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

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Abstract

Although it is commonly believed that trade liberalization results in higher GDP, little is known about its effects on poverty and inequality. This paper uses the sharp trade liberalization in India in 1991, spurred to a large extent by external factors, to measure the causal impact of trade liberalization on poverty and inequality in districts in India. Variation in pre-liberalization industrial composition across districts in India and the variation in the degree of liberalization across industries allow for a difference-in-difference approach, establishing whether certain areas benefited more from, or bore a disproportionate share of the burden of liberalization. In rural districts where industries more exposed to liberalization were concentrated, poverty incidence and depth decreased by less as a result of trade liberalization, a setback of about 15 percent of India's progress in poverty reduction over the 1990s. The results are robust to pre-reform trends, convergence and time-varying effects of initial district-specific characteristics. Inequality was unaffected in the sample of all Indian states in both urban and rural areas. The findings are related to the extremely limited mobility of factors across regions and industries in India. Indeed, in Indian states where inflexible labor laws impeded factor reallocation, the adverse impact of liberalization on poverty was more pronounced.

The findings, consistent with a specific factors model of trade, suggest that to minimize the social costs of inequality, additional policies may be needed to redistribute some of the gains of liberalization from winners to those who do not benefit as much. Creating a flexible institutional environment will likely minimize the need for additional interventions.

1 Introduction

After the Second World War, India, along with other developing countries, chose a strategy of import substitution to promote industrialization. In the past two decades, however, many countries have begun to favor global economic integration, and in particular trade liberalization, as a development strategy. Although it is commonly believed that trade liberalization results in a higher Gross Domestic Product, little is known about its effects on income distribution. The distributional impacts of trade are particularly important in developing countries, where

*I am indebted to Abhijit Banerjee, Esther Duflo, Sendhil Mullainathan for invaluable guidance and support. This paper also benefited from discussions with Shawn Cole, Nina Pavcnik, Robin Burgess, Pol Antras, David Autor, Eric Edmonds, Emmanuel Fahri, Ivan Fernandez-Val, Rema Hanna, Ann Harrison, Ashley Lester, Andrei Levchencko, Tal Regev, the participants in the development lunches at MIT and the NBER conference on Globalization and Poverty.

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income inequality is typically pronounced and there are large vulnerable populations. If economic integration leads to further growth in income inequality and a rise in the number of people in poverty, the benefits of liberalization may be realized at a substantial social cost unless additional policies are devised to redistribute some of the gains from the winners to the losers.

Standard economic theory (Heckscher-Ohlin model) predicts that gains to trade should flow to abundant factors, which suggests that in developing countries, unskilled labor would benefit most from globalization. The rising skill-premium in the U.S. is often cited in support of standard trade theory.[1] However, recently these sharp predictions have been challenged.[2] 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. Even if global economic integration induces faster economic growth in the long run and substantial reductions in poverty, if reallocation of factors across sectors is impeded, the adjustment might be costly, with the burden falling disproportionately on the poor (Banerjee and Newman, 2004).[3] In developing countries, where rigidities in the labor market and credit market imperfections are more pronounced, these theories are particularly relevant. Due to the ambiguity of the theory, the question of how trade liberalization affects poverty and inequality remains largely an empirical one.

Recent empirical work has addressed this question, focusing mostly on the effect of trade liberalization on within country income inequality. Studies using cross-country variation typically find little relationship between trade liberalization and levels or rates of change of inequality.[4] However, these studies face significant limitations: cross-country data may not be comparable, sample sizes are small, and changes in liberalization may be highly correlated with other variables important to income processes. A promising alternative is to use micro evidence from household and industry surveys. Several studies examine the relationship between trade reforms and skill-premia, returns to education, industry-premia, and the size of informal labor markets.[5] However, the findings of these studies are typically based on correlations and may not always be given a causal interpretation. And while there is some evidence on the effect of liberalization on industrial performance and wage inequality, the literature has fallen short of measuring the impact of these

[1] See Freeman and Katz (1991), Gaston and Trefler (1993) among others.

[2] See Stiglitz (1970), Davis (1996), Feenstra and Hanson (1997), Cunat and Maffezzoli (2001), Kremer and Maskin (2003), Banerjee and Newman (2004).

[3] See also Mayer (1974), Davidson et al. (1999).

[4] See Edwards (1998), Dollar and Kraay (2002), Milanovic (2002), Lundberg and Squire (2003) and Rama (2003).

[5] See Cragg and Epelbaum (1996), Revenga (1997), Hanson and Harrison (1999), Feliciano(2001), Goldberg and Pavcnik (2001), Wei and Wu (2001), Attanasio et al. (2004), Porto (2004), Verhoogen (2004), Hanson (2004), Golberg and Pavcnik (2004b) among others.

performance changes on poverty.

This paper investigates the impact of trade reforms on poverty and inequality in Indian districts. Does trade liberalization affect everyone equally or does it help those who are already relatively well off while leaving the poor behind? How does it affect income distributions within rural and urban areas? Is the effect of liberalization felt equally across regions in India? What are the mechanisms through which trade affects income: do institutional characteristics that ease the reallocation of factors across sectors, such as labor laws, play a role in the propagation of liberalization shocks?

India presents a particularly relevant setting to seek the answers to these questions. First, India is the home of one third of the world's poor (World Bank, 2001). Second, the nature of India's trade liberalization–sudden, comprehensive and largely externally imposed–facilitates a causal interpretation of the findings. India liberalized its international trade as part of a major set of reforms in response to a severe balance of payments crisis in 1991. Extremely restrictive policies were abandoned: the average duty rate declined by more than half and the percentage of goods importable without license or quantitative restriction rose sharply. The lower average tariffs, combined with changes in the tariff structure across industries, provide ample variation to identify the causal effects of trade policy on income processes.

Coincident with these tariff reductions were significant changes in the incidence of poverty and income inequality. To determine whether there is a causal link between liberalization and changes in poverty and inequality, this paper exploits the variation in the timing and degree of liberalization across industries, and the variation in the location of industries in districts throughout India. The interaction between the share of a district's population employed by various industries on the eve of the economic reforms and the reduction in trade barriers in these industries provides a measure of the district's exposure to foreign trade. This paper establishes whether district-level poverty and inequality are related to the district-specific trade policy shocks. Because industrial composition is predetermined and trade liberalization was sudden and externally imposed, it is appropriate to causally interpret the correlation between the levels of poverty and inequality and trade exposure. Of course if there were migration across districts in response to changes in factor prices, an analysis comparing districts over time may not give the full extent of the impact of globalization on inequality and poverty in India. However, the analysis still gives a well defined answer to the question of whether inequality and poverty increased more (or less) in districts that were affected more by trade liberalization (and in any case there is very limited migration as will

be shown below).

It is important to note that this empirical strategy does not measure the level effect of liberalization on poverty in India, but rather the relative impact on areas more or less exposed to liberalization. Therefore, while opening to trade may have had an overall effect of increasing or lowering the poverty rate and poverty gap, this paper captures the fact that these effects were not equal throughout the country, and certain areas and certain segments of the society benefited less (or suffered more) from liberalization.

The study finds that rural districts where industries more exposed to liberalization were concentrated experienced a slower progress in poverty reduction, both in terms of poverty incidence and poverty depth. The effect is quite substantial. According to the most conservative estimates, 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.

Finding any effect of trade liberalization on regional outcomes runs counter to standard trade theory, where factors are mobile both across geographical regions within a country and across industries. Factor reallocation would equate incidence of poverty across regions and factor returns across industries. However, standard theory assumptions do not apply in rural India: migration in rural India is remarkably low, with no signs of an upward trend after the 1991 reforms.

This paper demonstrates the validity of theories of trade liberalization that do not assume free movement of factors across sectors, by uncovering the importance of factor mobility, and institutions that may affect it, in mitigating the unequal effects of trade liberalization. Indian states with inflexible labor laws, where I find no measurable effect of liberalization on the allocation of labor across sectors, 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. While there was no effect on inequality in India as a whole, in these states, trade liberalization seems to have led to a rise in inequality.

Finally, this paper examines the evolution of industry wages and wage premia over time, and how these vary with the extent of liberalization. Wages and wage premia seem to have absorbed the effect of the relative price change. The findings are thus consistent with a specific-factor model of trade.

The remainder of the paper is organized as follows. Section 2 presents the conceptual framework for this study and Section 3 describes the Indian reforms of 1991 focusing on trade liberalization. Section 4 presents the data used in the analysis. In Section 5 the empirical strategy is explained, and the results follow in Section 6. Section 7 considers the mechanisms that drive the evolution of poverty and inequality. Section 8 concludes the paper.

2 Background

2.1 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 by a given industry 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 (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, 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.

To illustrate the simplest case, when labor immobility is assumed to be exogenous, consider each district in India to be a 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 industries, 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 industries.

In the short run, however, only capital is perfectly mobile between industries within the district. The equilibrium will take the following form: 1) $L_X = \overline{L_X}$, $L_Y = \overline{L_Y}$, 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 industries. There are industry-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.[6] The fall in p will lead to a less than proportionate rise in the earnings of workers in industry 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 industry a more than proportionate fall in its earnings. Unlike the standard H-O model, both factors employed in the industry with tariff reduction experience a drop in earnings. The workers in industry 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 poverty depth.

The juxtaposition of these two basic models of trade demonstrates that the effect of trade

[6] 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 $\Delta = -[F_{K_X K_X X}(K_X, \overline{L_X}) + pF_{K_Y K_Y Y}(K_Y, \overline{L_Y})] > 0$.

liberalization on poverty is largely dependent upon what extent factors are able to relocate in response to the 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.

2.2 Related Literature

This study is related to several strands of literature. First, it fits into the empirical literature on the effects of trade reforms on labor outcomes. This literature has largely dealt with the experience of Latin American countries: Cragg and Epelbaum (1996), Revenga (1997), Hanson and Harrison (1999), Feliciano (2001), Goldberg and Pavcnik (2001), Attanasio et al. (2004), Verhoogen (2004), Hanson (2004). Currie and Harrison (1997) study the effect of trade liberalization in Morocco. These papers typically use variation in trade policy over time and across manufacturing industries in urban areas to identify the relationship between trade policy and labor market outcomes, focusing mostly on the effect on wages or labor income.[7,8] In general, previous studies found small effects of trade on wage inequality of workers in the manufacturing sector. This paper extends this type of analysis, by focusing not only on the effect of trade reforms on relative wages in manufacturing, but by looking at regional outcomes in general, thus capturing how trade effects seeped from the directly affected workers to the their dependents, as well as people involved in the non-traded goods sectors.

This is also one of the first studies to examine the link between trade liberalization and poverty. So far, Porto (2004) and Goldberg and Pavcnik (2004b) have analyzed the relationship between trade and poverty in the case of Argentina and Colombia respectively. Porto's approach has several advantages. It provides a general equilibrium analysis of the relationship between trade liberalization and poverty, by simultaneously considering the labor market and consumption effects of trade liberalization. His results, however, rely on simulations based on cross-sectional data. Goldberg and Pavcnik (2004b) exploit cross-sectional and time-series variation of trade protection at the industry level and find little evidence of a link between the Colombian trade reforms and poverty. Yet, as the study focuses on urban areas, and people involved in manufacturing, it may miss the effects on the poorest segments of society. This paper relates plausibly exogenous changes in trade policy to poverty and inequality, studying both manufacturing and agricultural workers in both urban and rural areas. Moreover, by defining the district as the unit of observation, it

[7] Verhoogen (2004) uses the peso crisis of late 1994 to test for the relationship between trade induced quality upgrading and wage inequality in Mexico.

[8] Wei and Wu (2001) study the impact of trade on urban-rural inequality in China.

overcomes important selection and composition effects that studies at the industry level may face. Finally, the paper contributes to the literature on industry wage premia and their relation to trade protection.

3 The Indian Trade Liberalization

India's post-independence development strategy was one of national self-sufficiency, and stressed the importance of government regulation of the economy. Cerra et al. (2000) characterized it as "both inward looking and highly interventionist, consisting of import protection, complex industrial licensing requirements, pervasive government intervention in financial intermediation and substantial public ownership of heavy industry." In particular, India's trade regime was amongst the most restrictive in Asia, with high nominal tariffs and non-tariff barriers, including a complex import licensing system, an "actual user" policy that restricted imports by intermediaries, restrictions of certain exports and imports to the public sector ("canalization"), phased manufacturing programs that mandated progressive import substitution, and government purchase preferences for domestic producers.

It was only during the second half of the 1980s, when the focus of India's development strategy gradually shifted toward export-led growth, that the process of liberalization began. Import and industrial licensing were eased, and tariffs replaced some quantitative restrictions, although even as late as 1989/90 a mere 12 percent of manufactured products could be imported under an open general license; the average tariff was still one of the highest, greater than 90 percent (Cerra et al., 2000).

However, the gradual liberalization of the late 1980s was accompanied by a rise in macroeconomic imbalances—namely fiscal and balance of payments deficits— which increased India's vulnerability to shocks. The sudden increase in oil prices due to the Gulf War in 1990, the drop in remittances from Indian workers in the Middle East, and the slackened demand of important trading partners exacerbated the situation. Political uncertainty, which peaked in 1990 and 1991 after the poor performance and subsequent fall of a coalition government led by the second largest party (Janata Dal) and the assassination of Rajiv Gandhi, the leader of the Congress Party, undermined investor confidence. With India's downgraded credit-rating, commercial bank loans were hard to obtain, credit lines were not renewed and capital outflows began to take place.

To deal with its external payments problems, the government of India requested a stand-by

arrangement from the International Monetary Fund (IMF) in August 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 (Chopra et al., 1995). 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 sector loans.

The government's export-import policy plan (1992-97) ushered in radical changes to the trade regime by sharply reducing the role of the import and export control system. The share of products subject to quantitative restrictions decreased from 87 percent in 1987/88 to 45 percent in 1994/95. The actual user condition on imports was discontinued. All 26 import licensing lists were eliminated and a "negative" list was established (Hasan et al., 2003). Thus, apart from goods in the negative list, all goods could be freely imported (subject to import tariffs) (Goldar, 2002). In addition to easing import and export restrictions, tariffs were drastically reduced (Figure 1, Panel A and B). Average tariffs fell from more than 80 percent in 1990 to 37 percent in 1996, and the standard deviation of tariffs dropped by 50 percent during the same period. The structure of protection across industries changed (Figure 1 Panel G). Figure 1 Panel H shows the strikingly linear relationship between the pre-reform tariff levels and the decline in tariffs the industry experienced. This graph reflects the guidelines according to which tariff reform took place,[9] namely reduction in the general level of tariffs, reduction of the spread or dispersion of tariff rates, simplification of the tariff system and rationalization of tariff rates, along with the abolition of numerous exemptions and concessions. Agricultural products, with the exception of cereals and oil seeds, faced an equally sharp drop in tariffs, though the non-tariff barriers of these products were lifted only in the late 1990s (Figure 1, Panels C-F). There were some differences in the magnitude of tariff changes (and especially NTBs) according to industry use type: i.e. Consumer Durables, Consumer Nondurables, Capital goods, Intermediate and Basic goods (Figure 1, Panel D and F). Indian authorities first liberalized Capital goods, Basic and Intermediates, while Consumer Nondurables and agricultural products were slowly moved from the "negative" list to the list of freely importable goods only in the second half of the 1990s.

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

The Indian Rupee was devalued 20 percent against the dollar in July 1991 and further devalued in February 1992. By 1993, India had adopted a flexible exchange rate regime (Ahluwalia, 1999).

Following the reduction in trade distortions, the ratio of total trade in manufactures to GDP rose from an average of 13 percent in the 1980s to nearly 19 percent of GDP in 1999/00 (Figure 2). Export and import volumes also increased sharply from the early 1990s, outpacing growth in real output (Figure 2). India's imports were significantly more skilled-labor intensive than India's exports and remained so throughout the 1990s, as demonstrated in Figure 3 which plots cumulative export and import shares by skill intensity in 1987, 1991, 1994 and 1997.

India remained committed to further trade liberalization, and since 1997 there have been further adjustments to import tariffs. However, at the time the government announced the export-import policy in the Ninth Plan (1997-2002), the sweeping reforms outlined in the previous plan had been undertaken and pressure for further reforms from external sources had abated.

4 Data

The data for this analysis were drawn from three main sources. Household survey data are available from the 1983-84, 1987-88, 1993-94 and 1999-2000 ("thick") rounds of the Indian National Sample Survey (NSS). The NSS provide household level information on expenditure patterns, occupation, industrial affiliation (at the 3 digit NIC level) and various other household and individual characteristics. In general, the surveys cover all Indian states and collect information on about 75,000 rural and 45,000 urban households.[10] Using this data, I construct district level measures of poverty (measured as headcount ratio and poverty gap)[11] and inequality (measured as the standard deviation of the log of per capita expenditure and the logarithmic deviation of per capita expenditure). Following Deaton (2003a, 2003b), I adjust these estimates in two ways. First, I use the poverty lines proposed by Deaton as opposed to the ones used by the Indian Planning Commission, which are based on defective price indices over time, across states and between the urban and rural sector. The poverty lines are available for the 16 bigger states in India and Delhi to which I restrict the analysis.[12] In addition, the 1999-2000 round is not directly comparable to

[10] The NSS follows the Indian Census definition of urban and rural areas. To be classified urban, an area needs to meet several criteria regarding size and density of the population, and the share of male working population engaged in non-agricultural pursuits.

[11] These measures are explained in detail in Section 5.3. The headcount ratio represents the proportion of the population below the poverty line, while the poverty gap index is the normalized aggregate shortfall of poor people's consumption from the poverty line.

[12] Poverty lines were not available for some of the smaller states and union territories, namely: Arunachal Pradesh, Goa, Daman and Diu, Jammu and Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Andaman

the 1993-1994 round. The 1999-2000 round introduced a new recall period (7 days) along with the usual 30-day recall questions for the household expenditures on food, pan and tobacco. Due to the way the questionnaire was administered, there are reasons to believe that this methodology led to an overestimate of the expenditures based on the 30-day recall period, which in turn affects the poverty and inequality estimates. To achieve comparability with earlier rounds, 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 introduced. The poverty and inequality measures were derived from this "corrected" distribution.[13]

Throughout the 1990s, there were substantial changes in the administrative division of India, with districts' boundaries changing as new districts were carved out of existing ones. I construct consistent time-series of district identifiers using Census Atlases and other maps of India. These were also used to match the NSS and Census district definitions.

For industrial data, I use the Indian Census of 1991, which reports the industry of employment at the 3-digit National Industrial Classification (NIC) code for each district in India. Because the Census does not distinguish among crops produced by agricultural workers, I use the 43rd round of the NSS to compute agricultural employment district weights. There are about 450 industry codes of which about 190 are traded agricultural, mining or manufacturing industries.

Finally, I use tariffs to measure changes in Indian trade policy. While non-tariff barriers (NTB) have historically played a large role in Indian trade policy, data are not available at a level disaggregated enough to allow the construction of a time-series of NTBs across sectors.[14] Instead, I construct a database of annual tariff data for 1987-2001 at the six-digit level of the Indian Trade Classification Harmonized System (HS) Code based on data from various publications of the Ministry of Finance. I then match 5,000 product lines to the NIC Codes, using the concordance of Debroy and Santhanam (1993), to calculate average industry-level tariffs. The data on NTBs available come from various publications of the Directorate General of Foreign Trade, as well as the 1992 study of the Indian Trade Regime by Aksoy (1992).

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.

[13] Using the uncorrected distribution does not change qualitatively the results at the *district level*, though for some of the robustness checks specifications presented in Section 6.3, it renders the point estimates insignificant. All the results at the *region level* are insensitive to whether the "corrected" or "uncorrected" distribution is used.

[14] In addition, the experience of other developing countries shows that NTB coverage ratios are usually highly correlated with tariffs, thus estimates based on tariffs may capture the combined effect of trade policy changes (Goldberg and Pavcnik, 2004a). This relationship seems to hold in the case of India as well, based on the patchy data available.

In order to identify the mechanism through which trade liberalization affects regional poverty and inequality, I turn to an additional source of industrial data: the Annual Survey of Industries (ASI). The ASI reports information on production activity in the registered manufacturing sector by state for more than 100 3-digit industries during 1982-97.

5 Empirical Strategy, Measurement of Outcomes and Trade Exposure

5.1 Empirical Strategy

The Indian liberalization was externally imposed, comprehensive, and the Indian government had to meet strict compliance deadlines. The period immediately before the reform, and the five-year plan immediately following, give rise to a natural experiment. India's size and diversity (India was divided into approximately 450 districts across 27 states at the time of the 1991 Census) allow for a cross-region research design. The identification strategy is straightforward: districts whose industries faced larger liberalization shocks are compared to those whose industries remained protected. That is, depending on the industrial composition within a district and the timing of liberalization across industries, districts across India experienced to a different extent and at a different time the shock of trade liberalization.

The identification strategy exploits variation in the industrial composition across Indian districts, prior to liberalization. I construct a measure of district trade exposure as the average of industry-level tariffs weighted by the number of workers employed in that industry in 1991 as a share of all registered workers. The variation in industrial composition 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:

$$y_{dt} = \alpha + \beta \cdot \text{Tariff}_{dt} + \gamma_t + \delta_d + \varepsilon_{dt} \tag{1}$$

Where y_{dt} is district level outcome such as poverty and inequality, and Tariff_{dt} is the district exposure to international trade. The coefficient of interest, β, captures the average effect of trade protection on regional outcomes. The inclusion of district fixed effects (δ_d) absorbs unobserved district-specific heterogeneity in the determinants of poverty and inequality, while the year dummies (γ_t) control for macroeconomic shocks that affect equally all of India.

The above methodology estimates the short to medium-run effect of trade liberalization in a specific district compared to other districts. Note that in the presence of perfect factor mobility

across regions, one would expect no effect of liberalization on regional outcomes. If workers can easily migrate in response to adverse price changes, the effect of liberalization captured in β would be zero. 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 allied sectors.

Trade liberalization affects individuals as consumers, and as wage earners. Porto (2004) outlines a methodology to evaluate the distributional impact of trade, by considering the effect of liberalization on both final goods' prices and workers' incomes. 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, my 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.

It is important to emphasize that this empirical strategy does not reveal the first order effect of trade on poverty. Trade liberalization is likely to have effects common across India, through prices, availability of new goods, faster growth etc. However, it would be very difficult to draw a causal lesson using only time variation in trade liberalization and poverty levels, since the Indian economy was subject to numerous other influences over the period studied. This study, based on regional variation, does not seek to answer questions about overall levels. Instead, it answers the question of whether all regions in India derived similar benefits (or suffered similar costs) from liberalization, or whether some suffered disproportionately. This is an important question for policy makers who might need to devise additional policies to redistribute some of the gains from the winners to the losers in order to minimize potential social cost.

The balance of this section addresses two potential complications. First, the process of trade liberalization is explored in detail, including the possibility that liberalization was correlated with other factors that affect regional poverty and inequality. Second, the measures used to quantify poverty and inequality are described, including careful attention to possible problems with the data, and their solution. And finally, I introduce the district-level measure of trade exposure.

5.2 Endogeneity of Trade Policy

There are strong theoretical reasons (Grossman and Helpman, 2002) to believe that in the absence of external pressure, trade policy is an endogenous outcome to political and economic processes. As the empirical strategy of this paper exploits the interaction of regional industrial composition and differential degree of liberalization across industries to identify the effect of trade liberalization on poverty and inequality, understanding the source of variation in the tariff levels is important. In particular, there are two aspects to the potential endogeneity of trade policy. First, the initial decrease in tariffs might have been just a continuation of a secular trend. The timing of trade reform might have reflected Indian authorities' perception of domestic industries as mature enough to face foreign competition, and labor and credit markets as flexible enough to ease the intersectoral reallocation that would ensue. Second, the cross-sectional variation in changes of protection might be related to economic and political factors. The relatively less efficient industries might have enjoyed higher degree of protection; the political strength of labor as well as business is also often cited as a determinant of trade protection. If authorities did not liberalize as intensively the least productive industries, and if these industries were concentrated in slower growing districts, one might observe small decline in tariffs associated with small declines in poverty and erroneously conclude that trade liberalization boosted poverty reduction. These two concerns are addressed in sequence below.

As discussed in Section 3, the external crisis of 1991 opened the way for market-oriented reforms in India, such as trade liberalization. The Indian government required IMF support to meet external payments obligations, and was thus compelled to accept the conditions that accompanied the support. "Given several earlier attempts to avoid IMF loans and the associated conditionalities, the large number of members of the new cabinet who had been cabinet members in past government with inward-looking trade policies and the heavy reliance on tariffs as a source of revenues, these reforms came as a surprise." (Hasan et al., 2003). According to a study on the political economy of economic policy in India, "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," (Goyal, 1996).[15]

Varshney (1999) describes the political environment in which the trade reforms were passed. Mass political attention at the time was focused on internal politics (ethnic conflict in particular), and trade reforms pushed through by a weak coalition government apparently escaped general attention, in contrast to the failed reform attempts of the much stronger Congress Party in 1985. As late as 1996, less than 20% of the electorate had any knowledge of the trade reform, while 80% had opinions on whether India should implement caste-based affirmative action. While some liberalization efforts (for example privatization) were diluted or delayed due to popular opposition, trade liberalization was generally successful. As Bhagwati wrote: "Reform by storm has supplanted the reform by stealth of Mrs. Gandhi's time and the reform with reluctance under Rajiv Gandhi." (Bhagwati, 1993).

Even if the timing of the sharp drop in average tariffs (Figure 1) appears exogenous, there is significant variation in the tariff changes across industries, which could confound inference. More precisely, it is important to understand whether the changes in tariffs reflected authorities' perceptions on industry's ability to compete internationally, or the lobbying power of the industry. Ideally, the concern of potentially endogenous changes in trade protection could be alleviated by knowledge of the "true" intentions of Indian policymakers or, failing that, through a detailed study of the political economy behind tariff changes in India over the period. In the absence of objective and detailed analyses of such policy changes, the data may be examined for possible confounding relationships.

First, I investigate to what extent tariffs moved together. An analysis of the tariff changes of the 5,000 items in the dataset for 1992-96, the Eighth Plan, and for 1997-2001, the Ninth Plan, reveals that movements in tariffs were strikingly uniform until 1997 (Figure 4). During the first 5-year plan that incorporated the economic reforms of 1991, India had to meet certain externally imposed benchmarks, and the majority of tariff changes across products exhibited similar behavior (either increased, decreased, or remained constant each year). After 1997, tariff movements were not as uniform. Policymakers may have been more selective in setting product tariffs during 1997-2001, and the problem of potential cross-sectional endogenous trade protection is more pronounced.

[15] This view is confirmed in a recent 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

Second, there is no evidence that policymakers adjusted tariffs according to industry's perceived productivity during the Eighth Plan, i.e. until 1997. In a related study (Topalova, 2004), I test whether current productivity levels and productivity growth predict future tariffs – a relationship one would expect if policymakers were trying to protect less efficient industries. I find that the correlation between future tariffs and current productivity, and future tariffs and current productivity growth is indistinguishable from zero for the 1989-96 period. For the period after 1997 however, future tariff levels 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.

A third check uses data from the ASI to test for "political protection." Even if the change in industry tariffs appears uncorrelated with the initial productivity of the industry, tariff changes may be correlated with politically important characteristics of the industry. Using data from the ASI, (which covers the manufacturing and mining sectors), and following the literature on political protection, I regress the change in tariffs between 1987 and 1997 on various industrial characteristics in 1987.[16] These characteristics include employment size (a larger labor force may lead to more electoral power and more protection), output size, average wage (policy makers may protect industries where relatively low skilled/vulnerable workers are employed), concentration (measured by the average factory size, which captures the ability of producers to organize political pressure groups to lobby for more protection), and share of skilled workers. The results are presented in Table 1, Panel A. Tariff changes are not correlated with any of the industry characteristics.

Because agricultural workers are not included in the ASI data, but comprise a large share of India's population, I conduct a similar exercise using data from the 1987 NSS. I estimate for all industries the average per capita expenditure, wage, poverty rate and poverty depth, and I check whether there is a correlation between these industry characteristics and tariff declines. Results, presented in Table 1, Panel B, show no significant relationship between tariff changes and these measures of workers' wellbeing, once controls for industry use type are included.

A possible explanation for these results can be found in Gang and Pandey (1996). They conducted a careful study of the determinants of protection across manufacturing sectors across

[16] I use 1987 as the pre-reform year since the data on pre-reform poverty and inequality come from the 43rd round of the NSS which was collected in 1987. The results are robust to using 1988 or 1990 as the "pre" year.

three plans, 1979-80, 1984-85 and 1991-92, showing that none of the economic and political factors are important in explaining industry tariff levels in India.[17] They explain this phenomenon with the hysteresis of policy: trade policy was determined in the Second Five Year Plan and never changed, even as the circumstances and natures of the industries evolved.

The evidence presented here suggests that the differential tariff changes across industries between 1991 and 1997 were as unrelated to the state of the industries 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 (Figure 7). This brings some additional complications in the analysis, which are discussed at length in the following sections.

5.3 Measurement of Poverty and Inequality

For poverty, I use two standard measures: the "headcount ratio" (HCR) and the poverty gap. The former, which I refer to as the poverty rate, represents the proportion of the population below the poverty line. While the HCR is widely used, it does not capture the extent to which different households fall short of the poverty line, and is highly sensitive to the number of poor households near the poverty line. Thus, I also analyze the poverty gap index, defined as the normalized aggregate shortfall of poor people's consumption from the poverty line.[18,19] Figure 5 plots the evolution of poverty in India, and indicates a substantial decline over the past two decades.

I chose two measures of inequality, the standard deviation of log consumption and the mean logarithmic deviation of consumption,[20] both because they are standard measures, and because

[17] In other developing countries, protection tends to be highest for unskilled, labor-intensive sectors. See Goldberg and Pavcnik (2001), Hanson and Harrison (1999), Currie and Harrison (1997) for evidence from Colombia, Mexico and Morocco respectively.

[18] Both the headcount ratio and the poverty gap are members of the Foster-Greer-Thorbecke class of poverty measures, defined as $P_\alpha = \int_0^z \left(\frac{z-y}{z}\right)^\alpha f(y)dy$, where z is the poverty line and incomes are distributed according to the density function f(y). The headcount ratio is calculated by setting α to be 0, and the poverty gap by setting α to be 1.

[19] Since the survey design changed for the 1999-2000 round of the NSS, in order to obtain internally consistent measures of poverty and inequality, the per capita expenditure data were adjusted at the district level, following Deaton (2003).

[20] The mean deviation of consumption is part of the family of Generalized Entropy coefficients. It is calculated

similar values are obtained when they are estimated from either the micro data or the estimated distributions. In contrast to poverty's steady decline, inequality follows a more complicated pattern. While it registered a substantial decline between 1987 and 1993, both measures record a break in that trend and a slight increase in inequality after 1993 in rural India. In urban India, after a period of decline, inequality rose between 1993 and 1999.

5.4 Measurement of Regional Exposure to Trade Liberalization

As mentioned above, 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.[21] Table 2 provides summary statistics of the variables included in the analysis at the district level, including a breakdown of the workers across broad industrial categories. In the average rural district about 80 percent of main[22] workers are involved in agriculture, of whom 87 percent are involved in cultivation of cereals and oilseeds. Mining and manufacturing account for about 6 percent of the workers and the remaining 12 percent are involved in services, trade, transportation, and construction. In urban India agricultural workers represent only 19 percent.[23] Manufacturing and mining workers account for another fifth of the urban population and the remaining three-fifths comprise workers in services etc.

The district tariffs are computed as follows:

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

Tariff_{dt} is a "scaled" version of district tariffs. In this measure, workers in non-traded industries are assigned zero tariffs for all years. These are workers in services, trade, transportation, construction as well as all workers involved in growing of cereals and oilseeds. The latter assumption is justified by the fact that all product lines of these two industries were canalized (imports were allowed only to the state trading monopoly) as late as 2000.[24] Furthermore, the tariffs of all product lines under the growing of cereals industry are zero throughout the entire period of interest.

according to the following formula, $I(0) = \int \frac{y}{\mu} \log(\frac{\mu}{y}) f(y) dy$, where μ is mean income.

[21] As described in Section 4, the 1991 population and housing census is used to compute employment by industry for each district. The employment data are available for the urban and rural sector separately by industry at the 3 digit (NIC) level for all workers except agricultural workers. To match agricultural workers to the tariff data, I compute district employment weights from the 43rd round of the National Sample Survey (July 1987-June 1988).

[22] The 1991 Indian Census divides workers into two categories: "main" and "marginal" workers. Main workers include people who worked for 6 months or more during the year, while marginal workers include those who worked for a shorter period. Unpaid farm and family enterprise workers are supposed to be included in either the main worker or marginal worker category, as appropriate.

[23] Of these, 73 percent are cultivators of cereals and oilseeds.

[24] These products also have minimum support prices fixed by the Government of India.

One concern with the use of Tariff_{dt} is that it is very sensitive to the share of people involved in non-traded industries, the majority of whom are the cereal and oilseed growers. Since agricultural workers are usually at the bottom of the income distribution, Tariff_{dt} is correlated with initial poverty levels. The interpretation of results based on this measure may be unclear if there were (for other reasons) convergence or divergence across districts. In particular, poorer districts, which have a large fraction of agricultural workers may experience faster reduction in poverty due to mean-reversion or convergence. These districts may also record a lower drop in tariffs, since initially the Tariff_{dt} measure is low. Thus, one might find a spurious negative relationship between changes in tariffs and changes in poverty and erroneously conclude that trade liberalization led to a relative increase in poverty at the district level. Alternatively, if workers in non-traded activities are on a different growth path than those in traded industries, Tariff_{dt} might capture this differential growth, rather than the effect of trade policies. To overcome this shortcoming, I instrument Tariff_{dt} with TrTariff_{dt}, defined as:

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

TrTariff_{dt}, "non-scaled" tariffs, ignores the workers in non-traded industries. It weighs industry tariffs with employment weights that sum to one for the share of people in traded goods in each district. Thus, a district which has 1 percent workers in traded industries and another district where 100 percent of workers are in traded industries will have the same value of TrTariff_{dt} if, within the traded industries, the industrial composition is the same. Since the variation in TrTariff_{dt} does not reflect the size of the traded sector within a district, the "non-scaled" tariff does not reflect the magnitude of the effect trade policy might have. Yet, TrTariff_{dt} forms a good instrument for Tariff_{dt}, as it is strongly correlated with the "scaled" tariffs and overcomes the correlation with district initial poverty that is there by assumption in Tariff_{dt}. Table 3 presents the results from the first stage. Following equation 1, I estimate the following specification:

$$\text{Tariff}_{dt} = \alpha + \beta \cdot \text{TrTariff}_{dt} + \gamma_t + \delta_d + \varepsilon_{dt} \tag{2}$$

with γ_t and δ_d defined as above. Panel A gives the results for India as a whole, while in Panels B and C, I provide the results for two subsamples of states (to which I will return shortly). Columns (1) and (3) present the correlation between the scaled and nonscaled tariffs. There is a very strong relationship between the non-scaled and scaled tariffs in both urban and rural India.

Another instrument is suggested by Figure 1, Panel G: tariff changes are linearly related to initial tariffs. One important principle in the tariff changes was to standardize tariffs (reduce

the standard deviation). A natural consequence of this is that the higher the tariff initially, the greater the reduction. One could take advantage of this relationship by using 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 and may thus not form a valid instrument. Instead, I use pre-reform unscaled tariffs times a post dummy, in addition to the unscaled tariffs, as instruments for tariff:

$$\text{Tariff}_{dt} = \alpha + \beta \cdot \text{TrTariff}_{dt} + \theta \cdot \text{Post}_t \cdot \text{TrTariff}_{d,1987} + \gamma_t + \delta_d + \varepsilon_{dt} \quad (3)$$

Table 3 columns (2) and (4) include the interaction of the initial unscaled tariff and a post-liberalization dummy. The interaction of the non-scaled tariffs times a post dummy is strongly correlated with the scaled tariffs and adds explanatory power in all rural subsamples. In the urban sector, the relationship is not as strong.[25,26]

Data on outcome variables are available for 3 years: 1987, 1993 and 1999, while tariff data are available annually. It is not known how soon national policy changes affect regional outcomes, though there is probably some lag. If the 1993 outcomes were matched to the 1991 tariffs, 1993 would count as a "pre" year, while if they were matched to the 1992 tariffs, it would be a post year. To avoid this problem, 1993 is omitted from the analysis. I use the earliest available data, 1987, for the "pre" tariff measure, and the 1997 data as the "post" measure.

6 Results and Robustness

6.1 Basic Results

I estimate four versions of equation 1: the OLS relationship using Tariff_{dt}; a reduced form using TrTariff_{dt}; instrumenting for Tariff_{dt} using TrTariff_{dt}; and finally instrumenting for Tariff_{dt} with both TrTariff_{dt} and with $\text{TrTariff}_{d,1987}$*Post_t, where Post_t is a dummy equal to 1 in year 1999. Since the dependent variable is an estimate, I weight the observations by the square root of the average number of households in a district across rounds.[27] A post-liberalization dummy is included to account for macroeconomic shocks and time trends that affect outcomes equally across

[25] Since the TrTariff and Post*TrTariff measures are highly colinear, it is hard to interpret the coefficients in the first stage regression.

[26] An alternative way to think of the above specification is as inclusion of a non-linear function of the instrument TrTariff. As interpretion of the first stage is not needed, it might be useful to include additional functions of the instruments in order to increase the power in the first stage.

[27] The results presented in this section are insensitive to whether the district-level observations are weighted or not. However, weighting does increase the precision of the estimates at the district level in some of the specification checks discussed in Section 6.3. Across all specifications at the region level, weighting does not have an effect.

India, while district fixed effects absorb district-specific time-invariant heterogeneity. Outcomes of districts within a state might be correlated (since industrial composition may be correlated within a state), therefore I cluster the standard errors at the state-year level. The results for the four outcomes of interest are presented in Table 4a Section I for rural India and Section II for urban India. Each panel gives the results for a different dependent variable. Columns (1) and (5) show the OLS relationship, columns (2) and (6) the reduced form, and columns (3), (4), (7) and (8), the IV results. In column (4) and (8), I use both the unscaled tariffs and the pre-reform unscaled tariffs times a post reform dummy as an instrument.

In rural India, for both measures of poverty, there is a strong statistically significant negative relationship between district tariffs and poverty. The decline in tariffs as a result of the sharp trade liberalization appears to have led to a relative increase in the poverty rate and poverty gap in districts whose exposure to liberalization was more intense. The average district experienced 5.5 percentage point reduction in the "scaled" district tariffs. The point estimates of the various specifications are similar, and suggest that this 5.5 percentage point drop would lead to an increase in the poverty rate of 3.2 to 4.6 percentage points, and a 1.1 to 1.8 percentage point increase in the poverty gap. Given that poverty rate in the average district decreased by 12.7 percentage points and that poverty gap decreased by 4 percentage points during the entire decade, the effects of exposure to liberalization are rather large. Surprisingly, there is no statistically significant relationship between trade exposure and poverty in urban India. Though the point estimates are still negative, the magnitude of the coefficients is much smaller than in rural India.

In Panel E of Table 4a, I present the effect of trade liberalization on log average per capita expenditures in the district. Though there is no statistically significant relationship in this set of specifications, 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, the sign is reversed in the reduced form and IV specifications. The negative relationship between changes in tariffs and changes in per capita expenditures in the OLS (column (1)) implies that trade liberalization was 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 industries 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 will 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 is why the OLS estimates may be downward biased, as is the case for both measures of poverty and log consumption (columns (1) vs. columns (3) and (4)).

As a robustness check, I perform the analysis discussed above at the region level. NSS regions typically consist of several districts within a state with similar agroclimatic conditions and socioeconomic features. India is divided into 77 such regions, of which I use 62 for the analysis after dropping the states with missing poverty lines or other relevant data. I calculated all the outcomes measures and constructed the two tariff measures at the region level. Estimating equation 1 at the region level, I find almost identical results, though somewhat larger in magnitude (Table 4b). At the region level, the same pattern as in rural regions emerges for the urban sample. Rural and urban areas where more affected industries were concentrated experienced a slower reduction in poverty rate and poverty depth.

There is no statistically significant relationship between trade liberalization and either measure of inequality for the average district (or average region) in either rural or urban India.

6.2 Why rural

The empirical literature on trade liberalization so far has focused predominantly on the manufacturing sector and urban areas because these were the areas most commonly affected by trade liberalization (Goldberg and Pavcnik, 2004a). Therefore, it is surprising that the effect of trade liberalization on districts is more pronounced in rural rather than in urban India.[28] A close look at the evolution of tariff and non-tariff barriers in Figure 1 suggests an explanation. Agriculture was not omitted from the 1991 reforms in India. 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 addition, the agricultural tariffs and non-tariff barriers are strongly correlated. The post-liberalization data (the 55th round of the NSS) was collected from mid 1999 to mid 2000, right

[28] On the other hand, rural areas are where the poor people in India are concentrated. In 1987, both poverty rates and poverty depth were almost double in rural areas (40 versus 22.8 percent poverty rate and 9 versus 4.7 percent poverty depth).

when the bulk of the removal of NTB was taking place. Thus, the tariff measure may be capturing the effect of both tariff and non-tariff barriers and may reflect the short term effect of the change in relative price of agricultural products on the extensive rural population. I construct separate measures of agricultural tariffs and mining and manufacturing tariffs that a district faces and regress district poverty and inequality on these measures of trade policy. Table A1 in the Appendix reveals that the results are driven by agricultural tariffs.[29] There is little relationship between mining and manufacturing tariffs and district outcomes, though, due to the large standard errors of the point estimates, I can not reject that the effect of mining and manufacturing tariffs and of agricultural tariffs is the same for any of the outcomes and for any of the subsamples. The finding is not that surprising; manufacturing and mining workers represent only 6 percent of workers in the typical rural district – therefore, it is plausible that even if trade liberalization had a sizeable effect on their wellbeing or relative earnings, it would not be reflected in district-level outcomes.

Furthermore, people involved in agriculture are the most vulnerable, often with little access to insurance devices. There is no shortage of press accounts on farmers committing suicide in the face of adverse shocks in India.[30] Manufacturing workers, on the other hand, tend to be relatively richer than agricultural workers as presented in Figure 7: a significant decline in income may not be enough to push them below the poverty line.

6.3 Robustness

The effects of liberalization identified in this paper could be incorrect if measures of trade liberalization were correlated with omitted district-level time-varying variables that affect poverty and inequality. In this section, I first examine whether districts with different initial industrial compositions were on different growth paths. I then determine whether pre-existing conditions within districts are correlated with subsequent tariff changes. I measure whether "initial" (1987) conditions other than industrial composition in districts are correlated with subsequent changes in poverty, and if so, whether they are driving the results. Finally, I test whether the findings are confounded by other reforms, concurrent to trade liberalization.

To address the concern that districts with different industrial composition may be experiencing different time trends in poverty and inequality that are (spuriously) correlated with tariff changes, I perform a falsification test. In particular, I test whether changes in poverty and inequality in

[29] Note that the magnitudes of the coefficients in table A1 are not interpretable as the measures of agricultural and mining and manufacturing tariffs are not scaled by the share of population employed in the particular sector.

[30] See, for example, http://news.bbc.co.uk/2/hi/south_asia/3769981.stm.

the two periods prior to the reform (from 1983 to 1987) are correlated with measures of trade liberalization from 1987 to 1997. This analysis can be performed only at the region level as district identifiers are not available in the 38th round of the NSS. I use the four specifications (OLS, reduced form, and both IV specifications), but now using 1983 and 1987 outcomes as pre and post, rather than the 1987 and 1999 outcomes. The results are presented in Table 5. The coefficients on the tariff measure are rather imprecisely estimated, though they are smaller in magnitude than those in Table 4b (which presents the main regressions at the region level) and of opposite sign. In both urban and rural areas, there seems to be no correlation between tariff changes and the pre-reform trend in any of the outcomes.

The regressor of interest in equation 1 is Tariff_{dt}. If it is correlated with initial conditions, and initial conditions determine subsequent changes in poverty rates, one may find a spurious effect. For example, if convergence across districts became stronger after liberalization, so that poverty reduction is larger, while intensity of the treatment is smaller in poorer regions, then one would see large declines in poverty levels, small declines in tariffs and may conclude that the reduction in tariffs led to a relative increase in poverty even if such a relationship does not exist. Since, by assumption, Tariff_{dt} is correlated with the initial poverty, this is a valid concern. However, if the instruments non-scaled tariff TrTariff_{dt} and initial tariff level, are uncorrelated with initial levels of district outcomes, then the IV estimates should be free of bias.

Table 6 examines the relationship between tariff changes and initial conditions. Instead of looking at the pre-reform trends of outcomes, I regress district outcomes in 1987 (both rural and urban sectors) on changes in tariffs, controlling for the initial industrial composition in the district (namely percentage of workers in agriculture, manufacturing, mining, trade, transport, services - workers in construction are the omitted category), percentage literate and the share of scheduled caste and scheduled tribes population, $X_{d,1987}$.

$$y_{d,1987} = \alpha + \beta \cdot (\text{Tariff}_{d,1987} - \text{Tariff}_{d,1999}) + \theta \cdot X_{d,1987} + \varepsilon_{dt} \tag{4}$$

The scaled measure of trade exposure, Tariff_{dt}, is statistically significantly correlated with pre-reform poverty measures. Even the decline in TrTariff_{dt} has a statistically significant correlation with initial level of poverty depth (Table 6 columns (3) and (7)). However, if I use both the decline in TrTariff_{dt} and its initial level as instruments for the decline in scaled tariffs, the relationship disappears (columns (4) and (8)). In the rural sector, the coefficients not only become statistically insignificant but notably smaller in magnitude. This suggests that the most appropriate

instrument for the "scaled" tariffs is the combination of the "non-scaled" tariffs and the initial value of these tariffs interacted with a post dummy.

In Tables 7, I further investigate the possibility that the results might be driven by convergence or omitted variables.[31] I control for time-varying effects of various pre-reform district characteristics as well as initial levels of outcomes, by including the interaction of these initial characteristics and a post liberalization dummy, estimating:

$$y_{dt} = \alpha + \beta \cdot \text{Tariff}_{dt} + \theta \cdot \text{Post}_t \cdot X_{d,1987} + \gamma_t + \delta_d + \varepsilon_{dt} \tag{5}$$

In all specifications I include in $X_{d,1987}$ initial industrial composition (namely percentage of workers in agriculture, manufacturing, mining, trade, transport, services - workers in construction are the omitted category), percentage literate and the share of scheduled caste and scheduled tribes population. I sequentially add as controls the initial level of the log of mean per capita expenditure in the district, the pre-reform trend in the outcome variable (the difference between its 1983 and 1987 value), and finally the initial value of the dependent variable itself. I also allow for differential time trends in district outcomes across states with pro-employer, pro-worker and neutral labor laws by including post times labor law fixed effects.[32,33] In columns (1)-(5), I use only TrTariff_{dt} as an instrument for Tariff_{dt}, while in columns (6)-(10), I instrument the scaled tariff with both TrTariff_{dt} and the initial level interacted with a post-liberalization dummy. Columns (5) and (10) include the instrumented value of the lagged dependent variable, where the 1983 level is used as an instrument for the 1987 level.

The inclusion of district initial characteristics reduces slightly the point estimates of the effect of trade liberalization at the district level, from 0.69-0.83 to 0.41-0.58 for poverty rate and from 0.21-0.32 to 0.12-0.22 for poverty depth. Controlling for initial per-capita expenditure or pre-reform outcome reduces further the size of the coefficients when only the scaled tariff is used as an instrument. Thus, it may be that some of the variation in poverty depth and incidence that equation 1 attributed to trade liberalization was in fact due to certain omitted time-varying district specific characteristics. The inclusion of the actual value of the pre-reform dependent

[31] I present the analysis only for the rural sample from now on as the effect of trade liberalization in the urban sector can not be precisely estimated.

[32] Indian states are classified as having pro-worker, neutral, or pro-employer labor laws by Besley and Burgess (2004).

[33] As I argue in Section 2, trade liberalization (and the ensuing change in relative prices) should lead to reallocation of resources from industries where the relative price fell to those where it rose in a H-O world with perfect factor mobility. Yet, the institutional environment as reflected in labor laws may affect the ease to hire and fire workers, change wages etc., in other words the speed of factor reallocation.

variable (column (4) and (8)) lowers slightly the coefficient on the tariff measure and in some cases renders it statistically insignificant. This specification, however, is equivalent to regressing changes on levels: if there is mean reversion and measurement error, the estimated coefficients would be biased. In fact, the size of the coefficient on the initial level of the outcomes suggests implausibly strong convergence. Instrumenting the 1987 level of the dependent variable, with its 1983 level (columns (5) and (10)) solves to a certain extent that problem. In Table A2 in the Appendix, I reestimate all of the specifications discussed above at the region level. The findings are somewhat larger in magnitudes and more statistically significant.

After controlling for various district initial characteristics, the estimated effect of trade liberalization on the poverty measures remains statistically and economically significant. According to these estimates, the decline in tariffs increased relative poverty incidence by about 2 and poverty gap by 0.6 percentage points in the average district. The inclusion of the additional controls also helped estimate more precisely the effect of trade policy on the average per capita expenditures (the estimated coefficient is again larger in magnitude and more robust in the region-level regressions in Table A2). Districts more exposed to trade liberalization experienced slightly slower growth in consumption per capita. One percentage point decrease in the tariff a district faces translates into 0.6 percent lower average per capita expenditures.[34]

Next, I address the concern that some other reforms concurrent with trade liberalization may be driving the results. In particular, in 1991 the government of India increased the number of de-licensed industries and specified a list of industries for automatic approval for foreign direct investment.[35] 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.[36] The number of bank branches per capita in a district captures the potentially confounding effect of banking reforms.[37]

[34] The estimated effect of liberalization across specifications tends to be larger in magnitude and more robust at the region level. This could be due to lower measurement error in region-level variables. Migration across region boundaries is also likely to be smaller than migration across district boundaries.

[35] 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.

[36] Data on policies regarding industrial delicensing and opening to foreign direct investment were compiled from various publications of the Handbook of Industrial Statistics.

[37] 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, Burgess and Pande (2004) have shown that rural bank branch expansion over the 1980s led to reduction in poverty.

In Table 8, I replicate the specifications presented in Table 7 including these time-varying district level measures of reforms (the results on per capita consumption are not reported for brevity). The effect of trade liberalization on poverty is completely insensitive to the additional controls. There is no correlation between change in poverty and change in the number of bank branches per capita or share of industries under a license.[38] A larger share of industries open to FDI, however, is associated with faster reduction in poverty. As globalization is typically defined not only as trade liberalization but also opening to foreign investment, it is important to emphasize this finding. It also reconciles Hanson's (2004) conclusion that more globalized areas in Mexico[39] experienced a larger increase in labor income with the finding that trade liberalization slowed poverty reduction in more exposed districts in India. In Table A3 in the Appendix, I investigate the role of imports versus exports in addition to FDI, by including the district employment-weighted industry imports and exports. I use 1987 import/export data for the pre-reform period, and the 1993-1997 annual average for the post-reform period. Since imports and exports are the endogenous response to trade policy, exchange rate shocks, foreign demand etc., these regressions do not warrant a causal interpretation, yet they illustrate that imports (or more precisely potential exposure to imports) are associated with higher, while exports with lower incidence of poverty.

For the whole sample, for urban as well as rural areas, trade liberalization seems to have had no effect on inequality.

7 Mechanisms

So far this paper has established that, whatever the India-wide effects of trade liberalization were, rural areas with high concentration of industries that were disproportionately affected by trade liberalization, experienced slower progress in poverty reduction. There was no measurable impact of liberalization on inequality. In the remainder of the paper, I interpret these results within the framework of the two basic trade theories presented in Section 2, highlighting the underlying mechanisms that link trade policy, poverty and inequality. Understanding these mechanisms is crucially important to policymakers seeking to mitigate the unequal impact of trade liberalization on regions within a country.

[38] The absence of an effect of the number of bank branches per capita on rural poverty is not a contradiction to Burgess and Pande (2004) findings. Rural bank branch expansion levelled off after 1987; very few new branches opened throughout the 1990s. The results in Table 8 are robust to including the number of bank branches per capita in 1987 interacted with a post dummy.

[39] Hanson's definition of exposure to globalization takes into account the share of maquiladora value added, the share of FDI, and the share of imports in state GDP.

I explore why there is an effect of trade liberalization on regional outcomes by looking at two types of factor mobility: geographical and intersectoral. First, I look at migration patterns in India over time. Finding very little migration, 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. To determine whether features of the institutional environment may affect trade liberalization, I examine whether the effects of trade liberalization varied with the flexibility of labor laws. I then investigate whether the adjustment came through returns to factors, by looking at the effect of tariff changes on wages and wage premia. I find substantial adjustment in wages and industry premia.

7.1 Reallocation Across Regions

The regionally disparate effects of liberalization are not consistent with standard trade theory. In a standard trade model with perfect factor mobility across regions, labor would migrate in response to wage and price shocks, equalizing the incidence of poverty across regions. Estimating equation 1 would yield an estimate of β equal to zero, indicating that the local intensity of liberalization has no effect on local poverty.

The interpretation of the estimates of β in equation 1 as effects of liberalization on regional outcomes is correct if labor is immobile across geographical districts within India in the short to medium-run, that is, if each district constitutes a separate labor market. This represents an immediate departure from standard trade theory. 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 9 presents some estimates of migration for urban and rural India based on three rounds of the NSS (1983, 1987 and 1999). Overall migration is not low – 20-23 percent of rural and 31-33 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 district across different sectors (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).

Even the 8 percent level of urban residents who migrated from rural areas reported in Table 9 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.

These low migration figures are combined with a second characteristic of India's economy, namely the large and growing disparities in income across Indian states. Ahluwalia (2002), Datt and Ravallion (2002), Sachs et al. (2002), Bandyopadhyay (2003) and others document significant differences in the level of state GDP per capita and growth rate of state output.

7.2 Reallocation Across Industries and the Effect of Trade Liberalization

7.2.1 Reallocation Across Industries - Overall Patterns

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

Yet, in contrast to the predictions of the H-O model, many developing countries experienced an increase in skill premium and overall inequality in the aftermath of trade liberalization. Moreover, intersectoral reallocation has been very limited (see Attanasio et al. (2004), Wacziarg et al. (2003), 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.

Several dependent variables are created for this analysis, using data from the Annual Survey of Industries (ASI). I also conduct robustness checks with the NSS data, because the NSS include

agricultural workers and workers in non-traded industries. Following Wacziarg et al. (2003), 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_{st}, 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 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 $\left|\sum_s E_s^t - \sum_s E_s^{t-2}\right|$.

And finally 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 6 presents the evolution of the three variables over time.[40] 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. Table 10 presents the correlations of employment shares between 1981 and 1997, based on data from the ASI (Panel A) and NSS (Panel B). The latter includes agricultural workers and workers in non-traded industries, in addition to mining and manufacturing. The correlations between employment shares pre-reform and post-reform exceed 90 percent. In rural India, the correlations are extremely high, but that is largely due to the fact that about 65 percent of workers are involved in the growing of cereals. Regressing industry employment shares from the ASI (at the 3-digit NIC) on industry lagged tariffs, industry and year indicators, and clustering the standard errors at the industry level in order to correct for

[40] It is worth noting that India's average structural change, 0.04-0.1 percentage points, is much lower than Wacziarg et al. (2003)'s estimate of the average structural change across 20 developing countries, which is about 0.35 percentage points.

serial correlation over the 1988-1997 period confirms this conclusion (Table 11). The coefficient on lagged tariff is small in magnitude (-0.001) and statistically insignificant. Neither industry output, employment, fixed capital, nor the share of fixed capital are correlated with lagged industry tariffs. A similar exercise with employment shares from the NSS (Table 12) for all traded industries as well as separately for agriculture and mining and manufacturing finds no correlation between employment shares and tariffs.[41]

There is thus little evidence H-O style reallocation is occurring in India as a whole. 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)).

7.2.2 Reallocation Across Industries and Labor Laws

The 'sluggish' labor market response in developing countries may be institutionally driven through rigidities in the labor market. In a cross-country setting, Blanchard and Wolfers (2000) argue that the interaction of labor market institutions and macroeconomic shocks can explain the rise of equilibrium unemployment in Europe. Caballero et al. (2004) find that job security regulation clearly hampers the creative-destruction process and the annual speed of adjustment to shocks. 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. Similarly, in India, firms that should have expanded might not have done so for fear of getting stuck with too much labor (Indian growth in manufacturing employment was almost nil

[41] In order to perform the above exercise, I match the 3 versions of industry codes used in the NSS43, 50 and 55th round - respectively, NIC 1970, NIC 1987 and NIC 1998 version. I match these classifications at a more disaggregate level than the official concordance, which bundles almost all agricultural production in one industry. This matching is not immediately obvious in many cases and inevitably introduces additional measurement error.

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 industries are 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 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.[42] 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 (Basu et al., 2000). 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 Agarwala et al., 2001).

Even though the Industrial Disputes Act was passed at the central level, state governments

[42] 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.

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. Hasan et al. (2003) combine these categories with the ranking of the investment climate in Indian states from a survey of managers conducted by the World Bank (Goswami et al., 2002), in order to classify states as having flexible or inflexible labor laws (Table A3). Using industry-level disaggregated data by states, Hasan et al. (2003) find that lower protection led to higher elasticity of labor demand, and more 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, then one is also likely to see more labor reallocation and a higher correlation between the exogenous change in price due to tariffs and employment shares.

I turn to the NSS in order to complement Hasan et al. (2003)'s findings on this issue. I calculate two measures of employment shares for each state from the NSS, focusing only on the manufacturing and mining industries (those likely influenced by labor laws). The first measure is the number of workers employed in industry i in state j at time t as a share of total agricultural, mining, manufacturing and service workers in state j at time t, while the second measure is the number of workers employed in industry i in state j at time t as a share of total workers in mining and manufacturing in state j at time t. Unfortunately, once I break down the data by state and by industry there are only a few observations per state-industry (the median state-industry has 3 observations).[43] I regress these shares on industry tariffs, state-industry fixed effects and time dummies (the unit of observation is industry in a state in a particular year). I cluster the errors at the industry-year level to account for correlations of outcomes of the same industries across different states in India. Confirming the results in Table 12, there is no significant correlation between tariffs and employment shares in the sample of all Indian states (Table 13, column (1)). I then split the states according to their labor laws, as classified by Besley and Burgess (2004) and modified by Hasan et al. (2003).[44] The results are not nearly as stark as the findings of Hasan et

[43] The matching of industry classification across rounds imposes an additional constraint: some agricultural and manufacturing industries (namely in the cotton cleaning, and spinning/weaving industries) are not separately defined in the 55th round. I have not included these industries in the analysis of the manufacturing and mining industries. Their inclusion substantially increases the already large standard errors.

[44] 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 et al. (2003) 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.

al. (2003), but there is some suggestive evidence that reallocation of labor across industries was correlated with industry tariffs in states with flexible labor laws. However, the estimates are not precise enough to estimate the extent of this difference.

7.2.3 Trade Liberalization and Institutional Characteristics

As suggested in Section 2, the impact of liberalization may vary across states with different legal, institutional, or economic environments. Since Hasan et al. (2003)' study (and the evidence presented above) indicate that there was more reallocation in states with more flexible labor laws, it makes sense to examine whether these differences in the institutional environment affected the impact of liberalization.

I thus estimate equation 5 for the subsamples of states as in Table 13.[45] Panel A, B and E of Table 14 present the results for poverty rate, poverty gap and mean per capita consumption, while Panel C and D give the results for inequality. This table presents the specification as in Table 7 (columns (3) and (8)), which includes pre-reform district literacy, share of SC/ST population, industrial structure, log of per capita expenditures, and trend in the outcome variable interacted with a post dummy in the set of controls. For brevity, I report only the coefficient and standard error of the tariff measure. In column (1) and (3) I use the non-scaled tariffs as an instrument, while in column (2) and (4), 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. Though the standard errors are too large to statistically reject that the effect is equal across subsamples, the point estimates are generally much smaller in magnitude and in some cases even of the opposite sign in the sample of states with flexible labor laws. Though there was no effect of trade liberalization on inequality for India as a whole, trade liberalization seems to have significantly increased relative inequality as measured by the standard deviation of log consumption in states with flexible labor laws. There is a similar pattern, though less clear-cut, when logarithmic deviation is used as a measure of inequality.

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). Rajan

[45] I estimate the effect of trade liberalization on outcomes for subsamples of states only at the district level due to the small number of observations at the region level.

(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 labour laws and resulting labour market distortions and rigidities."

The apparent lack of intersectoral mobility in the short run, fostered by the institutional environment, indicates a departure from the framework of the H-O model when seeking to explain the observed effects on poverty and inequality. The inability of labor to relocate in the short run creates sector-specific rents for employed workers, which suggests the framework of the specific factor model, with labor as the specific factor as presented in Section 2. If wages contain a rent component, workers may be willing to trade off wages to preserve jobs. Thus, if 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 employment. 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.

7.3 Industry Premia

The final empirical section of this paper explores whether factor returns adjusted in response to liberalization. Using data from the ASI, I construct several measures of industry wage: average payments per worker (including wages and all other payments to workers), the average wage per worker, and the average wage per non-production employee. I regress the log of these wage measures on lagged industry tariffs, and industry and year dummies for the period 1988-1997. Results are presented in Table 11, columns (6)-(8). The average industry wage, and more specifically the wage to workers is positively and statistically significantly correlated with industry tariffs. A 10 percent drop in tariffs leads to a 0.5 percent decrease in industry wages. The result is driven primarily by the wages of workers, rather than non-production employees. 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.

Though the above findings are indicative of the effect of lowering tariffs on industry specific returns, they omit important factors, such as the composition of the industry labor force, which could be driving 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. Though

the ASI does distinguish between workers and employees, the distinction is relatively crude, and may disguise more subtle changes in the composition of the labor force. Gaston and 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 the reasons given above. 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, 2001). 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.

Industry premia in 1982, 1987, 1993 and 1999 are calculated using standard techniques in the literature (see Krueger and Summers, 1988). I then regress industry premia p_{jt} on lagged industry tariffs, industry and time dummies:

$$p_{jt} = \beta \cdot \text{LagTariff}_{jt} + I_j + \gamma_t + \epsilon_{jt} \tag{6}$$

The inclusion of industry dummies controls for time invariant political economy factors that might affect both the cross sectional variation across industry tariffs and wage premia, thus inducing spurious correlation between the two variables (though, as pointed out in Section 5.2, there is little evidence that, during the time period studied, changes in tariffs were correlated with any economic or political factors).

Since the dependent variable in the second stage is estimated, equation 6 is estimated using weighted least squares, with the weight equal to the inverse of the standard deviation of the estimated p_{jt}. This puts higher weight on industries whose premia are estimated more precisely. Errors are clustered by industry to allow for serial correlation.

The results are presented in Table 15. I run the regression for the industry premia estimated from the urban and rural sample of the NSS separately (panel 1 and 2). Since a very low percentage of people report a non zero wage in 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. Columns (1), (3) and (5) presents results for all three rounds (38, 50, 55), while in columns (2), (4) and (6) only data from the 38th and 55th rounds were used. The estimates indicate that there is a positive statistically significant relationship

between industry wage premia and tariffs in the urban sample. While this result is not statistically significant in the rural sample, the point estimates are virtually identical 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 industries receive higher wages than observationally identical workers in less protected industries. The point estimate of 0.14-0.16 is in line with the previous findings on the relationship between average industry wage and tariffs, based on the ASI database. The magnitude of the effect is substantial. The average industry experienced a tariff decline of about 65 percentage points between 1991 and 1997, which would translate in about 9 percentage point decrease in the real wage premium. (0.14*0.65). For industries which experienced the largest decline in tariffs (180 percentage points), the effect would be a 25 percentage points decrease in wage premium. This effect is not driven by mining and manufacturing, but also holds for wage-earners in agricultural industries. If only traded agricultural industries are included in the sample (columns (3) and (4)), the point estimate in fact increases to 0.28 suggesting that workers in the average agricultural industries saw a 17 percentage points reduction in their wage premia.

8 Discussion and Conclusion

The available evidence indicates that trade liberalization did not lead to significant reallocation of factors across industries. Rather, adjustment to changing tariffs occurred through the price system: relative returns to specific labor absorbed the change in product prices. How far does the decrease in industry wage premia go towards explaining the relative increase in and deepening of poverty, and the rise in inequality, in certain areas? Figure 7 plots the cumulative density of log per capita expenditure by broad industry affiliation (agriculture traded, agriculture nontraded, mining and manufacturing and other nontraded) for the urban and rural sample and according to the 43rd and 55th round of the NSS.[46] While workers in manufacturing and traded agricultural industries are poorer than the relatively few and well-off workers in non-traded non-agricultural industries (services, transport, construction, etc.), by far the poorest are cultivators and agricultural workers involved in non-traded agricultural industries. Thus, while the fall in the wages of workers in certain traded industries (those who felt the direct effect of trade liberalization) may have pushed

[46] Due to the incomparability of consumption data across the 43rd and 55th round in the Consumption Schedule of the NSS, data on consumption from the Employment-Unemployment Schedule of the NSS were used for this exercise.

them below the poverty line, and a lower demand for products and services from other agents in the economy may have amplified the shock, it is unlikely that the fall of wages in the affected industries can fully explain the slowdown in poverty reduction in areas with inflexible labor laws.

The most likely explanation for the relative increase in poverty as a result of trade liberalization is the slower rate of growth of the relatively richer formal non-agricultural industries in areas with inflexible labor laws. Besley and Burgess (2004) argue that pro-labor legislation, as measured by amendments to the Industrial Disputes Act, caused slower growth in registered (formal) manufacturing sectors. Aghion et al. (2004) find that the negative effect of pro-worker labor regulations was strengthened after the 1991 liberalization. Menon and Sanyal (2004) show that investment projects initiated in the second half of the 1990s are less likely to be located in states with pro-worker labor laws. This suggests that flexible labor laws 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 was less able to pull people out of poverty. 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.

The mechanisms discussed above are consistent with a specific factor model of trade in which labor is the specific factor in the short run. Rigid labor markets prevented the reallocation of factors in the face of trade liberalization in certain areas. Changes in relative output prices led to changes in relative sector-returns to the specific factors. The reduction in income resulting from trade liberalization may have led manufacturing workers (particularly those not at the top of the wage distribution prior to reforms) to fall below the poverty line. However, this effect was likely dwarfed by the slower overall growth in registered manufacturing employment in areas with pro-worker labor laws. In contrast, areas where reallocation was easier, and growth was faster, (because of labor laws or other environmental characteristics) were shielded from the effect of trade liberalization. In those areas, the changes in the income distribution seem to have taken place in the high end, as some workers tapped into the benefits of liberalization, thus increasing the consumption inequality.

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. Though this paper does not measure whether the overall effect of trade liberalization on income growth and poverty alleviation was positive

or negative, it establishes that different areas and segments of the population experienced differential effects of trade liberalization. Those areas that were more exposed to potential foreign competition did not reap as much of the benefits (or bore a disproportionate share of the burden) of liberalization in terms of poverty reduction. Institutional characteristics mattered. Laws that hindered the movement of factors across sectors of the economy exacerbated this adverse effect. The implementation of additional policies to redistribute some of the gains of liberalization from winners to losers may both mitigate the effects on inequality, and increase the political feasibility of liberalization. Creating a flexible institutional environment will likely minimize the need for additional interventions.

9 Appendix

Industry Premia An industry wage premium represents the portion of an industry wage that cannot be explained through worker or firm characteristics. It can be interpreted as industry rents, or returns to industry 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). In the case of India, there is substantial evidence that wages for observationally equivalent tasks differ across industries, consistent with the previously presented evidence on limited intersectoral mobility.

To investigate the effect of trade liberalization on industry wage premia, I follow the labor literature and employ a two-stage estimation framework. In the first stage, individual level data from 4 different NSS rounds (1983, 1987, 1993, and 1999), are used 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 industry j in year t, I_{ijt} is a dummy indicating industry 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 industry dummies I_{ijt} reflect the "value" of a person's industrial affiliation (industries are reported at the 3-digit NIC level in the NSS).[47] The industry dummies are jointly significant and generally individually significant as well (results are

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

available from the author).

Following Krueger and Summers (1988), the omitted industry is assumed to have a zero premium. The measure of industry wage premium used is the difference between the industry premium and the employment-weighted average wage differentials across all industries. This premium is the proportionate difference in wages between an employee in a given industry and the average employee in all industries with the same observable characteristics.

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Table 1. Tariff Declines and Pre-Reform Industrial Characteristics

DepVar: Tariff1987-Tariff1997	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Evidence from the ASI								
Log Real Wage	0.037							
	(0.062)							
Share of Non-production Workers		0.312						
		(0.399)						
Capital Labor ratio			0.013					
			(0.025)					
Log Output				0.019				
				(0.020)				
Factory size					0.000			
					(0.000)			
Log Employment						-0.002		
						(0.016)		
Growth Log Output 82-87							-0.038	
							(0.061)	
Growth Log Employment 82-87								0.024
								(0.083)
R2	0.093	0.096	0.091	0.096	0.094	0.090	0.092	0.091
Obs	135	135	135	135	134	135	135	135
Panel B. Evidence from the NSS, Rural and Urban Pooled								
Log Per Capita Expenditure	-0.040							
	(0.051)							
Log Wage		-0.002						
		(0.033)						
Poverty Rate			0.019					
			(0.113)					
Poverty Depth				-0.205				
				(0.339)				
R2	0.06	0.07	0.06	0.06				
Obs	315	274	315	315				

Note: Robust standard errors in parentheses. 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 indicators for industry use type: i.e. Capital goods, Consumer Durables, Consumer Non Durables, and Intermediate. In Panel A, regressions are weighted by the square root of the number of factories. Data are from the 1987 ASI and cover mining and manufacturing industries. In Panel B, regressions are weighted by the square root of the number of workers in each industry in the 1987 NSS. Urban and Rural sample are pooled and an indicator for urban is included. Separate regressions for the urban and rural sample exhibit similar patterns. Note that cereals and oilseeds cultivation has been treated as a non-traded industry, because imports of these agricultural products were canalized (restricted only to state trading monopolies) until 2000.

Table 2. Summary Statistics

RURAL 38TH ROUND 1983

Variable	Obs	Mean	Std. Dev.
Poverty Rate	364	0.435	0.173
Poverty Gap	364	0.120	0.067
Std Dev Log Consumption	364	0.501	0.058
Logarithmic Deviation	364	0.139	0.036
Log Per Capita Consumption	364	4.736	0.195

URBAN 38TH ROUND 1983

Variable	Obs	Mean	Std. Dev.
Poverty Rate	359	0.449	0.140
Poverty Gap	359	0.125	0.049
Std Dev Log Consumption	359	0.542	0.063
Logarithmic Deviation	359	0.165	0.041
Log Per Capita Consumption	359	5.034	0.182

RURAL 43rd ROUND 1987

Variable	Obs	Mean	Std. Dev.
Poverty Rate	364	0.375	0.195
Poverty Gap	364	0.090	0.064
Std Dev Log Consumption	364	0.459	0.080
Logarithmic Deviation	364	0.121	0.046
Log Per Capita Consumption	364	5.060	0.253
Poverty Rate Change in the 80s	364	-0.060	0.163
Poverty Gap Change in the 80s	364	-0.029	0.062
Std Dev Change in the 80s	364	-0.041	0.075
Logarithmic Deviation Change in the 80s	364	-0.018	0.047
Log Per Capita Consumption Change in the 80s	364	0.324	0.181
Tariff	364	0.081	0.080
TrTariff	364	0.883	0.096
Agricultural Tariff	364	0.822	0.142
Mining and Manufacturing Tariff	364	0.909	0.042
FDI	364	0.000	0.000
Licensed Industries	364	0.323	0.158
Number of Banks per 10,000 people	364	0.644	0.252
Percent Literate	364	0.368	0.137
Percent SC/ST	364	0.293	0.161
Percent Farmers	364	0.816	0.103
Percent Manufacturing	364	0.056	0.045
Percent Mining	364	0.005	0.014
Percent Service	364	0.065	0.037
Percent Trade	364	0.032	0.020
Percent Transport	364	0.013	0.011

URBAN 43rd ROUND 1987

Variable	Obs	Mean	Std. Dev.
Poverty Rate	353	0.254	0.167
Poverty Gap	353	0.058	0.051
Std Dev Log Consumption	353	0.503	0.110
Logarithmic Deviation	353	0.150	0.074
Log Per Capita Consumption	353	5.384	0.274
Poverty Rate Change in the 80s	351	-0.195	0.144
Poverty Gap Change in the 80s	351	-0.066	0.049
Std Dev Change in the 80s	351	-0.038	0.114
Logarithmic Deviation Change in the 80s	351	-0.014	0.079
Log Per Capita Consumption Change in the 80s	351	0.351	0.227
Tariff	362	0.172	0.085
TrTariff	362	0.891	0.083
Agricultural Tariff	362	0.782	0.090
Mining and Manufacturing Tariff	362	0.915	0.057
FDI	362	0.000	0.000
Licensed Industries	362	0.359	0.161
Number of Banks per 10,000 people	362	0.647	0.256
Percent Literate	362	0.591	0.094
Percent SC/ST	362	0.154	0.064
Percent Farmers	362	0.194	0.101
Percent Manufacturing	362	0.191	0.088
Percent Mining	362	0.013	0.041
Percent Service	362	0.264	0.073
Percent Trade	362	0.217	0.045
Percent Transport	362	0.073	0.025

RURAL 55th ROUND 1999

Variable	Obs	Mean	Std. Dev.
Poverty Rate	361	0.242	0.138
Poverty Gap	361	0.048	0.035
Std Dev Log Consumption	361	0.462	0.102
Logarithmic Deviation	361	0.116	0.042
Log Per Capita Consumption	361	5.758	0.262
Tariff	361	0.026	0.022
TrTariff	361	0.306	0.061
Agricultural Tariff	361	0.236	0.077
Mining and Manufacturing Tariff	361	0.341	0.022
FDI	361	0.223	0.114
Licensed Industries	361	0.071	0.136
Number of Banks per 10,000 people	361	0.773	0.300

URBAN 55th ROUND 1999

Variable	Obs	Mean	Std. Dev.
Poverty Rate	350	0.148	0.107
Poverty Gap	350	0.030	0.027
Std Dev Log Consumption	350	0.533	0.089
Logarithmic Deviation	350	0.159	0.054
Log Per Capita Consumption	350	6.161	0.271
Tariff	350	0.061	0.030
TrTariff	350	0.318	0.044
Agricultural Tariff	350	0.212	0.052
Mining and Manufacturing Tariff	350	0.336	0.030
FDI	350	0.255	0.136
Licensed Industries	350	0.082	0.125
Number of Banks per 10,000 people	350	0.777	0.307

Table 3. First Stage. Relationship Between Scaled and Non-Scaled Tariffs

DepVar: Tariff	I. RURAL		II. URBAN	
	(1)	(2)	(3)	(4)
		Panel A. Whole Sample		
TrTariff	0.356 ***	0.633 ***	0.407 ***	0.687 ***
	(0.090)	(0.089)	(0.091)	(0.150)
TrTariff*Post		0.288 ***		0.214 *
		(0.051)		(0.118)
R2	0.84	0.86	0.91	0.91
Obs	728	728	724	724
		Panel B. States with Flexible Labor Laws		
TrTariff	0.276 *	0.688 ***	0.539 ***	0.586 ***
	(0.151)	(0.156)	(0.082)	(0.156)
TrTariff*Post		0.320 ***		0.041
		(0.084)		(0.157)
R2	0.82	0.86	0.94	0.94
Obs	266	266	270	270
		Panel C. States with Inflexible Labor Laws		
TrTariff	0.487 ***	0.606 ***	0.255 ***	0.641 ***
	(0.100)	(0.101)	(0.088)	(0.240)
TrTariff*Post		0.169 *		0.265
		(0.100)		(0.181)
R2	0.86	0.87	0.89	0.90
Obs	432	432	428	428

Note: All regressions include year and district dummies. Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people 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 ***.

Table 4a. Effect of Trade Liberalization on Poverty and Inequality in Indian Districts

	I. RURAL				II. URBAN			
	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A. Dependent variable: Poverty Rate				
Tariff Measure	-0.287 **	-0.297 ***	-0.834 ***	-0.687 ***	-0.215	-0.065	-0.156	-0.403
	(0.118)	(0.084)	(0.250)	(0.225)	(0.190)	(0.156)	(0.353)	(0.275)
Obs	725	725	725	725	703	703	703	703
				Panel B. Dependent variable: Poverty Gap				
Tariff Measure	-0.129 ***	-0.114 ***	-0.319 ***	-0.206 ***	-0.084	-0.032	-0.076	-0.131
	(0.038)	(0.021)	(0.073)	(0.075)	(0.052)	(0.046)	(0.101)	(0.087)
Obs	725	725	725	725	703	703	703	703
				Panel C. Dependent variable: StdLog Consumption				
Tariff Measure	-0.086	-0.094	-0.265	-0.161	0.092	0.108	0.257	0.213
	(0.154)	(0.082)	(0.228)	(0.183)	(0.094)	(0.115)	(0.295)	(0.250)
Obs	725	725	725	725	703	703	703	703
				Panel D. Dependent variable: Log Deviation of Consumption				
Tariff Measure	-0.016	-0.020	-0.057	-0.020	0.034	0.090	0.215	0.172
	(0.066)	(0.042)	(0.115)	(0.071)	(0.062)	(0.066)	(0.174)	(0.144)
Obs	725	725	725	725	703	703	703	703
				Panel E. Dependent variable: Log Average Per Capita Expenditures				
Logmean	-0.015	0.132	0.370	0.552	-0.063	-0.126	-0.301	0.048
	(0.314)	(0.183)	(0.522)	(0.433)	(0.150)	(0.212)	(0.521)	(0.468)
Obs	725	725	725	725	703	703	703	703

Note: All regressions include year and district dummies. Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people 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 ***.

Table 4b. Effect of Trade Liberalization on Poverty and Inequality in Indian Regions

	I. RURAL				II. URBAN			
	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A. Dependent variable: Poverty Rate				
Tariff Measure	-0.324	-0.415 ***	-1.056 **	-1.145 ***	-0.185	-0.398 **	-0.707 **	-1.026 ***
	(0.218)	(0.155)	(0.466)	(0.435)	(0.296)	(0.202)	(0.316)	(0.309)
Obs	124	124	124	124	123	123	123	123
				Panel B. Dependent variable: Poverty Gap				
Tariff Measure	-0.191 ***	-0.157 ***	-0.400 ***	-0.378 ***	-0.084	-0.115 **	-0.204 **	-0.284 ***
	(0.058)	(0.033)	(0.103)	(0.096)	(0.074)	(0.054)	(0.084)	(0.085)
Obs	124	124	124	124	123	123	123	123
				Panel C. Dependent variable: StdLog Consumption				
Tariff Measure	-0.307 *	-0.131	-0.334	-0.219	0.224	0.027	0.048	0.131
	(0.174)	(0.138)	(0.320)	(0.304)	(0.177)	(0.118)	(0.213)	(0.247)
Obs	124	124	124	124	123	123	123	123
				Panel D. Dependent variable: Log Deviation of Consumption				
Tariff Measure	-0.115	-0.054	-0.137	-0.084	0.158	0.035	0.062	0.109
	(0.088)	(0.055)	(0.126)	(0.117)	(0.122)	(0.093)	(0.172)	(0.178)
Obs	124	124	124	124	123	123	123	123
				Panel E. Dependent variable: Log Average Per Capita Expenditures				
Logmean	-0.482	0.153	0.388	0.782	-0.200	-0.191	-0.339	0.373
	(0.487)	(0.339)	(0.897)	(0.807)	(0.403)	(0.392)	(0.761)	(0.498)
Obs	124	124	124	124	123	123	123	123

Note: All regressions include year and region dummies. Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people 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 ***.

Table 5. Pre-Reform Test. Correlation Between Pre-Reform Trends in Outcomes and Tariff Change

	I. RURAL				II. URBAN			
	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff	Tariff	TrTariff	IV-TrTariff	IV-TrTariff, Init TrTariff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Panel A. Dependent variable: Poverty Rate				
Tariff Measure	0.065	0.333	0.842	0.746	-0.092	0.148	0.274	0.375
	(0.566)	(0.323)	(0.843)	(0.754)	(0.371)	(0.288)	(0.560)	(0.573)
Obs	124	124	124	124	121	121	121	121
				Panel B. Dependent variable: Poverty Gap				
Tariff Measure	0.007	0.045	0.114	0.091	-0.079	-0.105	-0.194	-0.170
	(0.195)	(0.107)	(0.271)	(0.238)	(0.116)	(0.127)	(0.236)	(0.209)
Obs	124	124	124	124	121	121	121	121
				Panel C. Dependent variable: StdLog Consumption				
Tariff Measure	0.178	0.003	0.008	-0.119	-0.055	0.097	0.180	0.025
	(0.130)	(0.113)	(0.284)	(0.257)	(0.169)	(0.159)	(0.318)	(0.258)
Obs	124	124	124	124	121	121	121	121
				Panel D. Dependent variable: Log Deviation of Consumption				
Tariff Measure	0.074	-0.009	-0.023	-0.094	-0.102	0.064	0.118	0.041
	(0.070)	(0.054)	(0.140)	(0.118)	(0.106)	(0.107)	(0.212)	(0.168)
Obs	124	124	124	124	121	121	121	121
				Panel E. Dependent variable: Log Mean Per Capita Expenditures				
Tariff Measure	0.201	-0.010	-0.026	-0.126	-0.182	-0.691 *	-1.276	-1.453
	(0.340)	(0.163)	(0.413)	(0.376)	(0.375)	(0.383)	(0.885)	(1.003)
Obs	124	124	124	124	121	121	121	121

Note: All regressions include year and region dummies. Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people 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 ***.

Table 6. Correlation Between Pre-Reform Level of Outcomes and Tariff Change

	I. RURAL				II. URBAN			
	OLS	RF	IV-TrTariff	IV-TrTariff, Init TrTariff	OLS	RF	IV-TrTariff	IV-TrTariff, Init TrTariff
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Dependent variable: Poverty Rate								
Tariff Change	-0.416 **		-0.457	**0.101**	-0.716 *		-1.134	**-0.983** **
	(0.165)		(0.384)	**(0.270)**	(0.417)		(0.754)	**(0.637)**
TrTariff Change		-0.150				-0.303		
		(0.112)				(0.230)		
R2	0.306	0.299	0.306	0.291	0.354	0.354	0.351	0.353
Obs	364	364	364	364	353	353	353	353
Panel B. Dependent variable: Poverty Gap								
Tariff Change	-0.129 ***		-0.225 **	**-0.007**	-0.210 *		-0.290	**-0.223**
	(0.042)		(0.101)	**(0.083)**	(0.109)		(0.218)	**(0.198)**
TrTariff Change		-0.074 ***				-0.077		
		(0.026)				(0.066)		
R2	0.262	0.260	0.257	0.255	0.297	0.295	0.296	0.297
Obs	364	364	364	364	353	353	353	353
Panel C. Dependent variable: StdLog Consumption								
Tariff Change	-0.039		-0.365	**-0.245**	0.114		-0.101	**0.072**
	(0.154)		(0.273)	**(0.248)**	(0.218)		(0.358)	**(0.312)**
TrTariff Change		-0.119				-0.027		
		(0.102)				(0.093)		
R2	0.057	0.067	0.023	0.043	0.098	0.098	0.096	0.098
Obs	364	364	364	364	353	353	353	353
Panel D. Dependent variable: Log Deviation of Consumption								
Tariff Change	-0.021		-0.106	**-0.060**	0.064		-0.033	**0.004**
	(0.070)		(0.159)	**(0.135)**	(0.123)		(0.221)	**(0.206)**
TrTariff Change		-0.035				-0.009		
		(0.056)				(0.058)		
R2	0.051	0.053	0.044	0.049	0.063	0.063	0.063	0.063
Obs	364	364	364	364	353	353	353	353
Panel E. Dependent variable: Log Mean Per Capita Expenditures								
Tariff Change	0.506 **		0.400	**-0.051**	1.757 ***		3.391 ***	**2.951** **
	(0.254)		(0.470)	**(0.322)**	(0.637)		(1.161)	**(1.005)**
TrTariff Change		0.131				0.905 ***		
		(0.134)				(0.349)		
R2	0.410	0.402	0.409	0.399	0.427	0.435	0.414	0.420
Obs	364	364	364	364	353	353	353	353

Note: Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people in a district. Tariff change is define as Tariff1987-Tariff1997 (generally a positive number). In all regressions I control for industrial composition in the district in 1987: namely, percent manufacturing workers, percent farmers, percent workers in trade, transportation and services, as well as percent literate and share of scheduled caste and scheduled tribe population. 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 ***.

Table 7. Effect of Trade Liberalization on Poverty and Inequality at the District Level in Rural India Controlling for Initial Characteristics

	I. IV-TrTariff					II. IV-TrTariff, Init TrTariff				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A. Dependent variable: Poverty Rate. District Level (Obs=725)										
Tariff Measure	-0.607 ***	-0.434 **	-0.441	-0.346	-0.444 **	-0.418 ***	-0.426 ***	-0.522 **	-0.481 ***	-0.456 ***
	(0.232)	(0.217)	(0.281)	(0.242)	(0.208)	(0.141)	(0.163)	(0.206)	(0.164)	(0.134)
Logmean		0.469 ***	0.340 ***				0.469 ***	0.338 ***		
		(0.035)	(0.044)				(0.034)	(0.041)		
Trend			-0.322 ***					-0.322 ***		
			(0.067)					(0.067)		
Lagged 43				-0.670 ***	-0.419 ***				-0.665 ***	-0.417 ***
				(0.040)	(0.123)				(0.039)	(0.120)
Panel B. Dependent variable: Poverty Gap. District Level (Obs=725)										
Tariff Measure	-0.235 ***	-0.175 ***	-0.196 **	-0.077	-0.118 *	-0.121 **	-0.124 **	-0.177 **	-0.118 ***	-0.118 ***
	(0.075)	(0.066)	(0.090)	(0.066)	(0.069)	(0.062)	(0.063)	(0.080)	(0.042)	(0.041)
Logmean		0.161 ***	0.126 ***				0.162 ***	0.126 ***		
		(0.015)	(0.013)				(0.015)	(0.013)		
Trend			-0.319 ***					-0.318 ***		
			(0.064)					(0.064)		
Lagged 43				-0.782 ***	-0.576 ***				-0.778 ***	-0.576 ***
				(0.045)	(0.144)				(0.044)	(0.131)
Panel C. Dependent variable: StdLog Consumption. District Level (Obs=725)										
Tariff Measure	-0.192	-0.244	-0.258	0.075	-0.057	-0.083	-0.078	-0.175	0.081	0.006
	(0.258)	(0.260)	(0.249)	(0.313)	(0.232)	(0.197)	(0.203)	(0.187)	(0.287)	(0.202)
Logmean		-0.140 ***	-0.047				-0.136 ***	-0.045		
		(0.035)	(0.040)				(0.035)	(0.041)		
Trend			-0.635 ***					-0.635 ***		
			(0.063)					(0.063)		
Lagged 43				-0.752 ***	-0.382				-0.752 ***	-0.410
				(0.069)	(0.278)				(0.068)	(0.261)
Panel D. Dependent variable: Log Deviation of Consumption. District Level (Obs=725)										
Tariff Measure	-0.009	-0.037	-0.095	0.066	0.044	-0.005	-0.004	-0.079	0.032	0.020
	(0.131)	(0.120)	(0.098)	(0.128)	(0.108)	(0.081)	(0.082)	(0.074)	(0.124)	(0.097)
Logmean		-0.078 ***	-0.031 *				-0.077 ***	-0.030		
		(0.018)	(0.018)				(0.019)	(0.019)		
Trend			-0.584 ***					-0.584 ***		
			(0.100)					(0.100)		
Lagged 43				-0.803 ***	-0.570 *				-0.801 ***	-0.547 *
				(0.043)	(0.309)				(0.043)	(0.309)
Panel E. Dependent variable: Log Mean Per Capita Expenditures (Obs=725)										
Tariff Measure	0.668 *		0.647	0.446	0.664 *	0.491 **		0.605	0.503 *	0.490 **
	(0.374)		(0.431)	(0.378)	(0.359)	(0.243)		(0.374)	(0.287)	(0.243)
Logmean					-0.010					-0.022
					(0.186)					(0.187)
Trend			-0.713 ***					-0.714 ***		
			(0.059)					(0.057)		
Lagged 43				-0.602 ***	-0.010				-0.601 ***	-0.022
				(0.074)	(0.186)				(0.072)	(0.187)

Note: All regressions include year, district dummies, state labor laws-year dummies and pre-reform literacy, share of SC/ST population and industrial structure interacted with a post dummy. Regressions are weighted by the square root of the number of people in a district. The data are from the 43rd and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***. In columns (1)-(5), the district tariff is instrumented by the non-scaled tariff. In columns (6)-(10), the district tariff is instrumented by the non-scaled tariff and the interaction of pre-reform non-scaled tariff and a post dummy. In column (5) and (10) the level of the lagged dependent variable is instrumented with the value of the dependent variables in 1983.

Table 8. Effect of Trade Liberalization on Poverty and Inequality in Rural India Controlling for Initial Characteristics and Other Reforms

	I. IV-TrTariff					II. IV-TrTariff, Init TrTariff				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A. Dependent variable: Poverty Rate. District Level (Obs=725)										
Tariff Measure	-0.573 ***	-0.446 **	-0.428	-0.375	-0.447 **	-0.413 ***	-0.402 ***	-0.495 **	-0.464 ***	-0.445 ***
	(0.222)	(0.201)	(0.274)	(0.236)	(0.202)	(0.149)	(0.152)	(0.203)	(0.156)	(0.129)
Logmean		0.485 ***	0.353 ***				0.486 ***	0.350 ***		
		(0.034)	(0.043)				(0.033)	(0.040)		
Trend			-0.310 ***					-0.310 ***		
			(0.068)					(0.068)		
Lagged 43				-0.691 ***	-0.441 ***				-0.688 ***	-0.441 ***
				(0.040)	(0.135)				(0.039)	(0.133)
FDI opened industries	-0.051	-0.215 ***	-0.134 *	-0.210 ***	-0.152 ***	-0.055	-0.216 ***	-0.132 *	-0.207 ***	-0.152 ***
	(0.059)	(0.057)	(0.073)	(0.049)	(0.055)	(0.059)	(0.054)	(0.069)	(0.047)	(0.052)
License industries	0.008	0.050	0.069	0.028	0.020	0.012	0.051	0.067	0.025	0.021
	(0.059)	(0.077)	(0.074)	(0.090)	(0.074)	(0.059)	(0.075)	(0.074)	(0.088)	(0.073)
Bank branches per capita	3802 ***	1013	1285	-131	1293	3787 ***	1001	1304	-103	1291
	(789)	(766)	(861)	(924)	(1125)	(771)	(770)	(894)	(948)	(1117)
Panel B. Dependent variable: Poverty Gap. District Level (Obs=725)										
Tariff Measure	-0.224 ***	-0.181 ***	-0.190 **	-0.085	-0.118	-0.122 *	-0.117 *	-0.169 **	-0.113 ***	-0.115 ***
	(0.073)	(0.069)	(0.093)	(0.068)	(0.073)	(0.066)	(0.063)	(0.082)	(0.043)	(0.042)
Logmean		0.166 ***	0.128 ***				0.168 ***	0.129 ***		
		(0.017)	(0.015)				(0.017)	(0.014)		
Trend			-0.313 ***					-0.312 ***		
			(0.063)					(0.063)		
Lagged 43				-0.797 ***	-0.604 ***				-0.794 ***	-0.607 ***
				(0.047)	(0.160)				(0.046)	(0.147)
FDI opened industries	-0.008	-0.064 ***	-0.028	-0.049 ***	-0.039 **	-0.011	-0.066 ***	-0.028	-0.049 ***	-0.040 ***
	(0.018)	(0.020)	(0.024)	(0.018)	(0.016)	(0.019)	(0.021)	(0.024)	(0.017)	(0.015)
License industries	-0.002	0.012	0.021	0.007	0.005	0.000	0.014	0.022	0.006	0.005
	(0.017)	(0.021)	(0.021)	(0.023)	(0.019)	(0.017)	(0.021)	(0.022)	(0.022)	(0.019)
Bank branches per capita	1213 ***	260	330	-235	115	1204 ***	242	324	-227	110
	(232)	(224)	(267)	(262)	(366)	(224)	(219)	(268)	(268)	(342)
Panel C. Dependent variable: StdLog Consumption. District Level (Obs=725)										
Tariff Measure	-0.175	-0.213	-0.244	0.084	-0.066	-0.061	-0.063	-0.162	0.080	0.004
	(0.255)	(0.260)	(0.251)	(0.318)	(0.228)	(0.201)	(0.208)	(0.193)	(0.295)	(0.204)
Logmean		-0.147 ***	-0.050				-0.142 ***	-0.048		
		(0.036)	(0.038)				(0.036)	(0.039)		
Trend			-0.622 ***					-0.622 ***		
			(0.069)					(0.068)		
Lagged 43				-0.754 ***	-0.316				-0.754 ***	-0.356
				(0.074)	(0.324)				(0.074)	(0.295)
FDI opened industries	-0.089 *	-0.040	-0.054	-0.006	-0.054	-0.092 *	-0.045	-0.057	-0.006	-0.051
	(0.049)	(0.049)	(0.052)	(0.048)	(0.053)	(0.049)	(0.050)	(0.051)	(0.048)	(0.052)
License industries	0.067	0.054	0.033	-0.005	0.037	0.070	0.059	0.035	-0.005	0.035
	(0.042)	(0.045)	(0.051)	(0.050)	(0.052)	(0.044)	(0.046)	(0.052)	(0.050)	(0.051)
Bank branches per capita	1119	1964 *	1249	1050	1090	1109	1922 *	1226	1050	1081
	(1057)	(1091)	(964)	(1059)	(1032)	(1075)	(1109)	(962)	(1056)	(1042)
Panel D. Dependent variable: Log Deviation of Consumption. District Level (Obs=725)										
Tariff Measure	-0.002	-0.022	-0.089	0.066	0.040	0.008	0.007	-0.070	0.031	0.021
	(0.119)	(0.116)	(0.097)	(0.132)	(0.104)	(0.081)	(0.083)	(0.076)	(0.128)	(0.095)
Logmean		-0.078 ***	-0.029 *				-0.077 ***	-0.028 *		
		(0.018)	(0.017)				(0.018)	(0.017)		
Trend			-0.579 ***					-0.579 ***		
			(0.102)					(0.102)		
Lagged 43				-0.806 ***	-0.492				-0.805 ***	-0.463
				(0.046)	(0.404)				(0.047)	(0.388)
FDI opened industries	-0.055 **	-0.029	-0.039	-0.003	-0.023	-0.056 **	-0.030	-0.039	-0.002	-0.025
	(0.023)	(0.022)	(0.026)	(0.024)	(0.033)	(0.023)	(0.023)	(0.026)	(0.024)	(0.032)
License industries	0.044 **	0.037 **	0.024	-0.006	0.013	0.044 **	0.038 **	0.025	-0.007	0.015
	(0.017)	(0.018)	(0.023)	(0.022)	(0.027)	(0.018)	(0.019)	(0.024)	(0.021)	(0.026)
Bank branches per capita	258	704	423	246	251	257	696	418	250	253
	(510)	(518)	(436)	(452)	(458)	(509)	(519)	(436)	(443)	(455)

Note: All regressions include year, district dummies, state labor laws-year dummies and pre-reform literacy, share of SC/ST population and industrial structure interacted with a post dummy. Regressions are weighted by the square root of the number of people in a district/region. The data are from the 43rd and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***. In columns (1)-(5), the district tariff is instrumented by the non-scaled tariff. In columns (6)-(10), the district tariff is instrumented by the non-scaled tariff and the interaction of pre-reform non-scaled tariff and a post dummy. In column (5) and (10) the level of the lagged dependent variable is instrumented with the value of the dependent variables in 1983.

Table 9. Migration Patterns

	All			Male			Female		
	1983	1987	1999	1983	1987	1999	1983	1987	1999
			Panel A. Rural						
Place of Birth Different than Place of Residence	0.209	0.232	0.244	0.072	0.075	0.069	0.351	0.399	0.427
Moved within the past 10 years	0.094	0.102	0.097	0.047	0.048	0.040	0.144	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)	0.029	0.032	0.036	0.020	0.021	0.021	0.039	0.044	0.051
Moved within the past 10 years from urban to rural	0.011	0.013	0.013	0.010	0.011	0.011	0.012	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	0.005	0.004	0.008	0.009	0.007	0.002	0.002	0.001
			Panel B. Urban						
Place of Birth Different than Place of Residence	0.316	0.329	0.333	0.270	0.268	0.256	0.366	0.396	0.418
Moved within the past 10 years	0.182	0.185	0.174	0.168	0.164	0.151	0.198	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)	0.131	0.132	0.131	0.125	0.121	0.118	0.138	0.144	0.146
Moved within the past 10 years from rural to urban	0.080	0.080	0.076	0.073	0.070	0.065	0.087	0.091	0.089
	0.044	0.042	0.033	0.074	0.071	0.058	0.010	0.011	0.006

Table 10. Industry Shares in Overall Employment. Correlations Over Time.

Panel A. Manufacturing sector. Annual Survey of Industries

Correlations Based on 2-digit NIC

	1981	1987	1991	1997
1981	1.00			
1987	0.96	1.00		
1991	0.95	0.99	1.00	
1997	0.91	0.96	0.98	1.00

Correlations Based on 3-digit NIC

	1981	1987	1991	1997
1981	1.00			
1987	0.96	1.00		
1991	0.95	0.98	1.00	
1997	0.90	0.96	0.98	1.00

Panel B. All sectors. National Sample Surveys, 38th, 43rd, 50th and 55th round.

RURAL

	1983	1987	1993	1999
1983	1.00			
1987	1.00	1.00		
1993	1.00	1.00	1.00	
1999	1.00	1.00	1.00	1.00

URBAN

	1983	1987	1993	1999
1983	1.00			
1987	0.99	1.00		
1993	0.97	0.98	1.00	
1999	0.88	0.92	0.95	1.00

RURAL: Mining and Manufacturing

	1983	1987	1993	1999
1983	1.00			
1987	0.99	1.00		
1993	0.94	0.95	1.00	
1999	0.90	0.91	0.91	1.00

URBAN: Mining and Manufacturing

	1983	1987	1993	1999
1983	1.00			
1987	0.98	1.00		
1993	0.94	0.96	1.00	
1999	0.90	0.91	0.93	1.00

RURAL: Sevices, Trade, Transport,Construction etc.

	1983	1987	1993	1999
1983	1.00			
1987	0.96	1.00		
1993	0.95	0.95	1.00	
1999	0.84	0.88	0.96	1.00

URBAN: Sevices, Trade, Transport,Construction etc.

	1983	1987	1993	1999
1983	1.00			
1987	0.99	1.00		
1993	0.98	0.98	1.00	
1999	0.92	0.93	0.97	1.00

Note: This table presents the correlation of the share of employees in each industry across time. Panel A presents estimates based on the Annual Survey of Industries, which covers the manufacturing and mining sectors (approximately 190 3-digit NIC codes). In panel B, the shares are estimated based on principal industry affiliation from the individual employment and unemployment files in the 38th, 43rd, 50th and 55th rounds of the NSS. About 330 industries in rural India and 340 in urban India are represented in the NSS sample. All estimates are significant at the 1 percent confidence level.

Table 11. Effect of Tariffs on Industry Factor Shares, Employment, Output and Wages

	Employment Share	Capital Share	Log Employment	Log Capital	Log Output	Log wages	Log Wages to Workers	Log Wages to Non Workers
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged Tariff	-0.001	-0.001	-0.038	-0.152	-0.027	0.052 **	0.066 **	0.022
	(0.001)	(0.001)	(0.052)	(0.121)	(0.066)	(0.023)	(0.026)	(0.025)
Obs	1474	1474	1474	1474	1473	1474	1472	1473

Note: All regressions include industry dummies and year dummies. Regressions are weighted by the square root of the number of employees in the industry. The data are from the Annual Survey of Industries for the 1987-1997 period. Standard errors (in parentheses) are clustered at the industry level to account for potential serial correlation. 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 ***.

Table 12. Effect of Tariffs on Industry Employment Shares. NSS Evidence.

	All Industries	Agriculture	Mining and Manufacturing
	(1)	(2)	(3)
	Panel A. Rural Sample		
Tariff	-0.002	-0.006	0.001
	(0.004)	(0.010)	(0.000)
Obs	486	67	419
	Panel B. Urban Sample		
Tariff	0.000	-0.002	0.000
	(0.001)	(0.003)	(0.001)
Obs	494	62	432

Note: All regressions include industry dummies and year dummies. Regressions are weighted by the square root of the number of observations per industry. The data are from the 43rd, 50th and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the industry level. Significance at the 10 percent level of confidence is represented by a *, at the 5 percent level by **, and at the 1 percent level

Table 13. Reallocation of labor in Mining and Manufacturing and Industry Tariffs

	Share	ShareMfg	Share		ShareMfg	
	All India		Flexible Labor Laws	Inflexible Labor Laws	Flexible Labor Laws	Inflexible Labor Laws
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Rural Sample			
Tariff	0.0002	0.0050	0.0013 *	0.0005	0.0152 *	0.0083
	(0.0007)	(0.0072)	(0.0007)	(0.0008)	(0.0084)	(0.0091)
Obs	3413	3414	1126	1556	1126	1556
			Panel B. Urban Sample			
Tariff	-0.0005	-0.0024	0.0004	-0.0016	0.0004	-0.0055
	(0.0012)	(0.0044)	(0.0009)	(0.0018)	(0.0034)	(0.0059)
Obs	4865	4865	1750	2134	1750	2134

Note: All regressions include state-industry dummies and year dummies. Regressions are weighted by the square root of the number of employees. The data are from the 43rd, 50th and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***.

Table 14. Effect of Trade Liberalization on Poverty and Inequality in Rural India at the District Level by State Characteristics

	Flexible Labor Laws		Inflexible Labor Laws	
	(1)	(2)	(3)	(4)
	Panel A. Dependent Variable: Povery Rate			
Tariff Measure	0.091	-0.121	-0.608 **	-0.672 **
	(1.302)	(0.189)	(0.301)	(0.298)
Obs	265	265	431	431
	Panel B. Dependent Variable: Poverty Gap			
Tariff Measure	-0.143	-0.045	-0.209 **	-0.229 ***
	(0.372)	(0.102)	(0.084)	(0.087)
Obs	265	265	431	431
	Panel C. Dependent Variable: StdLog Consumption			
Tariff Measure	-1.384 **	-0.590 **	0.101	0.093
	(0.559)	(0.241)	(0.196)	(0.188)
Obs	265	265	431	431
	Panel D. Dependent Variable: Log Deviation of Consumption			
Tariff Measure	-0.487 ***	-0.210 *	0.005	-0.003
	(0.172)	(0.124)	(0.078)	(0.074)
Obs	265	265	431	431
	Panel E. Dependent variable: Log Mean Per Capita Expenditures			
Tariff Measure	-1.181	-0.049	0.831 *	0.923 **
	(1.508)	(0.191)	(0.451)	(0.458)
Obs	265	265	431	431

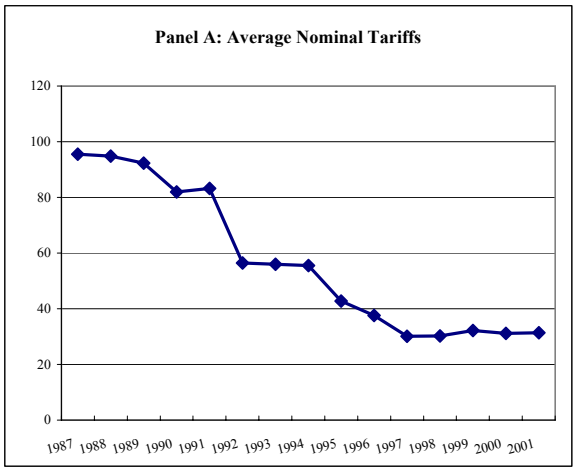
Note: All regressions include year, district dummies, state labor laws-year dummies and pre-reform literacy, share of SC/ST population, industrial structure, log of per capita expenditures, and trend in the outcome variable interacted with a post dummy. Regressions are weighted by the square root of the number of households in a district. The data are from the 43rd and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***. In columns (1) and (3), the district tariff is instrumented by the non-scaled tariff. In columns (2) and (4), the district tariff is instrumented by the non-scaled tariff and the interaction of pre-reform non-scaled tariff and a post dummy.

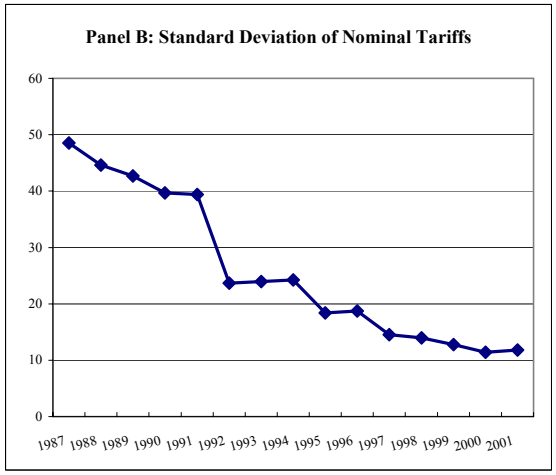
Table 15. Effect of Tariffs on Industry Premia

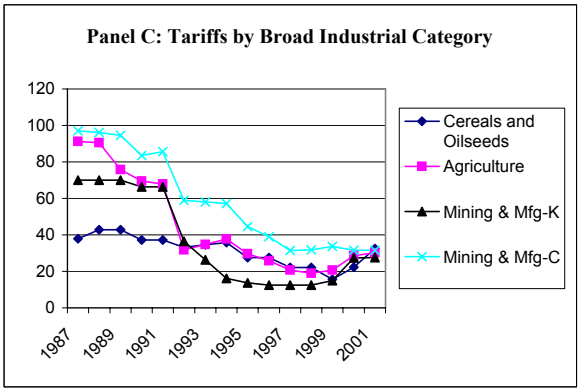
Dep: Wage Premium	All		Agiculture		Mining and Manufacture	
	(1)	(2)	(3)	(4)	(5)	(6)
			Panel A. Rural Sample			
Tariff	0.121	0.132	0.103	0.140	0.165	0.156
	(0.107)	(0.145)	(0.121)	(0.172)	(0.136)	(0.199)
R2	0.74	0.81	0.94	0.96	0.72	0.80
Obs	336	221	23	15	313	206
			Panel B. Urban Sample			
Tariff	0.139 ***	0.161 ***	0.286 *	0.248	0.137 ***	0.150 ***
	(0.049)	(0.052)	(0.152)	(0.162)	(0.053)	(0.058)
R2	0.69	0.84	0.64	0.84	0.70	0.84
Obs	347	230	23	15	324	215

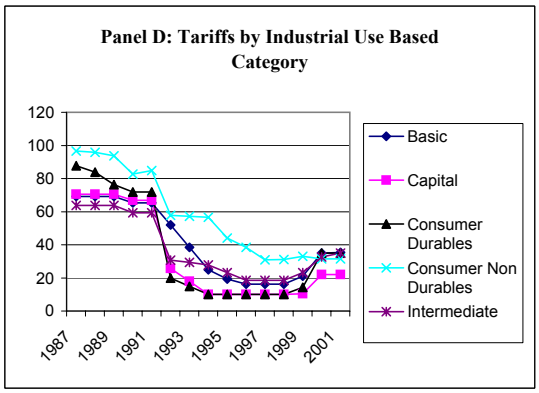
Note: All regressions include industry dummies and year dummies. Robust standard errors are in parentheses. Regressions are weighted by the inverse of the standard error of the industry premium estimate. Industry level tariffs for 1983 are assumed to be equal to those is 1987. In columns (1), (3), (5) data from the 38, 50 and 55th rounds were used, while columns (2), (4) and (6) only data from the 38th and 55th rounds were used.

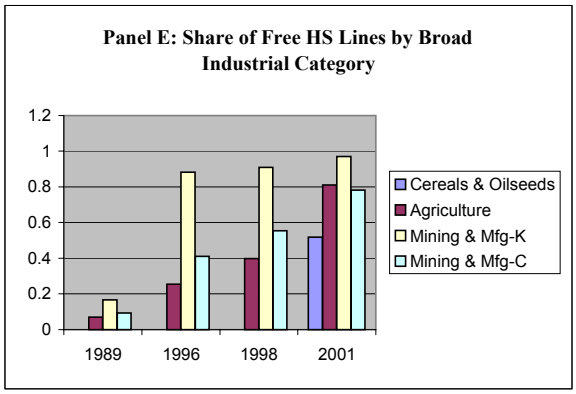
Figure 1. Evolution of Tariffs in India

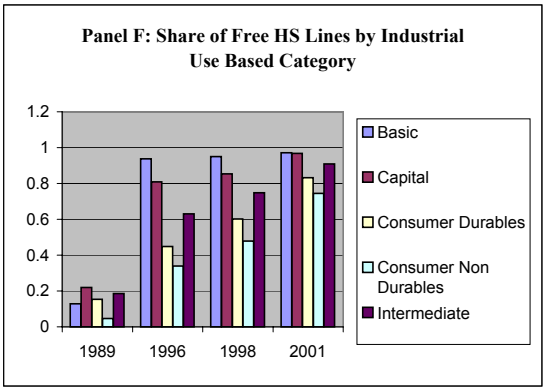


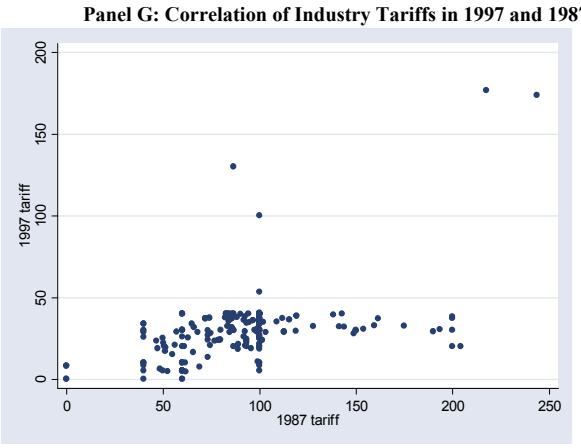












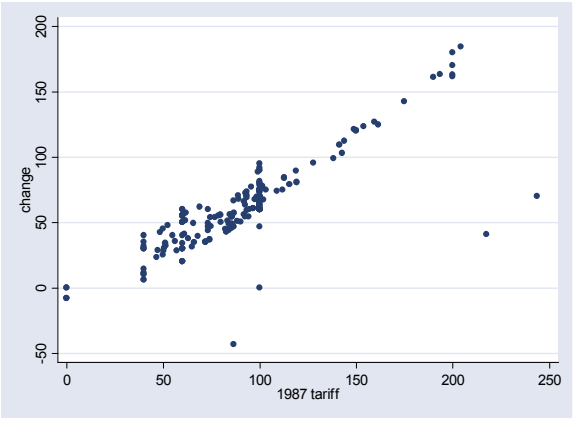


Figure 2. Evolution of India's Trade

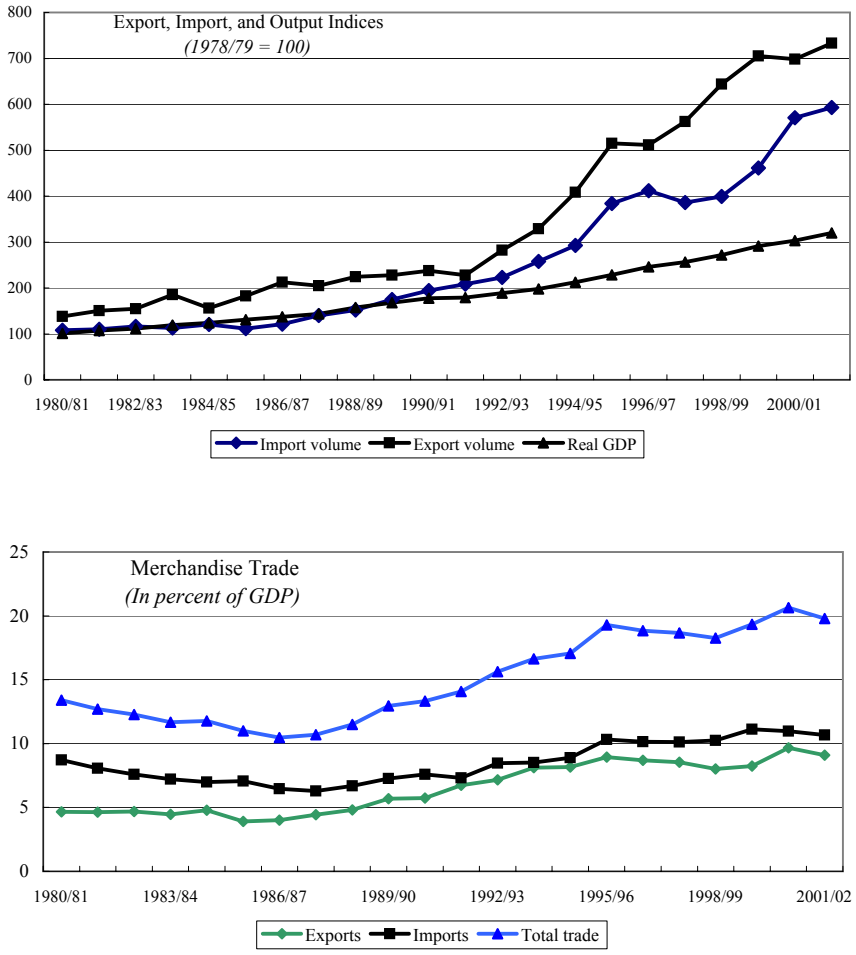
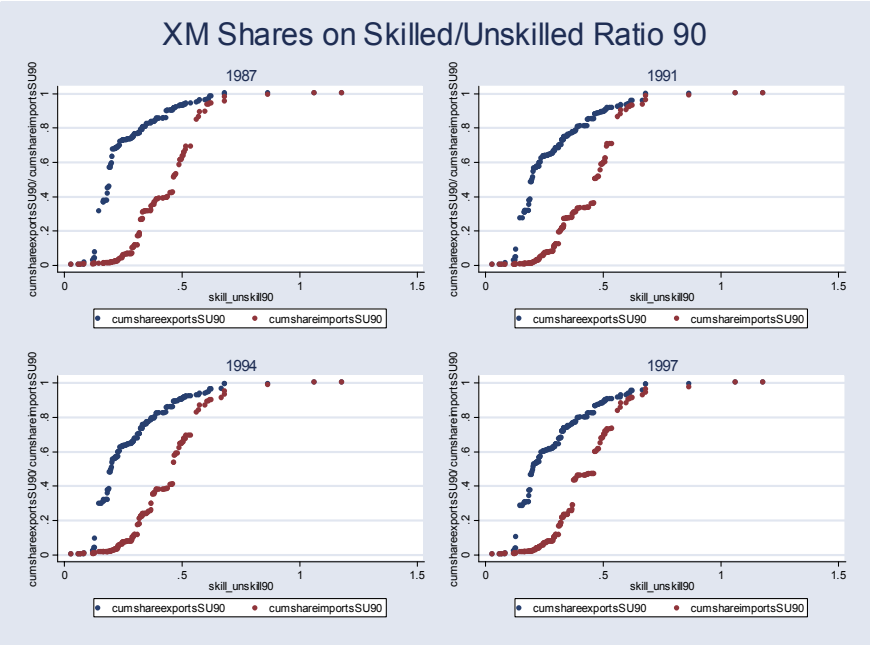


Figure 3. Pattern of India's Trade



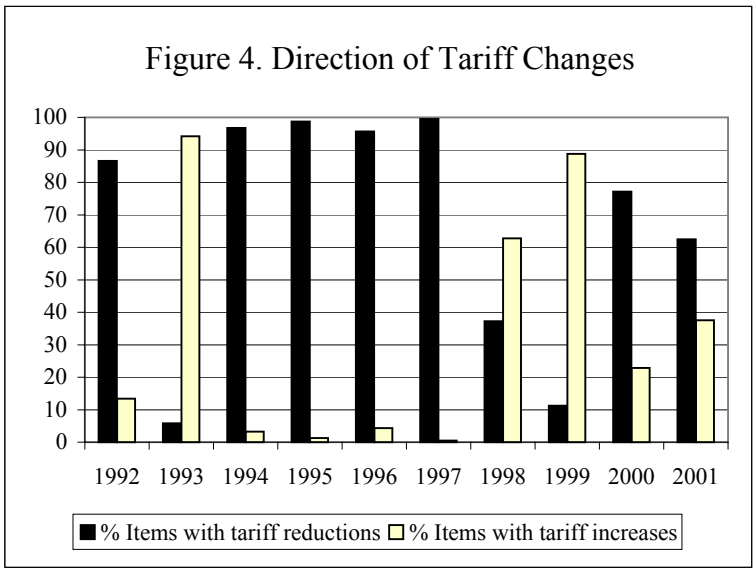
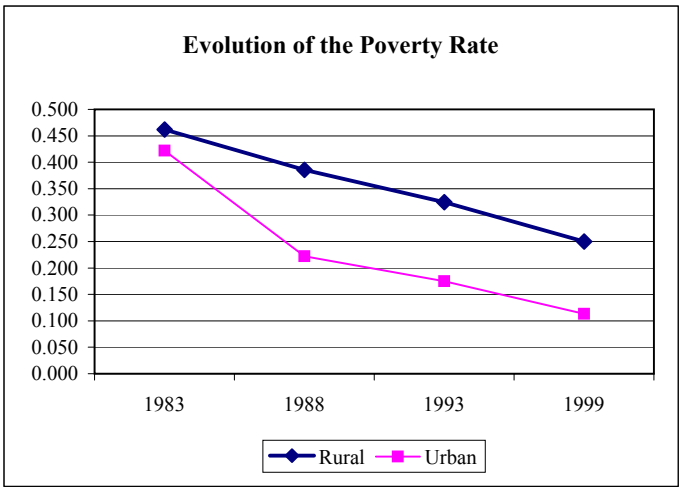
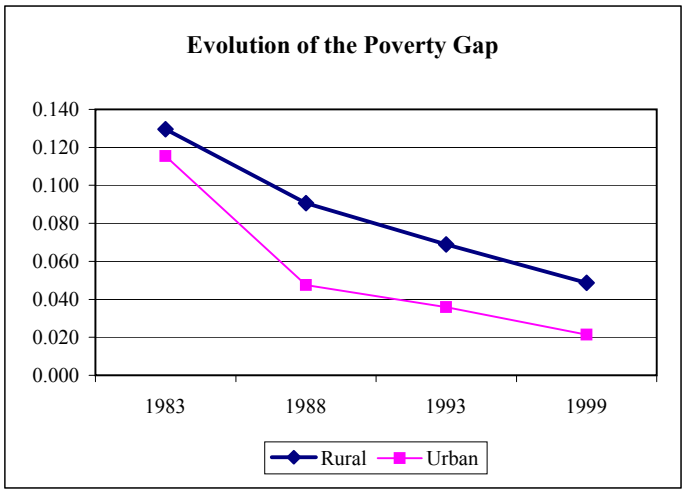
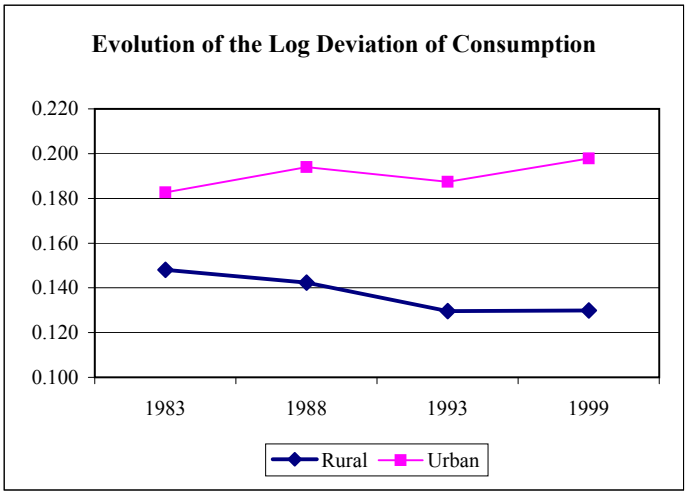


Figure 5. Trends in Rural and Urban Poverty and Inequality







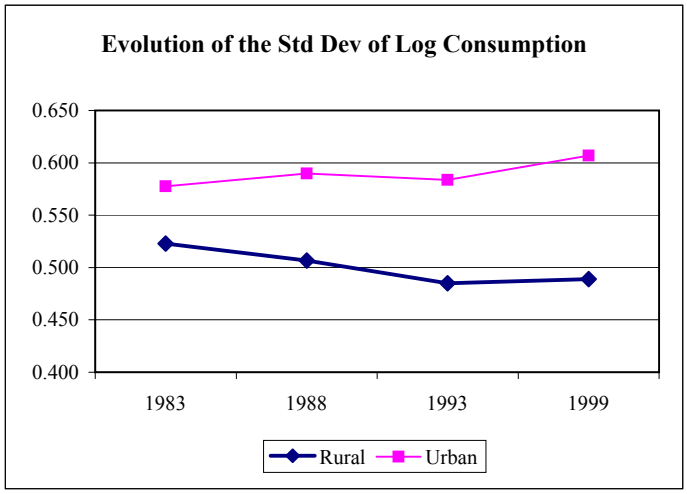
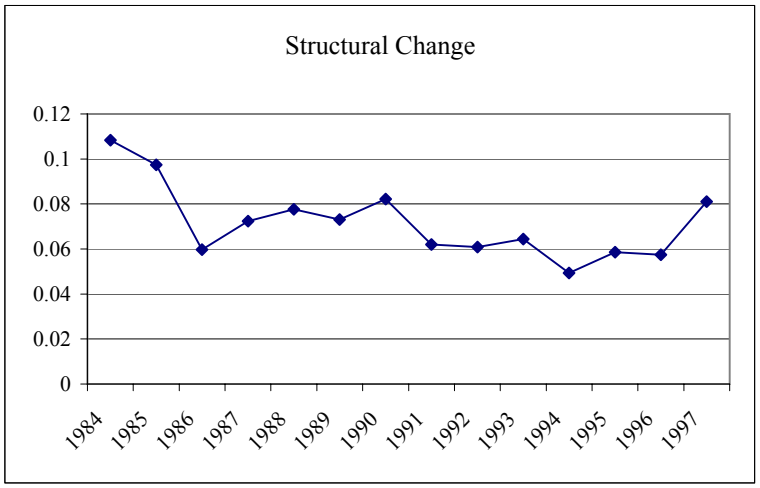
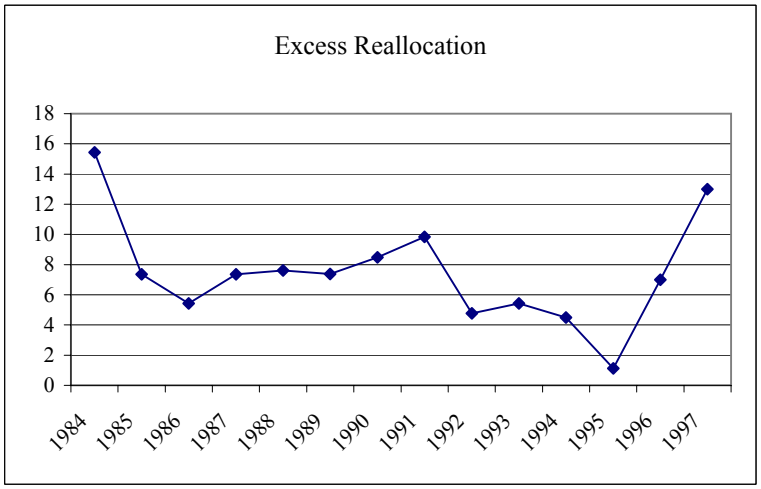


Figure 6. Intersectoral Reallocation in India

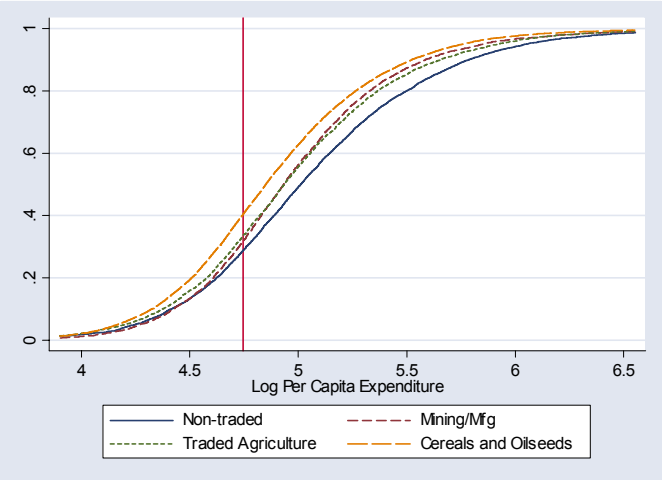




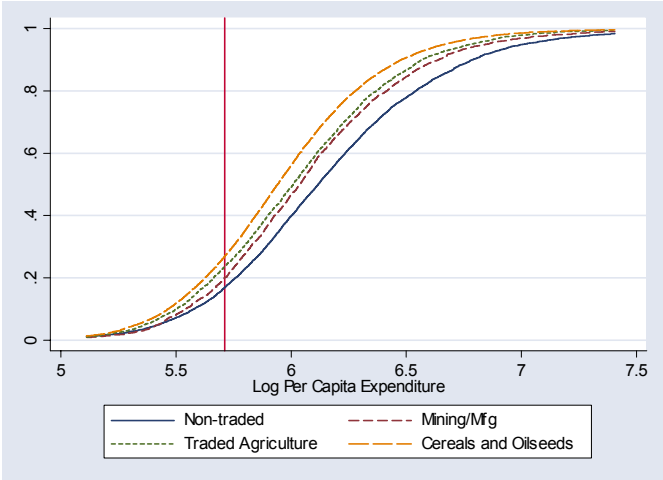
Note: Data from the Annual Survey of Industries which covers the registered manufacturing and mining sectors. Structural change in sector is measured as the absolute value of the change in a sector's employment share over two years. Excess job reallocation is defined as in Davis et al. (1996).

Figure 7. Comparison of the Cumulative Distribution of Log Per Capita Expenditure in 1987 and 1999 by Industrial Affiliation

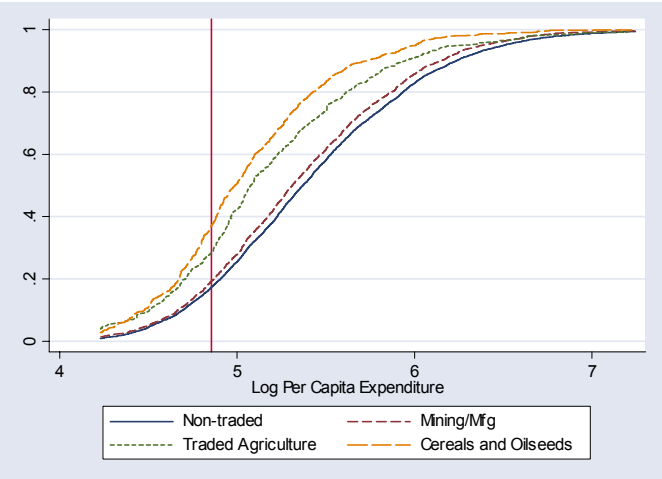
RURAL 1987



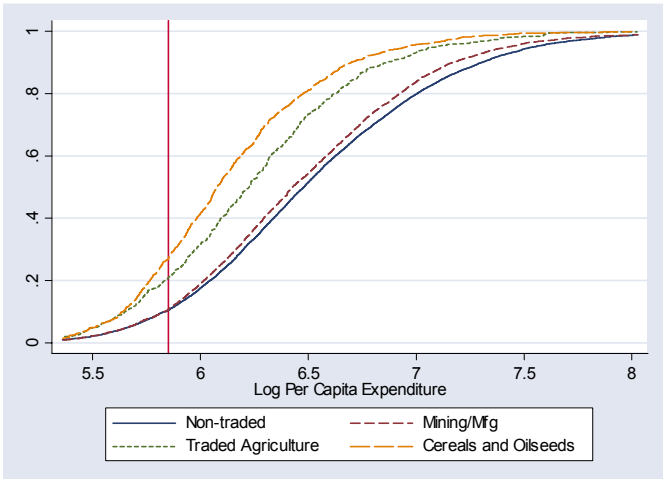
RURAL 1999



URBAN 1987



URBAN 1999



Note: Cumulative distribution of log per capita expenditure based on NSS43rd and NSS55th Employment-Unemployment Surveys. The vertical lines represent the poverty lines for the particular year and sector.

Table A1. Sectoral Tariffs and Poverty and Inequality in Rural and Urban India

	I. RURAL			II. URBAN		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Dependent Variable: Poverty Rate						
Agricultural Tariff	-0.219 ***		-0.213 ***	-0.242 **		-0.240 **
	(0.071)		(0.070)	(0.097)		(0.102)
Mining and Manufacturing Tariff		0.277	0.221		-0.154	-0.148
		(0.318)	(0.297)		(0.163)	(0.154)
Obs	725	725	725	703	703	703
Panel B. Dependent variable: Poverty Gap						
Agricultural Tariff	-0.081 ***		-0.080 ***	-0.066 **		-0.065 **
	(0.021)		(0.020)	(0.027)		(0.029)
Mining and Manufacturing Tariff		0.062	0.041		-0.072	-0.071
		(0.123)	(0.113)		(0.049)	(0.047)
Obs	725	725	725	703	703	703
Panel C. Dependent variable: StdLog Consumption						
Agricultural Tariff	-0.110 *		-0.110 *	0.060		0.060
	(0.064)		(0.062)	(0.091)		(0.092)
Mining and Manufacturing Tariff		0.030	0.002		0.000	-0.001
		(0.220)	(0.208)		(0.131)	(0.129)
Obs	725	725	725	703	703	703
Panel D. Dependent variable: Log Deviation of Consumption						
Agricultural Tariff	-0.037		-0.035	0.053		0.053
	(0.025)		(0.025)	(0.066)		(0.066)
Mining and Manufacturing Tariff		0.073	0.064		0.024	0.022
		(0.109)	(0.111)		(0.076)	(0.074)
Obs	725	725	725	703	703	703

Note: All regressions include year and district dummies. Standard errors (in parentheses) are corrected for clustering at the state year level. Regressions are weighted by the square root of the number of people 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 ***.

Table A2. Effect of Trade Liberalization on Poverty and Inequality at the Region Level in Rural India Controlling for Initial Characteristics

	I. IV-TrTariff					II. IV-TrTariff, Init TrTariff				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A. Dependent variable: Poverty Rate. Region Level (N=124)										
Tariff Measure	-1.161 ***	-1.063 **	-1.035 ***	-0.802 ***	-0.821 ***	-1.049 ***	-0.978 ***	-0.992 ***	-0.874 ***	-0.886 ***
	(0.428)	(0.421)	(0.361)	(0.297)	(0.284)	(0.285)	(0.299)	(0.242)	(0.218)	(0.213)
Logmean		0.343 ***	0.328 ***				0.345 ***	0.329 ***		
		(0.065)	(0.073)				(0.065)	(0.074)		
Trend			-0.108					-0.107		
			(0.103)					(0.106)		
Lagged 43				-0.460 ***	-0.436 ***				-0.457 ***	-0.426 ***
				(0.078)	(0.107)				(0.076)	(0.109)
Panel B. Dependent variable: Poverty Gap. Region Level (N=124)										
Tariff Measure	-0.438 ***	-0.398 ***	-0.407 ***	-0.175 **	-0.197 **	-0.326 ***	-0.297 ***	-0.322 ***	-0.181 ***	-0.192 ***
	(0.144)	(0.131)	(0.107)	(0.087)	(0.084)	(0.085)	(0.093)	(0.076)	(0.049)	(0.052)
Logmean		0.139 ***	0.136 ***				0.141 ***	0.138 ***		
		(0.026)	(0.026)				(0.027)	(0.027)		
Trend			-0.152					-0.148		
			(0.117)					(0.123)		
Lagged 43				-0.645 ***	-0.591 ***				-0.644 ***	-0.594 ***
				(0.107)	(0.133)				(0.100)	(0.123)
Panel C. Dependent variable: StdLog Consumption. Region Level (N=124)										
Tariff Measure	-0.301	-0.338	-0.357	0.259	0.344	-0.151	-0.177	-0.221	0.210	0.237
	(0.388)	(0.380)	(0.339)	(0.279)	(0.287)	(0.350)	(0.336)	(0.308)	(0.270)	(0.248)
Logmean		-0.131 **	-0.111 **				-0.128 **	-0.109 **		
		(0.053)	(0.049)				(0.052)	(0.048)		
Trend			-0.236 *					-0.229 *		
			(0.125)					(0.130)		
Lagged 43				-0.650 ***	-0.749 **				-0.642 ***	-0.690 ***
				(0.128)	(0.301)				(0.126)	(0.248)
Panel D. Dependent variable: Log Deviation of Consumption. Region Level (N=124)										
Tariff Measure	-0.109	-0.129	-0.148	0.137	0.208	-0.032	-0.046	-0.074	0.101	0.115
	(0.178)	(0.172)	(0.161)	(0.120)	(0.162)	(0.164)	(0.156)	(0.153)	(0.115)	(0.118)
Logmean		-0.070 **	-0.059 **				-0.068 **	-0.059 **		
		(0.028)	(0.025)				(0.027)	(0.024)		
Trend			-0.195					-0.185		
			(0.141)					(0.145)		
Lagged 43				-0.661 ***	-0.853 ***				-0.654 ***	-0.732 ***
				(0.116)	(0.313)				(0.115)	(0.231)
Panel E. Dependent variable: Log Mean Per Capita Expenditures (Obs=124)										
Tariff Measure	1.090 **		1.122 **	0.980 **	1.012 **	1.082 ***		1.099 ***	1.004 ***	1.026 ***
	(0.474)		(0.488)	(0.444)	(0.431)	(0.357)		(0.374)	(0.327)	(0.322)
Logmean										
Trend			-0.380 **					-0.380 **		
			(0.175)					(0.173)		
Lagged 43				-0.382 ***	-0.272				-0.381 ***	-0.272
				(0.132)	(0.182)				(0.132)	(0.183)

Note: All regressions include year, region dummies, state labor laws-year dummies and pre-reform literacy, share of SC/ST population and industrial structure interacted with a post dummy. Regressions are weighted by the square root of the number of people in a region The data are from the 43rd and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***. In columns (1)-(5), the region tariff is instrumented by the non-scaled tariff. In columns (6)-(10), the region tariff is instrumented by the non-scaled tariff and the interaction of pre-reform non-scaled tariff and a post dummy. In column (5) and (10) the level of the lagged dependent variable is instrumented with the value of the dependent variables in 1983.

Table A3. Imports, Export and Poverty in Rural India

DepVar: Poverty Rate	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Imports of All Traded Industries	0.010				0.009 *			
	(0.006)				(0.005)			
Imports of Agriculture		0.009		0.007		0.017 *		0.016 *
		(0.012)		(0.013)		(0.009)		(0.009)
Imports of Mining/Manufacture			0.008 ***	0.009 ***			0.006	0.006
			(0.003)	(0.003)			(0.004)	(0.004)
Exports of All Traded Industries	-0.002 *				-0.002			
	(0.001)				(0.001)			
Exports of Agriculture		-0.0003		-0.001		-0.001		-0.001
		(0.0018)		(0.002)		(0.001)		(0.001)
Exports of Mining/Manufacture			-0.002 **	-0.002 **			-0.002 *	-0.001 *
			(0.001)	(0.001)			(0.001)	(0.001)
FDI opened industries	-0.215 ***	-0.230 ***	-0.247 ***	-0.251 ***	-0.164 ***	-0.169 ***	-0.187 ***	-0.188 ***
	(0.060)	(0.061)	(0.055)	(0.057)	(0.056)	(0.054)	(0.051)	(0.048)
License industries	0.048	0.064	0.056	0.055	0.020	0.034	0.031	0.029
	(0.070)	(0.076)	(0.072)	(0.072)	(0.065)	(0.071)	(0.070)	(0.069)
Bank branches per capita	872	863	963	957	861	1059	941	981
	(685)	(727)	(710)	(697)	(1013)	(1099)	(1115)	(1101)
Logmean	0.504 ***	0.500 ***	0.503 ***	0.502 ***				
	(0.035)	(0.033)	(0.033)	(0.033)				
Lagged 43					-0.511 ***	-0.468 ***	-0.508 ***	-0.495 ***
					(0.128)	(0.142)	(0.137)	(0.142)
Obs	725	725	725	725	725	725	725	725

Note: All regressions include year, district dummies, state labor laws-year dummies and pre-reform literacy, share of SC/ST population and industrial structure interacted with a post dummy. Regressions are weighted by the square root of the number of people in a district/region. The data are from the 43rd and 55th rounds of the NSS. Standard errors (in parentheses) are corrected for clustering at the state year level. 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 ***. In columns (1)-(4), the district initial per capita expenditure interacted with a post dummy is included. In columns (5)-(8), the level of the lagged dependent variable, instrumented with the value of the dependent variables in 1983, and interacted with a post dummy is included.

Table A4. Classification of States

Flexible Labor Laws	Inflexible Labor Laws
Andhra Pradhesh	Assam
Gujarat	Bihar
Karnataka	Haryana
Madhya Pradesh	Kerala
Maharashtra	Orissa
Rajasthan	Punjab
Tamil Nadu	Uttar Pradesh
	West Bengal

Note: Classification is identical to Hasan (2003). It is a combination of the Besley and Burgess (2004) classification of state labor laws as pro-employer, pro-worker and neutral, and Goswami et al. (2002) survey of states' investment climate.