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Impacts of Rising Food Prices on Poverty and Welfare
in Vietnam

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IMPACTS OF RISING FOOD PRICES ON POVERTY AND WELFARE IN VIETNAM

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Abstract

This paper examines the impacts of rising food prices on poverty and welfare in Vietnam. Increases in food prices raise the real incomes of those selling food, but reduce the welfare of net food purchasers. Overall, the net impact of higher food prices on an average Vietnamese household's welfare is positive. However, the benefits and costs are not spread evenly across the population. A majority of the population would be worse off from increases in food prices. More specifically, a uniform increase in both food consumer and producer prices would reduce the welfare of 56 percent of Vietnamese households. Similarly, a uniform increase in the price of rice would reduce the welfare of about 54 percent of rural households and about 92 percent of urban households. The reason why average household welfare increases is that the average welfare loss of the households whose welfare declines (net purchasers) is smaller than the average welfare gain of the households whose welfare increases (net sellers). A relatively small increase in food prices reduces poverty rate slightly because poorer households in Vietnam tend to be net sellers. However, a large food price increase, for example a 50 percent increase, may increase the poverty rate.

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1. Introduction

Price data from Vietnam show that prices in that country have fluctuated around a rising inflation rate since 2000. More recently, inflationary forces intensified in 2007; the rate of inflation increased from 6.6 percent in 2006 to 12.6 percent in 2007

[1]. Even more worrisome is that official price statistics show that food prices are increasing much more rapidly than non-food prices. Food prices increased by 18.9 percent in 2007, and by 32.7 percent from January to September, 2008, higher than the general price index of 12.6 percent in 2007 and 21.9 percent in the first nine months of 2008.

A key policy issue for Vietnam is the impact of these changes in food prices on household welfare and poverty in that country. The impacts of higher food prices on welfare are strongly influenced by the patterns of household incomes and expenditures. Theoretically, higher food prices almost always have negative impacts on urban households because they are net purchasers of food. In contrast, the impacts on rural households are indeterminate. In rural areas, majority of households are both producers and consumers of food, so the net effect will depend on whether the household is a net purchaser or a net seller. Of particular interest is the impact of food prices on poverty. Clearly, the effect of increased food prices on poverty is determined by the location of net buyers and net sellers of food in the distribution of income, which may be very different in rural and urban areas. The existing literature gives mixed results. Ivanic and Martin (2008) examine the impacts of higher prices of staple foods on poverty in nine low-income countries. They show that increased food prices will lead to poverty increases in most of their surveyed countries. Deaton (1989) used non parametric techniques to study the effect of a hypothetical change in rice prices on the distribution of income in Thailand. He found that higher rice prices benefit rural households at all levels of income, especially middle- income rural households. Barret and Dorosh (1996) also used non-parametric techniques to examine the effect of an increase in rice prices on household welfare in Madagascar. They found negative impacts on the rural poor because the gains to net rice sellers were concentrated among the higher income rice farmers. Ravallion and Van de Walle

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[1] These inflation rates are price changes from December of the previous year to December of the current year.

(1991) estimated the impact on poverty of food price increases in Indonesia. They found that a 10 percent increase in the price of food increased the rate of poverty.

Several studies have examined the effect of food prices on household welfare and poverty in Vietnam. Using the 1993 Vietnamese Living Standards Survey (VLSS 1993), Minot and Goletti (2000) estimated that a 10 percent increase in the price of rice would lead to an average increase in household real income, since most Vietnamese households cultivated rice. However, they also found that such an increase in the price of rice would lead to a slight increase in the poverty rate. Using Vietnamese household surveys conducted in 1998 and 2004, Ivanic and Martin (2008) find that an increase in commodity prices, particularly in rice prices, reduces poverty in both 1998 and 2004.

The purpose of this paper is to analyze the impact of food prices on welfare and poverty in Vietnam, using the 2006 Vietnamese Household Living Standards Survey (VHLSS 2006), a national survey of about 9200 households that was conducted in 2006[2]. The structure of the paper is as follows. Section 2 describes the methods used and the data. Section 3 analyzes food production and consumption in Vietnam. Section 4 presents estimates of the impacts from a change in the price of food commodities in general, and of rice in particular, on Vietnamese households' welfare and poverty. The analysis pays particular attention to the impacts of rice prices, because rice is the most important food for Vietnamese households. In particular, rice is consumed in 99.9 percent of and produced by more than half of all Vietnamese households. Section 5 concludes the paper.

2. Methods and Data

This section presents the methods used in this paper to estimate the short-term effect of increased food prices on household welfare. It is useful at this stage to distinguish between food consumption and food purchases and between food production and food sales. In many developing countries, self-produced food constitutes an important proportion of both food production and food consumption. After harvest, many households consume part of the food crops they produce, selling the rest. They also purchase some food items to supplant the

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[2] The total sample size for the 2006 VHLSS was about 45,000 households, but of these only about 9200 completes the questionnaire that include detailed questions on consumption expenditures, which are used in this paper to measure household welfare.

consumption from their own production. Therefore, there are significant differences between total food production and food sales and between food consumption and food purchases. This is especially true for rice, which is both produced and consumed by a majority of farming households in Vietnam.

In order to assess the impact of changes in food prices on household welfare, one must assess changes in households' real expenditure brought about by those food price changes. This implies that household food sales and food purchases are the main interest in this paper, rather than household food production and consumption. More specifically, the most important variable for assessing changes in household welfare is a household's *net* food sales, which is defined as food sales minus food purchases.

To assess the impact of changes in food prices on household welfare, this paper uses a simple methodology first used by Deaton (1989). The impact of price changes on household welfare is estimated by the compensating variation, i.e. the amount of money needed to keep the household's utility level equal to its previous level of utility before the increase in food prices. One can use a household profit function to represent a household's production activities, and a indirect utility function to characterize its level of welfare. When food prices increase, the (implicit) profits increase for a household that produces any amount of food. Yet to maintain its previous utility level, the household must also increase its spending on food. The welfare change of the household is calculated as the increase in the household's profits minus the change in expenditure level needed to maintain its previous level of utility in response to a change in food prices. The welfare change can be expressed as a percentage of household real expenditure. This paper considers two kinds of impacts of food prices on household welfare. The first is the immediate impact. The second is the short-run impact, which allows for quantity responses on the consumer side, such as by switching among food items if their prices do not change at the same rates. However, responses from the producer side, such as increasing production or changes in the prices of supply inputs, are ignored. Although these changes can play an important role, they are relatively complicated and so are beyond the scope of this paper.

Following Deaton (1989), the paper uses the indirect utility function to express household welfare (utility)

$$U_h = \varphi(\omega T + b + \pi; p_c) \qquad (6.1)$$

U_h is the utility of household h, which is a function of (total) income and a vector of prices of all goods purchased p_c; ω is the wage rate, T is the total time available to all household members, b is non-labor income, and π is the household's profit from its agricultural or non-agricultural household business.

The profit in equation (6.1) is, by standard economic theory, a function of the prices of both the inputs used and the outputs produced by the household's production activities. A standard property of the profit function is that small changes in prices of commodities produced by the household change profits in proportion to the amount sold:

$$\Delta\pi = y_i \Delta p_{pi} \text{ which implies } \Delta\pi/\Delta p_{pi} = y_i \qquad (2)$$

where p_{pi} is the producer's price and y_i is the amount of commodity i sold by the household. The expression in equation (2) is the immediate change in profit for a one unit change in the price of the output y_i. The intuition is very simple. If the household is currently producing y kilograms of food, for example, a one thousand *Dong* (VND) increase in the price of rice will increase that household's profits by y thousand *Dongs*[3].

Next, consider what happens to profits from a change in the price of purchased goods.

$$\Delta\pi/\Delta p_{ci} = \Delta\pi/\Delta p_{pi} \times \Delta p_{ci}/\Delta p_{pi} = y_i \Delta p_{ci}/\Delta p_{pi} \qquad (3)$$

The fraction $\Delta p_{ci}/\Delta p_{ci}$ represents the relative change of consumer's price to producer's price. Many authors (for example, Deaton 1989) assume that $\Delta p_{ci}/\Delta p_{ci}$ equals to unity. However $\Delta p_{ci}/\Delta p_{ci}$ can differ from unity in certain circumstances, for example if the government uses price controls in the consumer market and/or the producer market. Thus, when examining data from any country, a one-to-one change in consumer and producer prices must be checked, and not simply assumed.

Roy's identity implies that

$$q_i = -(\Delta\varphi/\Delta p_{ci})/(\Delta\varphi/\Delta b) \qquad (4)$$

where q_i is the household's (gross) purchase of commodity i

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[3] In 2008, one U.S. dollar was equal to about 16,000 Vietnamese Dong at the official exchange rate, so in practice in Vietnam, a small change in a price is often considered to be a change of 1000 dong.

Making the standard assumption that the household maximizes its utility yields the following first order condition, which shows the impact of an increase in consumer's price of good i on household utility.

$$\frac{\Delta U_i}{\Delta p_{ci}} = \frac{\Delta \varphi}{\Delta b} \times \frac{\Delta \pi}{\Delta p_{ci}} + \frac{\Delta \varphi}{\Delta p_{ci}} = \frac{\Delta \varphi}{\Delta b}\left(\frac{\Delta \pi}{\Delta p_{ci}} - q_i\right) = \frac{\Delta \varphi}{\Delta b}\frac{(y_i \Delta p_{pi} - q_i \Delta p_{ci})}{\Delta p_{ci}} \qquad (5)$$

where the second equality is obtained using equation (4). Equation (5) implies that, if p_{ci} increases, utility can remain unchanged only if the household has a change in income, denoted by ΔB_i, sufficient to maintain its previous level of welfare (i.e. to keep its utility constant).

Therefore, equation (5) indicates that the change of total welfare to maintain previous utility from a change in the prices of n goods:

$$\Delta B = \Delta C - \Delta Y = \sum_{i=1}^{n}(q_i \Delta p_{ci} - y_i \Delta p_{pi}) = \sum_{i=1}^{n}(p_{ci}q_i \Delta \ln p_{ci} - p_{pi}y_i \Delta \ln p_{pi}) \quad (6)$$

in which ΔC is the change in expenditure and ΔY the change in production value brought about by changes in food price. The second equality in this expression is very intuitive. The amount of money needed to compensate for a change in the consumer price of good i and in the producer price of good i is the difference between the change in the money needed to maintain its initial consumption of that good minus the change in the value of the production. Summing over i goods, we have the equation (6)

And if we represent the change in income (ΔB) as a fraction of household expenditure (X), we have the net welfare change:

$$\Delta lnB = \sum_{i=1}^{n}\left(w_i \Delta ln p_{ci} - \left(\frac{p_{pi}y_i}{X}\right)\Delta \ln p_{pi}\right) \qquad (7)$$

where w_i is the budget share of commodity i and ($p_{pi}\ y_i\ /X$) is the sales of i as a fraction of total household expenditures. In our estimation, w_i is the share of purchasing values of food item i, excluding consumption from own production.

Equation (7) is similar to the result in Deaton (1989) but it is more flexible since it allows the change in purchasing price to differ from the change in the selling price.

However, equation (7) measures only the immediate effect from price changes. The cost of attaining the same level of utility will be lower if households can substitute away from

goods whose prices have risen disproportionately. We call this impact the short-run impact. A second-order Taylor series expansion for the expenditure equation that allows for substitution behavior will have the following form for expenditure change:

$$\Delta C = \sum_{i=1}^{n} q_i \Delta p_{ci} + \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} s_{ij}\, \Delta p_{ci}\Delta p_{cj} \tag{8}$$

where s_{ij} is the Slutsky derivative[4].

Equation (8) can be reformulated in terms of budget shares and proportional price changes, after some algebraic manipulation[5]:

$$\Delta lnC = \sum_{i=1}^{n} w_i \Delta lnp_{ci} + \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} w_i\varepsilon_{ij}\, \Delta \ln p_{ci}\, \Delta \ln p_{cj} \tag{9}$$

where ε_{ij} is the compensated price elasticity of good i with respect to the price of good j.

Thus, from (6) and (9) the short-run effect of price change becomes:

$$\Delta lnB^{sr} = \sum_{i=1}^{n}\left(w_i\Delta lnp_{ci} - \left(\frac{p_{pi}y_i}{X}\right)\Delta \ln p_{pi}\right) + \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n} w_i\varepsilon_{ij}\, \Delta \ln p_{ci}\, \Delta \ln p_{cj} \tag{10}$$

If one only wants to assess the price impact of a sing good i, for example a change in the price of rice, equations (7) and (10) can be simplified to become

$$\Delta lnB_i = w_i\Delta lnp_{ci} - \left(\frac{p_{pi}y_i}{X}\right)\Delta \ln p_{pi} \tag{11}$$

$$\Delta lnB_i^{sr} = w_i\Delta lnp_{ci} - \left(\frac{p_{pi}y_i}{X}\right)\Delta \ln p_{pi} + \frac{1}{2}\sum_{j=1}^{n} w_i\varepsilon_{ij}\, \Delta \ln p_{ci}\, \Delta \ln p_{cj} \tag{12}$$

To summarize, equations (7) and (11) show the immediate and direct impact, while the equations (10) and (12) show the short-run or second-order effect. In practice, producers may also respond to food price change by changing food production activities, such as by increasing production of food items whose price increased and reducing production of items whose prices declined. To calculate the effect of price change on food production, however, one needs to know the supply price elasticity of different food crops. Besides, food price

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[4] The Slutsky derivative, s_{ij}, is defined by the expression $s_{ij} = \partial x(p_{ci}, b)/(\partial p_{ci}) + x(p_{ci}, b) \times \partial x(p_{ci}, b)/\partial b$ where $x(p_{ci}, b)$ is the Walrasian demand function.

[5] For more detailed derivation of this estimate, see Friedman and Levinsohn (2002).

changes may lead to changes in the prices of agricultural inputs such as fertilizers and agricultural wages, lowering the real income of food producers. For simplicity, the supply-side effect from food price increase is ignored in this paper. Thus, this paper examines only the immediate effect of changes in food prices on household welfare and the short-run effect that allows consumers to adjust their demands in response to the changes in food prices. Similar procedures have been used in Friedman and Levinsohn (2002), and in Minot and Goletti (2000), the latter concerning rice only.

Following Deaton (1989), in addition to the above calculations, this paper applies non-parametric methods to investigate the impact of changes in food price on welfare. As Deaton (1989) argued, non-parametric techniques such as density estimation and locally weighted regression provide intuitively clear graphical descriptions of the impacts of changes in food prices on different groups of households. Non-parametric techniques have also been used in, *inter alia*, Budd (1993) and Barrett and Dorosh (1996).

Finally, consider the data used. This paper uses the 2006 Vietnam Household Living Standards Survey (2006 VHLSS) to assess the impact of changes in food prices on household welfare and poverty rates. The 2006 VHLSS is a nationally representation household survey with detailed information on household activities and characteristics. It includes 9189 households, of which 6882 in rural areas and 2307 in urban areas. Seventy five percent of these households are engaged in farming activities and 53 percent grow rice.

3. Food Production and Consumption in Vietnam

Table 1 provides information on the prevalence of farming and rice-farming in Vietnam. About 72 percent of Vietnamese households are farming households, and 53 percent of Vietnamese households grow at least some rice. Eighty six percent of the rural population are farmers, and two-thirds are rice farmers. In terms of regions, the North West has the highest percentage of both farming households and rice farming households: nearly 93 percent are engaged in farming activities and 77 percent grow rice. In contrast, in the South East, which includes Ho Chi Minh City, only 44 percent of the households are farmers and only 15 percent grow rice.

Based on the expenditure quintiles, the poor households are more likely to be farmers and rice farmers than the better off households. In the poorest quintile, 90 percent of the households are farmers and 76 percent are rice farmers, while in richest quintile, only 40 percent of households are farmers and 18 percent are rice farmers.

Ethnic minorities are more likely to be farmers and rice farmers than ethnic majority households; 94 percent and 81 percent, respectively of ethnic minority households are farmers and rice farmers, respectively. In contrast, 68 percent and 47 percent of ethnic majority households are farmers and rice farmers, respectively.

Table 2 presents food consumption, production, selling and purchasing patterns for Vietnamese households. The 2006 VHLSS data show that food constitutes 50 percent of households' real expenditure, about 47 percent for the non-poor population and 67 percent for the poor population. The percentage of total expenditure devoted to food is largest for the poorest quintile and smallest for the richest quintile. More specifically, food accounts for 65 percent of real expenditure for the first quintile (the poorest 20 percent of the population) but only 37 percent for the fifth quintile (the wealthiest 20 percent). For the population as a whole, food purchases constitute 72 percent of total food consumption, and self-produced food constitutes the other 28 percent. The poorest households depend least on purchased food (52 percent), while the richest quintile relies the most (88 percent).

Insert Table 1

Insert Table 2

4. Changes in Food Prices and Household Welfare

4.1. Food Prices and Household Welfare

This section uses the 2006 VHLSS to examine the impacts of changes in food prices on household welfare and poverty. It does so for six scenarios. The first scenario (1a) examines the direct impacts on household welfare and poverty of a hypothetical 20 percent increase in the prices of all food products. This scenario assumes that producer and consumer prices increase by the same amount, which is also assumed by Deaton (1989), Minot and Goletti (2004), and Ivanic and Martin (2008). The second scenario (1b) assumes that producer

prices increase faster than the increase in consumer prices, so that consumer prices increase by 20 percent while producer prices increase by 24 percent. The third scenario assumes that the producer prices increase less than consumer prices so that consumer prices increase by 20 percent while producer prices increase by 16 percent. Scenarios 2a, 2b and 2c replicate these scenario but with consumer prices increasing by 50 percent while producer prices increase by 50 percent, 60 percent and 40 percent, respectively.

More specifically, the following six scenarios are examined:

(1) Consumer price increases by 20%

(1a) Producer price increases by 20%
(1b) Producer price increases by 24%
(1c) Producer price increases by 16%.
(2) Consumer price increases by 50%

(2a) Producer price increases by 50%
(2b) Producer price increases by 60%
(2c) Producer price increases by 40%.

Since the consumer prices of all food items are assumed to increase at the same rate, there is no substitution effect in consumer demand. The impacts of these scenarios on household welfare are presented in Table 3. Table 3 shows that a hypothetical uniform food price increase of 20 percent would raise the real annual income of an average household in Vietnam by 3.4 percent. A uniform price increase of 50 percent would raise the income by 8.5 percent. Yet, the size and direction of the impact depends on whether producer prices increase the same as, or more or less than, consumer prices. If producer prices rise faster than consumer prices, the welfare impact would be large. For example, if the food consumer prices rise by 20 percent, while the food producer prices increase by 24 percent, average household welfare would rise by 5.6 percent. Yet, if food producer prices rise at 16 percent, household income would rise by only 1.3 percent.

Insert Table 3

These scenarios have different impacts on urban and rural areas. On average, the welfare of rural households increases while that of urban households decreases. For example,

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Scenario 1a (uniform 20% price increase) shows that an average rural household would experience a 6.0 percent increase in its standard of living, while an average urban household would suffer a reduction of 4.4 percent.

On average, middle-income groups gain the most (in percentage terms) from increased food prices. The welfare of households in quintiles 2, 3 and 4 would see their welfare increase between 4.1 and 4.7 percent in Scenario 1a, and between 10.3 and 11.6 percent in Scenario 2a. In contrast, the richest quintile has almost no gain in either scenario, and even loses in Scenarios 1c and 2c. The poorest quintile, as a whole, gains from food price increases, but the gains are less than those experienced by the middle-income groups.

The welfare of both poor and non-poor households increase in these scenarios, but the relative increase is slightly higher for non-poor households. For example, in Scenario 1a, the poor's household income increases by 3.4 percent, less than the rise in non-poor's household income (3.6 percent). If we further divide the poor and non-poor into urban and rural groups, the implications are more interesting. The rural non-poor gain more than the rural poor, while the urban non-poor lose more than the urban poor.

In terms of regions, only the most urbanized region- the South East- suffers a decline in average household income in all scenarios. The South East and the Central Highlands are particularly vulnerable to food price increases since they consume more than they produce, and may exhibit welfare decline if food consumer price increases faster than producer prices. Among the other regions, the Mekong River Delta is the biggest winner, which is not surprising since it produces far more food than it consumes. Average household income in this region may increase by 10 percent for a uniform 20 percent price increase, and by 25 percent for a uniform 50 percent price increase.

The impacts reported in previous paragraphs are averages for each group, and they reveal nothing about variation within groups. To examine the variation in welfare changes *within* groups, columns 8, 9 and 10 show the percentages of households whose welfare declines. These percentages would be the same for Scenario 1a and 2a, 1b and 2b, 1c and 2c since the price changes in these scenarios are proportional. Overall, from 53 percent to 61 percent of Vietnamese households will experience welfare declines from increases in food

prices. Nearly 90 percent of urban households will suffer a welfare decline, while from 40 to 50 percent of rural households would experience welfare reductions.

In terms of regions, the South East region is the most negatively affected: around 80 percent of households in this region suffer would reductions in their welfare in each of these scenarios. Although the Mekong River Delta is the most productive agricultural region in Vietnam, even in this region, over 50 percent of households experience a welfare decline. This is not surprising since nearly 40 percent of the households in this region are not engaged in any household farming activity. The region with the greatest percentage of households benefiting from an increase in food prices is the North West: only 27-37 percent of this region's households would be worse off under these scenarios. This is not surprising because, as shown in Table 2, 93 percent of the households in the North West are farmers, much higher than the national average of 72 percent. Table 3 also shows that the North West has the highest percentage of net food sellers (69 percent).

Grouping households by welfare quintiles, the poorest quintile has the lowest percentage of households whose welfare declines (37 to 48 percent) while the richest quintile has the highest (over 80 percent). Categorized by poverty status, from 36 to 47 percent of poor households would experience a welfare reduction; while from 56 to 64 percent of non-poor households would suffer a decline in welfare.

Most non-farmers (about 95 percent) would experience welfare reductions under all scenarios. The other five percent of non-farmers experience welfare increases because they are engaged in fishing activities, and sell more food than they purchase. As for farmers, 37-48 percent of farmers have lower welfare than before. This occurs because many Vietnamese farmers are small food producers, and the welfare improvement from higher food producer prices may not offset the negative effect brought about by higher food consumer prices.

The impacts of increases in food prices on poverty are summarized in Table 4. Increases in food prices of different rates do not necessarily have the same effects. A food price increase by 20 percent for both consumer and producer prices would reduce the national poverty headcount rate by 0.8 percentage points. Yet, if food prices increase uniformly by 50 percent, the poverty rate would increase by 0.3 percentage points. Since food prices increased by 12-15 percent in 2007, and 40-50 percent in 2008, the impacts of food price changes could

be poverty-reducing in 2007 but poverty-increasing in 2008. The intuition for this change in sign is simple. When food prices increase moderately, rural poverty would reduce significantly while urban poverty would increase mildly. The net effect is a reduction in the national poverty rate. However, as food prices increase dramatically, urban poverty would rise sharply, and bring about an increase in the national poverty rate.

Insert Table 4

More particularly, rural poverty falls in all five of those scenarios, the exception being Scenario 1c, while urban poverty increases in all scenarios. A uniform food price increase of 20 percent will reduce headcount poverty in rural areas by 1.4 percentage points, but raise it in urban areas by 0.8 percentage points. Yet if food price increases by 50 percent uniformly, the rural poverty headcount falls by only 0.8 percentage points but urban poverty headcount rises by 3.3 percentage points. More interestingly, a food consumer price increase of 50 percent, together with a food producer price increase by 40 percent (Scenario 2c) would increase poverty in both urban and rural areas, since many farmers are in the edge between being net food sellers and net food consumers.

Measured by the headcount poverty ratio (P0), about 13 percent of the poor would escape of poverty in Scenario 1a, 24 percent in Scenario 2a. In contrast, about 1.5 percent of the non-poor would fall into poverty in Scenarios 1a, and 4.9 percent in Scenario 2a.

Turning to regional patterns, some regions would have lower poverty rates, while some would experience higher poverty rates. Poverty rates would rise in the South Central Coast in all scenarios except 1c, and the South East in all scenarios. Poverty rates would also rise in the Central Highland if food prices increase by 50 percent, or if food producer prices increase significantly less than food consumer prices. More interestingly, except under Scenario 1b, the poverty rate increases in the Mekong River Delta- the most agriculturally productive region. A relatively high percentage of non-farmers in this region (35 percent) contribute to that result. Food price increases would reduce poverty in the North West, North Central Coast, Red River Delta and North East regions.

The normalized poverty gap index (P1) decreases slightly by 0.2 percent in Scenario 1a, but increases by 0.3 percent in Scenario 2a, implying a mixed direction as well in the poverty gap index of poverty.

4.2. Rice Prices and Household Welfare

Rice prices have increased sharply in international commodity markets since late 2007. The export price of Vietnam 5-percent broken rice almost tripled during one year, from $303/ton in April 2007 to $875/ton in April 2008. In the domestic market, the increase in the price of rice is less dramatic but still considerable. The price of grains, which is mostly rice, increased by 38 percent during the same period.

To study the effect of rice prices alone, assume that the prices of other foods are unchanged. This allows one to examine both the immediate effect and the short-run effect changes in rice prices, the latter of which allows consumers to substitute to other foods. Two scenarios will be examined: a uniform rice price increase of 20 percent and a uniform rice price increase of 50 percent[6].

Therefore, there are two scenarios:

(1) A uniform increase in the price of rice of 20 percent for both consumers and producers.

(2) A uniform increase in the price of rice of 50 percent for both consumers and producers.

We divide the effects in to the immediate or first-order effect (1a and 2a) and the short-term or second-order effect (1b and 2b). The estimation is based on equations (11) and (12) and on the compensated own- and cross- price elasticities that were estimated in Vu (2008).

The results are presented in Tables 5. On average, household welfare increases immediately by 1.3 percent in Scenario 1a, and 3.1 percent in Scenario 2a. Allowing for food substitution, the second-order effect is very small, less than 0.1 percent in Scenario 1b and 0.2 percent in Scenario 2b, because the demand for rice is price inelastic. Household welfare increase a little bit more in the short-term, but that difference between the short-term and the immediate effect is small. Even for a 50 percent increase in the price of rice, the difference is

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[6] The inclusion of differing consumer and producer prices of rice would make the analysis more complicated and hard to follow, especially since both the immediate effect and the short-run effect (which allows for food substitution) are examined.

less than 0.2 percent. Overall, the short-term effect improves household welfare by about 0.1-0.2 percent more than the immediate effect.

In rural areas, household welfare increases by 1.9 percent and 4.8 percent, respectively, in response to a 20 percent and 50 percent price increase. In urban areas, household welfare decreases by 0.7 percent and 1.8 percent, respectively. If we divide the income quintiles into urban and rural areas, some interesting patterns emerge. In rural areas alone, the rural households in quintile 3 have the largest welfare increases: 2.9-3.0 percent in Scenario 1, and 7.2-7.4 percent in Scenario 2[7]. In contrast, the poorest quintile (quintile 1) in rural areas has the lowest welfare increases among rural households: 0.6-0.7 percent in Scenario 1, and 1.4-1.7 percent in Scenario 2. In urban areas, all quintiles experience lower welfare due to higher rice prices, but the welfare reductions are lowest for quintile 3: 0.4-0.5 percent in Scenario 1, and 1-1.2 percent in Scenario 2, and highest for quintile 1: 1.5-1.7 percent in Scenario 1, and 3.8-4.2 percent in Scenario 2. Therefore, the rural middle-income groups appear to receive relatively high benefits from an increase in the price of rice. In the contrast, the poorest households in rural areas receive small average benefits, while the poorest households in urban areas suffer the largest welfare reductions (relative to their previous welfare) from an increase in the price of rice.

Regionally, the Mekong River Delta has the largest welfare increase: 5.5-5.6 percent in Scenario 1, and 13.7-14.0 percent in Scenario 2. In contrast, the North East, Central Highlands and South East regions experience reductions in average welfare. The Central Highlands has the largest welfare reductions: 0.8-0.9 percent in Scenario 1, and 1.9-2.1 percent in Scenario 2. Rice farmers' welfare increases by 4.2 percent in Scenario 1, and 10.4-10.5 percent in Scenario 2. Households that do not grow rice experience an average welfare reduction of 1.9-2.0 percent in Scenario 1, and 4.7-5.0 percent in Scenario 2.

Non-poor households have higher relative welfare increases than poor households: 1.4-1.5 and 3.6-3.8 percent, compared to 0.1-0.3 percent, and 0.5-0.7 percent in Scenarios 1 and 2 and 3, respectively.

Columns 5 of Table 5 shows the percentages of households whose welfare falls, which are the same in both scenario since uniform increases of consumer and producer prices are

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[7] The lower figures denote immediate effect, while the higher figures imply the short-term effect.

assumed. This column shows the immediate effect but the short-term effect is almost the same in terms of the percentage of worse-off households. About 64 percent of Vietnamese households as a whole, 54 percent in rural areas and 92 percent in urban areas, are made worse-off by increases in the price of rice. Turning to welfare quintiles, about half of quintiles 1, 2 and 3 in rural areas are worse-off. The percentages are higher for quintile 4 and 5 in rural areas, where 60 percent of households in quintile 4 and 71 percent of households in quintile 5 are worse-off. Perhaps the rich households in rural areas are more likely engaged in non-farming activities than other rural households are. In urban areas, about 80 percent of households in quintile 1 and 2 are worse-off, while 94-96 percent of households in quintiles 4 and 5 are worse-off. Fifty-two percent of poor households have lower welfare than before, while 66 percent of non-poor households experience a reduction in welfare. Finally, half of farming households and about one-third of rice farming households have lower welfare than before.

Insert Table 5

The South East and the Central Highlands have very high percentages of households whose welfare declines: 88 percent of households in the South East and 81 percent of households in the Central Highlands have welfare reductions. Only in the North West -- the region with the highest percentage of net rice sellers -- is the number of households whose welfare increases higher than the number of households whose welfare falls. Although, on average, households in Mekong River Delta have the highest average welfare increase, almost two-thirds of the households in that region have lower welfare than before after an increase in the prices of rice. About 52 percent of the poor would be worse-off and 48 percent would be better-off (or would be unaffected) from the change in the price of rice.

Table 6 shows that rice price increases have little on poverty reduction. For a 20 percent increase in the prices of rice, the effect is a reduction of poverty headcount rate by 0.2 percent. When rice prices increase by 50 percent, the poverty headcount index is unchanged, but reduces by 0.1 percentage points after short-term demand adjustments. While rice price increases would lower poverty index in rural areas slightly, by 0.4 percentage points in Scenario 1, they would raise poverty in urban areas mildly, by 0.3-0.4 percentage points. Previous studies find mixed results regarding the impacts of rice price increases on household

welfare. Using an international poverty line, Ivanic and Martin (2008) found that a 10 percent increase in the price of rice would reduce poverty by 0.5 percentage points in 1998 and 0.7 percentage points in 2004. In contrast, Minot and Goletti (2004) found that a 10 percent increase in rice prices would raise poverty by 0.2 percentage points immediately (before households' responses to prices) and by 0.3 percentage points after households' responses to prices. Note that the poverty headcount ratio defined in this chapter is different from those of both Minot and Goletti (2004) and Ivanic and Martin (2008). Minot and Goletti (2004) used the poverty measures defined by the population in the bottom 25 percent in terms of real per capita consumption expenditures; while Ivanic and Martin (2008) used the standard "dollar-a-day" expenditure-based measures of poverty from the 2007 World Bank *World Development Indicators*. The findings in this chapter imply that rice price changes have insignificant impacts on national poverty in Vietnam, and has little effect on both rural and urban areas. The impact of the increases in rice price on normalized poverty gap index (P1) for the country is also very close to zero in Scenarios 1, and 0.2 percentage points in Scenario 2, indicating neither improvement or worsening of the poverty gap in Scenario 1, and a slight increase in poverty depth in Scenario 2.

Insert Table 6

Figure 1 presents non-parametric regressions of the net sales ratio (defined as the value of net sales of rice divided by household expenditure) on the logarithm of household expenditure per capita for urban and rural areas. Thus, it indicates the magnitude of the possible welfare increase or reduction for households at different levels of welfare. Figure 1 shows that the net sales ratio in rural areas increases with household's living standards until the logarithm of expenditure per capita is around 9, (equivalent to an average expenditure per capita of 675 thousand VND per month). The curve then declines as the standard of living rises. The ratio is negative for very poor rural households, which implies that these households are harmed by increases in the price of rice. In urban areas, households are adversely affected at all welfare levels, but the poorest households are most adversely affected.

Insert Figure 1

Insert Figure 2

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Figure 2 shows regressions of the net sales ratio on the logarithm of household per capita expenditure for each quintile. Increases in the price of rice primarily benefit quintiles 2 and 3, while the benefits are lowest for quintiles 1 and 5. This is consistent with theory, since the poorest households spend a relatively larger share of their budget on rice. Among the rich, only a minority of the rich households are rice farmers and net rice sellers: 18 percent of households in the fifth quintile grow rice compared to 53 percent for the whole population. Similarly, only 11.5 percent of households in the fifth quintile are net rice sellers, compared to 30 percent of all Vietnamese households. Therefore, an increase in the price of rice will provide few benefits to the richest; instead it will primarily raise the cost of their consumption.

The average net sales ratios for all quintiles are positive, implying that a price change would increase the average welfare of all quintiles. Yet, although average welfare levels increase, a majority of households in all quintiles, especially quintiles 4 and 5, would experience a decrease in their standard of living. These results are striking even in the Mekong River Delta, the major rice production area; over 64 percent of households are worse-off following a uniform increase in the price of rice. The reason for this is the concentration of rice production in this region. Although it is the biggest rice producing area, a majority of households in the region do not produce any rice and thus are worse-off due to an increase in the price of rice. More specifically, only 37 percent of households in this region grow rice[8], less than the national average of 53 percent.

4.3 The Impacts of Food Price and Rice Price Changes in 2007-2008.

In this sub-section, we estimate the impacts of the cumulative food price and rice price changes that occurred from Jan, 2007 to Sept, 2008, using the price data from Vietnam's General Statistics Office. Since the producer price index in 2008 is not available, we assume that prices received by producers increase at the same rate as the food consumer price index in 2008. That assumption implies the price changes during 2007-08 as in Table 7.

Insert Table 7

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[8] About 28% of the households in this region are non-rice farmers and 35% are non-farming households (including 9% who earn income from aquaculture activities).

In our analysis, food consumption is divided into eleven food categories: rice, other staples, pork, poultry, other meats, fish and seafood, vegetables, fruit, other foods, drink and food away from home (FAFH). Yet, the GSO data provides price indices only for food of which: staples (including rice), non-staples foodstuff, and drink and tobacco. Thus, one must assume that the price index of FAFH is the general food price index. More generally, there are four price indices, corresponding to 11 food categories: the price index of rice and staples (categories: rice, staples), of non-staples foodstuffs (categories: pork, poultry, other meats, fruit, vegetables, and other foods), of drink (category: drink), and general food price index (category: FAFH).

These price indices are used to calculate the first-order effect (without demand adjustment) and the second-order effect (with demand adjustment) on household welfare (equations 7 and 10, respectively). The compensated price elasticities have been calculated in Vu (2008).

However, the second order effect is very small. In all cases, the second order effect on welfare is found less than one percent of the welfare change induced by the first-order effect. More specifically, Table 8 reports the immediate impact (first-order effect) and the short-term effect (both first-order and second-order effect) on household expenditure from food/rice price changes. It indicates that the second-order effect is negligible. Thus, this result is different from Friedman and Levinsohn (2002), who find the difference between the immediate impact and the short-term impact quite pronounced in Indonesia during the financial crisis. One reason for the difference between this study and Friedman and Levinsohn is that the aggregate data of food prices in this study do not provide detailed information about how prices of different food commodities changed. In contrast, Friedman and Levinsohn (2002) have detailed price data with considerable variation. In practice, the substitution effect might be more important if the rise in the prices of different foods differs significantly or if one has more exact data on different food items. Moreover, this study does not include non-food in the demand system, while Friedman and Levinsohn (2002) include non-food items. The inclusion of non-food items may make some changes in the estimation of second-order effect.

Insert Table 8

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In short, because the different between the immediate (first-order) and the short-term (second-order) effect is small, this chapter reports only the immediate effect. Table 9 presents the percentage change in welfare and Table 10 summarizes the impacts on poverty. Table 9 indicates that average household welfare increased by 2.8 percent from Jan, 2007 to Dec, 2007, and by 9.2 percent from Jan, 2007 to Sept, 2008 due to increases in food prices. Rice price alone leads to a 1 percent increase in household welfare in 2007 and 5 percent increase in the period Jan, 2007- Sept, 2008.. While rural households gain substantially from food price increases, urban households experience welfare reductions. The middle-income groups are more likely to gain from food price increases than the lowest and the highest income households. In rural areas, non-poor households gain proportionately more than the poor, while in urban areas, the non-poor lost proportionately more than the poor.

Insert Table 9

Insert Table 10

Table 10 presents the impacts on poverty from increases in food and rice prices. In 2007, food price increases reduced the rate of poverty headcount by 0.6 percentage points. However, the sharp increase in 2008 leads to a reverse impact on poverty, and the total impact on poverty from the food price increases from Jan, 2007 to Sept, 2008 is to increase poverty rate by 1.1 percentage points. The increase in rice prices alone is responsible for about 0.3 percentage point increase in the poverty rate during 2007-08.

Yet, the above analysis does not take into account the complexity of the rice market in Vietnam. In practice, the increase in producer food prices may be significantly lower than the increase in consumer food prices, especially for small farmers. One reason is that in Vietnam, the export market is still dominated by some large State-owned monopolies. Moreover, small farmers are less able to store their harvest and may need to sell their harvest at lower prices immediately after the harvest. As shown in table 6 above, the average welfare benefit would be substantially reduced if the increase in producer prices is significantly lower than the increase in consumer prices of food. Moreover, the medium-term and long-term welfare effects would also be lower if food price increases lead to increases in the prices of agricultural inputs, such as wages and prices of fertilizers.

6. Summary and Conclusion

This chapter demonstrates that the impacts of recent food price increases, especially rice price increases, on Vietnamese households are complicated. About 44 percent of Vietnamese households are net food sellers and 30 percent are net rice sellers. In rural areas, 54 percent of Vietnamese households are net food sellers and 38 percent are net rice sellers. These households will naturally benefit from increases in food prices[9]. However, the magnitude of benefits depends on the relative changes of producer's prices and consumer's prices. If changes in these prices are uniform, an increase in food price will induce an increase in average household welfare. When food prices increase uniformly by 20 percent, average household welfare increases by 3.4 percent and the national poverty rate falls by 0.8 percentage points. When rice prices increase (uniformly) by 20 percent, the average household's welfare increases by 1.3 percent and the national poverty rate falls by 0.2 percentage points. However these impacts are sensitive to the relative changes of producer and consumer prices. If consumer prices increase at a lower rate than producer prices, welfare benefits are higher and poverty reduction is greater. On the other hand, if consumer prices rise faster than producer prices, the positive impacts of the price changes on welfare and poverty reduction are smaller. Examining the price changes that actually occurred in 2007-2008, this chapter finds that average household welfare increased by 9.2 percent during the two years (until Sept, 2008). Yet, poverty increased by 1.1 percentage points during the same period. On the other hand, increases in rice price alone raised average household welfare by 5 percent in 2007-2008, but also raised poverty (headcount) rate by 0.3 percentage points during the same period.

Finally, it is important to note that the benefits and costs are not spread evenly across the population. A uniform increase in both consumer and producer food prices would make 56 percent of households worse off, and in rice price would make 64 percent of households worse off. In particular, increases in the price of rice alone lead to welfare reductions for a large percentage of households. With a uniform percent increase in the price of rice, about 54 percent of rural households and 92 percent of urban household would experience reductions in

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[9] Yet, if the food consumer prices increase faster than the food producer prices, some net food sellers may still be at loss because their increased food revenues are less than their increased food costs.

their household welfare. Regionally, the South East and Central Highlands would be hit the hardest; with 80- 90 percent of the population having lower welfare. In particular, the rural middle-income households gain the most while the rural poorest households gain the least from an increase in the price of rice. On the other hand, in the urban areas, the poorest households lose the most (relative to their welfare) from an increase in the price of rice. This indicates that support programs should target the poorest quintile, as well as the poor people in regions that are hit the hardest from an increase in price such as the South East, and the Central Highlands. While the Mekong River Delta, which produces about 90 percent of Vietnam's marketable rice, certainly gains much from an increase in price, only about one-third of the households in this region are better-off due to rice price increases. This indicates that some kind of assistance to poor people, particularly those in the regions gaining much due to price changes, is necessary to offset the negative impacts of rice price increases.

Our analysis takes into account the substitution effect in demand. The "real" case in 2007-08 reveals that the substitution effect is negligible due to low cross-price demand elasticities.

There are several limitations of this chapter. First, the chapter does not examine the production response to food/rice price increases. As rice prices increase, farmers may response by expand their production. On the other hand, the price of agricultural inputs may also increase, reducing farmers' disposable income. Second, data limitations do not allow us to fully explore the relationship between consumer and producer prices in different regions. Our analysis indicates that the welfare and poverty effects are sensitive to the relative prices between consumer and producer prices, and generally the effects are more beneficial if producer prices increase faster than consumer prices. However, food producer prices are often unavailable or not updated as often as food consumer prices[10]. More sophisticated analysis, based on reliable and updated regional consumer and producer price data would be useful for further research.

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[10] The General Statistics Office collects producer price index (PPI) but only published it annually, while consumer price index (CCI) is published monthly. The available PPI and CPI do not list specific index for food and foodstuff items such as rice, maize, beef etc. On the other hand, Ministry of Agriculture collects and publishes the local market price for several food and foodstuff items, but does not publishes producer (or farm-gate) prices of these items.

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Table 1: Distribution of Farming and Rice Farming Households

	Percentage of farmer	Percentage of rice farmer
All	71.9	52.5
Rural	86.2	66.0
Urban	29.3	12.3
Red River Delta	76.7	67.6
North East	84.0	70.3
North West	92.8	77.2
North Central Coast	80.9	66.1
South Central Coast	65.5	55.2
Central Highlands	86.6	41.1
South East	43.8	15.1
Mekong River Delta	65.1	37.3
Quintile 1	89.8	75.6
Quintile 2	84.8	69.4
Quintile 3	79.5	59.0
Quintile 4	66.2	41.5
Quintile 5	39.9	17.9
Ethnic majority	68.0	47.4
Ethnic minority	94.3	81.1
Non-poor	68.5	48.1
Poor	90.4	76.7

Table 2: Annual Food Production and Consumption by Household Groups (million VND and %)

	Food budget	Food production	Food consumption	Food sale	Food purchase	NFS*	NFS for net sellers	NFP* for net purchasers	Percentage of net sellers
All	50.4	15.4	10.2	11.9	8.4	3.5	19.6	-9.1	43.8
Rural	53.7	18.3	9.2	14.0	6.6	7.4	18.5	-5.9	54.4
Urban	40.8	6.6	12.9	5.8	14.1	-8.3	34.2	-14.1	11.9
Red River Delta	49.4	13.9	9.9	9.9	7.7	2.2	15.5	-8.6	44.8
North East	55.2	12.7	9.5	7.1	6.1	1.0	7.9	-7.0	53.5
North West	61.7	13.1	8.3	6.6	4.3	2.3	5.6	-5.4	69.9
North Central Coast	51.8	11.2	8.4	7.2	6.0	1.3	9.3	-6.1	47.7
South Central Coast	47.3	13.1	10.1	10.7	9.1	1.6	21.9	-9.4	35.1
Central Highlands	51.9	12.7	10.7	9.6	8.7	0.9	14.3	-8.0	40.0
South East	43.1	10.2	12.4	9.2	14.0	-4.8	29.1	-14.1	21.4
Mekong River Delta	50.5	26.7	10.7	24.2	9.3	14.9	41.5	-8.6	46.9
Quintile 1	64.7	9.9	6.5	5.5	3.5	2.1	5.6	-3.1	59.3
Quintile 2	56.0	13.3	8.0	9.0	5.4	3.6	10.7	-4.7	54.1
Quintile 3	51.2	16.1	9.4	12.2	7.3	4.9	17.0	-6.5	48.5
Quintile 4	44.7	18.9	11.4	16.0	10.1	5.8	30.5	-9.7	38.7
Quintile 5	36.6	18.3	15.2	16.6	15.8	0.8	72.8	-15.7	18.7
Ethnic majority	48.2	15.7	10.4	12.8	9.2	3.6	23.1	-9.7	40.5
Ethnic minority	63.2	13.2	8.5	7.1	4.5	2.6	6.7	-4.1	62.4
Non-farmer**	43.7	5.7	12.2	5.6	13.3	-7.7	102.6	-13.3	4.9
Farmer	53.1	19.1	9.4	14.4	6.6	7.8	16.9	-5.3	58.9
Not growing rice	45.5	11.3	11.4	10.5	11.8	-1.2	48.0	-11.5	17.3
Growing rice	54.9	19.1	9.0	13.1	5.4	7.7	13.1	-3.6	67.7
Non-poor	47.4	16.4	10.9	13.2	9.4	3.7	23.5	-9.9	40.7
Poor	66.5	9.6	6.3	5.2	3.2	2.0	5.1	-2.9	60.2

*NFS: Net food sale, NFP: Net food purchase; **including households who catch or raise aquaculture products;

Table 3: Household Welfare Change due to Food Price Increases (%)

	Welfare change (%)						Percentage of worse-off (%)		
+ Consumer price	20%			50%					
+ Producer price	20% (1a)	24% (1b)	16% (1c)	50% (2a)	60% (2b)	40% (2c)	(1a & 2a)	(1b & 2b)	(1c & 2c)
All	3.4	5.6	1.3	8.5	13.4	3.1	56.2	53.1	61.0
Rural	6.0	8.6	3.4	15.0	21.5	8.5	45.5	41.8	51.3
Urban	-4.4	-3.6	-5.2	-11.0	-8.90	-13.0	88.1	86.9	89.7
Red River Delta	3.5	5.5	1.4	8.8	13.8	3.7	55.1	51.9	59.8
North East	2.2	3.8	0.5	5.4	9.60	1.3	46.5	42.4	52.8
North West	4.2	6.1	2.3	10.4	15.2	5.6	30.1	27.3	37.3
North Central Coast	2.1	3.8	0.3	5.2	9.50	0.8	52.1	48.6	57.7
South Central Coast	1.5	3.4	-0.3	3.8	8.40	-0.8	64.9	61.4	72.2
Central Highlands	1.1	2.9	-0.7	2.8	7.20	-1.7	60.0	56.5	64.3
South East	-2.5	-1.1	-3.8	-6.1	-2.78	-9.5	78.5	76.9	81.1
Mekong River Delta	10.0	13.7	6.3	25.0	34.3	15.8	53.0	50.5	56.1
Quintile 1	3.6	5.7	1.5	9.1	14.3	3.8	40.4	36.7	47.5
Quintile 2	4.5	6.9	2.1	11.2	17.1	5.3	45.8	41.9	51.8
Quintile 3	4.6	7.1	2.2	11.6	17.7	5.4	51.4	47.4	56.1
Quintile 4	4.1	6.5	1.8	10.3	16.1	4.4	61.3	58.9	66.0
Quintile 5	0.2	1.6	-1.3	0.4	4.10	-3.3	81.3	80.1	83.0
Non-farmer	-5.2	-4.5	-6.0	-13.0	-11.2	-14.9	94.9	94.6	95.2
Farmer	6.8	9.5	4.1	16.9	23.7	10.2	41.1	36.9	47.6
Not growing rice	-1.5	-0.1	-3.0	-3.8	-0.14	-7.4	82.6	81.2	84.6
Growing rice	7.9	10.6	5.1	19.6	26.6	12.7	32.3	27.7	39.6
Poor	3.4	5.5	1.2	8.4	13.8	3.0	59.2	56.3	63.6
Non-poor	3.6	5.7	1.5	9.0	14.2	3.8	39.4	35.9	46.6
Rural poor	4.0	6.1	1.9	10.0	15.4	4.7	37.4	33.8	45.0
Rural non-poor	6.5	9.2	3.8	16.2	23.0	9.5	47.4	43.7	52.9
Urban poor	-3.3	-2.1	-4.6	-8.4	-5.22	-11.5	73.4	72.2	74.7
Urban non-poor	-4.4	-3.6	-5.2	-11.1	-9.06	-13.1	88.6	87.4	90.2

Table 4: Poverty Impacts of Food Price Increases

+ Consumer price		0%	20%			50%		
+ Producer price		0%	20% (1a)	24% (1b)	16% (1c)	50% (2a)	60% (2b)	40% (2c)
All country	P0	15.9	15.1	14.6	15.8	16.2	15.3	17.7
	P1	3.8	3.6	3.5	3.8	4.1	3.8	4.4
Rural poverty	P0	20.3	18.9	18.3	19.8	19.5	18.3	21.5
	P1	4.9	4.6	4.4	4.8	5.0	4.6	5.4
Urban poverty	P0	3.8	4.6	4.5	4.9	7.1	6.9	7.4
	P1	0.8	1.0	0.9	1.0	1.7	1.6	1.7
Non farmer	P0	5.0	6.6	6.5	6.6	11.5	11.4	11.7
	P1	1.1	1.5	1.4	1.5	2.8	2.8	2.9
Farmer	P0	20.4	18.5	18.0	19.6	18.2	16.8	20.2
	P1	4.9	4.5	4.3	4.8	4.6	4.2	5.0
Non-rice farmer	P0	7.5	8.7	8.6	8.9	12.8	12.6	13.5
	P1	1.7	2.0	2.0	2.1	3.3	3.2	3.4
Rice farmer	P0	23.4	20.7	20.0	21.9	19.2	17.6	21.5
	P1	5.6	5.0	4.8	5.3	4.8	4.4	5.3
Non-poor	P0	0.0	1.5	1.5	1.7	4.9	4.7	5.5
	P1	0.0	0.1	0.1	0.1	0.6	0.6	0.6
Poor	P0	100	86.5	84.1	90.6	75.9	71.2	82.4
	P1	23.9	22.4	21.4	23.4	22.6	21.0	24.4
Rural poverty	P0	20.3	18.9	18.3	19.8	19.5	18.3	21.5
	P1	4.9	4.6	4.4	4.8	5.0	4.6	5.4
Urban poverty	P0	3.8	4.6	4.5	4.9	7.1	6.9	7.4
	P1	0.8	1.0	0.9	1.0	1.7	1.6	1.7
Red River Delta	P0	8.8	7.2	6.6	7.8	7.0	6.4	8.3
	P1	1.5	1.3	1.2	1.4	1.4	1.2	1.5
North East	P0	25.0	23.1	22.6	24.3	21.5	20.1	24.4
	P1	5.6	5.1	4.9	5.4	5.0	4.6	5.5
North West	P0	49.0	46.2	45.1	47.7	41.2	37.4	46.1
	P1	15.6	13.8	13.2	14.4	12.0	11.0	13.3
North Central Coast	P0	29.1	26.3	26.0	27.4	26.2	23.9	27.6
	P1	7.6	7.0	6.7	7.3	7.1	6.6	7.7
South Central Coast	P0	12.4	12.7	12.1	13.4	14.4	14.0	15.9
	P1	2.6	2.7	2.5	2.8	3.3	3.0	3.5
Central Highlands	P0	28.4	28.1	27.3	29.1	29.1	28.2	31.5
	P1	8.8	8.4	8.1	8.8	8.7	8.1	9.5
South East	P0	5.7	6.6	6.6	6.8	9.6	9.4	10.1
	P1	1.4	1.7	1.6	1.7	2.7	2.6	2.8
Mekong River Delta	P0	10.2	10.3	10.2	11.0	14.8	14.2	15.8
	P1	1.8	2.0	1.9	2.1	3.3	3.2	3.5

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Table 5: Household Welfare Change due to Rice Price Increases

	20%		50%		% of
	Immediate	Short-term	Immediate	Short-term	worse-off
All	1.25	1.31	3.12	3.28	63.8
Rural	1.91	1.97	4.78	4.93	54.4
Urban	-0.73	-0.66	-1.83	-1.65	91.8
Red River Delta	1.12	1.15	2.80	2.88	51.9
North East	-0.23	-0.19	-0.57	-0.47	57.2
North West	0.03	0.09	0.08	0.22	49.0
North Central Coast	0.28	0.35	0.71	0.86	60.8
South Central Coast	0.29	0.34	0.72	0.84	65.4
Central Highlands	-0.87	-0.76	-2.18	-1.91	80.8
South East	-0.58	-0.50	-1.46	-1.24	87.9
Mekong River Delta	5.50	5.59	13.74	13.99	64.7
Rural					
Quintile 1	0.57	0.66	1.43	1.65	51.0
Quintile 2	2.13	2.19	5.32	5.47	49.0
Quintile 3	2.89	2.95	7.22	7.36	51.6
Quintile 4	2.38	2.44	5.96	6.09	59.9
Quintile 5	1.62	1.66	4.05	4.15	70.8
Urban					
Quintile 1	-1.65	-1.50	-4.13	-3.75	78.1
Quintile 2	-0.84	-0.72	-2.10	-1.80	79.4
Quintile 3	-0.49	-0.39	-1.22	-0.97	86.9
Quintile 4	-1.00	-0.92	-2.50	-2.30	93.4
Quintile 5	-0.55	-0.50	-1.37	-1.26	95.7
Non-farmer	-1.65	-1.56	-4.14	-3.91	98.0
Farmer	2.38	2.43	5.95	6.09	50.5
Not growing rice	-1.98	-1.87	-4.95	-4.68	98.5
Growing rice	4.17	4.19	10.42	10.48	32.5
Non-poor	1.44	1.50	3.61	3.76	65.9
Poor	0.18	0.28	0.46	0.69	52.4

Table 6: Poverty Impacts of Rice Price Increases, under Three Different Scenarios

| | 0% | | 20% | | | | 50% | | | |
| | | | Immediate | | Short-term | | Immediate | | Short-term | |
	P0	P1	P0	P1	P0	P1	P0	P1	P0	P1
All	15.9	3.8	15.7	3.8	15.7	3.8	15.9	4.0	15.8	4.0
Rural	20.3	4.9	19.9	4.9	19.9	4.9	20.0	5.1	19.8	5.1
Urban	3.8	0.8	4.2	0.8	4.1	0.8	4.9	1.0	4.8	1.0
Red River Delta	8.8	1.5	7.7	1.4	7.7	1.4	7.2	1.3	7.2	1.3
North East	25.0	5.6	25.0	5.6	25.0	5.6	25.3	5.7	25.1	5.6
North West	49.0	15.6	49.9	15.6	49.9	15.5	51.1	15.7	51.1	15.7
North Central Coast	29.1	7.6	29.1	7.6	29.1	7.6	27.8	7.8	27.6	7.7
South Central Coast	12.4	2.6	12.5	2.6	12.5	2.6	12.2	2.7	11.8	2.7
Central Highlands	28.4	8.8	28.7	9.1	28.7	9.1	30.4	9.9	30.4	9.8
South East	5.7	1.4	5.8	1.5	5.8	1.5	6.7	1.7	6.6	1.7
Mekong River Delta	10.2	1.8	10.1	1.9	9.9	1.9	11.1	2.3	10.9	2.3
Non-farmer	5.0	1.1	5.6	1.2	5.6	1.2	6.8	1.6	6.6	1.6
Farmer	20.4	4.9	19.9	4.9	19.8	4.9	19.7	5.0	19.6	5.0
Not growing rice	7.5	1.7	8.4	2.0	8.3	2.0	10.1	2.6	9.9	2.5
Growing rice	23.4	5.6	22.2	5.4	22.2	5.4	21.1	5.3	21.0	5.3
Non-poor, rural	0.0	0.0	0.8	0.0	0.7	0.0	2.2	0.1	2.0	0.1
Poor, rural	100.0	24.2	95.1	24.2	95.0	24.1	89.7	24.8	89.5	24.7
Non-poor, urban	0.0	0.0	0.4	0.0	0.4	0.0	1.2	0.1	1.1	0.0
Poor, urban	100.0	19.9	99.5	21.8	99.5	21.7	98.1	24.7	98.1	24.3

Table 7: Changes in Food Consumer and Producer Prices, 2007 and 2008.

	2007	2008 (Jan-Sept)
Consumer prices		
Food	18.9	57.8
of which		
staples	15.4	78.1
non-staples	21.2	50.1
drink	6.78	18.1
Producer prices		
Food	18.1	56.7
of which		
staples	15.9	78.9

Table 8 : Percentage Increase in Food/Rice Expenditure Due to Food/Rice Price Increase 2007/08

	2007		**2007-08**	
	Immediate	Short-term	Immediate	Short-term
Food price	18.90%	18.85%	57.80%	57.75%
Rice price	15.40%	15.64%	78.10%	77.48%

Table 9: Household Welfare Change (%) Due To Increases in Food and Rice Prices, 2007/08

	Food price change		Rice price change	
	2007	2007-08	2007	2007-08
All	2.78	9.23	1.02	4.97
Rural	5.16	16.66	1.55	7.58
Urban	-4.32	-12.93	-0.55	-2.84
Red River Delta	2.91	9.59	0.91	4.44
North East	1.73	5.83	-0.16	-0.88
North West	3.55	11.49	0.05	0.17
North Central	1.60	5.49	0.25	1.16
South Central Coast	1.06	3.88	0.25	1.17
Central Highlands	0.69	2.72	-0.64	-3.36
South East	-2.59	-7.46	-0.42	-2.24
Mekong River Delta	8.72	27.91	4.41	21.76
Quintile 1	3.00	9.90	0.38	1.77
Quintile 2	3.76	12.30	1.49	7.28
Quintile 3	3.88	12.68	1.86	9.15
Quintile 4	3.41	11.21	1.08	5.25
Quintile 5	-0.14	0.07	0.28	1.30
Non-farmer	-5.08	-15.28	-1.27	-6.46
Farmer	5.85	18.80	1.92	9.43
Not growing rice	-1.72	-4.78	-1.52	-7.73
Growing rice	6.86	21.91	3.32	16.45
Non-poor	2.74	9.12	1.17	5.73
Poor	3.00	9.86	0.19	0.79
Rural non-poor	5.60	18.03	1.85	9.11
Rural poor	3.37	11.03	0.29	1.30
Urban non-poor	-4.35	-13.03	-0.51	-2.66
Urban poor	-3.41	-9.99	-1.53	-7.84

Table 10: Change in Poverty Due To Increases in Food and Rice Prices 2007- 2008 (Percentage Points)

	Food price change				Rice price change			
	2007		2007-08		2007		2007-08	
	P0	P1	P0	P1	P0	P1	P0	P1
All	-0.64	-0.15	1.07	0.56	-0.22	0.00	0.31	0.51
Rural	-1.18	-0.28	-0.14	0.32	-0.39	-0.02	-0.06	0.55
Urban	0.83	0.19	4.41	1.23	0.25	0.06	1.33	0.43
Red River Delta	-1.36	-0.24	-1.21	-0.06	-0.91	-0.11	-1.52	-0.19
North East	-1.33	-0.37	-3.01	-0.48	-0.08	0.00	0.38	0.21
North West	-2.64	-1.58	-8.37	-3.73	0.73	-0.03	2.53	0.36
North Central	-2.49	-0.55	-2.44	-0.31	-0.04	-0.03	-2.68	0.45
South Central Coast	0.29	0.06	2.87	0.93	0.04	-0.02	-0.43	0.25
Central Highlands	0.20	-0.26	1.30	0.27	0.36	0.27	2.54	1.93
South East	0.91	0.27	4.91	1.68	-0.09	0.07	1.46	0.62
Mekong River Delta	0.16	0.16	5.79	2.13	-0.21	0.04	2.57	1.12
Non-farmer	1.45	0.36	7.93	2.36	0.53	0.14	2.91	0.94
Farmer	-1.50	-0.36	-1.73	-0.17	-0.52	-0.05	-0.75	0.34
Not growing rice	1.22	0.28	6.77	2.09	0.73	0.22	4.15	1.42
Growing rice	-2.29	-0.53	-3.95	-0.79	-1.06	-0.18	-3.08	-0.28
Non-poor	1.48	0.07	6.01	0.84	0.49	0.01	2.97	0.24
Poor	-11.87	-1.31	-25.01	-0.90	-3.98	-0.01	-13.74	1.96
Rural non-poor	1.65	0.07	6.38	0.86	0.59	0.01	3.59	0.28
Rural poor	-12.28	-1.62	-25.71	-1.80	-4.22	-0.11	-14.38	1.57
Urban non-poor	1.10	0.06	5.17	0.79	0.28	0.00	1.56	0.14
Urban poor	-5.87	3.25	-14.78	12.29	-0.52	1.43	-4.47	7.59

Figure 1: Nonparametric Estimation of Rise Net Sales Ratio for Urban and Rural Households (Bandwidth=0.2)
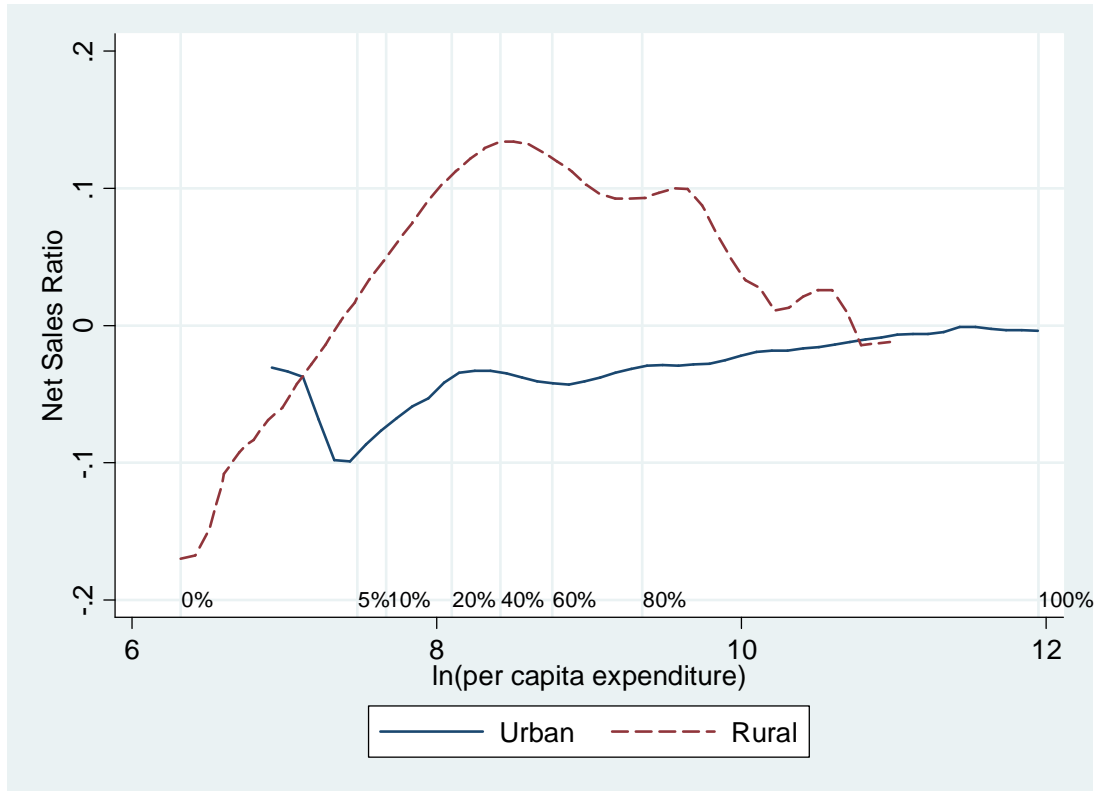
Figure 2: Nonparametric Estimation of Rise Net Sales Ratio for Households at Different Levels of Welfare