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The impacts of food price and income shocks on household food security and economic well-being: Evidence from rural Bangladesh

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ABSTRACT

This paper examines the combined impacts of food price and income shocks on household food security and economic well-being in low-income rural communities. Using longitudinal survey data of 1800 rural households from 12 districts of Bangladesh over the period 2007–2009, we estimated a three-stage hierarchical logit model to identify the key sources of household food insecurity. The first-difference estimator was then employed to compare pre- and post-shock expenditure for those households that experienced acute food shortages and those that managed to avoid the worst impacts of the shocks. On the basis of our results we conclude that: (1) the soaring food prices of 2007–2009 unequivocally aggravated food insecurity in the rural areas of Bangladesh; (2) the subsequent income shocks of 2007–2009 contributed toward worsening food insecurity; (3) the adverse impacts of these shocks appeared to have faded over time due to labor and commodity market adjustments, regional economic growth, and domestic policy responses, leaving no profound impacts on households' economic well-being in most cases; and (4) although the immediate adverse consequences of rising food prices were borne disproportionately by the poor, the longer term consequences were distributed more evenly across the rich and poor and were favorable for the day laborers.

1. Introduction

The combined effects of food price and income shocks arising from the global food and financial crises have been claimed to be the likely causes of the sharp increase in hunger and poverty in low income countries (FAO, 2009a,b). Three arguments lie at the core of this claim. First, since most households in low-income countries are net food buyers, higher food prices during 2007–2008 are likely to have reduced households' access to staple foods. Second, the global economic downturn led by the financial crisis reduced employment opportunities and remittance income through contraction in exports and foreign capital inflows (including foreign investment and development aid), thereby further limiting households' ability to purchase food at higher prices. Finally, traditional coping strategies during crises such as the selling of productive assets and indebtedness may have forced households into longer-term post-crisis destitution.

The validity of these claims and their core points of contention have not been widely tested by empirical studies. Most of the existing analyses that offer a scientific basis for these hypotheses rely on simulation approaches (e.g., Ivanic and Martin, 2008; Brinkman et al., 2010; de Hoyos and Medvedev, 2011). Generally, simulation based studies employ multi-country household survey data from the immediate pre-crisis years and assume a full rate of transmission from international to domestic scale. In some rare cases these studies take account of market and national-level responses to such shocks (e.g., adjustments to wages; incentives to export-oriented enterprises; abolition of import tariffs; food subsidies) (Ivanic and Martin, 2008; Anderson et al., 2013). The key messages of these analyses are that the poverty and food security consequences of food price and income shocks have been substantial and adverse, resulting in an additional 80 million to one billion people being classed as food insecure during 2008–2009 (USDA, 2009; FAO, 2009a).

The findings of these partial simulations require cautious interpretation. Critics argue that the core underlying assumptions (i.e., no responses to shocks) of the majority of these analyses may have resulted in an overestimation of the negative consequences. This argument has been further substantiated by recent studies examining the 'food price shock, food security and economic

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growth' nexus by Headey (2013) and Verpoorten et al. (2013). Headey's analysis of the Gallup World Poll data from 69 low- and middle-income countries during 2005–2008 revealed a surprising positive trend of increasing global food security: an additional 132 million people were recorded as food secure in 2008 compared to 2005–06. Likewise, Verpoorten et al. (2013) found that between 5 and 12 million people in 18 sub-Saharan African countries became more food secure over the period 2005–2008. These studies concluded that the impacts of a food price shock on food security are highly context specific. Thus, the true impact can only be known when household surveys from the affected countries are analyzed (Harttgen and Klasen, 2012).

Decades of academic research on the nexus between 'food price shock and poverty incidence' suggest that the welfare implications of high food prices are not straightforward (Sah and Stiglitz, 1987; Ravallion, 1990; Swinnen and Squicciarini, 2012). Although net food buying urban dwellers certainly do suffer, a food price shock is likely to cause winners and losers among the rural communities (Swinnen and Squicciarini, 2012). Which groups (e.g., farming or non-farming households, landowners or non-landowners) are helped or hurt depends on the rapidity and magnitude at which labor and commodity markets, both inside and outside agriculture, adjust in response to price shocks (Sah and Stiglitz, 1987; Jacoby, 2013). Using a partial equilibrium model of food price change and induced wage, Ravallion (1990) concluded that the short- and long-term welfare consequences of a food price hike vary substantially between the poor and non-poor. The rural poor are likely to lose in the short-term, but the adverse effect is likely to cease over a period of three or four years by making the welfare of a typical poor household neutral to food price shocks.

Like the 'food price shock and poverty incidence nexus', the nexus between 'income shock and poverty incidence' is also highly context specific. Neo-classical economic theory (e.g., the permanent income hypothesis) and empirical evidence from developed countries suggest that transitory income shocks are smoothed through saving and dissaving and therefore have no negative implications for household welfare (Friedman, 1957; Kukk et al., 2012). Empirical studies from low-income countries reveal significant negative welfare consequences of transient income shocks due to credit constraints and an absence of formal insurance markets (e.g., Morduch, 1994). However, such negative consequences are unlikely to be permanent in societies with informal insurance arrangements and well-designed social safety nets (Jalan and Ravallion, 2001). Jalan and Ravallion (2001) found that both rich and poor households eventually bounce back from transient income shocks, the speed of recovery being slower for the poor than for the non-poor.

Empirical studies examining the impacts of food prices and income shocks on rural households' food security and welfare using country specific household level data are rare in the literature. There is currently only one empirical study that examined the short-term welfare impacts of the 2007–2008 food price shock using contemporary (2008) cross-sectional data from rural communities in Côte d'Ivoire (Dimova and Gbakou, 2013). Dimova and Gbakou's (2013) study was unable to capture the longer-term welfare impacts of the shock as the evaluation was undertaken at a time when the food price shock was still ongoing. Further, an analysis of the extent to which a subsequent income shock might alter the dynamics of food security and welfare impacts remained outside the scope of their study. Thus, knowledge gaps clearly exist with regard to (1) the longer-term distributional impacts of a food price shock in rural communities; and (2) the nature and extent to which a subsequent income shock may worsen the food security and welfare impacts for poor and non-poor communities.

Given this background, this paper presents an empirical household level study of the simultaneous effects of food price and income shocks on the food security and economic well-being of low-income rural communities. Our study draws on a unique longitudinal survey dataset gathered from 1800 rural households in 12 districts of Bangladesh over the period 2006/07–2009/10. The time span covered by our data offers an ideal opportunity to capture both the short- and long-term impacts of the food price shock observed in Bangladesh during 2007–2009 in combination with a number of idiosyncratic and covariate income shocks between 2007 and 2009. The richness of the data set allows us to estimate a three-stage hierarchical logit model which provides a bimonthly analysis of self-assessed food security by accounting for the spatiotemporal dynamics of the food price shock. In addition, the model controls for a range of observable income shocks (i.e., remittance inflows and loss and damage incurred due to negative events) and tests hypotheses related to unobservable effects through scale heterogeneity. The panel nature of the data offers the opportunity to assess longer-term welfare impacts of the crises by comparing the pre- and post-shock expenditure profiles of the sampled households. To this end, we employ a first difference estimator by controlling for fixed and time-varying household-level heterogeneity. To the best of our knowledge, such an in-depth empirical examination of the food security and welfare consequences of food price and income shocks is non-existent in the literature.

The rest of the paper is organized as follows. Section 2 discusses the key macroeconomic parameters of Bangladesh during 2006/07–2009/10, followed in Section 3 by a description of the household data used in the empirical analysis. Section 4 presents descriptive statistics for the key variables of interest. Section 5 identifies the determinants of the self-assessed food security indicator by estimating a three-level hierarchical logit model. Section 6 discusses the objective food security indicator and analyzes the welfare impacts by comparing per-capita consumption expenditures before and after the crises. Section 7 discusses the main results and Section 8 outlines our key conclusions and policy implications.

2. The context: macro-economic indicators of Bangladesh during 2006/07–2009/10

Bangladesh is one of the poorest countries of the world. Approximately 75 percent of the country's population of 160 million lives in rural areas, earning an average of US$1300 per household per year (BBS, 2011a). Bangladesh is an agrarian country and a net importer of food. In fiscal year 2008, imports constituted 13 percent of the country's total rice and wheat supply (Bangladesh Bank, 2008). Rice is the staple food accounting for over 70 percent of the total calorie intake. Rice is also the dominant agricultural crop occupying two-thirds of the total arable land. Agriculture contributes to 20 percent of the gross domestic product and employs more than half of the total labor force (BBS, 2011b). Bangladesh is the second largest South Asian country in terms of international labor supply and the sixth largest source of global immigration (World Bank, 2011). Net exports and foreign remittances make up 20 percent of Bangladesh's gross national income (BBS, 2011b).

Fig. 1(a) presents the trends of the FAO Cereal Price Index and the retail price of coarse rice in Bangladesh during January 2007–December 2009. As shown in Fig. 1(a), there was a strong positive correlation between domestic rice price movement and FAO Cereal Price Index ($r = 0.83$, $p < 0.001$). The results of a simple linear regression analysis (Table 1) suggest that the positive association was statistically significant in most cases, except for the first quarter of 2008 when the rice price was 60 percent higher than its mean in 2007 and 2009. The price rise during this period was likely