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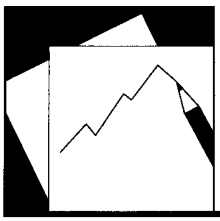

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Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty from India

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Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty From India

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Abstract

This paper uses the 1991 Indian trade liberalization to measure the impact of trade liberalization on poverty, and to examine the mechanisms underpinning this impact. Variation in sectoral composition across districts and liberalization intensity across production sectors allows a difference-in-difference approach. Rural districts, in which production sectors more exposed to liberalization were concentrated, experienced slower decline in poverty and lower consumption growth. The impact of liberalization was most pronounced among the least geographically mobile, at the bottom of the income distribution, and in Indian states where inflexible labor laws impeded factor reallocation across sectors.

JEL Classification Numbers: F13, I32, O15, O18, O19, O24

Keywords: Poverty, Trade Liberalization, India, Tariff

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I. INTRODUCTION[1]

The second half of the 20th century witnessed one of the greatest increases in trade openness in the history of the world. Significant declines in tariffs and transportation costs have caused international trade to affect the economy of nearly every country. Yet, while theory and cross-country studies suggest that trade liberalization increases overall welfare, credible evidence on how trade liberalization affects the distribution of income within a country is relatively scant, providing inconsistent results (see Pinelopi Goldberg and Nina Pavcnik (2007a) for a literature review). Even less is known about the mechanisms through which trade effects work. These questions are particularly important in light of recent criticism of globalization, from both developed and developing countries, and particularly relevant for developing countries with large vulnerable populations, inflexible industrial structure and inadequate social safety nets, where the long-run benefits of trade reforms may come at a substantial social cost.

Standard economic theory (i.e., the Heckscher-Ohlin model) provides the sharp prediction that with perfect factor mobility, gains to trade flow to the abundant factors, such as unskilled labor in developing countries. Recent trade models have challenged this theoretical finding, demonstrating that trade liberalization could reduce the wages of unskilled labor even in a labor abundant country, thereby widening the gap between the rich and the poor.[2] Abhijit Banerjee and Andrew Newman (2004), for example, develop a model in which the short-run costs of factor reallocation following trade liberalization fall disproportionately on the poor. An important feature in many of these models is the speed with which factors are reallocated across sectors of the economy. A number of empirical studies have indeed documented the existence of adjustment costs following trade liberalization episodes in developing countries using micro evidence from household and industry evidence within a particular country.[3,4]

This paper examines the affect of trade liberalization on poverty in India, using the sudden and extensive change in India's trade policy in 1991. First, I re-assess evidence initially presented in

[1] I am indebted to Abhijit Banerjee, Shawn Cole, Esther Duflo and Sendhil Mullainathan for invaluable guidance and support. This paper also benefited greatly from discussions with Nina Pavcnik. I also thank Robin Burgess, Pol Antras, David Autor, Eric Edmonds, Emmanuel Farhi, Ivan Fernandez-Val, Rema Hanna, Ann Harrison, Ashley Lester, Andrei Levchenko, two anonymous referees as well as numerous seminar and conference participants for helpful comments.

[2] See Joseph Stiglitz (1970), Donald Davis (1996), Robert Feenstra and Gordon Hanson (1997), Banerjee and Newman (2004).

[3] Cross-country studies typically do not find a strong relationship between trade liberalization and within country inequality. See, for example, Sebastian Edwards (1998), David Dollar and Aart Kraay (2002), Branco Milanovic (2002), Mattias Lundberg and Lyn Squire (2003) and Martin Rama (2003).

[4]See Ana Revenga (1997), Janet Currie and Ann Harrison (1997), Hanson and Harrison (1999), Zadia Feliciano (2001), Orazio Attanasio et al. (2004), Goldberg and Pavcnik (2005), Goldberg and Pavcnik (2007a), Goldberg and Pavcnik (2007b), among others.

Topalova (2007), but challenged by Rana Hasan, Devashish Mitra and Beyza Ural (2007), on the effect of India's trade liberalization on rural poverty. In Topalova (2007), I demonstrate that in rural India, districts more exposed to trade liberalization through their employment mix experienced slower progress in poverty reduction. This paper extends that analysis by including non-tariff barriers (NTBs), and by measuring how loss of trade protection affected consumption of households across the entire income distribution. I demonstrate that the finding is robust to a variety of approaches to deal with the potential endogeneity of the pre-liberalization composition of employment and the confounding effect of concurrent reforms, including the dismantling of NTBs.

The size of the effect on poverty is nontrivial: compared to a rural district experiencing no change in tariffs, a district experiencing the mean level of tariff changes saw a 2 percentage points increase in poverty incidence and a 0.6 percentage points increase in poverty depth. This set back represents about 15 percent of India's progress in poverty reduction over the 1990s.

A second important contribution of this paper is to explore the mechanisms by which trade reform may affect the income distribution, including factor mobility and adjustment in price levels. By focusing on the aggregate outcomes at the district level, the study goes beyond the industry-level analysis most prevalent in the literature, and captures general equilibrium impacts of liberalization within a region.

This paper builds on a small literature studying the Indian trade liberalization experience. Using the identification strategy developed in Topalova (2007), Eric Edmonds, Nina Pavcnik and Petia Topalova (forthcoming) demonstrate that short-run adjustment costs of trade reforms influenced the schooling decisions of children: the trends of rising schooling and declining child labor were attenuated in the more exposed rural districts. Using variation at the substantially more aggregate state-level and expanding the trade liberalization measure to include NTBs, Hasan, Mitra and Ural (2007) do not find evidence that greater exposure to trade opening is associated with slower reduction in poverty in rural India. These studies do not examine in detail the mechanisms that underlie the poverty effect (or lack thereof) of India's trade reforms.

The Indian liberalization presents a particularly useful setting in which to examine the poverty consequences of opening to international trade. India is a large country with the highest concentration of poor people in the world. The size of tariff reduction was large (the average drop in the tariff was 60 percentage points), and the rapid and externally-imposed implementation of the trade liberalization mitigates usual concerns about endogeneity of reforms. Multiple surveys on consumption and employment, combined with large variation in the quality of institutions across states, allow me to answer not only how big the effects of liberalization were, but also understand why some regions were more affected than others.

The identification strategy of this paper, which follows Topalova (2007), is straightforward: different districts in India had different industrial composition in 1991, just before the onset of the reforms. Tariffs for different industries were reduced by varying levels, and at varying times, inducing differential exposure to trade liberalization across Indian districts. Thus, this paper establishes whether changes in district-level poverty and levels of consumption across the income

distribution before and after the trade reform are related to the reduction of trade protection at the district level. An important feature of this empirical strategy needs to be emphasized. The difference-in-difference approach does not measure the level effect of liberalization on poverty and consumption across India as a whole: rather it measures the *relative* effect of liberalization on districts that were more or less exposed to trade. In short, the paper does not answer the question of whether India benefited from trade liberalization, but rather, did certain areas and certain groups of people within these areas capture more of the gains, or suffer more of the losses resulting from liberalization.

In analyzing effects across the distribution, I find that the average real per capita expenditure in districts where employment was concentrated in industries exposed to larger tariff cuts grew relatively more slowly. This pattern was most pronounced among the poorest households in affected districts, with the estimated impact declining in magnitude and becoming statistically indistinguishable from zero at the upper end of the distribution of consumption.

The finding that liberalization affects regional outcomes is not consistent with standard trade theory, which assumes perfect mobility of factors across geographical regions within a country as well as across industries. That I do not find perfect factor mobility in response to liberalization is not surprising, given the wide geographical variation in levels of income prior to trade liberalization. However, the finding of regional effects emphasizes the failure of standard theoretical models to explain the Indian experience: there is almost no geographical or cross-sectoral migration in rural India. Perhaps even more surprisingly, there is no sign of an upward trend in mobility after the 1991 reforms.

This paper demonstrates the importance of factor mobility, and institutions that may affect it, in mitigating the unequal effects of trade liberalization. The trade-consumption link is the strongest among those that are the least geographically mobile, i.e. the bottom of the consumption distribution. Indian states with inflexible labor laws, where reallocation of labor across sectors may have been impeded, are precisely the areas where the adverse impact of trade opening on poverty was felt the most. In contrast, in states with flexible labor laws, movements of capital and labor across sectors and the overall faster growth of manufacturing eased the shock of the relative price change. These findings underscore the relevance of theories of trade liberalization that do not assume free movement of factors across sectors.

Finally, this paper documents that the adjustment to the trade reform came through changes in prices. Wages and wage premia seem to have absorbed the effect of the trade-induced relative price change. These results are thus consistent with a specific-factor model of trade: the inability of labor to reallocate away from sectors that lost trade protection is the most likely explanation for the observed relationship between trade liberalization and poverty in India's rural districts.

The remainder of the paper is organized as follows. Section II describes the Indian reforms of 1991 focusing on trade liberalization and presents the data used in the analysis. In Section III, the empirical strategy is developed, while Section IV discusses the main findings and establishes the robustness of the results. Section V considers the mechanisms that drive the evolution of poverty. Section VI concludes.

II. BACKGROUND

A. Trade Reform in India[5]

After the Second World War, India, along with many other developing countries, chose a strategy of import substitution and heavy government intervention in the economy to promote industrialization (Valerie Cerra and Sweta Saxena 2000). India's trade restrictions were among the most severe in the world, and utilized a variety of tools: high tariff and non-tariff barriers, a complex import licensing system, an actual user requirement that prohibited imports by intermediaries, restriction of certain imports to the public sector ("canalization"), and government purchase preferences for domestic producers, among others. Despite the gradual easing of the trade regime in the late 1980s when India turned towards export-led growth under Rajiv Gandhi's leadership, as late as 1989/90 only 12 percent of manufactured products could be imported under an open general license, and the average tariff was still greater than 90 percent (Cerra and Saxena, 2000).

The gradual reforms of the late 1980s were accompanied by fiscal and current account imbalances. The first Gulf War brought these to the forefront in 1990, when oil prices rose, remittances dropped, and demand from important trading partners shrank. India was obliged to turn to the International Monetary Fund (IMF) and the World Bank for assistance with its external payments and negotiated a Stand-By Arrangement with the IMF in 1991. The IMF support was conditional on an adjustment program featuring macroeconomic stabilization and structural reforms. The latter focused on the industrial and import licenses, the financial sector, the tax system, and trade policy. On trade policy, benchmarks for the first review of the Stand-By Arrangement included a reduction in the level and dispersion of tariffs and a removal of a large number of quantitative restrictions (Ajai Chopra et al., 1995).[6]

Following 1991, trade policy changed dramatically along these guidelines (Figure 1).[7] From the period 1987–1994, the share of goods subject to quantitative restrictions fell from 87 to 45 percent.[8] Nominal tariffs were reduced, with the average tariff falling from 80 percent in 1990 to 37 percent in 1996. The standard deviation of tariffs also dropped by 50 percent. The structure of protection across industries changed (Figure 1, Panel D).

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[5]This section draws on Topalova (2004, 2005, 2007).

[6]Specific policy actions in a number of areas -- notably industrial deregulation, trade policy and public enterprise reforms, and some aspects of financial sector reform -- also formed the basis for a World Bank Structural Adjustment Loan, as well as sectoral loans.

[7]The guidelines were outlined in the Chelliah report of The Tax Reform Commission constituted in 1991.

[8] Additional restrictive policies (such as the actual user requirement and the import licensing lists) were abandoned; all goods except those on a negative list were importable subject to tariffs (Bishwanath Goldar, 2002).

One of the goals of the trade reform program was to reduce the dispersion of tariffs across products, and to simplify and rationalize the tariff system. Indeed, there is a strikingly linear relationship between the pre-reform tariff levels and the decline in tariffs the industry experienced. With the exception of cereals and oilseeds, tariffs on agricultural products were also sharply reduced (Figure 1, Panel B). The timing and magnitude of non-tariff barrier reductions varied across industry use type: Capital, Basic, and Intermediate goods were first to be liberalized, while Consumer Nondurables and agricultural goods were gradually moved from the negative list to the list of freely importable goods only in the second half of the 1990s. After devaluing the Rupee in July, 1991 and February, 1992, India adopted a flexible exchange rate regime in 1993 (Montek S. Ahluwalia, 1999).

The decline in tariffs was followed by a substantial increase in trade flows: the ratio of total trade in manufactures to GDP increased 50 percent, from a base of 13 percent in the 1980s, to nearly 19 percent of GDP in 1999/2000. India remained committed to trade liberalization in the Ninth Plan (1997–2002), though momentum for reform abated after the initial sweeping reforms had been undertaken and external pressure relieved.

The Indian trade liberalization presents a particularly useful setting in which to examine the effect of opening to international trade on poverty. Several features of the reforms mitigate the usual concerns of endogeneity of trade opening (Gene Grossman and Elhanan Helpman 2002). First, the timing of trade liberalization was unanticipated, as it was sudden and externally imposed. Thus, it was not part of a well-planned development strategy that would have given households and firms the opportunity to adjust their employment, consumption and production decisions in anticipation of trade liberalization. S. K. Goyal (1996) wrote that "the new policy package was delivered swiftly in order to complete the process of changeover so as not to permit consolidation of any likely opposition to implementation of the new policies. The strategy was to administer a `shock therapy' to the economy… There was no debate among officials or economists prior to the official adoption…The new economic policy did not originate out of an analysis of the data and information or a well thought out development perspective."[9] Indeed, the trade reforms were implemented so fast that they did not appear on the political radar (Ashutosh Varshney, 1999). Other reforms, such as privatization, were delayed by popular opposition, but, as Jagdish Bhagwati (1993) described it, "Reform by storm has supplanted the reform by stealth of Mrs. Gandhi's time and the reform with reluctance under Rajiv Gandhi."

Second, there is no evidence that the reductions of tariffs across products varied in systematic ways that could confound the empirical strategy as explained in the following sections. Policymakers do not appear to have adjusted tariffs according to industry's perceived productivity during the Eighth Plan, i.e. until 1997. Topalova (2004), using firm-level data to estimate

[9]This view is confirmed in a 2004 interview with Dr. Chelliah, one of the masterminds of the reforms "We didn't have the time to sit down and think exactly what kind of a development model we needed...there was no systematic attempt to see two things; one, how have the benefits of reforms distributed, and two, ultimately what kind of society we want to have, what model of development should we have?," July 5, 2004 http://in.rediff.com/money/2004/jul/05inter.htm

productivity and productivity growth, tests whether current productivity levels and productivity growth predict future tariffs -- a relationship one would expect if policymakers were trying to protect less efficient industries. There is no correlation between future tariffs and current productivity and productivity growth for the 1989–96 period. For the time period after 1997, however, Topalova (2004) does find that future tariffs are negatively correlated with current productivity. This evidence and the evidence on uniformity in tariff movements until 1997 suggest it may not be appropriate to use trade policy variation after 1997. As a result, this study focuses only on the 1987–1997 period.

Finally, Topalova (2007) tests for political protection, using the Annual Survey of Industries (ASI) dataset for manufacturing workers, and the National Sample Surveys (NSS) for agricultural employees. For both manufacturing and agricultural production sectors, there is no evidence that tariff changes are correlated with pre-reform sectoral characteristics, such as number of employees (presumably larger labor forces have greater political power), industrial concentration (measured by the average factor size), share of skilled workers, consumption, log wage, or measured poverty of the workers.

Why were changes in trade policy unrelated to the contemporaneous situation in India? One explanation is suggested by Ira Gang and Mihir Pandey (1996), who study the determinants of protection during the period 1979–92. They consistently find that economic and political factors are not important determinants of industry tariff levels in India.[10] Their preferred explanation is that trade policy was set in the Second Five-Year Plan, soon after Independence, and stayed static, even as the underlying economy evolved.

Thus, it seems that tariff changes between 1991 and 1997 were as unrelated to the state of the production sectors as can be reasonably hoped for in a real-world setting. One big exception to the seemingly random pattern of tariff reductions are two major agricultural crops: cereals and oilseeds. Throughout the period of study, the imports of cereals and oilseeds remained canalized (only government agencies were allowed to import these items) and no change in their tariff rates was observed (the tariff rate for cereals was set at 0). Thus, they were de facto non-traded goods. The delay in the liberalization of these major agricultural crops was due to reasons of food security. However, the cultivators of these crops were also among the poorest in India. This fact introduces some complications to the analysis, which are discussed in the following sections.

B. Data

The data for this analysis were drawn from several sources. The “thick” rounds of the Indian NSS, conducted in 1983, 1987–88, 1993–94 and 1999–2000, provide information on household expenditure, occupation, industrial affiliation and various other household and individual statistics. These nationwide surveys sample approximately 75,000 rural and 45,000 urban

[10]In other developing countries, protection tends to be highest for unskilled, labor-intensive sectors. See Goldberg and Pavcnik (2005), Hanson and Harrison (1999), Currie and Harrison (1997) for evidence from Colombia, Mexico and Morocco respectively.

households per round. I use the information from these repeated cross-sectional surveys to create a panel at the district (for rural areas) and region[11] (for urban areas) level.[12] There are roughly 450 districts and 77 regions in India.[13]

I calculate district- and region-level measures of poverty (measured as headcount ratio),[14] average consumption as well as various consumption percentiles for the 16 major Indian states, for urban and rural populations. Following Angus Deaton (2003a, 2003b), I adjust these estimates in two ways. First, I use the poverty lines proposed by Deaton as opposed to the official poverty lines used by the Indian Planning Commission, which are based on defective price indices over time, across states and between the urban and rural sector.[15] Second, due to a change in the survey design (namely the recall period for certain goods), consumption data in the 1999–2000 round are not directly comparable to previous rounds. To achieve comparability, I follow Deaton and impute the distribution of total per capita expenditure for each district from the households' expenditures on a subset of goods for which the new recall period questions were not used. The poverty and average consumption measures were derived from this corrected distribution of consumption from the detailed Consumption Schedule of the surveys.[16] Due to the relatively small number of observations at the district level, I compute the consumption percentiles from the expenditure data provided in the Employment and Unemployment Schedule of the NSS surveys, whose questionnaire was not changed over time.

The Indian Census of 1991 reports employment across production sectors at the 3-digit National Industrial Classification (NIC) code by district, which is used to determine the initial geographic allocation of production sectors.[17]

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[11]NSS regions typically consist of several districts within a state with similar agroclimatic conditions and socioeconomic features. India is divided into 77 such regions.

[12]Given the NSS sampling methodology in urban areas, it is not possible to create representative aggregates at the district level in urban India.

[13] The much more disaggregate nature of the data in this study may explain the different findings relative to Hasan, Mitra and Ural (2007)'s analysis which is based on the state-level variation across the 15 big states in India.

[14]The headcount ratio represents the proportion of the population below the poverty line.

[15]The poverty lines are available for the 16 bigger states in India and Delhi to which I restrict the analysis. Poverty lines were not available for the following states and union territories: Arunachal Pradesh, Goa, Daman and Diu, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Andaman and Nicobar Islands, Chandigarh, Pondicherry, Lakshwadweep, Dadra Nagar and Haveli. The results are not sensitive to the inclusion of these states, with poverty lines assumed to be the same as those of the neighboring states.

[16]Using the uncorrected distribution does not change qualitatively the results at the *district level*, though for some of the robustness checks specifications, it increases the standard errors of the estimated coefficients.

[17]The census does not specify which crops are produced by agricultural workers, so I use the 1987 NSS to calculate agricultural employment by district.

A compelling advantage of this study is the detailed tariff information, which is available at the six-digit level of the Indian Trade Classification Harmonized System (HS), for approximately 5,000 product lines. These data were hand collected from publications from the Ministry of Finance. I match these 5,000 product lines to NIC codes using the concordance of Debroy and Santhanam (1993), providing a relatively precise measure of average sector-level tariffs (Topalova, 2004).

I extend the analysis in Topalova (2007) by obtaining measures of non-tariff barriers (NTB). As much of the non-tariff trade restrictions in India are in the form of import licenses, I focus on the share of products within a production sector that can be imported without any license. The data on NTBs after 1997 are available at the product level, while for the pre-reform period I rely on M. Ataman Aksoy (1992) to construct sector-level NTBs.

In order to identify the mechanism through which trade liberalization affects regional poverty and consumption, I turn to an additional source of industrial data: the ASI. The ASI reports information on production activity in the registered manufacturing sector by state for more than 100 3-digit industries during the 1982–1997 period.

III. Empirical Strategy

A. Empirical Framework

The Indian trade liberalization was sudden, wide-reaching, and externally imposed, providing an unusual natural experiment. Because the geographic location of production sectors across the 450 Indian districts varied in 1991, the sudden removal of trade protection affected each district with a different intensity through the employment channel. It is thus possible to identify the impact of liberalization on poverty and consumption across the income distribution by comparing the evolution of these outcomes before and after the reforms in districts whose production sectors faced greater tariff cuts to districts whose production sectors remained relatively protected. This empirical strategy was first introduced in Topalova (2005).

To measure a district's exposure to trade protection prior to liberalization, I calculate the average tariff faced by a district as the nominal tariffs of the production sectors operating in that district as of 1991, assigning to each production sector a weight equal to the number of workers in that sector as a share of all workers in the district. The variation in the composition of production sectors generates a differential response of the district level trade exposure to the exogenous changes in tariffs. In a regression framework, the baseline specification takes the following form:

$$y_{dt} = \alpha + \beta \cdot Tariff_{dt} + Post_t + \delta_d + \varepsilon_{dt} \quad (1)$$

Where y_{dt} is district level outcome such as poverty, and $Tariff_{dt}$ is the level of protection enjoyed by the district. The coefficient of interest, β, captures the average effect of trade protection on district outcomes. The inclusion of district fixed effects, δ_d, controls for time-invariant heterogeneity at the district level, while year fixed effect, $Post_t$, controls for macroeconomic shocks or trends that affect India as a whole. Note that this strategy does not

identify the overall impact of trade liberalization on poverty, but rather measures whether some districts benefited more (or suffered less) than others.

This approach seeks to measure the short to medium-term effects of trade liberalization, by comparing more exposed districts to less exposed districts. Note that eq. (1) serves as a test of the hypothesis of perfect factor mobility: if workers shift across districts in response to changes in wages and prices, the estimated effect β would be zero. (I show below that in fact, migration across districts plays no discernible role in Indian labor markets). A further advantage of this identification strategy is that it includes the general equilibrium effect of trade liberalization within a geographical unit. Previous studies have focused on the effect of trade opening on manufacturing workers, who, in developing countries, typically represent a small fraction of the population, though often a large share of income. This strategy captures not only the effect of trade liberalization on manufacturing and agricultural workers, but also on their dependents, and individuals in related and unrelated sectors.

Trade liberalization affects individuals as consumers, and as wage earners.[18] The empirical strategy employed in this paper focuses primarily on the effect of trade on the income earner, without explicitly modeling the effect of changes in prices of final goods. Yet, because the poverty line is adjusted over time using state-level price deflators, the analysis implicitly accounts for the impact trade liberalization had on consumers through goods' prices. This is a nontrivial advantage of the comprehensiveness of the Indian data.

B. Measurement of Regional Exposure to Trade Liberalization

As in Topalova (2005), the measure of trade policy is the tariff that a district faces, calculated as the 1991 employment-weighted average nominal ad-valorem tariff at time t.[19] Table 1 provides summary statistics of the variables included in the analysis at the district level, including a breakdown of the workers across broad production sectors. The median district in India in 1991 had a population of approximately 22 million. In rural areas, approximately 80 percent of workers were involved in agriculture, of which about 87 percent were involved in the cultivation of cereals and oilseeds. Approximately 6 percent were involved in mining and manufacturing, while the remaining 12 percent worked in services, trade, transportation, and construction. In urban India, agricultural employment is much lower (19 percent), while manufacturing and mining employ 19 percent. Over half of urban workers are in either service or trade sectors.

The district tariffs are computed as follows:

$$Tariff_{dt} = \frac{\sum_i \text{Worker}_{d,i,1991} \cdot Tariff_{i,t}}{\text{Total Worker}_{d,1991}}$$

[18]Guido Porto (2006) outlines a methodology to evaluate the distributional impact of trade, by considering the effect of liberalization on both final goods' prices and workers' incomes.

[19]Note that all results presented in this paper are robust to using effective rates of protection as defined in Max Corden (1966) instead of nominal tariffs to construct the district measure of trade exposure.

In this calculation, non-traded industries (services, trade, transport, and cultivation of cereals and oil seeds) are assigned a zero tariff for the entire period.[20] This means that $Tariff_{dt}$, scaled tariff, is sensitive to the share of people involved in non-traded production sectors, most of whom are poor cereal and oilseed growers. Thus, $Tariff_{dt}$ is related to initial poverty levels. This could confound the empirical strategy if there were convergence or divergence in district outcomes for reasons unrelated to trade liberalization. For example, because of mean reversion, poorer districts, which have a larger share of agricultural workers, may experience greater declines in poverty. Such districts will also record a lower decrease in tariffs, since the initial $Tariff_{dt}$ measure is low. Thus, a negative estimate of β may not necessarily imply liberalization led to relative increases in poverty. Another possibility is that workers in traded and non-traded production sectors are on different growth paths. To overcome this shortcoming, I instrument $Tariff_{dt}$ with $TrTariff_{dt}$, defined as:

$$TrTariff_{dt} = \frac{\sum_i \text{Worker}_{d,i,1991} \cdot Tariff_{i,t}}{\sum_i \text{Worker}_{d,i,1991}}$$

$TrTariff_{dt}$, non-scaled tariffs, ignores the workers in non-traded production sectors. It instead uses only those employed in traded production sectors to weight the tariff measure. Thus, a district in which 2 percent of the workers are employed in traded production sectors will have the same measure of $TrTariff_{dt}$ as a district in which all workers are in traded production sectors, if the sectoral composition within traded production sectors is the same in both districts. Variation in $TrTariff_{dt}$ is independent of the size of the traded sector within a district, and thus the non-scaled tariff does not reflect the magnitude of the effect trade policy might have. Yet, $TrTariff_{dt}$ serves as a good instrument for $Tariff_{dt}$, since it is strongly correlated with the scaled tariffs, yet not correlated with district initial poverty. Table 2 gives results from the following first-stage equation:

$$Tariff_{dt} = \alpha + \beta \cdot TrTariff_{dt} + Post_t + \delta_d + \varepsilon_{dt} \quad (2)$$

with $Post_t$ and δ_d defined as above. Columns (1) and (3) present the correlation between the scaled and non-scaled tariffs. There is a very strong relationship between the non-scaled and scaled tariffs in both urban and rural India.

A second possible instrument is suggested by the fact that tariff changes are linearly related to initial tariffs. Tariff harmonization was an important goal of reforms: this means that the higher the initial tariff was, the greater the tariff cut. One possibility would be to use the initial level of the scaled tariff interacted with a post dummy as an instrument. However, as previously argued, the scaled tariff measure is correlated with the pre-reform levels of district income and poverty

[20]Since the identification strategies exploits change in tariffs within a district before and after the reform, it does not matter whether non-traded production sectors are assigned 0 or infinite tariffs as long as these tariffs do not change over time.

and may thus not form a valid instrument. Instead, I use pre-reform unscaled tariff times a post dummy, in addition to the unscaled tariff, as instruments for tariff:

$$(3) \qquad Tariff_{dt} = \alpha + \beta \cdot TrTariff_{dt} + \theta \cdot Post_t \cdot TrTariff_{d,1987} + Post_t + \delta_d + \varepsilon_{dt}$$

Table 2 columns (2) and (4) include the interaction of the initial unscaled tariff and a post-liberalization dummy. The interaction term is strongly correlated with the scaled tariff and adds explanatory power in all rural subsamples, though is less useful in urban sectors.[21, 22]

Outcome data from the NSS are available for the years 1987, 1993 and 1997. Since 1993 is right in the middle of the reforms, I focus on the 1987–1997 period.[23] Tariff data are available annually. I use the earliest available data, 1987, for the pre tariff measure, and the 1997 data as the post measure.

IV. RESULTS

A. Main Findings

Table 3a and 3b present estimates of the effect of liberalization on poverty and average consumption in rural and urban India, respectively. Each column reports a different version of eq. (1). Column (1) gives the OLS relationship with $Tariff_{dt}$, column (2) reports the reduced form using $TrTariff_{dt}$; column (3) is the IV approach using $TrTariff_{dt}$ as an instrument for $Tariff_{dt}$. Because the dependent variable is an estimate and to obtain a representative effect for all India, the regressions are weighted by the number of households used to construct the estimate. The post-liberalization dummy ($Post_t$) controls for macroeconomic shocks and time trends that affect India as a whole, while the district fixed effects absorb district-specific heterogeneity. To account for potential correlation of outcomes at the state level (since sectoral composition and economic growth may be correlated within a state), I cluster the standard errors at the state-year level. Panels A present the results for poverty rate, while panel B gives the estimates for the log of the average per capita consumption in the district.

These specifications replicate the findings in Topalova (2005, 2007) of a statistically significant relationship between reduction in trade protection and relative increase in poverty in rural India.

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[21] The $TrTariff_{dt}$ and $TrTariff_{d,1987} \cdot Post_t$ measures are highly collinear, so the first-stage is difficult to interpret.

[22] An alternative justification for these instruments is that I am simply using alternative, non-linear functions of the instrument $TrTariff_{dt}$. This improves the power of the first stage, whose coefficients need not be given an economic interpretation.

[23] Hasan, Mitra and Ural (2007) use all three rounds of surveys in their state-level analysis, presumably due to the very small number of states (15). However, due to the ambiguity of whether to treat 1993 as a pre- or post-liberalization year, this study focuses only on the long difference.

The OLS point estimate is -0.24, but increases to -0.71, significant at the one percent level, when $TrTariff_{dt}$ is used as an instrument for $Tariff_{dt}$. This means that the cut in tariffs caused a relative poverty increase of about 3.9 percentage points in a district experiencing the average decline in scaled tariffs of 5.5 percentage points. These effects are nontrivial when compared to the overall decline in poverty from 1987 to 1999 of about 13 percentage points (see Table 1). In urban areas, where analysis can only be performed at the regional level, the point estimates of the effect of tariff cuts on poverty are of similar size; however, with fewer observations, estimation is less precise, and the coefficients are not statistically distinguishable from zero (Table 3b).

In Panel B of Table 3a and 3b, I estimate the relationship between tariff reductions and per capita expenditure in the district. Though the relationship is statistically significant only in the IV specification, the estimated coefficient on the tariff measure from the OLS, reduced form and the IV clearly demonstrate the biases that the OLS (and the scaled measure of tariff exposure) may introduce: while the OLS relationship between changes in tariff measure and log consumption is negative in rural India, the sign is reversed in the reduced form and IV specifications. The OLS relationship presented in column (1) implies that trade liberalization is associated with faster growth at the district level: larger drops in scaled tariffs corresponded to larger increases in the mean consumption. However, the greater the share of workers involved in traded goods production sectors is (i.e. the more industrialized and richer is the district), the larger is the drop in scaled tariffs. If there is divergence across districts, so that initially richer districts grow faster, then the OLS relationship between changes in scaled tariffs and changes in consumption would be negative, even in the absence of any effect of trade liberalization, as the change in scaled tariff reflects the effect of being in an initially richer district on subsequent growth. This suggests the OLS estimates are downward biased, as is the case for poverty and log consumption (columns (1) vs. columns (3)).

An important concern with specification in eq. (1) is that changes in district trade protection as captured in *Tariff* and *TrTariff* may be systematically correlated with unobserved district-specific time-varying shocks that affect the evolution of poverty or average consumption. More specifically, the measure of exposure to trade liberalization is constructed as the interaction of the initial composition of production sectors within a district and the tariff changes at the production sector level. Thus, if the initial sectoral composition or other pre-reform district characteristics have a bearing on the future growth in a district, the estimates in column (3) may be biased.[24] To address this concern, I re-estimate eq. (1), but allow initial 1987 district characteristics to have a time-varying effect by interacting these with a post dummy.

$$y_{dt} = \alpha + \beta \cdot Tariff_{dt} + \theta \cdot Post_t \cdot X_{d,1987} + Post_t + \delta_d + \varepsilon_{dt} \quad (4)$$

[24]Hasan, Mitra and Ural (2007) do not allow for initial state characteristics to have a time-varying effect, as they are constrained by the very small number of states (16). This, in addition to the much more aggregated nature of their data, may explain the differences in the findings on the relationship between trade liberalization and poverty. The inclusion of NTBs in their analysis does not appear to account for the difference in results as demonstrated in the robustness checks.

The pre-reform characteristics, $X_{d,1987}$, that are interacted with the post-liberalization dummy include the district's employment composition at a more aggregate level than the one used in the construction of the tariffs (namely the share of workers in agriculture, manufacturing, mining, trade, transport, and services, with construction workers the omitted category), the share of the population that is literate, and the share that belongs to scheduled caste or scheduled tribe populations. I also allow for differential time trends in district outcomes in states with pro-employer labor laws by including an interaction of the post-reform indicator with state labor law indicators as defined in Tim Besley and Robin Burgess (2004).

In the rural sample, the basic results are robust to controlling for the time-varying effect of district initial characteristics (column (4)). The estimated relationship between tariffs and poverty rate falls from 0.71 to 0.47. It may therefore be the case that some of the variation in poverty incidence that eq. (1) attributed to trade liberalization was in fact due to certain omitted time-varying district specific characteristics. If anything, the relationship between tariffs and average consumption strengthens once I allow for differential-time trends.

In the urban sample, including district initial characteristics drastically increases the magnitude of the estimated relationships for both dependent variables, though they remain rather imprecisely estimated. This appears to be driven by a strong correlation between the pre-existing trends in outcome variables, other reforms that took place at the same time and trade liberalization shock at the region level in urban areas as demonstrated below.

B. Robustness

One important concern with all difference-in-difference estimates is the possibility that pre-existing trends are correlated with changes in the variable of interest. If the measures of liberalization are correlated with district-level trends in poverty or consumption, the estimates presented in the previous section may simply be a spurious correlation. To address this concern, I conduct a falsification test of whether changes in poverty or average consumption from 1983–1987 are correlated with changes in tariffs from 1987 to 1997. If the tariff drops are correlated with pre-existing trends in poverty and consumption, the coefficients on tariff should be similar to those estimated with the actual pre and post-reform data. Because the 1983 NSS round does not identify districts, I conduct the regressions at the regional level.

Column (5) in Table 3a and 3b present the falsification exercise, which assigns the pre-reform tariffs (1987) to the 38th round and post-reform tariffs to the 43rd round of data. In the rural sample, there is no evidence that our measure of trade liberalization is correlated with the pre-existing trends in the outcome variables. The estimated value of β from the falsification regressions are very small in magnitude and of opposite sign compared to those in column (4). In the urban sample however, there appears to be a strong correlation between the pre-reform poverty declines and consumption growth and tariff reduction: faster growing regions in the

1980s experienced larger tariff cuts in the 1990s. The correlation would bias the estimated association of poverty and trade exposure in eq. (1) and (4) for urban India.[25]

An important part of India's 1991 liberalization was the removal of NTBs. Hasan, Mitra and Ural (2007) argue that the inclusion of measures of NTBs in their state-level analysis of the trade liberalization-poverty link in India drives the difference in results relative to Topalova (2007). In order to test whether this is indeed the case, I include the employment-weighted district/region measure of NTB in eq. (4). Since the NTB is measured as the share of products within a production sector that can be imported freely (thus a higher value of this measure means freer trade), a positive coefficient on the NTB would imply that trade liberalization is associated with higher poverty. Columns (6) in Table 3a and 3b demonstrate that the point estimate and statistical significance of the effect of tariff cuts on poverty and consumption are invariant to the inclusion of NTBs. In fact, and in contrast to Hasan, Mitra and Ural (2007), the statistically insignificant coefficients on the NTBs suggest that, if anything, the removal of these barriers to trade was associated with a relative increase in poverty and relatively slower consumption growth in rural areas (i.e. the effects of both tariffs and NTB removal go in the same direction). However, as NTBs were dismantled more slowly, with the speed and extent of liberalization deliberately varying across different types of goods, the coefficients should not be given a causal interpretation.

Finally, I test whether other reforms occurring at the same time as liberalization may be responsible for the results. In particular, the Indian government de-licensed numerous industries after 1991, and eased restrictions on foreign direct investment.[26] Substantial reforms were initiated in the financial and banking sector as well. Following the same methodology as in the construction of district tariffs, I construct district employment-weighted share of license-industries and district employment-weighted share of industries that are open to foreign direct investment (FDI). The number of bank branches per capita in a district captures the potentially confounding effect of banking reforms.[27]

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[25] I further check the robustness of the basic findings by including the pre-reform trends in the outcome variables interacted with the post-reform indicator (results are not reported for brevity). Controlling for the time-varying effect of pre-reform trends does not affect the magnitude or significance of the estimated effects for rural India. For the urban sample, however, augmenting the set of controls reduces slightly the magnitude of the point estimates.

[26] Foreign investment was tightly regulated prior to 1991. Foreign companies needed to obtain specific prior approval from the Indian government and foreign investment was limited to 40 percent. In 1991, the government created a list of high technology and high investment priority industries with automatic permission for foreign equity share up to 51 percent. Over the 1990s this list was gradually expanded.

[27] The Indian government heavily regulates private and public banks, as it considers the banking system an integral tool in its efforts to meet a number of social goals, such as poverty reduction. Indeed, Robin Burgess and Rohini Pande (2004) have shown that rural bank branch expansion over the 1980s led to reduction in poverty.

In columns (7) in Table 3a and 3b, I estimate eq. (4) including these time-varying district level measures of reforms. The effect of trade liberalization on poverty and consumption in rural areas is insensitive to the additional controls. In the urban sample, however, the coefficient on the tariff measure declines substantially in magnitude once the controls for other reforms are included. This reflects the higher concentration of manufacturing sectors in urban areas, which were also more affected by the opening of industries to FDI and industrial delicensing.

I replicate this more complete specification (presented in columns (7) in Table 3a and 3b) but instrument the scaled tariff with both unscaled tariff, $TrTariff_{dt}$, and their initial level interacted with a post liberalization indicator as described in eq. (3). All findings are robust to this alternative instrumentation (see columns (8) in Table 3a and 3b).

As evidenced in Table 3a and Table 3b, the point estimates on the tariff measures are more consistent across specifications, and more precisely estimated, in the rural sample. In urban areas, on the other hand, coefficients are sensitive to the inclusion of various controls, and are much less precisely estimated. In most specifications, one cannot reject the hypothesis that the estimated effects are equal to those in the rural sample, nor the hypothesis that they are equal to zero. That the effect is stronger in rural areas than urban areas may at first appear puzzling, as the concentration of workers in traded sectors is higher in urban areas. However, there are several reasons this may be so. First, poverty is much more prevalent in rural India and the density of households close to the poverty line is higher. Thus, the same negative income shock may have a larger impact on the poverty rate in rural vs. urban areas.

Second, agricultural reforms were also an important component of the liberalization of 1991. Tariffs of agricultural products fell in line with tariffs of manufacturing and other goods. While quantitative restrictions and licensing requirements on both the import and export of agricultural products (out of a concern for food security) were removed later than on other goods, the share of agricultural products that could be freely imported jumped from 7 percent in 1989 to 40 percent in 1998. By 2001, more than 80 percent of agricultural products could be imported without any license. In a robustness test (Appendix Table 1), I run a horse race between agricultural tariffs and tariffs for mining and manufacturing. The poverty-tariff relationship seems to be driven by agricultural tariffs in both the urban and rural sample. This is not that surprising: manufacturing workers are generally richer than agricultural workers and a decline in wages may not push them below the poverty line.

Third, if one focuses on the most demanding specification, columns (7) in Table 3a and Table 3b, the magnitude of the estimated coefficients in the urban and rural sample are of the same order of magnitude. The noisiness of the urban estimates may be due to the smaller number of observations and the fact that in urban areas the regional change in tariffs is very highly correlated with the pre-existing trends in the outcome variables and other reforms (Table 3b, column (5)). While allowing for the pre-existing trends to have a time-varying effect as well as controlling for other reforms reduces the point estimates on the region tariff, I cannot rule out the possibility that the tariff measure is capturing the effects of other time-varying regional shocks that have an effect on consumption growth and poverty in urban India. Thus, as the validity of the

proposed empirical approach falls into question when analyzing urban areas, and because the urban results are substantially noisier, I focus on the findings from rural India.

V. MECHANISMS

So far this paper has established that, whatever the India-wide effects of trade liberalization were, rural areas with employment concentrated in sectors that were disproportionately affected by trade liberalization, experienced slower growth in average consumption and slower progress in poverty reduction. In the remainder of the paper, I attempt to uncover the underlying mechanisms that link trade policy, poverty and consumption within the framework of the two most basic trade theories. Understanding these mechanisms is crucially important to policymakers seeking to mitigate the unequal impact of trade liberalization on regions within a country.

A. Conceptual Framework

International trade theory can deliver contradictory predictions regarding the effect of international trade on income distribution within a country. To provide a framework for my empirical strategy and results, I describe the two basic trade models that demonstrate the link between factor prices and product prices.

In the Heckscher-Ohlin (H-O) model with its companion Stolper-Samuelson theorem, countries will export goods that use intensively the factors of production that are relatively abundant, and import goods that use intensively the relatively scarce factor of the country. Trade liberalization raises the real returns to the relatively abundant factor (unskilled labor in the case of India) as the relative price of the unskilled labor intensive good increases, thus reducing inequality, and possibly poverty. In the H-O model, the factors of production are assumed to be perfectly mobile, and their returns are equalized across sectors. Thus, price changes only affect economy-wide and not sector-specific returns. Movements of labor and capital across sectors are precisely what allow countries to reap the benefits of trade openness in this classical trade model.

However, these stark predictions can be easily reversed. If labor employed in a given production sector is temporarily immobile and can reallocate only gradually over an extended period of time, the short-run response of factor returns to exogenous price changes will differ from the long-run equilibria with the bulk of the adjustment stemming from adjustments in factor returns, as opposed to employment and output. This immobility may arise from capital market imperfections (Banerjee and Newman, 2004), or frictions in the labor market (Carl Davidson et al. (1999) develop the case when there are search costs in the labor market). The institutional environment as reflected in labor regulations (for example legislation on dismissals, imposition of severance payments etc.) can be another important source of relationship specific rents and can induce sectoral specific attachment. In a cross-country setting, Ricardo Caballero et al. (2004) find that job security regulation clearly hampers the creative-destruction process and the annual speed of adjustment of employment to shocks, while Olivier Blanchard and Justin Wolfers (2000) argue that the interaction of labor market institutions and macroeconomic shocks can explain the rise of equilibrium unemployment in Europe. In a micro study of trade liberalization in Morocco, Currie

and Harrison (1997) point out that many firms responded by reducing profit margins and raising productivity rather than laying off workers.

To illustrate the simplest case, assume that labor is immobile, and each district in India is a distinct two-by-two economy with two factors, K and L, and two goods, X and Y. The goods are produced according to functions $F_X(K_X, L_X)$ and $F_Y(K_Y, L_Y)$ assumed to be homogeneous of degree 1, twice differentiable, strictly quasi-concave and increasing in both factors of production (the Y good is more capital intensive). K_X, L_X, K_Y, L_Y are the capital and labor allocated to the production of goods X and Y, respectively. The total endowment of these factors in the district is $\overline{L}$ and $\overline{K}$. Normalizing $p_X = 1,\ p_Y = p,$ the long-run equilibrium, when both K and L are mobile across production sectors, is characterized by the following set of equations: 1) $L_X + L_Y = \overline{L},$ 2) $K_X + K_Y = \overline{K},$ 3) $w = F_{L_X X} = pF_{L_Y Y},$ 4) $r = F_{K_X X} = pF_{K_Y Y}$. Factor markets clear and the returns to factors are equalized across production sectors.

In the short run, however, only capital is perfectly mobile between production sectors within the district. The equilibrium will take the following form: 1) $L_X = \overline{L_X},\quad L_Y = \overline{L_Y}$, 2) $K_X + K_Y = K,$ 3) $w_X = F_{\overline{L_X} X}(K_X, \overline{L_X})$, $w_Y = pF_{\overline{L_Y} Y}(K_Y, \overline{L_Y}),$ 4) $r = F_{K_X X}(K_X, \overline{L_X}) = pF_{K_Y Y}(K_Y, \overline{L_Y}),$ where $\overline{L_X}$ and $\overline{L_Y}$ are the optimal amounts of labor allocated to the production of *X* and *Y* in the long-run. Note that the returns to labor are not equalized across production sectors. There are sector-specific rents (which in this empirical work are referred to as industry wage premia).

Trade liberalization can be seen in this framework as a reduction in the relative price of the capital intensive good, *p*. It is obvious from the set of equations describing the short run equilibrium that the effect of this price change on labor returns depends crucially on the sector in which labor is employed.[28] The fall in *p* will lead to a less than proportionate rise in the earnings of workers in production sector *X* and an improvement in their welfare. The mobile factor *K*, however, will experience a less than proportionate drop in its returns, and the specific factor in the *Y* production sector a more than proportionate fall in its earnings. Unlike the standard H-O model, both factors employed in the production sector with tariff reduction experience a drop in earnings. The workers in production sector *Y* are unambiguously worse off as their income has decreased both in terms of good *Y* and good *X*. If these workers are close to or below the poverty line, one will see an increase in aggregate poverty rates and a slower growth in average consumption.

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[28]The elasticity of factor returns with respect to output prices can be derived by totally differentiating the equations characterizing the short run equilibrium: $\frac{dr}{r}\frac{p}{dp} = -\frac{F_{K_X K_X X}(K_X, \overline{L_X})}{\Delta} < 0,$ $\frac{dw_X}{w_X}\frac{p}{dp} = \frac{F_{K_X K_X X}}{\Delta}\frac{K_X r}{L_X w_X} > 0, \frac{dw_Y}{w_Y}\frac{p}{dp} = \left(1 - \frac{pF_{K_Y K_Y Y}}{\Delta}\frac{K_Y r}{w_Y L_Y}\right) < 0$ where $\Delta = -[F_{K_X K_X X}(K_X, \overline{L_X}) + pF_{K_Y K_Y Y}(K_Y, \overline{L_Y})] > 0.$

The juxtaposition of these two basic models of trade demonstrates that the effect of trade liberalization on poverty is largely dependent upon the extent to which factors are able to relocate in response to a change in relative prices. If labor were fully mobile, in this example all workers would have been unambiguously better off, and capital unambiguously worse off.

I explore why trade liberalization affects regional outcomes by looking at two types of factor mobility: geographical and sectoral. First, I look at migration patterns in India over time and whether these are related to the change in protection experienced by districts. Noting that geographic mobility appears to be lowest among the poorest in rural India, I estimate the relationship between tariff and per capita consumption across the income distribution. The impact of trade reforms seems to be concentrated indeed among the poorest, who are also the least mobile.

I then examine whether, as the H-O model predicts, there is intersectoral reallocation of labor and capital. There is no evidence of significant reallocation for India as a whole. In fact, as the specific factor of model predicts, the adjustment to trade reform came through changes in output prices and returns to factors of production. Building on previous literature that has established that intersectoral labor mobility (Hasan, Mitra and Ramaswamy (2007)) and industrial growth (Tim Besley and Burgess (2004)) across India's states is influenced by the states' labor laws, I examine whether the effects of trade liberalization varied with the flexibility of labor laws. Indeed the impact of trade reforms on poverty and average consumption is substantially less pronounced in states with relatively flexible labor laws.

B. Reallocation Across Regions

The very finding of regionally disparate effects of liberalization suggests the absence of perfect factor mobility across regions in India.[29] In the standard H-O model, one would expect labor to migrate in response to wage and price shocks, equalizing the incidence of poverty across regions. However, actual levels of migration in India contrast sharply with the assumptions of the standard trade model. The absence of mobility is striking. The pattern of migration has also remained remarkably constant through time, with no visible increase after the economic reforms of 1991.

Table 4 presents some estimates of migration for rural and urban India based on two rounds of the NSS (1987-1988 and 1999-2000). Overall migration is not low -- 23 percent of rural and 33 percent of urban residents have changed location of residence at least once in their lifetime. However, most migrants are women relocating at marriage: around 40 percent of females in rural and urban India report a change in location, versus 7 percent of men in rural and 26 percent of men in urban locations. The migration most relevant for this study is short-run movement (within the past 10 years) of people across district boundaries or within a district across different sectors

[29] The limited factor mobility is also evidenced in the large and growing disparities in income across Indian states. Ahluwalia (2002), Gaurav Datt and Martin Ravallion (2002) and others document significant differences in the level of state GDP per capita and growth rate of state output.

(i.e. from an urban area to a rural one, or vice versa). Short-run migration figures are low: only 3–4 percent of people living in rural areas reported changing either district or sector within the past 10 years. Once again, the percentage of women relocating is double the share of men. For people living in urban areas, the percentage of migrants is substantially higher. Yet, less than 0.5 percent of the population in rural and 4 percent of the population in urban areas moved for reasons related to economic considerations (or employment).[30]

Neither migration nor the level of population appears to be related to the change in the trade protection that a district experienced over the 1990s. In Table 5, Panel A, I estimate eq. (4) with the share of in-migrants in a district as the dependent variable. I focus on migrants who report to have relocated to the current district within the past ten years. In Panel B, I turn to evidence from the 1991 and 2001 census, and estimate eq. (4) with log population as the dependent variable. Contrary to what a trade model with perfect factor mobility would predict, neither the NSS nor the Census data reveal a correlation between the flow of migrants and changes in the level of population and the change in the district's exposure to trade reforms.

While overall geographic mobility is low, there is substantial variation across different kinds of workers. Skilled workers are much more likely to be in-migrants than workers without any education. Men who are in the top 10^{th} percentile of the consumption distribution, are 4–5 times more likely to be in-migrant than men who are in the bottom 10^{th} percentile (Figure 2). I estimate the relationship between district tariffs and per capita consumption along the income distribution. In particular, for each district and time period, I compute the 10^{th}, 20^{th}, 40^{th}, 60^{th}, 80^{th} and 90^{th} percentile of the consumption distribution, which are then used as the outcome variables in specification (4). Given the migration patterns observed, one would expect the impact of the loss of trade protection to be felt most strongly among those that are the least mobile, i.e. the bottom of the consumption distribution.

Table 6 demonstrates that this is indeed the case. The table presents the results from estimating eq. (4) allowing for time-varying effects of initial district characteristics (the results are robust to alternative specifications). Panel A gives the estimates for the district level regressions while Panel B presents the results at the region level in rural India.[31] The estimated effect of tariff cuts on log of per capita consumption is the largest for the households in the bottom 10^{th} and 20^{th} percentile of the consumption distribution. As one moves up the income distribution, the effect decreases in magnitude and become statistically insignificant. This pattern is especially

[30] Even the 8 percent level of urban residents who migrated from rural areas reported in Table 4 does not indicate substantial rural to urban migration. Since the median urban sector of a district has only one fifth of the population of the median rural sector of a district, the 7.6 percent rural migrants in the median urban district in the 1990s would translate to only 1.6 percent of the median rural district migrating to the city. Thus, rural-urban migration is unlikely to have a significant impact on outcomes in rural districts, though it may have some impact on urban areas. This may be a reason why it is difficult to detect an effect of liberalization in the urban sector.

[31] The results for urban areas (available from the author) follow a very similar pattern. However, the estimates are very noisy.

pronounced at the region level, where the point estimate for the tariff effect declines from 1.5, significant at the 1 percent level for the bottom 10th percentile, to 0.1 for the top 10th percentile. Of course, absent a natural experiment inducing exogenous variation in the ability of households to relocate, we cannot rule out the possibility that other factors, beyond geographical mobility, explain the heterogeneous effects tariff reductions have on household consumption.

C. Reallocation Across Production Sectors

Even if there is little migration across districts, there could be high levels of reallocation within districts, across production sectors. In the H-O world, where factors are assumed to be fully mobile across production sectors, trade liberalization in a labor-abundant country will lead to expansion of the labor-intensive production sector, thus benefiting labor and reducing inequality and possibly poverty.

Yet, in contrast to the predictions of the H-O model, in many developing countries intersectoral reallocation in the aftermath of trade liberalization has been very limited (see Attanasio et al. (2004), Romain Wacziarg and Jessica Wallack (2004), Hanson and Harrison (1999)). I therefore investigate whether the evidence from India supports the mechanism of adjustment suggested by the H-O: a contraction of the sectors that experienced a decline in their output price (those that experienced a tariff reduction), and an expansion of those that experienced a relative price increase. I do so using standard metrics of sectoral allocation: structural change, excess job reallocation, and net change in aggregate employment, described below.

Using data from the ASI and following Wacziarg and Wallack (2004), I define a measure of structural change that accounts for the movement of workers directly from sector to sector as well as sectorally unequal changes in aggregate employment (resulting from population growth and uneven entry into the labor force). Structural change in sector *s* is measured as the absolute value of the change in a sector's employment share, S_s^t, over a certain time period (in this case, two years).

$$CH_{st} = \left| S_s^t - S_s^{t-2} \right|$$

Excess job reallocation, first defined by Steven Davis et al. (1996), focuses on the movement of labor across sectors, independently of overall employment gains or losses. Denoting employment in sector *s* at time *t* as E_s^t:

$$SH_t = \frac{\sum_s \left| E_s^t - E_s^{t-2} \right| - \left| \sum_s E_s^t - \sum_s E_s^{t-2} \right|}{\frac{1}{2} \sum_s \left| E_s^t + E_s^{t-2} \right|}$$

The term $\sum_s \left| E_s^t - E_s^{t-2} \right|$ measures the total number of employment changes within a 2-year period, from which I subtract the number of job losses or gains that are not offset by a gain or loss in other sectors $\left| \sum_s E_s^t - \sum_s E_s^{t-2} \right|$.

The third dependent variable isolates the net change in aggregate employment:

$$EM_t = \frac{\sum_s E_s^t - \sum_s E_s^{t-2}}{\frac{1}{2}\sum_s \left| E_s^t + E_s^{t-2} \right|}$$

Figure 3 presents the evolution of the three variables over time.[32] There is no evidence of an increase in job reallocation post 1991. In fact, the measures of excess reallocation and structural change decline until 1996. Consistent with the findings of low structural reallocation, employment shares remained remarkably constant.

Regressing industry employment shares from the ASI (at the 3-digit NIC) on industry lagged tariffs, industry and year indicators over the 1988-1997 period confirms this conclusion (Table 7, Panel A). The coefficient on lagged tariff is small in magnitude and statistically insignificant. Neither industry output, employment, fixed capital, nor the share of fixed capital, are correlated with lagged industry tariffs.

There is thus little evidence that factor reallocation across production sectors is occurring in India as a whole as a result of the cuts in tariffs. As mentioned previously, the very stable employment pattern in India is consistent with the experience of other developing countries. Papageorgiou et al. (1991) study 19 episodes of trade liberalization in less developed countries, finding very little relationship between trade liberalization and shifts in employment. Roberts and Tybout (1996) show that industry exit and entry (one indicator of intersectoral reallocation of labor) do not increase with import competition in their case studies of developing countries. Micro studies, focusing on a specific country, such as Attanasio et al., 2004 (Colombia), Currie and Harrison, 1997 (Morocco), also find little relationship between trade liberalization and intersectoral reallocation. Indeed, these studies show that adjustment occurred through changes in relative wages. In contrast, in the US and Canada, employment exhibits greater sensitivity than wages to trade shocks (Grossman (1986), Freeman and Katz (1991), Revenga (1997), Gaston and Trefler (1993)).

The 'sluggish' labor market response in developing countries may be institutionally driven through rigidities in the labor market. Indian firms that should have expanded might not have done so for fear of getting stuck with too much labor (Indian growth in registered manufacturing employment was almost nil during this period except for a sharp rise in 1996). From the point of view of the agricultural workers, the poorest in India, the inflexibility of the labor market is directly related to their outside option. If the manufacturing sector is not expanding, agricultural workers may be unable to switch occupation even in the face of an unfavorable price shock, thus slowing down the exit out of poverty.

In India, hiring and firing laws were quite rigid until the amendment of the Industrial Disputes Act in 2001. Since this study focuses on the period before 2000, it is worth briefly outlining the specifics of the labor laws prior to the amendment. Datta Chaudhuri (1996) argues that the

[32]It is worth noting that India's average structural change, 0.04–0.1 percentage points, is much lower than Wacziarg and Wallack's (2004) estimate of the average structural change across 20 developing countries, which is about 0.35 percentage points.

primary concern of the worker in the organized sector in India is job security. (This is consistent with an idea developed by Grossman (1984) that unions may extract rents in the form of employment guarantees rather than wages, see also Attanasio et al. (2004)). The Industrial Disputes Act, 1947, required firms employing more than 100 workers to seek government permission for any retrenchment, and required giving notice to workers three months prior to any action.[33] Retrenchment authorizations, however, were almost impossible to get. In theory, employers with 50-99 workers needed only to notify the government, while those with fewer than 50 employees did not need to do even that to shut down. However in practice workers in such firms could appeal to other laws, such as the Indian Contracts Act, 1972, to resist dismissal. To close a plant, a company employing more than 100 workers needed to receive government permission; the government could deny permission for closure even if the company were losing money on the operation (Kaushik Basu et al., 2009). It was virtually impossible to close an unprofitable factory if the owner was able to pay workers. Instead, the unit was declared sick, and continued to function on the basis of government subsidies (Datta Chaudhari, 1996). Businesses could potentially resort to contract workers, yet the Contract Labour Act put some restrictions on that practice as well. According to the Contract Labour Act, state governments may ban contract labor in any industry in any part of the state (Dollar et al., 2002). Though firms probably found alternative ways to gain some control over the allocation of manpower (such as subcontracting, etc.), in an interview of managers throughout India, Dollar et al. (2002) found that managers would lay-off 16-17 percent of their work force if given the chance. (This estimate is nearly identical to an estimate of the share of redundant labor in manufacturing calculated by Ramgopal Agarwala and Zafar Khan, 2001).

Even though the Industrial Disputes Act was passed at the central level, state governments could amend it under the Indian Constitution. Besley and Burgess (2004) examine all the 113 amendments made by state governments between 1958 and 1992 and code them as pro-worker, pro-employer or neutral. Besley and Burgess (2004) find that rigid labor regulations retard registered manufacturing growth. The finding is also echoed in Ahmed Ahsan and Carmen Pages (2007). A recent study by Hasan, Mitra and Ramaswamy (2007) combine these categories with the ranking of the investment climate in Indian states from a survey of managers conducted by the World Bank (Omkar Goswami et al., 2002), in order to classify states as having flexible or inflexible labor laws.[34] Using industry-level disaggregated data by states, Hasan, Mitra and Ramaswamy (2007) find that lower protection led to higher elasticity of labor demand, and more

[33]In fact the only country other than India which has enacted similar laws requiring prior permission of the government before lay-offs and retrenchment is Zimbabwe.

[34]Besley and Burgess (2004) classify each state as pro-worker, pro-employer or neutral according to the amendments to the Industrial Disputes Act that the states passed. Hasan, Mitra and Ramaswamy. (2007) modify this classification noting that certain states, like Maharashtra and Gujarat, though recorded as having pro-worker labor laws, have been pointed as the states with the best investment climate according to a recent survey by Goswami et al. (2002) while Kerala, with pro-employer labor laws, is one of the states with the worst investment climate.

importantly that the elasticities are not only higher for states with more flexible labor regulations, but were also significantly affected by trade reforms. If employment is more sensitive to exogenous shocks in output demand conditions in these states, one would also expect the impact of trade liberalization on factor returns and thus consumption and poverty to be smaller in these states.

D. Trade Liberalization and Institutional Characteristics

To investigate whether the institutionally-driven immobility of labor across sectors underlies the poverty – trade liberalization link, I estimate eq. (4) but allow for the effect of tariff cuts to vary according to the state's labor laws as classified by Besley and Burgess (2004). The results are presented in Table 8. In column (1)-(3), I use the non-scaled tariffs as an instrument, while in column (4)–(6) I instrument with both the non-scaled tariffs and their pre-reform level.

An interesting pattern emerges. Trade liberalization had an effect on poverty and per capita expenditures predominantly in states with less flexible labor laws. The interaction between the tariff measure and the indicator of whether the district is in a state with flexible labor laws is of the opposite sign as the (non-interacted) tariff measure and of roughly the same magnitude, suggesting that the tariff cuts had no impact on poverty and consumption in states with flexible labor laws.

India's inflexible labor laws have been criticized for limiting the efficacy of policy reforms in other areas, including, for example, export growth. (Sachs, Varshney and Bajpai, 1999). Ramikshen Rajan (2002) goes as far as writing: "the reforms in India per se are not ex-ante biased towards the capital and skill-intensive sectors and thus 'anti-poor'. Rather, they have become so ex-post mainly because of draconian labor laws and resulting labor market distortions and rigidities."

The apparent lack of mobility of labor both across regions and across sectors suggests the existence of district – and sector-specific rents for employed workers, as in the specific factor model. As workers absorb the bulk of the pressure of the trade policy induced change in relative output price by giving away rents, it may be possible to maintain the existing allocation of factors. This explanation would be consistent with Revenga (1997), who suggests that Mexican workers in manufacturing, who were very unionized and enjoyed sector-specific rents, adjusted primarily through sector-specific wage declines, rather than through employment reallocation in response to trade liberalization.

E. Trade Liberalization and Factor Returns

The final empirical section of this paper explores whether prices and factor returns did in fact adjust in response to liberalization. Specifically, I study changes in domestic prices, factor returns, industry premia, and agricultural wages.

I first document that the tariff cuts indeed resulted in changes in domestic prices. Using disaggregated data on the roughly 350 products that are included in India's whole sale price

index (WPI) over the 1987-2001 period, I regress the log of the product prices on the lagged tariff of the product including year and product fixed effects. The findings from this regression are presented in Table 7, Panel B, column (1). There is a significant pass through of tariff changes to domestic prices: the larger the tariff cut, the lower is the price faced by domestic producers.

Second, I show evidence that factor returns adjusted to the change in trade policy. Using data from the ASI, I construct a measure of industry real wage as average payments per production worker. I regress the log of this wage measure on lagged industry tariffs, and industry and year dummies for the period 1988-1997. Results are presented in Table 7, Panel B, columns (2). The average industry wage is positively and statistically, significantly correlated with industry tariffs. A 10 percent drop in tariffs leads to a 0.8 percent decrease in industry wages. Thus, instead of inducing factors to relocate, the change in relative prices stemming from the tariff reductions led to changes in industry specific factor returns. This is confirmed in a second exercise below.

Though the above findings are indicative of the effect of reduced tariffs on industry specific returns, they omit important factors, such as the composition of the industrial labor force, which could drive this correlation. When faced with lower output prices, producers might choose to substitute unskilled for skilled labor, without any change in relative wages, which would lead to a correlation between industrial wages and tariffs similar to what I find in the data. Noel Gaston and Daniel Trefler (1994) point out that looking at the correlation between average industry (plant level) wage and trade protection may overstate the effect of trade policy on wages precisely for this reason. Even if there were no compositional changes in the labor force, if the returns to education changed concurrently with tariffs, as happened in several Latin American countries, one might falsely conclude that tariff cuts in sectors with large proportion of skilled workers led to an increase in the wage premia (Goldberg and Pavcnik, 2005). In addition the ASI only captures the effects in registered manufacturing, which employs a small fraction of the Indian labor force. Individual-level data from the NSS Employment/Unemployment surveys can help overcome these concerns.

Sectoral premia are calculated using standard techniques in the literature (see Alan Krueger and Lawrence Summers, 1988) for the rural and urban sample separately. Since a very low percentage of individuals report a non-zero wage in the rural sample of the 43rd (1987) round (7 percent versus 30 percent in the other rounds), I use the wage premia for the 38th (1983) round instead, to which I assign the earliest available 1987 tariffs. I then regress the estimated premia on lagged production sector tariffs, production sector and time dummies. Since the dependent variable in the second stage is estimated, the equation is estimated using weighted least squares, with the weight equal to the inverse of the standard deviation of the estimated premia of the production sector.

The results are presented in Table 7, Panel B, columns (3) and (4). The estimates indicate that there is a positive statistically significant relationship between sectoral wage premia and tariffs in the urban sample. While this result is not statistically significant in the rural sample, the point estimates are very close to the ones in the urban sample. It appears that the measurement error resulting from the unreliable wage data in the rural 43rd round biases the rural sample toward

finding no relationship. Workers in more protected production sectors receive higher wages than observationally identical workers in less protected production sectors. The point estimate of 0.13–0.14 is in line with the previous findings on the relationship between average industry wage and tariffs using the ASI database. The magnitude of the effect is substantial. The average production sector experienced a tariff decline of about 65 percentage points between 1991 and 1997, which would translate to about 9 percentage points decrease in the real wage premium (0.14*0.65). For sectors which experienced the largest decline in tariffs (180 percentage points), the effect would be a 25 percentage points decrease in wage premium.

As a final piece of evidence, I estimate whether the district agricultural wages respond to the change in district level tariffs. I regress annual district real agricultural wages from Esther Duflo and Rohini Pande (2007), on the employment-weighted district tariffs, instrumented by the unscaled district tariffs, controlling for district and year fixed effects. Similar to the evidence on industrial wages and wage premia, agricultural wages are positively and significantly correlated with the district-level measure of trade protection (Table 7, Panel B, column (5)). The magnitude of the estimated impact is also very much in line with those in the previous exercises: the average rural district experienced a 5.5 percentage point decline in scaled tariffs between 1987 and 1999 implying a 5.7 percentage points relative decrease in the agricultural wage (1.034*5.5).

The available evidence points to limited labor mobility as the reason for the observed poverty-tariff relationship. Trade liberalization did not lead to significant reallocation of factors across regions and production sectors. Rather, adjustment to changing tariffs occurred through the price system: relative returns to specific labor absorbed the change in product prices. The relative fall in wages to workers in traded goods sectors may have pushed some of them below the poverty line; the fall in the incomes of those further away from the brink of poverty may have lowered overall demand for products and services, thus amplifying the shock and affecting even those not directly employed in traded production sectors. As the impact of tariff reductions on factor prices is larger, the less mobile the factor, the poverty-tariff link is stronger for households and districts where labor mobility is lower: workers at the bottom of the income distribution and districts in states with inflexible labor laws. The data also suggests that this link is more robust in rural India and seems to be driven by the change in the agricultural tariffs that a district faces.

A natural question arises: why would state labor laws, which primarily concern workers in registered manufacturing, affect the relationship between trade protection and poverty in rural areas, where employment is concentrated mostly in agriculture? To answer this question it is important to keep in mind what the estimated effects capture. With the difference-in-difference approach, the estimated coefficients on regional tariffs imply that districts more exposed to tariff declines through their employment mix grew slower than the average growth rate in the country, and poverty declined by less than the national trend. Thus, those employed in agriculture (including the non-traded agricultural sectors) who tend to be among the poorest, were affected not only through the direct impact of lower tariffs for their products, but also by the fact that other sectors (such as the higher-wage non-farm sectors and manufacturing jobs) to which they could transition were also growing at a slower rate. To the extent that labor regulations affect the growth of these other, higher-wage sectors (evidence of which is

presented in Besley and Burgess (2004), Aghion et al. (2007), Menon and Sanyal (2005)), they will affect the poverty impact of trade reforms. Flexible labor laws may have eased the shock of liberalization by facilitating reallocation of factors, and enhancing overall faster growth, while the slower growth in areas with inflexible labor laws constrained the speed of poverty reduction. The findings on the role of labor laws are of course indicative rather than definitive as states that adopted flexible labor laws may be different in various other dimensions, such as attitude towards business, preferences for faster economic growth, urbanization etc.

VI. CONCLUSION

This paper examines the evidence of the effect of India's opening to international trade in 1991 on poverty and consumption growth. While poverty declined dramatically in both rural and urban India in the 1990s, rural areas in which employment was concentrated in sectors exposed to larger reductions in tariff protection experienced substantially less poverty reduction, and slower consumption growth, than relatively unexposed rural areas. This finding is robust across a range of alternative specifications, including controlling for NTBs and other concurrent reforms. The magnitude of the effect is substantial. On average, a rural district experiencing no change in tariffs experienced a 14 percentage point decline in poverty. In a district exposed to the average level of tariff reductions, poverty incidence declined by 11–12 percentage points. The impact on average consumption is much smaller: relative to rural districts which were not exposed to tariff cuts, districts with the average exposure to trade opening, experienced approximately 3–4 percentage point lower consumption growth. The consumption growth of the poorest was hit disproportionately.

These findings confirm the results in Topalova (2007), and are in contrast to Hasan, Mitra and Ural (2007), who find no evidence of a trade-poverty link. There are several data and methodological differences in these studies that may account for the differences in findings. First, the data used by Hasan, Mitra and Ural (2007) is of a much more aggregate nature. Their analysis relies only on 15 Indian states, relative to the 360 districts used in the current study. Their measures of industry tariffs and NTBs are also at a substantially more aggregate industry definition. Second, due to the small number of states, Hasan, Mitra and Ural (2007) use three rounds of household data in their analysis: from 1987, 1993 and 1999. It is not clear whether 1993 should be attributed to a pre- or post-treatment year, as the household data was collected immediately following the reforms. This study focuses only on the long 1987–1999 difference, providing for a cleaner test. Finally, Hasan, Mitra and Ural (2007) do not allow for the pre-reform state characteristics, such as industrial structure, and pre-reform trends in the outcome variables to have a time-varying effect, whose importance is demonstrated in this study.

The findings of an effect of trade reform on poverty and consumption is consistent with a specific factor model of trade, in which labor is specific in the short run. Indeed, there is very little evidence of trade-induced reallocation of workers both across geographical districts as well as across production sectors. As theory would suggest, the trade-consumption link is the strongest among those that are the least geographically mobile, i.e. the bottom of the consumption distribution. In addition, Indian states with inflexible labor laws, where reallocation of labor across sectors and overall manufacturing growth may have been impeded, are precisely the areas

where the adverse impact of trade opening on poverty was felt the most. Specific factor returns were affected by changes in relative output prices as a result of trade reform. Relative to areas with more flexible labor markets, protection may have prevented some manufacturing workers from falling below the poverty line, but the number so affected was likely much smaller than those who suffered from slower overall growth in the manufacturing sector. Areas with flexible labor laws, and more reallocation, likely enjoyed higher growth, and thus in aggregate did relatively better off because of liberalization.

I stress that the methodology of this paper precludes making any conclusion on whether trade liberalization, in aggregate, causes higher or lower income growth or faster or slower poverty reduction. Rather, this paper shows that trade liberalization has strikingly heterogeneous effects, with different areas and segments of the population experiencing markedly different gains (or losses) than other segments depending on their ability to reallocate.

The findings in this study are important from a policy perspective: an increasing number of developing countries are pursuing trade liberalization to achieve faster economic growth, increased living standards, and poverty reduction. However, the paper demonstrates that in India, areas that were more exposed to potential foreign competition through their employment mix did not reap as much of the benefits of liberalization in terms of poverty reduction. Institutional characteristics mattered. Laws that hindered the movement of factors across sectors of the economy seem to exacerbate the adjustment costs of trade reforms. The implementation of additional policies to redistribute some of the gains of liberalization from winners to losers may both mitigate the effects on poverty, and increase the political feasibility of liberalization. Creating a flexible institutional environment will likely minimize the need for additional interventions.

Table 1. Descriptive Statistics

	Rural (N=366)				Urban (N=62)			
	1987/88		1999/00		1987/88		1999/00	
	Mean	StDev	Mean	StDev	Mean	StDev	Mean	StDev
Poverty rate	0.373	0.193	0.242	0.139	0.214	0.120	0.122	0.070
Log Per Capita Consumption	5.054	0.246	5.759	0.263	5.449	0.199	6.250	0.217
Scaled Tariff	0.083	0.082	0.026	0.022	0.198	0.073	0.069	0.026
Unscaled Tariff	0.883	0.096	0.305	0.061	0.892	0.067	0.312	0.038
NTB - share of free HS codes	0.010	0.017	0.038	0.043	0.018	0.008	0.111	0.046
FDI	0.000	0.000	0.219	0.118	0.000	0.000	0.286	0.104
Licensed Industries	0.339	0.160	0.091	0.154	0.394	0.128	0.117	0.130
Number of Banks per 10,000 people	0.650	0.266	0.785	0.327	0.703	0.290	0.843	0.331
Initial District Characteristics	Mean	StDev			Mean	StDev		
Share literate	0.368	0.137			0.622	0.073		
Share SC/ST	0.291	0.162			0.157	0.065		
Share Farming	0.814	0.105			0.159	0.070		
Share Manufacturing	0.056	0.045			0.217	0.077		
Share Mining	0.005	0.014			0.013	0.024		
Share Service	0.065	0.037			0.260	0.053		
Share Trade	0.033	0.020			0.215	0.033		
Share Transport	0.013	0.012			0.083	0.025		
Share Construction	0.013	0.014			0.053	0.017		
Poverty Rate Change in the 80s	-0.060	0.161			-0.225	0.098		
Log Per Capita Consumption Change in the 80s	0.321	0.178			0.381	0.155		

Table 2. First Stage. Relationship Between Scaled and Non-Scaled Tariffs

	Rural		Urban	
	(1)	(2)	(3)	(4)
Traded Tariff	0.314***	0.576***	0.632***	1.096***
	[0.092]	[0.060]	[0.178]	[0.391]
Traded Tariff * Post		0.290***		0.343
		[0.044]		[0.250]
r2	0.84	0.86	0.95	0.95
N	728	728	127	127

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. All specifications include a post-reform indicator. Columns (1) and (2) include district fixed effects, while columns (3) and (4) include region fixed effects.

Table 3a. Trade Liberalization, Poverty and Average Consumption in Rural India

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Data	pre & post	pre & post	pre & post	pre & post	pre only	pre & post	pre & post	pre & post
	Panel A. Dependent Variable: Poverty Rate							
Tariff	-0.242*		-0.710***	-0.467*	0.038	-0.479**	-0.424*	-0.381***
	[0.122]		[0.250]	[0.247]	[1.000]	[0.236]	[0.229]	[0.139]
Traded Tariff		-0.223**						
		[0.084]						
NTB (Share of free HS codes)						0.073		
						[0.202]		
	Panel B. Dependent Variable: Log Average Per Capita Consumption							
Tariff	-0.055		0.512	0.677*	-0.085	0.683*	0.657*	0.583**
	[0.353]		[0.639]	[0.400]	[0.463]	[0.373]	[0.333]	[0.216]
Traded Tariff		0.161						
		[0.207]						
NTB (Share of free HS codes)						-0.036		
						[0.248]		
IV with traded tariff	no	no	yes	yes	yes	yes	yes	yes
IV with traded tariff and initial traded tariff	no	no	no	no	no	no	no	yes
District Indicators	yes	yes	yes	yes	n.a.	yes	yes	yes
Initial District Conditions * Post	no	no	no	yes	n.a.	yes	yes	yes
Region Indicators	n.a.	n.a.	n.a.	n.a.	yes	n.a.	n.a.	n.a.
Initial Region Indicators * Post	n.a.	n.a.	n.a.	n.a.	yes	n.a.	n.a.	n.a.
Other Reforms Controls	no	no	no	no	no	no	yes	yes
N	728	728	728	728	128	728	728	728

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. All specifications include a post-reform indicator. Initial district conditions that are interacted with the post reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employer in services (construction is the omitted category), the share of district's population that is schedule caste/tribe, the percentage of literate population, and state labor laws indicators. Other reform controls include controls for industry licensing, foreign direct investment and number of banks per 1000 people. Regressions in column (5) replace all district-level variables with their equivalents at the regional level and use only pre-reform data for the outcomes of interest.

Table 3b. Trade Liberalization, Poverty and Average Consumption in Urban India

Data	(1) pre & post	(2) pre & post	(3) pre & post	(4) pre & post	(5) pre only	(6) pre & post	(7) pre & post	(8) pre & post
				Panel A. Dependent Variable: Poverty Rate				
Tariff	-0.221		-0.600*	-2.908	4.478*	-1.93	-0.239	-0.239
	[0.302]		[0.311]	[1.756]	[2.349]	[1.794]	[1.347]	[1.347]
Traded Tariff		-0.379						
		[0.237]						
NTB (Share of free HS codes)						0.215		
						[0.380]		
				Panel B. Dependent Variable: Log Average Per Capita Consumption				
Tariff	0.015		-0.419	6.011***	-5.629**	3.676**	0.851	0.857
	[0.383]		[0.771]	[1.861]	[2.494]	[1.484]	[2.020]	[2.018]
Traded Tariff		-0.265						
		[0.428]						
NTB (Share of free HS codes)						-0.830*		
						[0.478]		
IV with traded tariff	no	no	yes	yes	yes	yes	yes	yes
IV with traded tariff and initial trade	no	no	no	no	no	no	no	yes
Region Indicators	yes	yes	yes	yes	yes	yes	yes	yes
Initial Region Indicators * Post	no	no	no	yes	yes	yes	yes	yes
Pre-reform trend * Post	no	no	no	no	no	yes	yes	yes
Other Reforms Controls	no	no	no	no	no	no	yes	yes
N	127	127	127	126	125	124	124	124

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a region. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. All specifications include a post-reform indicator. Initial region conditions that are interacted with the post reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employer in services (construction is the omitted category), the share of district's population that is schedule caste/tribe, the percentage of literate population and state labor laws indicators. Other reform controls include controls for industry licensing, foreign direct investment and number of banks per 1000 people. Regressions in column (5) use only pre-reform data for the outcomes of interest.

Table 4. Migration Patterns in Rural and Urban India

	All		Men		Women	
	1987	1999	1987	1999	1987	1999
			Panel A. Rural			
Place of Birth Different than Place of Residence	0.232	0.244	0.075	0.069	0.399	0.427
Moved within the past 10 years	0.102	0.097	0.048	0.040	0.160	0.156
Moved within the past 10 years, excluding migration within the same district and within the same sector (i.e. rural to rural and urban to urban)	0.032	0.036	0.021	0.021	0.044	0.051
Moved within the past 10 years from urban to rural	0.013	0.013	0.011	0.011	0.015	0.016
Moved within the past 10 years because of employment, excluding migration within the same district and within the same sector	0.005	0.004	0.009	0.007	0.002	0.001
			Panel B. Urban			
Place of Birth Different than Place of Residence	0.329	0.333	0.268	0.256	0.396	0.418
Moved within the past 10 years	0.185	0.174	0.164	0.151	0.209	0.199
Moved within the past 10 years, excluding migration within the same district and within the same sector (i.e. rural to rural and urban to urban)	0.132	0.131	0.121	0.118	0.144	0.146
Moved within the past 10 years from rural to urban	0.080	0.076	0.070	0.065	0.091	0.089
Moved within the past 10 years because of employment, excluding migration within the same district and within the same sector	0.042	0.033	0.071	0.058	0.011	0.006

Table 5. Migration, Population and Tariffs in Rural India

	(1) All	(2) Men
	Panel A. Dependent Variable: Share of In-Migrants From Outside District/Sector	
Tariff	0.066	0.059
	[0.071]	[0.091]
	Panel B. Dependent Variable: Log Population	
Tariff	-0.006	-0.014
	[0.152]	[0.158]
N	728	728

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. Tariff is instrumented with traded tariff. All regression include contols for district and year fixed effects, and initial district conditions that are interacted with the post reform indicator (see notes to Table 3 for detail). Data in Panel A are from the 43rd and 55th rounds of the NSS; data in Panel B are from the 1991 and 2001 Census.

Table 6. Trade Liberalization and Per Capita Household Consumption Across the Consumption Distribution in Rural India

	(1) 10th Percentile	(2) 20th Percentile	(3) 40th Percentile	(4) 60th Percentile	(5) 80th Percentile	(6) 90th Percentile
			Panel A. District Level			
Tariff	0.698**	0.673*	0.346	0.383	0.5	0.443
	[0.339]	[0.344]	[0.278]	[0.336]	[0.440]	[0.482]
N	728	728	728	728	728	728
			Panel B. Region Level			
Tariff	1.514***	1.287***	0.66	0.386	0.232	0.106
	[0.482]	[0.439]	[0.452]	[0.402]	[0.361]	[0.553]
N	124	124	124	124	124	124

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district/region. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. Tariff is instrumented with traded tariff. All regression include contols for district/region and year fixed effects, and initial district/region conditions that are interacted with the post reform indicator (see notes to Table 3 for detail).

Table 7. Reallocation, Prices and Tariffs

	(1)	(2)	(3)	(4)	(5)
	Panel A. Reallocation				
	Employment Share	Capital Share	Log Employment	Log Capital	Log Output
Tariff	0	-0.001	-0.036	-0.115	-0.066
	[0.000]	[0.001]	[0.056]	[0.109]	[0.068]
Production Sector Indicators	Yes	Yes	Yes	Yes	Yes
Year Indicators	Yes	Yes	Yes	Yes	Yes
Data Source	ASI	ASI	ASI	ASI	ASI
N	1473	1473	1473	1473	1473
	Panel B. Prices				
	Log Wholesale Price index	Log Real Workers Wage	Production Sector Premium Rural	Production Sector Premium Urban	Log Agricultural Wages
Tariff	0.096***	0.080***	0.131	0.143**	1.034**
	[0.031]	[0.027]	[0.206]	[0.071]	[0.422]
Production Sector Indicators	Yes	Yes	Yes	Yes	No
District Indicators	No	No	No	No	Yes
Year Indicators	Yes	Yes	Yes	Yes	Yes
Data Source	WPI	ASI	NSS Schedule 10, 38th and 55th rounds	NSS Schedule 10, 43rd and 55th rounds	Duflo and Pande (2007)
N	4201	1472	222	230	2684

Note: Standard errors (in brackets) are clustered at the production sector level in Panel A and columns (1)- (4) in Panel B. Standard errors are clustered at the district level in column (5) in Panel B. Regressions are weighted by the log employment in the production sector in Panel A and column (2) of Panel B, and by the inverse of the standard error of the production sector premium estimate in columns (3) and (4) of Panel B. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. Tariff is instrumented with traded tariff in column (5) of Panel B.

Table 8. Trade Liberalization, Labor Laws and Poverty in Rural India

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A. Dependent Variable: Poverty Rate					
Tariff	-0.633**	-0.784***	-0.731***	-0.575***	-0.891***	-0.869***
	[0.307]	[0.224]	[0.206]	[0.167]	[0.216]	[0.196]
Tariff*Flexible Labor Law	0.637	0.901	0.923	0.634	0.659	0.667
	[0.709]	[0.982]	[0.894]	[0.447]	[0.441]	[0.410]
	Panel B. Dependent Variable: Log Average Per Capita Consumption					
Tariff	1.126**	1.037***	0.949***	0.975***	1.126***	1.049***
	[0.545]	[0.361]	[0.323]	[0.341]	[0.365]	[0.332]
Tariff*Flexible Labor Law	-1.719*	-1.619	-1.409	-1.367***	-1.194**	-1.042**
	[0.922]	[0.986]	[0.885]	[0.496]	[0.474]	[0.442]
IV with traded tariff	yes	yes	yes	no	no	no
IV with traded tariff and initial traded tariff	no	no	no	yes	yes	yes
Pre-reform trend * Post	no	yes	yes	no	yes	yes
Other Reforms Controls	no	no	yes	no	no	yes
N	728	728	728	728	728	728

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a region. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. All regression include contols for district and year fixed effects, and initial district conditions that are interacted with the post reform indicator (see notes to Table 3 for detail).

Figure 1. Evolution of India's Tariff and NTBs

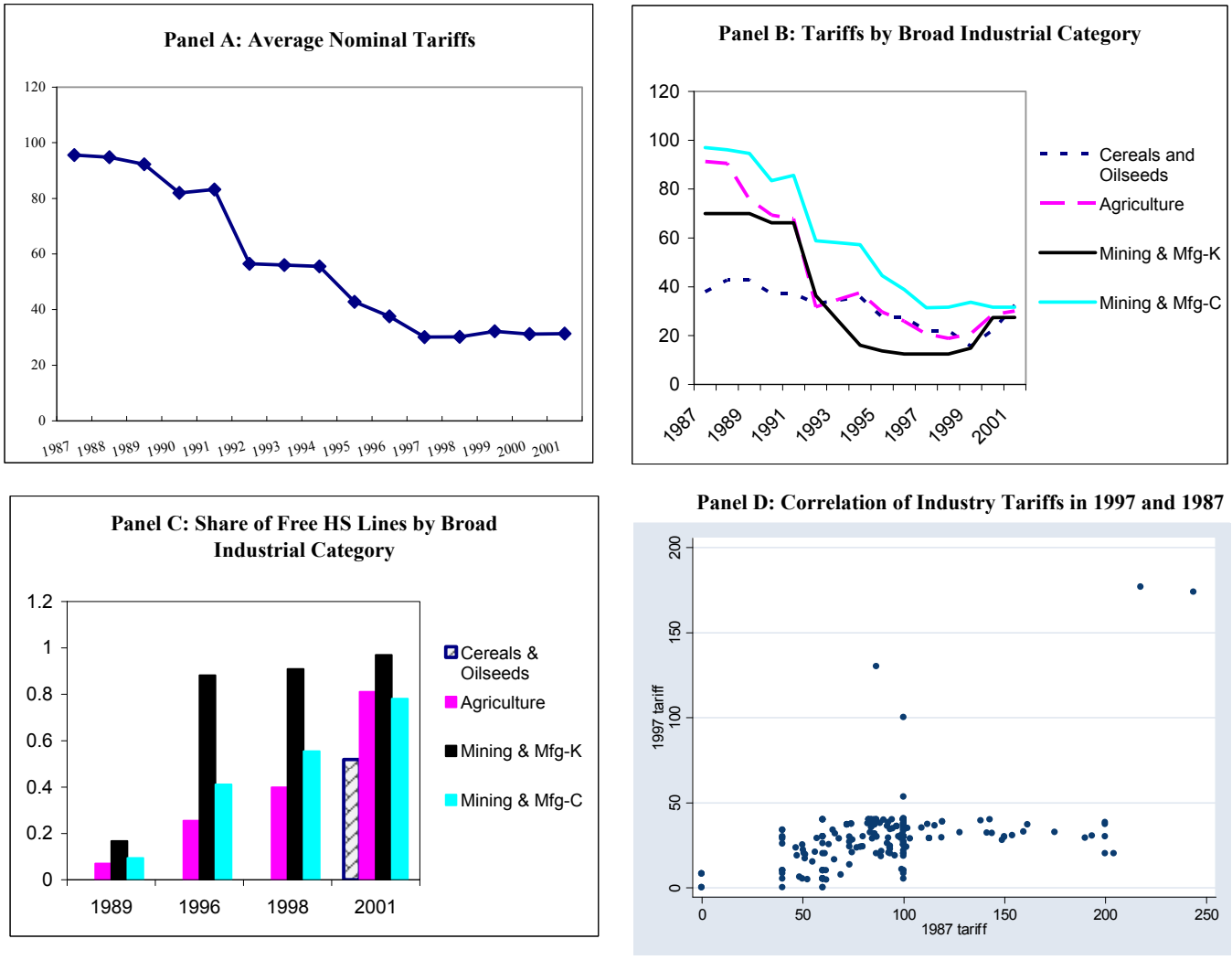


Figure 2. Probability of Having Moved Within the Past 10 Years (excl. migration within the same district and within the same sector)
by Percentiles of per capita consumption

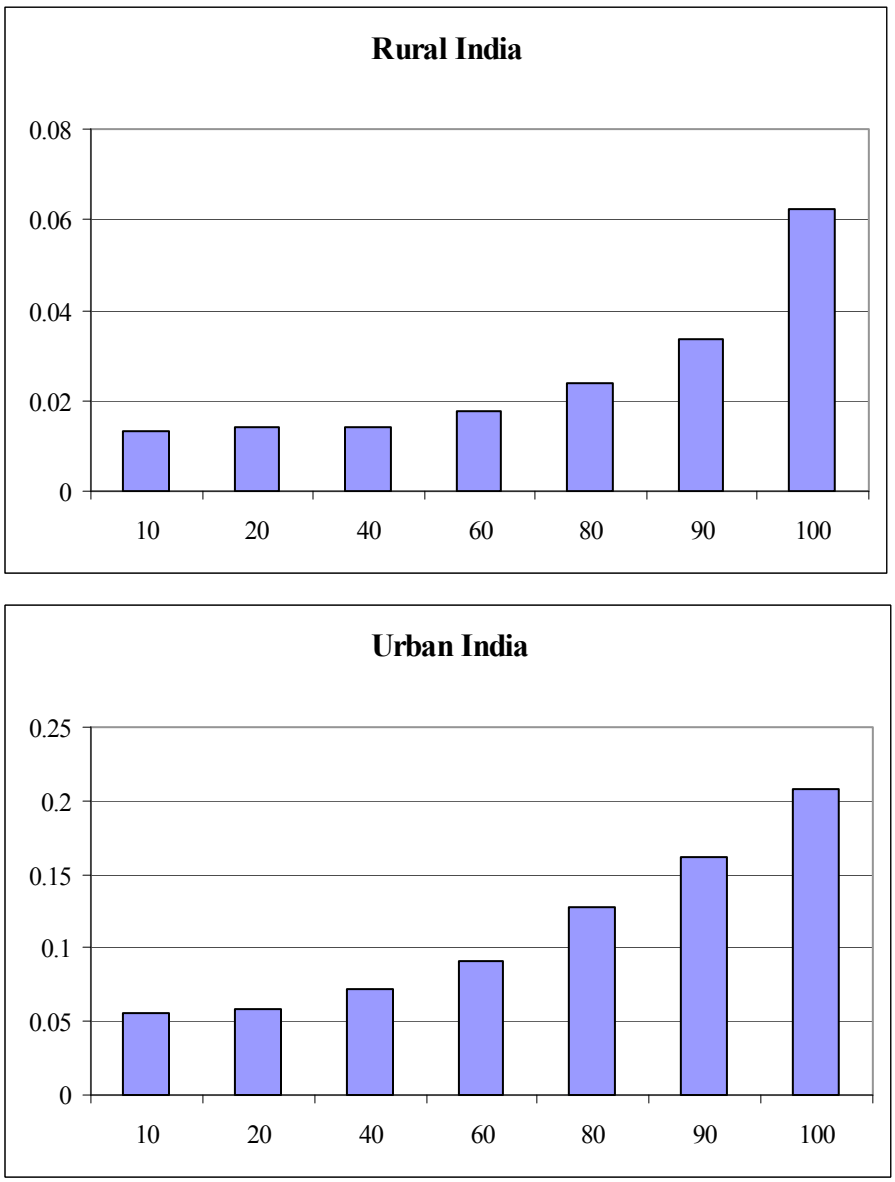
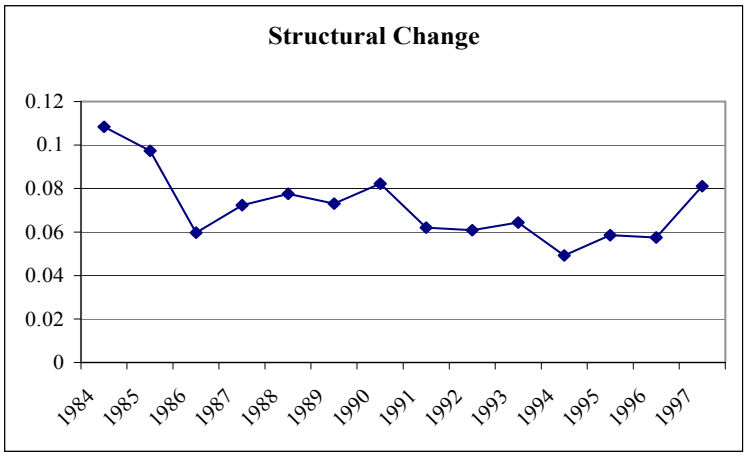
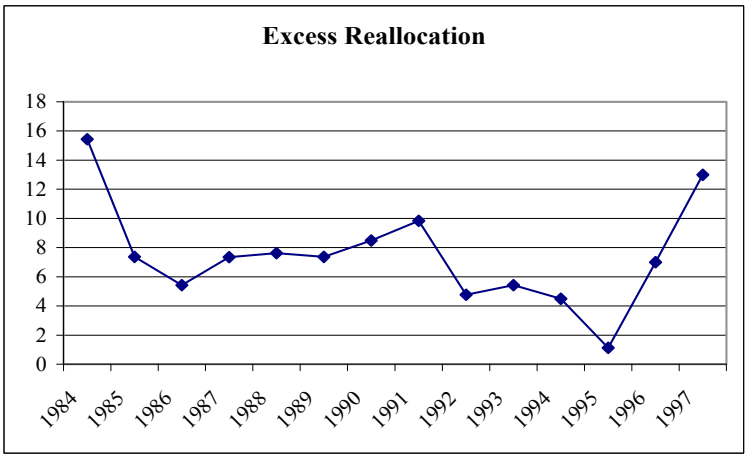
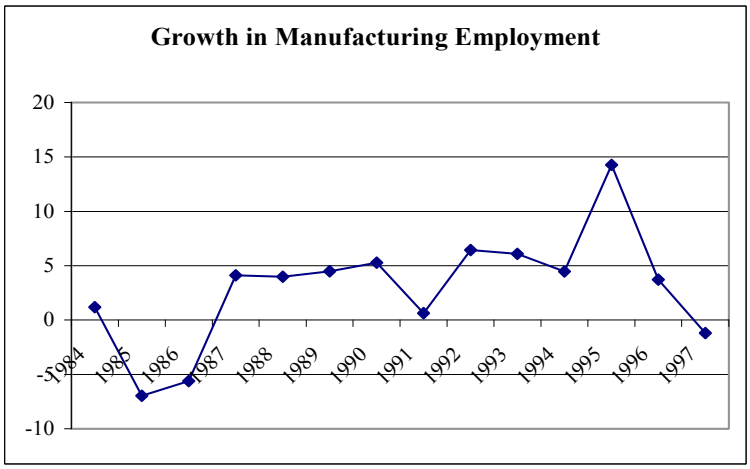


Figure 3. Intersectoral Labor Reallocation in India







Note: Data from the Annual Survey of Industries which covers the registered manufacturing and mining sectors. Structural change in sector is measured as the absolute value of the change in a sector's employment share over two years. Excess job reallocation is defined as in Davis et al. (1996).

Appendix. Data Sources

Poverty Rate. The poverty rate is equal to the share of a district/region population whose consumption is below the poverty line. It is computed from the household expenditure information in "thick" rounds of the Consumption and Expenditure Schedule of the NSS. The measures are computed at a district and NSS region level, using poverty lines proposed by Deaton (2003a, 2003b) and Deaton's methodology to adjust poverty measures in 1999/2000 NSS round for the change in the recall period.

Poverty Depth/Gap. The poverty depth (gap) is defined as the mean consumption shortfall relative to the poverty line, averaged across the number of the poor. It is computed from the household expenditure information in "thick" rounds of the Consumption and Expenditure Schedule of the NSS. The measures are computed at a district and NSS region level, using poverty lines proposed by Deaton (2003a, 2003b) and Deaton's methodology to adjust poverty measures in 1999/2000 NSS round for the change in the recall period.

Average per capita consumption. The average per capita expenditure is computed from the household expenditure in "thick" rounds of the Consumption and Expenditure Schedule of the NSS. The measures are computed at a district and NSS region level, using poverty lines proposed by Deaton (2003a, 2003b) and Deaton's methodology to adjust poverty measures in 1999/2000 NSS round for the change in the recall period.

Tariffs. Please see Section II-B.

NTBs. $NTB_{d,t} = \sum_i \omega_{id} * NTB_{i,t}$, where $\omega_{id} \equiv \frac{Emp_{i,d}}{\sum_i Emp_{i,d}}$ is the employment in production sector *i* in district *d* as a share of total employment in the district. $NTB_{i,t}$ is equal to the share of HS product codes within production sector *i* that can be imported without any license. Thus, the higher the value of the NTB measure the more open is the district. Data on NTBs for 1997 were compiled from the publication EXIM Policy, Directorate General of Foreign Trade, India. The values on NTBs prior to the 1991 are adopted from Aksoy (1992).

FDI. $FDI_{d,t} = \sum_i \omega_{id} * FDILib_{i,t}$, where $\omega_{i,d} \equiv \frac{Emp_{i,d}}{\sum_i Emp_{i,d}}$ is the employment in industry *i* in district d as a share of total mining and manufacturing employment in district *d*. FDI is an indicator equal to one if the industry is in the list of industries with automatic permission for foreign equity share up to 51 percent at time t. Data on the list of such industries is compiled from various publications of the Handbook of Industrial Statistics. Data for 1987 and 1997 are used for the 43rd and 55th round, respectively.

Industry Licensing. $License_{d,t} = \sum_i \omega_{id} * License_{i,t}$ where $\omega_{i,d} \equiv \frac{Emp_{i,d}}{\sum_i Emp_{i,d}}$ is the employment of industry *i* in district *d* as a share total mining and manufacturing employment in district *d*. License is an indicator equal to one if the industry is subject to licensing requirements at time *t*. Details on policies regarding industrial delicensing were compiled from various publications of the Handbook of Industrial Statistics. Data for 1987 and 1997 are used for the 43rd and 55th round, respectively.

Number of Bank Branches. The number of bank branches per capita is the number of bank branches in the district as reported in the Directory of Commercial Bank Offices in India (Volume 1), Reserve Bank of India, 2000, divided by the district population from the 1991 Indian Census. Note that the number of bank branches represents the total number for the district. Data on the number of bank branches in the rural part of the district were not available.

Labor Regulation. State labor regulation indicators are from Besley and Burgess (2004), and indicate whether a state has a pro employer, pro worker, or neutral labor market regulation based on amendments to the 1947 Industrial Disputes Act. Smaller states not covered in Besley and Burgess (2004) were coded as neutral. I create an indicator equal to one if the state has a pro-employer labor legislation as of 1991.

Population counts. Information is from the 1991 and 2001 rural Indian Census on the number of people living in a district. This information is also provided by gender.

In-migrants. Data is from the 43rd and 55th round of the NSS, Schedule 10.

Product price. Product prices are compiled from various publications of the India Whole Sale Price Index, Ministry of Commerce and Industry, India. These were manually matched to the relevant HS codes.

Industry Wage. Computed as the average payments per production worker from industry level data of the Annual Survey of Industry.

Industry Premia A production sector wage premium represents the portion of the wage that cannot be explained through worker or firm characteristics. It can be interpreted as sectoral rents, or returns to sector specific skills that are not transferable in the short run, and is particularly relevant in the presence of imperfect competition and/or in cases in which labor mobility is constrained (Attanasio et al, 2004). I use individual level data from the 38th, 43rd and 55th rounds in order to estimate separate cross section wage equations.

$$\ln w_{ijt} = I_{ijt} \cdot p_{jt} + X_{ijt} \cdot \gamma_t + \varepsilon_{ijt}$$

where w_{ijt} is log wage for individual i in production sector j in year t, I_{ijt} is a dummy indicating sector of occupation, and X_{ijt} is a vector of human capital and demographic controls such as: education, age, gender, marital status, religion, caste, nine occupation dummies, and

geographic location expressed as state dummies. The coefficients p_{jt} on the production sector dummies I_{ijt} reflect the value of a person's sectoral affiliation (production sectors are reported at the 3-digit NIC level in the NSS).[35] Following Krueger and Summers (1988), the omitted sector is assumed to have a zero premium. The measure of sectoral wage premium used is the difference between the production sector premium and the employment-weighted average wage differentials across all production sectors. This premium is the proportionate difference in wages between an employee in a given production sector and the average employee in all production sectors with the same observable characteristics.

Agricultural Wages. Agricultural wages are the average daily male agricultural wage in a district from the Evenson and McKinsey India Agriculture and Climate dataset (available at http://chd.ucla.edu/dev_data/index.html). The wage data, spanning 1971–1994 in the original dataset, was updated until 1998. We thank Rohini Pande and Siddharth Sharma for providing us with the updated data. Districts are defined by 1961 district boundaries. This data covers only a subset of districts (271 across 13 Indian states). They are deflated by the state-specific Consumer Price Index for Agricultural laborers (CPIAL) (reference period October 1973-March 1974) from Bert Ozler, Gaurav Datt and Martin Ravallion (1996).

Appendix Table 1. Sectoral Tariffs and Poverty in Rural and Urban India

	(1)	(2)	(3)	(4)	(5)	(6)
	Rural			Urban		
Agricultural Tariff	-0.223***	-0.273***	-0.272***	-0.388***	-0.368***	-0.317***
	[0.079]	[0.097]	[0.095]	[0.112]	[0.091]	[0.092]
Mining and Manufacturing Tariff	0.911*	0.895	0.903	-0.42	0.239	0.309
	[0.488]	[0.590]	[0.605]	[0.324]	[0.338]	[0.282]
Initial Region Conditions * Post	yes	yes	yes	yes	yes	yes
Pre-reform trend * Post	no	no	yes	no	no	yes
Other Reforms Controls	no	yes	yes	no	yes	yes
N	127	127	127	127	127	124

Note: Standard errors (in brackets) are clustered at the state-year level. Regressions are weighted by the number of households in a district. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level by ***. All regressions include region and year fixed effects. Initial region conditions that are interacted with the post reform indicator include percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employer in services (construction is the omitted category), the share of district's population that is schedule caste/tribe, the percentage of literate population and state labor laws indicators. Other reform controls include controls for industry licensing, foreign direct investment and number of banks per 1000 people.

[35]Since certain production sectors do not contain enough observations to estimate the premium, production sectors are aggregated to produce about 100 traded production sectors in the rural areas and 115 in the urban areas. Using disaggregated data, which has 140 rural and 160 urban production sectors, produces virtually identical results.

REFERENCES

Agarwala, Ramgopal, and Zafar Khan, 2001, "Labor Market and Social Insurance Policy in India: A Case of Losing on Both Competitiveness and Caring," International Bank for Reconstruction and Development/World Bank, Stock Number 37168.

Aghion, Philippe, Robin Burgess, Stephen Redding, and Fabrizio Zilibotti, 2008, "The Unequal Effects of Liberalization: Theory and Evidence from India," *American Economic Review,* 94 (4): 1397–1412

Ahluwalia, Montek, 1999, "India's Economic Reforms. An Appraisal" In *India in the Era of Economic Reforms,* ed. Jeffrey Sachs, Ashutosh Varshney and Nirupam Bajpai, 26–80, Delhi: Oxford University Press.

Ahluwalia, Montek, 2002, "State-Level Performance Under Economic Reforms in India?" In *Economic Policy Reforms and the Indian Economy*, ed. Ann Krueger, 91–122. USA: University of Chicago Press.

Ahsan, Ahmad, and Carmen Pages, 2007, "Are All Labor Regulations Equal? Assessing the Effects of Job Security, Labor Dispute and Contract Labor Laws in India," World Bank Policy Research Working Paper 4259.

Aksoy, M. A, 1992, "The Indian Trade Regime," World Bank Working Paper Series 989.

Attanasio, Orazio, Pinelopi Goldberg, and Nina Pavcnik, 2004, "Trade Reforms and Wage Inequality in Colombia," *Journal of Development Economics*, 74(2): 331–366.

Banerjee, Abhijit, and Andrew Newman, 2004, "Inequality, Growth and Trade Policy," Unpublished.

Basu, Kaushik, Gary Fields, and Shub Debgupta, 2009, "Labor Retrenchment Laws and their Effect on Wages and Employment: A Theoretical," In *New and Enduring Themes in Development Economics,* ed. Bhaskar Dutta, Tridip Ray, and E. Sommanathan, 181–206. Singapore: World Scientific Publishers.

Besley, Timothy, and Robin Burgess, 2004," Can Labor Regulation Hinder Economic Performance? Evidence from India," *Quarterly Journal of Economics*, 119(1): 91–134.

Bhagwati, Jagdish, 1993, *India in Transition: Freeing the Economy*, Oxford University Press.

Blanchard, Olivier, and Justin Wolfers, 2000, "The Role of Shocks and Institutions in the Rise of European Unemployment: the Aggregate Evidence," *Economic Journal*, 110: 1–33.

Burgess, Robin, and Rohini Pande, 2005, "Can Rural Banks Reduce Poverty? Evidence from the Indian Social Banking Experiment," *American Economic Review,* 95(3): 780–95.

Caballero, Ricardo, Kevin Cowan, Eduardo Engel, and Alejandro Micco, 2004, "Effective Labor Regulation and Microeconomic Flexibility," National Bureau of Economic Research Working Paper 10744.

Cerra, Valerie, and Sweta Saxena, 2000, "What Caused the 1991 Currency Crisis in India?," International Monetary Fund Working Paper No. 00/157.

Chopra, Ajai, Charles Collyns, Richard Hemming, Karen Parker, Woosik Chu, and Oliver Fratzscher, 1995, "India: Economic Reform and Growth," International Monetary Fund Occasional Paper No. 134.

Corden, Max W, 1966, "The Structure of a Tariff System and the Effective Protective Rate," *Journal of Political Economy*, 74, (June): 221–237.

Currie, Janet, and Ann Harrison, 1997, "Sharing the Costs: The Impact of Trade Reform on Capital and Labor in Morocco," *Journal of Labor Economics*, 15(3), Part 2: 44–71.

Datt, Gaurav, and Martin Ravallion, 2002, "Is India's Economic Growth Leaving the Poor Behind," *Journal of Economic Perspectives*, 16(3): 89–108.

Datta Chaudhuri, Mrinal, 1996, "Labor Markets as Social Institutions in India," Center for Institutional Reform and the Informal Sector, India Working Paper 10.

Davidson, Carl, Lawrence Martin and Steven Matusz, 1999, "Trade and search generated unemployment," *Journal of International Economics*, 48: 271–99.

Davis, Donald, 1996, "Trade Liberalization and Income Distribution," National Bureau of Economic Research Working Paper 5693.

Davis, Steven, John Haltiwanger, and Scott Schuh, 1996, *Job Creation and Destruction*. Cambridge, MA: MIT Press.

Deaton, Angus, 2003a, "Adjusted Indian Poverty Estimates for 1999–2000," *Economic and Political Weekly*, pp. 322–326.

Deaton, Angus, 2003b, "Prices and Poverty in India, 1987–2000." *Economic and Political Weekly*, pp. 362–368.

Debroy B. and A. T. Santhanam, 1993, "Matching Trade Codes with Industrial Codes," *Foreign Trade Bulletin*, 24(1).

Dollar, David, and Aart Kraay, 2002, "Growth is Good for the Poor." *Journal of Economic Growth*, 7(3): 195–225.

Dollar, David, Guiseppe Iarossi, and Taye Mengistae, 2002, "Investment Climate and Economic Performance: Some Firm Level Evidence from India," Center for Research on Economic Development and Policy Reform Working Paper 143.

Duflo, Esther, and Rohini Pande, 2007, "Dams," *Quarterly Journal of Economics*, 122(2): 601–46.

Edmonds, Eric, Nina Pavcnik, and Petia Topalova. Forthcoming, "Trade Adjustment and Human Capital Investments: Evidence from Indian Tariff Reform." *American Economic Journal: Applied Economics*.

Edwards, Sebastian, 1998, "Openness, Productivity and Growth. What Do We Really Know?," *Economic Journal*, 108(447): 383–98.

Feenstra, Robert, and Gordon Hanson, 1997, "Foreign Direct Investment and Relative Wages: Evidence from Mexico's Maquiladoras," *Journal of International Economics*, 42(2): 371–93.

Feliciano, Zadia, 2001, "Workers and Trade Liberalization: The Impact of Trade Reforms in Mexico on Wages and Employment," *Industrial and Labor Relations Review*, 55(1): 95–115.

Freeman, Richard, and Lawrence Katz, 1991, "Industrial Wage and Employment Determination in an Open Economy," In *Immigration, Trade and the Labor Market,* ed. John Abowd, and Richard Freeman, 235–60. University of Chicago Press.

Gang, Ira, and Mihir Pandey, 1996, "Trade Protection in India: Economics vs. Politics?," University of Maryland Working Paper 27.

Gaston, Noel, and Daniel Trefler, 1993, "The Labor Market Consequences of the Canada--U.S. Free Trade Agreement." *Canadian Journal of Economics*, 30(1): 18–41.

Gaston, Noel, and Daniel Trefler, 1994, "Protection, Trade and Wages: Evidence from US Manufacturing." *Industrial and Labor Relations Review*, 47(4): 574–93.

Goldar, Bishwanath, 2002, "Trade Liberalization and Manufacturing Employment," International Labor Organization Employment Paper 2002/34.

Goldberg, Pinelopi, and Nina Pavcnik, 2005, "Trade, Wages, and the Political Economy of Trade Protection: Evidence from the Colombian Trade Reforms," *Journal of International Economics*, 66(1): 75–105.

Goldberg, Pinelopi, and Nina Pavcnik, 2007a, "Distributional Effects of Globalization in Developing Countries," *Journal of Economic Literature*, 45(1): 39–82.

Goldberg, Pinelopi, and Nina Pavcnik, 2007b. "The Effects of the Colombian Trade Liberalization on Urban Poverty." In *Globalization and Poverty*, ed. Ann Harrison, 241-90. The University of Chicago Press.

Goswami, O., A.K. Arun, S. Gantakolla, V. More, A. Mookherjee, D. Dollar, T. Mengistae, M. Hallward-Driemier, and G. Iarossi, 2002, "Competitiveness of Indian Manufacturing. Results From a Firm-Level Survey," Confederation of Indian Industry and World Bank, 2002.

Goyal, S.K. 1996, "Political Economy of India's Economic Reforms," Institute for Studies in Industrial Development (ISID) Working Paper, October 1996.

Grossman, Gene, 1984, International Competition and the Unionized Sector, *Canadian Journal of Economics*, 17(3): 541–56.

Grossman, Gene, 1986, "Imports as a Cause of Injury: The Case of the U.S. Steel Industry," *Journal of International Economics*, 20(3–4): 201–23.

Grossman, Gene, and Elhanan Helpman, 2002, *Interest Group and Trade Policy*, Princeton University Press.

Hanson, Gordon, 2007, "Globalization, Labor Income, and Poverty in Mexico," In *Globalization and Poverty*, ed. Ann Harrison, 417–56. The University of Chicago Press.

Hanson, Gordon, and Ann Harrison, 1999, "Trade and wage inequality in Mexico," *Industrial and Labor Relations Review*, 52(2): 271–88.

Harrison, Ann, and Gordon Hanson, 1999, "Who Gains From Trade Reform? Some Remaining Puzzles," *Journal of Development Economics*, 59(1): 125–54.

Hasan, Rana, 2002, "The Impact of Imported and Domestic Technologies on the Productivity of Firms: Panel Data Evidence From Indian Manufacturing Firms," *Journal of Development Economics*, 69(1): 23–49.

Hasan, Rana, Devashish Mitra, and K. V. Ramaswamy, 2007, "Trade Reforms, Labor Regulations and Labor Demand Elasticities: Empirical Evidence from India," *Review of Economics and Statistics*, 89(3): 466–81.

Hasan, Rana, Devashish Mitra, and Beyza Ural, 2007, "Trade Liberalization, Labor-Market Institutions and Poverty Reduction: Evidence from Indian States," *India Policy Forum*, 3: 71–122.

Krueger, Alan, and Lawrence Summers, 1988, "Efficiency Wages and the Inter-Industry Wage Structure," *Econometrica*, 56(2): 259–93.

Lundberg, Mattias, and Lyn Squire, 2003, "The Simultaneous Evolution of Growth and Inequality," *Economic Journal*, 113(487): 326–44.

Mayer, Wolfgang, 1974, "Short-Run and Long-Run Equilibrium for a Small Open Economy," *Journal of Political Economy*, 82(5): 955–67.

Menon, Nidhiya, and Paroma Sanyal, 2005, "Labor Disputes and the Economics of Firm Geography: A Study of Domestic Investment in India," *Economic Development and Cultural Change*, 53(4): 825–54.

Milanovic, Branko, 2002, "Can We Discern the Effect of Globalization on Income Distribution? Evidence from Household Budget Surveys," World Bank Research Paper 2876.

Papageorgiou, Demetris, Michael Michaely, and Armeane Choksi, 1991, *Liberalizing foreign trade*, Cambridge, Mass. and Oxford: Blackwell.

Porto, Guido, 2006, "Using Survey Data to Assess the Distributional Effect of Trade Policy," *Journal of International Economics*, 70(1): 140–60.

Rajan, Ramikeshen S, 2002, "Trade Liberalization and Poverty: Revisiting the Age-Old Debate." University of Adelaide, Australia, mimeo.

Rama, Martin, 2003, "Globalization and the Labor Market." *World Bank Research Observer*, 18(2): 159–186.

Revenga, Ana, 1997, "Employment and Wage Effects of Trade Liberalization: The Case of Mexican Manufacturing." *Journal of Labor Economics*, 15(3): 20–43.

Roberts, Mark, and James Tybout, 1996, *Industrial evolution in developing countries: Micro patterns of turnover, productivity, and market structure.* Oxford and New York: Oxford University Press.

Sachs, Jeffrey, Ashutosh Varshney, and Nirupam Bajpai, 1999, *India in the Era of Economic Reforms.* Oxford University Press, 1999.

Stiglitz, Joseph, 1970, "Factor Price Equalization in a Dynamic Economy." *Journal of Political Economy*, 78(3): 456–88.

Topalova, Petia, 2004, "The Effect of Trade Liberalization on Productivity: The Case of India." IMF Working Paper 04/28 .

Topalova, Petia, 2005, "Factor Immobility and Regional Impacts of Trade Liberalization: Evidence on Poverty and Inequality from India." Unpublished.

Topalova, Petia, 2007, "Trade Liberalization, Poverty and Inequality: Evidence from Indian Districts." In *Globalization and Poverty*, ed. Ann Harrison, 291–336. The University of Chicago Press.

Varshney, Ashutosh, 1999, "Mass Politics or Elite Politics? India's Economic Reforms in Comparative Perspective." In *India in the Era of Economic Reforms,* ed. Jeffrey Sachs, Ashutosh Varshney and Nirupam Bajpai, 222–60. Delhi: Oxford University Press.

Wacziarg, Romain, and Jessica Wallack, 2004, "Trade Liberalization and Intersectoral Labor Movements." *Journal of International Economics*, 64(2): 411–39.