mentioned previously, the households of interest are those with at least one member who is a small famer and/or fisherfolk; a more restrictive definition will

be to limit the definition only to those whose household head is a small farmer and/or fisherfolk, i.e., his or her primary occupation is in AF. Alternatively, the estimates may be limited to just farm income of the household.

Changes in poverty are another useful indicator of enhanced profitability and income. A household and all its members are deemed poor when its per capita income (total household income divided by number of members) is below a poverty line. Poverty is usually measured with reference to a population or population sub-group. The simplest indicator is poverty incidence, which is the percent of a population (or a sub-group) whose per capita income falls below a poverty line.

Box 1: The agricultural household model

The agricultural household model was designed to incorporate in a single theoretical framework the join production and consumption decisions of a household that also produces for subsistence and for the market. The seminal papers are Lau, Lin, and Yotopoulos (1978) and Barnum and Squire (1979). The following summary is drawn from Singh et al (1986).

For a given production cycle, a household derives utility from consumption of a staple X_a, a market-purchased good X_m, with respective prices P_a and P_m; also consumed is leisure *X.* the amount of the staple produced is *Q*, hence sales equal $Q - X_a$.

Production of the staple entails inputs *L*, *V*, *A, K*, respectively denoting farm labor, a variable input with price p_v, the household's land asset, and its capital assets (e.g., farm equipment).

The wage of farm labor is given by p_l, while labor may also be supplied by the household itself, denoted *F*. Lastly the household also earns non-labor, non-farm income *E* (e.g., remittances).

The goal of the household is to maximize utility *U*:

$$U = U(X_a, X_m, X)$$

There is a cash constraint given by the expression:

$$p_m x_m = p_a\left(Q - X_a\right) - p_l\left(L - F\right) - p_v V + E$$

The household also faces a time constraint *T*:

$$X + F = T$$

If all prices are given and markets are complete, then a key feature of the solution is *separability*, i.e., the household first maximizes utility regardless of consumption preferences or other givens of the model; given maximum profit, the household then proceeds to maximize utility. If, however, prices are not given, or other restrictions in the model are relaxed (e.g., allow for risky production), then separability can be violated. Early efforts to test separability have failed to reject the hypothesis (e.g., Benjamin, 1992). More recent empirical work has found evidence to reject separability (e.g., Dillon and Barett, 2017). Market completeness seems to be related to the household's access to land: separability tends to fail for smallhold farm households, whereas it fails to be rejected for agricultural households with larger farms (LaFave et al, 2020).

Poverty incidence is insensitive to the magnitude of the shortfall between per capita incomes of the poor and the poverty line. The *poverty gap* is the total shortfall of incomes of the poor and the poverty threshold, divided by the total population. Meanwhile the *income gap* is the total shortfall of incomes of the poor and the poverty line, divided by the number of the poor.

The poverty gap may be seen as the amount of payments per capita needed to bring all poor persons up to poverty line. Meanwhile the income gap may be seen as the average transfers per poor person needed to bring all the poor up to the poverty line (assuming no leakages). Official statistics in Philippines estimates the poverty gap ratio, which is just the poverty gap expressed as a percentage of the poverty line, as well as the income gap ratio, which is the income gap expressed as a percentage of the poverty line.

2.3. Sources of data

The following is based on secondary data, namely the following:

- Farm income per ha is obtained from the Philippine Statistics Authority (PSA) data from the Cost and Returns Survey (CRS);
- Farm household income is obtained from the village (barangay) surveys conducted by the International Rice Research institute (IRRI), as well as the nationwide Rice-Based Farm Household Survey (RBFHS) of the Philippine Rice Research Institute (PhilRice);
- Household income and expenditure is available from the PSA Family Income and Expenditure Survey (FIES)

CRS data is useful to show trends and patterns in farm income, as it covers various agricultural products, and is available over time (2002 to 2020; for some crops the time series starts even earlier). However, CRS underestimates total income of the household, to the extent that households with landholdings receive income from nonfarm sources. Moreover, as CRS is expresses farm income in per ha terms, and provides no information on household landholding, it cannot show actual farm income of the household.
The PhilRice data remedies the problem of missing nonfarm income, which is available in its Rice Base Farm Household Survey from 2006 to 2012. Rice farm income is also available from IRRI; this data set has the advantage of providing additional information on land assets of households, hence net farm income may be compared across various farm sizes. Selected surveys conducted by IRRI are also able to provide time series trends using a panel data set, which has a well-known advantage of controlling for household-level fixed effects. For this study the following surveys and years are selected:

- Laguna Loop Survey: 1978, 1999 – 2000; 2007 – 2008
- Central Luzon Loop Survey: 1979-80; 1998-99; 2011-12

Selection of years is based on pre-AFMA (late 1970s), AFMA (nearest year to 1997), and post-AFMA (most recent year available). The disadvantage of using PhilRice and IRRI data is that the information is limited to rice farming households only.
The FIES remedies this by covering all types of agriculture and fisheries households. For this assessment, an agriculture and fisheries household is determined by using primary occupation of household head; hence the FIES data must be merged with the Labor Force Survey (LFS). This merged data at the level of households and individuals was obtained upon request from the PSA. Available years are 2012, 2015, and 2018.
Note that there was a significant change in sampling design for the 2018 survey. For 2012 and 2015, FIES used the 2003 Master Sample which considered the 17 administrative regions as the sampling domains. Adopting provinces as a sample domain was then deemed too expensive

as it would entail a much larger sample size. Hence in 2015, the final sample consisted of 41,544 households (PSA, 2017).
In 2018, the PSA offered provincial level statistics based on the 2013 Master Sample, consisting of 117 major domains: 81 provinces (including the newly created province Davao Occidental), 33 highly urbanized cities (including 16 cities in the National Capital Region), and 3 other areas (Pateros, Isabela City, and Cotabato City). The resulting sample size was much larger with 171,072 households. The remainder of this section is devoted to previous studies that examine trends in profitability and incomes of agricultural households, based on data sets described above.

2.4. Studies on farm household income

In the mid-1980s, income of rice farming households even in favorable environments was much lower than that of households in more recent years. Table 1 provides data from rice farming villages across different production environments, namely irrigated (a favorable environment), favorable rainfed, and unfavorable rainfed. The villages in each environment are further broken down to Central Luzon and Panay Island (both of which are deemed "rice bowls" in the Luzon and Visayas island groups, respectively). Among rice growing households, overall income, whether total or in per capita terms, is higher in more favorable production environments; the per capita income in the unfavorable rainfed environment is less than a third that of the Central Luzon irrigated environment. Moreover, farm income comprises a smaller income share in less favorable environments. Nonetheless, income in the mid-1980s was rice farm households was far below what was earned in these regions in more recent years; for instance, the Central Luzon average household income in 2012 was Php 259,000 (in current prices); in Western Visayas the figure was Php 202,000 (PSA, 2014).

Table 1: Household income in selected villages, by farm environment, 1985

	Irrigated		**Favorable rainfed**		**Unfavorable rainfed**
	Central Luzon 1	*Panay 1*	*Central Luzon 2*	*Panay 2*	*Panay 3*
	In Php, purchasing power of the peso (PPP)-deflated, 2012 = 1.00				
Rice production	124,012	62,006	49,966	53,578	8,428
Non-rice production	60,200	107,156	67,424	66,220	49,966
Farm	33,110	43,946	49,966	33,712	28,294
Non-farm	27,090	63,210	17,458	32,508	21,672
Total income	184,212	169,162	117,390	119,798	58,394
Per capita income	30,702	27,090	23,478	21,672	9,632

Source: David et al (1994).

A preponderance of agricultural households in mid-1980s was poor, with the highest incidence of poverty found among farm workers, and cultivators of non-rice crops. Table 2 provides information on poverty measures for agricultural households using FIES data for 1985. At the time, poverty headcount ratio was very high at 73 percent. Poverty incidence is even higher than 73 percent for corn, coconut, and other crops farmers, together with fishermen. Rice producers are relatively better off, with below average poverty incidence and income shortfall of the poor; however, they are still major contributors to poverty in agriculture as they account for the largest.

Official poverty estimates are not available for 1985; in 1994 the official figure was 40.5 percent, with rural poverty being considerably higher at 53.1 percent (PSA, 2000). If the latter figure is a proxy for poverty incidence in agriculture, then most likely poverty had fallen over the decade following 1985.

Table 2: Measures of poverty among agricultural households, by activity, 1985 (%)

	Share in total	Headcount index	Income gap	Poverty gap
All agricultural families	100.00	72.86	41.36	30.13
Rice farmers	27.86	66.21	39.27	26.00
Corn farmers	15.05	83.49	49.11	41.00
Sugarcane farmers	0.49	60.73	29.64	18.00
Other crop farmers	5.13	84.40	42.65	36.00
Coconut farmers	9.11	75.46	41.08	31.00
Fruit tree farmers	0.44	56.29	26.65	15.00
Livestock and poultry farmers	0.59	61.38	34.21	21.00
Other farmers	0.23	73.04	38.34	28.00
Rice and corn farm workers	5.43	81.07	44.41	36.00
Sugarcane farm workers	2.23	93.81	43.71	41.00
Other crop farm workers	0.41	84.69	42.51	36.00
Coconut farm workers	1.55	83.70	41.82	35.00
Livestock and poultry workers	0.35	62.69	33.50	21.00
Other crop and animal husbandry	2.02	51.42	35.01	18.00
Forestry workers	1.18	82.60	39.95	33.00
Fishermen	13.01	76.70	40.42	31.00
Other occupations	14.90	61.74	35.63	22.00

Note: The classification of a household is based on the primary occupation of the household head.
Source: Balisacan (1993).

Household incomes of rice farmers have been increasing post-Green Revolution, driven by incomes from rice farming and non-farm activity. The Green Revolution in rice started in 1966, the starting year for the rice panel data set reported in Table 3. The panel of households in Central Luzon rice villages were re-surveyed in the 1980s and 1990s, with total household incomes confirmed to be increasing in real terms over the long term, except for a decline in 1990 – 94, a period of economic difficulty for the country as a whole. The increase is not entirely due to technological change in rice farming though, as the bigger portion of the increase in incomes was actually due to non-farm earnings.

Table 3: Average household income in Central Luzon rice villages, by source, 1966 – 1994

	1966	1986	1990	1994
	(In Php, PPP-deflated, 2012 = 1.00)			
Agriculture	105,601	111,281	172,851	112,628
Rice	83,122	81,735	111,425	90,497
Non-rice	22,479	29,546	61,426	22,130
Non-agriculture	39,826	68,159	121,615	118,796
Total	145,427	179,440	294,466	231,423

Source: Estudillo and Otsuka (1999)

A similar message is delivered in Table 4. Over a 19-year interval, farm household income rose (in real dollar terms) by 69 percent. For these households, income share of rice increased; the bigger increases in share though were observed for non-farm wage income, and for remittances. There were also increases in income for landless households, implying increases in agricultural wages in rice farming villages, although the increase is far more subdued (David et al, 1994).

Table 4: Average per capita household income, Central Luzon villages, 1985 and 2004

	Farm households		*Landless households*	
	1985	**2004**	**1985**	**2004**
Per capita income (USD, 1984 prices)	164	277	135	221
Income shares (%):				
Rice	17	22	0	0
Non-rice crop and livestock	34	17	12	8
Agricultural wage	22	9	36	21
Nonfarm wage	18	35	38	54
Remittances and others	9	17	14	17

Source: Estudillo et al (2006)

Earnings from rice farming for both large and small farms have been increasing at approximately the same pace from mid-1970s to mid-1990s. Table 5 pertains to panel data from a Pila, Laguna village over a span of three decades, disaggregated by size class of rice farm. The size classes are 0.0 to 2.0 ha, and above 2.0 ha, respectively "small" and "large" farms. Farm income is unsurprisingly higher for large farms, though it is not clear from this study whether size class matters for farm income per ha. Over time, earnings have been increasing for both size classes, at approximately the same rate (i.e., doubling over a span of two decades).

Table 5: Average per capita household income, Pila, Laguna village, 1974 - 1996

	1974/6	**1980/3**	**1995/6**
	In Php '000, deflated by CPI outside Manila (1995=100)		
Farmer			
Large farm (2.0 and greater)	16.5	20.2	33.2
Small farm (0.0 – 2.0 ha)	9.4	9.1	18.4
Agricultural laborer	5.8	6.2	7.7
Non-farm worker	N/A	11.5	17.5

Source: Hayami and Kikuchi (2000).

In the 2000s, income of rice farming households was decreasing. Data from a nationwide survey of rice farmers show a declining household income per capita in the latter part of the 2000s (Table 6). In 2006, monthly income of rice farming households was Php 4,600 (in 2012 prices), but fell to Php 2,600 the following year. Notwithstanding the rice price boom starting 2007, monthly per capita income was below its 2006 level in real terms in 2011 and 2012. Rice farming households did increase the share of income from rice farming in the latter years, but this was not enough to raise up overall household income. Note that these figures are not comparable with those in previous tables, even after adjusting for inflation, as the RBFHS collects income data by semester.

Table 6: Monthly income of rice farming households, 2006 – 2012, selected semesters

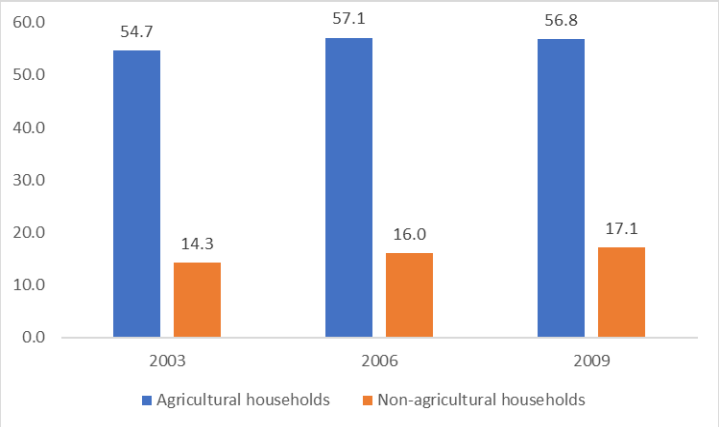
	2006 (2nd Sem)	2007 (1st Sem)	2011 (2nd Sem)	2012 (1st Sem)
	In Php, PPP-adjusted (2012=1.00)			
Monthly per capita income (Php)	4,624	2,552	3,364	4,344
Shares by source (%)				
Rice Farming - On Farm	50	48	61	58
Rice Farming - Off Farm	2	3	2	2
Other Farming/Fishing - On Farm	8	11	6	11
Other Farming/Fishing - Off Farm	2	2	1	1
Non Farming	37	36	30	27

Source: PhilRice (2022).

Poverty among agricultural households was much lower in the 2000s compared with the 1980s, though an increasing trend was observed between 2003 and 2009. Poverty incidence in agriculture in 2003 was 55 percent (Figure 2). This appears high, until one compares with the poverty incidence in the mid-1980s reported in Table 2, which stood at 73 percent. In the 2000s, poverty incidence among agricultural households was rising. The increase in poverty is not at all unique to agricultural households, as this was also the experience of households in general over the period, i.e., poverty among households in general increased from 14.3 percent in 2003 to 17.1 percent in 2009.

For 2009, a breakdown of poverty measures is available by type of agricultural occupation, based on occupation of household head (Table 7). For instance, 48 percent of households headed by one engaged in fishing are poor. Their contribution to the magnitude of poverty is also sizable at 14.5 percent. Among crop farmers, largest shares of the poor are to be found among those growing palay (30 percent), followed by those growing corn (17.4 percent), and those growing coconut (13.9 percent). However, among these major contributors, poverty incidence is lowest among palay growers at 41.5 percent; higher poverty rates are observed for coconut growers (56.2 percent), and for corn growers (64.1 percent).

Figure 2: Poverty incidence by type of household, 2003, 2006, and 2009 (%)



Note: In this chart, an "agricultural household" is one whose income from agricultural sources is at least equal to its income from non-agricultural sources.

Source: Reyes et al (2012).

Table 7: Incidence and distribution of poverty in agriculture, by occupational type, 2009 (%)

	Poverty incidence	Share to total poor
Growing of palay	41.5	30.0
Growing of corn	64.1	17.4
Growing of coconut	56.2	13.9
Growing of banana	35.5	2.2
Growing of sugarcane	43.2	3.7
Growing of other fruits	30.6	0.7
Growing of vegetables	48.1	7.5
Growing of coffee, cacao	53.6	0.5
Growing of other crops	50.6	1.5
Animal farming/raising	18.9	1.4
Hunting and trapping	35.7	0.0
Agricultural services	49.2	4.0
Forestry activities	68.1	2.3
Fishing	48.0	14.6
Total	47.9	100.0

Source: Reyes et al (2012).

3. Assessment of enhanced profit and incomes in agriculture and fisheries

3.1. Changes in returns to agriculture and fisheries activities

3.1.1. Findings from the PSA CRS

Since the 2000s, real net returns per ha have tended to increase for most of the major agricultural products, though with significant fluctuation over time. Table 8 shows the major agricultural products based on contribution to total value of output; the itemization is based on the availability of product-level data in the CRS. The largest single contributor is by far palay, at 17 percent, followed by corn; milkfish and pineapple have similar contributions to value of output.

Table 8: Distribution of value of production in agriculture and fisheries, by type of product, 2019 – 2021 (%)

	2019	2020	2021	Average
Palay	17.36	16.79	16.67	16.94
Corn	5.87	5.30	5.92	5.70
Milkfish	2.39	2.32	2.58	2.43
Pineapple	2.13	3.08	2.01	2.41
Mango	1.47	1.54	1.60	1.54
Tilapia	1.39	1.34	1.45	1.39
Cassava	1.19	1.30	1.10	1.19
Onion	0.41	0.72	0.58	0.57

	2019	2020	2021	Average
Potato	0.22	0.24	0.21	0.22
Calamansi	0.19	0.14	0.17	0.17
Other agriculture and fisheries	67.38	67.23	67.72	67.44
Total	**100.00**	**100.00**	**100.00**	**100.00**

Source: PSA (2022).

Average net returns per ha based on CRS of PSA for the various agricultural products are summarized in Table 7. There have been increases in net farm income per ha for temporary crops from 2005 to 2020, for palay, corn, cassava, cauliflower, and potato. Among perennial crops however, increases were observed only for pineapple. For fisheries, increases were found for tilapia (2015 onward), but not for milkfish (2005 onward), although for the latter, net returns for ha had been increasing over the interval 2010 to 2020. In fact, trends have been inconsistent from period to period; for instance, net returns for cassava fell between 2000 and 2005, and again from 2010 to 2015. Returns to corn and palay have been falling after 2018.

Table 9: Average net returns per ha, by type of product, 1998 – 2020

	2000	2005	2010	2015	2018	2019	2020
	In Php, PPP-adjusted (2012 = 1.00)						
Major temporary crops							
Palay	-	13,751	17,096	19,484	28,030	18,461	17,358
Corn	-	3,051	6,221	12,989	16,516	14,069	11,612
Cassava	32,309	24,534	40,064	30,830	41,540	44,774	52,815
Other temporary crops							
Onion bulb			141,953	263,861	279,977	278,629	437,658
Cauliflower	529,540	54,514	113,502	240,961	461,488	450,512	393,877
Potato	166,904	95,063	259,344	147,624	321,007	290,864	325,950
Perennial crops							
Calamansi	109,031	120,279	94,951	81,480	76,262	85,090	56,877
Mango	131,359	107,512	51,638	51,599	59,726	59,991	60,278
Pineapple	282,356	181,414	137,097	238,302	539,420	557,826	533,059
Fish							
Milkfish	-	51,730	35,429	45,398	52,664	54,499	51,565
Tilapia	-	-	-	142,059	147,533	153,137	151,492

Source: PSA (2022).

The bigger contributors to agricultural value (e.g., rice and corn) tend towards the lower end of returns per ha. Comparison of figures in Tables 8 and 9 presents a stark contrast: some of the products with the highest net returns per ha (rice and corn) are among the largest contributors to value of output. This accounts for the thrust towards "high value" crops, which we plainly see among the vegetables, and pineapple among the perennials. The divergence shows little if any tendency towards convergence over time, even over a span of two decades, suggesting there are deep structural reasons for the persistence of large concentrations of resources (land, labor, capital) among the traditional staple crops.

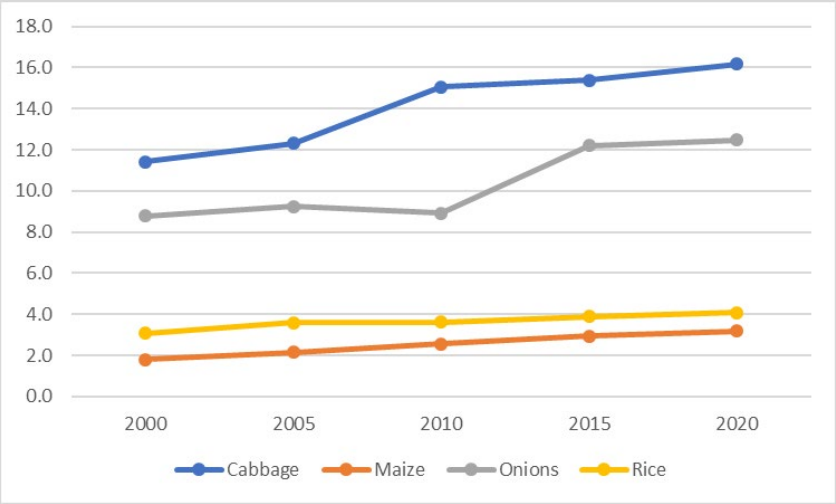
Table 10: Average cost per kg output, by type of product, 1998 – 2020

	2000	2005	2010	2015	2018	2019	2020
	In Php, PPP-adjusted (2012 = 1.00)						
Major temporary crops							
Palay	-	10.45	11.34	11.11	10.00	9.50	9.33
Corn	-	9.41	9.62	7.02	6.62	6.61	6.39
Cassava	2.23	2.34	2.04	2.54	2.43	2.82	2.87
Other temporary crops							
Onion bulb	9.13	9.27	6.86	7.85	8.25	7.79	7.71
Cauliflower	9.13	9.27	6.86	7.85	8.25	7.79	7.71
Potato	10.85	10.58	10.24	9.97	11.50	11.74	11.42
Perennial crops							
Calamansi	5.88	6.00	5.92	7.11	10.85	10.15	11.90
Mango	9.35	10.88	14.90	14.54	19.24	19.68	19.64
Pineapple	2.11	2.19	1.72	1.75	2.37	2.46	2.50
Fish							
Milkfish	-	33.77	40.91	37.44	35.98	34.39	34.33
Tilapia	-	-	-	43.73	41.37	41.50	43.91

Source: PSA (2022).

For several major agricultural products, cost per kg trends imply increasing competitiveness. As discussed in Section 2, increases in income may arise from multiple causes. One is increasing competitiveness, as gauged from cost per kg of output (Table 10). Since 2005, such decreasing cost has been observed for palay, corn, onion, and cauliflower. Additional analysis is needed to determine whether the increased competitiveness is due to greater productivity or decreased input price, or both; although positive yield trends suggest that the former is that increasing productivity is the bigger contributor (Figure 3).

Figure 3: Yield in tons per ha, selected crops, 2000 – 2020



Source: FAO (2022).

A decline in price is also an important factor in explaining net returns per ha. In the case of palay though, the decline in cost per kg has occurred too slowly to explain decline net returns per ha. The main reason for declining net returns is the real price of palay following the enactment of RA 11302, the Act liberalizing the rice industry, popularly referred to as the Rice Tariffication Law (RTL).

3.1.2. Findings from rice village surveys

Real net income and returns from rice have been highly erratic over time, regardless of farm size. For rice, cost and returns estimates are available from the IRRI rice village panel surveys, distinguished by farm size (Table 11). Over time, real net returns show no clear pattern, as returns to rice farming are subject to vagaries of weather and the market, as was also found in trends over time using CRS data.

Net income in rice farming tends to be greater for larger farms, partly because of higher net returns per ha. For rice farms, as farm size increases, real net returns from rice farming tend to increase, for both Central Luzon and Laguna Loop villages, as seen in first three columns of Table 11. This is to be expected as larger farms produce more output, and therefore produce more net income. However, this effect is not the only source of rising rice farm income, as the pattern holds as well for net rice farm income on a per ha basis, as seen in the latter three columns of Table 11.

The tendency though is not as strong as for total net rice farm income. Exceptions to this pattern are found for Laguna Loop in 1978 and 2007, where the 0 to 1 ha farm size earned the 2nd highest average income in 1978, and the highest average income in 2007. Hence, it is possible for the smallest farms (under 1 ha) to realize a relatively high net income per ha.

Table 11: Net rice farm income by farm size class and year

	Total income			Income per ha		
	In Php, PPP-adjusted (2012 = 1.00)					
Central Luzon						
	1979	**1988**	**2011**	**1979**	**1988**	**2011**
0 to 1 ha	33,454	55,107	26,223	33,440	77,330	32,457
1.01 to 2 ha	184,041	273,629	103,906	85,502	181,831	61,801
2.01 to 3 ha	403,112	734,150	236,917	125,562	264,963	88,673
Over 3 ha	1,116,612	1,412,534	1,119,094	185,861	290,946	135,912
Laguna						
	1978	**1999**	**2007**	**1978**	**1999**	**2007**
0 to 1 ha	49,377	14,278	135,953	63,404	32,295	193,485
1.01 to 2 ha	82,837	111,135	164,202	46,751	68,862	104,090
2.01 to 3 ha	133,826	224,550	441,840	42,465	87,319	173,490
Over 3 ha	580,548	639,765	394,591	99,155	128,022	102,176

Source: IRRI (2022).

Compared with cost per kg, there is a noteworthy tendency for price per kg to be greater for the larger farm sizes. Table 12 presents indicators of price per kg and cost per kg, disaggregated by farm size class. To interpret the entries, consider the value of 1.47 under price

per kg for Central Luzon, 1979: this implies that price per kg of palay for the Central Luzon Loop households in 1979 belonging to the 1 – 2 ha range of farm size, is 47 percent greater than price per kg of palay from the same set of households, but in the 0 – 1 ha range of farm size. Note that most of the entries under the Price columns exceed unity, for farm sizes above 1 ha; the exception is Central Luzon Loop for 2011. In addition, in two instances the highest value of the index is found for the largest farm class, i.e., Laguna in 1978 and 1999. On the other hand, cost per kg trends by farm size are more mixed; the index values are below unity in the above 1.0 ha class for two rounds in Laguna (1978 and 2007). Given these, higher price per kg is likely a more important driver of greater income per ha for the larger farms, perhaps due to differential access to higher end segments of the rice value chain.

Table 12: Price and cost per kg index, by year and farm size class (0 – 1 ha = 1.00)

	Price			*Cost*		
Central Luzon	**1979**	**1988**	**2011**	**1979**	**1988**	**2011**
0 to 1 ha	1.00	1.00	1.00	1.00	1.00	1.00
1.01 to 2 ha	1.47	1.45	0.86	1.38	1.43	1.45
2.01 to 3 ha	1.46	1.39	0.97	1.81	2.02	1.84
Over 3 ha	1.23	1.44	0.97	2.33	2.31	2.54
Laguna	**1978**	**1999**	**2007**	**1978**	**1999**	**2007**
0 to 1 ha	1.00	1.00	1.00	1.00	1.00	1.00
1.01 to 2 ha	0.93	1.77	1.28	0.86	1.32	0.73
2.01 to 3 ha	0.87	2.01	1.19	1.01	1.50	0.98
Over 3 ha	1.05	2.13	1.16	1.50	2.07	1.05

Source: IRRI (2022).

3.2. Changes in poverty of basic sectors

There has been a massive fall in numbers of poor farmers and fisherfolk in 2015-18, as well as a significant declines in poverty incidence. Official estimates of poverty allow a breakdown by basic sector beginning in 2006 (Table 13). Note that the official estimates pertain to *individual workers* engaged in farming or fishery as primary occupation, although the comparison with the poverty line is done using the workers' respective per capita household income. The estimate of magnitude of population of poor farmers and fisherfolk is available for 2015 and 2018, while incidence estimates are available from 2006 onward.

Table 13: Incidence and magnitude of poverty among population groups, 2006 - 18

	2006	**2009**	**2012**	**2015**	**2018**
Incidence (%)					
Farmers	38.5	38.0	38.3	40.84	31.60
Fisherfolk	41.2	41.3	39.2	36.85	26.20
Population	26.6	26.3	25.2	23.30	16.60
Magnitude ('000)					
Farmers				3,684	2,382
Fisherfolk				453	287
Population				23,514	17,595

Source: PSA (2022).

As can be seen, poverty incidence of farmers and fisherfolk remain virtually unchanged between 2006 and 2012, except for a small decline in fisherfolk poverty between 2009 and 2012. This mirrors trends for overall poverty of the population, which remained in the 26 percent range in 2006 and 2009, and dipping slightly to 25 percent in 2012. Between 2012 and 2015, there is faster decline in national poverty incidence, as well as poverty incidence for fisherfolk; however, over this interval poverty incidence among farmers increases. The biggest reduction was observed between 2015 and 2018; there was a 9 percentage-point drop in poverty incidence for farmers, and 11 percentage-point drop in poverty incidence for fisherfolk; for the country as a whole there is a 7 percentage-point drop in poverty incidence. The change is even more dramatic in terms of sheer numbers of the poor; at the national level the decline is 25 percent, while that of poor farmers and fisherfolk is 35 – 37 percent. Put in another way: in just three years, 5.9 million persons escaped poverty; a quarter of these escapees are farmers and fisherfolk, although at the outset (in 2015) they account for just 18 percent of the total poor.

3.3. Changes in income and poverty of agricultural households

This sub-section now addresses changes in income of agricultural households from 2012 to 2018. In a sense it updates previous estimates of Reyes et al (2012), though with some differences. First, the list of occupational types is modified; second, the definition of an "agricultural household" is changed from an income-based definition to one based on occupation of household head. The latter is in any case the basis for classifying the household by type of occupation, and is the same criterion as used in Balisacan (1994).

Since 2012, there was a decline in the number of agricultural households as well as in the share of agricultural income in household income. Table 14 presents a profile of agricultural households using the household-head based definition. The population count uses the FIES sample observations, adjusted by the associated sample weight and family size of each observation.

Table 14: Profile of agricultural population, 2012 - 2018

	Population count ('000)			*Agricultural income, share in total (%)*		
	2012	**2015**	**2018**	**2012**	**2015**	**2018**
Major crop producers:	2,572	2,272	2,100	54.3	51.1	38.7
Rice	1,250	1,126	1,011	51.1	48.6	35.0
Corn	774	717	637	58.9	53.2	44.1
Sugarcane	44	22	33	55.1	45.8	37.0
Coconut	505	408	419	54.8	53.9	40.3
Other crop producers	675	723	590	47.1	45.6	36.2
Livestock producers	47	70	69	26.0	24.8	20.8
Chicken producers	14	24	14	25.0	19.4	13.7
Poultry producers	13	12	16	36.4	44.2	28.8
Hog raisers	113	139	148	22.1	22.6	19.8
Fisheries producers	51	28	48	72.9	58.2	71.7
Crop workers	1,648	1,689	1,554	55.1	51.8	9.0
Livestock workers	-	-	88	-	-	11.0
Fisheries workers	673	727	191	58.4	58.8	4.1
Total	5,807	5,685	4,818	53.5	50.5	27.9

Source: PSA (2021)

As of 2018, there are 2.6 million crop producers based on primary occupation of household head; of these about half are rice producer, while another 0.64 million produce corn, and another 0.42 million produce coconut. Producers of the major crops (rice, corn, sugarcane, coconut) account for 2.1 million. This finding is consistent with trends in official statistics, which found that the absolute number of agriculture and fisheries workers fell between 2011 and 2018 (PSA, 2019).

Table 14 also shows the share of agricultural income in total. Agriculture accounted for the majority of the income earned by agricultural households back in 2012. However, by 2018, this was no longer the case, as these households managed to generate about 72 percent of their income from nonfarm sources. This is likewise observed in the share of households for which agriculture comprises at least half of income: in 2012, the share stood at 56 percent; by 2015, the share had fallen to 50 percent; with the share shrinking further to 28 percent by 2018. The latter figure is remarkable as it applies to all households for which the primary occupation of the household head is in agriculture.

While still low compared with the national average, per capita income for agricultural households have been steadily rising. In 2012, per capita household income for the agricultural households was Php 26,000 (Table 15). Compare this with average household income of Php 267,000 or about Php 47,000 per capita. The difference is around 46 percent. The 2012 income of agricultural households is certainly higher than it was in 1997, when average per capita household income nationwide was Php 24,634 in 2012 prices.

Table 15: Average household income per capita, 2012 – 2018

	Mean income (Php, PPP-deflated, 2012 = 1.00)			*Change (%)*	
	2012	**2015**	**2018**	**2012-15**	**2015-18**
Major crop producers	32,379	36,654	43,193	13.2	17.8
Rice farmers	38,579	44,412	53,608	15.1	20.7
Corn farmers	24,332	26,463	32,413	8.8	22.5
Coconut farmers	39,331	43,702	57,445	11.1	31.4
Other crop producers	28,751	32,761	33,299	13.9	1.6
Livestock producers	31,648	34,907	41,376	10.3	18.5
Chicken producers	36,446	41,224	53,094	13.1	28.8
Poultry producers	92,799	80,579	81,170	-13.2	0.7
Hog raisers	51,382	65,713	108,761	27.9	65.5
Fisheries producers	60,557	62,895	73,315	3.9	16.6
Crop workers	30,849	32,750	31,286	6.2	-4.5
Livestock workers	23,554	27,178	31,850	15.4	17.2
Fisheries workers	-	-	51,350	-	-
All households	26,175	29,579	36,038	13.0	21.8

Source: PSA (2021)

From 2012 to 2018, per capita income of agricultural households reached Php 36,000, a 36% increase over six years. This level however is still lower than the national average of Php 53,000 per capita (estimated from average household income of Php 267,000 at 2012 prices). By type of occupation, it was the producers of palay, sugarcane, and livestock, who were among those

with the higher-than-average increases (respectively, 39.0 percent, 46.1 percent, and 45.7 percent). Theses correspond to the agricultural commodities receiving among the highest rates of trade protection in the country (see Chapter 2).

Income of agricultural households has been increasingly coming from rising nonagricultural income, especially wage and salary income, and transfers from domestic sources. As income of agricultural households has been increasing, the sources of income have been changing as well. The share of wages and salaries has been increasing from 2012 to 2018, together with that of transfers (Table 16). For the latter, it is the share of transfers from domestic sources that has been increasing; these transfers cover both income remitted by other household members, as well as sundry payments from government, including 4Ps. On the decline has been wages from agricultural activity (data available up to 2015) and other agricultural income, consistent with trends shown in Table 14.

Table 16: Distribution of income of agricultural households, by source, 2012 – 2018 (%)

	2012	**2015**	**2018**
Wages and salaries	*41.1*	*41.9*	*45.2*
Agricultural	10.2	9.3	-
Non-agricultural	30.9	32.6	-
Other agricultural income	*14.0*	*13.0*	*10.8*
Other nonagricultural income	*12.7*	*12.5*	*12.4*
Transfers	*14.9*	*15.6*	*16.1*
From abroad	4.3	4.2	4.4
From domestic sources	10.6	11.4	11.7
Other income	*8.5*	*8.5*	*7.4*

Note: Sector of origin of wages and salaries in 2018 made available by PSA did not have a breakdown by sector.
Source: PSA (2022).

Consistent with rising income, poverty incidence fell sharply among agricultural households from 2012 to 2018. Among agricultural households, poverty incidence declined from 40.3 percent in 2012 to 26.6 percent in 2018, a 12.7 percentage point drop (Table 17). This is much larger than the decline in national poverty incidence, which fell from 25.2 percent in 2012, to 16.6 percent in 2018, an 8.6 percentage point drop. Among the agricultural activities, the largest declines were observed among corn and sugarcane producers. Some activities accounting for larger numbers of the poor, i.e., crop workers, rice producers, and coconut producers, experience rapid but below average declines in poverty incidence.

Table 17: Poverty incidence in agriculture, by type of activity, 2012 – 2015 (%)

	Share in total poor			*Poverty incidence in group*		
	2012	**2015**	**2018**	**2012**	**2015**	**2018**
Major crop producers:	42.4	40.1	42.9	38.6	37.0	26.1
Rice	15.2	13.6	12.7	28.4	25.3	16.1
Corn	18.4	18.4	18.3	55.6	54.0	36.8
Sugarcane	0.6	0.3	0.3	31.2	28.5	12.8
Coconut	8.3	7.8	11.5	38.6	40.0	35.3

	Share in total poor			*Poverty incidence in group*		
	2012	**2015**	**2018**	**2012**	**2015**	**2018**
Other crop producers	11.6	12.2	13.0	40.1	35.3	28.3
Livestock producers	0.4	0.8	0.7	21.6	24.8	12.6
Chicken producers	0.2	0.1	0.1	28.4	11.8	10.7
Poultry producers	0.1	0.0	0.1	20.6	4.3	6.6
Hog raisers	0.4	0.9	0.9	9.2	13.6	7.7
Fisheries producers	0.7	0.2	1.1	32.2	15.8	28.1
Crop workers	33.5	33.6	37.2	47.6	41.8	30.6
Livestock workers	0.0	0.0	0.9	-	-	13.3
Fisheries workers	10.6	12.0	3.2	37.0	34.7	21.2
All households	0.0	0.0	0.0	40.3	36.9	26.6

Source: PSA (2021)

The biggest contributor to the decline in poverty is the movement of agriculture. A World Bank (2016) study identified the main forces behind poverty reduction from 2006 to 2015:

- About 67 percent of the reduction in poverty was due to increases in nonagricultural wage income, together with rising agricultural wages, which in turn were driven by the movement of workers out of agriculture;
- Transfers from government social programs contributed another 25 percent reduction.
- Remittances contributed 18 percent to the reduction.

Note that aforementioned sources sum up to over 100 percent; this is possible because entrepreneurial income from informal sources (such as income from farming, from small retail shops, etc.) suffered a decline, thereby contributing to a worsening of poverty.

Among the poor, the average shortfall has also been falling over the same period. Both income ratio and poverty gap ratio have been falling among agricultural households since 2012 (Table 18). The decline in poverty gap ratio is larger than that decline in income gap, given that poverty incidence also fell, meaning the relative share of poor to non-poor has shifted towards the latter. Among the agricultural activities, the drop in poverty incidence is correlated with the size in reduction in the income gap ratio, with a few exceptions, such as sugarcane producers (above average poverty incidence reduction, but below average income gap reduction).

Table 18: Poverty gap and income gap ratios of poor agricultural households, as a percentage of poverty line, by type of activity, 2012 – 2015

	Income gap ratio			*Poverty gap ratio*		
	2012	**2015**	**2018**	**2012**	**2015**	**2018**
Major crop producers:	25.9	25.1	25.4	11.0	9.5	7.0
Rice	26.0	22.4	24.0	7.6	6.1	4.5
Corn	33.3	26.9	28.0	17.7	13.8	10.6
Sugarcane	23.9	15.1	25.0	7.1	4.3	3.1
Coconut	25.3	26.0	23.7	9.6	11.4	8.6
Other crop producers	30.5	28.7	24.5	11.8	10.2	7.4

	Income gap ratio			*Poverty gap ratio*		
	2012	**2015**	**2018**	**2012**	**2015**	**2018**
Livestock producers	25.8	20.3	17.0	5.5	5.0	1.7
Chicken producers	23.0	21.5	22.6	6.0	2.3	1.8
Poultry producers	24.3	35.1	22.2	5.6	1.4	1.6
Hog raisers	23.2	18.3	16.9	2.0	2.4	1.3
Fisheries producers	16.8	31.7	16.1	5.4	4.5	3.9
Crop workers	28.0	26.7	22.0	12.9	10.8	6.9
Livestock workers	-	-	19.4	-	-	2.7
Fisheries workers	25.0	23.0	21.3	9.4	8.6	4.9
All households	28.2	25.7	23.8	11.2	9.6	6.6

Source: PSA (2021)

4. Synthesis and recommendation

4.1. Key findings

1) **Since the late 1990s, per capita income of agricultural households has been increasing.**

Based on the indicator of *enhanced profitability and incomes of agricultural households*, agriculture and fisheries has been undergoing modernization. Indeed, the trend or rising incomes has been observed for decades before the enactment of AFMA. Evidence for this is available from various household surveys, though mostly limited to rice; since 2012 though there is broader evidence of this coming out to FIES. Note however that incomes of agriculture and fisheries households arises from multiple sources, hence attributing the increase in agricultural incomes to farming activity requires more disaggregated analysis.

2) **Despite fluctuations over time (mostly due to environmental stresses such as climate change), income from farming has been on the whole increasing over time, though its long run contribution has been falling.**

Agricultural income is subject to some volatility, mainly owing to environmental stresses. Typhoons and droughts can bring down crop harvests; both disasters can be worsened by climate change (Holden and Marshall, 2018; WFP, 2016). Pest and disease can also bring incomes down, as among swine growers (due to African Swine Fever) and banana growers (due to Fusarium wilt). Nevertheless, as a whole, more disaggregated analysis confirms that income from farming has indeed been increasing, as revealed by various household surveys. Likewise, the increase has been measured even long before AFMA, with evidence accumulating since the start of the Green Revolution in the mid-1960s. Hence, farming remains a key income source of agricultural households. However, its contribution to household incomes, even among agriculture and fisheries households, has been falling over time. Consistent with overall economic modernization, the larger share of income growth has been contributed by non-farm incomes. The trend for Philippines replicates findings from microdata studies worldwide, indicate that up to 20 percent of the global decline in agricultural employment are due to investments in human capital (Porzio et al, forthcoming). That is, over time households have invested in better schooling of children, allowing them to move to

nonfarm employment. Note that agricultural growth has likely played a positive role in the early part of the structural transformation by enabling households to fund educational investments (Estudillo and Otsuka, 1999).

3) **Increases in agricultural income have been driven in part by productivity growth, increases competitiveness of agriculture, and diversification towards higher value activities.**

Increases in farm income also has multiple causes, such as increases in price, and increases in competitiveness, i.e., the real cost of inputs per unit of output. As we have seen, for some key products, yield has been increasing; in combination with declining cost per kg, then it is likely that productivity has been increasing, thereby driving the improvement in profitability. This is consistent with positive total factor productivity (TFP) trends reviewed in Chapter 1, at least before the 2010s.

However, in the case of rice, profitability has declined steeply since 2019, driven mostly by a fall in price due to market reform. Note that AFMA as a whole balances the objective of increasing incomes of agriculture with the objective of pursuing a market-driven approach (Chapter 2), as well as the principle of Rational Use of Resources (see Introduction). The freer operation of the market due to the market-driven approach (as implemented by Rice Tariffication) has led to a counter-factual shift in resources from traditional crops (rice) toward higher value activities, thereby raising farm household incomes. The appropriate response to the loss of entitlements of adversely affected sub-sectors (e.g. palay farmers) is addressed under the heading of Policy Implications.

4) **The increasing fragmentation of landholdings in recent decades is associated with farming inefficiency.**

As pointed out in Chapter 1, farm sizes in Philippines have been declining over the past several decades. The reason is population growth, though successive waves of land reform and land market restrictions, in particular the PD 27 program for rice and corn lands, and the Comprehensive Agrarian Reform Program (CARP) from 1987 to the present, have also been a major reason for the breakup of farms.

The finding of this study correlating net farm income per ha positively with farm size suggests this fragmentation has vitiated a more rational use of resources in agriculture. The implications are worsened further by weakening coordination with downstream logistics and processing, which are indisputably characterized by significant economies of scale, as discussed extensively in Chapters 5 and 6.

The negative impact of land reform on productivity is buttressed by the findings of Brescani et al (2009), namely that legal restrictions deprive the land poor and agrarian reform beneficiaries' additional access to land owing to the associated obstacles to land markets. Moreover, property rights have been undermined by the distribution of collective land titles in lieu of individual land titles, thereby constricting access to credit. These features of the program negative much of the gain received by beneficiaries from land ownership and support services. The impact of these restrictions is more precisely measured by Adamopoulos and Restuccia (2020), who estimated that farm size fell by 34 percent as a result of land reform. This in turn led to a a negative crop productivity effect of 17 percent, as a result of the ceiling on landholdings, combined with land transfer restrictions. Moreover, the forcible fragmentation of lands has prevented clustering and consolidation of farm operations, complicating the task of assembling harvests to realize economies of scale in downstream processing. This fragmentation is possibly the key constraint facing Philippine agriculture at present.

5) **Poverty incidence among agricultural households has been falling, with an accelerated pace of decline since 2012.**

Increases in incomes of agricultural households is expected to lead to a decline in poverty, which indeed has been found to be the case. The pace of reduction had languished for several decades but managed to accelerate after 2012. A study of World Bank (2018) attributed the bulk of this reduction to the movement of agricultural workers into non-agricultural employment; also making a contribution are rising agricultural wages, and aggressive transfer programs. such as the government's Pantawid Pamilyang Pilipino Program (4Ps).

4.2. Policy implications

1) **Adopt strategies to accelerate modernization by structural change, such as boosting infrastructure investment, and promotion of industrial innovation.**

As argued repeatedly in this study, economic modernization and productivity growth in agriculture are the key long run drivers of increased incomes and declining poverty of agricultural households. Hence, despite traditional focus on agencies such as Department of Agriculture (DA), agricultural modernization indeed requires a whole-of-government approach, involving industrial innovation and public investment outlays. For industrial innovation (see Chapter 7), the Department of Trade Industry (DTI) and the Board of Investments (BOI) must coordinate the agencies of government to resolve the most binding constraints to entry of new firms and integration of the Philippines to global value chains (DTI, 2017). As for public infrastructure, the current administration has pledged to ramp up the Build, Build, Build (BBB) program, with public infrastructure reaching 7 percent of GDP. This continues the rising trend in infrastructure spending from 2004 onwards, when infrastructure share reached 1.5 percent of GDP in 2004-2010, rising to 2.5 percent in 2010 – 2016, and up to 4.9 percent of GDP in 2016 – 2022 (Dominguez, 2022).

Challenges ahead to this long-term growth strategy is the narrowing of the fiscal space, as well as ensuring effectiveness and efficiency of public expenditure. Reliance on deficit finance of public infrastructure leads to a slower economic growth rate compared with tax finance (Komatsuzaki, 2019); the need to avoid deficit finance is reinforced by current high levels of debt-to-GDP ratio (now at about 64 percent). Improvements in public efficiency are needed as numerous studies have revealed effectiveness gaps in public investment. For example, Inocencio et al (2021) summarize studies that uncover significant wastage that has afflicted the resurgent irrigation program starting 2008.

2) **Accelerate productivity growth in agriculture by R&D and extension**

Productivity growth in agriculture interacts strongly with economic modernization; higher farm incomes enable households to make the requisite investments in human capital (towards gainful nonfarm employment); it also permits accumulation of financial and physical capital that can be deployed in other enterprises, both on and off the farm. In turn, productivity growth is greatly facilitated by greater public investments in R&D and in extension (see Chapter 3).

3) **Undertake measures to promote diversification within agriculture.**

Simply boosting productivity within agriculture is just one part of achieving agricultural modernization. Re-allocation of resources is needed, from low value traditional activities, towards high value products and activities. Structural inefficiencies that prevent diversification into high value products must be addressed. Many agricultural products are bulky and perishable, inhibiting the formation of market linkages and specialization patterns across urban-rural space. In other words: "Trade-cost induced price wedges can prevent producers from

specializing in crops in which they have a comparative advantage even within countries" (Deininger et al, p. 8).

4) **Promote agri-food systems modernization by appropriate industrial policies, including operational consolidation of landholdings.**

The inability of agricultural households to access a wider asset base, especially land, has turned out to be a significant binding constraint to agri-food systems modernization. This point has been made in previous chapters, namely 4, 5, and 6, but it bears repeating here. In other countries, policies to increase transferability of land not only promotes greater productivity in agriculture, they also promote the movement of labor out of agriculture, and thereby accelerate structural change. In Mexico, a country land certification program increased migration, farm sizes, and household welfare; computerization of land administration in Pakistan led to greater leasing by owners of agricultural land, who then tend to shift to non-agricultural employment (Deininger et al, forthcoming).

In Philippines, much of the nonfarm employment growth has been in overseas factor markets, or in services. Based on experience of other countries, there is considerable potential for non-agricultural employment to shift initially adjacent activities within the agri-food system. The formation of a modern, organized agri-food system with geographically extended supply chains entails capital deepening in logistics, storage (especially refrigerated), and processing, based on urban demand for diversified and packaged foods, both at home and abroad. More updated and disaggregated microdata on employment and income on households are critical for research on the dynamics of the agri-food system (Charlton et al, 2021).

5) **Re-deploy safety nets and social protection schemes as targeted measures towards cushioning adjustment to reform.**

Relatively low incomes in agriculture creates a strong political demand for short-term amelioration measures, as discussed previously in Chapter 2. This is exacerbated by the high volatility of agricultural incomes, and the clamor for safety nets against natural and economic shocks. However, these programs offer only temporary relief, while deepening the fiscal hole from which to extricate public finances. For instance, the fertilizer subsidies are now popular owing to soaring fertilizer prices, but it prevents farmers from adjusting to new scarcity conditions, and ultimately cannot be sustained if fertilizer prices remain elevated. Instead, social protection should be designed carefully to address rather than aggravate market failure. For example, expansion of subsidized agricultural insurance may serve the deeper purpose of stimulating agricultural credit; cash transfers to affected farmers may defuse political opposition to market reform by cushioning the adverse impact of lost entitlement.

5. Bibliography

PSA. 2019. Decent Work Statistics (DeWS) Philippines Summary Tables (1995-2018). Quezon City: PSA.

PSA. 2017. 2015 Family Income and Expenditure Survey Final Report. Quezon City: PSA.

PSA. 2020. 2018 Family Income and Expenditure Survey. National and Regional Estimates. Volume 1 ISHB Series No. 182. Quezon City: PSA.

Balisacan, A. 1993. Agricultural growth, landlessness, off-farm employment, and rural poverty in the Philippines. *Economic Development and Cultural Change* 41(3): 533-562

Barnum, H., and L. Squire. 1979. An econometric application of the theory of the farm household. Journal of Development Economics 6(1):79-102.

Bisht, I., S. Pandravada, J. Rana, S. Malik, A. Singh; P. Singh, F. Ahmed, K. Bansal, 2014. Subsistence farming, agrobiodiversity, and sustainable agriculture: A case study. *Agroecology and Sustainable Food Systems* 38 (8): 890–912.

Bresciani, F., A. Balisacan, F. Virtucio, S. Piza, N. Fuwa, C.A. Santos, R. Briones, M. Ballesteros, R. Edillion, R. Clarete, M. L. Cristiaensen, C. Figueroa – Geron, I. Shuker, and M. Leonen. 2009. Land Reform, Rural Development, and Poverty in the Philippines: Revisiting the Agenda. Technical Report 49503. Taguig City: World Bank Office in the Philippines.

Charlton, D., Z. Rutledge, and J.E. Taylor. 2021. Chapter 77. Chapter Handbook of Agricultural Economics vol. 5. Amsterdam: Elsevier Publishing.

David, C., V. Cordova, and K. Otsuka. 1994. Technological change, land reform, and income distribution in the Philippines. In: David, C., and K. Otsuka, eds. *Modern Rice Technology and Income Distribution in Asia*. Boulder, Co.: Lynne Reinner Publishers.

Deininger, K, S. Jin, and M. Ma. 2022. Structural Transformation of the Agricultural Sector In Low- and Middle-Income Economies. Annual Review of Resource Economics 2022 14:1

Dominguez, C. 2022. The Ship of State has been masterfully steered. Philippine Economic Briefing, April 22, 2022. https://www.bsp.gov.ph/About%20the%20Bank/PEB%20FINAL_CMG.pdf. Accessed 12 July 2022.

DTI [Department of Trade and Industry]. 2017. Philippine Inclusive Innovation Industrial Strategy (i3S). DTI Policy Briefs Series No. 2017-05. Makati City: DTI.

Estudillo, J. and K. Otsuka. 1999. Green Revolution, human capital, and off-farm employment: changing sources of income among farm households in Central Luzon, 1966-1994. Economic Development and Cultural Change 47(3):497-523.

Estudillo, J., Y. Sawada. K. Otsuka. 2006. The Green Revolution, development of labor markets, and poverty reduction in the rural Philippines, 1985 – 2004. Agricultural Economics 35():399 – 407.

Hayami, Y, and M. Kikuchi. 2000. A Rice Village Saga: Three Decades of Green Revolution in the Philippines. Lanmah MA: Barnes and Noble.

Holden, W, and S. Marshall. 2018. Chapter 24 – Climate Change and Typhoons in the Philippines: Extreme Weather Events in the Anthropocene. In: Samui, P, D. Kim, and C Ghosh, eds. Integrating Disaster Science and Management. Amsterdam: Elsevier, 407 – 421.

Inocencio, A, A. Inocencio, and R. Briones. 2021. Chapter 8. Assessing the resurgent irrigation development program of the Philippines: Synthesis report. Revitalizing Philippine Irrigation: A Systems and Governance Assessment for the 21st Century. Quezon City: PIDS, 199 – 224.

IRRI [International Rice Research Institute]. 2022. Farm Household Survey Database. http://ricestat.irri.org/fhsd/php/panel.php?page=4&keyword=philippines. Accessed 30 June 2022.

Komatsuzaki, T. 2019. Improving public infrastructure in the Philippines. Asian Development Review 36(2): 159-184.

LaFave, D., E. Peet, and D. Thomas. 2020. Farm profits, prices, and household behavior. NBER Working Paper 2663. Washington, D.C.: New Bureau of Economic Research.

Lau, L., W. Lin, and P. Yotopoulos. 1978. The linear logarithmic expenditure system: an application to consumption leisure choice. Econometrica 46:843-68.

Merriam-Webster. 2022. The Merriam-Webster Dictionary. https://www.merriam-webster.com/dictionary/subsistence%20farming. Accessed 24 June 2022.

Porzio, T., F. Rossi, G. Santangelo. Forthcoming. The Human Side of Structural Transformation. American Economic Review.

PSA [Philippine Statistics Authority]. 2000. 1997 Philippine Poverty Statistics. Quezon City: PSA.

PSA. 2014. 2012 Family Income and Expenditure Survey. Final Report. Quezon City: PSA.

PSA. 2017. 2015 Family Income and Expenditure Survey.

PSA. 2019. Decent Work Statistics (DeWS) – Philippines Publication Tables 1995-2018. Quezon City: PSA.

PSA. 2020. 2018 Family Income and Expenditure Survey. Vol. 1 ISHB Series No. 182. Quezon City: PSA.

PSA. 2021. Merged FIES and LFS, 2012, 2015, 2018. Data File. Quezon City: PSA.

PSA. 2022. PSA OpenStat. www.openstat.psa.gov.ph. Accessed 30 June 2022.

Quimba, F., and J. Estudillo. 2020. Forces of modernization and the welfare of rural households: a saga of a village in Central Luzon, 1977-2013. Philippine Review of Economics 57(1):42-70.

Reyes, C., A. Tabuga, R. Asis, and M. Datu. 2012. Poverty and agriculture in the Philippines: Trends in income poverty and distribution. Discussion Paper Series No. 2012-09. Quezon City: PIDS.

Singh, I., L Squire, and J. Strauss. 1986. A survey of agricultural household models: recent findings and policy implications. World Bank Economic Review 1(1):149-179.

World Bank. 2018. Making Growth Work for the Poor: A Poverty Assessment for the Philippines. Washington, D.C.: World Bank.

WFP [World Food Programme]. 2016. Philippines: Is the fun drying up? Implications of intensifying El Nino conditions for drought risk and food security. Report for C-ADAPT, funded by Government of Sweden. Geneva: WFP.