Trade Liberalization, Child Labor, and Schooling:

Evidence from India*

Eric Edmonds
Department of Economics
Dartmouth College
NBER

Nina Pavcnik
Department of Economics
Dartmouth College
NBER and CEPR

Petia Topalova
Department of Economics
Yale and IMF

February 24, 2005

Preliminary and incomplete draft

Comments are very welcome

Abstract

Few issues are more controversial in the contemporary globalization debate than the effects of trade liberalization on poverty and well-being in low-income countries. The question of how changes in trade policy affect child labor and schooling is particularly contentious. We study the relationship between changes in trade policy and schooling and child labor using detailed household level data from the Indian National Sample Survey (NSS) spanning the period of trade liberalization initiated in 1991. We explore the causal link between liberalization and changes in child labor by relating child labor to district and intertemporal variation in exposure to tariff cuts. During the time period of our study, India experienced dramatic declines in child labor and increases in schooling attendance. However, we find that children living in districts more exposed to tariff cuts observed smaller declines in child labor and smaller increases in school attendance. We believe the findings reflect some of the adjustment costs associated with trade liberalization, and they illustrate how even temporary adjustment costs may have long-term effects on the impacted.

* We would like to thank Marc Melitz for useful comments. Correspondence to Edmonds or Pavcnik at 6106 Rockefeller Hall. Dartmouth College. Hanover, NH 03755 USA. Email: eric.edmonds@dartmouth.edu, nina.pavcnik@dartmouth.edu, or Topalova at petia@mit.edu. We are grateful for the support of the National Science Foundation on this project, and Pavcnik is also grateful for financial support on this project from the Rockefeller Center at Dartmouth College

1. Introduction

Trade liberalization is one of the most common policy prescriptions offered to initiate the process of poverty eradication in today's poor countries. Most would agree that growth is likely the most important channel through which trade might lower poverty in the long run.[1] However, recent research has emphasized the importance of short- to medium- run consequences of trade reforms. This focus is in part motivated by very limited mobility of individuals across industries and/or regions within poor countries in response to large trade policy shocks (see, for example, Harrison and Hanson (1999) and Revenga (1997) for Mexico, Currie and Harrison (1997) for Morocco, Attanasio, Goldberg, and Pavcnik (2004) for Colombia, Topalova (2004) for India). Consequently, Hanson (2004), Goldberg and Pavcnik (2004), and Topalova (2004) find differential impact of globalization on poverty across industries/regions within poor countries that persist over a relatively long period (at least 8-10 years) after the reforms.

An important aspect of poverty in poor countries is a high level of child labor coupled with low school attendance rates. For example, in India, 32 percent of children ages 10-14 report working as their *usual principal activity* and 98 percent of these working children do not attend school at the beginning of our sample in 1983. In general, only 54 percent of children ages 10-14 report attending school in 1983. Trade reforms, by differentially altering the local economic environment in which families operate and the resources available to families, might affect parents' decision to invest in children. This study considers how trade policy changes in India have affected the labor force status and schooling of India's children.

Understanding the effect of trade policy on education and child labor is crucial for several reasons. First, human capital accumulation is one of the main correlates of long run growth (Barro 1991). Trade policy induced changes in a parent's ability or incentives to invest in the schooling of children might then translate into long-term consequences for growth. Second, the

[1]There is convincing evidence on the link between growth and poverty (see Ravallion (2004) for survey). The empirical relationship on trade and growth has been more elusive (see Hallak and Levinsohn (2004), Winters et.al (2004) for recent overviews).

prevalence of child labor in an area may have general equilibrium effects on wages (Basu and Van 1998) that in turn influence occupational choices and create intergenerational poverty traps (Banerjee and Newman 1993). If trade policy can influence child labor decisions, then there may be persistent, long-term effects. Third, empirical evidence on the link between international trade and child labor is important for the debate on the effectiveness of trade sanctions to combat child labor by lowering employment opportunities for children.[2] While the trade policy considered in the current study (i.e. unilateral reductions in import tariffs by a poor country) differs from the policy that is the focus of discussion (namely, the imposition of tariffs on exports from poor country by a trading partner), both policies entail similar underlying mechanisms through which trade policy-via changes in product prices-might affect child labor and schooling.

Theory work on child labor emphasizes the importance of poverty (Basu and Van 1998) or phenomena associated with poverty such as credit constraints (Baland and Robinson 2000, Ranjan 2000) as determinants of high levels of child labor and low schooling rates in poor countries.[3] Labor demand conditions also play a role (Basu and Van 1998, Maskus (1997), Brown 2000, Dixit 2000, Ranjan 2001). Ultimately, how trade affects child labor/schooling depends on the direction and magnitudes of the effect of trade policy changes on these channels. The existing empirical work in a cross-country setting documents a negative association between openness and child labor (Shelburne (2001), Cigno, Rosatti, and Guarcello (2002), Edmonds and Pavcnik (2004)), and this relationship appears to be driven mostly by the well-documented positive relationship between trade and income (see Frankel and Romer (1999), Irwin and Tervio (2001)). While one advantage of a cross-country approach is that it does not rely on a particular

[2] For example, the U.S. Congress has repeatedly considered legislation that would prohibit imports into the United States of all products made with child labor. Under threat of such sanctions, export oriented garment factories in Bangladesh released more that 10,000 child workers under the age of 14 in the mid 1990s. More recently, the U.S. House of Representatives has deliberated the "Child Labor Elimination Act" that would impose general trade sanctions, deny all financial assistance, and mandate U.S. opposition to multilateral credits to 62 developing countries with a high incidence of child labor. The aim of this type of policy is to coerce changes in domestic policies in low income countries.

[3] See Basu 1999, Basu and Tzannatos 2003 for surveys of theory work on child labor.

case study, problems with the endogeneity of trade and of data comparability across countries limit inference.[4] The literature that considers how trade policy affects child labor and schooling *within* a country identifies geographic differences in exposure to trade policy changes by tracking variation in product prices *within* country over time, and finds evidence for importance of income playing an important role (Edmonds and Pavcnik (2005b)) but also instances where labor demand effects dominate the income effects (Krueger 2004).[5]

In this paper, we empirically examine how heterogeneity in the impact of trade policy changes within a country can be used to evaluate the consequences of trade reforms for schooling and child labor. In particular, we study the implications of trade policy for child labor and schooling with *within-country* data from India using detailed household level data from the Indian National Sample Survey (NSS) that surveys over 130,000 children from 1987 to 1999 and spans the period of India's unilateral economy-wide trade liberalization launched in 1991 that drastically lowered the average tariffs from 83 percent in 1991 to 30 percent in 1997.

Our study aims to make several contributions to the existing empirical literature on the role of trade policy for child labor and schooling in developing countries. Our first contribution is methodological. The main identification problem that limits the empirical evidence is the endogeneity of trade: the resource endowments and policies which determine trade flows also influence child labor supply and are difficult to fully control for in an empirical setting. We explore the causal link between liberalization and child labor and schooling by relating child labor/schooling to regional and intertemporal variation in import tariffs. This is to our knowledge the first study on the topic that addresses the main identification problem in the

[4]Edmonds and Pavcnik (2004a) address the endogeneity of trade by relying on trade based on geography as an instrument for actual trade as in Frankel and Romer (1999). However, the implications of the results for policy are less clear, because trade policy may have different effects on child labor/schooling than trade based on geography.
[5] Edmonds and Pavcnik (2005) study the effect of rice market liberalization on child labor in Vietnam during the 1990s using a panel of rural households spanning the liberalization episode. They find that rice price increases are associated with declines in child labor and that these effects vary across children living in households that differ in their exposure to rice prices as consumers and producers (with income effect playing an important role). Kruger (2004) repeats this analysis for coffee market liberalization in Nicaragua and finds that higher coffee prices induce more child labor, likely because the substitution effect of higher coffee prices exceeds the income effect.

research on trade and child labor/schooling by using information on actual tariff policy (rather than product prices) as a source of identifying variation. Trade policy measures are less likely to suffer from endogeneity and omitted variable biases than prices. Of course, political economy models of trade policy formation (e.g. Grossman and Helpman 1994) suggest that trade policy itself might be an endogenous outcome of a political process. While this is likely the case with pre-reform tariff *levels* in India, as we argue in detail in section 2.1, the nature of the reform in India provided little scope for various interest groups to influence trade policy *changes*. Trade liberalization was largely unanticipated, externally imposed, and the reform changed the structure of protection toward more uniform tariff rates across sectors. Thus, the usual concerns about the endogeneity of trade policy *changes* are likely small in the current context.

Our empirical methodology is based on geographical diversity in how families are exposed to India's trade reforms. India is divided into almost 450 districts that differed in industrial composition before the trade liberalization and hence exposure to trade liberalization. We exploit this variation in pre-liberalization industrial composition across districts in India. The interaction between the share of a district's population employed by various industries prior to trade reforms and the reduction in trade barriers in these industries provides a measure of the district's exposure to foreign trade. Our empirical work thus relies on differential impact of trade reform across regions.

There are several limitations in our study that are important to its interpretation. First, our empirical work focuses on a trade liberalization episode that consisted of a unilateral reduction in import barriers, so we cannot examine how the elimination of trade barriers by a trading partner affects child labor/schooling. That said, the unilateral trade liberalizations have recently been widely used in the developing world and import tariff reductions affect child labor- via product prices- through similar underlying mechanisms as trade policies of trading partners

(albeit magnitudes and directions of the effects might obviously differ).[6] Second, we rely on the differential impact of trade reform across districts within a country, so our approach cannot identify to what extent trade reform has contributed to the economy-wide changes in child labor/schooling. However, the partial equilibrium framework does not require the strong assumptions needed to answer the broader question in the general equilibrium framework. It allows us to link child labor and schooling to trade liberalization using plausibly exogenous variation in trade policy over time, so that identification of the trade policy effects is arguably more compelling. Moreover, differential responses of schooling/child labor to tariff reductions across regions are a crucial component of understanding the adjustment to trade reform in a setting where labor is very immobile geographically. Topalova (2004b) illustrates that individuals rarely move across districts/industries subsequent to trade shocks in India. This experience is not unique to India, but seems to characterize virtually every recent trade liberalization episode in the developing world (see Goldberg and Pavcnik (2004a) for a survey). Finally, there is still little known about the short- and medium-run effects of trade reforms. Given that the adjustment costs associated with trade liberalization are potentially high, a study of the short- or medium-run effects is important from a policy point of view, especially since the negative stance towards free trade is often attributed to the negative effects that reforms are expected to have in the short run.

In addition to its methodological contribution, this study also expands our understanding of how trade policy changes affect schooling and child labor during an *economy-wide trade reform*. Previous work (Edmonds and Pavcnik 2005b, Kruger 2004) has focused on the effects of agricultural trade liberalization and child labor in a setting where kids mostly work on a family farm. This is not surprising given that most child labor worldwide occurs in nontraded sectors or on family farms. However, some argue that agricultural trade liberalizations (especially in countries where a vast majority of population relies on self-employed agriculture)

[6]Most developing countries that were members of GATT/WTO have not participated in tariff reducing GATT rounds and have thus liberalized trade policy through unilateral trade liberalizations.

might provide very special case studies because income effects associated with self-employed agriculture might play an extremely consequential role that would not be as pronounced during an economy-wide trade reform. In addition, some suggest that child work for wages (rather than work on family farm) is the type of work that interferes most with schooling and is thus of greater policy interest. While these are obviously controversial claims, the Indian trade liberalization enables us to examine whether and how an *economy-wide* trade policy change in a country with more developed nonagricultural sector (and thus greater potential for children to work for wages in nonagricultural sector) affects child labor and schooling decisions.

We find that children living in districts more exposed to tariff cuts observed smaller declines in child labor and smaller increases in school attendance than the rest of India. Previous work by Topalova (2004b) finds that districts that experienced larger average tariff declines observed smaller declines in poverty. Thus, the relationship between child labor/schooling and district's exposure to trade found in our study is consistent with the importance of trade induced income effects in families' child labor/schooling decisions as observed in Edmonds and Pavcnik (2005b). In that study, Edmonds and Pavcnik find declines in child labor associated with rising incomes in the context of Vietnam's liberalization of rice trade. In the present Indian case, child labor fails to decline and schooling fails to increase in areas that also do not experience the declines in poverty that occur in the rest of India.

In the next section, we briefly describe the characteristics of trade reforms in India that are crucial for our empirical framework, and child labor and schooling data used in the analysis. In section 3, we discuss the theoretical relationship between child labor/schooling and import tariffs. Section 4 outlines our empirical methodology and presents our basic findings; robustness is explored in section 5. Section 6 concludes.

2. Background on Indian Trade Liberalization and Data

2.1 Trade Policy

India provides an excellent setting to study the relationship between trade policy, child labor and schooling. In August 1991, India launched a dramatic, unilateral trade liberalization.[7] The reforms were initiated in the context of the 1991 currency crisis as a condition of IMF bailout. Several features of the reform are crucial for our empirical work. First, because tariffs were high prior to the reform, the reform drastically reduced the level of tariff protection. Figure 1 portrays evolution of average tariffs over time and shows that average tariff declined from 83 % in 1991 to 30% in 1997.[8] These tariff cuts encompassed all sectors of the economy. Figure 2 depicts industry tariffs in 1987 and 1997 and demonstrates that virtually all industries experienced large tariff declines. Second, the liberalization was instigated as part of the IMF bailout conditions in response to the 1991 currency crisis and came as a surprise (Hasan et al, 2003).[9] The reforms were thus *unanticipated* in the sense that they were unlikely foreseen in child labor and schooling decisions made during the 1980s and in the industrial composition before the crisis. Third, the reform drastically changed the structure of protection across industries by reducing the differences in tariffs across industries. Figure 3 depicts declines in industry tariffs between 1997 and 1987 (a decline is a positive number) and pre-reform tariffs in 1987 and indicates a move toward a more uniform tariff structure across industries: industries with larger pre-reform tariffs experienced larger tariff cuts. This is not a pattern that would be expected by an observer sensitive to political economy concerns. This pattern might in part reflect that the reforms were *externally* imposed, which could have diminished industry's ability to influence *changes* in trade policy.[10] Fourth, Indian trade reform has potentially important implications for those living in rural areas (where agriculture is a predominant activity) and urban areas (where manufacturing is more pronounced) because tariff reductions not only encompassed the manufacturing sector and mining, but also agricultural products. This is

[7]Although India was a member of GATT since 1947 it did not participate in tariff reducing GATT rounds.
[8]The sources of tariff data are various publications of the Indian Ministry of Finance.
[9]This crisis was in part triggered by the sudden increase in the oil prices due to the Gulf War in 1990, the drop in remittances from Indian workers in the Middle East, and the political uncertainty surrounding the fall of a coalition government and assassination of Rajiv Gandhi which undermined investor's confidence.
[10] In fact, the IMF conditions required a reduction in the level *and* dispersion of tariffs (Chopra et al., 1995).

illustrated in Figure 4 that depicts average tariffs for cereals and oilseeds, agriculture (other than cereals and oilseeds), and manufacturing and mining over time. The figure suggests that all sectors experienced tariff reductions, albeit the tariff reductions were less pronounced in cereals and oilseeds.

Finally, India is divided into almost 450 districts. These districts *differ* in terms of industrial composition *before* the trade liberalization and thus exposure to trade liberalization. This provides geographic and time heterogeneity in exposure to trade policy within India. Our identification strategy exploits this variation in pre-liberalization industrial composition across districts in India. The interaction between the share of a district's population employed by various industries on the eve of trade reforms and the reduction in trade barriers in these industries provides a measure of the district's exposure to foreign trade.[11]

In particular, we rely on district-level measures of trade policy as in Topalova (2004b). District *d*'s exposure to trade liberalization at time *t* is measured by the 1991 employment weighted average nominal ad-valorem tariff at time *t*. For each industry *i* in district *d*, we compute employment $Emp_{i,d}$ using 1991 population and housing census[12] and create industry employment weights $w_{i,d} \equiv \frac{Emp_{i,d}}{\sum_i Emp_{i,d}}$ that are normalized to sum to one for each district. Our measure of district's exposure to trade reform at time t is the employment weighted sum of industry-specific national tariff *(i.e.* $tariff_{i,t}$*)* at time t: $tariff_{d,t} = \sum_i w_{id} * tariff_{i,t}$.[13] Since this computation uses district specific employment weights based on industrial composition that is

[11]The district is an administrative unit within the state. Boundaries of the districts have been relatively constant since colonial times, though many of the older districts have been split into two or more modern districts. The assumption that we are making by looking at the district is that it is the appropriate labor and capital market. Given the very low migration across districts (see Topalova (2004b)) and large disparities across districts, it does not seem unreasonable to make this assumption. Two recent papers, Banerjee and Iyer (xxxx), and Iyer (xxxx), also use variations across districts to study the effect of colonial rule. Duflo and Pande (2004) use district level analysis to examine the effect of infrastructure on poverty/inequality.

[12]Because the census does not distinguish among various subcategories of agriculture, employment information on subcategories of agriculture from the 1987 (i.e. 43rd) round of the National Sample Survey is used.

[13]Because census data distinguishes between rural and urban population in each district, we can compute district specific exposure to trade that varies across rural and urban areas.

determined prior to trade reform, this allows us to causally interpret the correlation between the levels of child labor and trade exposure. A similar measure has also been created at a region level.[14]

Note that the above trade measure takes into account the employment in non-traded and traded industries within a district. Workers in nontraded industries are assigned zero tariffs in all years and nontraded industries consist of services, trade, transportation, construction, and growing of cereals and oilseeds.[15] This leads to average tariffs at the district level whose level is substantially lower than the tariff rate on traded goods with tariffs (for example, in table 1 compare 8 percent to 88 percent in 1987/88). The above tariff measure is sensitive to the share of individuals working in non-traded sectors, and might be correlated with initial poverty in a district. As we discuss in detail in section 5, this might bias our results if there are underlying latent differences in trends in child labor across districts that depend on pre-reform industry composition (and thus poverty). Subsequently, we also create a measure of average tariffs that depends only on employment in traded sectors that experience changes in tariffs over the period of study. This measure is constructed along the same lines as district tariff measure, except that weights are created using only the employment in traded sectors within a district. We call this the average traded tariff for the district and label it $TrTariff_{dt}$. This tariff measure will be correlated with the district average tariff $Tariff_{dt}$, but variation in $TrTariff_{dt}$ won't be influenced directly by the size of the non-traded sector. Finally, in our analysis we will also examine to what extent our results are driven by tariff reductions in agricultural sector, or mining and manufacturing. We thus also create a tariff measure that captures average agricultural tariff in a

[14]India is divided into 77 regions and a region is a collection of several districts. Creation of regional tariffs enables us to check the robustness of our findings.

[15]Topalova (2004b) argues that the latter two categories should be treated as non-traded because all product lines within cereals and oilseeds were canalized (i.e. imports were allowed only by the state trading monopoly) until 2000 and the tariffs on all product lines under the growing of cereals are zero throughout the period of our sample.

district and a tariff measure that captures average tariff in mining and manufacturing in a district.[16] Table 1 summarizes these tariff measures at a district and regional level.

While the measure of trade policy used in our analysis is based on tariffs, Indian trade reform also significantly lowered non-tariff barriers to trade (NTBs), albeit NTB reductions occurred at a slower pace (especially in agriculture). We focus on tariffs because they are more transparent and easier to comparably measure across industries and time than NTBs, and NTB data is not available at a level detailed enough for empirical analysis. Moreover, additional considerations suggest that our focus on tariffs rather than NTBs is unlikely problematic. First, exclusion of NTBs from the analysis would be worrisome if NTBs increased in response to tariff reductions. This was not the case in India. The limited data on NTBs suggest that tariffs and NTBs are positively correlated during this period (Topalova 2004b). Second, the fact that NTBs were eliminated at a slower pace than tariffs (especially in the agriculture) might, if anything, attenuate our findings on the impact of trade reform when we focus on tariffs as a measure of trade policy. Third, trade policy changes are mirrored in increases in imports and exports so that the share of merchandise trade in GDP increased from about 10% in 1986/87 to about 19% in the late 1990s. Finally, since most NTBs were eliminated by 1998, we can check the robustness of our findings by focusing on tariff variation from the 43rd and 55th round of the household survey and ignoring the 50th round that takes place when many of the NTBs continued to be in place. Preliminary analysis (note: not yet included here) along these lines yields virtually identical findings to those reported in the paper.

2.2 National Sample Survey

Our analysis of the relationship between district exposure to trade and child labor/ schooling is based on two rounds of the National Sample Survey (NSS) in India. We match district-level information on tariffs described in the previous section to household survey data

[16]The district specific agricultural (mining and manufacturing) tariff uses the share of employment in a subcategory of agriculture (mining and manufacturing) in total agricultural employment (mining and manufacturing employment) in a given district as weights.

from the 38th (Jan-Dec 1983), 43rd (July 87-Jun 88), and 55th (July 1999 - June 2000) rounds of the NSS.[17] The NSS is a multipurpose household survey that provides information on household expenditures, household demographic characteristics, education, and employment among others. The surveys are nationally representative and large in scale with approximately 75,000 rural and 45,000 urban households in each survey round. We analyze the activities of over 130,000 children ages 10-14.[18]

Although the NSS is a repeated cross-section at the level of individuals (households), the data has a panel dimension at a district level. Topalova (2004b) has matched districts across rounds and in so-doing adds this geographic panel dimension to the data. As a result, this is one of the first studies that uses this rich micro data set to study the effect of policies that vary across districts of India and over time on various outcomes of interest. The district-panel dimension of the data significantly improves a researcher's ability to separate the effects of trade policy from other district-specific factors that could be influencing child labor and schooling. Our analysis relies crucially on this data feature.

We consider several measures of the activities of children that have been asked in a consistent manner in each of the survey rounds. We define a child's work status based on survey question about the child's *usual principal* activity. The question distinguishes between the following categories of work: regular salaried/wage employee, casual wage laborer, begging, work in a household enterprise (farm or non-farm), and domestic work. A child is labeled *working* if his/her usual principal activity is in one of the above work categories. It is possible that a child's principal activity might be work while the child also attends school. We define an

[17]In particular, the tariff measure for 43rd round (i.e. 1987/88) is based on tariff information for 1987. No detailed earlier data on tariff is available prior to 1987, but there were no major trade reforms prior to 1991. Tariff measure of 55th round (i.e. 1999/00) is based on tariff information for 1997. We use a tariff lag because there is likely some delay in how national policies affect regional outcomes. We do not have data on 1983 tariffs (38th round of NSS), so we use 1983 data only in a robustness check that our results are not driven by preexisting trends in outcome variables.

[18]The sample is restricted to children ages 10 - 14. Very few children below the age of 10 work and 14 is typically an upper bound on the definition of a child in child labor conventions such as the International Labor Organization's C182 on the worst forms of child labor.

indicator *attend school* that is one if a child attends school regardless of his/her usual principal activity based on the information from the household roster. We also define an indicator for whether a child works as a principal activity *and* does not attend school (i.e. *work only*).

Table 2 provides descriptive statistics on child labor and schooling between 1983 and 1999/2000 for India as a whole and the rural and urban samples separately. Each mean in Table 2 is weighted to be nationally representative for the given year. Several interesting patterns emerge. First, the comparison of proportion of children that work and the share of children that work and do not attend school suggests that most children that report working as a primary activity (including domestic work), do not attend school. Thus, our measure of child labor is of interest to researchers concerned only about human capital accumulation. Second, while child labor is prevalent in India (especially in rural India), the fraction of children working as a usual principal activity has been declining over time from 31.6 percent in 1983 to 12.4 percent 1999/2000. At the same time, the share of children that report attending school has increased from 54 percent to 75.8 percent. Our empirical analysis will consider whether any of these changes are related to changes in district specific changes in import tariffs over time.

In our future analysis we will also focus on subcategories of child work: *market work* and *domestic work*. A child works in *market work* if his/her usual principal activity is working for wages (as regular salaried/wage employee or as casual wage laborer), in a household enterprise (farm or non-farm), or in begging. *Domestic work* includes attending domestic duties and free collection of goods (vegetables, roots, fire-wood, cattle feed,..), sewing, tailoring weaving, etc. for household use. Policy tends to focus more on market work (and especially wage work), but a basic model of time allocation (e.g. Becker 1965) would suggest that movements in market work and domestic work should be related. In table 2, it is evident that working children are almost evenly split between market work and domestic work and that declines in both types of work are similar over time. The largest employment category within market work is in a household enterprise such as a farm or family business which we believe is particularly substitutable with

domestic work. Hence, an important component of our future analysis will be to consider how the type of work performed by children is related to changes in the structure of trade protection.

The NSS is unusual in both its sample size and its detailed questionnaire. In addition to information about the activities of children, we use information on child's demographics (gender, age, completed education) and child's household attributes (religion, caste or tribe, primary activity, household expenditure per capita, household size, information on household head (literacy, competed education, gender, age)) in our analysis. However, one important limitation of the NSS is that, as a household survey, it inevitably misses children that do not live within the sampling frame. Especially vulnerable groups like sex workers, bonded laborers, street children, and the homeless are likely missing from the data. This data limitation means that we will not be able to infer anything about changes in the status of these children during India's trade liberalization. However, we are able to evaluate whether our sample changes in a substantive way over time and from this infer whether there is systematic selection into the NSS sample that is correlated with trade policy changes. Thus, while certain vulnerable groups will be missing from our analysis, the extent to which this affects inference is straightforward to assess (and does not appear to be an issue in our preliminary analysis).

3. Theoretical Motivation

Within the trade literature, there are several papers that consider the relationship between trade and child labor in a general equilibrium setting (see Ranjan (2001), Brown (2000), Dixit (2000), Maskus (1997) for examples). As the main contribution of our paper is empirical, our goal in this section is to simply summarize the mechanisms that can be in play in as transparent a way possible. As such, we treat the general equilibrium effects emphasized in the literature as an exogenous change in the parameters of the household's schooling decisions.

For simplicity, there is one child per household and two goods in the economy. One good is a consumption good that can be produced at home or purchased in a formal market for a price p. The other good is a capital good that cannot be produced at home but is used in

production at home. There are no binding constraints on labor supply outside of the household, although we assume that households cannot hire in for home production. Let market clearing wages be defined as *w* and they are exogenous to a household. Because of the absence of constraints on employment outside of the household, equilibrium requires that if a child works both inside and outside of the household, the value of child time in home production is just the child's market clearing wage. Total adult labor supply is assumed to be completely inelastic with respect to the liberalization of trade.[19] This simplification allows our discussion to focus more directly on the child's schooling and labor supply decisions at the expense of missing interaction between child and adult labor supply. Denote total income from non-child labor sources (i.e. adult labor) as *Y*.

Let *r* be the market price of capital used in home production. It is exogenous to the household. *K* denotes the capital stock used in production. In our context, we will think of capital as also encompassing all intermediate inputs in production. Denote L_H as child labor used in home production in the constant returns to scale production function $F(L_H,K)$. c is the (composite) consumption good, so the family's budget constraint is:

$pc = Y + pF(L_H, K) + wL_M - rK$. L_M is child labor supplied outside of the household. Preferences are additively separable in schooling *S* and consumption of *c* and have the representation: $U(c,S) = u(c) + v(\delta S)$ where δ is the (future) market return to a unit of schooling. For simplicity, we assume certainty in the return to schooling, and the function *v* reflects any discounting, agency problems, etc. We assume positive diminishing marginal utility in both *c* and *S* and abstract from financial motives for investing in schooling. The child faces a time constraint such that time spent in work outside the household, inside the household, and in school must add to 1: $1 = S + L_M + L_H$. In this set-up we assume that all non-work time goes towards schooling. In so doing, we consider schooling to also embody other inputs into child

[19]This assumption is often made in trade literature. The assumption is useful in the present discussion but does not influence our empirical work.

human capital accumulation including play and leisure and abstract from the so-called "idle" children problem.

Note that the allocation of the child's labor inside and outside of the household will depend on the rental price of capital to the household, because child labor is allocated between the household to keep the value of labor's marginal product in the household equal to the wage. Since the focus of this study is on the allocation of child time between work (inside or outside the household) and schooling, we do not further discuss the allocation of child labor between the household and the formal labor market and the interplay of capital prices in that decision.

The determinants of total child labor supply and schooling are the same in this setting. Hence, we frame our discussion in terms of schooling, but the same factors also affect labor supply. Denote the household's demand for schooling as: $S = D(p, w, \delta, r, Y)$. Totally differentiating, we have five basic mechanisms through which the reduction of import tariffs in a district can influence child labor supply:

$$dS = \frac{\partial D}{\partial p} dp + \frac{\partial D}{\partial w} dw + \frac{\partial D}{\partial \delta} d\delta + \frac{\partial D}{\partial r} dr + \frac{\partial D}{\partial p} dY \,. \qquad (1)$$

In discussing the mechanisms through which liberalization affects schooling, we proceed through each term of (1), holding all other factors fixed (that is, when we discuss the effects of a change in i, we set all derivatives not i equal to 0). First, the reduction in import tariffs changes final consumption prices. In the present case, we assume that the effect on the price level is negative so that the price of traded goods falls in India as a result of the liberalization. Everything else equal, this induces households to substitute away from the now relatively more expensive school and switch towards consumption. Moreover, everything else equal, lower consumption prices raise real wages which further creates incentives for households to move away from schooling.[20] The second term in (1) is the direct nominal wage effect (we ignore the correlation between

[20] Falling consumption prices raise real wages and lower the value of the marginal product of labor inside the household. Hence, when children work in both the home and market, lower consumption prices will push children towards the formal labor market in our set up.

changes in child wages and adult wages for a moment). We regard the direct wage effects of India's liberalization as heterogeneous across communities.[21] A priori it is not absolutely clear in which direction the wage effect should go. A potentially very compelling scenario is one in which districts that are more exposed to trade through bigger tariff cuts might experience (everything else equal) proportionately larger declines (or smaller increases) in product demand and thus proportionately larger declines (smaller increases) in wages/child labor. However, one could also imagine scenarios whereby child wages increase. For example, the loss of protection might shift employment to less skill intensive industries whereby the demand for child labor increases. Other scenarios are also possible, so we regard the wage effects as ambiguous although we view a decline in child wages through the decline in product demand as the most likely result of India's liberalization in heavily protected districts.

The third term in (1) is the effect of a change in the return to education δ. Again, we see this as unclear. On the one hand, the promise of a future with freer trade seems likely to be one where education can be rewarded. On the other hand, there are questions about whether a move from import substitution industrialization could lower returns to education. If India's comparative advantage is in unskilled labor intensive goods (or if tariff cuts were larger on skilled-intensive goods), the effect of India's liberalizations will be to reduce returns to schooling and thus increase child labor. Moreover, the loss of tariff revenues and NTB rents might affect local public finance in ways that alter educational quality and thereby the returns to education for the worse.

The fourth term in (1) is the change in the rental price of production inputs. As with the general price level, we expect these to decline, everything else equal. However, the effects of this rental price change is less clear and depends on whether the child works outside of the household and the effect of additional capital on the productivity of labor. When children work for wages, their schooling will be determined by the market wage. Changes in labor productivity

[21] As we argue in other parts of the paper, most evidence suggests that labor is very immobile across districts of India following the trade liberalization episode.

in the household will change the allocation of labor between the family and the formal labor market but not between work and school. However, in our data and in other low income countries, children typically work mostly in the own household – wage work is rare (Edmonds and Pavcnik 2005a). In this case, child labor and schooling can be affected by whether additional child labor complements or substitutes for child labor. In the typical case, we expect additional capital to improve the productivity of labor and to thereby affect a decline in schooling in order to maintain equilibrium in the allocation of time (assuming diminishing marginal utility of the return to schooling) and increase child labor supply (Moeller 1984). A second possibility is that the additional capital replaces child labor (specifically, lowers the marginal product of child labor). We mention this, because one often reads in the child labor literature stories of how children no longer work once their efforts have been replaced by a chemical pesticide, a tractor, etc. We do not have a strong prior on whether changes in the price of capital goods and raw material inputs will end up substituting for or complementing child labor in household production.

The fifth term is the effect of changes in parental income. Child labor is generally viewed as declining with family incomes (everything else equal), and there are theoretical reason (Basu and Van 1998) with empirical support (Edmonds 2005) for child labor being especially responsive to change in income that lift families out of poverty. While the general equilibrium effects of India's trade liberalization may be important and positive, we know from Topalova (2004) that there is a positive correlation between reduction in tariffs and the poverty rate at the district level. As this is the same identifying variation that we use, we expect the (relatively) rising poverty associated with India's liberalization to push families away from schooling and towards child labor. Thus, we expect rising poverty coupled with declining consumption prices to push families towards child labor and away from schooling. The ambiguous effects of liberalization on nominal child wages and the returns to education coupled with the ambiguous

effects of falling input prices on child labor mean that the net effects of all these factors on child labor supply and schooling are unclear.

4. Empirical Methodology and Basic Results

Our empirical strategy is straightforward. Indian districts vary in their exposure to tariff changes based on the composition of employment prior to the reforms. We correlate changes in a district's exposure to international trade based on the composition of district employment before liberalization with changes in child labor and schooling in a district. We use the detailed micro data of the NSS to control for changes in individual correlates, but fundamentally the variation used for identification of the effects of trade on child labor/schooling is based on the district panel dimension of our data.[22] $Tariff_{dt}$ is our measure of the district *d*'s exposure to trade at time *t* and is constructed as described in section 2.1. Let y_{jhdt} denote an indicator for participation in activity *y* (i.e. attend school, work, work only) by child *j* living in household *h* in district *d* at time (survey round) *t*. The measures of these activities of children are detailed in section 2.2. Our base specification is then:

$$y_{jhdt} = \beta_0 + \beta_1 Tariff_{dt} + \pi\left(A_{jt}, G_{jt}\right) + \alpha_1 H_{ht} + \tau_t + \lambda_d + \varepsilon_{jhdt}. \qquad (2)$$

We control for the association between the activities of children and the child's age and gender with $\pi\left(A_{jt}, G_{jt}\right)$, a third order polynomial in the child's age, a gender indicator, and a third order polynomial in age interacted with the gender indicator. H_{ht} is a vector of household characteristics including indicators for caste, religion, the head's gender, age, literacy, and education that might affect household choice of child activity (potentially because of social norms, economic status, . . .). We control for unobserved changes over time in the activities of children with a survey-round fixed effect τ_t. Note, then, that the coefficients on tariffs do not capture any aggregate effects of Indian reforms. Indian districts differ in their endowments, schooling facilities, accessibility, geography. All of these attributes are potentially correlated

[22] Data on children is a repeated cross-section, but we observe the same districts over time.

with tariffs (or industrial composition) and schooling/child labor. We control for time-invariant district attributes with a district fixed effect λ_d. We thus identify the association between activity *y* and average tariff T_{dt} with *within* district variation in exposure to trade.[23] β_1, the coefficient on district tariffs, is our main coefficient of interest. Given the scaling in our data, its interpretation is the percentage point change in child labor or schooling rates associated with a doubling of the average tariff.

While the theory on trade and child labor has strong predictions about the mechanisms affecting the relationship between trade policy and child labor, it should be clear from our discussion in section 3 that we do not have strong priors on which mechanism will dominate in the case of India's trade liberalization. Thus, we follow a more inferential approach in our analysis and let the patterns we observe in estimating equation (2) guide our analysis. Everything else equal, a negative (positive) value of the coefficient on tariff β_1 in (2) would suggest that tariff cuts are associated with increases (decreases) in child labor/schooling.

OLS estimates of specification (2) are presented in table 3 for rural and urban sample, respectively. The top panel of the table presents the rural results. The urban results are in the bottom panel. While child labor is declining and schooling increasing in India over the 1990s, we find that child labor increases and schooling declines in districts that experience larger tariff declines in rural areas. We begin by estimating equation (2) for rural sample and school attendance as a dependent variable (column 1). The table reports the coefficient on tariff and the coefficients on year indicators[24]. As observed in the raw data, the negative coefficient on the later year effects suggest that school attendance is in general increasing in rural India over time. However, the positive coefficient on tariffs suggests that these increases are smaller in areas that experience larger tariff declines. Everything else equal, tariff declines in rural district are

[23]Throughout this project, we will estimate equation (2) separately for rural and urban households. Moreover, because our source of variation is district level average tariffs, our standard errors will be clustered at the district level.

[24]1987, a pre-reform year is the base category.

associated with declines in school attendance in that district. To get a sense of the magnitude, note that the year effects suggest a 17 percentage point increase in schooling between 1987/88 and 1999/00 in communities that only experience the general equilibrium effects of India's liberalization – that is, with no district specific exposure. The average district tariff in rural areas in 1987/88 was 0.08 and 0.025 in 99/00 (table 1). This change in tariffs implies, everything else equal, a 2 percentage point decline in schooling or that schooling only increased by 15 percentage points in districts with the average tariff change.

Increases in child labor accompany these declines in schooling. Column 2 reports the rural estimates of equation (2) with child labor as a dependent variable. While the year effects suggest that the incidence of child labor is in general declining in rural India, these declines are smaller in districts that experience greater tariff cuts. That is, conditional on the secular trend towards declining child labor, greater tariff reductions are associated with more child labor. At the average tariff change, child labor would increase by 1 percentage point. Finally, column 3 estimates (2) using an indicator that the child works and does not attend school (work only) as a dependent variable. The column 3 results suggest that most of the increases in child labor as a usual primary activity associated with trade liberalization occur among the kids that also do not attend school.

The strong correlations between changes in tariffs and child labor increases / schooling declines that we observe for children 10-14 in rural areas are not evident in urban areas. This is evident in columns 1-3 of the bottom panel of Table 3. Not only are the associations between the outcomes of interest and tariffs statistically insignificant, they are also much smaller in magnitude. We view the large differences between urban and rural areas in responses to tariff changes as somewhat surprising. However, there is relatively little rural-urban migration in India surrounding trade liberalization episode (Topalova 2004b), so it is possible that urban and rural labor markets could be sufficiently segmented as to experience fundamentally different responses to tariff changes (especially with 10 years of the initial reforms). However, the

analysis in the subsequent section reveals that differences in schooling and child labor responses in urban and rural areas only occur in the OLS specification and may reflect differences in the size of the non-traded sectors between rural and urban areas.

4.2. IV estimates

The endogeneity of our tariff measure is a primary concern in our empirical work. The coefficient on tariff β_1 in (2) is identified under the assumption that unobserved district-specific time varying shocks that affect child labor are uncorrelated with changes in district tariffs over time. Recall that our measure of industrial composition used to construct district tariffs is determined prior to reform. Hence, our measure of exposure to reform $Tariff_{dt}$ is not changing with changes in industrial composition associated with the reforms (which would be endogenous to changes in factors also influencing child labor supply). The inclusion of a district fixed effect controls for time invariant characteristics that might lead to a correlation between child labor and the industrial composition of employment in a district. Yet, latent time trends correlated with the pre-reform industrial composition of a district and child labor and schooling are still an identification concern.

We analyze the robustness of our findings from (2) with a number of checks designed to control for these latent time trends. First, changes in the average tariff measure in (2) depend in part on how large the non-traded sectors are in a given district (as they enter the employment total but have no change in tariffs). Child labor is more prevalent in non-traded sectors and in agriculture (where some sectors do not experience price changes). This could lead to a correlation between tariff changes and child labor/schooling changes that merely captures time trends in child labor and schooling in areas where child labor is more prevalent. To address this, we construct a measure of average tariffs that depends only on employment in traded sectors that experience changes in tariffs over the period of study. We call this the average tariff for traded goods in the district and label it $TrTariff_{dt}$. This tariff measure will be correlated with the

district average tariff $Tariff_{dt}$, but variation in $TrTariff_{dt}$ won't be influenced directly by the size of the pre-reform non-traded sector. Hence, we instrument for $Tariff_{dt}$ in (2) with $TrTariff_{dt}$. The estimates from the first stage regressions of 2SLS are reported in column 1 (for rural areas) and 3 (for urban areas) of table 4. The average tariff for a district is highly correlated with the average tariff on traded goods for a district (i.e. the instrument is not weak). Columns 1-3 of Table 5 contain the reduced form relationship between average tariffs on traded goods in a district and schooling/child labor. In rural and urban sample, we find that, everything else equal, declines in average tariffs on traded goods in a district are associated with declines in schooling (column 1) and increases in child labor (column 2, 3).

Columns 4-6 of Table 5 contain the IV estimates of the specification in (2). In rural and urban areas, we find that everything else equal, tariff declines in a district are associated with declines in schooling and increases in child labor in that district. Relative to the OLS estimates in table 3, the magnitudes of the declines in schooling and increases in child labor increase substantially when we instrument to address endogeneity through the non-traded sector. We view this rise in magnitude as exactly what we would expect if non-traded sectors are relatively unaffected by tariff changes. In the rural areas, everything else equal, the average change in tariffs (.055) is associated with a 4 percentage point decline in schooling and a 2 percentage point rise in children working without attending school. The coefficients on tariffs in urban sample are lower in magnitude (in absolute value) than rural coefficients. However, because urban areas experience on average bigger tariff declines over the period of trade reform (.14, see table 1), everything else equal, the average change in district tariffs in urban areas (.14) is associated with 6.8 percentage point decline in school attendance and a 4 percentage point decline in children working without attending school.[25] These are non-negligible effects.

[25]Appendix table A.1 formally tests for differences between urban and rural responses to tariff declines. While the magnitudes of the coefficients are smaller (in absolute value) in urban areas than in rural areas, one cannot reject that urban responses to tariffs are statistically different from the rural responses, with the exception of the OLS estimates in columns 1-3.

A second, related concern is the endogeneity of trade policy changes subsequent to initial reforms. It should be clear from section 2 that the unusual nature of India's, largely externally imposed, trade reforms diminishes this concern. Moreover, Topalova (2004b) tests for the endogeneity of tariff changes to industry characteristics, including latent productivity, and finds no evidence to suggest that the direct endogeneity of trade policy is concern. Nevertheless, we are still concerned about the timing of trade policy changes subsequent to initial reforms. Moreover, tariff cuts following the initial ones might have been anticipated. Recall that the goal of the reforms was in part to reduce tariff levels and reduce the variation in tariffs. Thus, the change in tariffs in a district will be correlated with the district's baseline tariff level without reflecting any endogeneity in trade policy change. To implement this idea, we also instrument for $Tariff_{dt}$ in (2) with $TrTariff_{dt}$ and the baseline traded tariff level interacted with the post-reform survey round indicator $TrTariff_{d1987} * Post_t$. We allow a different relationship between the baseline average traded tariff and each survey round year after the reform to account for changes in the reform's progress over time. These results are in columns 7-9 of Table 5 and do not substantively alter our discussion from columns 4-6.[26]

The identifying variation in the above analysis is at a district level. A question arises whether the district is the relevant level of aggregation for measuring a household's exposure to the trade reforms. We view this as primarily a measurement error issue. If the district is too aggregate a measure, our findings would be attenuated by the heterogeneity in impacts of trade policy within the district. If the district is not aggregate enough, our findings would be attenuated, because the average tariff does not reflect how the household is affected by the trade policy reforms. We can consider this latter case directly by replicating our analysis (and reconstructing our tariff measure) at the more aggregate region level.[27] Appendix Tables A.2 and A.3 replicate the analysis in table 5 for rural and urban sample, respectively. This analysis

[26]First stage results for schooling are reported in columns 2 (rural) and 4 (urban) of table 4.
[27]There are 77 regions.

yields similar findings as the results presented in table 5, albeit the coefficients are larger in magnitude. One reason why looking at the district level could be more than a measurement error issue might be if there is significant migration across districts correlated with changes in average tariffs. Topalova (2004b) considers migration directly in our data set, and it is striking how little migration there is. Even in 1999, less than 4 percent of the rural population of India reports having moved outside their current district of residence within the last 10 years and less than half a percent report moving from outside their current district of residence for employment reasons.

6. Robustness Analysis of Basic IV results

Although the above IV estimation addresses our principal endogeneity concerns, in this section we provide 3 additional checks that the IV estimates are robust to controls for latent time trends and time-varying policy variables.

First, we address the issue of preexisting time trends in outcome variables that are potentially correlated with tariff changes. We use the information from the two rounds of the NSS (33rd and 43rd round) that took place prior to 1991 trade reform to compute region-specific pre-reform change in schooling, child labor, and work only that occurred between 33rd and 43rd round of NSS.[28] We then allow for outcome variables to experience location specific differential time trends by estimating specification (2) with the interactions of location-specific pre-reform changes in outcome variables with year indicators. These results are presented in columns 1-3 of table 6 for rural sample and columns 1-3 of table 7 for urban sample.[29] Allowing for these differential time trends does little to the magnitudes or statistical significance of our estimates. The reported coefficients on tariffs are very similar to the IV estimates in table 5.

Second, child labor is a strong correlate of poverty, and we suspect that poverty might vary across districts in ways that are correlated with the composition of employment, potentially even employment in traded goods industries. Thus, we allow changes in child labor and schooling to vary with pre-reform industrial structure in a district (i.e. percentage of workers

[28] One can compute these changes only at a region level.
[29] Check statistical significance of trends.

employed in agriculture, mining, manufacturing, trade, transport, services (construction is the omitted category)), the share of district's population that is a scheduled caste/tribe, and the percentage of literate population in a district. That is, we add year round effect that vary with the above initial condition in the district to specification (2). These results are in columns 4-6 of Table 6 for rural areas and columns 4-6 of table 7 for urban areas. Allowing for time effects that vary with the baseline industrial structure and other initial conditions reduces the magnitude of the coefficients on tariffs in rural areas, but the estimates (especially for schooling) continue to be nonnegligible. The urban estimates continue to be large, but they are very imprecisely estimated.

Third, over the 1990s, substantial policy attention has been directed towards the promotion of schooling in India. A 1993 Supreme Court ruling declared education to be a fundamental right up to age 14, and a proposed constitutional amendment in 1997 would enshrine education as a fundamental right of children 6-14 (Mehendale 2002). Several major initiatives in the late 1980s and 1990s were designed to increase primary school enrollments through improving school quality such as Operation Blackboard (Chin 2002) and the District Primary Education Project launched in November 1994 (Pandey 2001). The relative importance of these schooling efforts versus other changes in the environment in explaining improvements in schooling in India over the 1990s does not appear to have been resolved.[30] Most of our data on local public infrastructure that we currently have is at the state level. Hence, we can consider whether changes in state expenditures on education, or schooling availability (measured as primary schools per 100,000 middle and secondary schools per 100,000) explain any of the association between tariff changes and child labor and schooling by inclusion of these 3

[30] Note that these reforms only bias our results if district-level schooling reforms are correlated with district level tariff changes. Moreover, to the extent these reforms were implemented differentially across districts with different initial school attendance or poverty, we in part control for them by allowing for differential trending of outcome variables across districts with different initial conditions and pre-existing changes in outcome variables.

measures in IV estimates of specification (2). The results are reported in table 8 and the inclusion of these time-varying state controls does not alter our main findings.[31]

6. Conclusions

We consider the effect of trade policy changes on child labor and schooling by exploiting within country heterogeneity in the exposure to economy-wide trade reforms. This study provides a methodological contribution in exploring how the heterogeneity in regional impacts of economy-wide reforms can be analyzed (although we cannot estimate the overall effect of the economy-wide reforms) and provides novel evidence on the direct effects of trade policy on child labor and schooling. In particular, we find that in the case of India, districts that experienced larger declines in tariffs did not experience as large a rise in schooling or decline in child labor as did the rest of India. That is, everything else equal, larger tariff reductions are associated with less schooling and more child labor. For example, in rural areas (table 5, columns 7-9), the data imply at the sample means a tariff elasticity of schooling of 0.87 and a tariff elasticity of child labor -1.53. It is important to emphasize that these estimated effects are not the total effect of a tariff change; rather, they reflect differential changes in areas with more exposure to the tariff reform after controlling for any economy wide changes associated with the tariff changes or other economic factors.

While these patterns are extremely robust, further work is necessary to understand why we observe these relative declines in schooling and increases in child labor. We suspect that an important part of the story is in Topalova (2004b) who documents higher relative poverty in areas where we observe declines in schooling and increases in child labor. Thus, the patterns observed herein are consistent the idea that child labor declines with poverty as Edmonds and Pavcnik (2005b) observed in the context of rice trade liberalization in Vietnam. We are also interested in exploring whether the patterns observed in the data vary with the local institutional environment. Topalova (2004b) documents that her findings of increased poverty vary with state

[31] In future work we need to obtain state-level measures on Operation Blackboard from Chin (2002) so that we can perform an additional robustness check.

institutional characteristics, such as the extent to which it regulates labor or enforces existing labor laws. Given that the informal nature of most child labor, we do not expect to find much of direct effect of these attributes beyond their effect on family incomes. However, ultimately the data will inform this question.

References

Acemoglu, D., S. Johnson, and J. Robinson (2004). "Institutions as the Fundamental Cause of Long-Run Growth." in *Handbook of Economic Growth*, P. Aghion and S. Durlauf, eds., forthcoming.

Aghion, P., R. Burgess, S. Redding, and F. Zilibotti (2003). "The Unequal Effects of Liberalization: Theory and Evidence from India," LSE mimeo. London, UK: LSE.

Baland, J. M. and J. Robinson (2000). "Is Child Labor Inefficient," *Journal of Political Economy* 108, 663-79.

Banerjee, A. and A. Newman. (1993). "Occupational Choice and the Process of Development." *Journal of Political Economy*, 101, 274-298

Barro, R. (1991). "Economic Growth in a Cross Section of Countries." *Quarterly Journal of Economics*, 106(2), 407-43.

Basu, K. and P. H. Van (1998). "The Economics of Child Labor," *American Economic Review*, 88, 412-427.

Basu, K., and Z. Tzannatos. (2003). "The Global Child Labor Problem: What Do We Know and What Can We Do?" *World Bank Economic Review*. 17(2), 147-73.

Basu, K. (1999). "Child Labor: Cause, Consequence, and Cure, with Remarks on International Labor Standards." *Journal of Economic Literature*. 37(3), 1083-119.

Becker, G. (1965). "A Theory of the Allocation of Time," *Economic Journal*, 75, September, 493-517.

Ben-Porath, Y. (1967). "The Production of Human Capital and the Life Cycle of Earnings," *Journal of Political Economy*, 75(4), 352-65.

Besley, T. and R. Burgess (2004). "Can Labor Market Regulation Hinder Economic Performance? Evidence from India," *Quarterly Journal of Economics* 119(1), 91-134.

Bommier, A. and P. Dubois (2004). "Rotten Parents and Child Labor," *Journal of Political Economy* forthcoming.

Brown, D.K. (2000). "A Transactions Cost Politics Analysis of International Child Labor Standards," in Alan V. Deardorff, and Robert M. Stern, eds., *Social Dimensions of U.S. Trade Policies.* Ann Arbor: U Michigan Press.

Chin, Aimee. (2002). " The Returns to School Quality When School Quality is Very Low: Evidence from Operation Blackboard in India," Houston: University of Houston, *Department of Economics Manuscript*.

Chopra, A., C. Collyns, R. Hemming, K. Parker, W. Chu, and O. Fratzscher (1995). " India: Economic Reform and Growth," IMF Occasional Paper #134.

Cigno, A, and F. Rosati, and L. Guarcello (2002). "Does Globalization Increase Child Labor?" *World Development* 30, 1579-1589.

Deaton, A. (2003). "Prices and Poverty in India, 1987-2000," *Economic and Political Weekly*, Jan 25, 362–8.

Dixit, A. (2000). Comment on "A Transactions Cost Politics Analysis of International Child Labor Standards," in Alan V. Deardorff, and Robert M. Stern, eds., Social Dimensions of U.S. Trade Policies. Ann Arbor: U Michigan Press.

Dollar, D. and A. Kraay (2002). "Growth is Good for the Poor," *Journal of Economic Growth* 7, 195-225.

Dollar, D. and A. Kraay (2003). "Institutions, Trade, and Growth," *Journal of Monetary Economics* 50, 133-162.

Edmonds, E. (2005). "Does Child Labor Decline with Improving Living Standards?" *Journal of Human Resources*, 40(1), Winter 2005, 77-99.

Edmonds, E. and N. Pavcnik (2003). "Trade Liberalization and the Allocation of Labor between Households and Markets." *Journal of International Economics*, forthcoming.

Edmonds, E. and N. Pavcnik (2004). "International Trade and Child Labor: Cross-country Evidence," *Journal of International Economics*, forthcoming and NBER *Working Paper* 10317.

Edmonds, E. and N. Pavcnik (2005a). "Child Labor in the Global Economy," *Journal of Economic Perspectives*, 18(1), Winter 2005, 199-220..

Edmonds, E. and N. Pavcnik (2005b). "The Effect of Trade Liberalization on Child Labor," *Journal of International Economics*, 65(2), March 2005, 401-419.

Frankel, J. A. and D. Romer (1999). "Does Trade Cause Growth?", *American Economic Review* 89, 279-399.

Goldberg, P. and N. Pavcnik (2004). "Trade, Inequality, and Poverty: What Do We Know? Evidence from Recent Trade Liberalization Episodes in Developing Countries," *Brookings Trade Forum*, forthcoming.

Grossman, G. and E. Helpman (1994). "Protection for Sale", *American Economic Review*, 84(4), 833-850.

Hall, Robert and Charles Jones. (1999). "Why Do Some Countries Produce So Much More Output Per Worker Than Others?" *Quarterly Journal of Economics*, 83-116.

Hanson, G. (2004).

Hasan, R., Mitra, D. and K. Ramaswamy (2003). "Trade Reforms, Labor regulations, and Labor Demand Elasticities: Evidence from India," *NBER Working Paper* 9879.

Irwin, D. and M. Tervio (2002). "Does Trade Raise Income? Evidence from the Twentieth Century," *Journal of International Economics* 58, 1-18.

Kruger, D. (2004). "Child Labor and Schooling During a Coffee Sector Boom: Nicaragua 1993 -1998", in: *Trabjo Infantil: Teoría y Evidencia desde Latinoamerica*, Luis F. Lopez Calva, ed., Mexico, D.F.: Fondo de Cultura Económica de México, Forthcoming.

Maskus, K. (1997). "Core Labor Standards: Trade Impacts and Implications for International Trade Policy, " *World Bank International Trade Division Mimeo*.

Pandey, R., (2000). "Going to Scale with Education Reform: India's District Primary Education Program, 1995-99," The World Bank, Country Studies, Education, Reform and Management Publication Series, 1.

Ranjan, P. (2001). "Credit Constraints and the Phenomenon of Child Labor," *Journal of Development Economics* 64, 81-102.

Ravallion, M. (2004).

Schultz, T. W. (1960). "Capital Formation by Education." *Journal of Political Economy*. December, 571-583.

Shelbourne, R. (2001). "An Explanation of the International Variation in the Prevalence of Child Labour," *World Economy* 24, 359-378.

Topalova, P. (2004a). "Trade Liberalization and Firm Productivity: the Case of India," *IMF Working Paper 04/28.* Washington, DC: IMF.

Topalova, P (2004b). "The Effect of Trade Liberalization on Inequality and Poverty: The Case of India," *MIT mimeo*.

Winters, A., N. McCulloch, and A. McKay (2004). "Trade Liberalization and Poverty: The Evidence so Far," *Journal of Economic Literature* 62, 72-115.

Figure 1: Average Nominal Tariffs

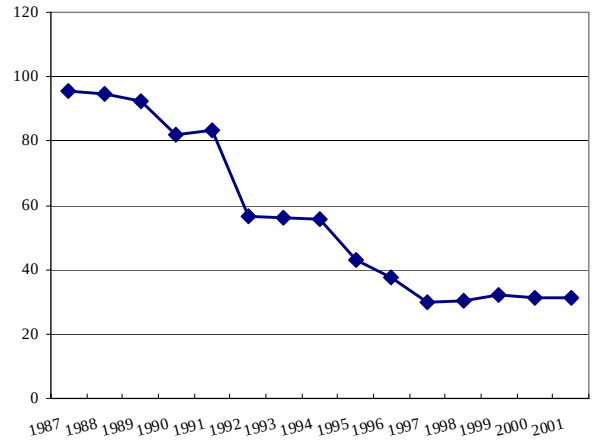


Figure 2: Correlation of Industry Tariffs in 1997 and 1987

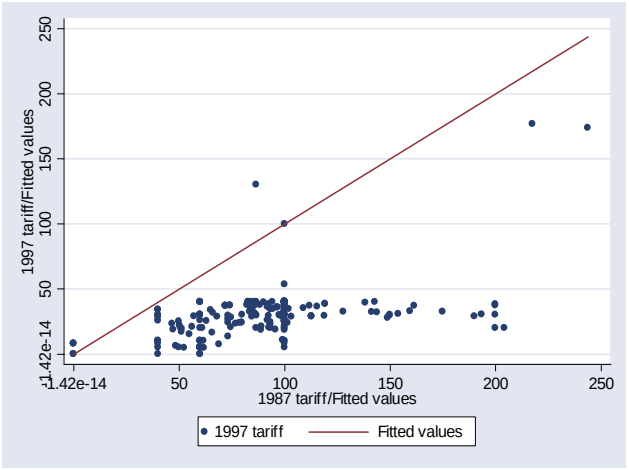


Figure 3: Tariff Declines and Industry Tariffs in 1987

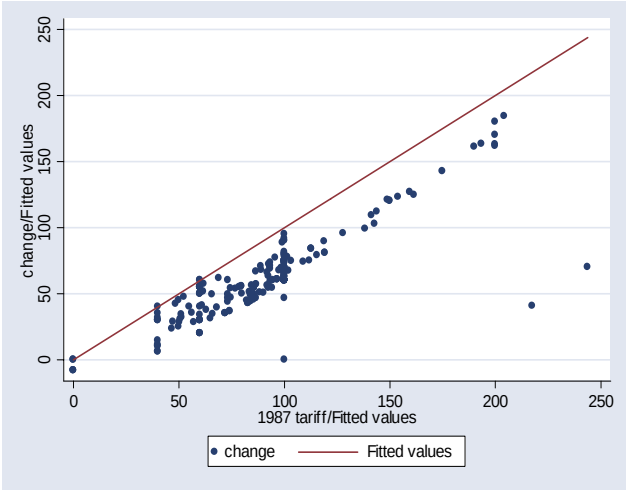
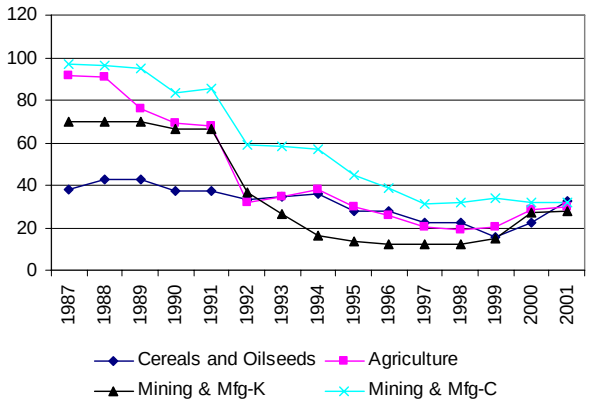


Figure 4: Tariffs by Industry Category



All figures from Topalova (2004b)

Table 1: Tariff Measures

	Rural		Urban	
	87/88	99/00	87/88	99/00
District				
Average Tariff (Tariff)	.080	.025	.214	.074
Average Tariff on Traded Goods (Trtariff)	.883	.308	.903	.318
Agricultural Tariff	.812	.230	.770	.211
Mining and Manufacturing Tariff	.911	.343	.923	.333
Region				
Average Tariff (Tariff)	.080	.025	.216	.074
Average Tariff on Traded Goods (Trtariff)	.880	.304	.907	.318
Agricultural Tariff	.816	.230	.775	.213
Mining and Manufacturing Tariff	.915	.345	.930	.334

Note: Tariff is the employment weighted average nominal ad-valorem tariff at time t in a district/region (employment weights are based on pre-liberalization employment shares in a district/region). Workes in nontraded industries (service, trade, transportation, construction, workers in growing of cereals and oilseeds) are assigned zero tariffs in all years in this measure. Average tariff on traded goods is employment-weighted tariff over the set of traded industries (i.e. it abstracts from individuals working in nontraded industries in a given district/region). All means are weighted. The tariff measure for 87/88 round is based on tariff information for 1987. Tariff measure for 99/00 round is based on tariff information for 1997.

Table 2: Activities of Children in India, 1983-2000

	National			Rural			Urban		
	1983	87/88	99/00	1983	87/88	99/00	1983	87/88	99/00
Attend School	54.2	59.8	75.8	48.5	55.1	72.8	73.0	76.2	84.9
Work	31.6	22.2	12.4	36.0	25.0	14.1	16.9	12.3	7.3
Work Only	31.1	21.7	12.0	35.5	24.5	13.6	16.5	11.9	7.0
Market Work	16.6	12.0	6.6	19.3	13.7	7.5	7.5	6.0	3.7
household ent.	9.9	6.9	3.4	11.9	8.2	4.0	3.2	2.6	1.3
wage work	6.5	5.0	3.2	7.1	5.5	3.5	4.2	3.4	2.4
begging	0.0	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.0
domestic work	15.1	10.2	5.9	16.7	11.2	6.6	9.4	6.3	3.6

Note: Each cell contains the participation rate in the indicated activity (row) for the indicated survey round of the National Sample Survey (column) for children ages 10-14. Information on participation in types of work is based on the child's principal usual activity. Domestic work includes chores, collection activities, and sewing, tailoring, weaving, etc for household use. Market work includes work in a household enterprise such as a farm or business, wage work, and begging. Work refers to participation in market work or domestic work as a principal usual activity. Work only indicates that the child reports market or domestic work as a principal usual activity and does not report attending school. All means are weighted to be nationally representative. All means are weighted by survey weights.

Table 3: Tariffs, Schooling, and Child Labor --OLS Results

	OLS		
	School	Work	Work only
	(1)	(2)	(3)
RURAL			
Tariff	0.367	-0.173	-0.18
	(0.092)	(0.073)	(0.073)
Year (99/00)	0.172	-0.103	-0.104
	(0.008)	(0.007)	(0.007)
Demographic Controls	yes	yes	yes
Household Controls	yes	yes	yes
District Indicators	yes	yes	yes
R^2	0.2537	0.1944	0.1946
Number of Observations	95,669	95,695	95,669
URBAN			
Tariff	0.044	-0.015	-0.021
	(0.116)	(0.071)	(0.072)
Year (99/00)	0.081	-0.046	-0.046
	(0.015)	(0.009)	(0.009)
Demographic Controls	yes	yes	yes
Household Controls	yes	yes	yes
District Indicators	yes	yes	yes
R^2	0.208	0.137	0.137
Number of Observations	48,871	48,915	48,871

Standard errors in parenthesis are clustered at district level. Demographic controls include third order polynomial in child's age and gender. Household controls include an indicator for whether a child's household belongs to a scheduled caste or schedule tribe, indicators for whether the child's household is hindu, muslim, christian, sikh, and controls for the head of the child's household gender, age, education, and literacy.

Table 4: First Stage Results

	Rural		Urban	
	(1)	(2)	(3)	(4)
Average Tariff for Traded Goods (TrTariff)	.3430	.5650	.4410	.5020
	(.0840)	(.0950)	(.0990)	(.2210)
TrTariff*Post 1991 Dummy		.2580		.0500
		(.0650)		(.1490)
District Indicators	yes	yes	yes	yes
Year Indicators	yes	yes	yes	yes
F statistic for joint significance of instruments	16.71	17.61	20.07	10.31
R^2	.864	.878	.922	.922
Number Observations	95,669	95,669	48,915	48,915

Standard errors in parenthesis are clustered at district level. Regressions also include third order polynomial in child's age and gender, an indicator for whether a child's household belongs to a scheduled caste or schedule tribe, indicators for whether the child's household is hindu, muslim, christian, sikh, and controls for the head of the child's household gender, age, education, and literacy.

Table 5: Tariffs, Schooling, and Child Labor--Reduced Form and Instrumental Variables Results

	REDUCED FORM			IV 1			IV 2		
	School	Work	Work only	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
RURAL									
Tariff				0.737	-0.397	-0.408	0.564	-0.25	-0.258
				(0.241)	(0.166)	(0.168)	(0.212)	(0.139)	(0.139)
TrTariff	0.253	-0.136	-0.14						
	(0.071)	(0.051)	(0.052)						
Year (99/00)	0.299	-0.173	-0.175	0.192	-0.116	-0.116	0.183	-0.108	-0.108
	(0.042)	(0.031)	(0.031)	(0.014)	(0.011)	(0.011)	(0.012)	(0.009)	(0.009)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.2536	0.1945	0.1946	0.2532	0.1942	0.1943	0.2535	0.1944	0.1946
Number of Observations	95,669	95,695	95,669	95,669	95,695	95,669	95,669	95,695	95,669
URBAN									
Tariff				0.488	-0.295	-0.301	0.503	-0.297	-0.306
				(0.249)	(0.132)	(0.135)	(0.252)	(0.135)	(0.138)
TrTariff	0.215	-0.13	-0.133						
	(0.111)	(0.059)	(0.060)						
Year (99/00)	0.201	-0.12	-0.12	0.14	-0.083	-0.083	0.142	-0.083	-0.084
	(0.064)	(0.035)	(0.036)	(0.033)	(0.018)	(0.019)	(0.033)	(0.019)	(0.019)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.209	0.137	0.137	0.207	0.136	0.136	0.207	0.136	0.136
Number of Observations	48,871	48,915	48,871	48,871	48,915	48,871	48,871	48,915	48,871

Standard errors in parenthesis are clustered at district level. Demographic controls include third order polynomial in child's age and gender. Household controls include an indicator for whether a child's household belongs to a scheduled caste or schedule tribe, indicators for whether the child's household is hindu, muslim, christian, sikh, and controls for the head of the child's household gender, age, education, and literacy. Trtariff (ie.average tariff on traded goods) is employment-weighted tariff over the set of traded industries (i.e. it abstracts from individuals working in nontraded industries in a given district. Initial Trtariff is the value of Trtariff in 1987. Specification IV 1 uses trtariff as an instrument. Specification IV 2 uses trtariff and its pre-reform 1987 value interacted with post indicator as instruments.

Table 6: Tariffs, Schooling, and Child Labor in Rural India--Robustness Analysis

	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.739	-0.401	-0.407	0.37	-0.116	-0.121
	(0.253)	(0.175)	(0.175)	(0.187)	(0.143)	(0.145)
Demographic Controls	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes
Year Indicators	yes	yes	yes	yes	yes	yes
Initial Conditions*Year Dummies	no	no	no	yes	yes	yes
Pre-reform Change in Outcome of interest*Year Dummies	yes	yes	yes	no	no	no
R^2	0.2541	0.1956	0.1957	0.2559	0.1962	0.1965
Number of Observations	95,669	95,695	95,669	95,669	95,695	95,669

Standard errors in parenthesis are clustered at district level. Table 5 notes describe the variables and other controls. Initial conditions that are interacted with year indicators include the percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employed in services (construction is the omitted category), the share of district's population that is a scheduled caste/tribe, the percentage of literate population in a district, and state-labor laws indicators. Instrument is Trtariff.

Table 7: Tariffs, Schooling, and Child Labor in Urban India--Robustness Analysis

	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.465	-0.303	-0.309	1.02	-0.422	-0.459
	(0.247)	(0.136)	(0.138)	(0.563)	(0.392)	(0.393)
Demographic Controls	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes
Year Indicators	yes	yes	yes	yes	yes	yes
Initial Conditions*Year Dummies	no	no	no	yes	yes	yes
Pre-reform Change in Outcome of interest*Year Dummies	yes	yes	yes	no	no	no
R^2	0.2072	0.1355	0.1358	0.2099	0.1374	0.1376
Number of Observations	48,871	48,915	48,871	48,871	48,915	48,871

Standard errors in parenthesis are clustered at district level. Table 5 notes describe the variables and other controls. Initial conditions that are interacted with year indicators include the percentage of workers in a district employed in agriculture, employed in mining, employed in manufacturing, employed in trade, employed in transport, employed in services (construction is the omitted category), the share of district's population that is a scheduled caste/tribe, and the percentage of literate population in a district.

Table 8: Tariffs, Schooling, and Child Labor in Rural India--Time Varying State-level Education Controls

	Rural			Urban		
	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)
Tariff	0.784	-0.469	-0.514	0.566	-0.292	-0.297
	(0.351)	(0.354)	(0.365)	(0.251)	(0.140)	(0.141)
Education Spending	0.003	0.022	0.024	0.04	0.004	0.002
	(0.018)	(0.017)	(0.017)	(0.019)	(0.012)	(0.012)
Number of Middle Schools	0.003	-0.002	-0.002	-0.003	0	0
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Number of Primary Schools	0.002	-0.001	-0.001	0.001	0	0
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Demographic Controls	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes
Year Indicators	yes	yes	yes	yes	yes	yes
R^2	0.2595	0.2049	0.2043	0.217	0.143	0.142
Number of Observations	79,057	79,078	79,057	41,604	41,637	41,604

Standard errors in parenthesis are clustered at district level. Table 5 notes describe the variables and other controls. Data: 43rd and 55th rounds of the National Sample Survey. Education controls are all at the state level.

Table A.1: Tariffs, Schooling, and Child Labor --Urban and Rural Comparison

	OLS			REDUCED FORM			IV 1			IV 2		
	School	Work	Work only	School	Work	Work only	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	0.374	-0.176	-0.183				0.744	-0.398	-0.41	0.575	-0.259	-0.266
	(0.091)	(0.073)	(0.073)				(0.240)	(0.165)	(0.166)	(0.212)	(0.139)	(0.139)
Tariff*Urban	-0.331	0.161	0.162				-0.262	0.112	0.118	-0.082	-0.027	-0.028
	(0.147)	(0.100)	(0.100)				(0.334)	(0.208)	(0.212)	(0.324)	(0.194)	(0.196)
TrTariff				0.255	-0.137	-0.141						
				(0.071)	(0.051)	(0.052)						
TrTariff*Urban				-0.042	0.01	0.012						
				(0.128)	(0.075)	(0.078)						
Year (99/00)	0.172	-0.103	-0.104	0.301	-0.173	-0.176	0.193	-0.116	-0.116	0.183	-0.108	-0.108
	(0.008)	(0.007)	(0.007)	(0.042)	(0.031)	(0.031)	(0.014)	(0.011)	(0.011)	(0.012)	(0.009)	(0.009)
Year (99/00)*Urban	-0.091	0.057	0.057	-0.101	0.055	0.057	-0.053	0.033	0.034	-0.042	0.025	0.025
	(0.016)	(0.010)	(0.010)	(0.074)	(0.045)	(0.046)	(0.035)	(0.021)	(0.021)	(0.035)	(0.021)	(0.021)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.255	0.187	0.187	0.255	0.187	0.187	0.254	0.186	0.186	0.254	0.186	0.187
Number of Observations	144,540	144,610	144,540	144,540	144,610	144,540	144,540	144,610	144,540	144,540	144,610	144,540

Standard errors in parenthesis are clustered at district level. Table 5 notes describe the variables and other controls. Data: 43rd and 55th rounds of the National Sample Survey.

Table A.2: Tariffs, Schooling, and Child Labor in Rural India--Region Level Analysis

	OLS			REDUCED FORM			IV 1			IV 2		
	School	Work	Work only	School	Work	Work only	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	0.551	-0.236	-0.241				1.092	-0.742	-0.749	0.861	-0.467	-0.472
	(0.160)	(0.146)	(0.146)				(0.394)	(0.332)	(0.334)	(0.292)	(0.231)	(0.234)
TrTariff				0.368	-0.25	-0.253						
				(0.082)	(0.078)	(0.079)						
Year (99/00)	0.179	-0.104	-0.104	0.365	-0.239	-0.24	0.208	-0.132	-0.132	0.196	-0.117	-0.117
	(0.014)	(0.012)	(0.012)	(0.050)	(0.046)	(0.047)	(0.022)	(0.019)	(0.019)	(0.018)	(0.015)	(0.015)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Region Indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.2386	0.1801	0.1805	0.2388	0.1805	0.1808	0.238	0.1794	0.1797	0.2384	0.18	0.1803
Number of Observations	95,943	95,969	95,943	95,943	95,969	95,943	95,943	95,969	95,943	95,943	95,969	95,943

Standard errors in parenthesis are clustered at region level. Trtariff (ie.average tariff on traded goods) is employment-weighted tariff over the set of traded industries (i.e. it abstracts from individuals working in nontraded industries in a given region. Initial Trtariff is the value of Trtariff in 1987. Table 5 notes describe the variables and other controls.

Table A.3: Tariffs, Schooling, and Child Labor in Urban India--Regional Analysis

	OLS			REDUCED FORM			IV 1			IV 2		
	School	Work	Work only	School	Work	Work only	School	Work	Work only	School	Work	Work only
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Tariff	0.198	-0.081	-0.094				0.556	-0.441	-0.46	0.6	-0.437	-0.459
	(0.168)	(0.100)	(0.101)				(0.309)	(0.177)	(0.187)	(0.319)	(0.181)	(0.193)
TrTariff				0.289	-0.229	-0.239						
				(0.176)	(0.081)	(0.084)						
Year (99/00)	0.1	-0.053	-0.055	0.243	-0.177	-0.182	0.148	-0.101	-0.103	0.153	-0.101	-0.103
	(0.023)	(0.014)	(0.014)	(0.101)	(0.048)	(0.050)	(0.041)	(0.025)	(0.026)	(0.043)	(0.026)	(0.027)
Demographic Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Household Controls	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
District Indicators	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
R^2	0.194	0.123	0.123	0.194	0.123	0.123	0.193	0.122	0.122	0.193	0.122	0.122
Number of Observations	49,165	49,210	49,165	49,165	49,210	49,165	49,165	49,210	49,165	49,165	49,210	49,165

Standard errors in parenthesis are clustered at region level. Table 5 notes describe the variables and other controls. Data: 43rd and 55th rounds of the National Sample Survey.