The Response of Consumption to Income Shocks: Evidence from the Indian Trade Liberalization[*]

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ABSTRACT

This paper uses the Indian tariff reforms of the early nineties to estimate how households responded to the negative income shocks caused by the tariff decreases. Households more hurt by the tariff reform decreased overall expenditure, but the response is not uniform across food items. In particular, households more hurt by the reform did not change their consumption of cereals, but decreased their consumption of all other food items. Although this coping mechanism helped maintain overall levels of calorie consumption, diet diversity and the associated benefits were sacrificed.

Keywords: Trade, Nutrition, Structural Reform, Developing Countries

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Section 1: Introduction

Despite rapid economic progress and reduced incidence of poverty since the early 1990s, India continues to encompass the largest share of the world's poor and food-insecure population, typically defined as individuals consuming less than 2100 calories daily. In the past two decades the country has enacted a number of policies, including a dramatic trade liberalization, that in part aim to reduce the incidence of both poverty and food insecurity. This study focuses on how households employed in industries exposed to large tariff decreases cope with the negative income shocks caused by the increased import competition.

There are a variety of coping mechanisms households employ to weather economic shocks, which include accessing credit markets and selling off assets.[1] Studies also describe differences between poor and rich households in the composition of diets and differences in the intra-household allocation of calories (e.g., Oldewage-Theron and Dicks 2006). Here, changes to both the number of overall calories consumed as well as the composition of those calories in response to a negative income shock are analyzed.

The Indian tariff reform of the early nineties, implemented in response to a severe balance-of-payments crisis and under the advice of the IMF, represents an excellent opportunity to analyze the resulting change to food insecurity. Rather than targeting tariff decreases at industries that were trending differently, the vast majority of the unexpected change resulted from the reduction of the maximum tariff rate and the normalization of all tariffs to one of five levels between 1991 and 2004. Furthermore, although the tariff reform was just one portion of a large number of structural reforms, larger tariff decreases were not aimed more or less at other industries that were targeted for other reforms. Thus, this setting reduces the chances that the resulting change to food security assessments will be the result of unrelated industrial or consumption trends.

In order to identify consumption of those most hurt, regional differences in pre-reform employment are exploited. Specifically, regions where pre-reform employment was exposed to large tariff decreases are compared to regions where pre-reform employment was exposed to much smaller tariff decreases. Previous studies have demonstrated that workers in industries suddenly exposed to the resulting import competition did in fact economically suffer. Rural poverty decreased by less in regions exposed to the largest tariff decreases (Topalova 2007), and there is indirect evidence that underemployment decreased less in those same regions (Edmonds et al.

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[1] For surveys of this literature, see Payne and Lipton (1994) and Barrett (2002).

2009).

In the main empirical finding, regions more hurt by the tariff reform did observe a decrease in overall expenditure- the average regional exposure to the tariff reform caused a 4.9 percent decrease in a household's per capita expenditure. Although overall expenditure decreased, the expenditure on individual food items did not uniformly decrease. Households hurt by the reform did not reduce cereals expenditure, but decreased expenditure of all other food categories (e.g., dairy, meat, vegetables, etc.). This substitution away from more expensive calories allowed households to better cope with the income shock, and resulted in no statistically significant relationship between the negative income shocks of the trade reform and the numbers of food-insecure households.

We draw two primary conclusions from these results. First, the substitution of households hurt by a negative income shock towards a less diversified diet that is more reliant on cereals could help to explain the poor nutritional outcomes in the country amongst the poorest households, many of which consume over 2100 total calories. This includes not only high rates of acute malnutrition, but also the possibility of increased incidence of many other poor health outcomes later in life (e.g., Drescher et al 2007).[2]

Second, these estimates help illuminate the potential short to medium-run impacts trade reforms have on food security. Although many policy makers and researchers advocate more trade openness as a means to increase income and improve food security in the long run (e.g., von Braun et al 1992), studies have repeatedly shown that these policies involve both structural adjustment costs in the short to medium run as well as a subset of the population that is worse off in the long run (e.g., Jones and Neary 1995). These estimates suggest that households in India are able to effectively cope with these adjustment costs in order to maintain a minimum level of calorie consumption, but the composition of those calories change as a result. Thus, food assistance programs that better promote diet diversity might be able to help mitigate these costs in the short to medium run.

The rest of the paper is structured as follows: Section 2 describes both the tariff and concurrent reforms in India; Section 3 presents the empirical strategy and evidence of how the tariff reform affected household consumption; and Section 5 concludes.

Section 2.1: The Indian Structural Reforms

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[2]Estimates of malnutrition are available at a World Health Organization database accessed at http://www.who.int/nutgrowthdb/database/countries/en/ January 2011.

The Indian structural reforms began in July of 1991. With the Industrial Policy Statement, the government liberalized FDI in certain industries, abolished most oversight and licensing laws, and substantially changed laws governing the public sector. In addition to the changes in industrial policies, there were changes in both the quantitative and price restrictions hampering external trade. Tariffs were dramatically reduced and the negative list, which accounted for the bulk of the quantitative trade restrictions, was also significantly dismantled. The reforms continued throughout the next decade, where tariffs were further reduced, and nearly all industries were eventually opened to FDI without approval and taken off the negative list; the public sector and licensing reforms varied slightly, but almost all the changes were those made initially.

A large and growing literature has evolved describing the strong effects these reforms have had on the economy. Hasan, Mitra, and Ramaswamy (2003) find that the trade reforms led to an increase in labor-demand elasticities; Aghion et al (2008) describe how licensing reforms had a larger positive effect on firm productivity in states with more flexible labor laws; and Topalova (2007) and Edmonds et al (2007) respectively find that the regions where employment was more affected by the tariff decreases had smaller decreases in poverty and smaller increases in school enrollment for children. All of these studies suggest that over different time horizons, each aspect of the structural reforms had a strong effect on the economy.

Despite the comprehensive nature of the reforms, there are reasons to expect that the FDI, Licensing, and Public sector reforms might not have had as strong or as immediate of an impact as expected. The effects of these reforms critically depend on new entrants into local markets. However, removing restrictions imposed by the Central government did not suddenly create free entry, as discussed at length by Sinha (1998). Demonstrating the power wielded by the state, in response to a question about obtaining a license from the central government, an investor responded "Licenses? It was a hurdle. But it was as if we had ten hurdles to cross, and the license amounted to only two... The other hurdles were in the states: land, approval for electricity, raw materials, pollution controls, and labor regulations. So today [after liberalization] we have the same problem."[3]

On the other hand, tariff decreases increased competition from producers outside the purview of state governments, and might be more likely to have an immediate impact on the economy. The bulk of the tariff changes were the result of a readily apparent selection criteria: tariffs above a peak rate were brought down to a declining peak tariff rate over time and eventually

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[3]Quote was taken from Sinha (1998).

all tariffs were normalized to one of five rates. Beginning in 1992, any tariff above 150% was reduced to that level. In subsequent years the peak rate was reduced to 110%, 85%, 65%, and so forth. Combining the fact that relative tariff levels appear to largely be the result of industrial policies dating back to the early 1950s (Panagaryia 2006), this structure minimizes the chances that the resulting political response to the tariff reform was the result of politicians picking industries that were trending differently prior to the reform.

In addition to these changes, there were a small handful of cases where the government individually targeted industries for tariff changes for troubling reasons. For example, in speeches to parliament, the various finance ministers have prefaced the announcement of these small number of tariff changes with statements such as "There has been a persistent complaint from industry," or "Our electronics industry has become of age"(Mishra 1996). However, these types of tariff changes accounted for a very small share of the total reform. This point is demonstrated in Figure 1, which graphs the average tariff rate of both the true tariff series and a hypothetical tariff series created by ignoring these individually targeted tariff changes. Specifically, the downward-moving peak is applied to the pre-reform tariff rates. The two series are remarkably similar, and only start to slightly diverge later in the reform period as the peak tariff changes become smaller and the individually targeted changes start to make up a larger share of the total reform.

In order to attribute changes in consumption to the trade reform, we need to verify that tariff decreases for particular industries did not coincid with other reforms and were not correlated with other industrial trends. Corroborating the general lack of political manipulation in the tariff reform, initial tariff changes between 1991 and 1996 and tariff changes between 1991 and 2004 are regressed on trends in employment shares prior to 1991 and politically sensitive worker characteristics. These include measures of skill intensity, wages, household characteristics, etc.[4] If politicians were aiming reforms at the least politically sensitive industries one might expect the affected industries to be correlated with determinants of political affiliation, where previous studies have noted that urban, higher skilled, and wealthier individuals tend to support the right-wing political party Bharatiya Janata Party (BJP) (Sthanumoorthy and Eapen 2004, Yadav 2004). Displaying the results in Table 1, there is very little evidence of a correlation between the tariff changes and observable worker characteristics; a joint test of significance yields p-values of .90 and .41 respectively in the two specifications.

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[4]These variables were taken from pre-reform NSS Consumer Expenditure and Employment & Unemployment surveys. Reform data was acquired from publications by the responsible Indian government ministries.

On the other hand, in order to separate the effects of the tariff reforms from the other reforms, it is also important to verify that the tariff reform was not targeted at the same industries experiencing other reforms. Table 2 presents results from regressing the tariff change aimed at each industry in each time period on an indicator for whether the reform experienced each of the other types of reforms- fdi, licensing, public sector, and quantitative restrictions on imports. The results suggest that the tariff reform was uncorrelated with other reforms. None of the estimated coefficients are statistically significant, and in column (5), the p-value on a test of all coefficients jointly equaling zero is .500.

Section 3.1: Tariff Liberalization and Food Security

Rather than focus on more complete definitions of food security which focus on the probability of having enough food in the current as well as future periods (e.g., Barrett 2002), this analysis is forced to focus on the observed consumption responses to the negative income shocks caused by the trade reforms. In particular, this analysis focuses on the total amount of consumption as well as changes in consumption of particular food items.

In order to identify the response of those harmed, this study follows Topalova (2007) and Edmonds, Pavcnik, and Topalova (2007) in constructing a metric correlated with the magnitude of economic losses from the reform. As mentioned in the introduction, this metric identifies regions where the primary pre-reform employer was exposed to large tariff decreases. Specifically, using i to denote industry and r to denote region, short run employment costs associated with increased import competition are identified using the following metric:

$$TarExposure_{rt} = \frac{\sum_i E_{ir} * Tar_{it}}{Pop_r}$$

where E_{ir} denotes total pre-reform employment, Tar_{it} denotes the tariff level, and Pop_r is the pre-reform population.[5] Thus, employment in a region was more exposed to the tariff decreases if this measure was more positive.

These studies both present evidence that increased import competition, as measured through a smaller $TarExposure$, leads to a larger share of the population harmed by the tariff reform. Specifically, a more negative value is consistent with lower prices of imported goods forcing firms to leave the market, which causes newly unemployed workers to join the reservation pool

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[5]The primary difference between this measure and the ones used in Topalova (2007) and Edmonds, Pavcnik, and Topalova (2007) is that this measure uses both rural and urban employment. Results do not change when only using rural employment in the construction of $TarExposure$ and restricting the analysis to rural households.

of agriculture labor. This subsequently puts downward pressure on the local reservation wage (Edmonds, Pavcnik, and Topalova 2007). Further verifying that these regions in fact have a higher share of voters economically harmed by the reform, Topalova (2007) demonstrates that regions facing increased import competition observe smaller decreases in poverty relative to other regions.

The following reduced form specification is estimated:

$$ (1) \qquad Consump_{rth} = \lambda_r + \tau_t + \gamma TarExposure_{rt} + \delta X_{rth} + \xi_{rth} $$

where $Consump_{rth}$ and denotes the expenditure of household h in district r and time t; λ_r and τ_t denote regional and time fixed effects; and X_{rth} contains control variables for individual households.[6] Time fixed effects absorb economic shocks affecting the entire country; district fixed effects more fully absorb time-invariant district heterogeneity. Specifications are estimated which analyze total household consumption, and consumption of particular food and non-food items. Estimates of γ identify the consumption response of households hurt by the reform. An estimate of $\gamma > 0$ indicate that households hurt by tariff decreased their consumption.

There are a few things worth noting about this formulation. First, although the tariff reforms appeared to be uncorrelated with observable industrial characteristics, it is important to make sure that the small number of individually selected tariff changes are not driving the results. In this regard, $TarExposure$ is constructed using the hypothetical tariff series based only on the application of peak tariff rate decreases described in Section 2.1.

Second, this specification will not be able to determine whether consumption decreased in total in response to the reform. There are a number of other possible gains and losses from the tariff reform that are absorbed by the various fixed effects and controls. These estimates simply allow us to compare the consumption changes in response to one particular aspect of the reform. Lastly, there were a large number of reforms that could both help and hurt households that are captured in the set of controls. Thus any estimation focusing on one portion needs to demonstrate the omission of the other aspects of the reform do not affect the results.

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[6]Controls varying with time include an indicator of whether a household belongs to a Scheduled Caste or Tribe, the amount of land possessed, and household size. Additionally, the controls contain a number of characteristics of the head of the household, including gender, age, marital status, and occupational dummy for industry of employment. Lastly, exposure to other reforms, similar to the tariff measure are constructed and included in the set of controls.

To estimate specification (1), data is pieced together from a variety of sources. Pre-reform Employment was obtained from both the 43'rd Round of the National Sample Survey (NSSO) and the 1991 Census; pre-reform population was obtained from the 1991 Census; and measures of the reforms were gathered from a number of Indian government publications. Household consumption and characteristics were obtained from the 43'rd and 55'th rounds of the NSSO survey.

Section 3.2: Tariff Liberalization and Food Security

Estimates of specification (1) are presented in Table 3. Consistent with both Topalova (2007) and Edmonds et al (2009), households in regions more exposed to the tariff reductions decreased their expenditure on all goods and services. The average exposure to the tariff reform over this time period implies a 4.9 percent reduction in overall expenditure.

Table 3 also estimates specifications where the dependent variable is disaggregated into each individual component. The reduction in consumption is not uniform across all goods. Rather, households do not decrease their consumption of cereals, but decrease their consumption of every other food item aside from meat. This substitution away from more expensive calories negatively impacts the diversity of the Indian diet, which already relies on cereals for nearly 70 percent of total calorie consumption (Tandon and Landes, forthcoming).

However, despite the decrease in overall consumption, calories consumed are less responsive to the tariff reform. Households more exposed to the tariff reform do decrease the number of calories consumed, but the data cannot reject the hypothesis that the number of food-insecure households is uncorrelated with the exposure to the tariff reform.

Section 4: Conclusions

This study used the regional exposure to the tariff liberalization during the Indian structural reforms to estimate how household food consumption responded to the negative income shocks. Overall consumption did decrease, but this pattern was not uniform across different food groups. Rather, in order to cope with the income shocks, households substituted away from more expensive calories while maintaining the consumption of cereals. This resulted in consuming fewer calories, but did not significantly affect the number of food-insecure households.

These patterns suggest that households effectively mitigated the income shock in terms of

maintaining a minimum level of consumption. However, this consumption change suggests that households sacrificed diet diversity and made their diet more dependent on cereals. This pattern illustrates an additional possible short to medium-run impact of trade reforms on food security.

However, this analysis cannot address the efficacy of the existing food assistance programs in the country. Although the consumption surveys present detailed data regarding the amount of food aid received, participation in the program pre and post-reform were certainly not random. However, one possible reason as to why cereals consumption did not decrease in response to an income shock might be the result of the presence of food assistance, which sells subsidized rice and grains.

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Table 1: Selection of Industries for Reform

	Dependent Variables:	
	TarDif 1991-1996 (1)	TarDif 1991-2004 (2)
Employ Trend in industry i prior to reform: $(Employ_{i, 1991} - Employ_{i,1988})$	.938 (1.59)	-2.23 (1.99)
Share of workers in industry i that are married	-.014 (.096)	-.017 (.120)
Share of workers in industry i living in rural areas	.016 (.085)	.050 (.106)
Share of workers in industry i with marginal literacy	-.006 (1.06)	-.016 (.230)
Share of workers in industry i with skilled occupations	-.102 (.345)	-.031 (.393)
Average household size of workers in industry i	-.004 (.007)	.007 (.008)
ln(Average land owned by workers in industry i)	-.001 (.023)	-.030 (.036)
ln(Average per capita monthly expenditure or workers in industry i)	.014 (.013)	-.035[*] (.019)
p-value all coefficients jointly zero	.90	.41
Obs	167	167

Notes:

1. This table reports results from regressing the tariff changes aimed at specific industries on observable characteristics of individuals working in those industries. The level of observation is the industry.
2. All specifications include 2-digit NIC fixed effects and standard errors are clustered by 2-digit NIC codes.
3. * significant at 10%; ** significant at 5%; ***significant at 1%

Table 2: Correlations between Tariff and Other Reforms

Dependent Variable: Change in Tariff Rate$_{it}$

|	(1)	(2)	(3)	(4)	(5)
Indicator Equaling 1 if FDI was liberalized During the Time Period	-.014 (.024)	-	-	-	-.009 (.024)
Indicator Equaling 1 if Industry was De-licensed During the Time Period	-	.002 (.027)	-	-	.003 (.274)
Indicator Equaling 1 if Industry was opened to Private Competition During the Time Period	-	-	-.045 (.036)	-	-.042 (.036)
Indicator Equaling 1 if Industry had Quantitative Import Restrictions Removed During the Time Period	-	-	-	.023 (.019)	.024 (.185)
p-value all coefficients jointly zero	-	-	-	-	.500
Obs	668	668	668	668	668

Notes:

1. This table reports results from regressing the tariff changes in each industry during each of the four time periods on indicator variables describing whether the industry was the target of other reforms. The level of observation is the industry during each of the four time periods.
2. All specifications include industry fixed effects and standard errors are clustered by industry
3. * significant at 10%; ** significant at 5%; ***significant at 1%

Table 3: Consumption and Employment Exposure to the Tariff Reform

Dependent Variable	Independent Variable TarExposure
Monthly Per Capita Expenditure	12.6**
	(6.34)
Cereals	.535
	(35.6)
Pulses	19.1***
	(6.76)
Dairy	135.1***
	(45.6)
Oil/Spice/Food Preparation	33.9**
	(15.3)
Meat	-12.8*
	(7.64)
Veg	41.1
	(28.8)
Fruit	38.1***
	(11.9)
Processed Foods	137.6***
	(50.7)
Pan/Tobacco/Intoxicants	22.2**
	(7.52)
Cooking Fuel	160.9***
	(41.7)
Clothes	460.7***
	(50.4)
Education	46.7**
	(22.9)
Entertainment	-2.33
	(8.43)
Residual Expenditure	306.4
	(275.4)

Notes: Each row represents a separate regression, with the dependent variable in column (1), and column (2) reports the estimated coefficient on the interaction between an indicator for the household belonging to a backward caste or scheduled tribe and the share of close elections lost by the BJP in a region. All specifications have 82,513 observations. Robust standard errors clustered at the region level are reported in the parentheses. *** denotes statistical significance at the 1% level, ** denotes statistical significance at the 5% level, and * denotes statistical significance at the 10% level. All specifications include regional and time fixed effects, and control variables described in Section 3.

Figure 1: Average Tariff Rates versus Hypothetical Series Based on Peak Tariff Reduction
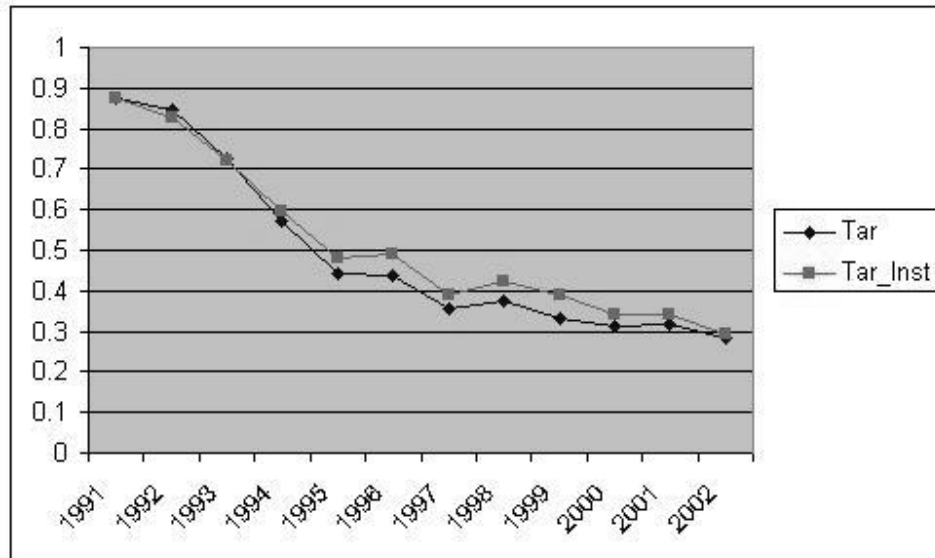
Notes:

1. The figure graphs the average tariff rates of the actual tariff series (Tar) over this time period, as well as the average tariff rate of a hypothetical tariff series (Tar_Inst).
2. The hypothetical series (Tar_Inst) is constructed by taking the actual pre-reform tariff rates, and simply applying the downward moving peak tariff rate, and then applying the normalization of all tariff rates to one of five levels. Specifically, this series is constructed to ignore tariff changes aimed at individual and specific groups of industries.