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Philippines: Food Security versus Agricultural Exports?

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Philippines: Food Security versus Agricultural Exports?

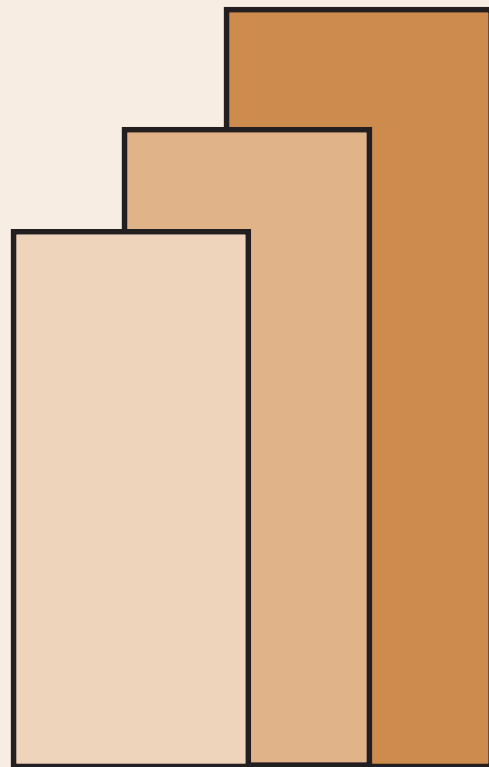
Marites M. Tiongco and Kris A. Francisco

DISCUSSION PAPER SERIES NO. 2011-35

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Philippines: Food Security versus Agricultural Exports?

Marites M. Tiongco and Kris Francisco

ABSTRACT

One of the goals of the current administration is to achieve food security and food self-sufficiency in rice by 2016. This paper tries to look at the current food security situation of the country with respect to this goal, and tries to explore alternative pathways to achieving food security. Specifically, it aims to address the question: “*Should the government continue its efforts in increasing rice productivity to achieve food self-sufficiency, or should it focus instead on increasing the production of high value crops for exports in the aim of achieving food security?*” Results of the investigation revealed that the Philippines is still far from being food secure. At the macro level, the food-trade balance showed that food security has rapidly deteriorated due to increasing food imports (dominated by rice imports). While at the micro-level, food self-sufficiency was found to be negatively correlated with all four indicators of food security identified. This implies that in general, households that were more self-sufficient in food tend to be less food secure. Furthermore, rice self-sufficiency and per capita expenditure (a measure of standard of living), were found to be positively correlated with food security. Finally, we looked at whether expanding production high value crops would contribute to food security by reducing domestic food production. Results revealed that net returns are significantly higher for high value crops such as pineapple, milkfish, and mango as compared with cereal crops like palay and corn.

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I. Introduction

Like many developing countries, the Philippines place high priority on strengthening food security. In the past, food security is defined as food availability and equated with self-sufficiency. However, food analysts argue that food self-sufficiency does not imply food security and that food security should be gauged through income since poverty causes food insecurity (Cabanilla, 2006; Minot, 2010). Food self-sufficiency generally emphasizes the ability of a country or household to produce various food items to meet its food needs, particularly for staple food crops. At present, the most widely accepted definition of food security is the one given by the Food and Agriculture Organization (FAO) in the 1996 World Food Summit. It 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 maintaining an active and healthy life. Thus, not only food availability over time is considered, but also the capacity of individuals, including the poor, to access food by producing it or obtaining it from the market. This suggests that income generation is a key to achieving food security. Nonetheless, the ability of individuals to gain access to food with reference to food prices and income is recognized.

The Philippine government recognizes that the success of providing food security greatly relies on the agricultural sector because it produces bulk of the country's food needs. Hence, agricultural development and food security have always been part of the government's policies. Food security can be promoted by creating an environment that would enable poor farmers' to respond to domestic, regional, and international market opportunities. This can be achieved by increasing investment and institutional reforms that will promote agricultural productivity and economic growth such as increasing imports and/or producing food according to its comparative advantage and purchasing some of its food requirements from the market.

However, considering the rate of growth of the population and the slow-down in agricultural productivity, many questions 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 by 24% in 1998 because of the El Niño, and bounced back in the following year, after which it has been generally stable in 2000–07, except for a slowdown in 2003 and 2005. The annual population growth rate of 2.1% of the estimated 92 million Filipinos in 2009, however could lead to increase in food import dependency. The USDA Projections tell us that Philippines will still be importing rice in 2019 (estimated at 3.5 million tons, Appendix Table 1) because of limited ability to expand

production (U.S. Department of Agriculture, 2010). This poses serious problems for the country's food security unless rice production keeps a step ahead of population growth.

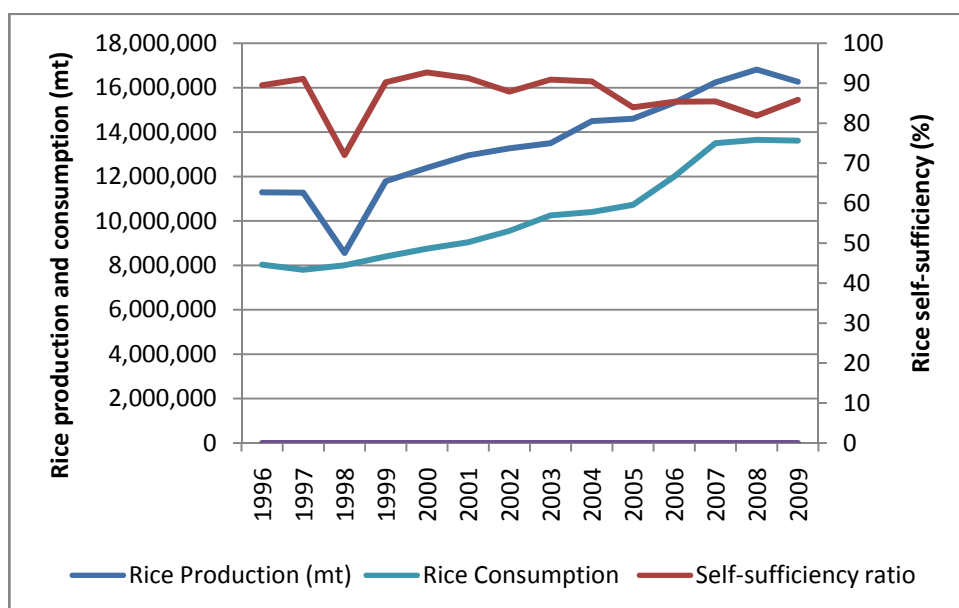
Table 1. Rice Supply (kg/capita/yr) and population

Year	Rice Production (mt)	Rice Supply (kg/capita/yr)		Population (in millions)		
		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 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 imports for rice (with a 14.2% 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 of Dawe (2004), Habito and Briones (2005) and Cabanilla (2006), suggest that the best way to achieve rice self-sufficiency is to invest in agricultural research and infrastructure such as farm to market roads. These studies also suggest to reallocate resources in improving production of other commodities such as high value crops,) where there is comparative advantage, and use the income to finance food imports.

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



Source: Bureau of Agricultural Statistics, 2010.

The primary aim of this paper is to investigate whether the government should continue its efforts in increasing rice productivity to achieve food self-sufficiency, or should it focus instead on increasing the production of high value crops for exports in the aim of achieving food security. Specifically, it wants to address the following research questions:

- 1) What are the causes of food insecurity in the Philippines?
- 2) Will improvement in rice-self sufficiency also improve access to food and standards of living in the Philippines?
- 3) What are the trends in the production of export crops and import-competing crops? What are the costs and returns of switching from staple food crops to export crops?
- 4) Would investment on export crop production improve food security or would it contribute to food insecurity by reducing domestic food production?

This paper is organized as follows: Section 2 examines agricultural growth and performance in the Philippines. It focuses on the patterns of food insecurity and the key indicators of food security at both the macro and micro level. Section 3 explores the relationship between self-sufficiency, food security, and standard of living at the household level, while Section 4 examines the patterns and trends of agricultural export crops, and compares the costs and returns of switching to each of these crops relative to rice production. The last section summarizes the findings and implications for food security policy in the Philippines.

Data and methods

The description of patterns and trend in agricultural production and trade is based largely on secondary data from the Department of Agriculture’s Bureau of Agricultural Statistics (BAS)

and National Statistical Office (NSO). In some cases, data from 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 BAS's Selected Statistics on Agriculture 2010.

For the household level analysis, we use the 2006 Family Income and Expenditure survey (FIES) to explore the relationship between self-sufficiency and food security, and examine the effect of export crop production on income and food security. The 2006 FIES is a national survey conducted by the National Statistics Office (NSO), consisting of 51,000 sample households. The dataset provides information on family income and expenditure as well as household demographic characteristics that may affect income and expenditure behavior. To capture seasonal patterns in consumption and expenditure, the households are interviewed in two separate operations, each covering half-year period: January to June and July to December. Stratified random sampling is used wherein barangays are chosen as primary sampling unit (PSU). The PSUs are classified as urban or rural within each province, where each province was selected using systematic sampling with probability proportional to size. At least 500 households were sampled using systematic sampling from each barangay, based on the Population Census List of Households in 2002.

We use the 2006 FIES data to calculate for the self-sufficiency and food security indicators, wherein the effect of trade on domestic food production and food security was inferred. We calculate three indicators of food self-sufficiency namely: home-produced food as share of all food consumed; home-produced cereals as a share of all cereals consumed; and home-produced rice as a share of all rice consumed

The four measures of food security are the following: a) per capita real value of food consumption; b) non-staples as a share of food consumption; c) animal products as a share of food consumption; and d) reported number of months per year that the household has sufficient food, as a measure of food shortage.

In addition, we also consider the relationship of both types of indicators to the measure of general well-being measured in terms of per capita consumption and expenditure, which includes the value of home-produced food and non-food goods.

II. Agricultural Growth and Development

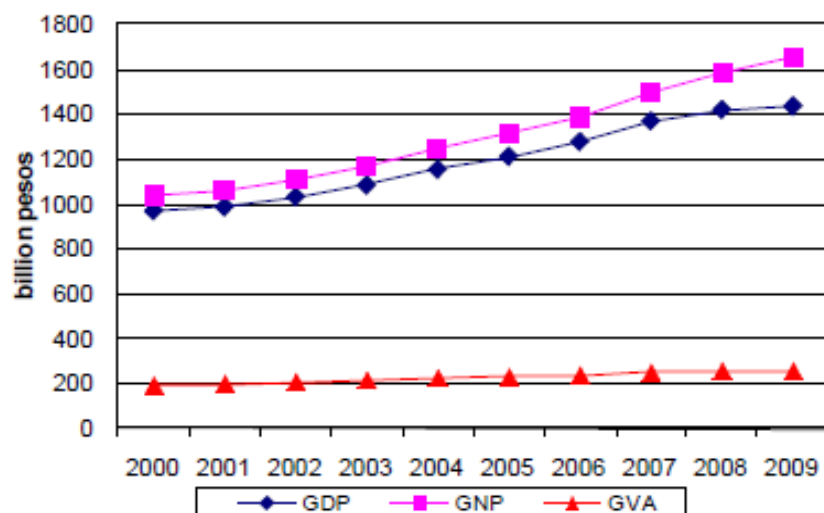
Trends in Philippine Agricultural Growth

Agriculture's vital role in the Philippine economy, has stimulated government intervention both in input and output markets, to promote agricultural growth and development. A number of studies¹ have been devoted in assessing the Philippine agricultural performance over the years and have shown that the agricultural sector has not been performing well. As shown in Figure 2, the share of agriculture value added in total GDP has been gradually declining, from

¹ David, Ponce and Intal (1992); David (1995); Cabanilla and Velasco (2003); and Cabanilla (2006)

22% in 1994 to 20% in 2000, and 18% in 2009. Despite this, agriculture employs around 30 to 40% of the labour force, and increasing at an average rate of 3.2% (highest growth rate relative to manufacturing and services sectors) (Table 2).

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

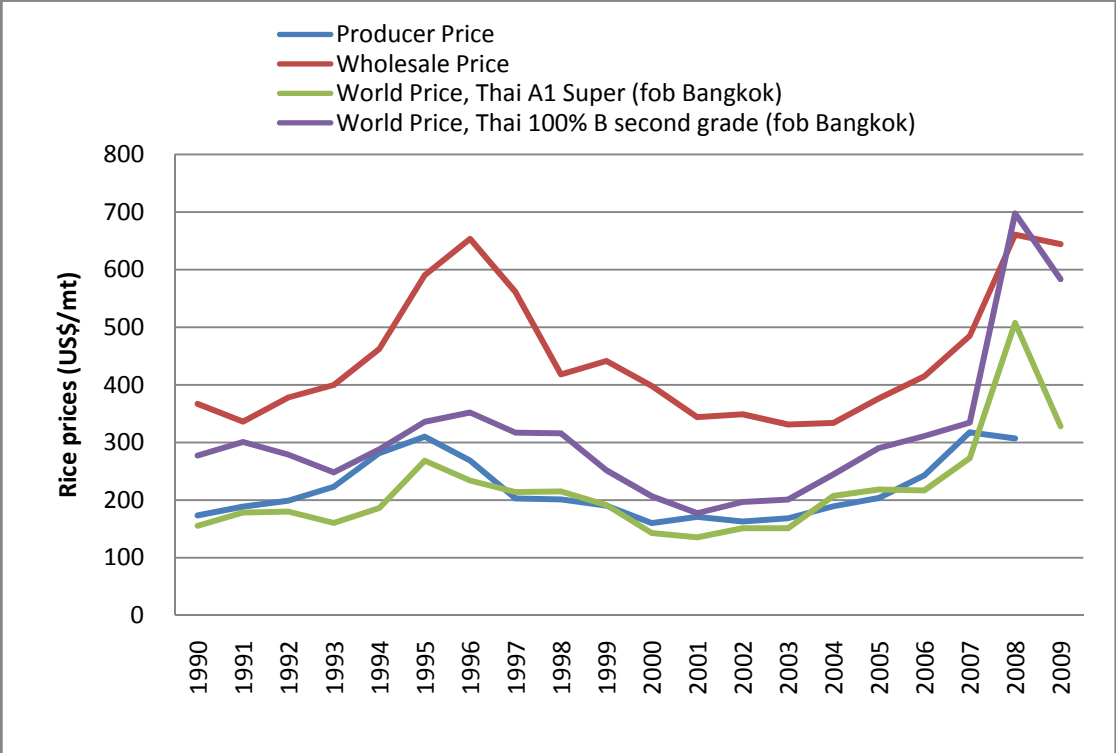
A study done by David (1995) revealed how economic policies and agricultural incentives affected agricultural development through time. She finds that there was a remarkable growth in the agricultural sector until the early 80's with the adoption of modern varieties, then a decline thereafter. The setback in crop area expansion, increase in input prices and sharp decline in real prices of rice could have caused the slowdown. In the 1990's, domestic prices of rice have been set higher than world market price (shown in Figure 3), in contrast to the pricing policy in the 1980s when domestic price of staple crops (such as rice and corn) were set below world prices (Cabanilla, 2006).

In 1996, after the ascension of the country to the World Trade Organization (WTO), domestic prices soared, with nominal wholesale price was almost twice (91%) 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 rice prices 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 they face.

Government efforts such as increase in investment in irrigation in the 1990s and keeping output prices above the world prices to increase agricultural growth were not enough to reverse the downward trend. Input prices also declined because of the Asian financial crisis in 1997-1998 that could have been favourable for the growth in rice production.

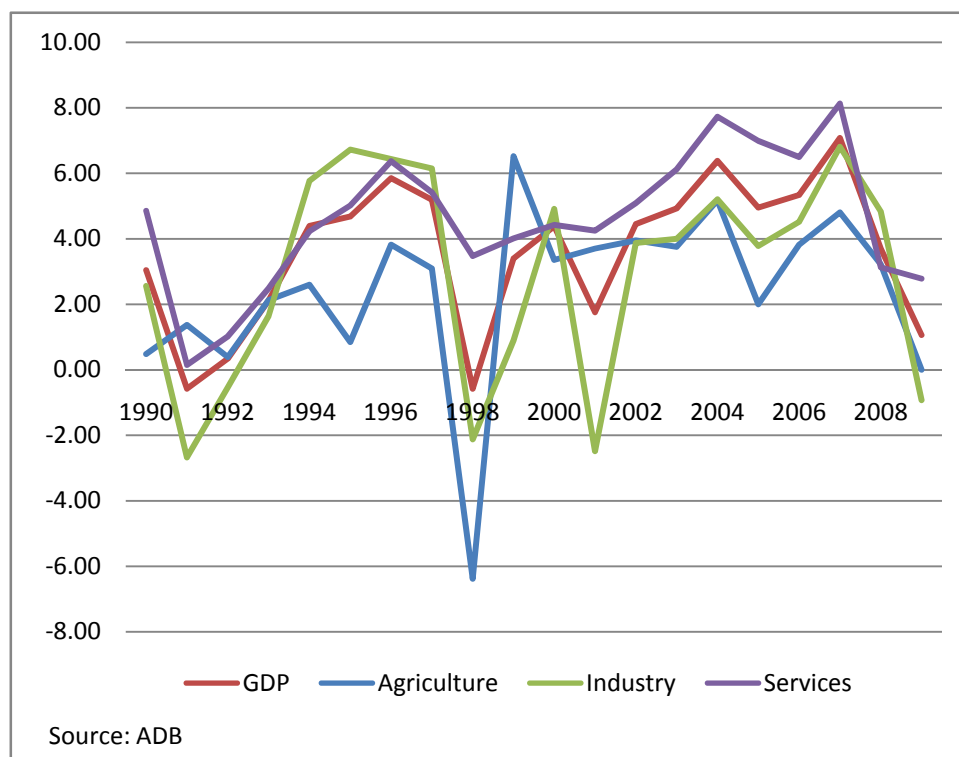
After a negative growth in 1998, the Philippines had since recovered and had achieved an average GDP growth rate of 4.8% from 1999 to 2009 (Figure 4); while, agriculture growth rate has declined between 2000-2009 (Table 3). Although agriculture output was largely stagnant through the years, industry and especially services significantly raised their output shares, surpassing agricultures' slower pace by a relatively large percentage particularly in the past two decades (Figure 4 and Table 3). Table 3 also shows the value added of agriculture to the current GDP is only about 15% 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 show that the El Nino has 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 but in the case of poultry and

livestock subsector, they showed production gains. The poultry, livestock and fisheries subsectors—combining for about 56% of total agricultural output—posted positive growths of 3%, 1% and 0.7%, 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, which primarily constitutes animal feeds.

It is a common observation that the poor performance of the Philippine agricultural sector in recent decades traces not so much to weaknesses in production, but to failures and shortcomings in the policy and institutional environment within the agricultural sector (Habito and Briones, 2005). They also supported the argument of David (2003) that the policy regime has not established an appropriate incentive structure for the rapid development of agriculture. With the reversion of price policies towards agricultural protection in the 1990s, the protection favoured import-competing sectors such as rice, corn and chicken, rather than export-oriented sectors such as coconut and banana (see Table 4). These events continue the regime of distortions, while further eroding the competitiveness of labor-intensive industries due to artificially high food prices that raises the cost of wage goods

Table 4. Nominal protection rates (%) by agricultural commodity

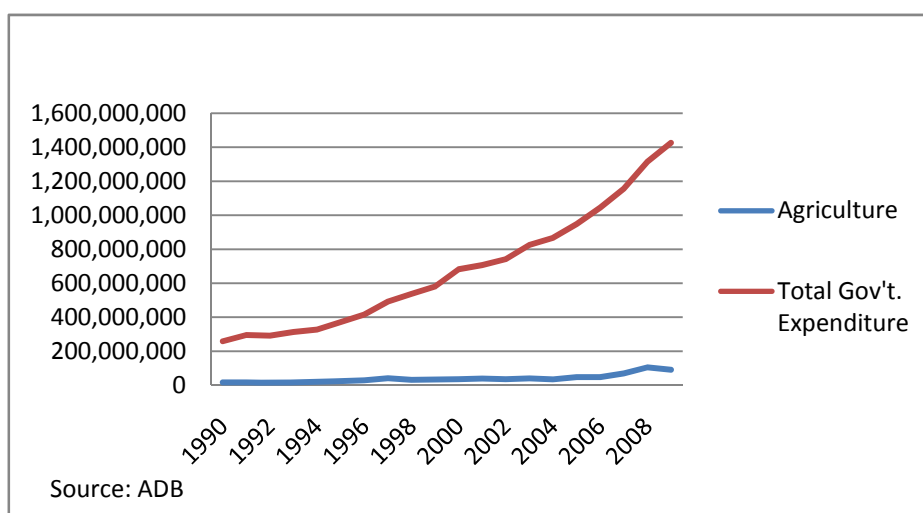
Year	Rice	Corn	Sugar	Oil	Copra		Chicken	Pork
					Coconut	Beef		
1960-64	20	53	9	-16	-24	30	115	-13
1965-69	12	44	86	-29	-31	-32	163	-24
1970-74	4	19	-37	-31	-35	-53	84	-38
1975-79	-13	30	-26	-20	-28	-25	91	-39
1980-84	-13	25	19	-28	-37	15	100	-28
1985-89	16	67	122	-16	-31	6	56	2
1990-94	26	70	51	-7	-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; International Monetary Fund, IMF Commodity Prices (2008) and Bureau of Agricultural Statistics, CountrySTAT, Philippines (2008) for 2006 and 2007.

The government has also failed to provide adequate quantity and quality of investments in irrigation and other infrastructures in favour of agriculture. Figure 5 shows government's expenditure on agriculture, which remained low at 5-7% since 1990 while total expenditures on other sectors are increasing. Irrigation investments have declined from the 1980s through the early 1990s. Similarly, investments in rural roads and ports have plummeted, significantly

raising costs of rural access. Research & development (R&D) is badly underfunded, resulting in research intensity ratios far lower than those in other countries. Moreover, much of the research resources are inordinately focused on rice, several times out of proportion to that commodity's GVA contribution. Instead of agricultural support policies specializing in expanding credit access and providing extension, scarce resources were allocated to fund high-cost activities such as provision of post-harvest 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 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 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)



As emphasized by David (1995), government support to agriculture is relatively low compared to other nearby Asian countries. 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 have relied primarily on short-term price and trade regulations, with minimal or no tangible positive impact. The use of scarce resources have instead, imposed heavy and unnecessary transaction costs on farmers. Francisco and Bordey (2009) added that the overlapping functions and roles of research and development institutions constrain the present research and development system.

Cabanilla and Velasco (2003) revealed that though there is limited room for expansion of agricultural land in the Philippines, there seem to be enough suitable rice lands to provide for the country's needs for the next 25 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 typhoon visits and lack of investment on infrastructure. The

Philippines is visited by an average of 19 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, with an annual average of only 6,332 cubic meter per capita of available water, as compared to 6,526 and 11,406 cubic meter 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, the rest are rainfed. According to Cabanilla (2006), agricultural growth was attributed to high world commodity prices, adoption of modern varieties, increased fertilizer use, and expansion of irrigation. The slowdown of agricultural performance on the other hand, was largely affected not only the depressed world prices during that time, but also the country's inability to cope up with technological advances necessary for the growth and development. Problems like land reform program, limited access of farmers to credit, and, conversion of agricultural lands to urban and industrial uses, further aggravated the situation.

Experts suggest how we can improve agricultural growth. One way is to promote use of agricultural resources and diversification of cropping systems (Lozada et al., 1999). Another is to create an environment for an efficient incentive and institutional structure of support service delivery 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 improvement in productivity 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).

International trade poses certain challenges to Philippine agriculture. 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. However, the capacity of developing countries like the Philippines to penetrate the world market is constricted by the heavy protection of the agricultural sector of developed countries. Tariffs are imposed that may lead to reduction in agricultural income. Aside from tariffs imposed on agricultural trade products, non-tariff measures prove to be another barrier for Philippine produce. Non-tariff measures limit the penetration of Philippine exports in the international market. Varying standards per country, that deviate from internationally accepted standards makes international trade more costly (Pasadilla and Liao 2007). Although the standards established by nations are 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.

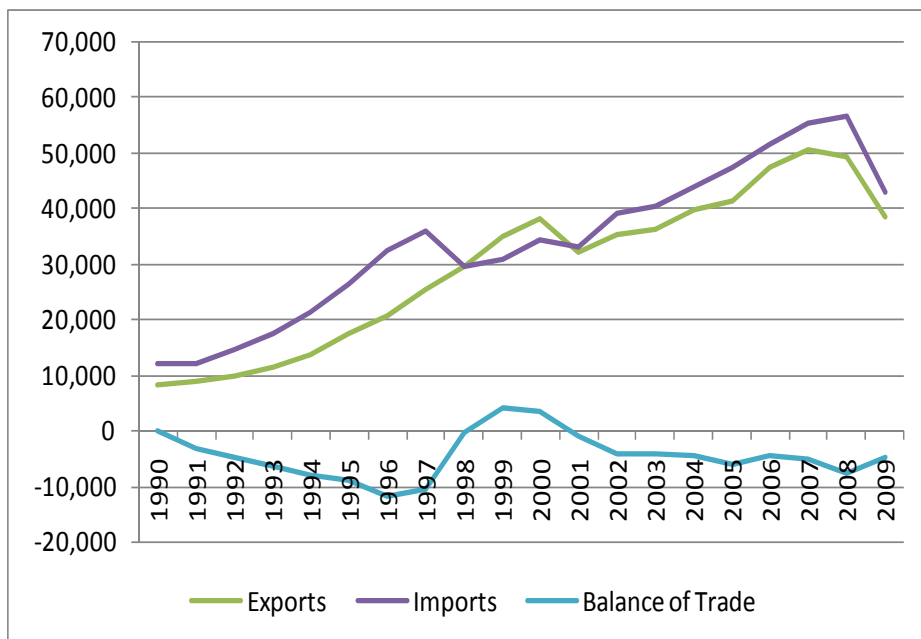
Indeed, there are many constraints faced by Philippine agriculture, both in the domestic and international scene. It is however, important to note that agricultural growth is a way to food security attainment, and international trade is an important development strategy for agricultural growth.

III. 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. As shown in Figure 6, the 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.¹ 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, poor physical and cognitive growth, and death) (Grebmer et al., 2010).

The GHI in the Philippines shows some improvement over the 1990 GHI, falling from 19 to 13 or by 30% (Table 5). The contribution of the proportion of underweight children under five in the GHI declined by 9.2 points, and the under-five mortality rate and the proportion of undernourished also improved, but the GHI remains serious.

Table 5. Data underlying the calculation of the 1990 and 2010 Global Hunger Indices

Country	Proportion of undernourished in the population (%)		Prevalence of underweight in children under five years (%)		Under five mortality rate (%)		GHI	
	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

Among the countries in Southeast Asia, Indonesia has the most number of undernourished people averaging to 27.8 million in 1990-2007 growing at 4.2% on average. This is followed by Vietnam, the Philippines and Myanmar with 15.2, 14.3 and 14.1 million undernourished people, respectively. While Vietnam ranked second with the most number of undernourished people, the rate of growth is reducing at 22.9%, which contributed to a remarkable reduction in its GHI score by more than 13 points (Table 5). Myanmar also performed well in terms of reducing the number of undernourished people from 44% in 1990-92 to 17% in 2004-06 (Table 5). The Philippines was also able to reduce the proportion of undernourished people 15% to in 2004-06 compared with 21% 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 food security status is the agricultural potential (food production per capita). In the Philippines, statistics showed that the country is generally improving its food security status in terms of food production per capita. In 1990-2006, FAO data showed that there is an increasing dietary energy supply (DES) averaging at

2,403 kcal/person/day. This has grown at 3.11% on average. DES indicates the food available for human consumption. On the other hand, over the same period, the average minimum dietary requirement posts at 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 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 at .45% while the mean per capita food consumption remained at steady level of 1,684 kcal/day.

Table 6. Food supply and consumption requirement in the Philippines, 1990-2007.

Supply and Consumption Indicator	1990-1992		1995-1997		2000-2002		2004-2006	
	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% of income to food items (NSO-FIES, 2009). Grains especially rice comprise majority of the food consumed in the country. As the prime staple food in the country, rice supply is politically and socially considered as a key indicator to gauge the level of food security in the Philippines. Hence, achieving food security is tantamount to rice self-sufficiency. In 2006, rice contributed 48% to the daily energy supply of Filipinos, which indicates the importance of rice in the meal (FAO, 2006). Production data in 1994-2009 showed that in general there is increasing trend in the volume of rice supply in the country with an average growth rate of 3.6%. Although the same trend is observed in terms of area planted and yield, growth rate is at dismal level of 1.8% and 1.6%, 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% 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. Then in 1998, production fell by 24.1% because of the El Niño phenomenon but this fall was easily recovered the following year when output increased by 37.8%. However, imports have increased in 1998 and since then, the Philippines has continued to import rice.

In addition to the country's production, the Philippines is constantly importing rice. From 1998 to 2006, the National Food Authority (NFA)'s rice imports accounted for about 15% of rice production (assuming 65.4% rice recovery from palay). This accounts for 10% 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 our local farmers (Figure 7). In 1994-2009, rice consumption averaged to about 9.9 million MT (IRRI, 2010) while local production is registered at 13.1 million MT (Table 8). Although this may imply surplus on rice, the seemingly lower consumption level may be attributed to gaps on distribution system and the poor purchasing power associated with low income and poverty. This may also be attributable to the Philippines' "hoarding" behaviour to maintain low domestic stocks of rice to protect itself against shortages (like what happened in 1998 because of the El Niño phenomenon) in the future and to calm down domestic price increases especially during food crisis.

Table 7. Annual production, area and yield of rice in the Philippines, 1994-2009.

Year	Rice Production (Paddy)		Rice Area Harvested Growth		Yield	
	Amount (mt)	Growth rate (%)	(ha)	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 Agriculture Statistics

*Note: (-) means
no data*

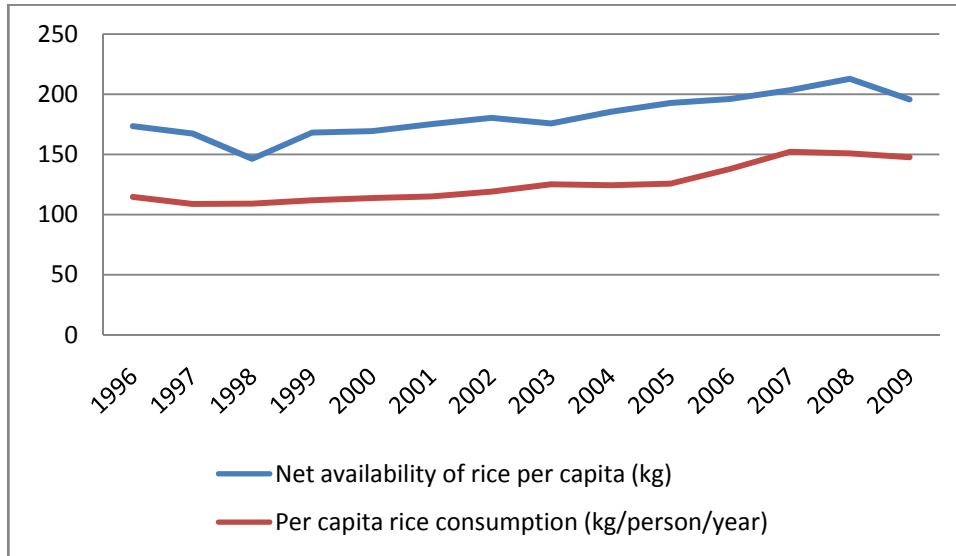
Table 8. Annual rice net availability and consumption of rice in the Philippines, 1994-2009

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 7. 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 issues on food security. The Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) considered 49 (63%) out of the 77 provinces in the country prone to varying levels of food insecurity (FIVIMS, 2010). The small area poverty estimates (SAPE) conducted by the 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 study, survey conducted by the SWS 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% of the country's food requirement and the source of the country's top agricultural exports, nonetheless it accounts for the most number of areas considered vulnerable to food insecurity due to poverty. NSCB identified 40 poorest municipalities in the Philippines, about 70% or 28 municipalities are found in Mindanao. This clearly suggests that availability of food is not sufficient condition to achieve food security. Economic accessibility as represented by income is 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 the 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

We calculate the following three indicators of food self-sufficiency using the FIES 2006 data: 1) home-produced food as share of all food consumed; 2) home-produced cereals as a share of all cereals consumed; and 3) home-produced rice as a share of all rice consumed;

And four measures of food security, namely: per capita real value of food consumption; non-staples as a share of food consumption; animal products as a share of food consumption; and 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. On average, rural households produce 15.2% of the cereals they consume (and buy the remaining 85%), and 15.3% of the rice they consume (Table 9). As expected, the urban figures are lower than the rural figures (except for the animal products and non-staples as share of food consumption), while the national averages lie between the two.

In addition, we consider the relationship between the self-sufficiency indicators and the food security indicators to the measure of general well-being measured in terms of 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 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 measured by the share of non-staples and the share of animal products. These households are perhaps those that live far from markets and roads and lack economic access to food such that they are not able to produce anything for the market and are forced to grow crops that they may not have comparative advantage in producing those crops.

Per capita expenditure is positively correlated with the measures of food security except with the number of months with sufficient food. Percent of household with sufficient food for six months are positively correlated with food-cereal-rice self-sufficiency indicators. The implication of these findings is that some households (particularly rural households) may be forced into food self-sufficiency by lack of market access, but encouraging household food self-sufficiency 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 6mos (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 non-staples 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 non-staples in food(%)	Share of animal products in food (%)	(%) Households with sufficient food for the past 6mos
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.

IV. Trends in Agricultural Exports

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

Agricultural exports accounted for 8.2% 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% lower than the 2008 record (Table 12). The most valuable agricultural export is coconut oil, followed by fresh banana, pineapple, and tuna. These top earners among agricultural exports have a combined share of 52% to total agricultural exports. Coconut oil was mostly shipped to United States and Netherlands, Japan (5%), Italy (4%), and China (3%) (Table 11). On the other hand, the major markets of banana fresh were Japan, Iran, South Korea (8%), Singapore (6%), and China (4%). Tuna went to United States, Germany and UK Great Britain and Ireland (12%), Japan (8%), and France (5%). Pineapple and pineapple products were mostly exported to United States and Japan, Singapore (6%), South Korea (5%), and Netherlands (4%). The composition of agricultural exports have shifted away from the traditional commodities like sugar, tobacco, abaca and forest products, in favour of bananas, pineapples, tuna, and other non-traditional export crops.

Table 11. Value of agricultural imports is higher than 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%), banana fresh (11%), tuna (11%), pineapple and products (8%)
Major markets:	
coconut oil:	USA (44%), Netherlands (35%)
banana fresh:	Japan (60%), Iran (12%)
tuna:	USA (28%), Germany (18%)
pineapple 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%), soyabean oil/cake meal (7%), milk and cream and products (6%)
Major suppliers:	
rice:	Vietnam (95%)
wheat and meslin :	USA (57%), Ukraine (23%)
soyabean 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 is 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	
Banana, Fresh	2199.32	2192.55	1664.05	
Tuna	73.93	108.24	105.25	
Pineapple & Pineapple Products	587.82	586.15	487.7	
Desiccated Coconut	130.72	142.66	116.42	
Tobacco Manufactured	17.68	20.01	17.24	
Seaweeds & Carageenan	26.18	26.25	24.08	
Unmanufactured Tobacco	18.9	23.64	30.09	
Milk and Cream & Products	35.94	37.96	26.61	
Fertilizer Manufactured	255.85	213.46	324.96	
Mango, fresh	26.34	20.84	20.38	
VALUE OF TOTAL AGRICULTURAL				

EXPORTS			
(FOB in million US \$)	3168.07	3889.3	3135.7
VALUE OF TOP EXPORTS (FOB in million US \$)			
Coconut Oil	733.81	1039.61	594.49
Banana, Fresh	396.28	405.56	344.43
Tuna	210.87	388.78	334.82
Pineapple & Pineapple Products	247.42	388.78	334.82
Desiccated Coconut	157.43	240.36	145.76
Tobacco Manufactured	97.89	125.26	109.36
Seaweeds & Carageenan	91.64	122.03	98.68
Unmanufactured Tobacco	42.98	63.03	96.85
Milk and Cream & Products	138.76	162.5	95.62
Fertilizer Manufactured	53.64	55.81	92.5
Mango, fresh	23.28	19.58	15.98

Source: NSO, 2010

In terms of imports, the country continues to be a net importer of rice and corn (since 1995 when the Philippines became a net food importer, same year that the Philippines acceded to the WTO). Agricultural imports accounted for 13.3% of the total value of Philippine imports in 2009 (Table 11). Agricultural import expenditures reached US\$ 6,079.80 million, which was 20.88% lower than the 2008 level (Tables 11 and 13). Rice, wheat, and meslin accounted for 31% of the total agricultural imports. The bulk or 95% of rice imports came from Vietnam while the major sources of wheat and meslin were United States and Ukraine (Table 11). Corn or maize displaced rubber on the 8th place in the list of major agricultural imports.

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

	2007	2008	2009 ^P
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 & Cream & 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 & Cream & 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

The rapid growth in the production of fruits and vegetables, and fish and livestock products contrasts with the relatively slow growth in cereals production. Part of the explanation is 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 banana, pineapple, mango, nuts, and seafoods. The rising demand for these high value commodities is transmitted to farmers in the form of remunerative prices. Will this motivate farmers to expand the area planted in these crops beyond what it would be without trade? We have comparative advantage in producing these high value commodities. We also have achieved self-sufficiency for these HVCs so expanding production for export market is promising (Table 14). If farmers divert land into export crop production, will they raise the price of agricultural commodities and contribute to food insecurity by reducing domestic crop production such as 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
2009 ^P	100.01	100	122.64	110.26	102.71	100.67	113.22	107.16

P – Preliminary

Source: BAS

This does not necessarily mean that the prices of these high value commodities (HVC) are higher than staples such as rice and corn. As shown in Table 15, the price of rice (palay) is currently higher than the price of pineapple, one of the top export crops. This could mean that the rising demand makes these high value crops more profitable. The table shows that the net returns are significantly higher for almost all commodities than for cereal crops. However, farmers usually do not select their crops solely based on the profit or net returns. They give high priority to meeting a certain proportion of their food needs first by growing paddy or corn for own consumption. For farmers who have enough land and a tolerance for a certain degree of risk, however, the profitability of high value commodities is attractive. The net returns per hectare from growing HVC like pineapple is appealing with a net profit-cost ratio of 2.1 (compared to palay with net profit-cost ration of 0.44 and cost per kg is 10.17 pesos).

Table 15. Cost and returns of growing rice and corn as opposed to export commodities

Commodities	2002	2009^P
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

Note: P - Preliminary data

Source: Data on costs of production and returns from Bureau of Agricultural Statistics, 2010.

To shed light to this question, let us make a distinction between farmers growing HVC and other farmers. For those growing HVC, the income earned from their sales would most likely allow them to purchase rice and other staples; otherwise, they would stop growing HVC. For those farmers who do not grow HVC, they may be adversely affected by the diversion of land into export crops, but the effect is likely to be small for the following reasons. First, any reduction in production of a staple crop such as rice would be compensated by higher imports so most likely the domestic price will not be affected. Second, the area planted with HVC is small. The area under all fruits and vegetables is only about 13% of the cropland under fruits and vegetables (Table 16), and only 7% of the total cropland. If we take the area allocated to banana and pineapple, the area planted is only about 5% of the total cropland. Exports account

for 20% of banana and pineapple production. Applying this percentage to the area under area banana and pineapple, the area used to produce the exported quantity is only 1.4%. In the absence of exports, increase in domestic supply would lower the price and so domestic demand would increase. Thus, expansion of export crop production will not displace cropland and will not have a significant effect on staple crop availability or prices.

Table 16. Share of Fruit and Vegetable Sub-Sector in Agricultural Output and Area

	Fruits and vegetables		Agricultural crops excl. rice & 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 in 2007-2008 emphasizes the volatility of prices in world markets, particularly in rice markets. Looking at the volatility of prices, we use two measures of volatility: the coefficient of variation and the average percentage change in annual prices², 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

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: $\sigma = (1/N) \sum (P_t - \mu)^2$ where μ is the mean price defined as: $(1/N) \sum P_t$, 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: $(100/(N-1)) \sum (P_t - P_{t-1})/P_{t-1}$ where P_t is the annual price in year t and N is the number of years of data.

measure of relative volatility, but it lacks a simple intuitive interpretation. The average percentage change is less commonly used, but is more easily understood.

One simple measure of the volatility in prices with imports is the historical volatility in rice prices. The world rice price increases that occurred in 2007-2008 heightened in April and May 2008 when the average price of rice reached over US\$ 1000/ton (for 5% broken Thai white rice) from an average of US\$ 330/ton in January-October 2007. The effect of the world price increases increased the domestic rice price by 22.9% that would lead to a reduction in average standard of living by 1.9% (Son, 2008). Son estimated that in 2007-2008, the increase in food prices (including rice) contributed to a decrease in the average standard of living by 9.4%. Rice farmers, in particular, were affected with the price increases in 2008, since they are also net consumers of rice and they have to purchase rice. Furthermore, poorer households are much more vulnerable with the increase in prices since they spend 18% of their total expenditure on rice, and 60% of their expenditure on food commodities. Despite strong food policy measures by the government, the effect of higher world price spikes did not fully transmit to domestic prices, food price inflation has surged to 9.6% (Timmer, 2008; Keats et. al., 2010).

One measure is to look at wholesale prices. As shown in Table 17, over 1990-2007, the CV of annual average wholesale prices has been 22%, with an average annual change of 2.7%, which is low. However, it could be argued that these do not represent rice price volatility under free trade because of policies by the Philippine government to stabilize rice prices, including the procurement and distribution activities of the National Food Authority.

Better measures of the volatility of rice prices on the world market are the prices of Thai A1 Super broken rice and Thai 100% B Second grade rice, widely used as benchmark rice prices in international markets. Over 1990-2007, the CV for these prices was 21% and 19%, respectively, indicating a level of volatility slightly lower than wholesale rice prices and roughly similar to producer prices. However, if we include year 2008-2009, the CV of both Thai prices increases substantially (40% and 41%, respectively). In addition, the average percentage change from one year to the next is quite low at 7.4% and 7% respectively (but if we take the average percentage change from one year to the next until 2008, the average percentage change is 18% and 17% respectively).

Table 171. Measures of actual rice price volatility under trade

	Time period	Mean	Coefficient of variation	Average percentage change
Producer price	1990-2007	207 \$/mt	21%	2.3%
Producer price	1990-2009	281 \$/mt	24%	3.5%
Wholesale price	1990-2007	424 \$/mt	22%	2.7%
Wholesale price	1990-2009	447 \$/mt	26%	4.3%
Thai A1 Super broken	1990-2007	193 \$/mt	21%	5.1%
Thai A1 Super broken	1990-2009	216 \$/mt	40%	7.4%

Thai 100% B Second grade	1990-2007	274 \$/mt	19%	2.1%
Thai 100% B Second grade	1990-2009	310 \$/mt	41%	7.0%

IV. 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 heavily invest in irrigation, farm-to-market roads and post-harvest facilities, seed subsidy on quality genetic materials well as in research and extension services, credit support (inputs), information services, production support, regulatory services, and policy and planning services. Irrigated land increased to 1.5 million ha in 2009 to boost 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 food security status reveal that the Philippines 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 we will continue to import rice because of 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 population growth rate.

We also looked at the relationship of 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 non-staples, 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 of agricultural exports on food security. In particular, we looked into whether expanding production high value crops (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 (mungo) than cereal crops (palay and corn). However, farmers usually do not select their crops solely based on the profit or net returns. They give high priority to meeting a certain proportion of their food needs first by growing paddy or corn for own consumption. For farmers who have enough land and a tolerance for a certain degree of risk, however, the profitability of high value commodities is attractive. The net returns per hectare from growing HVC like pineapple are appealing with a high net profit-cost ratio of 2.1. Finally, we found

that expansion of export crop production we will not displace cropland and will not have a significant effect on staple crop availability or on prices. Two main reasons, one is that the area planted with HVC is small with respect to total land under fruits and vegetables and more so, to total cropland. Second, reduction in production of a staple crop such as rice would be compensated by higher imports so most likely the domestic price will not be affected.

To summarize, agriculture plays 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 estimate the economic benefits and costs of agricultural exports on the welfare of producers and consumers. Promoting public investment in agriculture by making improvements in the 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
<i>Imports, million metric tons</i>												
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/ Former Soviet Union 2/	1.35	1.40	1.38	1.41	1.46	1.50	1.53	1.57	1.61	1.65	1.69	1.73
Other Europe	0.36	0.33	0.35	0.35	0.36	0.35	0.34	0.33	0.32	0.31	0.29	0.28
Bangladesh	0.10	0.10	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
China	0.60	0.70	0.75	0.81	0.87	0.94	1.00	1.07	1.13	1.20	1.27	1.34
Japan	0.33	0.35	0.40	0.40	0.43	0.46	0.49	0.52	0.55	0.58	0.63	0.67
South Korea	0.70	0.70	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68	0.68
Indonesia	0.26	0.30	0.36	0.38	0.40	0.42	0.44	0.44	0.44	0.44	0.44	0.44
Malaysia	0.25	0.30	0.42	0.40	0.50	0.60	0.72	0.89	0.96	1.03	1.08	1.15
Other Asia & Oceania	1.02	0.83	0.87	0.89	0.92	0.95	0.97	1.01	1.04	1.07	1.10	1.13
Iraq	2.52	2.56	2.28	2.34	2.37	2.39	2.42	2.47	2.51	2.57	2.63	2.68
Iran	1.00	1.10	1.08	1.09	1.12	1.16	1.19	1.22	1.25	1.28	1.31	1.34
Saudi Arabia	1.70	1.70	1.58	1.52	1.52	1.52	1.56	1.60	1.63	1.67	1.72	1.76
Other N. Africa & M. East	1.36	1.37	1.40	1.43	1.46	1.49	1.52	1.54	1.57	1.59	1.62	1.64
Sub-Saharan Africa	2.05	2.10	2.06	2.18	2.24	2.29	2.34	2.39	2.45	2.50	2.55	2.61
	6.53	6.68	6.70	6.89	7.08	7.30	7.50	7.73	7.96	8.19	8.41	8.65

3/												
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

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

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

3/ Excludes Republic of South Africa.

4/ Includes unaccounted.

The projections were completed in November 2009.

Source: USDA Agricultural Projections to 2019, 2010.

ⁱ The GHI ranks countries on a 100-point scale, with 0 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 2004–2006; data on child mortality are for 2008; and data on child malnutrition are for the latest year in the period 2003–2008 for which data are available. For more information, see von Grebmer et al. (2010).