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# Household Exposure to Food Price Shocks in Rural Bangladesh[1]

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Recent food price volatility has led to concerns about the exposure of the rural poor in Bangladesh to food price shocks. Yet, higher prices could also lead to improved terms of trade for sellers and higher rural wages for agricultural workers, both of which are likely to benefit the poor from rural areas. Our analysis shows that rural wages in Bangladesh responded positively to higher crop prices over the last decade. Moreover, using a general-equilibrium-consistent welfare index that accounts for such wage gains, we show that far from falling hardest on the poor the burden of higher food prices has been closer to being distributionally neutral.

**Keywords:** Poverty, Food Security, Food Prices, Bangladesh

**JEL Codes:** I3, Q18, E3

## I. INTRODUCTION

Prices of major food crops have surged in international markets over the past several years. Between 2005 and 2008, rice prices rose by 25 percent, wheat prices by 70 percent, and maize prices by 80 percent (Ivanic and Martin 2008). After a brief dip, grain prices began rising again in 2010. These price trends have been alarming for Bangladesh, a low-income country that depends on food imports, raising concerns about increased poverty and food insecurity.

Nevertheless, since a large number of rural households from all income levels are both food producers and consumers, they may be net beneficiaries of higher prices. While much less attention has been paid to potential adjustment in

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rural wages,[2] the benefits of such wage adjustments are well-recognized in the literature (see Singh, Squire, and Strauss 1986, Deaton 1989, and a large subsequent literature).[3] In Bangladesh, where most of the labor force is employed in the agricultural sector, such wage adjustments are likely to be important (Ravallion 1990). In this paper, we present evidence that rural wages in Bangladesh respond elastically to changes in agricultural prices. Moreover, unlike past empirical work on wages and prices in Bangladesh, which is based on aggregate time series data covering an era of food grain autarky (Boyce and Ravallion 1991, Rashid 2002), our results are less subject to endogeneity concerns. In particular, we use data on the *international* prices of the principal agricultural commodities, which are *not* co-determined with domestic wages.

Extending Deaton's partial equilibrium analysis to allow for price adjustments that occur in general equilibrium (see also Jacoby 2013), we offer a novel measure of households' exposure to food price shocks. In particular, in our empirical specification a rise in international agricultural prices not only leads to higher nominal wages with attendant income effects but also to higher nontraded goods prices. Applying Deaton's *net consumption ratio* methodology to household expenditure data from Bangladesh, we show that the rural poor suffer the greatest proportional welfare losses. By contrast, our general equilibrium exposure index, which takes into account empirically validated wage adjustments, indicates that the welfare impacts are much closer to being distributionally neutral, with both the rich and the poor experiencing moderate welfare losses.

The remainder of this paper is structured as follows. In the next section, we present a simplified discussion of general equilibrium effects of food price shocks, explain how the general equilibrium model can be validated empirically, and present alternative household exposure indices. Section III describes the survey data used for our analysis and provides basic summary, while Section IV presents our findings. The last section concludes the study, putting our findings in perspective.

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[2]In their cross-country study, Ivanic and Martin (2008) incorporate the unskilled wage changes calculated by a computable general equilibrium model, finding small poverty impacts of such adjustments.

[3]A by no means exhaustive list includes Barrett and Dorosh (1996) for Madagascar; Budd (1993) for Cote d'Ivoire, Klytchnikova and Diop (2006) and Vishwanath and Serajuddin (2010) for Bangladesh, Ferreira *et al.* (2011) for Brazil, along with the multi-country studies of Ivanic and Martin (2008) and Wodon *et al.* (2008).

## II. METHODOLOGY

### 2.1 Graphical Exposition

Figures 1 to 3 summarize the welfare impact of price shocks in a two-sector economy consisting of agriculture and manufacturing. In particular, Figure 1 shows the budget line-indifference curve diagram between the manufactured good and the agricultural good (food), Figure 2 illustrates the labor market equilibrium condition, which says that the rural wage must equal the value of marginal product of labor in each sector, and Figure 3 plots the (value of) production function and optimal employment labor in agriculture, against net income from agriculture.

Suppose that the price of food *P* rises in international markets. Ignoring general equilibrium effects – i.e., assuming zero wage adjustment – Figure 1 is sufficient to describe the welfare implications for a particular type of household. The budget line rotates through an endowment point that depends on the households initial production of food; in other words, what matters for welfare is *net* food consumption (as in, for example, Deaton 1989). Hence, net producers of food are made better off by the price increase and net consumers of food are made worse off.

While the partial equilibrium story ends there, in general equilibrium we observe additional income effects of the price change. Figure 2 shows that higher food prices increase the value of marginal product of labor in agriculture but not in manufacturing. As labor is drawn into agriculture, the unique equilibrium wage, *W*, must rise to staunch the flow of workers out of manufacturing and restore labor market equilibrium. Insofar as they are suppliers of labor (to either sector), households benefit. There is a countervailing effect for landowners, however, which is illustrated in Figure 3. Holding rural wages fixed, the rise in food prices increases the value of production, yielding greater profits from agriculture, but the rise in wages attenuates or even reverses these income gains for producers. The net income effect for a particular household is thus heterogeneous, depending on land and labor endowments. Figure 1 illustrates one of many possibilities for the general equilibrium welfare impact of a food price shock.

The addition of a nontraded (service) sector to the model introduces another consumption-side welfare channel. As higher food prices lead to higher wages, resulting in higher prices in the service sector, this in turn leads to lower welfare for consumers of such services. In the technical appendix, we formally describe this model and derive the precise implications for wages and for the price of services. In particular, the elasticity of the wage with respect to the price of food is given by

$$\varepsilon = \beta_A/(1-\beta_S) \qquad (1)$$

where $\beta_A$ and $\beta_S$ are the shares of labor in the economy allocated to agriculture and services, respectively.

To see why the wage-price elasticity depends on the sectoral labor shares, consider the special case of $\beta_S = 0$, which can be analyzed using Figure 2. Compare equilibrium *A*, with a high share of labor in agriculture to equilibrium B with a low agricultural share. At *A* the value of the marginal product curve in manufacturing (the supply curve of labor to agriculture) is necessarily very steep; at *B* it is very flat. Thus, in moving from *A* to *A*', a 50% increase in the agricultural price translates into an almost 50% increase in the wage, whereas, in moving from *B* to *B*', the same price increase leads to virtually no wage increase whatsoever (in proportional terms). An increase in $\beta_S$ for a given $\beta_A$, as seen in equation (1), leads to an amplification of the wage-price elasticity. Since the nontraded sector must expand when agricultural prices rise, the supply curve of labor into agriculture becomes even more inelastic as nontradables become important.

Figure 1: **Budget Line–Indifference Curve Diagram**

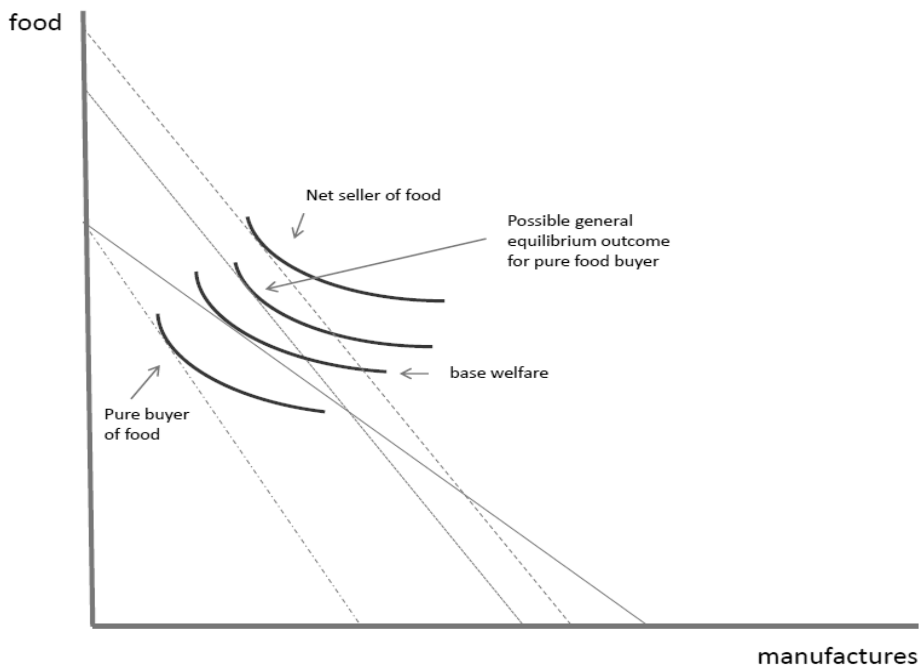


Figure 2: **Labor Market Equilibrium Diagram**

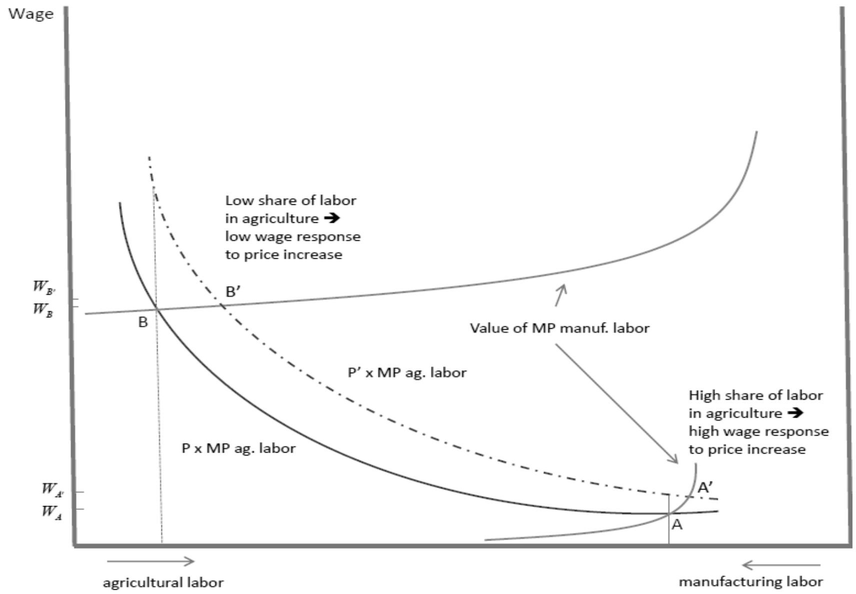
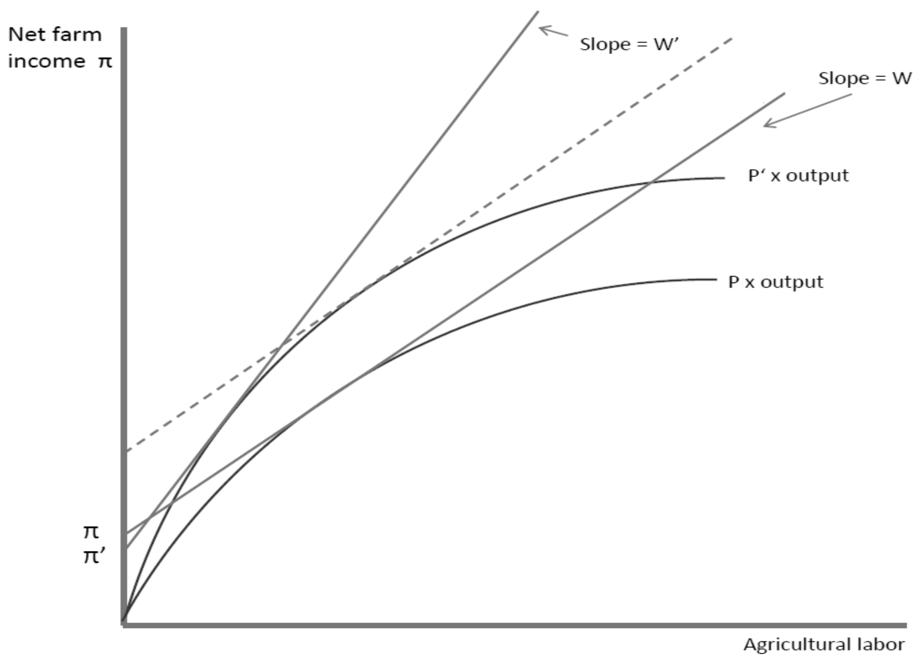



Figure 3: **Net Farm Income Diagram**



### 2.2 Empirical Validation

Suppose that the model sketched out in the previous section applies to each rural district in Bangladesh. In other words, consider each district as an island with a fixed labor force, which can import or export agricultural and manufactured goods. To make this approximation valid, inter-district migration must be sufficiently limited across rural Bangladesh, at least over the short to medium run horizons that we are considering. Under this assumption, then each district *d* has its own wage-price elasticity, $\varepsilon_d$, following equation (1).

To test the validity of our model, we run the following district-level regression in 5-year first-differences

$$\Delta w_{dt}/\varepsilon_{dt-5} = \zeta_t + \gamma \sum_j s_{d,jt-5}\, \Delta p_{jt} + u_{dt} \qquad (2)$$

where $\Delta w_{dt} = \log Wdt - \log W_{dt-5}$, $\Delta p_{dt} = \log Pdt - \log P_{dt-5}$, $s_{d,jt-5}$ is the district-level production value share of crop *j* (see the first equation in the technical appendix), and $u_{dt}$ is a disturbance term. The price-change coefficient $\gamma$ and the year dummy coefficient $\zeta_t$ are the parameters to be estimated. Under the null hypothesis ($\gamma = 1$), equation (2) implies that the magnitude of the wage response to price shocks is, on average, equal to the theoretically implied elasticity $\varepsilon_{dt-5}$. Given the above arguments, $\varepsilon_{dt-5} = \beta_{A,dt-5}/(1-\beta_{S,dt-5})$.

### 2.3 A Household Exposure Index

Consider three alternative indices of household exposure to price shocks, in order of increasing generality. Recall, first, Deaton's (1989) net consumption ratio for crop *j*

$$D_j = \frac{P_j\left(Y_j - X_j\right)}{C}$$

which is the ratio of the value of production (*Yj*) net of consumption (*Xj*) to total consumption expenditures (*C*); in other words, *Dj* is the welfare-price elasticity for good *j* holding factor prices fixed.

Next, we allow wages to adjust but we assume that prices in the nontraded sector are inflexible, which is tantamount to assuming that $\varepsilon = \varepsilon^0 = \beta_A$. The welfare-price elasticity in this scenario is:

$$E_j^0 = D_j + s_j \varepsilon^0 \frac{W(l-h)}{C}$$

where *l* is household wage labor supplied off the farm and *h* is hired labor on the farm; see Ravallion (1990) for a similar formulation.

Finally, we allow the price of services to be fully flexible, leading to

$$E_j = D_j + s_j \varepsilon \frac{W(l-h) - P_S X_S}{C}.$$

Here, we use the result (see technical appendix) that the elasticity of the price of services ($P_S$) with respect to the price of food is equal to the wage-price elasticity $\varepsilon$.

## III. DATA

Our empirical analysis is primarily based on the 2010 Household Income Expenditure Survey (HIES10) for Bangladesh. The HIES10 is nationally representative and follows a sampling frame based on the 1991 Population and Housing Census. A two stage stratified sampling design was followed and at the first stage, 442 primary sampling units (PSUs) were drawn from 14 different strata within all 64 districts of Bangladesh.

### 3.1 Wages and Prices

To estimate equation (2), we use information on daily wages for three successive rounds of the HIES. In HIES10 there were 2,113 individuals from rural areas who reported working as agricultural daily laborers and 2,032 individuals who reported working as non-agricultural laborers. The reported numbers were similar in HIES05 and HIES00 rounds (see Table I). Rather than using raw wage data, however, we use the district fixed effects from a log-wage regression run separately for each HIES round, which includes a quadratic terms for age and gender, and the interaction between the two, month of interview dummies, and a sector of employment dummy (agriculture/non-agriculture). The wage difference term in equation (2), $\Delta wdt$, corresponds to the between round difference in district mean log-wages, net of changes over time in the age-gender composition of the workforce. To correct for heteroskedasticity, we compute standard errors for the fixed effects following the methodology proposed by Haisken-DeNew and Schmidt (1997).

Sectoral labor share, $\beta_{j,dt-5}$, is computed as the ratio of workers in district $d$ in sector $j$ to the total workforce in district $d$ using successive rounds of the Labor Force Survey (LFS). Thus for $t$ = 2010, we use the 2005 LFS, and for $t$ = 2005 we use the 1999 LFS. The district-level labor shares are reported in Table A.1 in the Appendix.[4]

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[4] For our purpose, construction and transport are included in the service sector.

Prices are measured using average farm-gate prices (in USD) of major crops (rice, wheat, and jute) obtained from the World Bank's Distortions to Agricultural Incentives database. As a result, the constructed price index (see the *j*-terms $\Delta pjt$ on the right-hand side of equation 2) varies only over time and crops (see Table II), but not over districts, the same way as do the value shares of the major crops ($s_{d,jt\text{-}5}$), derived from the agriculture modules of the corresponding HIES; see Appendix Table A.1 for the 2010 figures. Thus, for example, a heavily jute-growing district would experience a large positive price shock between 2005 and 2010 relative to a predominately rice-growing district. The advantage of this construction is that price changes are *exogenous* with respect to local wages; that is, a productivity shock in a particular district of Bangladesh that directly affects wages cannot affect the price of a major crop on international markets. Note, finally, that the value shares do not necessarily sum to one, which is tantamount to assuming that price changes for crops other than rice, wheat, and jute are zero.

TABLE I

**DAILY WAGE WORKERS IN HIES**

| | Agriculture | | | | Non agriculture | | | |
|---|---|---|---|---|---|---|---|---|
| | Daily workers | | Wage (in Taka) | | Daily workers | | Wage (in Taka) | |
| | Number | Share | Mean | SD | Number | Share | Mean | SD |
| 2000 | 1,952 | 0.46 | 52.62 | 20.85 | 2,293 | 0.54 | 78.36 | 49.92 |
| 2005 | 1,907 | 0.57 | 71.61 | 29.51 | 1,415 | 0.43 | 101.04 | 61.63 |
| 2010 | 2,113 | 0.51 | 140.89 | 56.72 | 2,032 | 0.49 | 172.29 | 133.68 |

**Source:** HIES, Bangladesh for respective years.

TABLE II

**FARM-GATE PRICES OF MAJOR CROPS IN BANGLADESH**

| | Farm-gate price (USD/MT) | | |
|---|---|---|---|
| | Rice | Jute | Wheat |
| 2000 | 154.6 | 137.7 | 179.8 |
| 2005 | 114.6 | 111.2 | 184.4 |
| 2010 | 150.5 | 243.6 | 243.6 |

**Source:** Distortions to Agricultural Incentives, World Bank.

### 3.2 Exposure Indices

The household exposure indices developed above are estimated using HIES10 using the 7,840 rural households present in the sample. According to the HIES10, around 20 percent of cultivable land in Bangladesh is leased-in under some form of tenancy. Tenancy complicates the construction of *Dj* because, in general, a tenant only receives a fraction of his agricultural production as income, either explicitly under sharecropping or implicitly in a fixed rental arrangement. Likewise, a landlord receives more than what he produces on his own cultivated land. Therefore, in computing *Dj*, we need to multiply *Yj* by an adjustment factor *τi* to correct for tenancy. Based on the information available in HIES10, let

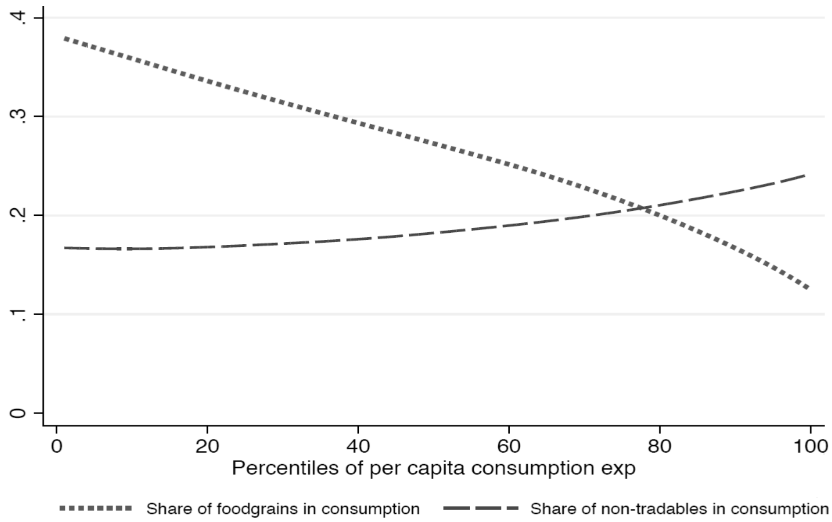
$$\tau_i = \begin{cases} (L_i^o + \mu_i L_i^r)/(L_i^o + L_i^r) & if\ tenant \\ [L_i^c + (1-\mu_i)L_i^r]/(L_i^c) & if\ landlord \end{cases}$$

where $Li^k$, $k = o, c; r$, represents land area of household *i* owned, cultivated, and rented (in or out as the case may be), respectively, and $\mu_i$ is the average tenancy share. For tenants, $\mu_i$ is computed as the average (across crops) share that tenant *i* pays as rent, whereas for landlords $\mu_i$ is the average share of total district production received by tenants in that (the landlord's) district. Note that for a pure sharecropper $Li^0 = 0$ and $\tau_i = \mu_i$, while for owner-cultivators $\tau_i = 1$; in general, $0 < \tau_i < 1$.

To calculate the market value of net household labor supply *W(l – h)*, which we require for computing *Ej0* and *Ej*, we take the difference between total annual off-farm earnings of all household members and total annual expenditures on hired farm labor.

We use per capita household expenditures as our measure of household living standards, excluding lump-sum expenditures like house extension, pilgrimage (haj), marriage, etc. The nontradable consumption subaggregate consists of expenditures on fuel and lighting, transport, tailoring, housing rent/repair, medical care, education, recreation, remittances/charity, and taxes. Figure 4 shows distribution of the food and nontradable consumption shares by per-capita expenditure percentile. Rural households at the bottom of the expenditure distribution have food shares in excess of 40 percent, whereas for rural households at the top end of the distribution, the same statistic is only just above 10 percent. An opposite, but more gradual pattern is evident for nontradables.

Figure 4: **Food and Nontradables Expenditures Shares**




**IV. RESULTS**

## 4.1 Wage Response to Price Shocks

Table III presents least squares estimates of equation (2) weighted by the inverse variance of $\Delta w_{dt}$. Robust standard errors are clustered at the district level. Both specifications (1) and (2) assume inflexible prices of services, so that the dependent variable is $\Delta w_{dt} / \varepsilon^0$. Specification (2) controls for the lagged share of labor in agriculture as a robustness check. While the estimate of $\gamma$ is greater than unity under either specification, the null hypothesis that $\gamma = 1$ cannot be rejected.

TABLE III
**REGRESSION RESULTS**

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Fixed price of services | | Variable price of services | |
| Gamma (γ) | 1.382* | 1.322* | 0.972** | 0.934** |
| | (0.716) | (0.748) | (0.442) | (0.433) |
| Lagged share of agriculture labor | | 0.18 | | 0.493** |
| | | (0.453) | | (0.221) |
| H0: γ=1 (p-value) | 0.596 | 0.668 | 0.951 | 0.879 |
| Observations | 126 | 126 | 126 | 126 |
| R-squared | 0.022 | 0.024 | 0.033 | 0.079 |

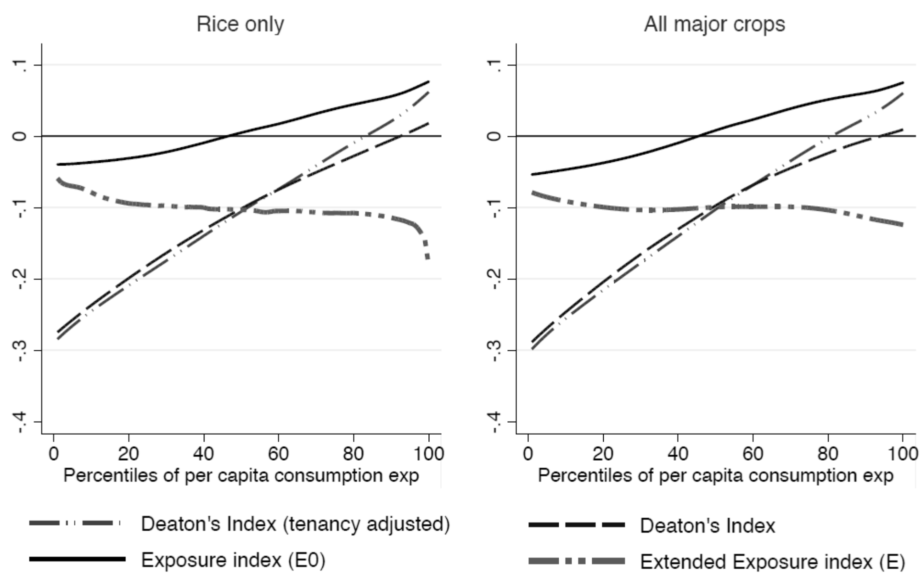
**Note:** Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Specifications (3) and (4) scale log-wage changes by the wage-price elasticity $\varepsilon_{dt-5} = \beta_{A,dt-5}/(1-\beta_{S,dt-5})$, thus allowing for a flexible price of services. Once again, the null hypothesis that $\gamma = 1$ cannot be rejected. These results imply that, on average district wages respond to agricultural price shocks in a manner consistent with our three-sector general equilibrium model.

### 4.2 Household Exposure to Food Price Shocks

Figure 5 illustrates the welfare and distributional consequences of a one percent increase in the price of rice (left panel) and of a uniform one percent increase in the prices of all three major crops (right panel). In particular, we compare (i) the Deaton's index without tenancy adjustment; (ii) the Deaton's index with tenancy adjustment; (iii) the exposure index *E0*, in which the price of services is fixed; and (iv) the exposure index *E*, which allows for flexibility in the services price.[5]

Figure 5: **Welfare Impacts by Percentile**




The main conclusions from Figure 5 are as follows. First, despite pervasive land tenancy in rural Bangladesh, with the exception of the top per-capita expenditure quintile where most landlord households are situated, the tenancy

[5]Sectoral labor shares are calculated from the 2010 LFS, matching expenditure share data from HIES10.

adjustment factor $\tau_i$ makes little difference for the welfare impacts of price shocks. Second, the Deaton's index suggests that the poorest households experience as much as a 0.4 percent drop in welfare for a one percent increase in agricultural prices. By contrast, because both *E0* and *E* incorporate the benefits of higher rural wages, with either of these exposure indices the welfare losses of the poorest are only about a quarter as large. Third, with the exception of *E* which is unique in allowing the price of services to rise in response to higher agricultural prices, all other indices suggest that the wealthier households benefit marginally from food commodity price shocks. Since the rich spend a larger share of their income on service than the poor, they are consequently made worse off on balance by the flexibility of the exposure index. Fourth, overall, accounting for general equilibrium effects renders the welfare impact of a price shock more distributionally neutral inasmuch as it makes the poor better off and the rich worse off relative to the partial equilibrium effects. Lastly, not surprisingly given the relative importance of rice in Bangladesh, the effects of an increase in rice prices are very similar to those of a uniform increase in all major crop prices (i.e., rice, wheat, and jute).

## V. CONCLUSION

This paper seeks to answer the following question: Do the rural poor in Bangladesh bear the brunt of rising food prices? Our empirical analysis suggests that the answer is sensitive to the time horizon considered. If we take the view that the partial equilibrium approach accurately describes welfare impacts in the short-run, before the anticipation of higher prices filters its way through the labor market via agricultural labor demand, poor households experience the greatest negative welfare impact. However, once the rural labor market adjusts to higher agricultural prices, our analysis shows the opposite result: the poor are made slightly better off in proportional terms relative to the rich, albeit still worse off than in the absence of a price increase.

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## Technical Appendix

Consider an economy with three sectors: agriculture (*A*) and manufacturing (*M*), both of which produce tradable goods, and services (*S*), which produces nontradable goods. Output $Y_i$ in each sector $i = A, M, S$ is produced with a specific (i.e., immobile) type of capital $K_i$ and with labor $L_i$. In the case of agriculture, $K_A$ represents land. Labor is perfectly mobile across sectors but its supply is fixed at $L = L_A + L_M + L_S$ within each district.[6]

To deal with multiple crop outputs $Y_1,\ldots,Y_c$, let $Y_A = G(Y_1,\ldots, Y_c)$, where the product transformation function *G* is assumed to be homogeneous of degree one. A price index $P_A$ thus exists such that $P_A Y_A = \sum_{j=1}^{c} P_J Y_J$, which upon differentiation yields

$$\hat{P}_A = \sum_j s_j \hat{P}_j$$

where "^" denotes a proportional change and $s_j$ is the value share of crop *j*.

Now, let *W* be the nominal wage for manual labor and $P_M$ and $P_S$ be the prices of manufactures and services, treating the former output price as fixed so that the price of manufactures is the *numeraire*. Finally, let $\Pi_j$ be the average return on capital in sector *j*; that is, for production function $F_j$, total return or profit is $\Pi_j K_j = P_j F_j (L_j, Kj) - WL_j$.

Assuming Cobb-Douglas production functions with equal input cost shares across sectors and constant returns to scale, we obtain the following system of four equations

$$\alpha\widehat{W} + (1-\alpha)\widehat{\Pi}_A = \hat{P}_A \qquad \text{(A.1)}$$

$$\alpha\widehat{W} + (1-\alpha)\widehat{\Pi}_M = 0$$

$$\alpha\widehat{W} + (1-\alpha)\widehat{\Pi}_S = \hat{P}_S$$

$$\beta_\alpha\widehat{\Pi}_A + \beta_M\widehat{\Pi}_M + \beta_S\widehat{\Pi}_S = \widehat{W}$$

for $\widehat{W}$ and $\widehat{\Pi}_i$ (recall that $\hat{P}_M$= 0 by assumption). The first three equations are the sectoral first order conditions which imply that price equals unit cost, where $\alpha$ denotes the input cost share of labor. The last equation is derived from the labor constraint, which implies $\sum_i \beta_i \hat{L}_i = 0$ and the fact that $\hat{L}_i = \widehat{\Pi}_i - \widehat{W}$ in the Cobb-Douglas case.

The solution for the wage price-elasticity is

$$\widehat{W}/\hat{P}_A \equiv \epsilon = \beta_A + \beta_S\delta, \qquad \text{(A.2)}$$

where $\delta$ is the (endogenous) elasticity of $P_S$ with respect to $P_A$. Solving out $\delta$ involves equating changes in service sector supply $\widehat{Y_S}$ and demand $\hat{X}_S$. Suppose that the Marshallian demand function for services takes the form $X_S = M/P_S$, where income is $M = \sum_i P_i Y_i$, the total value of product from all three sectors. Given the Cobb-Douglas

[6]Jacoby (2013) and Kovak (2011) consider slightly more general models along these same lines.

assumption, sectoral income shares are equivalent to sectoral labor shares (i.e., $\beta_j = P_j Y_j / M$). Therefore, differentiating demand and using the envelope theorem, we obtain

$$\hat{X}_S = \beta_S \hat{P}_S + \beta_A \hat{P}_A - \hat{P}_S. \quad \text{(A.3)}$$

On the supply side, from the production function and the fact that land is fixed, we have

$$\hat{Y}_S = \alpha \hat{L}_S. \quad \text{(A.4)}$$

Meanwhile, the condition that input prices equal respective marginal value products implies that $\hat{W} = \hat{P}_S + \hat{F}_{L_S} = \hat{P}_S - \hat{L}_S + \hat{Y}_S$, where the second equality follows from the total differentiation of the marginal productions $\hat{F}_{L_S}$. Rearranging yields

$$\hat{Y}_S = \frac{\alpha}{1-\alpha}\left(\hat{P}_S - \hat{W}\right). \quad \text{(A.5)}$$

To summarize, equation (A.3) implies that $\hat{X}_S / \hat{P}_A = (\beta_S - 1)\delta + \beta_A$ and equation (A.5) implies that $\hat{Y}_S / \hat{P}_A = \frac{\alpha}{1-\alpha}(\delta - \epsilon)$. Equating $\hat{Y}_S / \hat{P}_A$ and $\hat{X}_S / \hat{P}_A$ and rearranging gives

$$\delta = \frac{\alpha\epsilon + (1-\alpha)\beta_A}{1 - (1-\alpha)\beta_S}$$

which, when combined with equation (A.2), yields $\epsilon = \beta_A / (1 - \beta_S)$. Finally, substituting this expression for $\epsilon$ into equation (A.6) yields $\delta = \beta_A / (1 - \beta_S) = \epsilon$. In other words, the proportional responses of wages and of nontraded goods prices to a price shock are identical.

# APPENDIX

## TABLE A.1

**DESCRIPTIVE STATISTICS FOR RURAL DISTRICTS OF BANGLADESH**

| District | Share of labor in agriculture | | | Share of labor in Service | | | Share of labor in industry | | | Revenue share of major crops | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | Rice 2010 | Wheat 2010 | Jute 2010 |
| BAGERHAT | 0.51 | 0.47 | 0.49 | 0.48 | 0.41 | 0.43 | 0.01 | 0.11 | 0.07 | 0.99 | 0 | 0 |
| BARGUNA | 0.49 | 0.56 | 0.38 | 0.46 | 0.28 | 0.45 | 0.05 | 0.15 | 0.17 | 0.87 | 0 | 0 |
| BARISAL | 0.39 | 0.48 | 0.49 | 0.56 | 0.38 | 0.36 | 0.05 | 0.13 | 0.16 | 0.78 | 0 | 0.01 |
| BHOLA | 0.3 | 0.57 | 0.54 | 0.67 | 0.3 | 0.32 | 0.03 | 0.12 | 0.14 | 0.88 | 0.01 | 0 |
| BOGRA | 0.48 | 0.37 | 0.57 | 0.49 | 0.48 | 0.38 | 0.03 | 0.15 | 0.05 | 0.87 | 0 | 0.07 |
| BRAHMANBARI | 0.44 | 0.57 | 0.53 | 0.52 | 0.29 | 0.34 | 0.04 | 0.14 | 0.13 | 0.88 | 0 | 0.04 |
| CHANDPUR | 0.43 | 0.36 | 0.43 | 0.51 | 0.51 | 0.44 | 0.06 | 0.13 | 0.13 | 0.98 | 0 | 0.02 |
| CHITTAGONG | 0.39 | 0.49 | 0.51 | 0.55 | 0.37 | 0.37 | 0.06 | 0.14 | 0.12 | 0.94 | 0 | 0 |
| CHUADANGA | 0.51 | 0.75 | 0.53 | 0.45 | 0.22 | 0.38 | 0.04 | 0.03 | 0.08 | 0.46 | 0.01 | 0.23 |
| COMILLA | 0.46 | 0.67 | 0.51 | 0.51 | 0.26 | 0.39 | 0.03 | 0.07 | 0.11 | 0.92 | 0.01 | 0 |
| COX'S BAZAR | 0.46 | 0.61 | 0.5 | 0.53 | 0.21 | 0.36 | 0.01 | 0.18 | 0.14 | 1 | 0 | 0 |
| DHAKA | 0.18 | 0.51 | 0.27 | 0.61 | 0.37 | 0.5 | 0.21 | 0.12 | 0.24 | 0.97 | 0 | 0 |
| DINAJPUR | 0.46 | 0.69 | 0.58 | 0.5 | 0.26 | 0.34 | 0.04 | 0.04 | 0.08 | 0.92 | 0.02 | 0.02 |
| FARIDPUR | 0.43 | 0.55 | 0.59 | 0.54 | 0.35 | 0.33 | 0.03 | 0.1 | 0.07 | 0.19 | 0.03 | 0.52 |
| FENI | 0.26 | 0.53 | 0.4 | 0.72 | 0.36 | 0.48 | 0.03 | 0.11 | 0.12 | 0.97 | 0 | 0 |
| GAIBANDHA | 0.51 | 0.42 | 0.56 | 0.46 | 0.47 | 0.38 | 0.03 | 0.11 | 0.07 | 0.77 | 0 | 0.01 |
| GAZIPUR | 0.35 | 0.41 | 0.47 | 0.59 | 0.36 | 0.36 | 0.06 | 0.23 | 0.17 | 0.99 | 0 | 0 |
| GOPALGANJ | 0.46 | 0.4 | 0.59 | 0.49 | 0.46 | 0.29 | 0.06 | 0.14 | 0.13 | 0.87 | 0 | 0.11 |
| HABIGANJ | 0.51 | 0.66 | 0.68 | 0.47 | 0.21 | 0.26 | 0.02 | 0.13 | 0.07 | 0.99 | 0 | 0 |

*(Cont. Table A.1)*

| District | Share of labor in agriculture | | | Share of labor in Service | | | Share of labor in industry | | | Revenue share of major crops | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | Rice 2010 | Wheat 2010 | Jute 2010 |
| JAMALPUR | 0.45 | 0.72 | 0.59 | 0.52 | 0.17 | 0.3 | 0.03 | 0.11 | 0.12 | 0.89 | 0.01 | 0.06 |
| JESSORE | 0.49 | 0.51 | 0.56 | 0.49 | 0.42 | 0.35 | 0.03 | 0.06 | 0.09 | 0.78 | 0 | 0.17 |
| JHALOKATI | 0.46 | 0.51 | 0.51 | 0.49 | 0.44 | 0.37 | 0.05 | 0.05 | 0.13 | 0.96 | 0 | 0 |
| JHENAIDAH | 0.51 | 0.55 | 0.65 | 0.46 | 0.38 | 0.32 | 0.03 | 0.07 | 0.03 | 0.68 | 0.02 | 0.1 |
| JOYPURHAT | 0.63 | 0.56 | 0.56 | 0.36 | 0.39 | 0.4 | 0.01 | 0.05 | 0.04 | 0.73 | 0.01 | 0.05 |
| KHAGRACHHARI | 0.31 | 0.57 | 0.66 | 0.59 | 0.37 | 0.23 | 0.1 | 0.05 | 0.11 | 0.99 | 0 | 0 |
| KHULNA | 0.41 | 0.2 | 0.61 | 0.58 | 0.37 | 0.35 | 0.02 | 0.42 | 0.04 | 0.98 | 0 | 0.01 |
| KISHORGONJ | 0.39 | 0.47 | 0.51 | 0.56 | 0.36 | 0.36 | 0.06 | 0.17 | 0.13 | 0.89 | 0 | 0.03 |
| KURIGRAM | 0.5 | 0.63 | 0.58 | 0.5 | 0.26 | 0.34 | 0.01 | 0.11 | 0.09 | 0.94 | 0.02 | 0.04 |
| KUSHTIA | 0.51 | 0.63 | 0.51 | 0.45 | 0.25 | 0.41 | 0.04 | 0.12 | 0.08 | 0.6 | 0.01 | 0.3 |
| LAKSHMIPUR | 0.32 | 0.51 | 0.38 | 0.63 | 0.43 | 0.51 | 0.05 | 0.06 | 0.11 | 0.73 | 0 | 0 |
| LALMONIRHAT | 0.53 | 0.57 | 0.61 | 0.47 | 0.3 | 0.3 | 0 | 0.13 | 0.08 | 0.92 | 0 | 0.03 |
| MADARIPUR | 0.58 | 0.57 | 0.55 | 0.4 | 0.29 | 0.35 | 0.01 | 0.14 | 0.11 | 0.51 | 0.02 | 0.44 |
| MAGURA | 0.4 | 0.54 | 0.61 | 0.56 | 0.32 | 0.33 | 0.04 | 0.14 | 0.06 | 0.54 | 0.02 | 0.25 |
| MANIKGANJ | 0.53 | 0.54 | 0.46 | 0.44 | 0.32 | 0.41 | 0.03 | 0.14 | 0.13 | 0.66 | 0 | 0.04 |
| MAULVIBAZAR | 0.41 | 0.59 | 0.56 | 0.57 | 0.24 | 0.32 | 0.03 | 0.17 | 0.11 | 0.95 | 0 | 0 |
| MEHERPUR | 0.59 | 0.72 | 0.59 | 0.32 | 0.22 | 0.35 | 0.08 | 0.05 | 0.06 | 0.72 | 0.05 | 0.17 |
| MUNSHIGANJ | 0.3 | 0.32 | 0.45 | 0.65 | 0.51 | 0.45 | 0.05 | 0.17 | 0.1 | 0.31 | 0 | 0 |
| MYMENSINGH | 0.42 | 0.65 | 0.61 | 0.54 | 0.27 | 0.3 | 0.04 | 0.08 | 0.09 | 0.97 | 0 | 0.01 |
| NAOGAON | 0.55 | 0.76 | 0.59 | 0.43 | 0.19 | 0.31 | 0.02 | 0.05 | 0.1 | 0.96 | 0.02 | 0 |
| NARAIL | 0.44 | 0.62 | 0.59 | 0.56 | 0.31 | 0.36 | 0 | 0.07 | 0.05 | 0.82 | 0 | 0.12 |
| NARAYANGANJ | 0.21 | 0.17 | 0.23 | 0.65 | 0.41 | 0.42 | 0.14 | 0.42 | 0.36 | 1 | 0 | 0 |
| NARSINGDI | 0.35 | 0.44 | 0.46 | 0.53 | 0.36 | 0.4 | 0.12 | 0.2 | 0.15 | 0.95 | 0 | 0.02 |

*(Cont. Table A.1)*

| District | Share of labor in agriculture | | | Share of labor in Service | | | Share of labor in industry | | | Revenue share of major crops | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | 2000 | 2005 | 2010 | Rice 2010 | Wheat 2010 | Jute 2010 |
| NATORE | 0.67 | 0.61 | 0.61 | 0.33 | 0.33 | 0.33 | 0 | 0.06 | 0.07 | 0.62 | 0.05 | 0.07 |
| NAWABGANJ | 0.34 | 0.7 | 0.51 | 0.62 | 0.26 | 0.4 | 0.04 | 0.04 | 0.09 | 0.74 | 0.05 | 0 |
| NETRAKONA | 0.45 | 0.58 | 0.58 | 0.51 | 0.27 | 0.33 | 0.04 | 0.15 | 0.09 | 0.99 | 0 | 0.01 |
| NILPHAMARI | 0.53 | 0.52 | 0.55 | 0.46 | 0.33 | 0.38 | 0.01 | 0.14 | 0.07 | 0.77 | 0 | 0.11 |
| NOAKHALI | 0.33 | 0.54 | 0.36 | 0.62 | 0.37 | 0.53 | 0.05 | 0.1 | 0.11 | 0.78 | 0.02 | 0 |
| PABNA | 0.31 | 0.64 | 0.64 | 0.57 | 0.24 | 0.31 | 0.11 | 0.12 | 0.05 | 0.57 | 0.03 | 0.23 |
| PANCHAGARH | 0.39 | 0.75 | 0.55 | 0.47 | 0.22 | 0.35 | 0.14 | 0.03 | 0.11 | 0.78 | 0.09 | 0.06 |
| PATUAKHALI | 0.49 | 0.51 | 0.53 | 0.46 | 0.38 | 0.32 | 0.05 | 0.11 | 0.15 | 0.91 | 0 | 0 |
| PIROJPUR | 0.45 | 0.48 | 0.46 | 0.49 | 0.45 | 0.39 | 0.06 | 0.07 | 0.14 | 0.99 | 0 | 0 |
| RAJBARI | 0.51 | 0.56 | 0.52 | 0.46 | 0.33 | 0.4 | 0.02 | 0.11 | 0.08 | 0.36 | 0.09 | 0.45 |
| RAJSHAHI | 0.52 | 0.63 | 0.63 | 0.45 | 0.34 | 0.3 | 0.03 | 0.03 | 0.07 | 0.51 | 0.03 | 0.04 |
| RANGAMATI | 0.37 | 0.69 | 0.57 | 0.61 | 0.15 | 0.39 | 0.03 | 0.16 | 0.04 | 0.97 | 0 | 0 |
| RANGPUR | 0.58 | 0.52 | 0.57 | 0.4 | 0.4 | 0.35 | 0.01 | 0.09 | 0.08 | 0.77 | 0 | 0.01 |
| SATKHIRA | 0.54 | 0.39 | 0.59 | 0.44 | 0.43 | 0.34 | 0.02 | 0.18 | 0.07 | 0.93 | 0 | 0.03 |
| SHARIATPUR | 0.45 | 0.47 | 0.4 | 0.52 | 0.44 | 0.47 | 0.02 | 0.09 | 0.13 | 0.8 | 0.01 | 0.14 |
| SHERPUR | 0.43 | 0.74 | 0.51 | 0.55 | 0.2 | 0.38 | 0.02 | 0.05 | 0.11 | 0.84 | 0.03 | 0.08 |
| SIRAJGANJ | 0.46 | 0.38 | 0.47 | 0.42 | 0.31 | 0.27 | 0.12 | 0.32 | 0.25 | 0.78 | 0.02 | 0.07 |
| SUNAMGANJ | 0.41 | 0.64 | 0.69 | 0.57 | 0.3 | 0.25 | 0.02 | 0.07 | 0.05 | 0.99 | 0 | 0 |
| SYLHET | 0.38 | 0.58 | 0.59 | 0.6 | 0.37 | 0.37 | 0.03 | 0.05 | 0.03 | 0.99 | 0 | 0 |
| TANGAIL | 0.47 | 0.49 | 0.49 | 0.49 | 0.36 | 0.37 | 0.04 | 0.16 | 0.14 | 0.79 | 0 | 0.04 |
| THAKURGAON | 0.5 | 0.8 | 0.67 | 0.45 | 0.18 | 0.25 | 0.05 | 0.02 | 0.08 | 0.82 | 0.1 | 0.02 |
| Mean share | 0.44 | 0.55 | 0.53 | 0.51 | 0.33 | 0.36 | 0.04 | 0.12 | 0.11 | 0.82 | 0.01 | 0.07 |
| Sample size (in '000) | 8.21 | 24 | 31.51 | 9.57 | 13.74 | 20.6 | 0.82 | 5.16 | 6.01 | 4.28 | 4.28 | 4.28 |

**Note:** Shares are calculated from the Labor Force Survey, Bangladesh of respective years. Share of revenue is calculated from HIES 2010.