Non-food Coping Strategies in Response to the World Food Price Crisis: Evidence from Education in India

Sharad Tandon*

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ABSTRACT

World grains prices dramatically increased between 2007 and 2008, but rice prices especially surged. Utilizing the much larger spike in rice prices than in wheat, this article compares the response of Indian households consuming rice as the staple grain to households consuming wheat. Households worse affected by the crisis sacrificed diet diversity, spent less on labor-saving durable goods, sent fewer children to school, and increased the amount of children performing domestic work. These results demonstrate a direct link between food insecurity and human capital investments, and suggest significant non-health costs to the rising food prices of the past two decades.

Keywords: World Food Price Crisis, Education, Nutrition, India

JEL classification: D12, I25, J24 O12, O53

*Economic Research Service, USDA. Contact: standon@ers.usda.gov, 202-694-5291 (Phone), 202-694-5793 (Fax). Address: 355 E St. SW, Washington, D.C. 20472. The views expressed here are those of the authors and may not be attributed to the Economic Research Service or the U.S. Department of Agriculture.

Introduction

Despite widespread improvements in the availability and stability of food supplies, recent estimates suggest there are between 700 and 870 million malnourished people in the world (FAO 2013a; Fan 2012; Meade and Rosen 2013). Given the difficulties faced by many households in obtaining adequate sustenance, considerable attention has been devoted to measuring different aspects of malnourishment (FAO 2012), analyzing methods to better deliver food assistance,[1] and analyzing how households cope with food insecurity.[2]

This article focuses on the response of households to the global food price crisis in India. Food prices across the world began to increase in 2006, but then dramatically rose in 2007 and the first half of 2008. However, the rise in food prices was not uniform. The prices of staple grains (e.g., rice and wheat) especially surged, and the average increase in rice prices was nearly twice as large as the increase in wheat prices (e.g., Viatte et al. 2009). The causes of the price shock are complex and unclear, but droughts, speculation in commodity futures, rising oil and fertilizer prices, the expansion of biofuels, and increasing demands of a rising global population have all been offered as potential explanations (e.g., Trostle 2008; Viatte et al. 2009). Whatever the causes, the effects have been dramatic, where as many as 44 million people were driven into food insecurity by the surge in prices (Mitchell 2008).

In addition to the crisis, rising food prices have been a pressing concern in developing countries for the past two decades. Both the FAO and IMF track a number of commodity prices over time, and demonstrate that food prices have been steadily increasing since the end of the 1990's (FAO 2013b; IMF 2014). Additionally, commodity prices again spiked following the world food price crisis, suggesting that coping with rising food prices is a significant household problem and is of great interest to policy makers (e.g., Trostle et al. 2011).

India's response to the dramatic rise in food prices is a particularly interesting case. Although government intervention mitigated the scale and

[1] See Behrman and Deolalikar (1988) and Barrett (2002) for summaries.
[2] See Barrett (2002) for a summary.

immediacy of the shock, the price patterns in India followed the general global patterns and there was a much larger increase in rice prices than in wheat. Additionally, there are regions of the country which essentially consume only rice or wheat as the primary staple food. Given that a high proportion of the Indian diet is composed of grains (e.g., Deaton and Dreze 2009), rice-eating regions were ultimately much worse hit by the global crisis than wheat-eating regions. Thus, this setting allows a comparison of both food and non-food coping strategies between the two types of regions to better describe the consequences of the crisis and how households cope with food insecurity more generally.

This article adapts a simple model of consumption presented in Jensen and Miller (2008a), which imposes a penalty on individuals who choose to consume less than their minimum daily energy requirement. In a traditional model of consumption of normal goods, households would substitute away from a good made relatively more expensive in response to a price increase. However, given the penalty of consuming below subsistence, households cannot substitute away from grains after a large increase in the price of grains, and must cut consumption of other types of goods. Such a model can help to explain how households might sacrifice diet diversity, spending on durable goods that might help reduce the amount of domestic work to be done (e.g., washing machines, sewing machines, etc.), and education in response to the dramatic increase in the price of grains during the food price crisis.

Although this partial equilibrium model focuses only on consumption and assumes household wealth to be exogenous, there are other ways in which the rise in grains prices might affect education. In particular, households might have increased the amount of domestic work needing to be accomplished (e.g., delaying the purchase of labor-saving durable goods, etc.) and also might have decreased the amount of people to accomplish the domestic work (e.g., spouse of the head of the household engaging more in market work). Alternatively, children can also perform market work to help support household income during the negative price shock. Thus, it is possible that children were assigned to domestic or market work instead of attending school.

Using a number of different measures that utilize pre-crisis consump-

tion of each staple good, this article corroborates that rice-eating regions were more exposed to the dramatic increase in grains prices than wheat-eating regions. Consistent with articles measuring the impact of the crisis in other countries (e.g., D'Souza and Joliffe 2012; D'Souza and Joliffe 2014), estimates suggest that households primarily consuming rice reduced their non-grains consumption by nearly 19 percentage points more than households primarily consuming wheat. However, there was not a significant difference in overall calorie consumption as households better maintained their grains consumption.

Despite the lack of a calorie response to the crisis, the larger decrease in diet diversity in rice-eating regions resulted in worse nutritional outcomes. Households worse affected by the price spike had a larger decrease in total consumption of calcium, dietary fiber, and iron. Importantly, rice and wheat-eating regions did not have different trends in diet diversity and calorie consumption prior to the spike in food prices, and households in rice-eating regions did not significantly increase consumption of wheat as the relative price of rice increased. These findings help rule out other explanations for the change in diet patterns and suggest that the effects can be attributed to the rise in food prices.

Given evidence that households in rice-eating regions were more exposed to the dramatic rise in grains prices, this article estimates the response of school attendance to the dramatic rise in prices. The spikes in food prices significantly affected education. Regions exposed to larger price increases in staple foods had lower growth in school attendance in children older than the normal age of primary school attendance (aged above 10), who were better able to contribute to domestic work than younger children. The results are robust to a number of definitions of rice and wheat-eating regions and estimation strategies, but the baseline results compare districts where pre-crisis consumption of rice was less than two percent of overall calories to regions where pre-crisis consumption of wheat was less than two percent of overall calories. Using this measure, there was a smaller increase of 6.6 percentage points in school attendance in rice-eating regions than in wheat-eating regions. Importantly, there is little difference in any of these patterns between boys and girls, and little difference between rural and urban households.

Additionally, children who stopped attending school increased the amount of domestic labor they performed. There was an increase in the share of children aged above 10 whose primary occupation was domestic labor by 5.9 percentage points in rice-eating regions relative to wheat-eating regions, but no relative differences for younger children who did not decrease school attendance in response to the spike in grains prices. Further verifying that the price shocks potentially affected the demand for household labor, households in rice-eating regions sacrificed expenditure on purchasing and maintaining a number of labor-saving durable goods (e.g., sewing machines, washing machines, etc.) by approximately 45 percent more than households in wheat-eating regions. Thus, it is likely that the amount of household labor to perform actually increased in response to the rising food prices. However, the adult members of the household did not significantly change their domestic labor, which suggests that children might have been needed to contribute more to domestic tasks.

Importantly, these results survive a number of robustness checks. First, it is important to note that there are significant differences in school attendance and educational policies between states in which most rice and wheat-eating regions are located.[3] However, school attendance was not trending differently between the two types of regions prior to the crisis, which suggests that these results are not detecting differences aside from those resulting from the differential rise in staple prices. Second, given the large amount of overlap between regions primarily consuming and growing particular types of grains, the results could also be driven by relative changes to income in households whose primary occupation was agricultural production during a tumultuous period in agricultural markets.[4] However, this does not seem to be the case as all results are identical when dropping all households whose primary occupation is agricultural production.

Third, education is significantly affected by state-level policies and it

[3]Although some of the rice-eating regions are from states in the south of the country (e.g., Andhra Pradesh and Tamil Nadu) that are much wealthier than the northwest states that contain the wheat-eating regions, a number of the rice-eating regions are from relatively poorer states in the east of the country (e.g., Assam, Orissa, etc).

[4]Rural agricultural wages also increased during this time period, albeit by less than the dramatic increase in grains prices (Ministry of Labour and Employment 2010). However, this occurred in both rice and wheat-eating regions, and is likely captured in the empirical analysis in the consumption and education trends common to both regions.

could be possible that a single state containing wheat-eating regions was taking steps to improve school attendance on average, or a single state containing rice-eating regions enacted policies that make school attendance less attractive to children. However, the results suggest that this scenario is unlikely. Both rice and wheat-eating regions are contained in a number of states, and the results are uniform across states.

Lastly, there are a number of events that happened during the time period under analysis aside from the dramatic rise in grains prices. Although far from an exhaustive list, the global financial crisis significantly affected employment across the country (e.g., Bajpai 2011), there was a significant expansion in the social safety net through a national employment program (MNREGA) which further affected labor markets (e.g., Azam 2012), and there were significant state-level initiatives to improve food aid through the Public Distribution System (PDS) in a number of states (e.g., Khera 2011). Although each of these events could have affected schooling decisions at the household level, unless these factors differentially affected households in rice and wheat-eating regions, they would be captured by the common trends in schooling in both types of regions. However, specifications are estimated which restrict the sample to children from households that were least likely to be affected by the global financial crisis, which restrict the sample to households that received no assistance through MNREGA, and specifications are estimated which exclude children that resided in states that instituted PDS reforms. All results are identical to the baseline specification.

These results help to better describe the non-health costs of the world food price crisis, and find evidence of a link between food insecurity and education. Although theoretical models of food security incorporate many linkages between food consumption and investment in human capital (e.g., Barrett 2002), and a separate literature analyzes the effect that health has on education outcomes (e.g., Glewwe and Miguel 2007), little empirical evidence exists suggesting that households might actually sacrifice education in response to food insecurity. Such a link further underscores the need to develop effective food aid policies to help target food-insecure households during times of rising food prices, which has been a significant issue in developing countries both before and after the food price crisis (FAO 2013b).

Furthermore, these results suggest that the long-term effects of the food price crisis, through both health and education, are potentially larger than predicted (e.g., Mitchell 2008).

Additionally, this article fits in the literature analyzing the effects of the world food price crisis on nutrition. These results are most closely related to household-level studies that find, in response to the crisis, households sacrificed diet diversity but maintained overall calorie consumption.[5] D'Souza and Joliffe (2012) found this pattern in Afghanistan, and Jensen and Miller (2008b) found little nutritional response to the beginning portions of the crisis in China prior to the most severe surge in grains prices. Aside from generalizing the analysis to non-food coping strategies, the results presented here generalize D'Souza and Joliffe (2012) to a less tumultuous setting (e.g., no conflict), and generalize Jensen and Miller (2008b) to a setting in which there was a dramatic rise in the price of staple foods. Furthermore, the response of India to the crisis is particularly important, given the country contains nearly forty percent of the world's food-insecure population (e.g., FAO 2013a).

These results are also related to articles which find a link between schooling and the cost of education (e.g., Angrist 2002; Shultz 2004, Duflo et al. 2006, etc.). However, this article establishes a link between schooling and the cost of non-school goods, which is a setting that has become increasingly important in developing countries in the past two decades. Additionally, these results are also related to a number of articles which find a link between schooling and income (e.g., Behrman and Knowles 1997; Glewwe and Jacoby 2004; Duncan et al. 2004; Yang 2008; Edmonds et al 2010; etc.). The results are most similar to Edmonds, Pavcnik, and Topalova (2010), which demonstrated that schooling decreased in regions worse hit by the Indian trade reforms, and emphasized informal schooling costs as a potential factor. The present results generalize the income effects analyzed in Edmonds, Pavcnik, and Topalova (2010) to a setting of rising food prices, which involves both substitution and income effects. Additionally, given that there was no difference in informal educational expenditures

[5] A number of articles projected the effects of the price spikes on nutrition based on simulations, and find that food security worsened over the time period (e.g., Ivanic and Martin 2008; Ul Haq et al. 2008; Woden et al. 2008; Simler 2010; and Robles and Terero 2011).

(e.g., books, school supplies, etc.) between rice and wheat-eating regions, the results presented here suggest that households that removed their children from school were investing little in their children's education aside from the opportunity cost of their domestic labor. Thus, schooling costs do not appear to be a driver of the observed patterns.

The rest of the article is structured as follows. Section I presents a simple model of consumption; Section II describes the spike in rice and wheat prices in India; Section III describes the data; Section IV analyzes food-based coping strategies; Section V analyzes the effect rising grains prices had on education; and Section VI concludes.

I. A Simple Model of Consumption

This section adapts the simple framework presented in Jensen and Miller (2008a) to describe how rising food prices might affect food-insecure households. Households consume a staple food (x_1) and all other goods (x_2), where all other goods includes more nutritious foods, education, durable goods, etc. Households are assumed to have homothetic preferences, which implies that in response to a price increase, households will substitute away from the good made relatively more expensive in the standard utility maximization problem.

The staple good is assumed to have c calories per unit consumed. Households meet their daily minimum energy requirement s through consumption of the staple good x_1, but can choose to consume less of x_1 and face a penalty for doing so of $f(cx_1 - s)$. It is assumed that the penalty decreases rapidly as calorie consumption approaches subsistence, and the penalty goes to zero as households consume well above subsistence (i.e.,$f(\cdot)$ is decreasing and convex). Thus, in the limiting case of sufficient food consumption, the penalty is essentially zero and the penalty function will have little effect on household behavior. However, for lower levels of consumption closer to subsistence, the penalty is substantial and household behavior will deviate from the standard utility maximization problem.

Denoting the price of the staple food and all other goods as p_1 and p_2, and denoting wealth as w, households choose x_1 and x_2 to solve:

$$Max_{x_1,x_2\geq 0} \quad u(x_1,x_2) - f(cx_1 - s) \qquad \text{s.t. } p \cdot x \leq w$$

Assuming an interior solution, the first order conditions for the problem imply:

$$\frac{u_1(x_1^*, x_2^*)}{u_2(x_1^*, x_2^{*)}} = \frac{p_1}{p_2} + \frac{cf'(cx_1^* - s)}{u_2(x_1^*, x_2^*)} \tag{1}$$

This equation differs from the standard utility maximization problem by the second term of the RHS of (1). The assumption of the penalty function decreasing in calories consumed and the assumption of marginal utility being positive imply that the term is negative. Thus, given that homothetic preferences imply that the LHS of (1) is decreasing in the ratio of the staple food to all other goods ($\frac{x_1}{x_2}$), households who face a subsistence penalty choose a higher $\frac{x_1}{x_2}$ than would be chosen in a standard utility maximization problem.

Furthermore, this very simple framework can illustrate how consumption might vary when the price of the staple food (p_1) substantially increases. In the standard problem, the assumption of homothetic preferences imply that such a change would cause households to decrease the ratio of the staple food consumed to all other goods as they substitute towards the goods made relatively cheaper. However, in the present case, the penalty of consuming near subsistence, captured by the second term of the RHS of (1), will mitigate the substitution away from the staple food as such a shift is increasingly painful as households consume further below subsistence. In the case of a sufficiently large penalty for households that are very food-insecure, households can maintain consumption of the staple food, but must significantly decrease consumption of all other goods in order to cope with the shock to food prices. The key comparison is the size of the marginal decrease of the penalty function relative to the size of the marginal increase in utility of consuming the non-staple good.

Such a framework could predict that in response to a dramatic rise in the price of the staple food, food-insecure households might decrease consumption of more nutritious non-grains foods, decrease consumption of durable goods that help households perform domestic labor, and also

decrease education. Although this partial equilibrium model focuses only on consumption and takes household wealth to be exogenous, decreasing consumption of durable goods that help households perform domestic labor might also increase the amount of domestic labor that needs to be done in the household. Such changes might also have additional impacts on household education decisions.[6,7]

II. Rice and Wheat Markets in India

Rice and wheat prices in India dramatically increased between 2004/2005 and 2009/2010, the period under analysis in this article.[8] The timing of

[6]Although the simple model has implications for how household wealth might affect how households coped with the spike in grains prices, there is not a clear theoretical prediction and the issue is likely empirical. The simple model presented above could predict that as household wealth decreases, the penalty function becomes more severe as households consume closer to subsistence, and thus some coping strategies might become more pronounced. However, the prediction does not necessarily survive relaxing the assumption of homothetic preferences. It is possible that relatively poorer households were consuming very few non-grains calories and not purchasing many labor-saving durable goods prior to the food price crisis, and thus do not significantly decrease consumption of these goods. Subsequently, if the decrease in school attendance was driven by the increase in domestic work, it might be the case that differences in school attendance might not be primarily driven by the poorest households.

[7]Although the simple model has implications for how households coped with the large increase in the price of staple grains, it would be difficult to interpret estimates that allow the response to the spike in grains prices to vary by wealth given that measures of wealth themselves might vary in response to the spike in prices. Further complicating such an analysis, the Employment and Unemployment survey conducted by the National Sample Survey Organization used in the empirical analysis does not collect information on expenditure in the post-period. The closest measure collected in all surveys is the amount of land owned by each household, but one cannot reject the hypothesis that the effect the spike in grains prices did not vary with the amount of land owned by each household.

[8]The Public Distribution System provides subsidized food grains to households based on their poverty status. Households that are below-the-poverty line (BPL) receive significantly subsidized rice and wheat, and other above-poverty-line (APL) households receive smaller subsidies. About 21 percent of sampled households in the 2004/2005 consumer expenditure survey (the survey used for the baseline year of the empirical analysis) had a BPL card that entitled them to the highest PDS subsidies, and approximately 56 percent of households had an APL card. However, the standard ration size in most states (20-35kg) is far lower than total household consumption of grains (Deaton and Dreze 2009), and households who are able to purchase their entire ration are still adversely affected by the dramatically higher market prices of grains. Additionally, a number of states during the time period under analysis were particularly poor at distributing the subsidized grains, and many households could not obtain their entire entitlements (e.g., Khera 2011).

the increases in each commodity corresponds to the rapid increase in the world prices between 2006 and 2008. Figure 1 presents average rice prices in Thailand and average wheat prices in the U.S., which are good proxies for world prices (Westcott and Trostle 2013). Prices for each commodity began to soar between 2007 and 2008, but the jump in rice prices was far larger than the jump in wheat prices. Following the crisis, the price of wheat decreased back to pre-crisis levels, but the price of rice remained significantly above pre-crisis levels.

Figure 1 also presents average prices of rice and wheat in India. Although the scale and immediacy of the crisis in India was mitigated relative to the increase in world prices due to government intervention in grains markets, there was a significant surge in the prices of rice and wheat in India. Three important patterns emerge from these average prices. First, similar to global patterns, the price of rice in India increased far more than the price of wheat. Specifically, the price of rice more than doubled and the price of wheat increased by more than 60 percent during the time period under analysis in this article. Second, also similar to global patterns, wheat prices started to spike in 2006 before decreasing. And lastly, rice prices started to surge in the beginning of 2008 and continued to surge beyond 2010. This last pattern is different from world rice prices, which fell dramatically in the second half of 2008.

Just as the causes of the world food price crisis are complex and unclear, the causes of the price rises in India are also unclear. Historically, India has been successful in maintaining relatively stable domestic rice and wheat prices, but market and policy developments have led to noticeably higher prices for both commodities since the mid-2000s (Childs and Kiawu 2009). The government stabilizes grains prices in a number of ways- it purchases a large amount of rice and wheat directly from farmers at the Minimum Support Price (MSP) to supply subsidized rations for poor households through the country's large food assistance program, occasionally sells some of its stockpiles of rice and wheat on the open market to regulate market prices, and restricts imports and exports of rice and wheat to try to limit the effect world prices have on the domestic markets (Jha, Srinivasan, and Landes 2007).

However, despite the government intervention, rice prices surged much

more than wheat prices. One factor for the higher surge in rice prices was that there was more room for transmission of the spike in world grains prices to rice markets than wheat. International trade was highly regulated during this time period for both wheat and rice. Wheat exports were effectively banned between 2006 and 2011, whereas exports of basmati rice and some amounts of common varieties were still allowed to Bangladesh and Sub-Saharan Africa (Childs and Kiawu 2009). Given the positive exports of rice and the fact that Indian rice prices are far below world prices (Figure 2), there was more potential for international rice prices to be transmitted to the domestic market than was the case for wheat.

In addition to it being more likely that the international spike in grains prices was transmitted to rice markets than wheat, another factor in the higher surge in rice prices appears to be larger increases in the economic cost of production, as reflected by the larger increase in the MSP for rice (Figure 2). According to the guidelines used by the Commission on Agricultural Costs and Prices (CACP), MSP's are intended to reflect changes in underlying costs of production. During this time period, the CACP documents significant increases in labor costs in agricultural production, and this is more likely to adversely affect rice markets than wheat given the higher labor intensity in rice production (Westcott and Trostle 2013).

III. Data

In order to estimate the response of school attendance, diet choice, and expenditure on labor-saving durable goods, this article utilizes data obtained from consumer expenditure and employment surveys conducted by the National Sample Survey Organization (NSSO) in India. Each survey is a repeated cross-section and samples the entire country. The survey is stratified by whether a household resides in a rural or urban area, and is further stratified by relative household affluence. In the baseline estimates, this article utilizes the "thick" rounds conducted in 2004/2005 (61'st Round) and 2009/2010 (66'th Round).[9,10]

[9]The rounds are referred to as "thick" due to the higher number of households surveyed than those in the annual "thin" surveys.

[10]Given the stratification of the surveys, population estimates for both rural and urban

This article focuses on the effect the food price crisis had on education and child labor decisions. Data on school attendance and types of work performed by each household member are obtained from the employment and unemployment surveys. Each survey reports the usual activity (e.g., school, domestic work, market work etc.) of each household member, and further reports a number of household characteristics and the district in which each household resides.

In particular, this article focuses on the school attendance of children who were older than the age of normal primary school attendance (older than 10). Children younger than this rarely focus on domestic work, likely because they are less able to perform domestic tasks. However, specifications are also estimated which analyze the school attendance and domestic work of children who are the normal age to attend primary school (aged 5-10).

Verifying that households in rice-eating regions were more exposed to the rising food prices, this article also analyses the effect the rise in grains prices had on diet choice. Data on diet choice are obtained from the consumer expenditure surveys. Each consumer expenditure survey provides data on quantities and values of food items consumed over the past thirty days. From this data, household calorie consumption from each source is estimated by utilizing nutritional information provided by Gopalan, Rama Sastri, and Balasubramanian (1989). All food items consumed at home are combined into the following groups: grains, pulses, sources of animal-based protein (dairy and meat), and produce (fruits and vegetables).

This article analyzes the effect rising grains prices had on non-grains consumption- consumption of pulses, animal-based protein, and produce.

areas can only be constructed at the state and national levels. In this instance, it is not possible to construct population estimates for groups of districts that primarily consume rice or wheat. Although the household decisions under analysis are potentially affected differently by the spike in grains prices based on income and whether a household resides in a rural or urban area, the empirical analysis estimates changes in household behavior. Thus, since the stratification is identical across surveys, it is not necessary to re-weight observations to arrive at a population estimate of school attendance and other household decisions. However, all trends discussed in the main text are identical when divided up by rural and urban areas, and all patterns discussed below are similar if the sample is restricted to particular second-stage strata within which there is random sampling of households (i.e., non-affluent households in the rural sector, non-affluent households in the urban sector, affluent households in the rural sector, etc.).

Based on recommended dietary allowances in India, households on average have greater deficiencies in non-grains consumption than in grains consumption (National Institute of Nutrition 2010). A higher level of non-grains consumption would imply higher scores on most diet quality indices, which are associated with better health outcomes.[11] However, specifications are also estimated that analyze total nutritional content of the household diet (e.g., calories, protein, calcium, iron, etc.).

Additionally, this article also estimates the effects the rise in grains prices had on other types of expenditure. Each consumer expenditure survey reports expenditure on purchasing and maintaining durable goods that might help household members perform daily domestic tasks- washing machines, sewing machines, pressure cookers, refrigerators, irons, and automobiles. And lastly, the consumer expenditure survey also reports spending on education. Although schooling is free in India for most children, the survey reports spending on school supplies, books, etc.[12]

Using this data, this article analyzes a number of food and non-food coping strategies by comparing changes in household choices in rice-eating regions to changes in wheat-eating regions that were less exposed to the dramatic increase in grains prices. All definitions of rice and wheat-eating regions use average consumption of grains in 1999/2000, the last "thick" survey conducted prior to the base period in the analysis (2004/2005). The baseline specifications define rice-eating regions as those where average wheat consumption is less than two percent of overall calorie consumption; and wheat-eating regions are defined as those where average rice consumption is less than two percent of consumption.[13]

Based on this definition, Figure 3 presents rice and wheat-eating districts across all of India. Rice-eating regions are primarily located in the south and the east of the country; wheat-eating regions are primarily lo-

[11] See Wirt and Collins (2009) for an overview of studies analyzing the relationship between diet quality and health outcomes, and for definitions of 25 separate measures of diet quality used in the literature.

[12] Specifically, the survey reports expenditure on books, newspapers, library charges, stationary, tuition and other fees, and private tutors.

[13] It is also possible to identify wheat and rice-eating regions by average consumption of the dominant grain as opposed to consumption of the non-dominant grain. However, given grains consumption is highest in the poorest households (e.g., National Sample Survey Organization 2007), these measures might also capture district characteristics aside from the choice of staple grains, such as relative poverty, etc.

cated in the northwest of the country. Although some of the rice-eating regions are from wealthy states in the south of the country (e.g., Andhra Pradesh and Tamil Nadu), a number of the rice-eating regions are also from relatively poorer states in the east of the country (e.g., Assam, Orissa, etc). A smaller cut-off of consumption of the non-dominant grain used to define rice and wheat-eating regions corresponds to a lower number of each type of region, and a lower number of states from which each type of region is contained. However, the results are robust to the use of both lower and higher cut-offs to define rice and wheat-eating regions.

Table 1 presents summary statistics of household non-grains consumption, household expenditure on labor-saving durable goods, school attendance, the share of children primarily performing domestic work, and the usual activity of household adults. Over this time period, consumption of non-grains calories and total calories are decreasing, the proportion of children attending school is increasing, and the share of children primarily engaged in domestic work is decreasing. All of these trends are consistent with other articles analyzing nutrition and education in India (e.g., National Sample Survey Organization 2007; Deaton and Dreze 2009; Edmonds, Pavcnik, and Topalova 2010).

Most important to the analysis, households in rice-eating regions did not substitute towards wheat consumption as the price of rice rose significantly more than the price of wheat between 2004/2005 and 2009/2010. If this did occur, it would be difficult to argue that households in rice-eating regions were more hurt by the increases in food prices, and it would be difficult to estimate the magnitude of the response households had in response to the spike in grains prices. However, Figure 4 demonstrates that there was very little change in the consumption of the non-dominant grain in the regions used in the baseline empirical specifications.

Defining regions as rice and wheat-eating based on consumption of the non-dominant grain representing less than two percent of total consumption, Table 2 presents the basic identification strategy in a difference-in-difference table analyzing changes in diet choice and school attendance in response to the rising grains prices. Column (1) demonstrates that both rice and wheat-eating regions reduced overall calorie consumption, and one cannot reject the hypothesis that there is no difference in the response be-

tween the two types of regions. However, column (2) demonstrates that there was a significant difference in the nutritive value of the decreased calories. Rice-eating regions that were more exposed to the rising grains prices reduced calories from non-grains sources by 23.5 percentage points more than wheat-eating regions.

Additionally, column (3) demonstrates that households in rice-eating regions had essentially no change in expenditure on labor-saving durable goods, while consistent with national trends, households in wheat-eating regions rapidly increased spending on labor-saving durable goods. Lastly, columns (4)-(7) demonstrate that households in rice-eating regions had lower growth in school attendance and had smaller declines in children performing domestic work than households in wheat-eating regions.

IV. The Response of Diet Choice to the Rise in Grains Prices

Based on the simple framework presented in Section I, this section formalizes the difference-in-difference identification strategy outlined in Table 2. Specifically, this section analyzes whether households reduced non-staple food consumption in response to the dramatic rise in the price of the staple food. In analyzing the effects rising grains prices had on households, it is difficult to rely on actual local price changes given the potential for unobserved local shocks to affect both grains prices and potential household coping strategies. For example, India was adversely affected by the global financial crisis during this time period, and different levels of local exposure based on employment could affect both agricultural markets and household decisions on diet and education. Thus, this study utilizes the differential spike in grains prices during the world food price crisis and compares the household response of those that consume primarily rice to those that primarily consume wheat.

The baseline specification restricts households to those residing in rice or wheat-eating regions and estimates the following specification:

(2)
$$ln(NonGrains_Calories_{idt}) = \kappa_d + \gamma RiceEating_{idt} * Post_{idt} + \beta X_{idt} + \epsilon_{idt}$$

where d denotes districts according to 2004 boundaries; t denotes the time period (t=2004, 2009); κ_d denotes district fixed effects; $NonGrains_Calories$ denotes daily per capita calories consumed from pulses, sources of animal-based protein, and produce; $RiceEating$ denotes an indicator equal to one if the household resides in a region where average household consumption of wheat in 1999/2000 was less than two percent of overall consumption; $Post$ denotes an indicator equal to one if the household observation is taken from the 2009/2010 survey; and X contains $Post$ and time-varying control variables.[14] The coefficient of interest is γ, which gives the difference-in-differences estimate of the effect higher grains prices had on non-grains consumption. If the increased grains price led to lower consumption from more diverse calorie sources, then estimates of γ should be negative and significant.[15]

The estimates of γ are presented in Table 3. All estimates suggest that rice-eating regions more exposed to the rise in grains prices decreased non-grains consumption by more than households in wheat-eating regions. Column (1) estimates the baseline specification, and suggests that households in rice-eating regions sacrificed non-grains consumption by nearly 19 percentage points more than households in wheat-eating regions.

Alternatively, Table 3 also performs a number of robustness checks to verify the decrease in non-grains consumption was not caused by trends unrelated to the rise in food prices. First, given the dramatic rise in food

[14]Controls include the natural logarithm of non-food expenditure, indicators for whether a household resides in a rural area, indicators for household religion (Muslim, Christian, Hindu, Jain), indicators for the social group to which the household belongs (Scheduled Caste, Scheduled Tribe, or Other Backward Class), the number of sons in the household, and the number of daughters in the household.

[15]This article also investigated matching methods proposed by Smith and Todd (2005) and Blundell and Costa-Dias (2000) to estimate the effects higher grains prices had on diet choice and school attendance. This estimator is the difference between the matching estimator in rice-eating regions and the matching estimator in wheat-eating regions, which each use a post indicator to define treatment. The standard error is calculated with the bootstrap. However, Abadie and Imbens (2008) demonstrate that standard errors calculated with the bootstrap fail to perform well in even the most simple matching estimator, which suggests such an estimator might be inappropriate. Alternatively, when using the matching estimator proposed by Abadie et al. (2004) to estimate treatment separately in rice and wheat-eating regions (using the post indicator to define treatment and matching on the household-level control variables in the baseline specification), the difference is nearly identical to the OLS estimates discussed in the main text and the confidence intervals on the two estimates do not overlap.

prices, it might be the case that changes in non-grains consumption might have been caused by changes to the income of agricultural producers and not the rise in food prices more generally. However, column (2) demonstrates that this likely is not the case as the results are identical when restricting the sample to only households whose primary form of employment is not agricultural production.

Second, Table 3 demonstrates the decrease in non-grains consumption is not an artifact of the definition of rice and wheat-eating regions. Columns (3) and (4) define rice and wheat-eating regions as those where average pre-crisis consumption of the non-dominant grain was less than one and three percent of total consumption respectively. Although small increases in the cut-off of consumption of the non-dominant grain significantly expands the regions under analysis, the results in these alternate specifications are qualitatively identical to the baseline results.

Lastly, columns (5) and (6) demonstrate that the households in rice and wheat-eating regions only began to differentially change their non-grains consumption after the dramatic rise in grains prices. Column (5) estimates a specification analyzing the difference-in-difference in non-grains consumption prior to the rise in grains prices; and column (6) adds the pre-existing trend to the baseline specification. The coefficient on the difference-in-difference estimate of non-grains consumption prior to the food price crisis is statistically insignificant in both specifications and smaller in magnitude than the baseline estimates. Additionally, the baseline estimate is nearly identical when adding the pre-existing trend to the specification.[16,17]

Table 4 more fully examines the nutritional implications of lower non-grains consumption, and further demonstrates that the change in diet choice resulted in worse nutritional outcomes in rice-eating regions. Column (1) demonstrates that the change in total calorie consumption was not significantly different in rice and wheat-eating regions. However, columns

[16]The 1994-1995 survey does not have district identifiers, and thus cannot be used in estimating pre-existing trends in diet choice or school attendance.

[17]Although the specifications are not reported, this specification survives all robustness checks performed for the specifications analyzing the response of school attendance to the increase in grains prices. This includes restricting the sample to households not benefiting from MNREGA, restricting the sample to households from states not reforming the PDS, and restricting the sample to households least affected by the global financial crisis.

(2)-(5) demonstrate that regions more hurt by the rising food prices had larger decreases in total consumption of a number of beneficial nutrients. In particular, the larger decrease in non-grains consumption in rice-eating regions translated into a significantly larger decrease in the total consumption of calcium, dietary fiber, and iron. This is consistent with evidence that higher non-grains consumption is associated with better nutritional outcomes (Wirt and Collins 2009).

V. The Response of Education to the Rise in Grains Prices

Based on the simple framework presented in Section I, and given evidence of households significantly coping with the differential spike in grains prices, this article investigates the effect the rise in grains prices had on school attendance. The article focuses on children who are older than the normal age to attend primary school (older than 10 in most states), which are the children most able to help perform domestic work. Specifically, the following specification is estimated:

$$(3) \quad AttendSchool_{idt} = \kappa_d + \gamma RiceEating_{idt} * Post_{idt} + \beta X_{idt} + \epsilon_{idt}$$

where i denotes the individual household member, *AttendSchool* is an indicator equaling one if the child attends school, and all other variables are defined as above.[18] The level of observation is the individual, and γ again represents the difference-in-difference estimate of the impact the higher spike in grains prices had on school attendance. If a higher spike in grains prices translated into lower school attendance, the estimate of γ would be negative.

[18]Controls include the age of the child, an indicator for whether the child is male, indicators for whether a household resides in a rural area, indicators for household religion (Muslim, Christian, Hindu, Jain), indicators for the social group to which the household belongs (Scheduled Caste, Scheduled Tribe, or Other Backward Class), the number of sons in the household, the number of daughters in the household, and a third-order polynomial in the child's age which includes interactions between each term and the child's gender. All household-level controls are identical to the previous specification except for the exclusion of the natural logarithm of non-food expenditure, which is not available in the 66'th round of the Employment and Unemployment survey.

However, there are a number of important issues to address in the estimation of specification (3). First, all the same issues discussed when estimating food-based coping strategies are present when analyzing school attendance. Specifications are estimated excluding all households that are primarily engaged in agricultural production, so as to rule out the possibility that the changes to education are being driven by changes in agricultural income; other definitions of rice and wheat-eating regions are used to demonstrate that the results are not an artifact of the definition of rice and wheat-eating regions; and given that the dependent variable is a binary, probit specifications are also estimated.

Second, there are a number of events that happened between 2004/2005 and 2009/2010 aside from the dramatic rise in food prices. Although far from an exhaustive list, the global financial crisis significantly affected employment across the country (e.g., Bajpai 2011), there was a significant expansion in the social safety net through a national employment program (MNREGA) that affected labor markets (e.g., Azam 2012), and there were a number of state-level initiatives to improve food aid through the PDS (e.g., Khera 2011). Although each of these events could have affected schooling decisions at the household level, unless these factors differentially affected rice and wheat-eating regions, they would be captured by the common trends in schooling in both types of regions. However, specifications are estimated that exclude households that were most exposed to these other policy changes and shocks to investigate whether the baseline estimates are uncovering effects attributable to other concurrent events.

Third, although this article focuses on children who are older than the normal age to attend primary school, specifications are also estimated that analyze children who are the normal age to attend primary school in most states (aged 5 to 10). Additionally, specifications are estimated which analyze what activities children are engaged in, such as domestic work, market work, school, etc., for each age group. These specifications will further help to demonstrate what activities children are engaged in if they are not attending school.

Fourth, education is significantly affected by state-level policies and it could be possible that a single state containing wheat-eating regions was taking steps to improve attendance on average, or a single state contain-

ing rice-eating regions enacted policies that make school attendance less attractive for children better able to perform domestic work. However, both rice and wheat-eating regions are contained in a number of states. Thus, specifications are estimated to help analyze how uniform the empirical patterns across states, in order to see whether state-level policies in a particular state might be driving the results.

Lastly, there are significant differences between rice and wheat-eating regions, and these differences might be causing the regions to be trending differently in absence of the dramatic rise in grains prices. Thus, specifications are estimated analyzing trends prior to the rise in grains prices. If the grains prices are driving the empirical results, one would expect there to be no prior trends in school attendance.

A. Results

The rise in grains prices had a significant effect on school attendance of children most likely able to help with domestic work. Table 5 presents estimates of specification (3) and demonstrates that school attendance of children older than 10 increased by less in regions more exposed to the rising grains prices. Column (1) estimates a specification that excludes the third-order polynomial in the child's age, and column (2) includes these terms. The most complete specification in column (2) suggests that the share of children older than 10 that attended school increased by 6.6 percentage points less in rice-eating regions than in wheat-eating regions. Additionally, given the dependent variable is binary, column (3) demonstrates that the estimate is qualitatively identical when estimating a probit specification.

There is little evidence that the effect the spike in grains prices had on school attendance varied significantly across households. Columns (4) and (5) estimate specifications that interact the variable of interest in specification (3) with a gender and rural indicator respectively. Neither estimate is statistically significant at conventional significance levels, and one cannot reject the hypotheses that the effect the spike in grains prices had on school attendance was identical for girls and boys, and also identical between rural and urban regions. Column (6) estimates a specification including both interaction terms in the baseline specification. Again, neither

of the coefficients are individually significant, and one cannot reject the hypothesis that the two coefficients are jointly equal to zero at conventional significance levels (p-value of 0.273).

Additionally, columns (7)-(9) of Table 5 re-estimate the baseline specification, but respectively restrict the sample to children aged 5 to 10, children aged 11-14, and children older than 14. The specifications follows Edmonds, Pavcnik, and Topalova (2010) and breaks up the sample of children older than primary school age into those 14 and below and those above, which is the demarcation of the worst forms of child labor by the International Labor Organization. Column (7) demonstrates that one cannot reject the hypothesis that there was no difference in the growth of children aged 5-10 attending school between rice and wheat-eating regions. However, columns (8) and (9) demonstrate that both children aged 11-14, and children older than 14 had smaller increases in school attendance in rice-eating regions relative to wheat-eating regions.

Alternatively, Table 6 report a number of robustness checks discussed above. Column (1) restricts the sample to those not employed in agricultural production to verify that the results are not being driven by changes to agricultural income during a time of volatility in agricultural markets. The estimate is identical to the baseline results, which suggests that changes in agricultural incomes are not driving the results.

Table 6 also demonstrates that the baseline results are robust to using different definitions of rice and wheat-eating regions. Specifically, columns (2) and (3) re-estimate the baseline specification, but define rice and wheat-eating regions using a cut-off of consumption of the non-dominant grain to less than one and three percent of total consumption respectively. The results in each column are qualitatively identical to the baseline results. The number of rice and wheat-eating regions significantly expands as the cut-off of consumption for the non-dominant grain increases, as well as the number of states from which they are contained. The uniformity of results across different definitions of regions further suggests that the results are not being driven by policies of any particular state.

Given the significant national and regional changes aside from the dramatic increase in grains prices between 2004/2005 and 2009/2010, Table 6 estimates a number of additional robustness checks. Column (4) re-

estimates the baseline specification, but excludes children from households that received benefits from the national employment scheme instituted during the time period (MNREGA); column (5) excludes children from households in states that significantly reformed the PDS during this time period;[19] column (6) restricts the sample to children from households that were least affected by the global financial crisis.[20] However, all results are identical to the baseline specification, which suggests that the baseline results are capturing the effects of the dramatic increase in grains prices and not other concurrent events.

Lastly, Table 6 also demonstrates that school attendance was not differentially trending between regions prior to the dramatic increase in grains prices. Column (7) presents the difference-in-difference estimate between 1999/2000 and 2004/2005, and demonstrates that one cannot reject the hypothesis that there was no difference in school attendance growth between rice and wheat-eating regions prior to the rise in grains prices. Additionally, column (8) adds the pre-existing trend to the baseline specification, and demonstrates that the difference in school attendance growth between the regions between 2004/2005 and 2009/2010 is identical to the baseline estimate, and that one cannot reject the hypothesis that school attendance was differentially trending prior to the food price crisis.

B. Discussion

In addition to estimating the effects the rising grains prices had on school attendance, this section further investigates what types of children were kept from attending school and what children might have done instead of attending school. First, it appears that the children that stopped attending school were likely children for whom education would not have

[19]This article identified states that instituted PDS reforms based on the characterization utilized in Khera (2011). These states are Chhattisgarh, Madhya Pradesh, and Orissa.

[20]Based on Bajpai (2011), the sectors most affected by the global financial crisis were those that were primarily export-oriented. Over the year immediately prior to the global financial crisis between 2007-2008, the top five exporting sectors in India were petroleum products, manufacturing of machinery, gems and jewelry, pharmaceuticals, and Cotton (Ministry of Commerce 2009). Thus, households where the head of the household was employed in any of these industrial codes were excluded from the baseline specification.

been a priority in absence of the rising food prices. Column (1) of Table 7 re-estimates the household-level specification (2) using household expenditure on informal educational expenses as the dependent variable, and demonstrates that one cannot reject the hypothesis of no differences in the change in spending between rice and wheat-eating regions.

Table 7 further investigates the existence of other non-food coping strategies that might have contributed to the need for children to stop attending school. In particular, the table investigates whether households increased the amount of domestic work to be accomplished, which might be a potential cause of the decrease in school attendance. The simple model in Section I suggests it is possible that households reduced consumption of a number of types of non-food goods in response to the dramatic rise in the price of the staple food. Thus, Table 7 re-estimates the household-level specification (2), but using a measure of household expenditure on labor-saving durable goods as the dependent variable.[21]

Table 7 demonstrates that households in rice-eating regions significantly decreased expenditure on labor-saving durable goods relative to households in wheat-eating regions. The baseline estimate in column (2) suggests that households in rice-eating regions had an increase in expenditure on labor-saving durable goods that was 45 percentage points lower than the increase in wheat-eating regions. Column (3) suggests that the results were not driven by households employed in agricultural production; columns (4)-(5) demonstrates that the results survive using different definitions of rice and wheat-eating regions; and columns (6)-(7) demonstrate that expenditure on labor-saving goods did not begin to change differently between rice and wheat-eating regions until the dramatic spike in grains prices.[22]

Given the relative decrease in spending on labor-saving durable goods, it is possible that the amount of household domestic work increased. However, it does not appear that adult members of the household changed their

[21]The specification includes all controls used in the baseline specification except for the natural logarithm of non-food expenditure because the dependent variable is a portion of that expenditure.

[22]Although the specifications are not reported, this specification survives all robustness checks performed for specification (3). This includes restricting the sample to households not benefiting from MNREGA, restricting the sample to households from states not reforming the PDS, and restricting the sample to households least affected by the global financial crisis.

labor allocation, and that the potential excess domestic work was left for children. Table 8 re-estimates the individual-level specification (3) using adult household members as the level of observation, and uses an indicator equaling one if the household member was engaged in particular types of work as the dependent variable.

The estimates in table 8 demonstrate that one cannot reject the hypothesis that neither the household head nor the spouse of the household head changed their labor allocation differently between rice and wheat-eating regions. Columns (1) and (2) report specifications using an indicator equaling one if the individual was performing domestic work; columns (3) and (4) report specifications analyzing market work; and columns (5) and (6) report specifications analyzing whether the individual is not engaged in either market or domestic work. All coefficient estimates are not statistically significant at conventional significance levels, the point estimates are low in magnitude, and many of the estimated standard errors are small enough to bound the 95 percent confidence interval on the difference-in-difference estimate to an absolute value of approximately one percent or less.

Given the potential increase in domestic labor to be performed, and the lack of an increase in domestic labor accomplished by adult members of the household, it is possible that children stopped attending school in order to perform domestic work. Although there are a number of potential explanations for the changes in school attendance, at least some of the children that stopped attending school primarily engaged in domestic work. Table 9 re-estimates specification (3), but uses an indicator equaling one if the child was engaged in a particular type of work as the dependent variable. In particular, columns (1)-(6) re-estimate variants of the baseline specification but analyze whether the child was engaged in domestic work; and columns (7) and (8) analyze whether the child was engaged in market or other work respectively.

Table 9 demonstrates that rice-eating regions had smaller declines in the share of children that perform domestic work than wheat-eating regions. The estimate in column (1) suggests that the decline in domestic work was 5.9 percentage points smaller in rice-eating regions. Column (2) demonstrates that this estimate is qualitatively identical when estimating a probit specification; column (3) demonstrates that this pattern is

not driven by children from households primarily engaged in agriculture; column (4) demonstrates that children aged 5-10, which had no decrease in school attendance, did not observe similar changes in the incidence of domestic work; and columns (5)-(6) demonstrate that there was no differential trending in domestic work amongst children prior to the spike in grains prices, and that the baseline estimate is identical when including a pre-existing trend in the specification.[23]

Alternatively, there did not seem to be a change in any other type of work, suggesting that the children who stopped attending school primarily engaged in domestic work. Column (7) of Table 9 estimates a specification analyzing market work, and column (8) estimates a specification analyzing other work. Both estimates have point estimates that are smaller in magnitude than any of the estimates from specifications analyzing domestic work in columns (1)-(6), and neither estimate is statistically significant at conventional significance levels.

V. Conclusion

This article investigates the effects the world food price crisis had on Indian households by utilizing differences in the size of the price increase between rice and wheat. To infer the causal effect of the rise in grains prices on school attendance, regions that primarily consume rice as the staple grain are compared to regions that primarily consume wheat. This article finds that regions worse affected by the rise in grains prices observed smaller increases in school attendance and smaller decreases in children performing domestic work. Verifying that households in rice-eating regions were worse affected by the spike in food prices than wheat-eating regions, the comparison between rice and wheat-eating regions uncovered food-based coping strategies found in other countries in response to the food price crisis (e.g., Jensen and Miller 2008b; D'Souza and Joliffe 2012; D'Souza and Joliffe 2014).

[23]Although the specifications are not reported, this specification survives all robustness checks performed for specification (3). This includes restricting the sample to households not benefiting from MNREGA, restricting the sample to households from states not reforming the PDS, and restricting the sample to households least affected by the global financial crisis.

These findings have implications for the rise in food prices over the past two decades (FAO 2013b; IMF 2014). In particular, the results suggest significant non-health costs related to higher food prices, which further underscores the importance of better targeting food-insecure households with assistance during times of rapidly rising prices. Additionally, these results also help illustrate the costs of the world food price crisis in India- a country that contributes nearly forty percent of the world's food-insecure population (FAO 2013a), but also was better shielded from the turbulence of the world agricultural markets than many other countries (Childs and Kiawu 2009).

However, these results focus on the price effects of the world food price crisis, and do not investigate potential employment and income effects of the crisis on household decisions. Such an analysis might nicely complement Edmonds, Pavcnik, and Topalova (2010), which analyzes the response of schooling in households whose income was negatively affected by the Indian trade reforms. The trade reforms of the early nineties were entirely targeted at the manufacturing sector, and agricultural sectors were largely untouched until later. However, the present setting is one in which agricultural employment and income were shocked, and the majority of Indian households were directly affected.

Furthermore, it is important to note that some Indian households are able to substitute between rice and wheat as the staple good, and it is difficult to estimate the magnitude of the response of these households to the rise in grains prices based on an analysis that relies on households that primarily consume one or the other. During the time period under analysis, households that consume both types of grains likely pivoted consumption towards wheat and away from rice, and such substitution likely helped mitigate the effects of the differential price spike. However, given that wheat and rice prices both spiked during this time period, it is likely that such households still decreased diet diversity and children of such households were less likely to attend school.

Lastly, it is important to note that this article estimates a reduced form relationship and does not precisely explain why households kept their children from attending school in worse-affected regions. Estimates are consistent with a model in which households cope with the rise in food prices by

sacrificing spending on labor-saving durable goods and some children are needed to perform the additional domestic work. However, it is possible that at least some children who stopped attending school also performed other types of labor or were potentially idle.

References

Abadie, Alberto, David Drukker, Jane Herr, and Guido Imbens. 2004. "Implementing Matching Estimators for Average Treatment Effects in Stata." *The Stata Journal* 4 (3), 290-311.

Abadie, Alberto and Guido Imbens. 2008. "On the Failure of the Bootstrap for Matching Estimators." *Econometrica* 76 (6), 1537-1557.

Angirst, Joshua, Eric Bettinger, Erik Bloom, Elizabeth King, and Michael Kremer. 2002. "Vouchers for Private Schooling in Colombia: Evidence from a Randomized Natural Experiment." *American Economic Review* 92 (5), 1535-1558.

Azam, Mehtabul. 2012. "The Impact of Indian Job Guarantee Scheme on Labor Market Outcomes: Evidence from a Natural Experiment." IZA Discussion Paper Series No. 6548, Instiute for the Study of Labor (IZA).

Bajpai, Nirupam. 2011. "Global Financial Crisis, its Impact on India and the Policy Response." Working Paper No. 5, Columbia University, July.

Barrett, Christopher. 2002. "Food Security and Food Assistance Programs," in *Handbook of Agricultural Economics* vol. 2 (B), eds. B. Gardner and G. Rauser, 2103-2190. Amsterdam: Elsevier.

Behrman, Jere and Anil Deolalikar. 1988. "Health and Nutrition," in *Handbook of Development Economics* Vol. 1, eds. Hollis Chenery and T.N. Srinivasan, 633-711. Amsterdam: North-Holland.

Behrman, Jere, and James Knowles. 1997. "How Strongly is Child Schooling Associated with Household Income." Penn Institute for Economic Research Working Paper 97-022, University of Pennsylvania.

Blundell, Richard and Monica Costa-Dias. 2000. "Evaluation Methods for Non-Experimental Data." *Fiscal Studies* 21 (4), 427-468.

Childs, Nathan, and James Kiawu. 2009. "Factors behind the Rise in Global Rice Prices in 2008." RCS-09D-01, US. Department of Agriculture, Economic Research Service. May 2009.

Deaton, Angus and Jean Dreze. 2009. "Food and Nutrition in India: Facts and Interpretations." *Economic and Political Weekly* 44 (7), 42-65.

D'Souza, Anna, and Dean Joliffe. 2012. "Rising Food Prices and Coping Strategies: Household-level Evidence from Afghanistan." *Journal of Development Studies* 48 (2), 282-299.

D'Souza, Anna, and Dean Joliffe. 2014. "Food Insecurity in Vulnerable Populations: Coping with Food Price Shocks in Afghanistan." *American Journal of Agricultural Economics* 96 (3), 790-812.

Duflo, Esther, Pascaline Dupas, Michael Kremer, and Samuel Sinei. 2006. "Education and HIV/AIDS Prevention: Evidence from a Randomized Evaluation in Western Kenya." World Bank Policy Research Working Paper 4024.

Edmonds, Eric, Nina Pavcnik, and Petia Topalova. 2010. "Trade Adjustment and Human Capital Investments: Evidence from Indian Tariff Reform." *American Economic Journal: Applied Economics* 2 (3), 42-75.

FAO. 2012. "International Scientific Symposium on Food and Nutrition Security: from Valid Measurement to Effective Decision Making." Research Report, Food and Agriculture Organization of the United Nations.

FAO. 2013a. "The State of Food Insecurity in the World, 2013." Research Report, Food and Agriculture Organization of the United Nations.

FAO. 2013b. "FAO's Food Price Index Revisited." Food Outlook Report, Food and Agriculture Organization of the United Nations, November.

Fan, Shenggen. 2012. "Food Policy in 2012: Walk the Talk." Research Report, International Food Policy Research Institute.

Glewwe, Paul, and Hanan Jacoby. 2004. "Economic Growth and the Demand for Education: Is There a Wealth Effect?" *Journal of Development Economics* 74 (1), 33-51.

Glewwe, Paul, and Edward Miguel. 2008. "The Impact of Child Health and Nutrition on Education in Less Developed Countries," in Paul Schultz and John Strauss, eds., *Handbook of Development Economics*, Vol. 4: 5-56. Amsterdam: North-Holland.

Gopalan, C., B.V. Rama Sastri, and S.C. Balasubramanian. 1989. *Nutritive Value of Indian Foods*. Hyderabad: National Institute of Nutrition, Indian Council of Medical Research.

IMF. 2014. "Commodity Market Monthly." Research Department, Commodities Team, International Monetary Fund, April.

Ivanic, Maros, and Will Martin. 2008. "Implications of Higher Global Food Prices for Poverty in Low-Income Countries." Policy Research Working Paper 4594, the World Bank.

Jensen, Robert, and Nolan Miller. 2008a. "A Revealed Preference Approach to Measuring Hunger and Undernutrition." NBER Working Paper

No. 16555.

Jensen, Robert, and Nolan Miller. 2008b. "The Impact of Food Price Increases on Caloric Intake in China." *Agricultural Economics* 39, 465-476.

Jha, Shikha, P.V. Srinivasan, and Maurice Landes. 2007. *Indian Wheat and Rice Sector Policies and the Implications of Reform.* Economic Research Report No. 41, U.S. Department of Agriculture, Economic Research Service.

Khera, Reetika. 2011. "Trends in Diversion of Grain from the Public Distribution System." *Economic and Political Weekly* 46 (21).

Meade, Birgit and Stacey Rosen. 2013. "International Food Security Assessment, 2013-2023." U.S. Department of Agriculture, Economic Research Service, International Agriculture and Trade Outlook No. GFA-24.

Ministry of Commerce. 2009. "Annual Report." Ministry of Commerce, Government of India.

Ministry of Labour and Employment. 2010. "Wage Rates in Rural India." Ministry of Labour and Employment, Government of India.

Mitchell, Donald. 2008. "A Note on Rising Food Prices." Policy Research Working Paper, the World Bank. July 2008.

National Institute of Nutrition. 2010. "Dietary Guidelines for Indians: A Manual." Report, National Institute of Nutrition, Government of India.

National Sample Survey Organization. 2007. "Nutritional Intake in India 2004-2005." Ministry of Statistics and Programme Implementation, Report No. 513.

Robles, M., and M. Torero. 2010. "Understanding the Impact of High Food Prices in Latin America." *Economia*, 10 (2), 117-164.

Shultz, T. Paul. 2004. "School Subsidies for the Poor: Evaluating the Mexican Progresa Poverty Program." *Journal of Development Economics* 74 (1), 199-250.

Simler, K. R. 2010. "The Short-Term Impact of Higher Food Prices on Poverty in Uganda. Policy Research Working Paper 5210, the World Bank.

Smith, Jeffrey and Petra Todd. 2005. "Does Matching Overcome LaLonde's Critique of Nonexperimental Estimators?" *Journal of Econometrics* 125 (1), 305-353.

Thomas, Duncan, Kathleen Beegle, Elizabeth Frankenberg, Bondan Sikoki, John Strauss, and Graciela Teruel. 2004. "Education in a Crisis." *Journal*

of Development Economics 74 (1), 53-85.

Trostle, Ronald. 2008. *Global Agricultural Supply and Demand: Factors Contributing to the Recent Increase in Food Commodity Prices.* WRS-0801, U.S. Department of Agriculture, Economic Research Service.

Trostle, Ronald, Daniel Marti, Stacey Rosen, and Paul Westcott. 2011. "Why Have Food Commodity Prices Risen Again?" WRS-1103, U.S. Department of Agriculture, Economic Research Service. June 2011.

Ul Haq, Zahoor, Hina Nazli, and Karl Meilke. "Implications of High Food Prices for Poverty in Pakistan." *Agricultural Economics* 39, 477-484.

Viatte, Ferard, Jacques De Graaf, Mulat Demeke, Takashi Takahatake, and Marie Rey de Arce. 2009. "Responding to the Food Crisis: Synthesis of Medium-term Measures Proposed in Inter-agency Assessments." Food and Agriculture Organization of the United Nations, Rome.

Westcott, Paul, and Ronald Trostle. 2014. *USDA Agricultural Projections to 2023.* OCE-141, U.S. Department of Agriculture, Economic Research Service. February 2014.

Wirt, Annika, and Clare Collins. 2009. "Diet Quality- what is it and does it matter?" *Public Health Nutrition* 12 (12), 2493-2503.

Wooden, Q.T., C. Tsimpo, P. Backiny-Yetna, G. Joseph, F. Adoho, and H. Coulombe. 2008. "Potential Impact of Higher Food Prices on Poverty: Summary Estimates for a Dozen West and Central African Countries." Policy Research Working Paper 4745, the World Bank.

Yang, Dean. 2008. "International Migration, Remittances and Household Investment: Evidence from Philippine Migrants' Exchange Rate Shocks." *Economic Journal* 118 (528): 591-630.

Table 1. Summary Statistics for Rice and Wheat-Eating Regions by Survey

	2004/2005	2009/2010
Household-Level Variables	(1)	(2)
Daily per Capita Calories from Pulses, Produce, and Animal-Based Protein	441.3 (1404)	336.9 (305.6)
Daily per Capita Total Calorie Consumption	2143 (1740)	1936 (652)
Expenditure on Labor-Saving Durable Goods	188.1 (4539)	575.8 (12,735)
Observations	13,471	11,079
Activity of Children Aged 11-14		
Share of Children that Attend School	0.873 (0.333)	0.929 (0.257)
Share of Children that Perform Domestic Work	0.073 (0.260)	0.039 (0.193)
Observations	5100	3764
Activity of Children Older than 14		
Share of Children that Attend School	0.449 (0.497)	0.507 (0.500)
Share of Children that Perform Domestic Work	0.319 (0.466)	0.272 (0.445)
Observations	10,545	8016
Activity of Head of Household		
Share that Perform Market Work	0.876 (0.329)	0.860 (0.347)
Share that Perform Domestic Work	0.049 (0.196)	0.034 (0.182)
Observations	13,467	11,084
Activity of Spouse of Household Head		
Share that Perform Market Work	0.163 (0.370)	0.142 (0.349)
Share that Perform Domestic Work	0.815 (0.388)	0.835 (0.371)
Observations	11,158	9210

Notes: This table presents summary statistics of household diet choice, expenditure on labor-saving durable goods, and usual activity status of children and adults of households. Variable means are presented for each time period, and the standard deviation is presented in parentheses. The data from 2004/2005 are from the 61'st Round of the Consumer Expenditure and Employment and Unemployment surveys, and the data from 2009/2010 are from the 66'th Round of the Consumer Expenditure and Employment and Unemployment Surveys.

Table 2. Differences in Nutrition, School Attendance, and Domestic Work between 2004/2005 and 2009/2010

	Percentage Difference in total Daily per Capita Calories	Percentage Difference in total Daily per Capita non-Grains Calories	Percentage Difference in Expenditure on Labor-Saving Durable Goods	Difference in the Share of Children Aged 11-14 that attend School	Difference in the Share of Children Older than 14 that attend School	Difference in the Share of Children Aged 11-14 that perform Domestic Work	Difference in the Share of Children Older than 14 that perform Domestic Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Rice-Eating Regions	-0.106	-0.277	-0.065	0.042	0.057	-0.022	-0.033
	(0.039)	(0.053)	(0.090)	(0.012)	(0.024)	(0.006)	(0.018)
Wheat-Eating Regions	-0.085	-0.043	0.450	0.076	0.085	-0.053	-0.075
	(0.018)	(0.029)	(0.112)	(0.016)	(0.025)	(0.015)	(0.016)
Difference (Row 1 – Row 2)	-0.021	-0.235***	-0.514***	-0.034*	-0.028	0.032*	0.042*
	(0.043)	(0.060)	(0.143)	(0.019)	(0.034)	(0.016)	(0.023)
Observations	24,450	24,450	24,450	8864	18,561	8864	18,561

Notes: The first two rows report differences in daily per capita calorie consumption, non-grains consumption, expenditure on labor-saving durable goods, the share of children attending school, and the share of children engaged in domestic work between the 61'st round (2004/2005) and the 66'th round (2009/2010) of the NSSO Consumer Expenditure and Employment and Unemployment surveys. The third row presents the differences in the growth of consumption and usual activity status of children between rice and wheat-eating regions. All specifications include district fixed effects and standard errors clustered by district are presented in parentheses. For the differences presented in the third row, statistical significance is reported where *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level.

Table 3. Differences in Non-Grains Consumption between Rice and Wheat-Eating Regions

Dependent Variable:
log(Calories from Pulses, Produce, and Sources of Animal-Based Protein)

	Baseline Specification	Exclude Agricultural Producers	Specifications Utilizing Alternate Definitions of Rice and Wheat-Eating Regions		Pre-existing Trends	
	(1)	(2)	(3)	(4)	(5)	(6)
$RiceEating_r$ *$Post_t$	-0.186*** (0.045)	-0.177*** (0.046)	-	-	-	-0.238*** (0.064)
$RiceEating_r$ – One Percent Cut-Off*$Post_t$	-	-	-0.211*** (0.062)	-	-	-
$RiceEating_r$ – Three Percent Cut-Off*$Post_t$	-	-	-	-0.177*** (0.032)	-	-
$RiceEating_r$ * $Post_{t-1}$	-	-	-	-	-0.074 (0.072)	-0.059 (0.072)
Observations	24,550	15,072	14,298	41,380	23,658	34,737

Notes: This table presents the difference-in-differences estimate for consumption of non-grains calories between 2004/2005 and 2009/2010. Column (1) estimates the baseline specification; column (2) excludes households from the sample that are employed in agricultural production; columns (3)- (4) utilize different cut-offs to define rice and wheat-eating regions; and columns (5)-(6) estimate the pre-existing trends. All specifications include control variables and district fixed effects. Control variables include an indicator equaling one if the household was surveyed in the post-period, the natural logarithm of non-food expenditure, the number of male children in the household, the number of female children in the household, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), and indicators for household religion (Muslim, Christian, Hindu, Jain). Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

Table 4. Differences in Calorie and Nutrient Consumption between Rice and Wheat-Eating Regions

	Dependent Variable:				
	log(Total Daily per Capita Calories)	log(Daily per Capita Consumption of Protein)	log(Daily per Capita Consumption of Fiber)	log(Daily per Capita Consumption of Calcium)	log(Daily per Capita Consumption of Iron)
	(1)	(2)	(3)	(4)	(5)
$RiceEating_r$ *$Post_t$	-0.002	0.052	-0.349***	-0.183***	-0.161***
	(0.037)	(0.038)	(0.071)	(0.061)	(.046)
Observations	24,550	24,550	24,550	24,550	24,550

Notes: This table presents the difference-in-differences estimate for total consumption of calories and other nutrients. All columns re-estimate the baseline specification utilizing other measures of nutrition as the dependent variable. All specifications include control variables and district fixed effects. Control variables include an indicator equaling one if the household was surveyed in the post-period, the natural logarithm of non-food expenditure, the number of male children in the household, the number of female children in the household, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), and indicators for household religion (Muslim, Christian, Hindu, Jain). Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

Table 5. Differences in School Attendance between Rice and Wheat-Eating Regions

Dependent Variable:
Indicator Equaling One if Child Attended School

	Baseline Specification		Probit Specification	Variation in Response of Schooling			Restrict Sample to Children Aged 5-10	Restrict Sample to Children Aged 11-14	Restrict Sample to Children Older than 14
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$RiceEating_r$ *$Post_t$	-0.061***	-0.066***	-0.217**	-0.094***	-0.077***	-0.104***	0.019	-0.040**	-0.079***
	(0.022)	(0.023)	(0.093)	(0.027)	(0.026)	(0.031)	(0.021)	(0.020)	(0.028)
$RiceEating_r$ * $Post_d$ *$Female_{idt}$	-	-		-0.046	-	-0.046		-	-
				(0.029)		(0.029)			
$RiceEating_r$ * $Post_d$ *$Rural_{idt}$	-	-		-	0.013	0.010		-	-
					(0.029)	(0.030)			
Include Polynomial of Child's Age	N	Y	Y	Y	Y	Y	Y	Y	Y
p-value of test of all higher-order terms jointly equaling zero	-	-	-	-	-	0.273	-	-	-
Observations	27,425	27,425	27,425	27,425	27,425	27,245	12,905	8864	18,561

Notes: This table presents the difference-in-differences estimate for school attendance between 2004/2005 and 2009/2010 for children older than 10. Columns (1) and (2) estimate the baseline specification; column (3) estimates a probit specification; columns (4) and (5) interact the independent variable of interest with a female and rural indicator respectively, and column (6) jointly estimates the higher-order terms; and columns (7) - (9) re-estimate the baseline specification separately for children aged 5-10, children aged 11-14, and children older than 14. All specifications aside from column (3) include district fixed effects, and all specifications include control variables. Control variables include an indicator equaling one if the household was surveyed in the post-period, the child's age, the number of male children in the household, the number of female children in the household, an indicator equaling one if the child was female, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), indicators for household religion (Muslim, Christian, Hindu, Jain), and a third-order polynomial in the child's age where each term is also interacted with the child's gender. Column (1) excludes the third-order polynomial and includes all other control variables, and columns (2)-(9) include all control variables. Column (3) also includes state indicators which are absorbed by district-level fixed effects in all other specifications. Columns (4) and (5) also include all other lower-order terms of the triple interaction. Specifically, column (4) includes interactions between Female and Post, and Female and RiceEating; column (5) includes interactions between Rural and Post, and Rural and RiceEating; and column (6) includes all of these terms. Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

Table 6. Robustness Checks

Dependent Variable:
Indicator Equaling One if Child Attended School

	Exclude Agricultural Producers	Specifications Utilizing Alternate Definitions of Rice and Wheat-Eating Regions		Exclude House-holds Receiving Benefits from MNREGA	Exclude House-holds from States with PDS Reforms	Exclude House-holds Employed in Industries Most Affected by the Global Financial Crisis	Pre-existing Trends	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$RiceEating_r$ *$Post_t$	-0.070*** (0.022)	-	-	-0.049** (0.023)	-0.068*** (0.023)	-0.071*** (0.022)	-	-0.068** (0.031)
$RiceEating_r$ – One Percent Cut-Off*$Post_t$	-	-0.100*** (0.035)	-	-	-	-	-	-
$RiceEating_r$ – Three Percent Cut-Off*$Post_t$	-	-	-0.047*** (0.017)	-	-	-	-	-
$RiceEating_r$ * $Post_{t-1}$	-	-	-	-	-	-	-0.011 (0.023)	-0.005 (0.026)
Observations	17,213	17,020	44,316	20,052	26,839	17,395	26,461	38,241

Notes: This table presents a number of robustness checks on the difference-in-differences estimate for school attendance between 2004/2005 and 2009/2010. Column (1) excludes children from the sample that are from households employed in agricultural production; columns (2)-(3) estimate specifications that utilize different cut-offs for the consumption of non-dominant grains to define rice and wheat-eating regions; column (4) excludes children from households receiving benefits from MNREGA; column (5) excludes children from states that instituted PDS reforms between 2004/2005 and 2009/2010; column (6) excludes children from households most likely to be affected by the global financial crisis; column (7) estimates the difference-in-difference for the period preceding the food price crisis; and column (8) adds the pre-existing trend to the baseline specification. All specifications include district fixed effects and control variables. Control variables include an indicator equaling one if the household was surveyed in the post-period, the child's age, the number of male children in the household, the number of female children in the household, an indicator equaling one if the child was female, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), indicators for household religion (Muslim, Christian, Hindu, Jain), and a third-order polynomial in the child's age where each term is also interacted with the child's gender. Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

Table 7. Differences in Informal Educational Expenses and Expenditure on Labor-Saving Durable Goods between Rice and Wheat-Eating Regions

	Dependent Variable:						
	log(Expenditure on Informal Educational Expenses)	log(Expenditure on Purchasing and Maintaining Labor-Saving Durable Goods)					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$RiceEating_r$ *$Post_t$	0.128	-0.451***	-0.445***	-	-	-	-0.554***
	(0.200)	(0.134)	(0.152)				(0.130)
$RiceEating_r$ – One Percent Cut-Off*$Post_t$	-	-	-	-0.375***	-	-	-
				(0.106)			
$RiceEating_r$ – Three Percent Cut-Off*$Post_t$	-	-	-	-	-0.418***	-	-
					(0.104)		
$RiceEating_r$ * $Post_{t-1}$	-	-	-	-	-	-0.076	-0.095
						(0.132)	(0.131)
Exclude Agricultural Producers	N	N	Y	N	N	N	N
Observations	24,550	24,550	15,072	14,298	41,380	23,658	34,737

Notes: This table presents the difference-in-differences estimate for household expenditure on informal educational expenses, and expenditure on purchasing and maintaining labor-saving durable goods between 2004/2005 and 2009/2010. Column (1) re-estimates the baseline specification using the natural logarithm of expenditure on informal educational expenses as the dependent variable; column (2) re-estimates the baseline specification using the natural logarithm of expenditure on labor-saving durable goods as the dependent variable; column (3) excludes households from the sample that are employed in agricultural production; columns (4)- (5) utilize different cut-offs to define rice and wheat-eating regions; and columns (6)-(7) estimate the pre-existing trends. All specifications include control variables and district fixed effects. Control variables include an indicator equaling one if the household was surveyed in the post-period, the number of male children in the household, the number of female children in the household, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), and indicators for household religion (Muslim, Christian, Hindu, Jain). Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

Table 8. Differences in Adult Occupation between Rice and Wheat-Eating Regions

	Dependent Variable:					
	Indicator Equaling One if Engaged in Domestic Work		Indicator Equaling One if Engaged in Market Work		Indicator Equaling One if Engaged in Other Occupation	
	(1)	(2)	(3)	(4)	(5)	(6)
$RiceEating_r$ *$Post_t$	-0.004	-0.018	-0.0001	0.013	0.004	0.005
	(0.006)	(0.023)	(0.011)	(0.022)	(0.009)	(0.007)
Restrict Sample to Head of Household	Y	N	Y	N	Y	N
Restrict Sample to Spouse of Household Head	N	Y	N	Y	N	Y
Observations	24,551	20,368	24,551	20,368	24,551	20,368

Notes: This table presents the difference-in-differences estimate for the labor of household adults between 2004/2005 and 2009/2010. Columns (1)-(2) re-estimate the baseline specification but use an indicator equaling one if the household member was engaged in domestic work as the dependent variable; columns (3)-(4) analyze market work; and columns (5)-(6) analyze other work (not engaged in domestic work, market work, or school). All specifications include control variables and district fixed effects. Control variables include an indicator equaling one if the household was surveyed in the post-period, the adult's age, the number of male children in the household, the number of female children in the household, an indicator equaling one if the adult was female, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), indicators for household religion (Muslim, Christian, Hindu, Jain), and a third-order polynomial in the adult's age where each term is also interacted with the adult's gender. Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

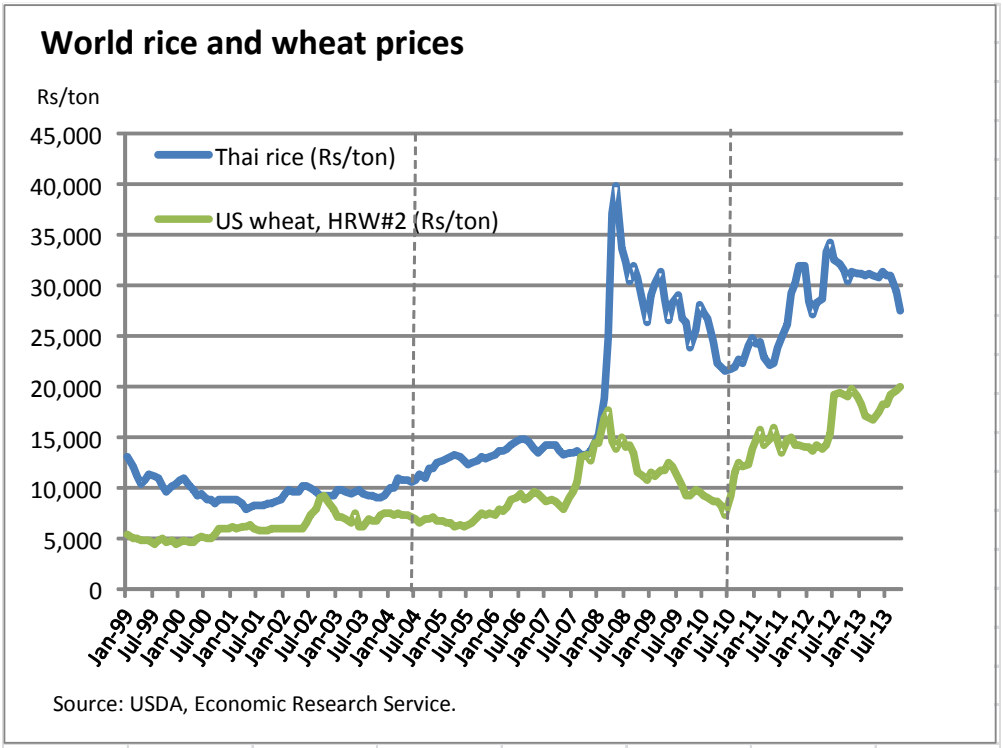
Table 9. Differences in Child Occupation between Rice and Wheat-Eating Regions

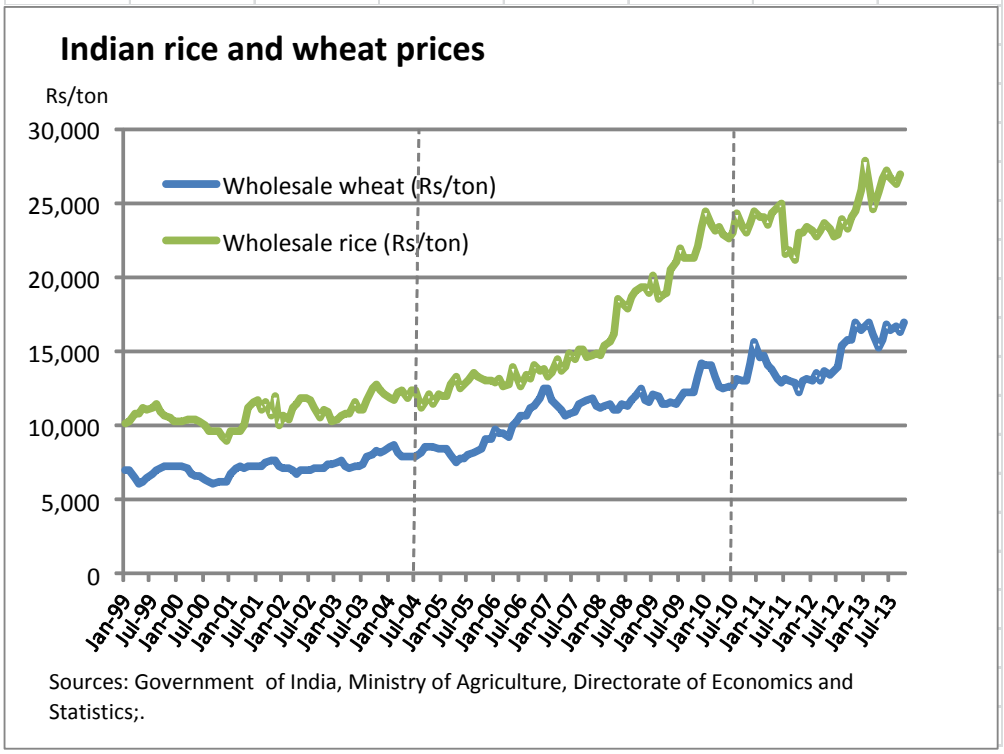
Dependent Variable:

	Indicator Equaling one if Childs Primary Occupation is Domestic Work						Indicator Equaling One if Primary Occupation is Market Work	Indicator Equaling One if Primary Occupation is Other Work
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$RiceEating_r$ *$Post_t$	0.059***	0.204***	0.057***	0.002	-	0.071***	0.010	-0.003
	(0.018)	(0.079)	(0.016)	(0.004)		(0.023)	(0.018)	(0.007)
$RiceEating_r$ *$Post_{t-1}$	-	-	-	-	0.018	0.015	-	-
					(0.020)	(0.021)		
Probit Specification	N	Y	N	N	N	N	N	N
Exclude Agricultural Producers	N	N	Y	N	N	N	N	N
Utilize Sample of Children Aged 5 to 10	N	N	N	Y	N	N	N	N
Observations	27,425	27,425	17,213	12,905	26,461	38,241	27,425	27,425

Notes: This table presents the difference-in-differences estimate for the labor of children older than 10 between 2004/2005 and 2009/2010. Column (1) re-estimates the baseline specification using an indicator equaling one if the child engaged in domestic work as the dependent variable; column (2) estimates a probit specification; column (3) excludes children from the sample that are from households employed in agricultural production; column (4) re-estimates the baseline specification, but restricts the sample to children under 11 years of age; columns (5)-(6) estimate the pre-existing trends in domestic work; and columns (7) and (8) re-estimate the baseline specification but analyze market and other work (not engaged in domestic work, market work, or school) respectively. All specifications include control variables, and all specifications aside from column (2) include district fixed effects. Control variables include an indicator equaling one if the household was surveyed in the post-period, the child's age, the number of male children in the household, the number of female children in the household, an indicator equaling one if the child was female, an indicator for whether the household resides in a rural area, indicators equaling one if the household belongs to a particular social group (Scheduled Caste, Scheduled Tribe, Other Backward Class), indicators for household religion (Muslim, Christian, Hindu, Jain), and a third-order polynomial in the child's age where each term is also interacted with the child's gender. Columns (2) also includes state indicators which are absorbed by district-level fixed effects in all other specifications. Standard errors clustered by district are reported in parentheses. * Denotes significance at the 10% level; ** Denotes significance at the 5% level; *** Denotes significance at the 1% level.

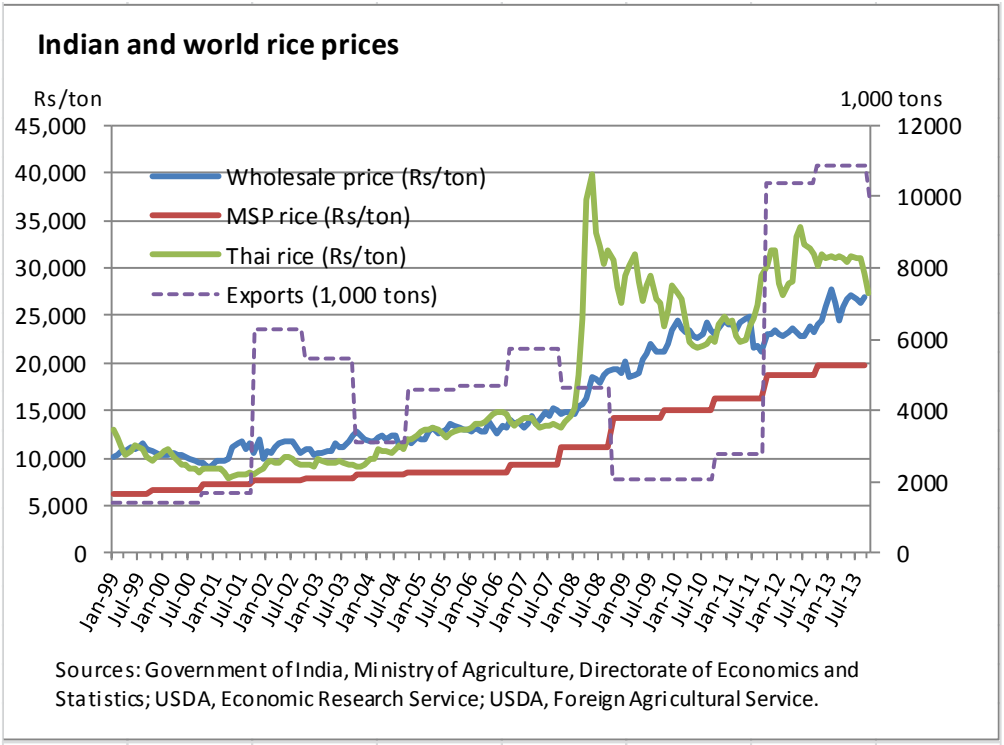
Figure 1. Rice and Wheat Prices, 1999-2013

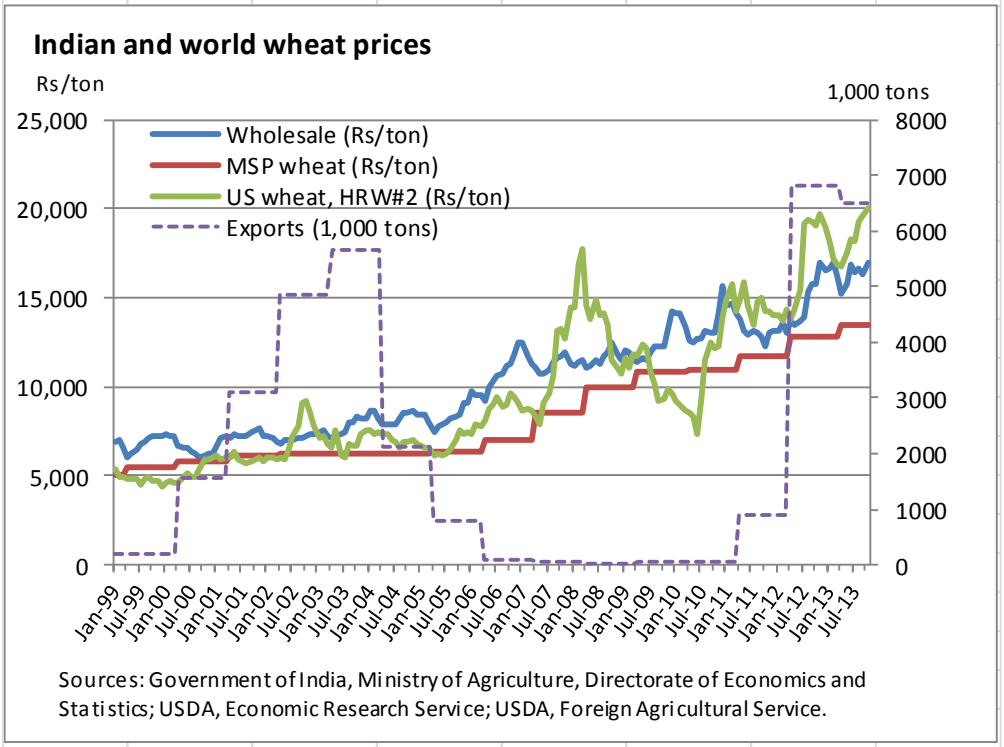




Note: This figure plots both world prices and Indian prices for rice and wheat between 1999 and 2013.

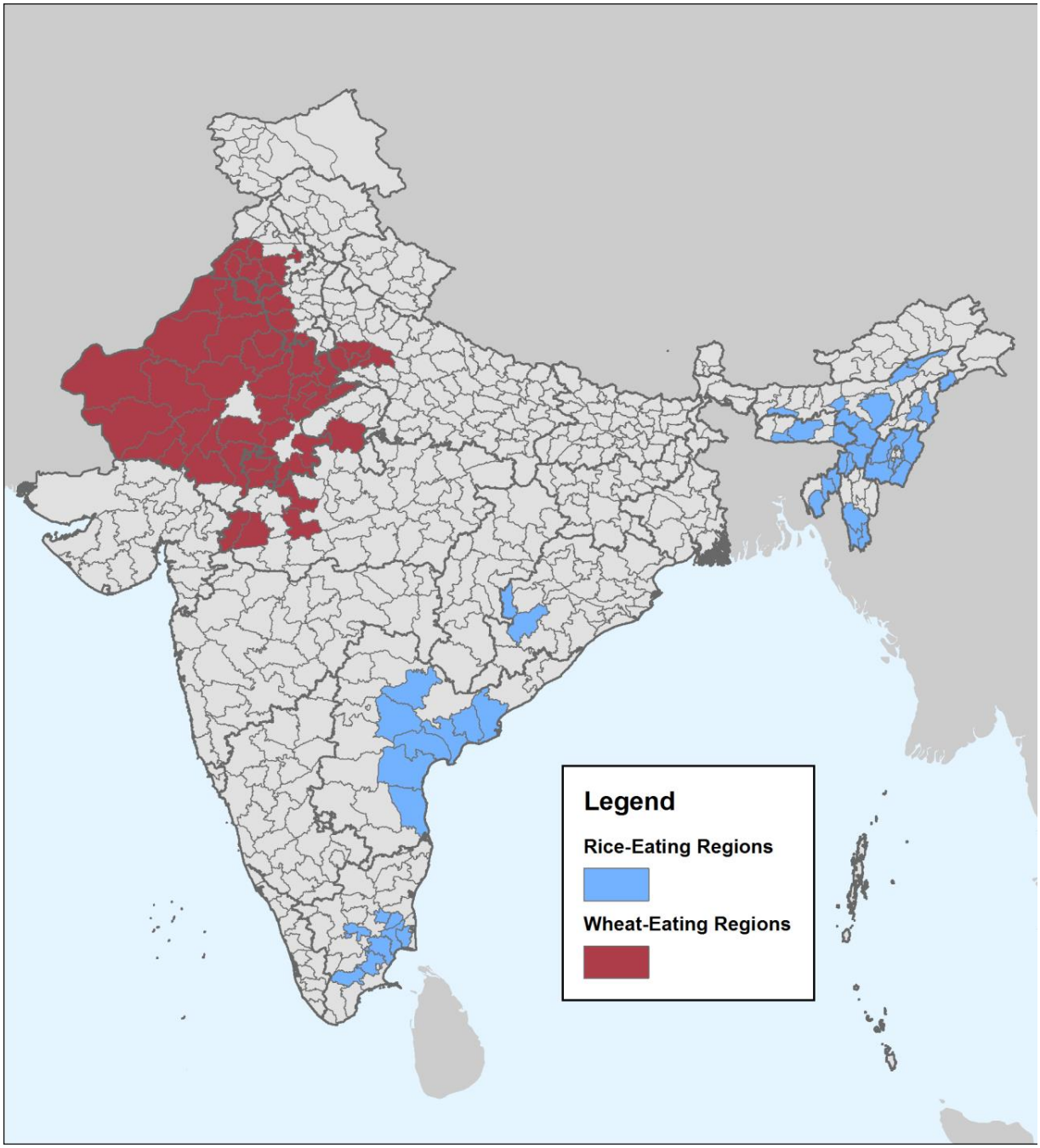
Figure 2. Minimum Support Prices, Exports, and Domestic and World Prices of Rice and Wheat





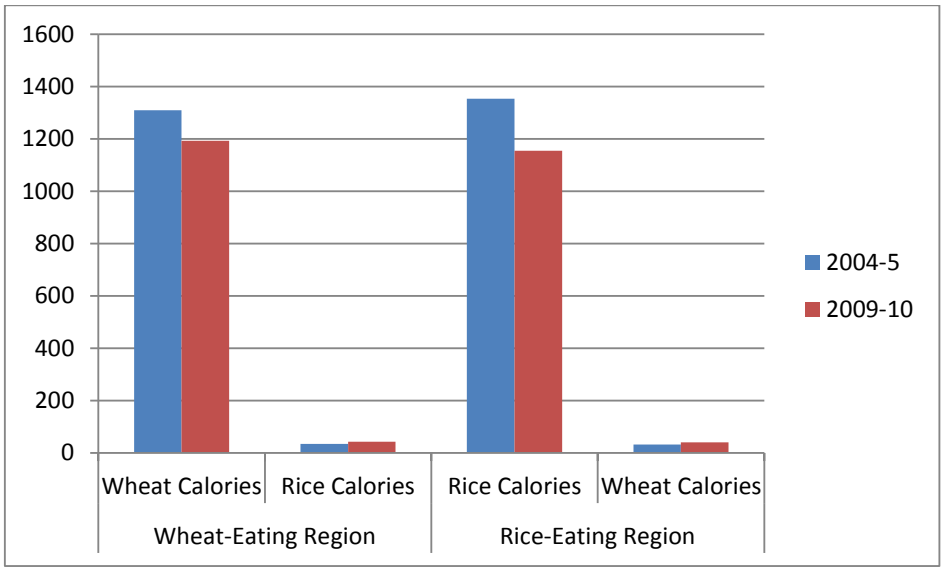
Note: This figure graphs the minimum support price, exports, and the domestic and world price of rice and wheat.

Figure 3. Rice and Wheat-Eating Regions in India



Note: This map highlights districts in which average consumption of wheat and rice were less than two percent of overall consumption in 1999/2000. The consumption data is derived from the 55'th Round of the Consumer Expenditure survey conducted by the National Sample Survey Organization.

Figure 4: Rice and Wheat Consumption by Type of Grain and Region



Note: This figure graphs consumption of dominant and non-dominant grains in rice and wheat-eating regions between 2004/2005 and 2009/2010.