CHAPTER 8

Philippines: Food Security versus Agricultural Exports?

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1. Introduction

Like many developing countries, the Philippines places a high priority on strengthening food security. In the past, food security was defined as food availability and was equated with self-sufficiency. Food self-sufficiency generally emphasizes the ability of a country or household to produce or procure various food items, especially staple food crops, to meet its food needs. However, food analysts argue that food self-sufficiency does not necessarily imply food security and that food security should be gauged through income since poverty causes food insecurity (Cabanilla 2006; Minot 2010). At present, the most widely accepted definition of food security is the one given by the 1996 FAO World Food Summit. The definition states that food security is achieved when people at the individual, household, regional, national, and global levels have physical and economic access to food at all times to meet their dietary needs and food preferences in order to maintain an active and healthy life. Thus, it is not only food availability over time that is considered but also the capacity of individuals, including the poor, to access food by producing it or obtaining it from the market. The ability of individuals to gain access to food with reference to food prices and income is thus recognized. This suggests that income generation is key to achieving food security.

In the Philippines, agricultural development and food security have always been part of government policies. The government recognizes that success in achieving food security relies

greatly on the agricultural sector because this sector produces the bulk of the country's food needs. Food security can be promoted by creating an environment that will enable poor farmers to respond to domestic, regional, and international market opportunities. It can be achieved if a country increases imports and/or produces food according to its comparative advantage and purchases some of its food requirements from the market. As pointed out by Balisacan and Ravago (2003), food security issues can be addressed through investment and institutional reforms that will promote agricultural productivity and economic growth. Further, Cabanilla (2006) emphasized that agriculture induces the economy's overall performance by fuelling the growth of the nonagricultural sector. It acts as the resource reservoir and source of intermediate products for the nonagricultural sector.

However, considering the growth rate of the population and the slowdown in agricultural productivity, there are questions about the capacity of the agricultural sector to supply the food needs of the rapidly increasing population. As shown in table 1, the growth of rice production has been unpredictable over the past two decades. Rice production dropped 24 percent in 1998 because of the El Niño phenomenon and bounced back the following year, after which it has been generally stable during the period 2000–07 (except for a slowdown in 2003 and 2005). However, the Philippines' annual population growth rate of 2.1 percent—as of 2009, the population of the country was estimated at 92 million—could lead to increasing dependency on food imports. Projections drawn up by the United States Department of Agriculture (USDA) indicate that the Philippines will still be importing an estimated 3.5 million tons of rice in 2019 (see appendix table 1) because of its limited ability to expand production (USDA 2010). This poses serious problems for the country's food security unless rice production stays a step ahead of population growth.

Table 1. Rice Supply (kg/capita/yr) and Population

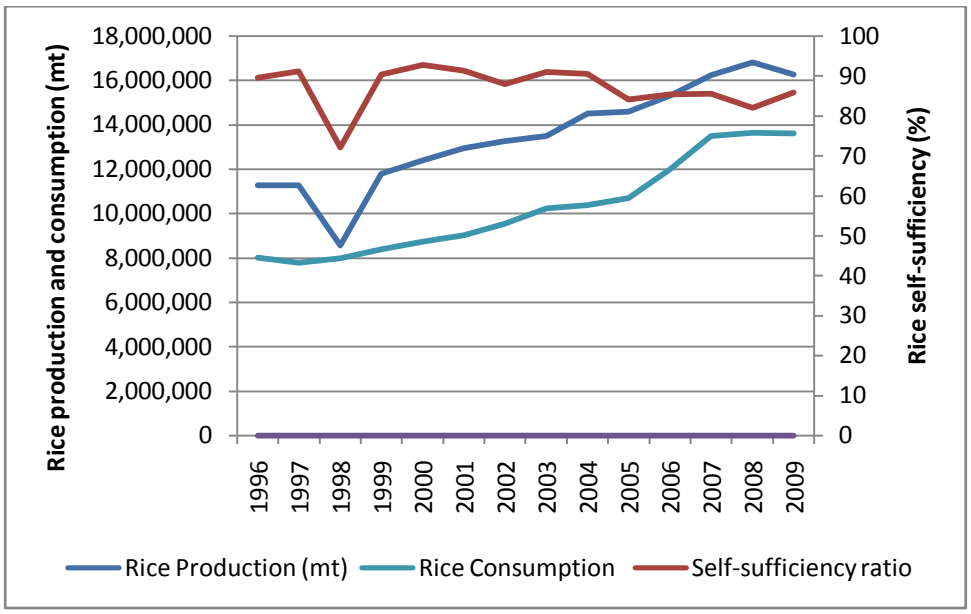
	Rice Production (mt)	Rice Supply (kg/capita/yr)		Population (in millions)		
Year		Milled Equivalent	Paddy Equivalent	Rural	Urban	Total
1990	-	93	139	31,962,870	30,464,610	62,427,480
1991	-	84	126	32,065,394	31,860,831	63,926,225

1992	-	87	131	32,137,666	33,289,179	65,426,845
1993	-	88	132	32,180,599	34,750,764	66,931,363
1994	10,538,054	89	133	32,195,729	36,247,572	68,443,301
1995	10,540,649	92	138	32,183,922	37,781,126	69,965,048
1996	11,283,568	99	148	32,245,363	39,252,116	71,497,479
1997	11,268,963	97	146	32,283,284	40,755,819	73,039,103
1998	8,554,824	92	138	32,296,272	42,290,961	74,587,233
1999	11,786,625	100	150	32,282,562	43,855,556	76,138,118
2000	12,389,412	104	155	32,241,088	45,448,281	77,689,369
2001	12,954,870	104	156	32,218,628	47,020,497	79,239,125
2002	13,270,653	109	163	32,170,159	48,618,789	80,788,948
2003	13,499,884	108	161	32,097,678	50,246,288	82,343,966
2004	14,496,784	117	175	32,003,793	51,907,568	83,911,361
2005	14,603,005	121	181	31,889,979	53,605,944	85,495,923
2006	15,326,706	121	182	31,843,437	55,255,680	87,099,117
2007	16,240,194	129	194	31,778,854	56,939,331	88,718,185
2008	16,815,548			31,694,232	58,654,205	90,348,437
2009	16,266,417			31,586,997	60,396,105	91,983,102

***Sources*:** FAOSTAT, 2010 for rice supply data; World Development Indicators, 2009 for population data; Bureau of Agricultural Statistics (BAS) for rice production (paddy).

As shown in figure 1, rice self-sufficiency ratio is high but the country still relies heavily on imports to meet consumption needs. Given the country's significant dependence on rice imports (with a 14.2 percent import-dependency ratio in 2009), the task of ensuring food security is not only a domestic problem but an international challenge as well (Tolentino 2002). Several studies suggest that the best way to achieve rice self- sufficiency is to invest in agricultural research and infrastructure (e.g., farm-to-market roads) and reallocate resources to improve the production of commodities other than rice (e.g., high-value commodities) in which the country has a comparative advantage and the income from which can be used to finance food imports (Dawe 2004; Habito and Briones 2005; Cabanilla 2006).

Figure 1. Rough rice production and consumption and rice self-sufficiency ratio, 1996--2009



***Source*:** Bureau of Agricultural Statistics (2010).

Research objectives

This paper aims to investigate whether the government should continue to invest heavily in increasing rice productivity (through bolstering irrigation capacity and providing high-yield seeds and postharvest facilities) to achieve food self-sufficiency or expand income generation by increasing the production of high-value agricultural crops for export in order to achieve food security. This objective is divided into four research questions:

1) What are the patterns and main drivers of food insecurity in the Philippines?
2) Is rice self-sufficiency associated with better access to food and higher standards of living in the Philippines? If so, then this will support the government's promotion of rice self-sufficiency by 2013.
3) What are the patterns and trends in the production of export crops and import-competing crops? What are the costs and returns to farmers from switching from staple food crops to export crops?
4) Would investment in the production of export crops improve food security or would it contribute to food insecurity by reducing domestic food production?

Data and methods

The description of patterns and trends in agricultural production and trade is based largely on secondary statistics from the Department of Agriculture's Bureau of Agricultural Statistics (BAS) and the National Statistical Office (NSO). In some cases, data from the Asian Development Bank (ADB), the World Bank (WB), and the Food and Agriculture Organization (FAO) were used. The analysis of the costs and returns of export crop production was based on BAS's Selected Statistics on Agriculture 2010.

For household-level analysis, we used the 2006 Family Income and Expenditure Survey (FIES) for the Philippines in order to explore the relationship between self-sufficiency and food security and the effect of export crop production on income and food security. The 2006 FIES was conducted by the NSO. A national sample consisting of about 51,000 households was interviewed for the survey. The data provided information on family income and expenditure and demographic characteristics affecting income and expenditure levels and patterns in the Philippines at the national and regional levels. To capture seasonal patterns in consumption and expenditure, the households were interviewed in two separate operations, each covering a half-year period: January to June and July to December. The sample design used stratified random sampling, with barangays as the primary sampling unit (PSU). The PSUs were stratified according to rural or urban within each province; each province was selected using systematic sampling with probability proportional to size. At least 500 households were systematically sampled from each barangay based on the 2002 Population Census List of Households.

We used this data to calculate for self-sufficiency and food security indicators as well as infer the effect of trade on domestic food production and food security.

From the FIES data, we calculated three indicators of food self-sufficiency:

- Home-produced food as share of all food consumed
- Home-produced cereals as a share of all cereals consumed
- Home-produced rice as a share of all rice consumed

We also calculated four measures of food security:

- Per capita real value of food consumption
- Nonstaples as a share of food consumption
- Animal products as a share of food consumption
- Reported number of months per year that the household has sufficient food (as a measure of food shortage)

In addition, we considered the relationship of both types of indicators to the measure of general well-being measured in terms of per capita consumption and expenditure, including the value of home-produced food and nonfood goods.

Organization of the paper

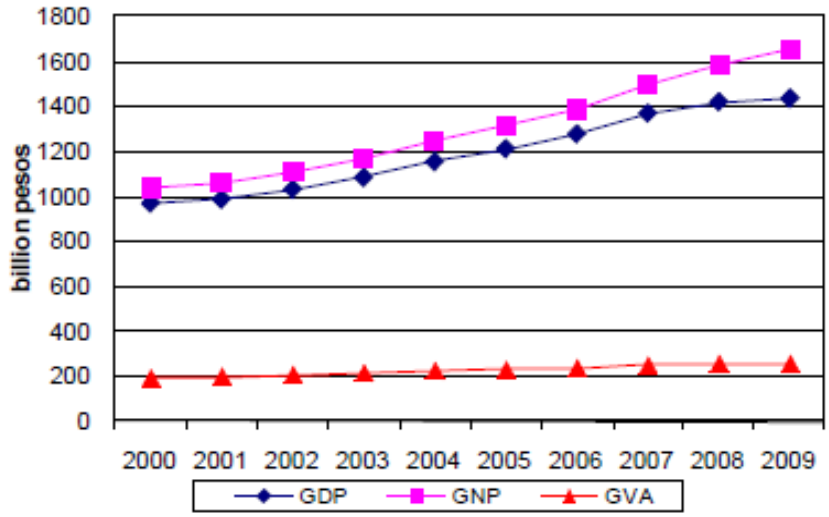
This paper is organized around the four research questions posed above. Section 2 examines agricultural growth and performance and focuses on the patterns of food insecurity and the key indicators of food security in the Philippines, both at the macro and micro levels. The next section explores the relationship between self-sufficiency, food security, and standard of living at the household level. Section 4 examines the patterns and trends of agricultural export crops and compares the costs and returns of each of these crops relative to rice production. The last section summarizes findings and discusses the implications for food security policy in the Philippines.

2. Agricultural Growth and Development

Trends in Philippine Agricultural Growth

Agriculture's vital role in the Philippine economy has stimulated government intervention in the input and output markets to promote agricultural growth and development. A number of studies assessing Philippine agricultural performance over the years have shown that the agricultural sector has not been performing well (David, Ponce, and Intal 1992; David 1995; Cabanilla and Velasco 2003; and Cabanilla 2006). As figure 2 shows, the share of agriculture value added in total Gross Domestic Product (GDP) has been gradually declining from 22 percent in 1994 to 20 percent in 2000 and then to 18 percent in 2009. Despite this decline, agriculture continues to employ approximately 30 percent to 40 percent of the labor force, a rate that is increasing an average of 3.2 percent (highest growth rate relative to the manufacturing and services sectors). Table 2 presents these data.

Figure 2. Share of agriculture value added to total GDP (%)



***Source*:** Key Indicators for Asia and the Pacific (2010); Country sources; ADB staff estimates using CEIC data.

Table 2. Labor Force Employment (in thousands)

	Total Employed	Employed in Agriculture	Employed in Manufacturing	Employed in Mining	Employed in Others
1990	22,212	9,981	2,236	129	9,865
1991	22,915	10,290	2,374	141	10,110
1992	23,696	10,727	2,523	147	10,300
1993	24,382	11,139	2,457	135	10,652
1994	25,032	11,286	2,539	111	11,097
1995	25,677	11,147	2,617	107	11,806
1996	27,187	11,645	2,696	113	12,734
1997	26,365	10,416	2,720	122	13,106
1998	26,631	10,091	2,715	114	13,711
1999	27,742	10,774	2,759	97	14,111
2000	27,453	10,181	2,745	108	14,419
2001	29,156	10,850	2,906	103	15,295
2002	30,062	11,122	2,869	113	15,958
2003	30,635	11,219	2,941	104	16,372
2004	31,613	11,381	3,061	118	17,054
2005	32,539	11,719	3,105	121	17,594
2006	32,963	11,815	3,059	141	17,949
2007	33,560	11,785	3,059	149	18,567
2008	34,089	12,030	2,926	158	18,974
2009	35,061	11,325	2,893	166	20,678

***Source*:** Key Indicators for Asia and the Pacific (2010); Country sources; ADB staff estimates using CEIC data.

A study done by David (1995) revealed how economic policies and agricultural incentives have affected agricultural development over the years. She found that there had been remarkable growth in the agricultural sector until the early 1980s with the adoption of modern rice varieties, after which the sector experienced a decline. The slowdown could have been caused by the setback in the expansion of crop areas, the increase in input prices, and the sharp decline in the real price of rice. In the 1990s, the domestic price of rice was set higher than world market price (shown in figure 3) in contrast to the pricing policy in the 1980s when the

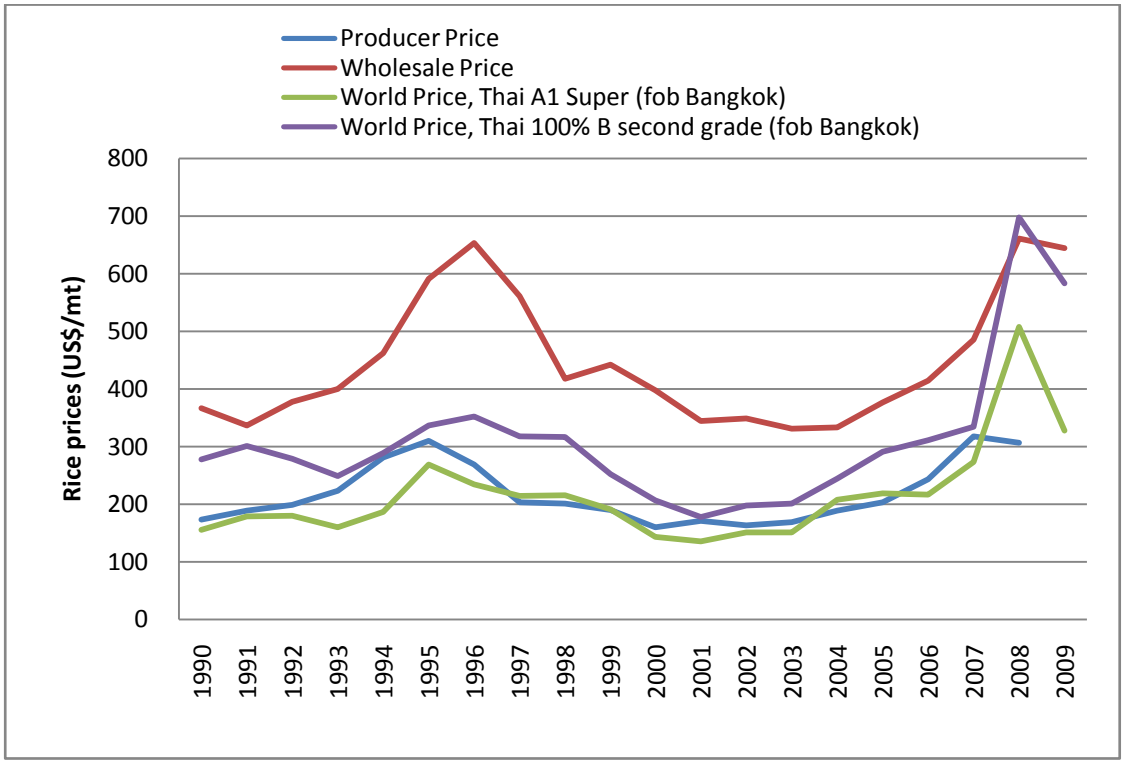
domestic price of staple crops (such as rice and corn) was set below world price (Cabanilla 2006).

Domestic prices soared after the country's ascension to the WTO in 1996, with nominal wholesale price almost twice (91 percent) as much as the world price. Wholesale prices continued to remain above world prices while input prices other than wages declined up to the onset of the Asian financial crisis in late 1997 and 1998. These developments proved favorable for the growth of rice production. However, as discussed below, the government's effort to support the price of rice through quantitative import restrictions hurt landless workers and small farmers (who are net buyers of rice) as well as urban workers. The volatility of domestic rice prices could have serious implications for farmers' incentive to invest in rice production as they would tend to adopt low-risk technologies due to the uncertainties of the market.

Government efforts, such as increased investment in irrigation in the 1990s and maintaining output prices above world prices to increase agricultural growth, were not enough to reverse the downward trend. Input prices also declined as a result of the Asian financial crisis in 1997—98, which could have been favorable for growth in rice production. However, the investments the government made in the agriculture sector were not in the areas where the gains were expected to be high in terms of improvement in long-term productivity.

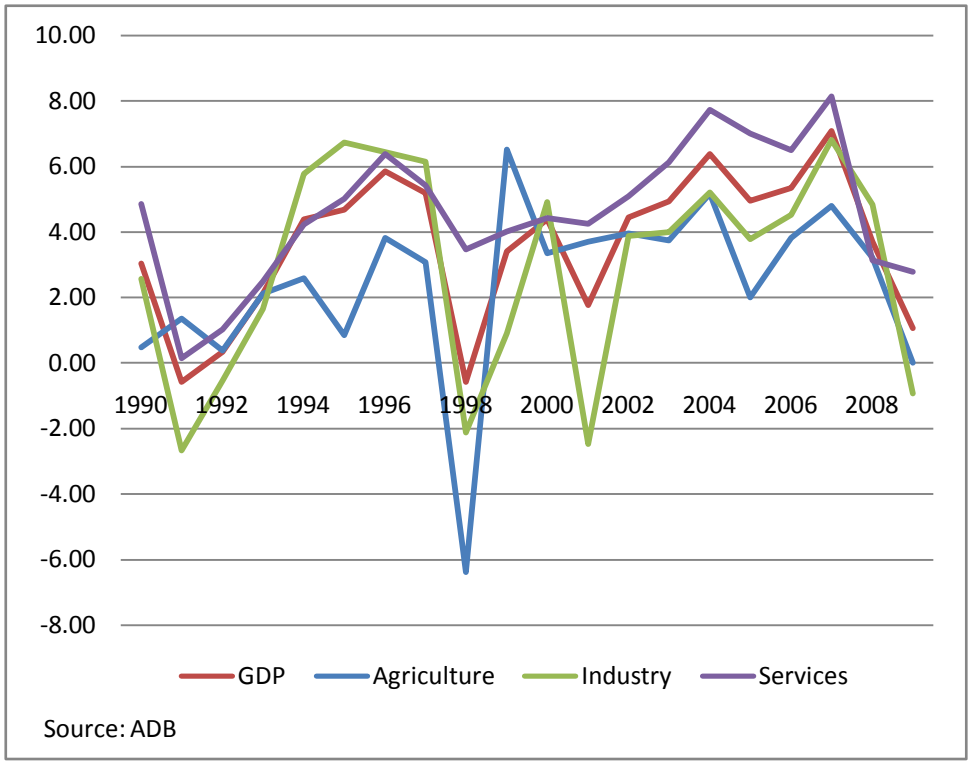
After experiencing negative growth in 1998, the Philippines recovered and achieved an average GDP growth rate of 4.8 percent from 1999 to 2009 (figure 4). Growth rate in the agriculture sector, however, declined from 2000 to 2009 (table 3). While the output of the agriculture sector had been largely stagnant through the years, the output shares of industry and especially services significantly increased, surpassing the slower pace of growth in agriculture by a relatively large percentage, particularly in the past two decades (figure 4 and table 3). Table 3 also shows that the value added of agriculture to the current GDP was only about 15 percent in 2009.

Figure 3. Trends in rice prices (US$/mt)



***Sources*:** FAOSTAT for producer prices and world prices; Bureau of Agricultural Statistics for wholesale prices.

Figure 4. Annual growth of output (% change)



***Source*:** Key Indicators for Asia and the Pacific 2010; Country table for Philippines.

Table 3. Percent of Value Added of Agriculture and Other Sectors to Total GDP

	Agriculture	Industry	Services	Agriculture Real Value Added
1990	21.90	34.47	43.62	0.48
1995	21.63	32.06	46.31	0.85
2000	15.76	32.27	51.97	3.36
2001	15.12	31.64	53.24	3.71
2002	15.11	31.83	53.06	3.95
2003	14.64	31.94	53.41	3.76
2004	15.07	31.70	53.23	5.18
2005	14.30	31.87	53.83	2.00
2006	14.16	31.66	54.19	3.82
2007	14.19	31.56	54.25	4.81
2008	14.88	31.69	53.43	3.22
2009	14.82	30.20	54.98	0.01

***Source*:** Bureau of Agricultural Statistics (2010).

Recent figures from the Department of Agriculture (DA) show that the El Niño phenomenon caused contractions in agricultural performance in the first half of 2010. The phenomenon affected the crops subsector. There was also a reduction in fish production while the poultry and livestock subsectors showed production gains. The poultry, livestock, and fisheries subsectors, which collectively account for about 56 percent of total agricultural output, posted positive growth of 3 percent, 1 percent, and 0.7 percent, respectively (not shown in table 3). Cabanilla (2006) noted that poultry and livestock have always been sources of agricultural growth. These sectors, however, are constrained by the high price of maize, the main component of animal feeds.

It is a common observation that the poor performance of the Philippine agricultural sector in recent decades can be traced not so much to weaknesses in production but to failures and shortcomings in the policy and institutional environment within the sector (Habito and Briones 2005). David (2003) and Habito and Briones (2005) contend that the policy regime has not established an appropriate incentive structure for the rapid development of agriculture. The reversion of price policies towards agricultural protection in the 1990s favored import-competing sectors such as rice, corn, and chicken rather than export-oriented sectors such as coconut and banana (see table 4). This continued the regime of distortions while further eroding the competitiveness of labor-intensive industries (i.e., because of artificially high food prices that raise the cost of wage goods).

Table 4. Nominal Protection Rates (%) By Agricultural Commodity

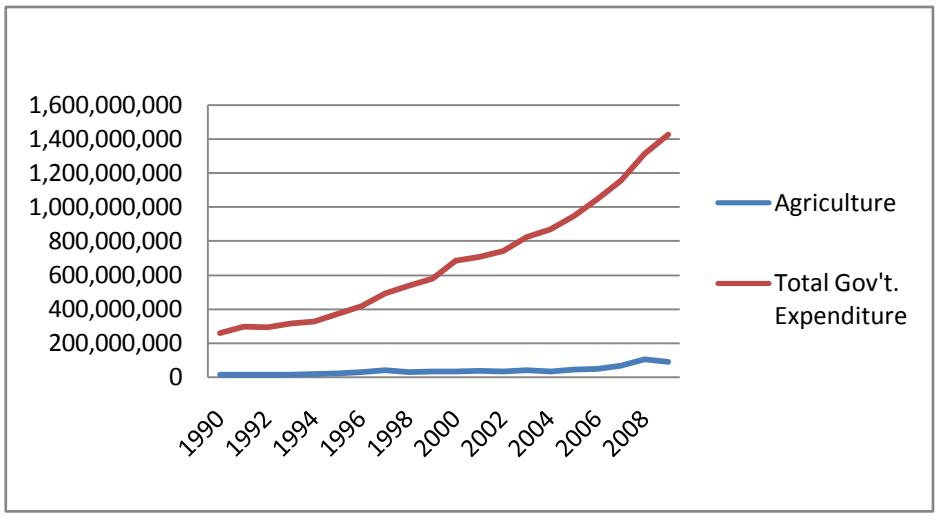
					Copra			
Year	Rice	Corn	Sugar	Oil	Coconut	Beef	Chicken	Pork
1960-64	20	53	9	-16	-24	30	115	-13
1965-69	12	44	86	-29	-31	-32	163	-24
1970-74	4	19	-37	-31	-35	-53	84	-38
1975-79	-13	30	-26	-20	-28	-25	91	-39
1980-84	-13	25	19	-28	-37	15	100	-28
1985-89	16	67	122	-16	-31	6	56	2
1990-94	26	70	51	-7	-26	31	69	43
1995-99	67	86	107	-12	-20	103	43	88
2000	87	104	82	-17	-33	73	23	53

2001	83	79	73	-21	-33	26	8	37
2002	63	51	111	-13	-18	18	5	76
2003	49	30	86	21	-20	28	-2	49
2004	21	41	47	-10	-30	-1	-5	32
2005	15	53	15	-16	-34	5	0	47
2006	19	51	2	-11	-32	16	22	80
2007	27	32	80	-10	-28	26	27	94

***Sources*:** David, Intal, and Balisacan (2007) for 1960—2005 figures; International Monetary Fund, IMF Commodity Prices (2008) and Bureau of Agricultural Statistics, CountrySTAT, Philippines (2008) for 2006 and 2007 figures.

The government has also failed to provide an adequate quantity and quality of investments in irrigation and other agriculture-related infrastructure. Figure 5 shows that government expenditure on agriculture remained low at 5 percent to 7 percent since 1990 while total expenditure in other sectors increased. Irrigation investments have declined from the 1980s through the early 1990s. Similarly, investments in rural roads and ports have plummeted, significantly raising the cost of access to rural areas. Research and development (R&D) is badly underfunded, resulting in research-intensity ratios far lower than those in other countries. Moreover, the bulk of research resources is inordinately focused on rice, several times out of proportion to that commodity's contribution to Gross Value Added (GVA). Instead of agricultural support policies specializing in expanding credit access and providing extension services, scarce resources were allocated to fund high-cost activities such as the provision of postharvest facilities, marketing, and credit subsidies, which are probably better off left to the market (Tolentino et al. 2001). A case in point is the tremendous fiscal and deadweight burden imposed by the National Food Authority's (NFA) activities on rice trade (Roumasset 2000). Another policy with adverse, unintended consequences for agricultural investments is land reform. Due to its slow pace of implementation, landowners yet to be subject to the Comprehensive Agrarian Reform Program (CARP) have scaled back their investments significantly (Habito et al. 2003; Briones 2002); thereby, contributing to the overall slowdown in investments in the sector.

Figure 5. Government expenditure on agriculture (in PHP)



***Source*:** ADB

As David (1995) emphasized, the Philippine government's support for agriculture is relatively low compared to the support provided by the governments of other Asian countries to their agriculture sector. She criticized the misallocation of funds for agriculture and underinvestment in programs that have long-term effects. David, Ponce, and Intal (1992) likewise noted the lack of support services for agriculture. They argued that government intervention in agriculture has relied primarily on short-term price and trade regulations, with minimal or no tangible positive impact. The use of scarce resources has instead imposed heavy and unnecessary transaction costs on farmers. Francisco and Bordey (2009) added that the overlapping functions and roles of R&D institutions constrain the present R&D system.

Cabanilla and Velasco (2003) revealed that though there is limited room for expansion of agricultural land in the Philippines, there seems to be enough suitable rice lands to provide for the country's needs for the next twenty-five years. It is therefore not an issue of land area but of agricultural productivity. The study assessed that Philippine agriculture is constrained by inadequate irrigation, frequent typhoons, and the lack of investment in infrastructure. The Philippines is visited by an average of nineteen typhoons a year. Hence, crop yields during the wet season are relatively lower than during the summer season.

In terms of water resources, the Philippines is not as well endowed as Thailand and Vietnam. It has an annual average of only 6,332 cubic meters per capita of available water compared to the 6,526 and 11,406 cubic meters per capita of Thailand and Vietnam, respectively (Cabanilla

2006). In fact, only about 0.6 million hectares of rice land in the Philippines have reliable sources of irrigation while the rest are rainfed. According to Cabanilla (2006), whatever agricultural growth the Philippines has enjoyed can be attributed to the high prices of commodities on the world market, adoption of modern varieties, increased fertilizer use, and expansion of irrigation. The slowdown in agricultural performance, on the other hand, can be attributed to depressed world prices at that time and the country's inability to cope with the technological advances necessary for the growth and development of the sector. Problems related to the land reform program, farmers' limited access to credit, and the conversion of agricultural lands for urban and industrial uses further aggravated the situation.

Experts suggested ways by which agricultural growth can be improved. One way is to promote the use of agricultural resources and to diversify cropping systems (Lozada et al. 1999). Another is to create an efficient incentive and institutional structure to support the delivery of services through complete deregulation, improved allocation of government funds, and restructured agricultural bureaucracy (David, Ponce, and Intal 1992). Briones (2010), on the other hand, pushes for agricultural growth through productivity improvement rather than land expansion, input intensification, or costly subsidies. Another alternative is to promote agricultural trade combined with public investment in productivity-enhancing support services (Balisacan and Ravago 2003).

In principle, productivity growth coupled with agricultural trade would assure food security. The success of trade is highly dependent on the capacity of the domestic market to adjust to technological changes to meet the demands of the world market.

International trade poses certain challenges to Philippine agriculture. The capacity of developing countries like the Philippines to penetrate the world market is constricted by the heavy protection given to the agricultural sector of developed countries; imposed tariffs may also lead to a reduction in agricultural income. Aside from tariffs imposed on agricultural trade products, nontariff measures are another barrier for Philippine produce. Nontariff measures limit the penetration of Philippine exports in the international market. Varying standards per country that deviate from internationally accepted standards make international trade more costly (Pasadilla and Liao 2007). Although the standards established by nations are meant to protect their citizens from inferior, deficient, or dangerous products, technical standards entail additional costs that may offset the competitive advantage of a country. Otsuki et al. (2001)

added that developing countries are vulnerable to regulatory changes because their scarce resources limit their ability to comply with restrictive standards.

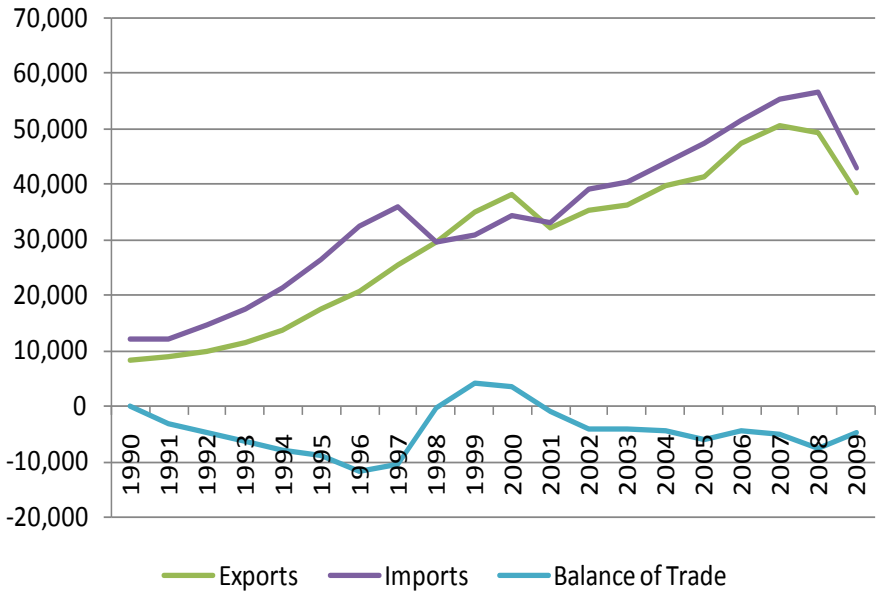
Indeed, Philippine agriculture faces many constraints both in the domestic and international markets. It is, however, important to note that agricultural growth is a way to food security, and international trade is an important development strategy for agricultural growth.

3. Food Security and Food Self-Sufficiency

Macro-level food security situation

The most common food security indicator is the ratio of total exports to food imports. This ratio reflects the relative cost of access to food in the country. This indicator has the advantage of capturing both the demand for imports and the capacity of a country to export; that is, it captures the fact that as long as a country generates enough foreign exchange from exports to finance food imports, it is considered food secure. Figure 6 shows a situation where macro-level food security has rapidly deteriorated due to increasing food imports; thus, the relative cost for access to food is high.

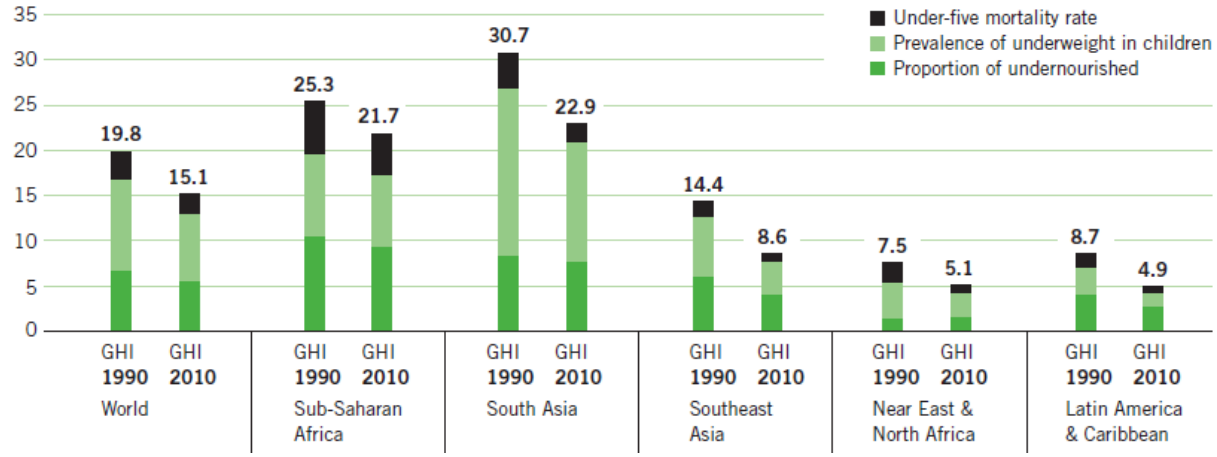
Figure 6. Food trade balance (ratio of total exports to food imports)



The Global Hunger Index (GHI) is another food security indicator. The GHI combines three equally weighted indicators: (1) the proportion of undernourished as a percentage of the population (reflecting the share of the population with insufficient dietary energy intake); (2) the prevalence of underweight in children younger than five (indicating the proportion of children suffering from weight loss); and (3) the mortality rate of children younger than five (partially reflecting the fatal synergy between inadequate dietary intake and unhealthy environments, i.e., lack of nutrients will create a high risk of illness, cause poor physical and cognitive growth, and ultimately result in death) (Grebmer et al. 2010).

Figure 7 shows some improvement in the 2010 GHI over the 1990 world GHI by almost one-quarter, from 19.8 down to 15.1 GHI.[1] The improvement in the three GHI indicators—namely, the proportion of the undernourished, the proportion of underweight children, and the under-five mortality rate all contributed to the world GHI. However, despite this improvement, world GHI remains at a serious level. In fact, the number of hungry people has increased and reached 1,020 million people, although new estimates by the FAO suggest that the number may have dropped to 925 million in 2010 (One World.net 2010).

Figure 7. Contribution of undernourished, underweight, and under-five mortality rate to 1990 GHI and 2010 GHI by region



***Source*:** Grebmer et al. 2010.

[1] The GHI ranks countries on a 100-point scale, with zero being the best score (no hunger) and 100 being the worst, though neither of these extremes is achieved in practice. Values less than 4.9 reflect low hunger, values between 5.0 and 9.9 reflect moderate hunger, values between 10.0 and 19.9 indicate a serious problem, values between 20.0 and 29.9 are alarming, and values of 30.0 or higher are extremely alarming. Data for the 2010 GHI are from 2003 to 2008. Specifically, the data on the proportion of undernourished are for 2004–06; data on child mortality are for 2008; and data on child malnutrition are for the latest year in the period 2003–08 for which data are available. For more information, see von Grebmer et al. (2010).

At the regional level, South Asia and Sub-Saharan Africa had the most number of undernourished people in 1990 and 2010 (figure 7). The 2010 GHI score fell by 14 percent in Sub-Saharan Africa compared with the 1990 score, and by about 25 percent in South Asia. The 2010 GHI in Southeast Asia shows progress with the GHI scores decreasing by 40 percent and more. It is worthwhile to note that about 10 percent and 22 percent of the population of China and India (two of the most populous countries in the world), respectively, are undernourished (table 5). The Philippines' 2010 GHI also shows some improvement over its 1990 GHI, falling from 19 to 13, or a 30 percent decrease (table 5). While the contribution of the proportion of underweight children under five in the GHI declined by 9.2 points and the under-five mortality rate as well as the proportion of undernourished also improved, the GHI remains serious.

Table 5. Data Underlying the Calculation of the 1990 and 2010 Global Hunger Indices

	Proportion of undernourished in the population (%)		**Prevalence of underweight in children under five years (%)**		**Under five mortality rate (%)**		**GHI**	
Country	1990—92	2004—06	1988—92	2003—08	1990	2008	1990 (with data from 1988--92)	2010 (with data from 2003--08)
South Asia								
Afghanistan	-	-	-	32.8	26.0	25.7	-	-
Bangladesh	36.0	26.0	56.5	41.3	14.9	5.4	35.8	24.2
Bhutan	-	-	34.0	12.0	14.8	8.1	-	-
India	24.0	22.0	59.5	43.5	11.6	6.9	31.7	24.1
Nepal	21.0	16.0	47.2	38.8	14.2	5.1	27.5	20.0
Pakistan	22.0	23.0	39.0	25.3	13.0	8.9	24.7	19.1
Sri Lanka	27.0	21.0	33.4	21.1	2.9	1.5	21.1	14.5
East and Southeast Asia								
Cambodia	38.0	25.0	44.7	28.8	11.7	9.0	31.5	20.9
China	15.0	10.0	15.3	6.0	4.6	2.1	11.6	6.0
Indonesia	19.0	16.0	31.0	19.6	8.6	4.1	19.5	13.2
Lao PDR	27.0	19.0	44.4	31.6	15.7	6.1	29.0	18.9

Malaysia	2.0	2.0	22.1	7.0	1.8	0.6	8.6	<5
Mongolia	30.0	29.0	10.8	5.3	9.8	4.1	16.9	12.8
Myanmar	44.0	17.0	32.5	29.6	12.0	9.8	29.5	18.8
Philippines	21.0	15.0	29.9	20.7	6.1	3.2	19.0	13.0
Thailand	29.0	17.0	17.2	7.0	3.2	1.4	16.5	8.5
Vietnam	28.0	13.0	40.7	20.2	5.6	1.4	24.8	11.5

***Source*:** Grebmer et al. (2010).

In Southeast Asia, Indonesia has the most number of undernourished people, averaging 27.8 million from 1990 to 2007 and growing at a rate of 4.2 percent on average. This is followed by Viet Nam, the Philippines, and Myanmar with 15.2, 14.3, and 14.1 million undernourished people, respectively. While Viet Nam ranked second with the most number of undernourished people, the rate of increase in this figure has gone down by 22.9 percent, which contributed to a remarkable reduction in its GHI score by more than 13 points (table 5). Myanmar also performed very well in terms of reducing the number of undernourished people from 44 percent in 1990—92 to 17 percent in 2004—06 (table 5). The Philippines was also able to reduce the proportion of undernourished people to 15 percent in 2004—06 from 21 percent in 1990—92 (table 5).

In addition to the GHI, another food security indicator that would capture both the macroeconomic and household-level dimensions of the status of food security is agricultural potential (i.e., food production per capita). Statistics for the Philippines showed that the country has generally improved its food security status in terms of food production per capita. From 1990 to 2006, FAO data showed that there was an increase in dietary energy supply (DES), averaging at 2,403 kcal/person/day. This has grown 3.11 percent on average. DES indicates the food available for human consumption. On the other hand, over the same period, the average minimum dietary requirement was 1,735 kcal/person/day (table 6). This means that there was more food available for consumption than the minimum energy requirement (FAO 2009). The Food Balance Sheet (FBS) in 2001 also indicated that the total supply of food in the country was more than adequate to address the nutrient needs of the population. The per capita food supply reached 1.19 kg, which exceeded the recommended dietary allowance of 1.03 kg. On average, per capita energy supply grew 0.45 percent while the mean per capita food consumption remained steady at 1,684 kcal/day.

Table 6. Food Supply and Consumption Requirement in the Philippines, 1990—2007

	1990—1992		1995—1997		2000—2002		2004—2006	
Supply and Consumption Indicator	**Amount (kcal/person/day)**	**Growth rate (%)**	**Amount (kcal/person/day)**	**Growth rate (%)**	**Amount (kcal/person/day)**	**Growth rate (%)**	**Amount (kcal/person/day)**	**Growth rate (%)**
Dietary energy supply (DES)	2,290	-	2,380	3.93	2,430	2.10	2,510	3.29
Minimum dietary energy requirement (MDER)	1,720	-	1,730	0.58	1,740	0.58	1,750	0.57
Average dietary energy requirement (ADER)	2,150	-	2,170	0.93	2,190	0.92	2,210	0.91

***Source*:** FAOSTAT, UN Food and Agriculture Organization (accessed November 2010)

On average, Filipinos allocate 42.6 percent of income to food items (NSO-FIES 2009). Grains, especially rice, constitute the bulk of the food consumed in the country. As the prime staple food in the country, rice (and its supply) is politically and socially considered as a key indicator of food security in the Philippines. Hence, achieving rice self-sufficiency can be equated with attaining food security. In 2006, rice contributed 48 percent to the daily energy supply of Filipinos, which underscores its importance in the meal (FAO 2006). Production data in the period 1994—2009 showed that, in general, there has been an increasing trend in the volume of rice supply in the country, with an average growth rate of 3.6 percent. Although the same trend has been observed in terms of area planted and yield, growth rate for these is a dismal 1.8 percent and 1.6 percent, respectively (table 7). The improvement in yield, particularly in the 1990s, may be attributed to technological interventions and infrastructure development. These include varietal improvement on rice, construction of farm-to-market roads, and expansion of irrigation facilities. The production growth rate of 2.8 percent in the 1990s can also be attributed to the rising real domestic price (despite falling world prices during that period) and falling real input prices (except wages). The 24.1 percent decline in

production in 1998 was due to the El Niño phenomenon, but this decline was easily recovered in 1999 when output increased by 37.8 percent. However, imports increased starting 1998 and since then, the Philippines has continued to import rice.

In addition to the volume of rice it produces, the Philippines has also been constantly importing rice. From 1998 to 2006, the NFA's rice imports accounted for about 15 percent of rice production (assuming a rice-recovery rate of 65.4 percent from palay) and 10 percent of the net available rice in the country. It is worthwhile to note that the country's rice consumption is less than the production of local farmers (figure 8). During the period 1994—2009, rice consumption averaged about 9.9 million metric tons (MT) (IRRI 2010) while local production was 13.1 million MT (table 8). Although this may imply a rice surplus, the seemingly lower consumption level may be attributed to gaps in the distribution system and the poor purchasing power associated with low income and poverty. It may also be attributable to the Philippines' "hoarding" behavior to increase domestic stocks of rice in the effort to protect itself against future shortages (like what happened in 1998 because of the El Niño phenomenon) and to keep a lid on domestic price increases especially during food crises.

Table 7. Annual Production, Area, and Yield of Rice in the Philippines, 1994—2009

Year	Rice Production (Paddy)		Rice Area Harvested		Yield	
	Amount (mt)	Growth rate (%)	(ha)	Growth rate (%)	Amount (mt/ha)	Growth rate (%)
1994	10,538,054	-	3,651,530	-	2.89	-
1995	10,540,649	0.02	3,758,691	2.93	2.80	-2.83
1996	11,283,568	7.05	3,951,136	5.12	2.86	1.83
1997	11,268,963	-0.13	3,842,270	-2.76	2.93	2.70
1998	8,554,824	-24.09	3,170,042	-17.50	2.70	-7.99
1999	11,786,625	37.78	3,999,839	26.18	2.95	9.19
2000	12,389,412	5.11	4,038,085	0.96	3.07	4.12
2001	12,954,870	4.56	4,065,441	0.68	3.19	3.86
2002	13,270,653	2.44	4,046,318	-0.47	3.28	2.92
2003	13,499,884	1.73	4,006,421	-0.99	3.37	2.74
2004	14,496,784	7.38	4,126,645	3.00	3.51	4.26
2005	14,603,005	0.73	4,070,421	-1.36	3.59	2.12
2006	15,326,706	4.96	4,159,930	2.20	3.68	2.70

2007	16,240,194	5.96	4,272,889	2.72	3.80	3.16
2008	16,815,548	3.54	4,459,977	4.38	3.77	-0.80
2009	16,266,417	-3.27	4,532,310	1.62	3.59	-4.81
Average	**13,114,760**	**3.59**	**4,009,497**	**1.78**	**3.25**	**1.55**

***Source*:** Bureau of Agricultural Statistics

Note: (-) means no data

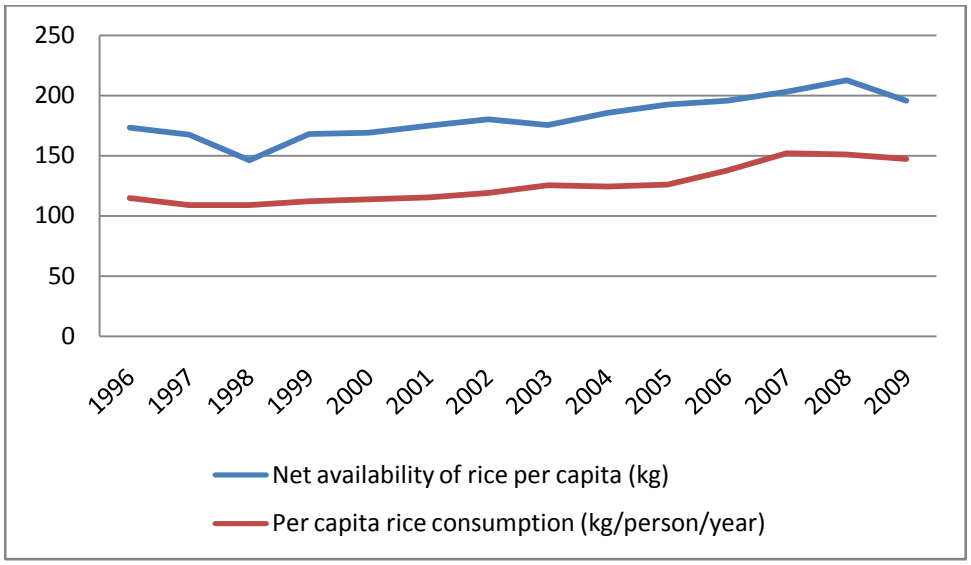
Table 8. Annual Rice Net Availability and Consumption of Rice in the Philippines, 1994—2009

Year	Rice Production (paddy)(mt) (a)	Rice Imports (mt) (b)	Net Availability (a) + (b)=(c)	Rice Consumption (mt) (d)	Difference (c) - (d)
1994	10,538,054	-	10,538,054	7,142,000	3,396,054
1995	10,540,649	-	10,540,649	7,509,000	3,031,649
1996	11,283,568	866,949	12,150,517	8,027,000	4,123,517
1997	11,268,963	724,902	11,993,865	7,800,000	4,193,865
1998	8,554,824	2,178,135	10,732,959	8,000,000	2,732,959
1999	11,786,625	838,071	12,624,696	8,400,000	4,224,696
2000	12,389,412	642,294	13,031,706	8,750,000	4,281,706
2001	12,954,870	810,903	13,765,773	9,040,000	4,725,773
2002	13,270,653	1,200,588	14,471,241	9,550,000	4,921,241
2003	13,499,884	888,984	14,388,868	10,250,000	4,138,868
2004	14,496,784	1,003,414	15,500,198	10,400,000	5,100,198
2005	14,603,005	1,829,604	16,432,609	10,722,000	5,710,609
2006	15,326,706	1,723,277	17,049,983	12,000,000	5,049,983
2007	16,240,194	1,809,828	18,050,022	13,499,000	4,551,022
2008	16,815,548	2,438,932	19,254,480	13,650,000	5,604,480
2009	16,266,417	1,784,141	18,050,558	13,614,000	4,436,558
Average	**13,114,760**	**1,338,573**	**14,286,011**	**9,897,063**	**4,388,949**

***Source*:** Bureau of Agricultural Statistics; UNCOMTRADE

Note: (-) means no data

Figure 8. Availability and consumption of rice per capita (kg/capita)



Ironically, while statistics shows that the Philippines has more than enough supply of food to feed its growing population, the country is confronted by food security issues. The Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) considered 49 (63 percent) out of the 77 provinces in the country to be prone to varying levels of food insecurity (FIVIMS 2010). The small-area poverty estimates (SAPE) conducted by the National Statistical Coordination Board (NSCB) in 2003 stated that four out every ten Filipinos are poor. Cabanilla (2006) emphasized that hunger could be prevalent even in surplus areas. In his integrative report, Cabanilla cited a survey conducted by the Social Weather Station (SWS), which pointed out that many Filipino families live with food deficit primarily due to lack of economic access to food. A case in point is Mindanao, which occupies one-third of the country's area, contributes 40 percent of the country's food requirements, and is the source of the country's top agricultural exports. Despite this, Mindanao has the most number of areas considered vulnerable to food insecurity due to poverty. According to the NSCB, of the 40 poorest municipalities in the Philippines, about 70 percent, or 28 municipalities, are in Mindanao. This clearly suggests that the availability of food alone is not a sufficient condition for the attainment of food security. Economic accessibility as represented by income is also an important factor to consider. According to Ajani et al. (2006), the level of income distinguishes the food-secure family from the food-insecure one since increasing household income also increases the family's command over bundles of food.

Household-level food security situation

Food security and food self-sufficiency at the household level

From the FIES data, we calculated three indicators of food self-sufficiency:

- Home-produced food as a share of all food consumed
- Home-produced cereals as a share of all cereals consumed
- Home-produced rice as a share of all rice consumed

We also calculated four measures of food security:

- Per capita real value of food consumption
- Nonstaples as a share of food consumption
- Animal products as a share of food consumption
- Reported number of months per year that the household has sufficient food

Table 9 shows the average values of the measures of self-sufficiency, food security, and standard of living in urban and rural areas.

Rural households produce, on average, 15.2 percent of the cereals they consume (and buy the remaining 85 percent) and 15.3 percent of the rice they consume (table 9). As expected, urban figures are lower than rural figures (except for animal products and nonstaples as a share of food consumption) while the national averages lie between the two.

In addition, we considered the relationship between self-sufficiency and food security indicators and the measure of general well-being (per capita expenditure). We found that there is a positive and significant relationship between per capita expenditure, a measure of standard of living, and per capita food expenditure as shown in table 10. A negative correlation between self-sufficiency and food security measures means that households that are more self-sufficient in food in general (i.e., households that produce what they consume) tend to be poorer and less food secure, as indicated by the share of nonstaples and animal products. These households are perhaps far from markets and roads and lack economic access to food so that they are not able to produce anything for the market and are forced to grow crops for which they may not have comparative advantage.

Per capita expenditure is positively correlated with the measures of food security except for the number of months with sufficient food. The percentage of households with sufficient food for six months is positively correlated with food-cereal-rice self-sufficiency indicators. These findings mean that some households (particularly rural households) may be forced into food self-sufficiency by lack of market access but encouraging household self-sufficiency in food is not a useful strategy for achieving food security or reducing poverty.

Table 9. Average Values of Measures of Self-Sufficiency, Food Security, and Standard of Living

Indicators	**Urban**	**Rural**	**Overall**
Households with sufficient food for the past 6 months (as % of total)	17.50	39.86	28.60
Cereal self-sufficiency (%)	4.27	15.16	9.76
Rice self-sufficiency (%)	5.10	15.28	10.16
Per capita food expenditure (%)	27.74	27.50	27.62
Share of nonstaples in food (%)	67.30	62.17	64.71
Share of animal products in food (%)	34.31	30.84	32.56
Per capita food expenditure (Php/mo)	3,013.12	1,772.61	2,387.73

***Source*:** Analysis of data from the 2006 FIES.

Table 10. Correlation of Self-Sufficiency Indicators and Food Security Indicators Among Rural Households

	Food security indicators			
	Per capita food expenditures	**Share of nonstaples in food (%)**	**Share of animal products in food (%)**	**Households with sufficient food for the past 6 months (%)**
Food self-sufficiency (%)	0.0019	-0.0707*	-0.0645*	0.8051*
Cereal self-sufficiency (%)	0.0543*	-0.0890*	-0.0731*	0.5980*
Rice self-sufficiency (%)	0.0588*	-0.0344*	-0.0284*	0.6077*
Per capita expenditure (Php/month)	0.3812*	0.2844*	0.2540*	-0.1934*

***Source*:** Analysis of data from the 2006 FIES.

4. Trends in Agricultural Exports

Turning now to agricultural trade performance, the sector is not considered a significant contributor in terms of foreign earnings (Cabanilla 2006). But agricultural trade contributes to food security by augmenting domestic supplies to meet consumption needs and by reducing variability in supply.

Agricultural exports accounted for 8.2 percent of the total value of Philippine exports in 2009 (tables 11 and 12). The country's total export earnings amounted to US$3,135.75 million in 2009, which was 19.37 percent lower than the 2008 record (table 12). The most valuable agricultural export is coconut oil, followed by fresh bananas, pineapples, and tuna. These top earners among agricultural exports collectively account for 52 percent of total agricultural exports. Coconut oil was shipped mostly to the United States and the Netherlands, Japan (5 percent), Italy (4 percent), and China (3 percent) (table 11). The major markets for fresh banana were Japan, Iran, South Korea (8 percent), Singapore (6 percent), and China (4 percent). Tuna was shipped to the United States, Germany, the United Kingdom (including Great Britain) and Ireland (12 percent), Japan (8 percent), and France (5 percent). Pineapples and pineapple products were exported mostly to United States and Japan, Singapore (6 percent), South Korea (5 percent), and the Netherlands (4 percent). The composition of agricultural exports has shifted away from traditional commodities like sugar, tobacco, abaca, and forest products in favor of bananas, pineapples, tuna, and other nontraditional export crops.

Table 11. Value of Agricultural Imports Relative to Agricultural Exports

Value of total agricultural exports	P 149 billion f.o.b. (US$3,136 million f.o.b.)
% agriculture in total exports	8.2%
Top agricultural export commodities	coconut oil (19%), fresh bananas (11%), tuna (11%), pineapples and products (8%)
Major markets	
coconut oil	USA (44%), Netherlands (35%)
fresh bananas	Japan (60%), Iran (12%)
tuna	USA (28%), Germany (18%)
pineapples and products:	USA (51%), Japan (16%)
Value of total agricultural imports	P 290 billion c.i.f. (US$6,079 million c.i.f.)
% agriculture in total imports	13.3%
Top agricultural import commodities	rice (17%), wheat and meslin (13%), soya bean oil/cake meal (7%), milk and cream and products (6%)
Major suppliers	
rice	Vietnam (95%)
wheat and meslin	USA (57%), Ukraine (23%)
soya bean oil/cake meal	Argentina (56%), USA (39%)
milk and cream and products	New Zealand (45%), USA (18%)
Agricultural trade deficit	P 140 billion

***Note*:** Peso per US dollar rate was 47.64 in 2009.

Table 12. Top Agricultural Exports: Volume and Value, Philippines, 2007—2009

	2007	2008	2009P	Annual growth rate (%)
VOLUME OF TOP EXPORTS ('000 mt)				
Coconut oil	888.85	850.08	832.94	-2.1
Banana, fresh	2199.32	2192.55	1664.05	-8.9
Tuna	73.93	108.24	105.25	12.5
Pineapple and pineapple products	587.82	586.15	487.7	-6.0
Desiccated coconut	130.72	142.66	116.42	-3.8

Tobacco, manufactured	17.68	20.01	17.24	-0.8
Seaweed and carageenan	26.18	26.25	24.08	-2.7
Tobacco, unmanufactured	18.9	23.64	30.09	16.8
Milk and cream and products	35.94	37.96	26.61	-9.5
Fertilizer, manufactured	255.85	213.46	324.96	8.3
Mango, fresh	26.34	20.84	20.38	-8.2
VALUE OF TOTAL AGRICULTURAL EXPORTS (FOB in million US$)	3168.07	3889.3	3135.7	-0.3
VALUE OF TOP EXPORTS (FOB in million US$)				
Coconut oil	733.81	1039.61	594.49	-6.8
Banana, fresh	396.28	405.56	344.43	-4.6
Tuna	210.87	388.78	334.82	16.7
Pineapple and pineapple products	247.42	388.78	334.82	10.6
Desiccated coconut	157.43	240.36	145.76	-2.5
Tobacco, manufactured	97.89	125.26	109.36	3.8
Seaweed and carageenan	91.64	122.03	98.68	2.5
Tobacco, unmanufactured	42.98	63.03	96.85	31.1
Milk and cream and products	138.76	162.5	95.62	-11.7
Fertilizer, manufactured	53.64	55.81	92.5	19.9
Mango, fresh	23.28	19.58	15.98	-11.8

***Source*:** NSO (2010).

In terms of imports, the country has been a net importer of rice and corn since 1995 when it acceded to the WTO, and it continues to be a net food importer to this day. Agricultural imports accounted for 13.3 percent of the total value of Philippine imports in 2009 (table 11). Agricultural and import expenditures reached US$6,079.80 million in 2009, which was 20.88 percent lower than the 2008 level (tables 11 and 13). Rice and wheat and meslin accounted for 31 percent of total agricultural imports. The bulk, or 95 percent, of rice imports came from Viet Nam while the major sources of wheat and meslin were the United States and Ukraine (table 11). Corn (maize) displaced rubber from the eighth place in the list of major agricultural imports.

Table 13. Top Agricultural Imports: Volume and Value, Philippines, 2007—2009

	2007	2008	2009P
VOLUME OF TOP IMPORTS ('000 mt)			
Rice	1805.61	2432.85	1755.18
Wheat and meslin	1,871.80	1,703.46	3,028.18
Soya bean oil cake/meal	1,322.49	1,203.16	1,267.63
Milk and cream and products	262.27	234.26	256.64
Tobacco, unmanufactured	58.81	60.73	46.77
Urea	462.6	524.59	626.64
Meat of bovine animals	104.52	109.25	84.02
Food preparations for infant use	17.14	21.27	19.91
Corn	152.31	22.97	303.12
Coffee	30.79	36.03	51.09
VALUE OF TOTAL AGRICULTURAL IMPORTS (CIF in million US$)	4918.29	7684.74	6079.8
VALUE OF TOP IMPORTS (CIF in million US$)			
Rice	657.14	1956.78	1039.64
Wheat and meslin	424.44	618.43	816.45
Soya bean oil cake/meal	392.02	506.58	422.16
Milk and cream and products	588.72	724.37	385.68
Tobacco, unmanufactured	182.49	223.46	192.53
Urea	123.35	199.87	185.93
Meat of bovine animals	139.27	209.17	143.83
Food preparations for infant use	97.97	124.99	125.5
Corn	48.46	25.41	104.21
Coffee	69.86	91.09	88.13

***Source*:** NSO (2010).
Note: P stands for preliminary data.

The rapid growth in the production of fruits and vegetables, and fish and livestock products contrasts with the relatively slow growth in cereals production. This can be partly explained by the fact that as consumer income rises, the share of spending allocated to basic staples declines while the proportion spent on animal products, fruits, vegetables, and processed goods tends to rise. In addition, rising incomes in China, India, and neighboring countries create a demand for

Philippine high-value products, such as bananas, pineapples, mangoes, nuts, and seafood. The rising demand for these high-value commodities (HVCs) is transmitted to farmers in the form of remunerative prices. Will this motivate farmers to expand the areas planted to these crops beyond what it would be without trade? We have comparative advantage in producing these HVCs. We have also achieved self-sufficiency for these HVCs, so expanding production for the export market is promising (table 14). If farmers divert land for the production of export crops, will they raise the price of agricultural commodities and contribute to food insecurity by reducing the domestic production of staple crops?

Table 14. Self-Sufficiency Ratio, by Exportable Commodity, By Year

	Coconut	**Sugarcane**	**Banana**	**Pineapple**	**Mango**	**Milkfish**	**Shrimps and Prawns**	**Crabs**
1996	100.04	100	142.11	109.8	105.39	100.08	116.78	106.4
1997	100.03	100	135.03	109.84	104.75	100.07	129.89	110.54
1998	100.03	100	138.87	108.05	105.5	100.1	136.3	110.86
1999	100.02	100	140.59	108.87	104.22	99.89	131.54	108.68
2000	100.01	100	148.03	109.51	104.82	100	100.62	112.14
2001	100.01	100	146.28	110.46	104.4	100.16	136.2	112.8
2002	100.01	100	146.94	112.23	103.86	100.1	155.95	112.65
2003	100.01	100	151.68	112.94	103.69	100.11	169.83	111.48
2004	100.02	100	146.43	113.11	103.6	100.18	144.95	100.4
2005	100.02	100	147.36	113.36	103.28	100.21	132.37	100.17
2006	100.01	100	151.56	116.68	102.93	100.35	133.57	99.83
2007	100.01	100	141.62	115.88	102.64	100.43	120.73	104.19
2008	100.01	100	133.76	115.21	102.41	100.47	114.01	103.72
2009P	100.01	100	122.64	110.26	102.71	100.67	113.22	107.16

***Source*:** BAS
Note: P stands for preliminary data.

This does not necessarily mean that the prices of HVCs are higher than those of staples such as rice and corn. As table 15 shows, the price of rice (palay) is currently higher than the price of pineapple, one of the top export crops. This could mean that rising demand could make these HVCs more profitable than they already are. The table further shows that net returns are

significantly higher for almost all commodities compared to cereal crops. However, farmers usually do not select their crops solely on the basis of profit or net returns. They give high priority to meeting a certain proportion of their food needs first by growing paddy rice or corn for their own consumption. Farmers with enough land and a tolerance for a certain degree of risk may find the profitability of HVCs attractive. The net returns per hectare from growing HVCs like pineapple is appealing, with a net profit-cost ratio of 2.1. Compare this to palay, which has a net profit-cost ratio of 0.44 and the cost per kilogram for which is PHP10.17.

Table 15. Cost and Returns of Growing Rice and Corn versus Export Commodities

Commodities		**2002**	**2009P**
All Palay			
	NET RETURNS	5619	16005
	NET PROFIT-COST RATIO	0.26	0.44
	Cost per kilogram in pesos	6.86	10.17
	Yield per hectare in kilograms	3188	3587
	Farmgate price in pesos per kilogram	8.62	14.63
All Corn			
	NET RETURNS	2431	8959
	NET PROFIT-COST RATIO	0.22	0.45
	Cost per kilogram in pesos	5.81	7.55
	Yield per hectare in kilograms	1915	2621
	Farmgate price in pesos per kilogram	7.08	10.97
Mango			
	NET RETURNS	64059	43635
	NET PROFIT-COST RATIO	1.66	0.73
	Cost per kilogram in pesos	6.09	14.64
	Yield per hectare in kilograms	6352	4101
	Farmgate price in pesos per kilogram	16.17	25.28
Pineapple			
	NET RETURNS	126949	133076
	NET PROFIT-COST RATIO	2.81	2.1
	Cost per kilogram in pesos	1.24	1.7
	Yield per hectare in kilograms	36457	37375
	Farmgate price in pesos per kilogram	4.72	5.26
Coffee			

	NET RETURNS	4542	18041
	NET PROFIT-COST RATIO	0.26	0.66
	Cost per kilogram in pesos	21.95	34.65
	Yield per hectare in kilograms	808	786
	Farmgate price in pesos per kilogram	27.57	57.6
Cabbage			
	NET RETURNS	36015	93965
	NET PROFIT-COST RATIO	0.61	0.87
	Cost per kilogram in pesos	5	7.34
	Yield per hectare in kilograms	11711	14701
	Farmgate price in pesos per kilogram	8.08	13.73
Eggplant			
	NET RETURNS	57193	40931
	NET PROFIT-COST RATIO	1.6	0.37
	Cost per kilogram in pesos	4.14	11.63
	Yield per hectare in kilograms	8630	9492
	Farmgate price in pesos per kilogram	10.77	15.94
Tomato			
	NET RETURNS	10999	57723
	NET PROFIT-COST RATIO	0.21	0.7
	Cost per kilogram in pesos	5.95	7.36
	Yield per hectare in kilograms	8938	11268
	Farmgate price in pesos per kilogram	7.18	12.48
Mongo			
	NET RETURNS	7029	12343
	NET PROFIT-COST RATIO	0.77	0.97
	Cost per kilogram in pesos	12.12	17.8
	Yield per hectare in kilograms	749	716
	Farmgate price in pesos per kilogram	21.46	35.04
Peanut			
	NET RETURNS	303	23566
	NET PROFIT-COST RATIO	0.02	0.92
	Cost per kilogram in pesos	18.01	15.59
	Yield per hectare in kilograms	1002	1649
	Farmgate price in pesos per kilogram	18.31	29.88
Milkfish			
	NET RETURNS	15973	36120

NET PROFIT-COST RATIO	0.71	1.1
Cost per kilogram in pesos	31.84	37.84
Yield per hectare in kilograms	708	868
Farmgate price in pesos per kilogram	54.4	79.45

***Source*:** Data on costs of production and returns from Bureau of Agricultural Statistics 2010.
***Note*:** P stands for preliminary data.

To shed light on this question, let us make a distinction between farmers growing HVCs and other farmers. For those growing HVCs, the income earned from sales would most likely allow them to purchase rice and other staples; otherwise, they would stop growing HVCs. On the other hand, farmers who do not grow HVCs may be adversely affected by the diversion of land for the production of export crops, but the effect is likely to be small for the following reasons. First, any reduction in the production of a staple crop such as rice would be compensated by higher imports, so the domestic price will most likely not be affected. Second, the area planted to HVCs is small. The area under all fruits and vegetables is only about 13 percent of the cropland under fruits and vegetables (table 16) and only 7 percent of the total cropland. The area planted to bananas and pineapples, for example, is only about 5 percent of the total cropland. Exports account for 20 percent of banana and pineapple production. If we apply this percentage to the area used for banana and pineapple production, it would mean that the area used to produce the exported quantity of bananas and pineapples is only 1.4 percent.
In the absence of exports, an increase in domestic supply would lower the price, so domestic demand would likely increase. Thus, expanding the production of export crops will not displace cropland and will not have a significant effect on the availability or prices of staple crops.

Table 16. Share of Fruit and Vegetable SubSector in Agricultural Output and Area

	Fruits and vegetables		Agricultural crops excl. rice and corn		Fruits and vegetables	
	Value of production[1]	**Area planted[2]**	**Value of production[1]**	**Area planted[2]**	**% of agri production**	**% of area planted**
1990	13,176.35	442,926.84	70,260.58	4,852,302.02	18.75	9.13
1991	12,610.94	451,141.39	69,735.79	4,886,055.40	18.08	9.23
1992	12,965.40	458,712.01	70,672.92	4,912,670.31	18.35	9.34
1993	13,293.35	470,540.98	71,637.73	5,037,325.47	18.56	9.34
1994	13,994.83	488,720.02	72,324.37	5,038,751.63	19.35	9.70
1995	16,999.91	506,122.37	76,070.73	4,981,476.64	22.35	10.16

1996	19,309.78	523,407.45	78,527.00	5,144,861.21	24.59	10.17
1997	21,467.31	537,985.88	83,898.43	5,121,361.82	25.59	10.50
1998	18,640.95	545,080.17	71,271.00	4,988,939.73	26.16	10.93
1999	20,519.15	568,143.31	77,273.50	5,150,558.06	26.55	11.03
2000	21,311.38	580,584.70	66,213.28	5,114,771.45	32.19	11.35
2001	21,961.07	590,054.47	68,069.96	5,109,079.85	32.26	11.55
2002	23,134.09	616,605.09	69,679.43	5,170,880.61	33.20	11.92
2003	23,634.23	635,149.57	71,400.50	5,268,505.46	33.10	12.06
2004	23,978.60	645,669.13	72,607.56	5,323,668.88	33.02	12.13
2005	25,245.16	656,315.90	73,910.42	5,305,753.37	34.16	12.37
2006	25,706.68	676,033.92	75,088.86	5,445,098.09	34.24	12.42
2007	28,771.02	703,685.09	77,992.86	5,516,439.64	36.89	12.76
2008	30,172.27	713,786.24	81,511.02	5,570,651.78	37.02	12.81
2009	29,817.57	723,150.81	80,786.81	5,613,215.61	36.91	12.88

Effect of agricultural trade on the volatility of prices

The food crisis of 2007—08 emphasizes the volatility of prices in world markets, particularly rice markets. We used two measures of volatility to study the volatility of prices: the coefficient of variation (CV) and the average percentage change in annual prices,[2] with an underlying assumption that consumers are risk averse and that they prefer a higher, more stable price than a lower, more volatile price. The coefficient of variation is a standard measure of relative volatility, but it lacks a simple intuitive interpretation. The average percentage change is less commonly used but more easily understood.

One simple measure of the volatility in prices in imports is the historical volatility in rice prices. The increase in the global price of rice that occurred in 2007—08 heightened in April and May 2008 when the average price of rice reached over US$1,000/ton (for 5 percent broken Thai white rice) from an average of US$330/ton between January and October 2007. The increase in the price of rice on the world market increased the domestic price of rice by 22.9 percent. This, in turn, reduced the average standard of living by 1.9 percent (Son 2008).

[2] The coefficient of variation (CV) in annual prices is defined as the standard deviation of prices and divided by the mean price. The standard deviation σ is defined as: $\sigma = (1/N) \Sigma (P_t - \mu)^2$ where μ is the mean price defined as: $(1/N) \Sigma P_t$, where P_t is the annual price in year t, and N is the number of years of data. The average percentage change in annual prices is defined as: $(100/(N-1)) \Sigma (P_t - P_{t-1})/P_{t-1}$ where P_t is the annual price in year t and N is the number of years of data.

Son estimated that in 2007—08, the increase in food prices (including rice) contributed to a 9.4 percent decrease in the average standard of living. Rice farmers, in particular, were affected by the 2008 price increases since they are also net consumers of, and have to purchase, rice. Furthermore, poorer households are much more vulnerable to price increases since 18 percent of their total expenditure goes to rice and 60 percent goes to food commodities. Despite strong, food-related policy measures passed by the government to prevent global price hikes from affecting domestic prices, the inflation in food prices surged to 9.6 percent (Timmer 2008; Keats et al. 2010).

One of the methods used to study volatility in prices was to examine wholesale prices. Table 17 shows that the CV of the annual average wholesale price in the 1990—2007 period was 22 percent, with an average annual change of 2.7 percent (which is low). However, it can be argued that these figures do not represent volatility in rice prices under free trade because of the policies passed by the Philippine government to stabilize rice prices and the NFA's procurement and distribution activities.

The better measures of the volatility of rice prices on the world market would be the prices of the Thai "A1 Super broken rice" and the Thai "100 percent B second-grade rice," which are widely used as benchmark for rice prices in the international markets. From 1990 to 2007, the CV for these prices was 21 percent and 19 percent, respectively, indicating a level of volatility slightly lower than wholesale rice prices and roughly similar to producer prices. However, if we include 2008—09, the CV in the prices of both Thai rice varieties increased substantially (40 percent and 41 percent, respectively). In addition, the average percentage change from one year to the next was quite low at 7.4 percent and 7 percent, respectively. However, if we take the average percentage change from one year to the next until 2008, the average percentage change becomes 18 percent and 17 percent, respectively.

Table 17. Measures of Actual Rice Price Volatility under Trade

	Time period	Mean (US$/mt)	Coefficient of variation (%)	Average percentage change (%)
Producer price	1990—2007	207	21	2.3
Producer price	1990—2009	281	24	3.5
Wholesale price	1990--2007	424	22	2.7
Wholesale price	1990--2009	447	26	4.3
Thai A1 Super broken	1990--2007	193	21	5.1
Thai A1 Super broken	1990--2009	216	40	7.4
Thai 100% B second grade	1990--2007	274	19	2.1
Thai 100% B second grade	1990--2009	310	41	7.0

5. Summary and Conclusions

One of the important goals of the current administration is to achieve its objective of food security and self-sufficiency in rice by 2016. To meet this goal, the government continues to invest heavily in irrigation; build farm-to-market roads and postharvest facilities; provide subsidy for the procurement of quality genetic materials like seeds; provide services in the areas of production, credit support (to help buy inputs), research and extension, information, regulation, and policy and planning. Irrigated land increased to 1.5 million ha in 2009, boosting production and income of farmers.

This paper investigates the food security situation of the country and explores alternative pathways to achieving food security. Results of the investigation about the Philippines' food security status reveal that the country is still far from being food secure. At the macro level, the food-trade balance shows that food security has rapidly deteriorated due to increasing food imports (dominated by rice imports); thus, the relative cost for access to food is high. It is projected that the Philippines will continue to import rice because of its limited ability to

expand production. This poses serious problems for the country's food security unless productivity growth rapidly increases at a phase faster than the population growth rate.

We also looked at the relationship between food security and food self-sufficiency and well-being. The results indicate that food self-sufficiency is negatively correlated with all four indicators of food security as measured by the value of food consumption, the share of nonstaples, the share of animal products, and the proportion of households with sufficient food. This means that households that are more self-sufficient in food in general tend to be less food secure. Furthermore, rice self-sufficiency is positively correlated with food security, and per capita expenditure, a measure of standard of living, is positively correlated with all four measures of food security. As expected, there is a strong relationship between per capita expenditure and per capita food expenditure. This implies that encouraging household food self-sufficiency is not a useful strategy for achieving food security or reducing poverty.

Finally, we investigated the relationship between agricultural exports and food security. In particular, we looked into whether expanding the production of high-value crops (i.e., export crops) would contribute to food insecurity by reducing domestic food production. Results revealed that net returns are significantly higher for export crops such as pineapple, milkfish, mango, peanuts, and legumes (mongo) than cereal crops (palay and corn). However, farmers usually do not select their crops solely on the basis of the profit or net returns. They give high priority to meeting a certain proportion of their food needs first by growing paddy rice or corn for their own consumption. Farmers with enough land and a tolerance for a certain degree of risk may, however, find the profitability of HVCs attractive. The net returns per hectare from growing HVCs like pineapple are appealing with a high net profit-cost ratio of 2.1. Finally, we found that expansion of export crop production will not displace cropland and will not have a significant effect on the availability or prices of staple crops for two main reasons. The first is that the area planted to HVCs is small compared to the total land area devoted to fruits and vegetables and even to total cropland. Second, a reduction in the production of a staple crop like rice would be compensated by higher imports so the domestic price would most likely remain unaffected.

To summarize, agriculture can play an important role in food security on both the macro and household levels but it should not be burdened. Research is needed to assess country-level growth options such as paying attention to the agricultural export sector and estimating the

economic benefits and costs of agricultural exports vis-à-vis the welfare of producers and consumers. Promoting public investment in agriculture by making improvements in agricultural infrastructure and introducing appropriate technologies to increase productivity would help shield against another food crisis in the future.

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Appendix Table 1. Rice Trade Long-Term Projections

	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20
						Imports, million metric tons						
Importers												
Canada	0.35	0.34	0.36	0.36	0.37	0.37	0.38	0.38	0.39	0.39	0.40	0.40
Mexico	0.50	0.60	0.61	0.62	0.63	0.65	0.67	0.69	0.71	0.73	0.75	0.77
Central America/Caribbean	1.27	1.53	1.60	1.67	1.72	1.78	1.85	1.91	1.97	2.01	2.06	2.11
Brazil	0.47	0.75	0.52	0.62	0.65	0.72	0.77	0.76	0.76	0.74	0.73	0.72
Other South America	0.64	0.57	0.71	0.76	0.79	0.82	0.85	0.86	0.87	0.89	0.90	0.92
European Union 1/	1.35	1.40	1.38	1.41	1.46	1.50	1.53	1.57	1.61	1.65	1.69	1.73
Former Soviet Union 2/	0.36	0.33	0.35	0.35	0.36	0.35	0.34	0.33	0.32	0.31	0.29	0.28
Other Europe	0.10	0.10	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Bangladesh	0.60	0.70	0.75	0.81	0.87	0.94	1.00	1.07	1.13	1.20	1.27	1.34
China	0.33	0.35	0.40	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.63	0.67
Japan	0.70	0.70	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
South Korea	0.26	0.30	0.36	0.38	0.40	0.42	0.44	0.44	0.44	0.44	0.44	0.44
Indonesia	0.25	0.30	0.42	0.40	0.50	0.60	0.72	0.89	0.96	1.03	1.08	1.15
Malaysia	1.02	0.83	0.87	0.89	0.92	0.95	0.97	1.01	1.04	1.07	1.10	1.13
Other Asia & Oceania	2.52	2.56	2.28	2.34	2.37	2.39	2.42	2.47	2.51	2.57	2.63	2.68
Iraq	1.00	1.10	1.08	1.09	1.12	1.16	1.19	1.22	1.25	1.28	1.31	1.34
Iran	1.70	1.70	1.58	1.52	1.52	1.52	1.56	1.60	1.63	1.67	1.72	1.76
Saudi Arabia	1.36	1.37	1.40	1.43	1.46	1.49	1.52	1.54	1.57	1.59	1.62	1.64
Other N. Africa & M. East	2.05	2.10	2.06	2.18	2.24	2.29	2.34	2.39	2.45	2.50	2.55	2.61
Sub-Saharan Africa 3/	6.53	6.68	6.70	6.89	7.08	7.30	7.50	7.73	7.96	8.19	8.41	8.65
Republic of South Africa	0.59	0.75	0.86	0.84	0.85	0.86	0.88	0.90	0.91	0.93	0.95	0.97

United States	0.61	0.67	0.70	0.72	0.75	0.77	0.79	0.82	0.84	0.87	0.89	0.92
Other foreign 4/	0.79	1.35	2.04	2.10	2.10	2.11	2.11	2.08	2.14	2.19	2.19	2.19
Philippines	2.60	2.60	2.68	2.78	2.85	2.90	2.98	3.05	3.16	3.25	3.38	3.50
Total imports	27.94	29.67	30.51	31.36	32.24	33.15	34.09	35.03	35.97	36.89	37.81	38.73
Philippines' share of imports	9.3%	8.8%	8.8%	8.9%	8.8%	8.7%	8.7%	8.7%	8.8%	8.8%	8.9%	9.0%
						Exports, million metric tons						
Exporters												
Australia	0.02	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Argentina	0.50	0.60	0.56	0.57	0.57	0.58	0.59	0.61	0.62	0.64	0.65	0.66
Other South America	1.69	1.61	1.29	1.31	1.33	1.31	1.35	1.37	1.39	1.43	1.45	1.47
European Union 1/	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.14	0.14	0.14	0.15	0.15
China	0.80	1.30	1.53	1.64	1.80	1.90	2.11	2.32	2.48	2.62	2.71	2.80
India	2.00	1.50	1.50	1.80	2.22	2.53	2.82	3.00	3.23	3.40	3.60	3.78
Pakistan	3.00	3.30	3.30	3.30	3.30	3.30	3.30	3.32	3.39	3.47	3.56	3.66
Thailand	8.50	10.00	10.28	10.38	10.46	10.70	10.93	11.26	11.50	11.75	12.00	12.30
Vietnam	5.80	5.50	5.81	5.99	6.05	6.20	6.23	6.30	6.40	6.52	6.67	6.80
Egypt	0.30	0.45	0.65	0.61	0.57	0.56	0.54	0.53	0.50	0.47	0.44	0.42
United States	2.99	3.07	3.20	3.29	3.36	3.42	3.49	3.55	3.61	3.68	3.74	3.77
Other foreign	2.20	2.16	2.22	2.30	2.40	2.49	2.54	2.62	2.68	2.74	2.80	2.87
Total exports	27.93	29.66	30.51	31.36	32.24	33.15	34.09	35.03	35.97	36.89	37.81	38.73

***Source*:** USDA Agricultural Projections to 2009, 2010.

Note: These projections were completed in November 2009.

1/ Covers EU-27, excludes intra-trade.

2/ Covers FSU-12. Includes intra-FSU trade.

3/ Excludes Republic of South Africa.

4/ Includes unaccounted.