The Impact of Rising Food Prices on the Poor

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This revised version: 29 June 2009

Contributed Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, August 16-22, 2009

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Abstract

This paper analyzes the household level impact of an increase in price of major tradable staple foods in a cross section of developing countries, using nationally representative household surveys. We find that, in the short term, poorer households and households with limited asset endowments and access to agricultural inputs will be hit the hardest by the price shock. Given the ample degree of heterogeneity among households and among the poor, the analysis emphasizes the importance of meaningful policy research to go beyond average impacts to look at how access to assets and inputs, livelihood strategies and other key household characteristics drive the magnitude and distribution of the effects of the price increases.

1. Introduction

In 2008 the real international prices of food commodities reached levels that had not been seen since the end of the 1970's. For the first time since 1981 the FAO real food price index surpassed the 150 mark, the result of a sharp increase in 2006-07, followed by and even steeper increment in the first part of 2008. These sharp increases led to social and political instability in a number of developing countries, and prices are expected to continue above the pre-2004 trend level for the foreseeable future (OECD-FAO, 2008).

Soaring food prices have triggered world-wide concern about threats to global food security, shaking the complacency created by many years of low commodity prices. In June 2008 representatives of 180 countries, including many heads of state, met in Rome to express their conviction "that the international community needs to take urgent and coordinated action to combat the negative impacts of soaring food prices on the world's most vulnerable countries and populations" (FAO, 2008). Similarly, at the G8 Summit in Japan, the leaders of the most industrialized nations voiced their concern "that the steep rise in global food prices, coupled with availability problems in a number of developing countries, is threatening global food security" (G8 Tokyo Declaration on Global Food Security, 2008).

The driving forces behind these price increases are complex and include both supply-side and demand-side factors. Long-term structural trends underlying growth in demand for food have coincided with short term cyclical or temporary factors affecting food supply, resulting in a situation in which growth in demand continues to outstrip growth in supply. Supply side factors include lower levels of cereal stocks by world's major cereals producers, which contributes to higher price volatility; production shortfalls due to bad weather; and soaring petroleum prices, which are highly correlated with food prices via fertilizer and transport costs. Demand-side factors include increased demand from the emerging biofuels market and changes in consumption patterns in large emerging economies such as India and

China. Financial market (speculation) and trade policy responses have exacerbated the problem. While most recent studies agree on these underlying forces, they often disagree on the relative importance of each factor.

While much recent analysis has focused on the determinates of the trends in international prices, their relative importance, the transmission of prices to domestic markets, and the prospects for future price trends, a number of contributions have emerged that look at the microeconomic impact of the crisis (Ivanic and Martin, 2008; Aksoy and Isik-Dikmelik, 2008; Dessus *et al.*, 2008; and Rios *et al.*, 2008a). The present paper follows within the latter strand, in that it is concerned with assessing the potential impact of high food prices on households in developing countries, with a particular focus on the poorer strata of the population. Compared to the available literature, this paper makes an extra effort at differentiating the impact of the increase in food prices across population subgroups. Specifically, the main objective of the paper is to investigate how household characteristics, access to assets and markets, and livelihood strategies are related to the direction and magnitude of the impact of rising food prices on household welfare.

The motivation for focusing on this part of the story is driven by the need to identify the specific groups of households that will be most likely affected by the rising crisis, which matters more from a policy perspective than just estimating the average gains or losses to society. If the rich lose somewhat, but the poor gain, such that the rising food prices trigger a progressive redistribution of resources, the concerns for governments to act (particularly if their policy objective is reducing poverty) may not be so high. If, on the other hand, the negative impact is greatest among those that are already poor or have the least means to adjust to a price shock, then the concerns are, from a poverty reduction perspective, clearly more urgent.

The fact that the livelihoods of the poor are so diverse (see, for instance, Davis *et al.*, 2009 and review therein) is an additional reason to dig deeper into the question of who can potentially gain or lose from the price increase, and to what extent. The poor rarely comprise a homogeneous group: the assets and markets they have access to, and the way they derive their livelihoods, are likely to determine the extent of the impact and the ability to cope with any economic shock.

Much of the recent work on the household level impact of the high food prices has in fact focused either on their effect on the poverty headcount and poverty gap (Ivanic and Martin, 2008), or the poverty deficit (Dessus *et al.*, 2008, in an analysis limited to urban households). Rios *et al.* (2008a) analyze the possible welfare impact on poor farmers using household survey data from three countries, while Aksoy and Isik-Dikmelik (2008) make a "first pass" at characterizing the welfare impacts of food prices on net food buyers and sellers.

Furthering this area of research, the paper employs data from 11 Living Standard Measurement Study (LSMS) or similar multi-topic household surveys which are part of the recently created Rural Income Generating Activities (RIGA) database. Our approach computes a simple measure of short-term change in welfare following an increase in tradable staple food prices, and relates it to a range of household characteristics in a cross-section of developing countries. We are hence able to differentiate the impact across household groups depending on their location (urban or rural), welfare level (as expressed by expenditure quintiles), land ownership status and livelihood strategy, thus identifying the potential winners and losers from the current food price trends, and understand the sources of their vulnerability to (or ability to gain from) higher food prices. This is an important new contribution to the understanding of the implications of the high food prices because, as Chen and Ravallion (2004: p. 30) state, "a policy analysis that simply averaged over such differences would miss a great deal of what matters to the debate on policy".

The paper is structured as follows: the next section describes the data and methodology used for this study, Section 3 discusses the main results, and Section 4 concludes.

2. Methodology and data

This paper is concerned with the immediate impact of high food prices on household welfare, which effectively depends on whether the household is net buyer or seller of the food item(s) being analyzed. We also experimented with including second round short term labor market effects (analyzed for instance by Ivanic and Martin, 2008; see also Ravallion, 1990) in two of the countries in our sample, in order to gauge the potential magnitude of such factors. We did not however analyze additional longer run supply response and general equilibrium effects (through the induced changes in productivity, and relative output, input and factor market prices). In that sense, the welfare effect we estimate represents the impact before any adjustment can take place in household production and consumption patterns.

In this framework, given a change in producer and consumer staple prices, the net effect on household welfare depends on the household's condition as net seller or net buyer. If staple prices increase, the household will experience a welfare gain in the short run if it is a net seller or a welfare loss if it is a net buyer. To quantify this change in welfare in an intuitive manner a useful notion is that of compensating variation, which equals the gain/loss to the income/monetary transfer needed to restore the household to the position it was before the (price) shock occurred. In this paper the compensating variation is expressed as a percentage of the initial welfare level.

The methodology used in this paper has several antecedents, starting with Deaton (1989), and many other empirical applications thereafter, including Budd (1993), Barrett and Dorosh (1996), Minot and Goletti (2000) and, recently, Ivanic and Martin (2008) and Rios *et*

al. (2008a). Formally, the immediate welfare effect of changes in the price of a staple food is given by[1]:

$$\frac{\Delta w_i}{x_{0i}} = \frac{\Delta p^p}{p_0^p} PR_i - \frac{\Delta p^c}{p_0^c} CR_i \qquad (1)$$

where Δw_i is the first-order approximation of the change in welfare for household *i* of a change in the staple food price, x_{0i} is the original income (here proxied by total consumption expenditure) of household *i*, $p^p{}_0$ is the original price of the staple at which production is valued, $p^c{}_0$ is the original price of the staple at which consumption is valued, PR_i is the value of the production of this staple for household *i* as a proportion of x_{0i}, and CR_i is the value of the consumption of this same staple for household *i* as a proportion of x_{0i}.

The above is what Minot and Goletti call a "before-response" effect. An "after-response" short term effect, which takes into account household responses in production and consumption decisions, can also be calculated by simply adding the short-term own-price elasticity of staple supply, and the own-price Hicksian elasticity of staple demand on the production and consumption side, respectively. We also carried out an estimate accounting for the possibility of short term adjustments in supply and demand of the main staple, using short-term elasticity parameters borrowed from the literature. The results of that analysis are not qualitatively different from the results without elasticities and are not reported.

The above equation can be readily adapted to account for different degrees of transmission of changes in producer and consumer prices, to account for regional variations in price changes within each country, and to account for different prices changes for different commodities. In this paper, however, we want to preserve some degree of cross-country comparability of the results and our preferred strategy is therefore that of simulating an identical flat, hypothetical 10 percent increase in both producers and consumer prices, limited

[1] This discussion follows, with minor adaptations, from Minot and Goletti (2000). For a full derivation of the equations, see their Appendix 2.

to the three main tradable food staples in each country. Imputing differing price changes across countries (for instance to reflect actual price increases recorded on local markets) would have rendered the international comparison less straightforward. Thus, equation (1) reduces to

$$\frac{\Delta w_i}{x_{0i}} = 0.1\left(PR_i - CR_i\right) \qquad (2)$$

The analysis focused on tradable staples (and staple products) only, as these are at the centre of the current international debate, but the same analysis can be easily extended to cover non-tradable staples as these, over time, may also increase due to growth in demand. The specific staples for each country were chosen by combining consumption and production, as well as trade information from the surveys with information from the FAOSTAT online database (Table A1 in the Appendix). The list of main staples used is available in Table A2 in the Appendix.

On the consumption side, expenditure on staples includes purchases, as well as the implicit cost of own produced foods and food received as gifts. Own produced food and food received as gifts are valued using the purchasing price of the same household. When such a price was not available, the median purchasing price of the same primary sampling unit or at the next level of geographical aggregation was used instead.

On the production side, the value was computed as the total output of the harvest, in kilograms, times the price of the staple. The price of the staple is the price at which the staple has been sold by the farm household (as recorded in the agricultural module of the survey). Whenever a sale price was not available for the household, the median sale price in the same primary sampling unit or at the next level of geographical aggregation was used instead.

To gauge the possible effects on welfare of a possible increase in agricultural wages induced by higher food prices, we calculated a slightly more complex variant of equation (2) that includes a term reflecting how household income would be affected by the increased

earnings (costs) from hiring out (in) agricultural wage labor at the new, higher agricultural wage rate. To calculate the new wage rate we use the country-specific short-run wage elasticity to food prices produced by the GTAP model[2].

The data for the analysis are taken from the RIGA database, which is a collaborative project of FAO and the World Bank.[3] The income variables and other household characteristics variables are calculated for each country using a consistent methodology to ensure that the data are as comparable as possible across countries.[4] A list of the countries used in the analysis, the year the survey was administered, the number of observations included and the tradable staple crops considered, can be found in Table A1 in the appendix. All the data are nationally representative, and the definitions of rural and urban areas are survey specific.

3. Results

3.1 The poor are mostly net buyers of food staples

Low income households, which spend a large proportion of their income on those tradable staple products whose prices increase substantially, are likely to be the ones whose overall welfare is worst affected, as we can see from Figure 1.

[FIGURE 1 ABOUT HERE]

Households that derive a large proportion of their income from the production and sale of those goods will, on the contrary, be positively affected. As we can see from the lower panel of Figure 1, in a number of countries, middle income rural households have the highest share of the value of the production of these main tradable staples in total expenditure, while in others, the poorest households show the highest share.

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[2] We are grateful to Maros Ivanic for providing the elasticity parameters.

[3] More information on the RIGA database can be found at http://www.fao.org/es/ESA/riga/index_en.htm.

[4] See Carletto, et al. 2007 for a detailed discussion of the methodology employed in constructing the household level income aggregates for the RIGA database. Surveys were included in the database based on the potential for creating comparable income aggregates.

The effect for households that are both producers and consumers is ambiguous, and will depend on their net position in the specific market, although a direct comparison between consumption and production shares offers the details by household expenditure quintile.

To understand how the poor are represented within the group of net sellers, the last three columns of Table 1 report the proportion of the poor that are also net sellers, using the dollar a day international PPP poverty line. The bottom line is that even in rural areas, where agriculture and staple food production is the main occupation for a majority of the poor, a vast share of them are net food buyers and stand to be hurt, or at least not to gain, from an increase in the price of tradable staple foods. At the same time, a substantial share of the poor is net food sellers and might therefore benefit from the higher prices. Therefore, even among the rural poor, the impact of increasing prices can be heterogeneous – both within and across countries. The present analysis tries to go beyond the recent literature by: *i)* looking at the characteristics of households who are more likely to be adversely affected, and *ii)* devoting special attention to the correlation between impacts and access to agricultural assets, so as to relate high commodity prices and livelihoods in rural areas.

[TABLE 1 ABOUT HERE]

3.2 The poor lose the most from an increase in staple food prices

Having characterized households in terms of their position in the market for the main food staples, and understood the relative importance of tradable staples in household production and consumption, the next step is to gauge the likely welfare impact of a change in the price on different household types. Figure 2 graphs the median welfare change (in terms of a percent loss in total expenditure) by expenditure quintiles, separately for urban and rural samples. First, and as expected from both intuition and the discussion above, urban consumers are expected to lose in all countries. In rural areas the situation is somewhat more mixed, but

overall gains are still only found in one country—Vietnam—the one country where tradable staples constitute a large share of income for rural households.

[FIGURE 2 ABOUT HERE]

Households in the poorest expenditure quintiles are the worst affected in both urban and rural areas, across the board. In Bangladesh, for instance, both rural and urban households are adversely affected by the increase in the price of rice, and the impact is on average of a similar magnitude at 1.6 to 1.8 percent of their initial total expenditure level. However, in both rural and urban areas the poorest of the poor (the bottom 20 percent) face the largest relative net loss (around 3 percent), with the second poorest quintile losing over 2 percent. In rural Malawi the median losses are around 1.9 percent, but in the poorest quintile they are twice as large as in the richest (2.5 versus 1.2).

This disturbing pattern is observed in all the countries in the sample, albeit with different magnitudes. Vietnam is a case in point. Here in fact rural households are expected to see their welfare increase by 1.4 percent following a 10 percent increase in rice prices. These gains are not, however, evenly distributed and the poorest quintile only gains 0.9 percent, with the larger gains (1.7 to 1.8 percent) accruing to the three middle quintiles. Poor urban consumers are the group whose estimated welfare loss is greatest in Vietnam (1.6 percent).

In Central America, Guatemala presents particularly bleak prospects for urban and rural households alike following a simulated 10 percent increase in the price of maize, wheat and beans, the basic ingredients in the diet of most households. Rural households will, according to these simulations, lose 1.4 percent on average, while urban households will lose about 1 percent. Once again the poorest lose the most: 1.8 percent in rural and 1.5 percent in urban areas. Nicaragua displays a very similar pattern.

Finally, the composition of diets can have implications for the magnitude and distribution of rising staple food prices. Households in countries where the diet is largely

composed of non-tradable food staples tend to be less affected, to the extent that the prices of non-tradables do not trail the prices of tradables. For example, in our simulations Ghanaian households appear to be relatively insulated from swings in international food markets, because a large share of their diet is based on non-tradable staples such as cassava and sorghum. Should the price of these non-tradables also increase, as demand for them increases, rising food prices would have a much sharper impact.

The fact that the poor are hit the hardest by rising food prices in both urban and rural areas is clearly a cause for concern. The erosion of real income in poor households not only harms their current ability to cover basic needs but has the potential to do so for some time to come, thus diminishing their prospects of escaping poverty. Poor households may be forced to cope with the added stress of high food prices by depleting their asset base, reducing the number or variety of meals they consume, or reducing spending on essential non food expenditures, such as health and education.

3.3. Towards a household profile of changes in welfare

As the above analysis suggests, it is extremely important to unpack the average impact estimates in order to understand how specific population subgroups stand to be affected, depending on household characteristics, their access to key assets and livelihood strategies. In particular, we focus on access to land, use of agricultural inputs, livelihood strategies and gender.

The outlook is systematically worse for the poor landless, as can be seen in Figure 4, which graphs the estimated welfare change separately for the rural landless and landowners, by expenditure quintiles. To give an idea of the relative importance of each group in each country, the size of the bubbles in the graphs is proportional to the share of rural population in each subgroup.

[FIGURE 3 ABOUT HERE]

With the exception of Panama, the losses are consistently larger for the landless than for landowners. Taking again the example of Bangladesh, the welfare losses for the landless are as high as 3.6 percent in the bottom quintile, and 3.2 percent in the second last. Even in rural Vietnam, where gains are estimated to accrue to a large share of the rural population, the one group that is expected to lose according to our estimates are the landless, whose average loss is estimated at 1.7 percent, with a peak of 3.3 percent in the bottom fifth of the expenditure distribution.

The comparison of Vietnam and Bangladesh is particularly telling. In both countries, rice is the main food staple and also the main food crop grown by small farmers. Vietnam has a fairly egalitarian distribution of land, with most farmers participating in the production and sale of rice. With impressive gains in smallholder productivity over the past couple of decades, Vietnam has become one of the world's leading exporters of rice. By contrast, most farmers in Bangladesh have limited access to land, often only through tenure arrangements such as sharecropping. Given the different land tenure arrangements, and in the importance of staple food production in household income (highlighted in Figure 1), high rice prices have a substantially different impact on rural welfare in the two countries. In Vietnam, even poor rural households gain from rising prices. In Bangladesh, the impact is negative and large across different income groups, and is particularly high for the poorest households.

To understand whether the estimated changes would be sensitive to the inclusion of short-term wage effects, we also looked at how would the magnitude of the estimated gains and losses change if these effects were to be included. To get a sense of the possible range of the differences associated with accounting for induced changes in agricultural wage rates we experimented with data for a country where agricultural wages are a significant part of rural livelihoods (Bangladesh) and one where their role is more limited (Ghana). In both cases we found the added effect of accounting for changes in agricultural wages to be negligible, and

have therefore decided to stick to the less computational intensive measure of welfare coming out of equation (2).

The fact that a household is engaged in farming does not, by itself, say much about the extent of the losses a rural household might face. We split the sample of rural households for which our welfare change variable is negative in two groups, the moderate losers and the extreme losers. These are defined respectively as households with a net loss lower in absolute value than the median among the losers, and households with a net loss higher than the median. As can be seen in Figure 4, in several of the countries households engaged in farming are more represented among the extreme than the moderate losers. However, factors related to the household's capacity to engage successfully in farming through access to agricultural specific inputs (such as land and the use of fertilizers and pesticides) are, on the contrary, markedly and consistently related to being in a condition to limit the losses from an adverse price shock. Households suffering extreme losses have, on average, lower landholdings and less use of fertilizers and pesticides, in almost all countries.

[FIGURE 4 ABOUT HERE]

The amount of land available is also important, as shown in Figure 5. Here we graph the estimated welfare change from the staple food price increase over land ownership percentiles (for landowners only). We display the results for countries with three very different patterns of the welfare change variable: Vietnam, in which most landowners gain; Pakistan in which the shares of winners and losers are fairly equally distributed; and Malawi in which most households lose. In all cases there is a very clear positive and direct relationship between the amount of land to which households have access and the magnitude of their gain or loss from increased food prices.

[FIGURE 5 ABOUT HERE]

Focusing on household livelihood strategies permits identification of those agricultural producers that are most likely to benefit from the price hikes. Households that specialize in agriculture, which we define as those that derive more than 75 percent of their income from farming, stand to gain the most. In Bangladesh, Pakistan, Nepal, and Vietnam, agricultural 'specializers' gain substantially from higher food prices, with benefits accruing even to some of the poor households (Figure 6). Somewhat surprisingly, wealthier households specializing in agriculture may not always gain the most from staple food price increases, as they may be producing other commodities, the prices of which may not be necessarily increasing, such as high value crops, or livestock.

[FIGURE 6 ABOUT HERE]

In Bangladesh these households, which form about one tenth of the rural sample, see their welfare improving by 2.4 percent on average (1.8 percent in the bottom quintile, 3.2 in the middle, 1.2 in the top one). In Vietnam as well the middle-income agricultural 'specializers' gain the most, at around 3 percent. But in the latter case this group represents a substantially larger share of the rural population, likely due to the more equal distribution of land.

The welfare impact also varies by the gender of the household head (Figure 7). Among urban households, who are primarily net buyers of food, female-headed households suffer a larger proportional drop in welfare as a result of an increase in food prices than male-headed households. The only significant exception in our sample is in Pakistan, where female-headed households represent a larger proportion among the wealthier income groups. Among rural households, female-headed households face considerably higher welfare losses in nearly all countries.

[FIGURE 7 ABOUT HERE]

Female-headed households are more vulnerable to food price shocks for two reasons. First, female-headed households tend to consume proportionally more food than male-headed households, and thus they are hit harder by the impact of high food prices on consumption. Second, female-headed households face a variety of gender-specific obstacles that limit their ability to produce food, and thus to potentially benefit from an increase in food prices. Chief among these constraints are differences in access to inputs and services, and land and credit in particular (see review in Quisumbing and Pandolfelli, 2008).

3.4 Multivariate analysis

To test the robustness of these descriptive results to the simultaneous introduction of additional control variables, we run a regression of the simulated percentage welfare change on a number of household demographic, asset and socio-economic characteristics. As noted by Chen and Ravallion (2004), who apply a similar model to their estimates of welfare change in China following WTO accession, these coefficients are not straightforward to interpret as they subsume effects on both production and consumption decisions.

We use these regressions mainly to isolate the correlates of the simulated welfare impacts. In our case, the interpretation is somewhat less complicated than in Chen and Ravallion as our simulations rely on a more limited set of price changes[5]. Since our aim in this paper is to ensure comparability in the cross-country analysis we have estimated the model, using OLS, on the same set of regressors for all the countries included in the analysis. Each country regression was run independently of each other, so we have a total of eleven country regressions, specified as follows:

$$w_i = \alpha + \beta X_i + \varepsilon_i \qquad (3)$$

[5] Chen and Ravallion (2004) simulate the impact of a full set of predicted price changes estimated using a GTAP model.

where w_i is the estimated change in welfare expressed as a percentage of initial per capita consumption expenditure of household i, X_i is a vector of household characteristics (as detailed in the next few paragraphs) and ε is an independently and identically distributed error term.

The first set of variables used in the analysis – schooling, age, employment and marital status of the household head, family size and the share of household individuals of non-working age, the gender of the household head, the share of female working age adults – represent the human capital, own-labor assets and demographic composition of the household. In addition, we include a variable on one particular aspect of access to social capital: whether the household head belongs to the country's main religious group[6]. It is difficult to sign a priori most of these variables as they can in principle have different effects on household's staple production and consumption.

The next set of variables measures household access to natural and physical capital, as well as household wealth. Natural capital is measured by hectares of land owned, and quality is approximated by the share of owned land that is irrigated[7]. For both agricultural productive assets and household non-productive assets, constructing comparable measures is challenging given the range of assets used for production or held as stores of wealth across the countries being analyzed. In both cases, we created indices of wealth that would facilitate comparison across countries.

Following Filmer and Pritchett (2001), a principal components approach is used in which indices are based on a range of assets owned by households. The choice of assets depended on the country under study but included agriculture-specific assets (such as tractors, threshers, harvesters) for agricultural wealth and household durables (e.g. TV, VCR, stove,

[6] In Guatemala a variable identifying whether the household head belongs to an indigenous group is used instead.

[7] This variable is not available for two countries, Bangladesh and Panama.

refrigerator) for non-agricultural wealth. By construction, the mean of these indices is zero. A measure of household livestock assets expressed in Tropical Livestock Units (TLUs) is also included, as well as two dummy variables indicating whether the household used any fertilizer or pesticides during the year preceding the survey.

We expect agricultural assets to be positively related to changes in welfare as they are likely to be correlated with the ability to produce a surplus in staples. As it has descriptively been shown earlier, however, the relationship may not be linear in the case of land, as larger landowners may diversify away from staple food crops. We therefore include a squared term for land owned in our regressions. We also expect the use of inputs like fertilizers and pesticides to be a good predictor of surplus production, as they have been shown elsewhere to be consistently positively correlated to successful performance in agricultural output markets (Rios *et al.*, 2008b; Zezza *et al.*, 2008).

Finally, the set of regressors includes a measure of access to infrastructure and markets, created in a manner similar to the wealth indices, including both public goods (electricity, telephone, etc.) and distance to infrastructure (schools, health centers, towns, etc.). As with the other indices, the variables included in the index vary somewhat by country. Country specific geographic dummies are also included in each regression.

[TABLE 2 ABOUT HERE]

We run the model separately for the rural and urban samples in each country. Given the large number of regressions, reporting the full set of results would be cumbersome. We therefore present in Table 2 a summary of the cases in which the coefficients for the key variables were significant at the 90 percent level in the country regressions[8]. In rural areas the first result that emerges is the consistency with which the agriculture-specific assets and inputs are a key element in drawing a profile of the households that are likely to gain from the

[8] Full regression results are available from the authors.

increase in staple food prices. Households with more land and that use fertilizers and pesticides are in fact more favorably affected by an upward movement in prices. The sign on the land coefficient is positive and significant in 10 out of 11 cases and those on the use of fertilizers and pesticides in 9 out of 11 and 7 out of 10 respectively. This is confirmed visually in Figure 9 which graphs the magnitude of the coefficients of those variables. Having obtained credit also appears to be positively correlated with the dependent variable in 3 out of the 4 cases where information on credit is available.

[FIGURE 8 ABOUT HERE]

For livestock the results are more mixed, as the coefficient is in fact negative in the three models of the Central American countries. This is likely due to the fact that in these countries households with large numbers of livestock are in fact specialized in relatively large scale meat and dairy production and purchase most of the food staples for their consumption.

Demographic characteristics are also important, with larger households consistently losing more from the price increase than smaller households (Figure 8). Female-headed households are also found to be on the losing side in 5 of 11 country regressions. Households whose head is employed in wage labor are also more likely to lose, as they are less likely to be earning a significant proportion of their livelihood from own production of agriculture.

In urban areas the results are quite different and wealthier households (as measured by the asset index) are consistently less adversely affected by the increases in food prices. This result squares with the analysis by expenditure quintiles discussed earlier, and it is due to the fact that staple food consumption constitutes a relatively less important expenditure item in the budget of richer households. A similar explanation holds for the consistently positive coefficients on education and the infrastructure index.

Interestingly, the use of agricultural inputs turns out to be a significant correlate of more favorable impact of staple food price increases in urban areas as well. In more than half

of the country regressions, households that use fertilizers or pesticides, and that are therefore engaged in urban agriculture, manage to at least shield some of the negative impacts of the higher food prices by producing some food staples themselves.

[TABLE 3 ABOUT HERE]

In Table 3 we break down households between gainers, moderate and extreme losers based on the magnitude and sign of the estimated welfare change, to give a descriptive taste of their differential characteristics. Gainers are defined as households showing a positive welfare change, while moderate and extreme losers have a negative impact higher and lower than the median adverse welfare change, respectively. It is quite striking that the prevalence of the latter group is higher in rural that in urban areas, which again testifies how it is the rural poorest of the poor who are the most negatively affected by the price hikes. As expected, households that lose the most rely less on agricultural-crop income and more on wages (both agricultural and non-agricultural). They also show the lowest degree of accumulation of capital, whether physical or human. They own an average 0.2 hectares of land, have the lowest education level, less than a third of the durable assets (in value) than the average household, and are highly unlikely to use any fertilizers.

In Table 4 the results of a country fixed-effects regression on the pooled dataset are reported. Being Vietnam the reference country, there is a negative relation between residing in other countries and the compensating variation in rural areas (as expected, since Vietnam is the only country showing a positive welfare change in rural settings). The use of fertilizers is strongly and positively correlated with the dependent variable, regardless of the setting, strengthening previous evidence from individual country regressions. Compared to the country regressions, infrastructure and wealth indices have been dropped from this specification as the variables are not comparable across countries. To account for permanent

wealth the value of durables in purchasing power parity has been introduced instead and is significant and with the expected sign.

[TABLE 4 ABOUT HERE]

4. Conclusions

The message that emerges most clearly from the discussion in this paper is that poorer households, and those with the least means to cope, are the most likely to be adversely affected by an increase in the price of basic tradable staple food commodities. All the evidence we presented goes in this direction, and holds regardless of the country, region and location (urban or rural).

The income and asset poor are not only very likely to be losing from the recent price increases, they are also likely to be experiencing proportionally larger losses. First, poor households are overwhelmingly found to be net food buyers of food. In addition, households in the lower expenditure quintiles, households with little land and education, and larger households are all found to be systematically associated to larger estimated percentage losses from rising food prices.

There are exceptions, in that some poor households are able to gain from the increase in prices, but those cases appear to be linked to having access to the key resources needed to turn farming into a profitable activity with reasonable levels of productivity: land in sufficient quantity, and modern inputs such as fertilizers and pesticides. Water is likely to be an additional key factor, but does not come out in our analysis.

From a policy perspective these results have some clear implications. First, countries should be prepared to implement safety nets for the very poor as the impact of high food prices on these households can have extremely serious consequences in the short term, as well as long term implications for their ability to recover from the shock, and their prospects for exiting poverty. While richer households may cope with the price shock by cutting on other

non-essential expenditures or drawing on savings, this option is less open to the poorest, who may be driven into further depleting their meager asset base, or cutting on essential expenditures such as education. This is especially true for poor female-headed households, who are particularly hard hit from the increase in food prices. This, and the longer term impact of inadequate food consumption, would likely translate into lower productivity and income generation potential in the medium- to long-term.

Second, the results point once again to the need to invest in agriculture and to address some of the imbalances in access to key resources and inputs that are required to turn agriculture into a viable enterprise for poor smallholders. While the price increase may provide some opportunity for agricultural growth to the extent that the terms of trade for agriculture improve, it is unlikely that the poor will participate in that growth unless complementary public goods are provided (agricultural research and extension, rural infrastructure) and markets for essential inputs are developed (fertilizers, pesticides, seeds). Once again this is especially true for female-headed households, who face gender-specific constraints in agricultural activities.

While the results presented in this study do not incorporate wage effects, sensitivity analysis confirmed that results would not be significantly different had short-term wage effects been included. We find it comforting that other studies that use more or less complex modeling techniques obtain results that are qualitatively the same as the ones presented here. This is for instance the case of Taylor *et al.* (2006) who simulate in a General Equilibrium framework the effect of a 10 percent change in the price of the main staple in four countries in Central America. Ivanic and Martin (2008) also obtain results that are close to those presented here, even when they account for some possible labor market effects (via the wage rate).

To conclude, we reiterate that in order to understand the real impact of the price increase on developing country households, it is essential not to lose sight of the

heterogeneity at household level. This is, on the one hand, a proposition that motivated this study, but also a recurrent finding that the data we analyzed confirmed in several different dimensions. Highlighting the differences between poor and non-poor, and generally between different groups along the expenditure distribution is certainly important, but limiting the focus to that misses a large part of the story.

We have shown that looking into how households differ in terms of their asset endowment and livelihood strategy yields additional important nuances that can be useful for designing better informed policy responses. And even within those that are adversely affected by the increase in prices, clear differences can be found in the extent to which the losses relate to asset endowments, access to inputs, and livelihood strategies.

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TABLES

Table 1. Share of households that are net sellers of food staples

	Share of Households			Share of dollar-day poor households		
in percent	*Urban*	*Rural*	*All*	*Urban*	*Rural*	*All*
Bangladesh, 2000	4.1	28.0	23.2	4.5	16.6	15.8
Pakistan, 2001	2.1	21.5	15.9	3.6	16.9	14.6
Nepal, 2003	10.7	35.5	31.5	13.8	25.3	25.1
Tajikistan, 2003	0.4	11	7.4	2.9	21.1	16.9
Vietnam, 1998	8.9	67.9	53.7	0.0	59.4	58.8
Guatemala, 2000	2.5	13.6	8.8	1.7	17.8	16.9
Nicaragua, 2001	2.1	21.5	9.6	6.2	27.0	21.0
Panama, 2003	0.2	10.3	3.8	0.0	11.8	11.4
Ghana, 1998	8.0	28.0	20.7	16.8	30.9	28.5
Malawi, 2004	3.4	7.2	6.7	1.0	5.2	5.0
Albania, 2005	0.9	32.4	17.1	*	*	*
Max	10.7	67.9	53.7	16.8	59.4	58.8
Min.	0.2	7.2	3.8	0.0	5.2	5.0
Unweighted average	3.9	25.2	18.0	5.0	23.2	21.4

Source: Authors' calculations using RIGA data. A household is defined as a net food seller when the value of food staples produced by the household is greater than the value of food staples consumed.

* Few observations

Table 2. Statistically significant coefficients for rural and urban OLS models. Dependent variable: percentage change in welfare

Variable	**Rural**	**Urban**	**Total # of**
	Positive/Negative	**Positive/Negative**	**countries**
HH size	0 / 10	0 / 9	11
Share of hh dependents	3 / 0	0 / 0	11
Share of females in hh labor	0 / 3	0 / 3	11
Female headed hh	0 / 5	1 / 3	11
Hh is single	1 / 1	2 / 0	11
Age of hh head	1 / 2	0 / 4	11
Age of hh head squared	1 / 1	2 / 0	11
Hh head wage laborer	0 / 7	1 / 4	10
Average hh education	4 / 1	7 / 0	11
Average hh education squared	2 / 2	0 / 4	11
Religion	2 / 0	0 / 0	9
Infrastructure index	4 / 0	8 / 1	11
Wealth index	4 / 1	11 / 0	11
Land owned	10 / 0	3 / 0	11
Land owned (squared)	0 / 9	0 / 3	11
Share of irrigated land	1 / 1	1 / 0	9
Livestock (TLU)	5 / 3	4 / 0	10
Agricultural wealth index	5 / 1		11
Fertilizers	9 / 0	7 / 0	11
Pesticides	7 / 0	6 / 0	10
Credit	3 / 0	3 / 0	4

Note: The dependent variable is the estimated percentage welfare change following a 10 percent increase in the price of the main tradable staples. The total number of cases refers to the country regression for which the specific dependent variable was included (variables were not included only when not available in the dataset).

Table 3. Pooled sample characteristics (weighted)

Variable	Gainer	Moderate Loser	Extreme Loser	*Total Sample*
Concentration				
Total	26%	37%	37%	*100%*
% of urban	4.5%	45.1%	21.6%	*25.8%*
% rural	95.5%	54.9%	78.4%	*74.2%*
Geographic				
% in Albania	0.6%	2.1%	0.1%	*1.0%*
% in Bangladesh	28.3%	25.3%	41.7%	*32.1%*
% in Ghana	4.5%	11.9%	0.5%	*5.8%*
% in Guatemala	0.9%	5.1%	2.0%	*2.9%*
% in Malawi	0.9%	4.1%	4.9%	*3.6%*
% in Nepal	7.2%	7.5%	3.4%	*5.9%*
% in Nicaragua	0.5%	2.6%	0.6%	*1.3%*
% in Pakistan	13.4%	17.0%	38.3%	*23.9%*
% in Panama	0.1%	2.6%	0.0%	*1.0%*
% in Tajikistan	0.4%	1.3%	2.1%	*1.4%*
% in Vietnam	43.2%	20.4%	6.4%	*21.2%*
Assets				
avg. years of education in hh	3.99	4.99	2.26	*3.72*
land owned, hectares	0.96	0.50	0.20	*0.51*
hh durables value (PPP US$2000)	1,726	3,303	550	*1,873*
hh uses fertilizers	92.4%	33.8%	18.4%	*43.7%*
Demographic				
number of people in the hh	5.44	5.09	5.72	*5.41*
share of hh dependants	55.6%	57.6%	51.7%	*54.9%*
hh share of female labor>14 but <60	50.0%	50.7%	52.7%	*51.3%*
female headed hh	12.1%	20.5%	14.0%	*15.9%*
age head of hh	46.53	46.20	44.48	*45.65*
single head of hh	13.1%	19.9%	14.3%	*16.1%*
Income sources				
agric. wage	5.8%	5.9%	16.9%	*10.0%*
non-agric wage	10.5%	29.6%	32.4%	*25.6%*
crop	42.8%	14.7%	9.7%	*20.3%*
livestock	13.2%	5.4%	4.9%	*7.3%*
self-empl.	13.8%	24.4%	16.8%	*18.8%*
transfers	8.1%	13.8%	13.2%	*12.1%*
other	5.8%	6.1%	6.1%	*6.0%*
Welfare Impact *(median)*	2.3	-0.9	-2.9	*-1.1*

Note: gainers when welfare change is positive; moderate and extreme losers when the negative impact is higher and lower than the median adverse welfare change, respectively.

Table 4. Pooled regression. Dependent variable: percentage change in welfare

Variable	urban		rural	
	coef.	se	coef.	se
number of people in the hh	-0.053***	0.006	-0.071***	0.011
share of hh dependants	-0.144	0.067	0.732***	0.134
hh share of female labor>14 but <60	-0.035	0.053	-0.267**	0.103
female headed hh	-0.058	0.045	-0.250***	0.075
single head of hh	-0.015	0.035	0.044	0.072
age head of hh	-0.019***	0.006	-0.029***	0.010
age head of hh squared	0.000***	0.000	0.000***	0.000
avg. years of education in hh	0.217***	0.012	0.204***	0.026
avg. years of education in hh squared	-0.008***	0.001	-0.017***	0.003
hh durables value (‘000, PPP US$2000)	0.014***	0.002	0.008	0.008
land owned, hectares	0.033***	0.009	0.151***	0.021
land owned squared, hectares	-0.000**	0.000	-0.001***	0.000
hh uses fertilizers	2.003***	0.210	3.350***	0.086
country==Albania	-0.215	0.089	-2.157***	0.289
country==Bangladesh	-0.429***	0.108	-1.827***	0.209
country==Ghana	0.646***	0.098	-0.239*	0.206
country==Guatemala	-0.206***	0.120	-2.673***	0.209
country==Malawi	-1.289***	0.152	-3.663***	0.191
country==Nepal	-0.132**	0.132	-1.595***	0.203
country==Nicaragua	-0.065**	0.094	-1.426***	0.225
country==Pakistan	-0.637***	0.093	-1.562***	0.214
country==Panama	-0.150	0.140	-1.508***	0.223
country==Tajikistan	-1.606***	0.105	-2.648***	0.209
constant	-1.296***	0.197	-0.340	0.299
Number of observations	24,249		47,163	
Population	19,020,849		56,302,866	
Number of strata	11		11	
Number of PSU	1,715		2,666	
R squared	0.337		0.312	
F-statistics	148		151	
p-value	0.000		0.000	

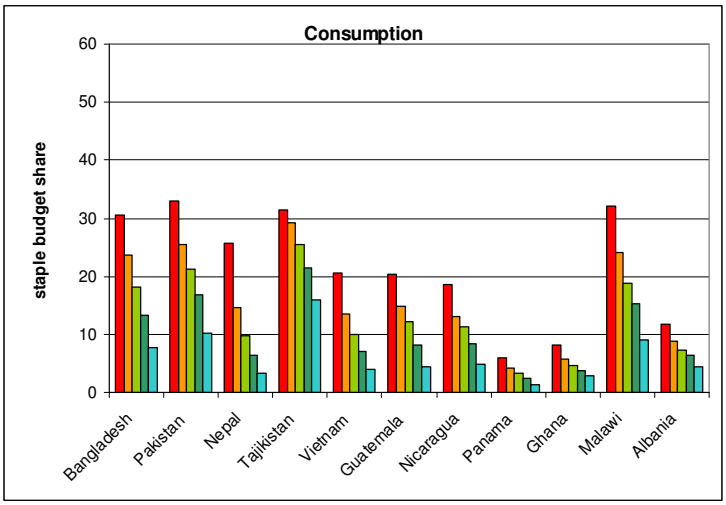
Note: *** p<0.01, ** p<0.05, * p<0.1

Variables are included only if available in all countries to avoid omission of country fixed effects. Standard errors are corrected (linearized) for intragroup correlation, to take account of two-stage cluster sampling design in each survey. Regression is weighted, and reference country is Vietnam.

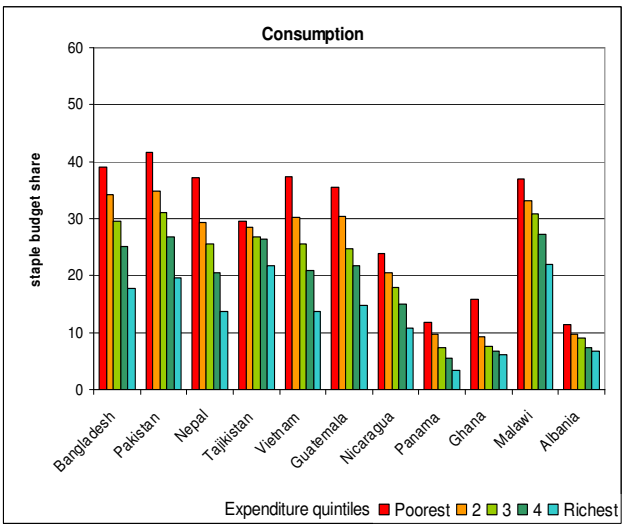
FIGURES

Figure 1. Share of value of consumption and production of main staple foods in total expenditure

Urban



Rural



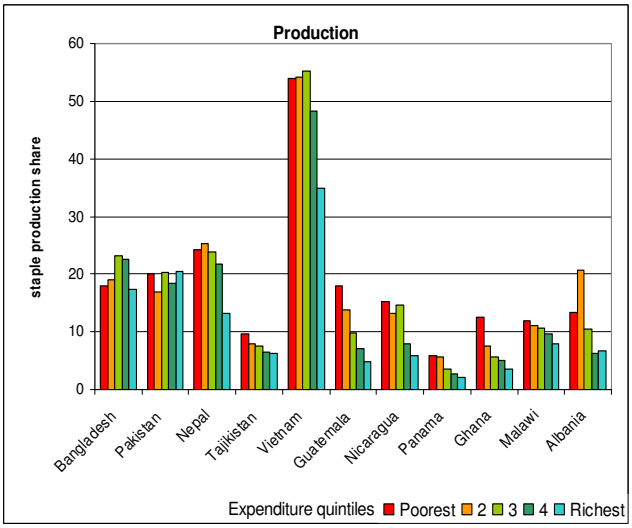


Figure 2. Median welfare effect of a 10 percent increase in the price of the main tradable staples, by expenditure quintiles (percentage)

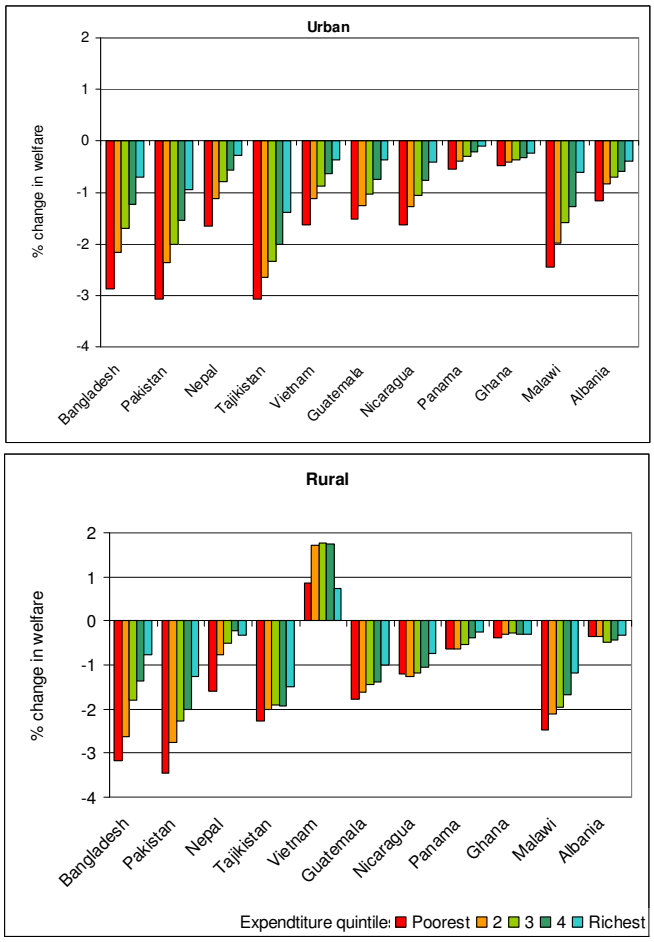


Figure 3. Median welfare effects for landowners and landless households by expenditure quintiles (rural sample only; selected countries)

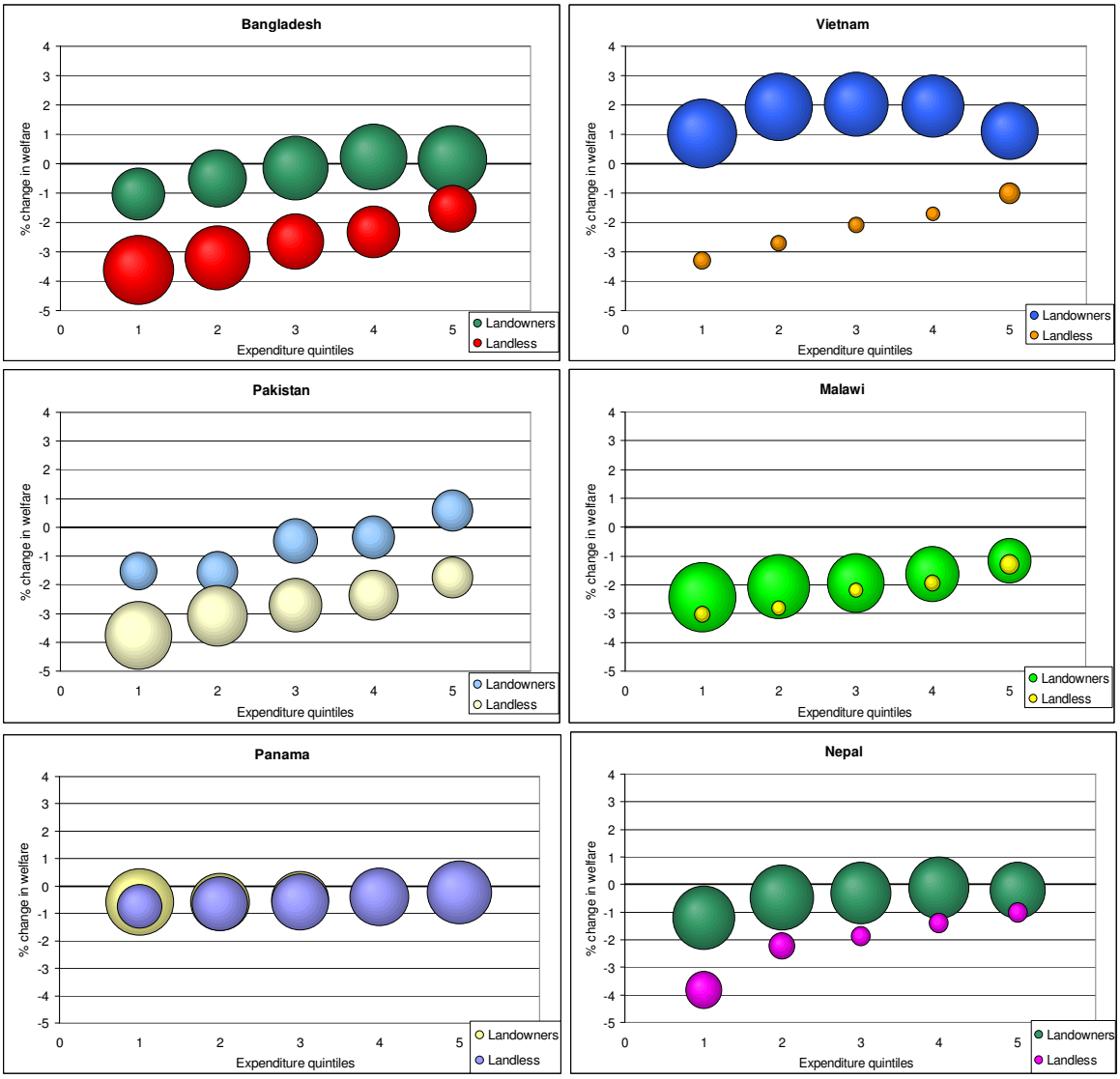


Figure 4. Characteristics of agriculture activity, by whether household suffers moderate or severe losses from price hikes

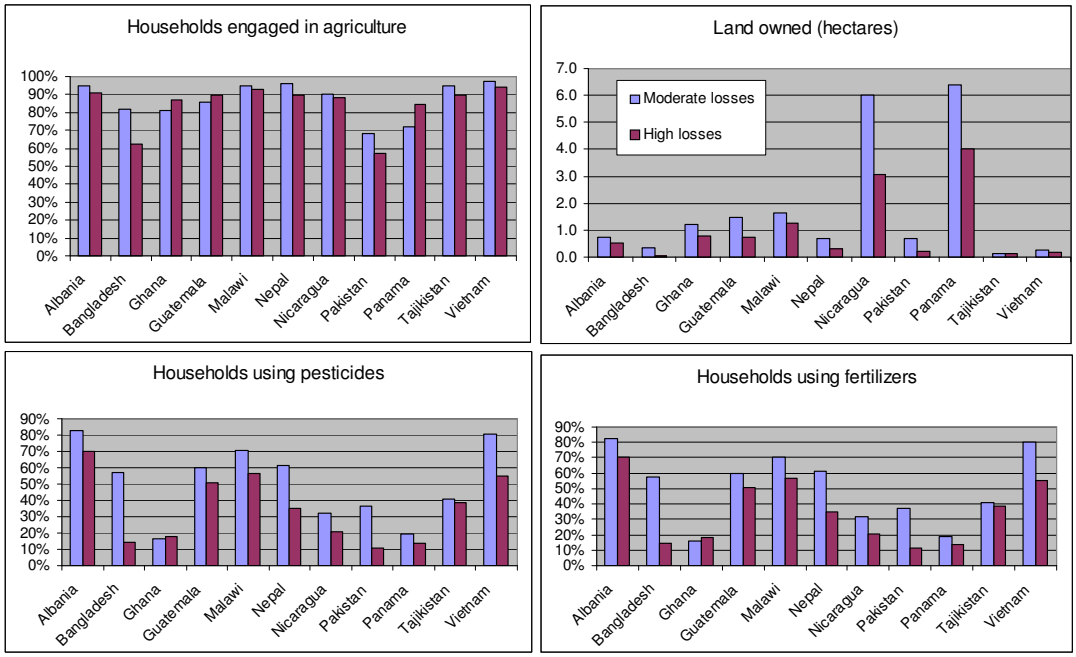


Figure 5. Median welfare change by land ownership percentile: Vietnam, Pakistan and Malawi

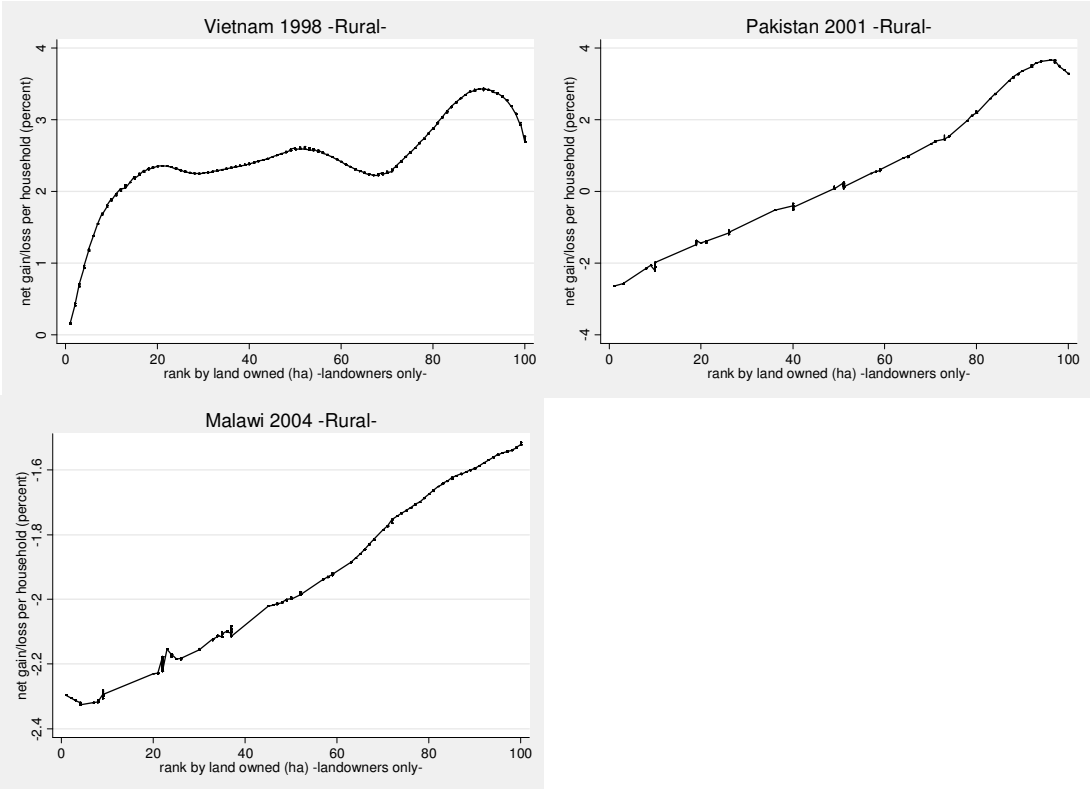


Figure 6. Median welfare effects by livelihood typology and expenditure quintiles (rural sample only; selected countries)

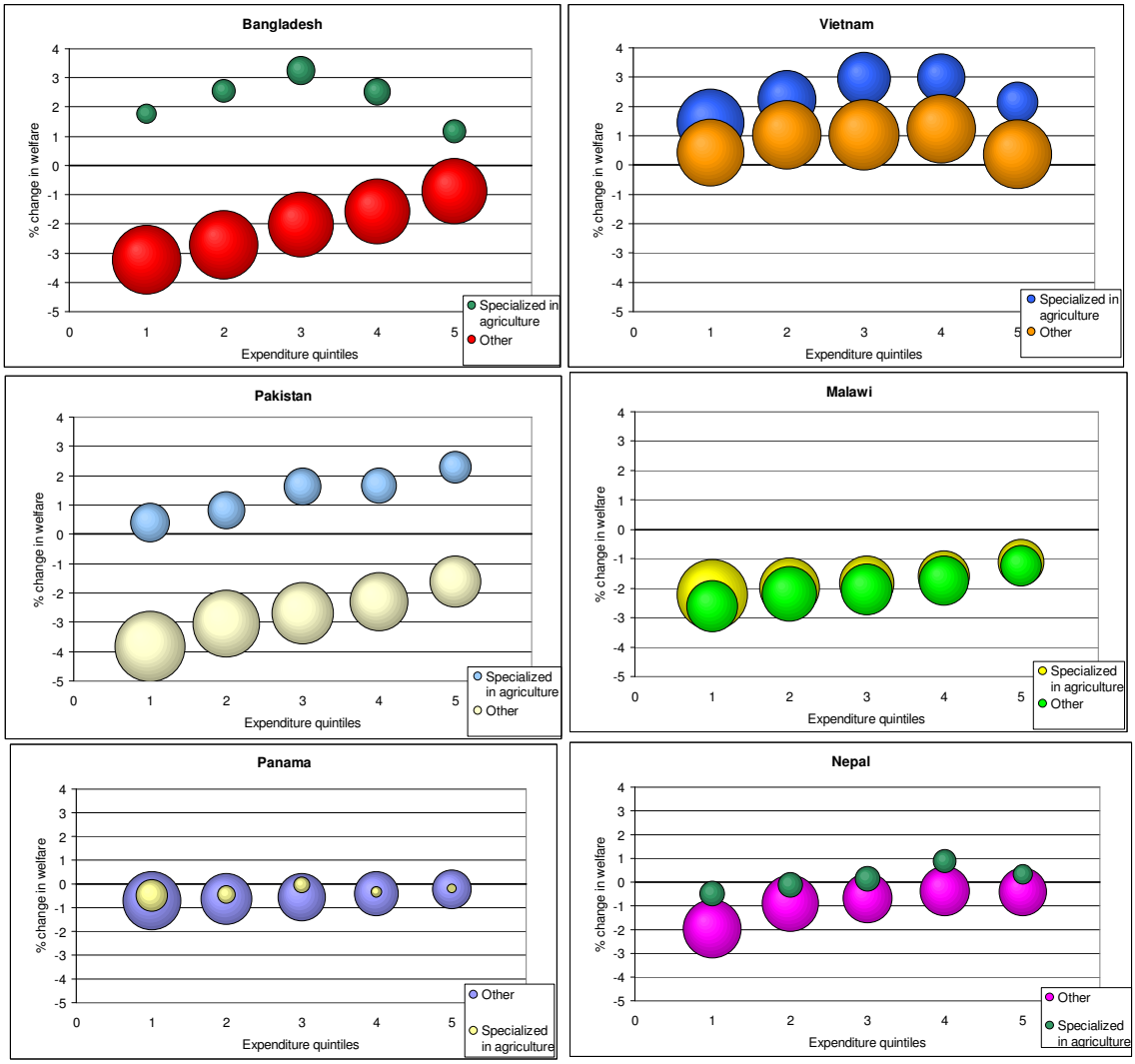


Figure 7. Differences in median welfare change between female- and male-headed households

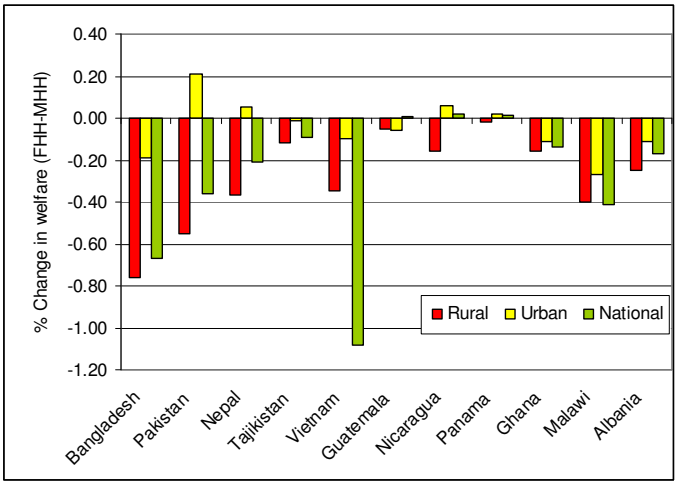
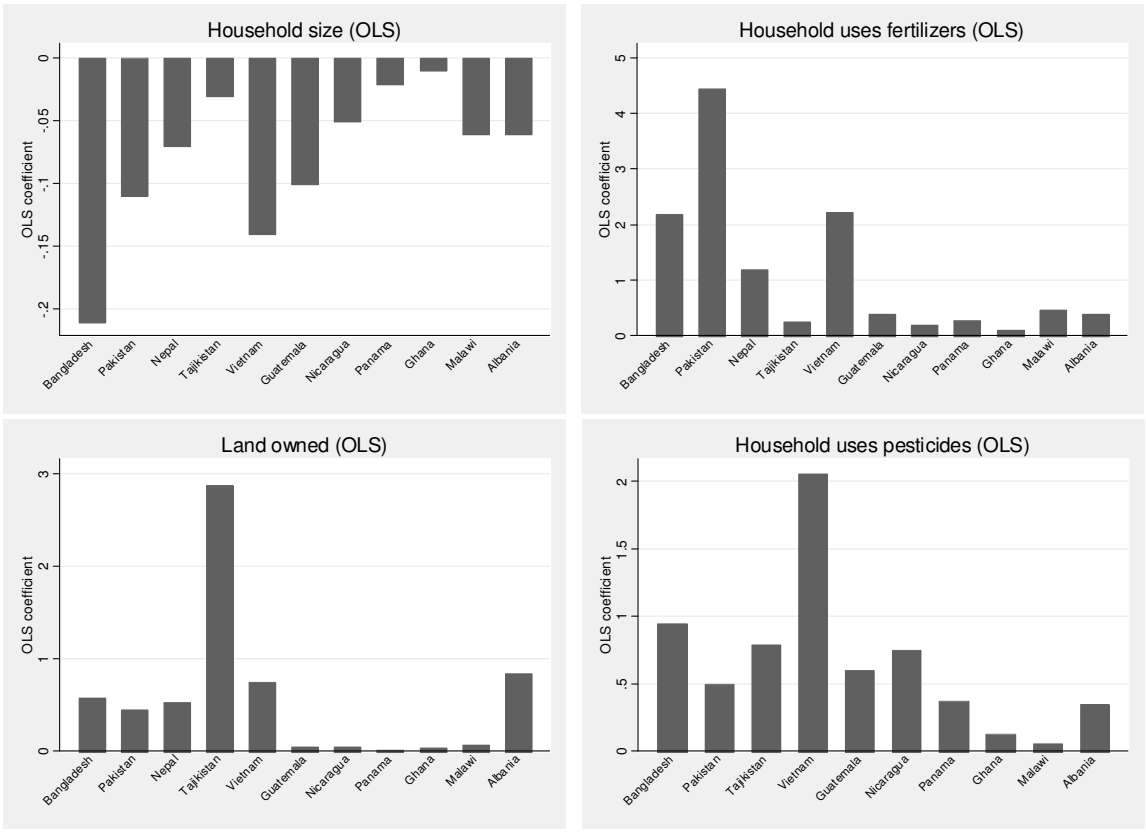


Figure 8. OLS Coefficients on land and fertilizer variables, rural sample



APPENDIX

Table A1. List of surveys used from RIGA database

Country	Name of Survey	Year of Survey	No. of obs.	Tradable staple crops
Africa				
Ghana	Ghana Living Standards Survey- Round Three	1998	5,998	maize, rice
Malawi	Integrated Household Survey-2	2004-05	11,280	maize, rice, pulses
South and East Asia				
Bangladesh	Household Income-Expenditure Survey	2000	7,440	rice, wheat, pulses
Nepal	Living Standards Survey II	2003-04	3,912	maize, rice, wheat
Pakistan	Integrated Household Survey	2001-02	15,776	wheat, rice, beans, maize
Vietnam	Living Standards Survey	1997-98	5,999	rice, maize, beans
Eastern Europe & Central Asia				
Albania	Living Standards Measurement Survey	2005	3,640	maize, rice, wheat
Tajikistan	Living Standards Survey	2003	4,160	rice, beans, wheat
Latin America				
Guatemala	Encuesta de Condiciones de Vida	2000	7,276	maize, beans, wheat
Nicaragua	Encuesta de Medición de Niveles de Vida	2001	4,191	maize, rice, beans
Panama	Encuesta de Condiciones de Vida	2003	6,363	wheat, maize, rice

Table A2. Balance sheets for tradable staple crops

crop	*year*	*production (tonnes)*	*consumption (tonnes)*	*exports (tonnes)* (1)	*imports (tonnes)* (2)	*difference* (1)-(2)	*% exports value/GDP*[9]	*% imports value/GDP*[1]
Africa								
Ghana								
maize	1998	1,034,500	25,089	29,747	4,026	25,721	0.026	0.020
rice	1998	193,600	21,596	107	77,985	-77,878	0.001	0.326
Malawi								
maize	2004	1,733,125	n/a	12,607	54,300	-41,693	0.070	0.350
rice	2004	49,722	n/a	180	262	-82	0.003	0.002
pulses	2004	254,222	n/a	18,172	2,804	15,368	0.226	0.050
South and East Asia								
Bangladesh								
rice	2000	37,627,500	21,503,282	700	452,122	-451,422	0.001	0.136
wheat	2000	1,840,000	3,195,589	n/a	1,600,000	n/a	n/a	0.506
pulses	2000	383,000	529,845	n/a	178,100	n/a	n/a	0.206
Nepal								
maize	2003	1,569,140	1,106,699	n/a	18,648	n/a	n/a	0.042
rice	2003	2,971,970	2,348,669	5745	54,831	-49,086	0.011	0.172
wheat	2003	1,344,190	968,320	314	22,470	-22,156	0.001	0.039
Pakistan								
wheat	2001	19,023,700	16,915,983	353,288	149,121	204,167	0.055	0.037
rice	2001	5,823,000	2,231,814	2,423,858	13,542	2,410,316	0.723	0.005
beans	2001	161,100	153,448	28,644	55,388	-26,744	0.015	0.021
maize	2001	1,664,400	1,585,116	n/a	4,005	n/a	n/a	0.007
Vietnam								
rice	1998	29,145,500	12,893,741	3,730,000	1,300	3,728,700	3.748	0.001
maize	1998	1,612,000	543,685	4,500	98,000	-93,500	0.003	0.056
beans	1998	144,100	123,823	1,926	n/a	n/a	0.004	n/a
Eastern Europe and Central Asia								
Albania								
maize	2005	219,900	n/a	n/a	51,646	n/a	n/a	0.073
rice	2005	n/a	n/a	n/a	23,079	n/a	n/a	0.088
wheat	2005	260,000	n/a	n/a	314,972	n/a	n/a	0.557
Tajikistan								
rice	2003	39,630	36,834	n/a	5,364	n/a	n/a	0.005
beans	2003	1,670	n/a	30	n/a	n/a	0.001	n/a
wheat	2003	660	839,114	n/a	143,881	n/a	n/a	0.798
Latin America								
Guatemala								
maize	2000	1,053,550	1,015,302	6,209	333,053	-326,844	0.023	0.200
beans	2000	109,678	80,949	6,494	6125	369	0.019	0.012
wheat	2000	9,525	341,598	720	27,1342	-270,622	0.001	0.231
Nicaragua								
maize	2001	419,863	268,206	6,969	18,464	-11,495	0.016	0.097
rice	2001	246,201	195,798	29	110,333	-110,304	0.000	0.786
beans	2001	176,832	141,162	22,960	3,619	19,359	0.318	0.046
Panama								
wheat	2003	n/a	123,523	n/a	119,091	n/a	n/a	0.170
maize	2003	72,390	61,252	n/a	293,378	n/a	n/a	0.305
rice	2003	197020	126,043	n/a	5,859	n/a	n/a	0.015

Source: FAO-STAT and WDI-World Bank

[9] Value of exports, imports and GDP are in USD, current prices.