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Impact of Food Inflation on Poverty in the Philippines

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Impact of food inflation on poverty in the Philippines

Abstract

We simulate the impact of actual food price increase between June 2006 and June 2008 on poverty across different areas and whether the household's main income source is agricultural activities. We explicitly treat heterogeneity in food price changes and the patterns of consumption and production by merging a expenditure survey dataset and a price dataset at the provincial level or lower. While the increase of head count index is larger for non-agricultural households than agricultural households, the opposite is true for the poverty gap and poverty severity measures, because poor agricultural households are particularly vulnerable to food inflation.

Key words: non-parametric regression, net consumption ratio, global food crisis, vulnerability
JEL Classification: E31, I32, O1

1. Introduction

The recent global food crisis has affected many, including the poor, across the globe. The FAO Food Price Index has increased from 124.7 in June 2006 to 224.1 in just two years. Following the financial crisis, the food price has dropped to as low as 141.2 in February 2009, but it has climbed up again rapidly. In February 2011, the index has reached 237.7 exceeding the pre-crisis peak level, indicating the crisis is far from over yet.

In the Philippines, many have been adversely affected by the food inflation. For example, it was reported that garbage scavengers in the impoverished Manila area of Tondo were increasingly looking for food to feed their families among rubbish (Cabrera, 2008). The overall impact of the inflation, however, is not obvious, because the increased food prices may benefit net sellers of food, some of who are poor. Hence, it is likely that the inflation of food prices has benefited at least some of the rural farmers whereas most of the urban poor have been adversely affected. Given that poor people often take inflation as one of the top concerns (Easterly and Fischer, 2001), understanding the heterogeneity of impacts of inflation is very important as different types of poor households would require different types of policies to cope with inflation. In this study, therefore, we simulate the extent of the heterogeneity of the impacts of inflation in the Philippines.

This study is different from the conventional poverty analysis, in which the treatment of price variations is often naïve at best. That is, the prices for a reference bundle of goods are calculated for various years, and they are normalized so that the base-year index is equal to unity. The nominal consumption is then deflated by this price index, and compared against the poverty line to calculate poverty statistics. Spatial price variations are also treated in a similar manner.

While this approach is straightforward, it is problematic especially when we are interested in how different segments of the population are affected by the food inflation. This is because the actual consumption bundle is heterogeneous across households, which in turn means the actual impact of price changes is also heterogeneous. Since the conventional approach often assumes away such heterogeneity, it is not useful when we want to identify the groups that are vulnerable to food inflation. In this paper, we explicitly incorporate the heterogeneity of consumption patterns into the analysis. We also incorporate the heterogeneity in food production patterns into the analysis to accurately reflect the vulnerability of households to food inflation. In addition, we use spatially disaggregated price data to reflect the spatial heterogeneity in food inflation.

We find that there is indeed a substantial difference in the impact of food inflation across households. In particular, the difference between agricultural households, or those households whose main income source is agricultural activities, and non-agricultural households is large. When we assume that the food inflation only affects the consumer price, the recent inflation between June 2006 and June 2008 would have increased the head count index by 9.3 and 6.1 percentage points for agricultural and non-agricultural households, respectively. However, the corresponding figures are 3.0 and 5.5 percentage points, respectively, once the positive effects of food inflation on agricultural income are taken into account. At the same time, however, this study also indicates that some poor agricultural households are severely affected by food inflation.

This paper is organized as follows: We provide a review of the poverty situation in the Philippines in Section 2. We then simulate the impact of inflation, which we discuss in Section 3. Section 4 provides some concluding remarks.

Table 1: Estimates of growth elasticity of poverty.

Data	Years	World	E. Asia	CHN	IDN	PHL	THA	VNM
Besley and Burgess (2003)	Varies by country (1980-1998)	-0.73 (0.24)	-1.06 (0.25)	-0.60 (0.14)	-1.12 (0.38)	-0.70 (0.12)	-1.72 (0.48)	
World Bank (2008)	1990-2000		-2.12 (0.42)	-1.20 (0.14)	-2.60 (0.74)	-1.85 (0.21)	-5.15 (0.46)	-2.13 (0.10)
World Bank (2008)	2000-2006		-2.19 (0.34)	-1.29 (0.07)	-1.85 (0.36)	-1.27 (0.45)	-4.55 (0.81)	-3.04 (0.18)

Source: authors' own calculation.Starndard error in the parentheses

2. Poverty in the Philippines

The Philippines witnessed the highest annual GDP growth in 31 years in 2007. With the annual GDP growth of 7.3 percent, the Philippines outperformed Indonesia, Malaysia and Thailand for the first time since 1998. While the Philippines were growing at a rate significantly lower than its neighbors in the early 1990s, it kept up with the healthy growth in the region in more recent years. Yet, the Philippines appear to have made only marginal gains in poverty reduction in recent years.

According to the estimates in World Bank (2008), the poverty rate using the international poverty line of one dollar per day per capita in purchasing power parity dropped from 13.5 percent in 2000 only to 13.4 percent in 2006 in the Philippines. In comparison, the proportion of people living under the same poverty line dropped during the same period from 15.4 percent to 7.7 percent in China, 9.9 percent to 8.5 percent in Indonesia, 5.2 percent to 1.8 percent in Thailand, and 15.2 percent to 4.9 percent in Vietnam. In these countries, the number of poor people also diminished. However, it increased in the Philippines because the population grew as much as 14 percent between 2000 and 2006—about three times higher than the regional average of East Asia and the Pacific—during the period of time when poverty rate declined very little.

Why is poverty not reducing while the economy is growing? To answer this question, we have estimated the growth elasticity of poverty using the method used by Besley and Burgess (2003). They constructed a data set from the World Development Indicators for the period between 1980 and 1998, and regressed the logarithmic head count index of dollar-a-day poverty on the real logarithmic per capita income. With country-level fixed effects, they estimated that the growth elasticity of poverty is -0.73 as replicated in Table 1. This result

indicates that one percent increase in per capita income is associated with 0.73 percent decrease in poverty. We have also run a regression for East Asia, and some individual countries in East Asia with at least four observations. The results show that the growth elasticity of poverty in the Philippines is lower than Indonesia and Thailand as well as the world average. On the other hand, the growth elasticity of poverty in China is even lower than that of the Philippines.

In order to look at more recent growth elasticity of poverty, we calculated the growth elasticity of poverty using the poverty and consumption data in World Bank (2008) for the periods of 1990-2000 and 2000-2006 as reported in Table 1. There are three points worth noting here. First, because we use consumption instead of income, the elasticity is higher in absolute value. Second, we confirm that the Philippines have a significantly lower growth elasticity of poverty in absolute value in comparison with its fast-growing neighbors, except for China. Third, the elasticity of poverty may have dropped in recent years, though we cannot conclude so statistically.

This is consistent with the observations made by other authors. For example, Ravallion (2001) estimated the growth elasticity of poverty reduction at 2.50, based on a regression of the proportionate change in the income or expenditure on the proportionate change in the dollar-a-day poverty rate using a sample of 47 developing countries in the 1980s and 1990s. The comparable figure for the provincial-level regression in the Philippines is 1.63 (Balisacan and Fuwa, 2004). While we cannot conclude that the growth elasticity in the Philippines is low as provincial-level growth is heterogeneous, this is indicative of the low responsiveness of poverty reduction to growth in the Philippines.

Why, then, have the fruits of the recent growth not been shared by the poor? A first step towards understanding it is to know who the poor is and how that has changed over time. We do so by analyzing the three rounds of the Family Income and Expenditure Survey (FIES) for 2000, 2003 and 2006, collected by the National Statistics Office (NSO) of the Philippines. We shall focus on poverty in the Philippines since 2000. This choice is made because we are primarily interested in the recent low responsiveness of poverty reduction to growth, and because there are a number of studies on poverty in the Philippines for earlier years based on various methods, including Asian Development Bank (2005), Balisacan (1995, 2000), Mangahas (1995), Mangahas and Guerrero (2002) and World Bank (2001a, 2001b, 2010).

FIES contains both income and consumption measures, both of which could be used as a measure of welfare. While consumption has several advantages over income, we shall take in this paper the income-based definition of poverty for 2006 as the point of reference in this report. This is because official statistics of poverty published by the National Statistical Coordination Board (NSCB) are based on income and they have already been widely used. Hence, providing poverty figures that are consistent with official poverty statistics facilitates the comparison of this study with numerous others.

The methodology used for setting the poverty line for official statistics has changed over time with two major changes in 1992 and 2003.[1] These changes resulted in lower poverty lines and thus a lower poverty incidence, and generated breaks in the comparability of poverty data. For instance, the 1992 revision brought down the original poverty estimate in 1985 from 59.0 percent to 44.2 percent while the 2003 revision revised poverty estimates in 2000 from 33.7 percent to 28.4 percent. Changes in methodology also changed the trend of poverty. The 2003 revision, for instance, revealed a 0.6 percentage point reduction in poverty among families between 1997 and 2000 while the old methodology shows a 1.9 percentage point increase in poverty. The refinement of methodology in 2003 also resulted in a lowered poverty incidence. Hence, a great caution needs to be exercised when interpreting and comparing official poverty estimates across time.

Besides changes in the methodology of computing poverty estimates, there have also been changes in the master sample design from which survey households are selected. Beginning July 2003, the NSO employed a new master sample design when conducting household surveys. The new master sample shifted the sample domains from urban and rural areas of each province to regions. Hence, the master sample is no longer representative at the level of urban and rural, or at the provincial level. While the NSCB reports provincial-level statistics, the users of the official statistics should keep it in their mind that they may not be very reliable at the level of urban and rural or at the provincial level. The statistics derived from FIES 2003 and 2006 in this report also suffer from the same problem.

[1] Asian Development Bank (2005) provides details on these changes.

Table 2: Poverty measures by area and household type in the Phlippines. All the numbers are expressed in percentage.

	Headcount index (P_0)			Poverty gap (P_1)			Poverty severity (P_2)			Poverty share			Population share		
	2000	2003	2006	2000	2003	2006	2000	2003	2006	2000	2003	2006	2000	2003	2006
Rural	44.6	44.4	45.9	13.9	14.4	14.6	5.9	6.3	6.2	73.1	72.7	70.8	50.6	50.9	50.7
Urban	16.9	17.3	19.5	4.5	4.7	5.4	1.8	1.8	2.2	26.9	27.3	29.2	49.4	49.1	49.3
Agricultural	61.6	63.1	65.4	20.4	22.0	22.6	8.9	10.1	10.2	53.1	53.6	50.2	26.6	26.4	25.3
Non-agricultural	19.8	19.6	21.9	5.3	5.1	5.8	2.0	2.0	2.2	46.9	46.4	49.8	73.4	73.6	74.7
Philippines	30.9	31.1	32.9	9.3	9.6	10.0	3.9	4.1	4.2	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors' estimates based on FIES 2000 (N=39,608), FIES 2003 (N=42,094) and FIES 2006 (N=38,483).

In addition to the issued above, we face an additional problem in adopting the official poverty statistics. That is, we are unable to reconstruct the official poverty figures because the NSCB only publishes the provincial-level poverty line for the final estimates, even though the official poverty lines for 2006 are defined at the level of urban and rural areas for each province. Hence, we set poverty lines for urban and rural areas in each province so as to be consistent with the provincial-level poverty line and to replicate the official estimates, details of which are reported in the appendix. While our provincial-level poverty lines and poverty estimates are very similar to the official ones (see appendix) and the difference is negligible for our purpose, readers should note that they are not identical. For comparing poverty between 2006 and earlier years, we have adjusted our poverty lines using consumer price index (CPI) at the provincial level, instead of using the official nominal poverty lines for earlier years. We do this because the underlying menu for drawing the poverty lines changes for each survey, making the official statistics not directly comparable across time.

Table 2 shows the overall poverty in the Philippines for 2000, 2003 and 2006. The head count index, poverty gap and poverty severity reported in the table are the Foster-Greer-Thorbecke (FGT) measure of poverty with parameter value of 0, 1, and 2 respectively (Foster, Greer and Thorbecke, 1984). According to our estimates, the poverty head count index has slightly increased between 2000 and 2003, even though the official estimates indicate that the poverty has dropped from 33.0 percent to 30.0 percent during the same time period. Between 2003 and 2006, both the official poverty estimate and our estimate increased. Both the official estimates and our estimates indicate that the number of poor people have increased between 2000 and 2006.

The poverty trends has quite different picture between urban and rural areas. In urban areas, poverty situation is getting worse since 2000 in all three measures of poverty we used. The picture in rural areas is strikingly different. In rural areas, the head count index has decreased between 2000 and 2003, and increased between 2003 and 2006, while the poverty severity

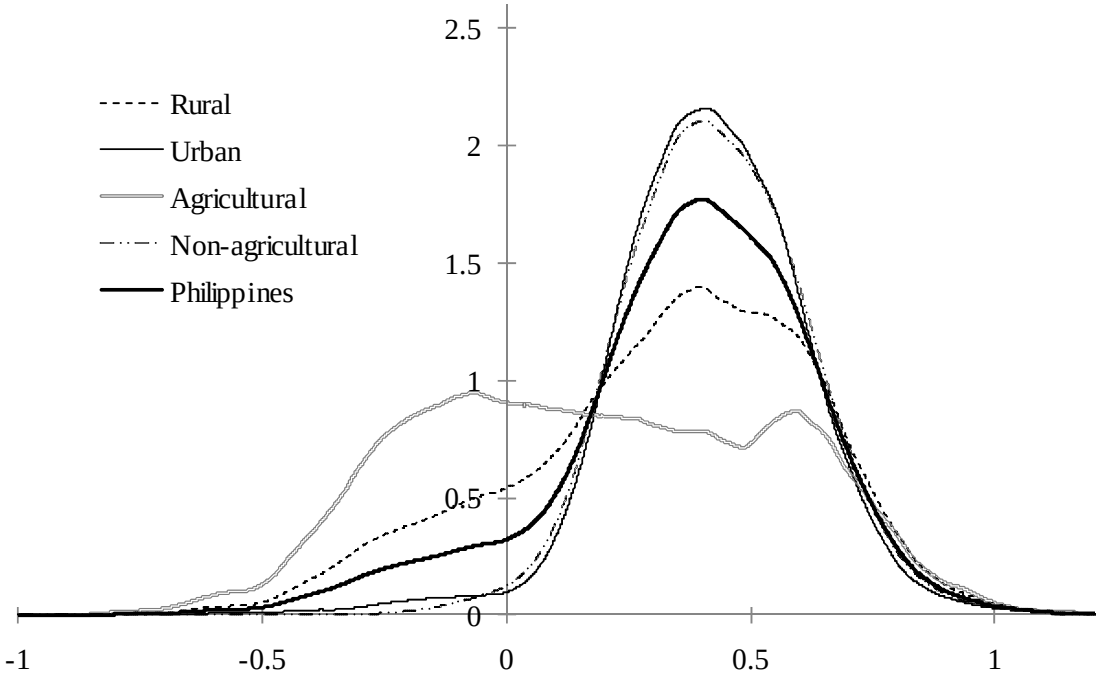

Figure 1: Net consumption ratio by area and household types.

first increased and then decreased. While the rural population share has not changed much, the poverty share has steadily decreased between 2000 and 2006.

Table 2 also shows the poverty statistics for agricultural and non-agricultural households. Here, agricultural households are defined as those households in which the total income earned from agricultural activities is greater than or equal to income earned from non-agricultural activities. While those living in agricultural households account for a quarter of the population, they account for half of the poor people. Table 2 shows that the poverty measures for agricultural households have worsened substantially since 2000 both in absolute terms and relative to non-agricultural households.

It can also be seen from Table2 that the poverty in the Philippines is deep. The average shortfall of income relative to the poverty line, which is given by the ratio of the poverty gap to the head count index, is about 30.4 percent in 2006. This measure is particularly high for agricultural households, exceeding one third. Even for the non-agricultural households, this measure exceeds one quarter. This means that there is a sizable gap between the household income and poverty line. This explains why the growth elasticity of poverty may be small in the Philippines.

Given that there are noticeable the differences in poverty changes between urban and rural areas as well as between agricultural and non-agricultural households, it is plausible that that the impacts of food inflation are heterogeneous across different types of households in different locations. In the next section, we investigate the impact of the inflation on poverty, highlighting the heterogeneity in the impacts across different groups of households.

3. Simulating the impact of food inflation on poverty

To evaluate the short-run impact of inflation, various authors have used the amount of money that is required to maintain the standards of living after the change, or its variant. Suppose that the consumption and production of good i for a certain household is q_i and y_i, respectively. When the price p_i for good i changes by Δp_i, the compensating variation, or the amount of money required to stay at the same level of welfare, is $\Delta p_i(q_i - y_i)$. The net consumption ratio $p_i(q_i - y_i)/x$, where x may be the total expenditure or income, is a useful measure of the vulnerability of the price changes in good i. When the net consumption ratio is negative [positive], the household benefits from the price increase [decrease]. These measures and their variants have been used to measure the changes in the level of welfare in various studies, including Deaton (1989), Budd (1993), and Barrett and Dorosh (1996).

In this study, we let x be the income and use the net consumption ratio to measure the vulnerability of individuals to food inflation. Because the definition of consumption goods and production goods are not identical, we use different categorizations for consumption and production. On the consumption side, the following seven items are used for q_i: (i) cereal, (ii) dairy and eggs, (iii) seafood, (iv) fruits and vegetables, (v) meat, (vi) other food, and (vii) beverages. On the production side, we have the following three components (net income sources) for y_i: (a) crop farming and gardening, (b) livestock and poultry raising, and (c) fishing.

Figure 1 shows the kernel density estimates of the net consumption ratios by urban/rural areas and the type of household (i.e., whether or not the main source of household income is

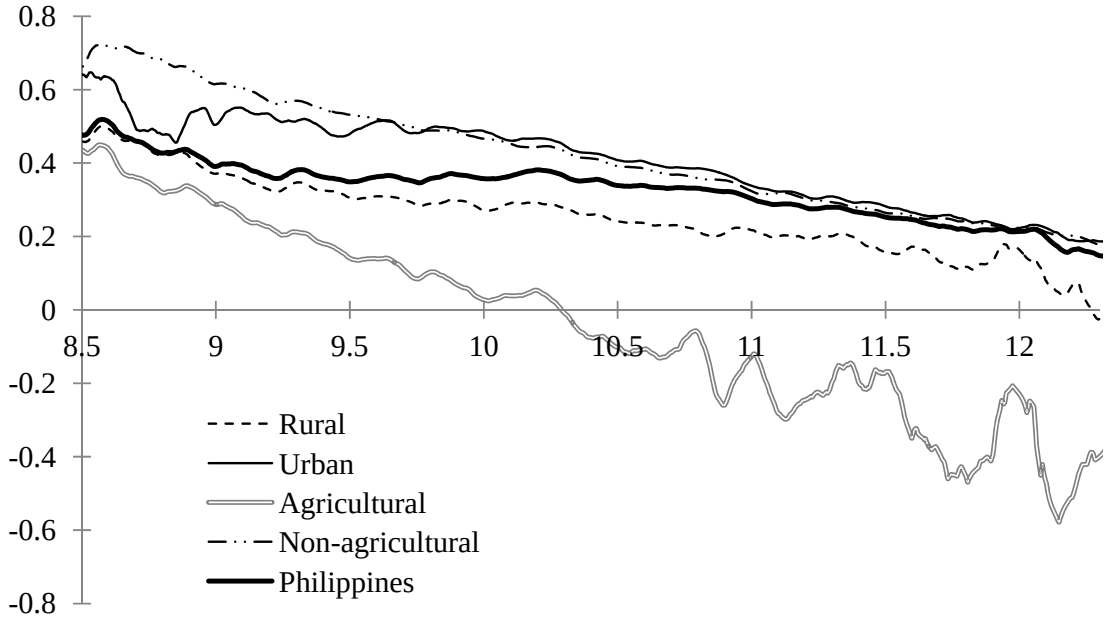

Figure 2: Net consumtpion ratio by logarithmic consumption per capita.

agricultural).[2] As can be seen from the graph, for the majority of households, the net consumption ratio of food is positive, which means that food price increase has a negative effect on their standards of living. In fact, only 10.3 percent of the people reside in a household with negative net consumption ratio in the Philippines. However, this proportion is considerably different between urban and rural areas. Only 2.7 percent of urban population have a negative net consumption ratio whereas the corresponding figure is 16.6 percent in rural areas. The difference is even more pronounced when we look at the difference in the net consumption ratio between agricultural and non-agricultural households, where agricultural households are those households which derive a majority of income from agricultural sources. The proportion of population with a negative net consumption ratio is only 1.3 percent for non-agricultural households, but the corresponding figure is 34.6 percent for agricultural households. These numbers have changed very little between 2003 and 2006.

While Figures 1 is useful for identifying the type of groups that may potentially benefit from the food inflation, it is not clear whether the poverty in the Philippines will increase or decrease as a result of inflation. This is because if the net consumption ratio is systematically negatively related to the level of income, the poor may be hurt by food inflation. Hence, we run a non-parametric regression of the net consumption ratio on the logarithmic income per

[2] Throughout this paper, we use Epanechnikov kernel with the bandwidth of 0.03 for kernel density estimation and non-parametric regressions.

capita. Figure 2 shows the estimated net consumption ratio by the areas and household types for different level of per capita consumption. Both tails are trimmed from the graph because the observations in the tails are scarce and estimates are not reliable.

As can be seen from Figure 2, rural households are less vulnerable to food price increases than urban households. Similarly, agricultural households are less vulnerable to non-agricultural households. However, among agricultural households, poorer households are more vulnerable than richer households. Among non-agricultural households, the net consumption ratio almost monotonically declines with the logarithmic income per capita. This indicates that poorer households are more vulnerable. When we aggregate both the agricultural and non-agricultural households, however, the net consumption ratio does not vary so much for the middle range of income distribution. There are two competing effects here. While the poorer households tend to be more vulnerable given the type of household (agricultural/non-agricultural), the agricultural households tend to be less vulnerable than non-agricultural households. Because agricultural households are on average poorer, the proportion of agricultural households is higher on the lower tail of income distribution. As a result of these two competing effects, the average net consumption ratio is fairly stable around the center of income distribution.

It should be noted that we implicitly assumed that the impacts of food inflation on agricultural wages is negligible. This is a reasonable assumption because the real farm wage increased only by 0.8 percent between 2006 and 2008 according to the Agricultural Labor Survey. If the agricultural wages had moved closely with the food inflation, however, the poor agricultural household would have been much less vulnerable to food inflation. When the agricultural wage earnings are included in the definition of agricultural income, 59.3 percent of the people in agricultural households have negative net consumption ratio of food. We have also drawn figures under this alternative assumption of agricultural income, which are reported in Figures 4 and 5 in the appendix. They clearly show that a majority of agricultural households have a negative net consumption ratio and even relatively poorer households of a negative consumption ratio on average.

The non-parametric regression results are useful for describing the profile of households that are likely to be vulnerable to inflation. However, it does not allow us to quantify the impact of inflation on the poor. The following two points are particularly important: First, the

Table 3: Impact of inflatio on poverty.

	(A) 5%, all prices			(B) 10%, all prices			(C) actual, cereal only			(D) actual, all food			(E) income effect + (D)		
	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2	P_0	P_1	P_2
Rural	3.3	1.7	0.9	6.5	3.5	2.0	5.5	3.8	2.5	8.8	5.9	3.8	5.2	3.4	2.2
Urban	2.2	0.8	0.4	4.5	1.6	0.8	2.7	1.3	0.7	5.0	2.3	1.2	4.5	2.0	1.1
Agricultural	3.6	2.2	1.4	6.6	4.6	2.9	6.3	5.5	3.9	9.3	8.4	5.9	3.0	3.6	2.6
Non-agricultural	2.5	0.9	0.4	5.1	1.9	0.9	3.4	1.6	0.8	6.1	2.7	1.4	5.5	2.4	1.3
Philippines	2.8	1.2	0.6	5.5	2.6	1.4	4.1	2.6	1.6	6.9	4.1	2.5	4.9	2.7	1.6

Source: Authors' estimates based on FIES 2006

magnitude of inflation may vary from place to place, especially in a country like the Philippines where domestic food market is relatively segmented because of the geography. To address this point, we merged the CPI data with the FIES data at the level of provinces and at the level of seven food items from (i) to (vii). For some provinces where we have price data for some of their cities, we used separate price data for urban and rural areas. Table 7 in the appendix provides the price changes between June 2006 and June 2008, which we used to simulate the impact on poverty. As Table 7 shows, the magnitude of food inflation indeed varies substantially across provinces. Therefore, it would be misleading to ignore the spatial heterogeneity of the food price changes.

Second, the pattern of consumption differs across households. Therefore, we also need to take into account the heterogeneous consumption patterns across households to simulate the impact of inflation on poverty. This point is important because the price of cereals, including rice, has gone up faster than other food items as shown in Table 7. As a result, the poorest of the poor may be most likely to be affected, because they spend a large share of expenditure in cereals.

To simulate the impact of food inflation across households, we consider the compensated income. When only the "price effects" are considered, the compensated income is given by $x - \sum_i \Delta p_i q_i$. When the "income effect" (i.e., the impact of food inflation on agricultural earnings) is also taken into account, the compensated income is given by $x_i - \sum_i \Delta p_i (q_i - y_i)$.

We need to make a few adjustments to incorporate the income effect, because we are unable to distinguish between some food items on the production side. For example, using the CPI weights, we aggregate the price changes for (i) cereals and (iv) fruits and vegetables to obtain the price change for (a) crop farming and gardening. Similarly, we aggregate consumption

items (ii) dairy and eggs and (v) meat for (b) livestock and poultry raising. For (c) fishing, we use the CPI change of (iii) seafood. We assume that agricultural households do not directly produce (vi) other food and (vii) beverages.

Notice here that we used the changes in the CPI to simulate the impacts on agricultural earnings. This exercise can be problematic if the consumer and producer prices do not move in a similar pattern. For example, if producer prices are fixed and only consumer prices go up, net sellers of food would also be negatively affected by food inflation. However, we do not have evidence that this was the case in the Philippines. The use of CPI has an additional advantage that the spatial coverage is complete.

Arguably more importantly, when farmers use some of their agricultural output for their own consumption, it is problematic to evaluate the impacts of food inflation separately for consumption and production with different price systems. This point is clearly seen by considering a completely self-sufficient household. For such a household, food inflation is clearly irrelevant. However, if we assume that the price changes for the production and consumption sides are different, the simulated impact may be positive [negative] if the producer price goes up faster [slower] than the consumer price. Because of these reasons, we chose to evaluate the changes in agricultural earnings with the CPI data.

In this study, we consider a total of five cases, Cases (A) to (E), to facilitate the comparisons. Out of these five cases, the income effect is ignored in first four cases. The first two cases serve as benchmark cases: (A) all prices go up by five percent and (B) all prices go up by ten percent. We then consider the effects of actual price changes between June 2006 and June 2008: (C) only the cereal price changes and (D) all the food price changes. Finally, we consider the case with the income effect: (E) all the food price changes and the income effect. Since Case (D) ignores the income effect, this may be thought of as giving an upper bound on the impacts of actual food inflation, whereas Case (E) may be considered our best guess of the impact of food inflation.

Table 3 shows the simulated impact of inflation on poverty for each of the five cases mentioned above. P_0, P_1, and P_2 refer to the head count index, the poverty gap and the poverty severity, respectively. The table shows, for example, that a five [ten] percent increase in all

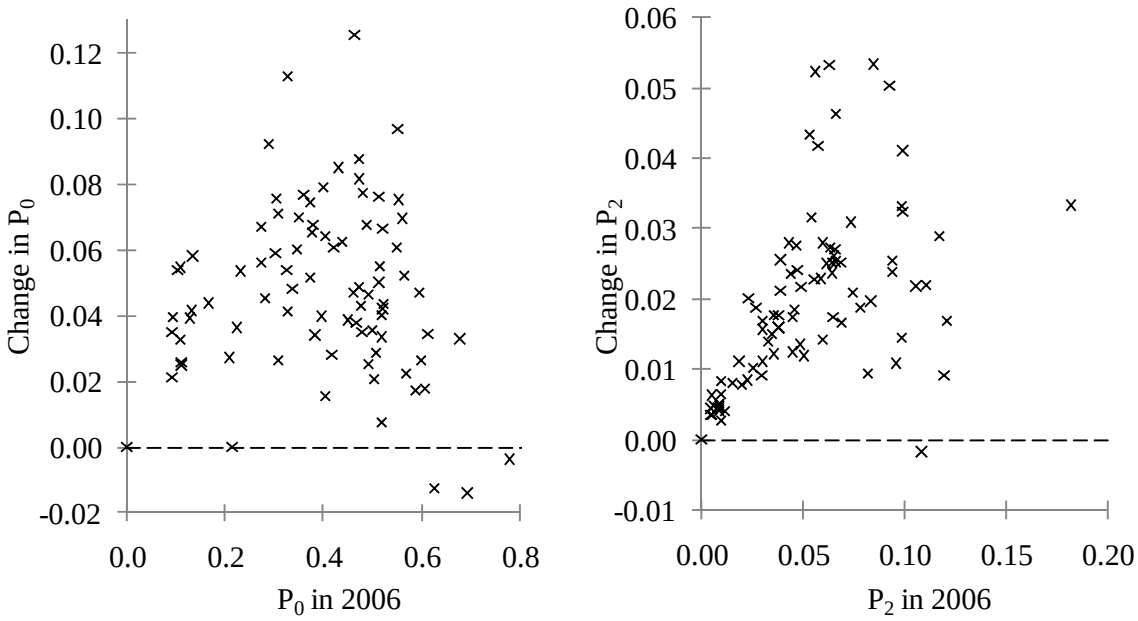

Figure 3. The initial level of the head count index (left) and poverty severity (right) and their changes due to the food inflation and income effects at the provincial level.

prices would lead to a 2.8 [5.5] percentage point increase in the head count index. The simulated impact shows that the impact of food inflation between June 2006 and June 2008 on poverty was sizable. The effect of increased cereal prices alone leads to the increase of head count index from 32.9 percent to 37.0(=32.9+4.1) percent. This impact is greater than the impact of a five percent increase in the general price level. When the effect of the increases in other food prices are taken into account, the resulting head count index is 39.8(=32.9+6.9) percent. Even when the income effect is taken into account, the head count index still increases by 4.9 percentage points in the Philippines, which is comparable to an increase of general price levels by 10 percent.

It can be seen from Table 3 that the impacts differ between urban and rural areas. In absolute terms, the impact on poverty is larger in rural areas, reflecting the fact that the proportion of people only slightly above the poverty line is larger in the rural areas. Table 3 also shows that the impacts differ between agricultural and non-agricultural households. In particular, the inclusion of the income effect makes a substantial difference. In Case (D) where the income effect is ignored, the impact of actual food inflation on the head count index is much larger for agricultural households than that for non-agricultural households. However, the increase in the head count index is actually smaller for agricultural households than that for non-

agricultural households once the income effect is taken into account as shown in Case (E). This is because there are a sizable proportion of poor or near-poor agricultural households that benefit from the food inflation through increased agricultural earnings.

It should be noted, however, that the increases in poverty gap and poverty severity measures for agricultural household in Case (E) is larger than that for non-agricultural households. This is because there are also very poor farmers, who are net buyers of food and negatively affected by the food inflation, especially by the inflation of cereals. This finding is consistent with Figure 2, which also show that the poor farmers are, on average, negatively affected by food inflation. They do not benefit from food inflation because agricultural wages did not go up at the time of food inflation

To further highlight this point, we have plotted the initial level of poverty in 2006 and its change due to the actual food price changes and income effects (Case (E)) for the head count index (P_0) and the poverty severity (P_2) at the provincial level in Figure 3. The figure shows that there is a considerable spatial heterogeneity in the impact of food inflation. It also shows that there is a strong positive correlation for the initial level P_2 and its change at the provincial level with a simple provincial-level correlation of 0.51.This means that when the poverty in the province is severe to begin with, the increases in poverty severity due to food inflation is larger. On the other hand, there is no such clear pattern for the head count index and the corresponding correlation is -0.04.

4. Concluding remarks

In this paper, we simulated the impact of recent inflation in 2008 on poverty in the Philippines. Our results show that the impact has been quite substantial. As far as we are aware of, this study is among the first to quantify the impacts of recent food inflation on various poverty measures in the Philippines. This study also contributes to the body of literature on the impact of recent food inflation, including Alem and Söderbom (2011), Cudjoe et al. (2010), de Janvry and Sadoulet (2010), Jongwanich and Park (2009), and Sabates-Wheeler and Devereux (2010).

We have also shown that the magnitude of the effects varies across locations and income levels. In particular, our results clearly show that the poor are particularly vulnerable to the

food inflation. Therefore, it is not sufficient to just look at the head count index of poverty because the poverty gap and poverty severity may substantially worsen even when the head count index is improving. Our study underscores the importance of carefully examining the impacts of food inflation to formulate effective anti-poverty programs, because they vary according to the location and income level, among other factors.

There is one caveat: we use the compensating variation measure to investigate the impact on poverty. It could be argued that this tends to exaggerate the impact of inflation because households are able to substitute between various food items and also substitute other goods with food. However, there are no close substitutes to food and substitution between food items is also limited among the poor because they have limited options to reduce the quality of food while maintaining the nutrient contents. Even if our estimates exaggerate the true change in poverty, our main finding is still valid: Poor agricultural households, especially those who derive incomes by agricultural wages, are particularly vulnerable to food inflation.

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Appendix

A.1. Adjustment of Poverty Lines

In order to adjust the poverty lines taking into account the difference between urban and rural areas, we have used the preliminary release of the official poverty line for urban and rural poverty lines. We have first drawn the “preliminary” poverty lines for urban and rural areas in each province to match the published official poverty rate at the provincial level, while keeping the ratio between urban and rural poverty lines fixed at the corresponding ratio for the preliminary release of official poverty lines. Because of the rounding errors, the national-level poverty estimate was slightly lower with these poverty lines. Hence, we have scaled up the poverty line so that the resulting poverty ratio at the national level coincides with the published official statistic.

Table 6 shows the official provincial-level poverty lines, the preliminary release of poverty line for urban and rural areas as well as the lines we used in this study. As the table shows, the provincial-level poverty line (poverty line for urban and rural areas weighted by the population) for this study is very close to the official poverty line. Further, the resulting poverty rates are very close to the official statistics, with the difference between official estimates and ours being within 1 percentage for all the provinces except for Camiguin, Aurora, Guimaras, and Cotabato City. In these four provinces, the number of observations are very small (at most 80), so that the difference is still relatively small compared with the standard errors associated with the estimates. Therefore, while our estimates and the official estimates are not identical, the difference is practically negligible for practical purposes.

Table 6: Poverty lines and head count index in official estimates and this study.

	Official PL	Official Preliminary PL			PL for This study			Head Count Index		
Province	Total	Urban	Rural	Total	Urban	Rural	Total	Official	This	Diff.
Abra	17900	.	17468	17468	.	17844	17844	60.7	60.7	0.0
Agusan del Norte	13986	14964	13059	13605	15495	13523	14088	40.0	40.1	-0.1
Agusan del Sur	14544	17358	13853	15085	17547	14004	15250	56.2	56.2	0.0
Aklan	15150	16980	13520	14288	18368	14625	15456	52.0	51.8	0.2
Albay	16128	17665	13915	15176	19435	15309	16697	46.2	46.2	0.0
Antique	14650	13776	12605	12786	15205	13913	14113	51.6	51.6	0.0
Basilan	13255	15712	13006	13589	15806	13084	13670	43.7	43.9	-0.2
Bataan	15538	16486	14270	15634	15795	13672	14979	10.5	10.3	0.2
Batanes	14970	.	15367	15367	.	14982	14982	0.0	0.0	0.0
Batangas	19616	18428	17222	17713	20381	19047	19590	30.7	30.7	0.0
Benguet	17483	17094	15661	16595	18759	17187	18212	11.1	11.1	0.0
Bohol	13610	13845	12317	12747	15056	13394	13862	46.9	46.7	0.2
Bukidnon	12186	14791	13223	13550	13214	11814	12106	37.2	37.3	-0.1
Bulacan	17768	17069	15844	16839	17936	16649	17694	13.4	13.5	-0.1
Cagayan	12928	14966	11575	12373	16322	12624	13494	23.1	23.1	0.0
Camarines Norte	14854	17704	13691	14673	17657	13654	14634	49.3	49.2	0.1
Camarines Sur	14634	17055	13017	13865	17419	13294	14161	49.9	49.9	0.0
Camiguin	16145	13676	15005	14625	12924	14180	13820	42.1	39.5	2.6
Capiz	14242	14372	12872	13102	15067	13495	13736	30.2	30.2	0.0
Catanduanes	13654	21980	13527	15145	22059	13576	15200	46.8	46.3	0.5
Cavite	18718	17293	18332	17364	18555	19670	18632	11.2	11.2	0.0
Cebu	13960	13927	11645	13189	15563	13013	14738	28.2	28.2	0.0
Davao	15753	17822	14992	16025	17700	14889	15915	44.8	44.9	-0.1
Davao de Sur	14452	17314	12732	15026	17802	13091	15449	27.4	27.4	0.0
Davao Oriental	13741	14932	12474	13137	15251	12740	13417	48.8	48.8	0.0
Eastern Samar	13873	13704	13257	13321	13684	13237	13302	51.9	51.9	0.0
Ifugao	15556	25240	15115	15815	25126	15047	15744	40.3	40.3	0.0
Ilocos Norte	16024	16869	14263	14899	18129	15328	16012	21.2	20.9	0.3
Ilocos Sur	16922	14940	14538	14634	17618	17144	17257	32.6	32.6	0.0
Iloilo	14810	13376	14157	13911	14334	15171	14907	30.4	30.4	0.0
Isabela	14124	15060	13079	13668	15547	13502	14110	30.7	30.9	-0.2
Kalinga	15031	17246	15237	15601	16002	14138	14475	51.9	51.9	0.0
La Union	16372	16714	15338	15610	17707	16249	16537	32.6	32.7	-0.1
Laguna	17724	16577	15194	16293	17880	16388	17574	13.2	13.1	0.1
Lanao del Norte	15225	16213	13944	14750	17874	15372	16261	52.2	52.0	0.2
Lanao del Sur	16567	16419	14983	15311	17540	16006	16356	58.5	58.8	-0.3
Leyte	13919	12923	12383	12532	14590	13980	14149	47.3	47.2	0.1
Maguindanao	15556	14955	14576	14620	15809	15408	15455	69.3	69.3	0.0
Manila	20868	19621	.	19621	20567	.	20567	11.0	11.0	0.0
Marinduque	14041	.	13395	13395	.	14044	14044	50.6	50.6	0.0
Masbate	14248	16402	14542	14845	15792	14001	14293	59.5	59.7	-0.2
Misamis Occidental	14555	15859	13073	14411	17110	14104	15547	56.3	56.5	-0.2
Misamis Oriental	14787	15076	12875	14233	16828	14371	15887	37.5	37.9	-0.4

Table 6: Poverty lines and head count index in official estimates and this study (cont'd).

	Official PL	Official Preliminary PL			PL for This study			Head Count Index		
Province	Total	Urban	Rural	Total	Urban	Rural	Total	Official	This	Diff.
Mountain Province	16785	15269	16591	16452	15340	16668	16528	50.4	50.4	0.0
Negros Occidental	13975	13532	14468	14086	13799	14754	14364	42.0	42.1	-0.1
Negros Oriental	12159	11777	11507	11570	12938	12641	12711	48.1	48.0	0.1
Cotabato	13315	15202	12671	12914	14785	12323	12560	34.6	34.6	0.0
Northern Samar	14275	20254	13932	15735	19980	13743	15522	61.1	61.3	-0.2
Nueva Ecija	17830	17572	15051	16172	19555	16749	17996	37.7	37.7	0.0
Nueva Vizcaya	14325	15870	12998	13645	16290	13342	14006	16.7	16.7	0.0
Occidental Mindoro	14219	15254	13431	14397	18002	15850	16990	57.0	56.8	0.2
Oriental Mindoro	16723	16735	15556	15827	17610	16369	16654	55.1	55.0	0.1
Palawan	13850	14018	12488	13043	15966	14223	14856	49.3	49.2	0.1
Pampanga	17243	17603	15261	16942	18798	16297	18092	10.8	10.8	0.0
Pangasinan	15656	15816	14879	15337	16178	15220	15688	35.0	35.0	0.0
Quezon	16125	17030	14854	15155	17371	15151	15459	47.7	47.9	-0.2
Quirino	14665	17451	13950	14966	17155	13713	14711	22.4	22.3	0.1
Rizal	17464	16552	16000	16501	16747	16188	16695	8.9	9.1	-0.2
Romblon	13832	14378	12162	12588	16033	13562	14038	51.7	51.4	0.3
Samar (Western)	13869	14168	13096	13156	13935	12880	12939	47.6	47.7	-0.1
Siquijor	12733	.	11226	11226	.	11296	11296	21.5	21.5	0.0
Sorsogon	15687	19056	13572	15296	20193	14382	16209	55.3	55.3	0.0
South Cotabato	15431	15530	13235	14332	16974	14465	15664	37.3	37.3	0.0
Southern Leyte	13998	.	12886	12886	.	13933	13933	36.0	36.0	0.0
Sultan Kudarat	13036	15934	12270	13011	16124	12416	13166	47.4	47.3	0.1
Sulu	15651	16525	13207	13736	18500	14785	15378	52.2	52.3	-0.1
Surigao del Norte	16961	17865	14451	15527	19991	16171	17375	60.2	60.0	0.2
Surigao del Sur	15264	16795	13533	14843	17530	14125	15492	55.1	55.1	0.0
Tarlac	16463	18198	14580	15987	18736	15011	16460	27.6	27.5	0.1
Tawi-tawi	14765	16473	13403	13917	17244	14031	14569	78.2	78.0	0.2
Zambales	16685	15904	13649	14863	17779	15258	16615	28.9	28.8	0.1
Zamboanga del Norte	13947	15108	12992	13354	16572	14251	14648	67.5	67.7	-0.2
Zamboanga del Sur	12741	16309	12851	13899	14703	11586	12530	33.8	33.8	0.0
NCR-2nd Dist.	20085	19041	.	19041	20073	.	20073	9.5	9.5	0.0
NCR-3rd Dist.	20908	18567	.	18567	20858	.	20858	12.8	12.8	0.0
NCR-4th Dist.	20582	19523	.	19523	20562	.	20562	9.2	9.2	0.0
Aurora	16275	15761	15319	15448	16039	15589	15720	36.8	32.8	4.0
Biliran	12028	12015	12501	12210	13209	13743	13424	42.2	41.8	0.4
Guimaras	14811	15837	15425	15516	15686	15278	15368	39.6	38.3	1.3
Sarangani	13746	16099	13044	13535	16491	13361	13864	52.0	52.0	0.0
Apayao	17837	17482	15712	15901	19393	17429	17638	63.1	62.6	0.5
Compostela Valley	15822	14787	13812	14031	16578	15485	15731	47.1	47.4	-0.3
Zamboanga Sibugay	12188	14731	11911	12580	14442	11677	12334	40.5	40.5	0.0
Isabela City	14115	17108	12148	13252	16794	11925	13009	51.9	51.4	0.5
Cotabato City	17335	15649	.	15649	17278	.	17278	44.1	43.0	1.1
Total	16058	16925	13753	15317	17993	14439	16191	32.9	32.9	0.0

A.2. Additional Tables and Figures

Table 7: The actual food inflation between June 2006 and June 2008. All the numbers are in percentage.

Province	Cereal		Dairy and eggs		Seafood		Fruits and veg.		Meat		Other food		Beverages	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Abra	.	36.3	.	12.8	.	5.7	.	1.7	.	9.2	.	5.5	.	8.1
Agusan del Norte	40.6	40.6	21.3	21.3	41.7	41.7	30.2	30.2	16.0	16.0	13.7	13.7	6.5	6.5
Agusan del Sur	64.1	64.1	19.7	19.7	17.0	17.0	18.2	18.2	21.1	21.1	23.6	23.6	8.1	8.1
Aklan	37.9	37.9	12.6	12.6	9.6	9.6	12.6	12.6	8.7	8.7	6.8	6.8	7.3	7.3
Albay	35.6	35.6	21.2	21.2	17.3	17.3	25.1	25.1	19.6	19.6	10.5	10.5	8.0	8.0
Antique	31.9	31.9	7.4	7.4	24.2	24.2	18.1	18.1	15.2	15.2	5.9	5.9	8.2	8.2
Basilan	50.7	50.7	38.9	38.9	9.8	9.8	2.8	2.8	16.4	16.4	26.6	26.6	10.5	10.5
Bataan	35.7	35.7	24.1	24.1	20.0	20.0	22.0	22.0	14.5	14.5	19.4	19.4	11.8	11.8
Batanes	.	21.9	.	17.6	.	10.5	.	0.6	.	1.4	.	12.9	.	2.8
Batangas	40.9	40.9	12.7	12.7	8.6	8.6	27.4	27.4	15.0	15.0	12.9	12.9	5.7	5.7
Benguet	31.3	21.7	36.7	20.3	7.9	-3.5	4.2	5.0	9.1	9.3	17.7	8.9	5.0	3.5
Bohol	27.5	27.5	15.3	15.3	18.2	18.2	10.7	10.7	5.7	5.7	12.7	12.7	3.7	3.7
Bukidnon	34.9	34.9	24.4	24.4	14.5	14.5	15.8	15.8	10.0	10.0	7.6	7.6	11.2	11.2
Bulacan	28.1	28.1	8.7	8.7	6.2	6.2	16.9	16.9	17.7	17.7	3.1	3.1	7.8	7.8
Cagayan	35.5	35.5	24.0	24.0	20.4	20.4	20.0	20.0	18.6	18.6	8.8	8.8	8.9	8.9
Camarines Norte	39.8	39.8	18.3	18.3	8.8	8.8	15.5	15.5	19.9	19.9	10.9	10.9	6.6	6.6
Camarines Sur	30.0	30.0	5.9	5.9	2.1	2.1	8.3	8.3	15.9	15.9	4.6	4.6	10.8	10.8
Camiguin	33.0	33.0	29.1	29.1	23.1	23.1	29.2	29.2	20.7	20.7	19.5	19.5	4.8	4.8
Capiz	32.9	32.9	15.1	15.1	13.9	13.9	12.8	12.8	6.9	6.9	10.7	10.7	6.2	6.2
Catanduanes	39.6	39.6	18.6	18.6	7.5	7.5	27.1	27.1	15.7	15.7	11.1	11.1	9.6	9.6
Cavite	28.5	28.5	19.0	19.0	12.5	12.5	11.9	11.9	15.3	15.3	6.1	6.1	6.4	6.4
Cebu	34.3	39.6	11.7	7.4	15.6	10.7	15.6	8.3	13.4	8.7	13.9	1.9	10.5	10.7
Davao	51.3	51.3	18.8	18.8	13.5	13.5	19.9	19.9	16.5	16.5	15.3	15.3	7.3	7.3
Davao de Sur	51.9	46.1	11.3	13.1	17.3	18.1	12.0	11.6	11.6	14.8	22.1	8.0	4.9	9.9
Davao Oriental	68.2	68.2	13.5	13.5	20.7	20.7	18.7	18.7	13.6	13.6	22.6	22.6	10.9	10.9
Eastern Samar	15.3	15.3	8.3	8.3	22.2	22.2	29.7	29.7	13.7	13.7	8.6	8.6	10.2	10.2
Ifugao	33.2	33.2	20.8	20.8	14.6	14.6	5.7	5.7	14.9	14.9	17.8	17.8	15.1	15.1
Ilocos Norte	46.1	46.1	14.1	14.1	3.6	3.6	8.5	8.5	4.3	4.3	5.9	5.9	4.6	4.6
Ilocos Sur	27.7	27.7	28.4	28.4	9.4	9.4	10.8	10.8	13.5	13.5	9.8	9.8	3.3	3.3
Iloilo	51.1	24.3	38.5	19.7	27.3	15.0	50.3	37.4	13.9	10.0	15.3	14.2	10.3	12.0
Isabela	27.9	27.9	11.3	11.3	3.1	3.1	5.3	5.3	9.1	9.1	4.2	4.2	11.7	11.7
Kalinga	35.8	35.8	9.7	9.7	1.6	1.6	12.3	12.3	7.4	7.4	17.3	17.3	4.9	4.9
La Union	26.6	26.6	29.3	29.3	30.6	30.6	28.8	28.8	13.4	13.4	6.8	6.8	5.2	5.2
Laguna	26.7	26.7	16.4	16.4	9.5	9.5	18.5	18.5	8.5	8.5	21.9	21.9	4.2	4.2
Lanao del Norte	54.0	54.0	21.5	21.5	20.2	20.2	26.4	26.4	11.7	11.7	12.6	12.6	6.9	6.9
Lanao del Sur	7.2	31.4	21.9	8.9	4.9	15.0	109.0	25.6	14.4	3.6	6.6	22.7	0.8	10.2
Leyte	32.3	32.3	15.7	15.7	16.2	16.2	22.0	22.0	15.6	15.6	11.8	11.8	10.0	10.0
Maguindanao	65.3	65.3	19.7	19.7	19.6	19.6	31.1	31.1	12.2	12.2	12.7	12.7	15.0	15.0
Manila	42.3	.	15.7	.	9.8	.	13.3	.	16.0	.	8.8	.	8.0	.
Marinduque	.	33.7	.	36.3	.	13.2	.	9.9	.	22.3	.	15.4	.	7.6
Masbate	36.7	36.7	18.5	18.5	14.3	14.3	9.5	9.5	18.1	18.1	2.6	2.6	7.6	7.6
Misamis Occidental	49.2	49.2	15.6	15.6	18.4	18.4	37.0	37.0	21.7	21.7	15.1	15.1	5.6	5.6
Misamis Oriental	41.1	37.3	15.8	20.4	13.0	30.9	15.1	27.6	16.4	17.3	15.3	9.0	1.7	7.0

Table 7: The actual food inflation between June 2006 and June 2008. All the numbers are in percentage. (cont'd)

Province	Cereal		Dairy and eggs		Seafood		Fruits and Veg.		Meat		Other food		Beverages	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Mountain Province	41.1	41.1	23.4	23.4	3.9	3.9	13.5	13.5	12.7	12.7	25.1	25.1	8.0	8.0
Negros Occidental	10.3	21.5	18.8	22.3	4.8	13.2	9.0	8.2	7.1	7.3	7.1	11.8	8.9	11.4
Negros Oriental	53.4	53.4	18.9	18.9	34.3	34.3	17.5	17.5	0.7	0.7	11.7	11.7	4.5	4.5
Cotabato	65.0	65.0	18.6	18.6	24.0	24.0	27.8	27.8	19.3	19.3	27.5	27.5	17.9	17.9
Northern Samar	39.7	39.7	21.1	21.1	18.1	18.1	27.9	27.9	9.1	9.1	16.7	16.7	9.5	9.5
Nueva Ecija	32.6	32.6	26.5	26.5	19.4	19.4	6.9	6.9	14.5	14.5	18.9	18.9	11.3	11.3
Nueva Vizcaya	41.8	41.8	27.0	27.0	20.0	20.0	26.4	26.4	14.5	14.5	17.1	17.1	9.5	9.5
Occidental Mindoro	37.5	37.5	12.2	12.2	12.7	12.7	4.6	4.6	11.0	11.0	7.3	7.3	5.9	5.9
Oriental Mindoro	49.9	49.9	17.3	17.3	19.1	19.1	22.8	22.8	18.0	18.0	10.0	10.0	8.2	8.2
Palawan	36.9	36.9	20.5	20.5	11.4	11.4	15.8	15.8	23.0	23.0	6.1	6.1	5.2	5.2
Pampanga	36.3	36.3	19.2	19.2	9.2	9.2	7.2	7.2	15.4	15.4	7.1	7.1	18.6	18.6
Pangasinan	35.0	35.0	13.9	13.9	9.2	9.2	13.0	13.0	13.4	13.4	11.0	11.0	7.9	7.9
Quezon	29.9	29.9	11.2	11.2	11.3	11.3	4.0	4.0	15.6	15.6	6.5	6.5	4.1	4.1
Quirino	27.2	27.2	24.6	24.6	-0.1	-0.1	9.8	9.8	9.3	9.3	19.0	19.0	6.3	6.3
Rizal	36.1	36.1	26.9	26.9	14.9	14.9	8.2	8.2	16.1	16.1	8.6	8.6	9.2	9.2
Romblon	26.9	26.9	15.6	15.6	11.0	11.0	9.4	9.4	7.9	7.9	9.2	9.2	5.2	5.2
Samar (Western)	42.0	42.0	12.4	12.4	24.2	24.2	19.8	19.8	11.3	11.3	19.3	19.3	10.3	10.3
Siquijor	.	26.4	.	11.3	.	6.3	.	25.9	.	5.3	.	13.6	.	10.8
Sorsogon	33.5	33.5	30.6	30.6	16.3	16.3	28.2	28.2	20.7	20.7	4.5	4.5	6.5	6.5
South Cotabato	51.8	50.6	17.4	23.8	14.2	10.1	27.3	4.7	12.9	11.7	8.3	8.7	12.2	13.8
Southern Leyte	.	32.2	.	8.9	.	21.5	.	13.5	.	13.3	.	9.0	.	9.3
Sultan Kudarat	81.6	81.6	18.3	18.3	21.5	21.5	29.5	29.5	14.1	14.1	20.9	20.9	8.9	8.9
Sulu	52.8	52.8	15.3	15.3	7.3	7.3	11.2	11.2	7.9	7.9	16.5	16.5	8.2	8.2
Surigao del Norte	19.0	19.0	14.0	14.0	21.7	21.7	11.0	11.0	7.7	7.7	4.9	4.9	7.0	7.0
Surigao del Sur	68.9	68.9	14.4	14.4	22.4	22.4	21.7	21.7	15.1	15.1	14.7	14.7	14.3	14.3
Tarlac	44.2	44.2	22.6	22.6	13.7	13.7	32.9	32.9	24.4	24.4	14.5	14.5	19.6	19.6
Tawi-tawi	38.5	38.5	27.0	27.0	25.9	25.9	16.9	16.9	8.2	8.2	9.8	9.8	4.7	4.7
Zambales	30.3	38.2	19.7	24.6	18.0	13.3	15.1	21.1	15.0	11.7	38.2	9.2	7.2	6.7
Zamboanga del Norte	39.9	39.9	23.3	23.3	7.9	7.9	11.6	11.6	10.1	10.1	25.9	25.9	9.7	9.7
Zamboanga del Sur	33.2	41.7	21.4	27.1	18.5	40.6	29.0	27.6	10.8	13.6	9.2	10.7	4.8	14.1
NCR-2nd Dist.	42.3	.	15.7	.	9.8	.	13.3	.	16.0	.	8.8	.	8.0	.
NCR-3rd Dist.	42.3	.	15.7	.	9.8	.	13.3	.	16.0	.	8.8	.	8.0	.
NCR-4th Dist.	42.3	.	15.7	.	9.8	.	13.3	.	16.0	.	8.8	.	8.0	.
Aurora	20.7	20.7	26.0	26.0	6.4	6.4	15.1	15.1	4.9	4.9	8.4	8.4	11.1	11.1
Biliran	29.7	29.7	9.7	9.7	17.6	17.6	13.2	13.2	13.6	13.6	16.7	16.7	8.3	8.3
Guimaras	26.3	26.3	12.9	12.9	25.3	25.3	30.0	30.0	14.6	14.6	8.9	8.9	8.0	8.0
Sarangani	62.9	62.9	12.0	12.0	13.0	13.0	13.0	13.0	22.2	22.2	11.2	11.2	10.1	10.1
Apayao	31.5	31.5	5.2	5.2	7.4	7.4	4.9	4.9	16.3	16.3	6.8	6.8	5.1	5.1
Compostela Valley	51.3	51.3	18.8	18.8	13.5	13.5	19.9	19.9	16.5	16.5	15.3	15.3	7.3	7.3
Zamboanga Sibugay	41.7	41.7	27.1	27.1	40.6	40.6	27.6	27.6	13.6	13.6	10.7	10.7	14.1	14.1
Isabela City	50.7	50.7	38.9	38.9	9.8	9.8	2.8	2.8	16.4	16.4	26.6	26.6	10.5	10.5
Cotabato City	56.3	.	13.4	.	16.2	.	35.4	.	8.1	.	7.7	.	8.2	.

Source: The author's calculation based on the Consumer Price Index.

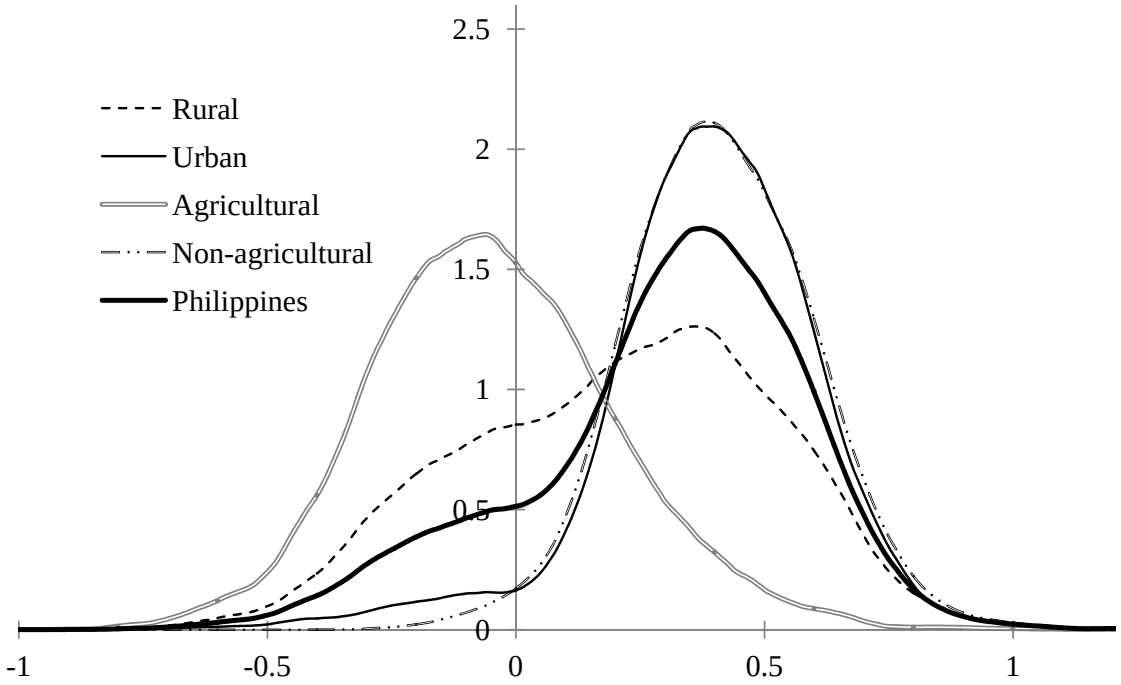

Figure 4: Net consumption ratio by area and household types under alternative definition of agricultural income.

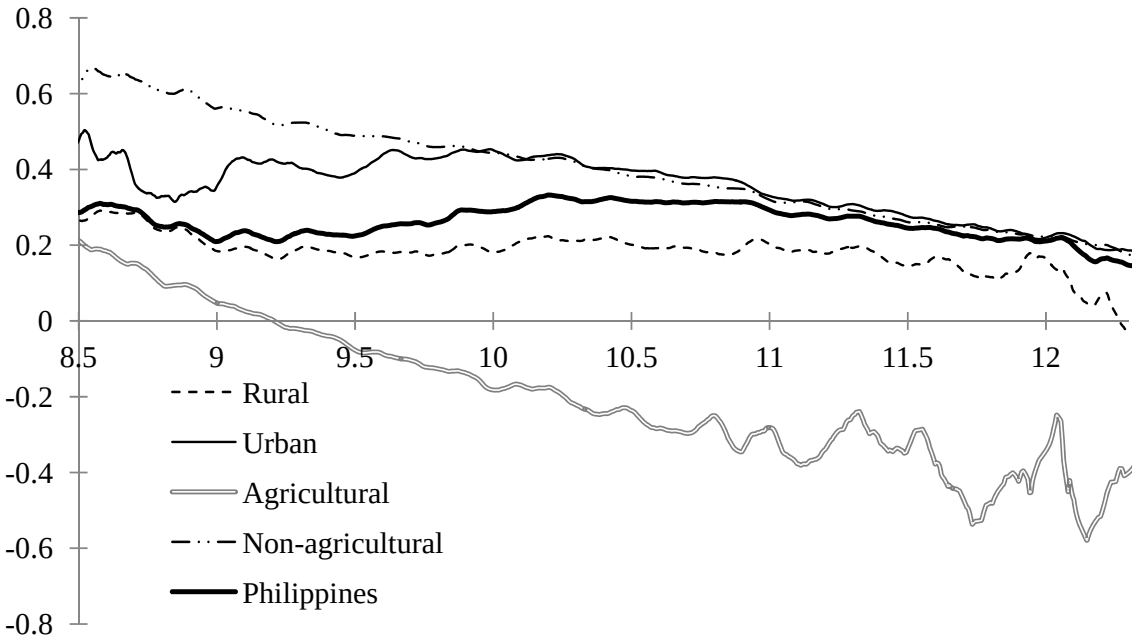

Figure 5: Net consumtpion ratio by logarithmic consumption per capita under alternative definition of agricultural income.