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The Effect of Parental Labor Supply on Child Schooling: Evidence from Trade Liberalization in India

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Abstract

This paper estimates the effect of changes in maternal and paternal labor supply on the schooling rates of children in India using the variation in industry-specific tariffs during a period of trade liberalization. The results show that an increase in maternal labor supplied outside of the household leads to a higher schooling probability for younger children. Specifically, a one day per week increase in maternal labor supply is associated with an approximately 5 percentage point increase in the schooling probability for children between the ages of 7 and 10. The results hold with a higher magnitude once we account for the endogenous fertility choices. However, father's labor supply has insignificant effect on child schooling across all specifications. The effect for older children between the ages of 11 and 14, who face a tradeoff between schooling, market work, and domestic work, is found to be insignificant.

Keywords: Child Schooling, Labor Supply, Trade Liberalization, India.
JEL Classification Numbers: D13, J13, O12, O19

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1 Introduction

There is a large literature on the relationship between globalization and human capital formation in a macroeconomic context. In this paper, we consider a mechanism that works at the microeconomic level through the labor market activity of parents within households. It is well established that greater labor market access for women improves their decision making power and gives them more control over household resources (Anderson and Eswaran, 2009; Quisimbing and Mallucio, 2003), which can then lead to improvements in child outcomes (Duflo and Udry, 2001; Duflo, 2003; Gleason, 2003). In developing countries, industrialization facilitates an increase in female labor supply by improving labor market opportunities for women outside of household enterprises (Mammen and Paxon, 2000; Fontana and Wood, 2000; Standing, 1999). The process of globalization, in particular trade integration, can affect the schooling probability of children by influencing the distribution of resources within households. If trade leads to greater market opportunities for women, then women's labor supply may increase and, through this channel, the post-trade liberalization may involve lower fertility and higher child quality. Although there is little known about this process through which international trade affects child quality and quantity, there is a recent interest in the literature on this mechanism (Atkin, 2009; Do et al., 2012; Ray and Riezman, 2012).

In this paper, we identify the relationship between parental labor supply and child schooling by exploiting the variation in tariff rates in India. India experienced substantial trade liberalization in 1991 and has detailed micro-level data that allow us to understand the extent to which the changes in labor market activities induced by tariff reductions affect child schooling. The paper focuses on the schooling probability of children who are too young to be productive in the labor market, as opposed to children who face a tradeoff between work and schooling. After controlling for a wide set of factors, this paper studies whether or not the changes in mothers' and fathers' labor supply induced by trade liberalization have contributed to the increased schooling rates in India.

The results show that an increase in maternal labor supply is associated with a higher schooling probability for younger children between the ages of 7 and 10, with a one day per week increase in maternal supply associated with an approximately 5 percentage point increase in their schooling rate. The differential effect of paternal supply was insignificant across all specifications. In general, a child who lives in a household in which the mother supplies significantly more labor than the father was approximately 2 percentage points more likely to attend school. Older children between the ages of 11 and 14, who face a tradeoff between schooling, domestic work, and market work, are not found to be significantly affected by the labor supply of either parent, after controlling for factors that are associated with the

general well-being of the household. Further, the results show that tariff reductions in both maternal and paternal industries were associated with higher labor supply to the market for wages and lower labor supply at household enterprises for both mothers and fathers, with a higher magnitude of this effect for mothers. Over the years between 1988 and 2000, the increase in maternal labor supplied outside of the household attributable to trade liberalization accounts for approximately one fifth of the improvement in the schooling rate for younger children.

The gender-specific labor market impacts of international trade have been widely studied in the literature. However, there is little known about how these differential changes are then translated to child outcomes, especially those of younger children. This paper contributes to the literature by using the exogenous variation in tariff rates, which affects the labor market outcomes for men and women, in order to identify the impact of parental labor supply on children. By exploiting this variation, it offers evidence that international trade can affect schooling rates by increasing the independent labor market activities of mothers outside of the household. Second, it uses a nationally representative employment survey from India to link each child to the tariff rates in maternal and paternal industries, which has not been previously done. This detailed data allow for a rigorous examination by controlling for a wide set of factors that are related to the characteristics of households, children, and parents, as well as the characteristics of the parents' respective industries.

The paper is organized as follows. Section 2 describes the background in the literature, and section 3 describes the theoretical framework. Section 4 introduces the data set used in this paper and discusses the descriptive statistics. In Section 5, we describe the trade reform in India and its impact on parental labor supply. Section 6 presents the effects of parental labor supply on child schooling and Section 7 concludes the paper.

2 Background

Child quality, especially in terms of schooling and health, is considered to be an outcome of a collective decision between parents which is made at the household level. Within each household, individuals are assumed to have heterogeneous preferences. Unitary household models that assume income pooling and a representative household utility function have generally been rejected by the empirical evidence (Browning and Chiappori, 1998; Duflo, 2003; Duflo and Udry, 2001; Pitt, Rosenweig and Wolpin, 1980; Quisumbing and Maluccio, 2003; and Thomas, 1991). Consequently, if the mother and father place different weights on fertility and child quality in their utility functions, then equilibrium outcomes would reflect their relative bargaining power.

Women in low-income countries are usually restricted to work in household enterprises. On the path of economic development, industrialization improves the labor market opportunities for women and eventually leads them to supply more labor outside of the household enterprises. Anderson and Eswaran (2009) distinguished between different forms of labor participation for women when analyzing female autonomy and concluded that employment outside of the household contributes to female autonomy rather than overall employment. Changes in market conditions, therefore, may increase the value of outside options differentially and thus influence the relative allocation of resources within households. It is in this context that Rees and Riezman (2012) viewed the globalization process as creating opportunities for market employment in developing countries. They assumed that women have a stronger relative preference towards the quality of children and that men have a stronger relative preference towards the quantity of children. If these market opportunities created by globalization are higher for women, then the bargaining power of women will improve within the household, and the post-globalization equilibrium will involve lower fertility and higher child quality.

Identifying this relationship empirically is not straightforward, as parental labor supply is often endogenous to child outcomes. This relationship is partially explained by the theory on the effects of fertility on labor supply, which generally focuses on two main channels. First, as the number of children increases, there will be more specialization within the household as women allocate more time to childcare, known as the 'specialization effect' (Becker, 1985). Second, fertility has a direct effect on the value of both parents' time in household production, often referred to as the 'home-intensity effect'. As a result, the theory predicts a reduction in the mother's labor supply, but the net effect on the father's labor supply will depend on the relative magnitudes of the specialization and home-intensity effects (Kim and Aasve, 2006).

This mechanism is expected to lead to a tradeoff between the quality and quantity of children. The shadow prices of child quality and quantity are strongly linked, and therefore, exogenous changes may cause a substitution between these two variables (Lam and Duryea, 1999). A mother with a small number of children may choose to allocate more time towards market production, which may reduce child quality in terms of their health and nutritional intake (Glick and Sahn, 1998). If schooling is viewed as a quality outcome, then we may expect a reduction in schooling as a result of an increase in maternal labor supply. On the other hand, with less time available for home activities, including childcare, parents may choose more schooling for their children. The causal effect of time spent in market production on schooling is therefore an empirical question which has not been addressed in most of the previous literature.

If maternal and paternal labor supplies are perfect substitutes, the reduction in

a mother's labor supply may be balanced by a proportional increase in a father's labor supply. In this case, we should see a positive effect for the father. Lundberg and Rose (2000) compared U.S. families before and after their first birth, using childless households as the control group. Their findings suggest that the first child leads to a reduction in the wages of mothers and an increase in the wages of fathers. In another study (Lundberg and Rose, 2002), they found that the father's labor supply and wages increased more in response to the birth of a son than to the birth of a daughter.

Most of these results seem to hold in developing countries as well. For example, Kim and Aasve (2006) used data from Indonesia, a country which moved from a high fertility-low income equilibrium to a low fertility-high income equilibrium between 1970 and 1995. They found that, mothers in rural areas decreased their hours of work for each child, whereas men increased their labor supply. In urban areas, they found similar results for women, but no significant effect for men. Lee (2008) used the preference for sons to identify the tradeoff between child quality and quantity in South Korea. He estimated a reproduction function to show that families have a strong preference towards sons and that the probability of having a second child is much higher if the first child is a daughter.

Changes in market conditions can be used to identify the effect of parental labor supply on child schooling, provided that these changes do not influence children directly. Relating the relationship between differential labor market opportunities and child outcomes, Atkin (2009) analyzed the effect of factory openings on child health due to international trade in Mexico. In order to account for the unobserved characteristics of women who choose to work, he used women whose first job was in the manufacturing sector as an instrument. He found that the expansion in employment opportunities due to factory openings induced women to work, which then improved their bargaining power within the household. In addition, women who began to work after the factory opened had significantly healthier children.

The extent to which trade reform affects labor supply works mainly through the increase in labor demand and earning opportunities, which are affected by changes in the relative prices of the domestic economy. The effect on labor markets could be systematic if, for example, male workers have a comparative advantage in brawn intensive industries, while female workers have a comparative advantage in brain intensive industries. More specifically, if males have more brawn, but all other characteristics of males and females are equal, then industries can be characterized as female relative advantage industries and male relative advantage industries (Suare and Zaobi, 2009). If trade liberalization causes specialization in female relative advantage industries, then employment opportunities should increase more for female workers relative to male workers.

By exploiting the variation between Indian districts, Edmonds, Pavcnik, and

Topalova (2011) looked at the effect of medium and short-term adjustment costs on the schooling rates of older children. They found that districts which experienced an average tariff reduction had less of an improvement in their schooling rates compared to districts with no tariff reduction. Therefore, children between the ages of 10 and 14, who face a trade-off between work and schooling, were differentially worse off as a result of trade liberalization. The current paper adds to this finding by documenting that the results may differ for younger children who do not face this trade-off, and showing that improvements in parental labor market outcomes induced by trade liberalization have had a positive effect on their schooling rates. This suggests that the impact on schooling may not have been uniform across the age spectrum, as trade liberalization may have helped improve the literacy rates while reducing the attendance rates among higher grades of children. It is important to note, however, that our results are not entirely comparable. The current paper analyzes the impacts at the household level, accounting for both first-order economy-wide effects as well as differential effects, instead of focusing only on the differential effects across districts. In doing so, we are able to identify an important channel which relates to the adjustments made within households with respect to the time allocation and relative bargaining power between parents.

This paper adds to the existing literature by providing evidence that trade liberalization can influence schooling rates through the labor market outcomes of parents. It shows that this mechanism specifically operates through mothers, as opposed to fathers, and therefore, trade-induced improvements in labor market opportunities for women must be considered as a significant factor in explaining improvements in school attendance. The paper further shows that the response of schooling probabilities to parental labor supply differs by age group, and the effect is significant only for children who are not actively engaged in labor market activities. Although the impact of international trade on child outcomes, and on gender-specific labor market outcomes have been widely studied, there are no papers in the literature that relate these changes to examine how trade protection in parental industries impacts child schooling. The current paper provides evidence that a significant relationship exists for younger children through their maternal labor market activity, and that a one day per week increase in maternal labor supplied outside of the household leads to approximately 5 percentage points increase in the schooling probability for children between the ages of 7 and 10.

3 Theoretical Framework

Consider the household as consisting of two individuals, one mother denoted by m and one father denoted by p. Their utilities depend on the general level of individual consumption, a household public good that we call the number of chil-

dren or fertility, and a household public good that we call the quality of children.[1] Their utility functions are given by:

$$u_i(x_i, n, q) = x_i + \varphi_i(n) + \varphi_i(q) \tag{1}$$

where x_i is consumption of member $i = m, p$ of the household, n is the number of children in the household and q is child quality. Assume that the female has a stronger preference for child quality, hence, $\varphi'_m(q) > \varphi'_p(q)$, while they have the same preference towards the number of children and consumption. Thus, it follows from this assumption that the female has stronger relative preference towards q while the male has stronger relative preference towards n and c.

The output, y, is given by the concave and strictly increasing production function, $h(t_m, t_p)$, where t_i is the time $i(= m, p)$ spends in household production. We assume a simple child rearing technology given by $c = an$, where $a > 0$ and c is the time m spends in child care.

If there is an outside labor market, then $i(= m, p)$ supplies $l_i \geqslant 0$ and receives wage w_i. The individual time constraints are:

$$l_m + t_m + c = 1; l_p + t_p = 1 \tag{2}$$

where the total time of each person is normalized to one.

The budget constraint is given by:

$$x + n(x_0 + bq + aw_m) \leqslant \sum_{i=m,p} w_i(1 - t_i) + h(t_m, t_p) \tag{3}$$

where $x_m + x_p = x$, b is the cost of child quality, and x_0 is the consumption level for each child. We assume that households maximize a weighted sum of adult utilities where the weights depend on the market wage. Hence, the household maximizes:

$$V(u_m, u_p; w_m, w_p) = \alpha(w_m, w_p)u_m + [1 - \alpha(w_m, w_p)]u_p \tag{4}$$

subject to the budget constraint above and where $\alpha m > 0$ and $\alpha p < 0$. The basic idea of the model is that better outside options enhance the bargaining power within the household. It is shown in Rees and Riezman (2012) that the above problem can be solved and the optimal number of children n^*, optimal child quality q^*, and that optimal changes in n^* and q^* with respect to the wage rates of the mother and father can be obtained. Then, it can be shown that:

$$\partial q^*/\partial l_m^* > 0; \partial n^*/\partial l_m^* < 0; \partial q^*/\partial l_p^* > 0, \partial q^*/\partial l_p^* < 0 \tag{5}$$

[1] Child quality and quantity are measured in real numbers.

It follows that trade liberalization can be considered as a process that affects the outside options of male and female individuals.[2] If trade liberalization increases female labor supply l_m, in the post-trade liberalization equilibrium, the value of female outside options will increase, and the household allocation will move towards her preferences, which means higher child quality and a lower number of children. On the other hand, if trade increases male labor supply, or leads to a reduction in female labor supply, then the equilibrium will move toward his preferences, leading to a lower child quality and higher fertility rates.

4 Description of the Data

We use the Employment and Unemployment Survey conducted by the Indian National Sample Survey (NSS) Organization. The NSS Organization adopted a quinquennial survey program that incorporates a nationally representative sample.[3] This is one of the largest and oldest household surveys for a developing country. Our analysis relies on the 43^{rd} and 55^{th} rounds of this survey in rural and urban India and covers a time period of 12 years from 1988 to 2000. The collected information includes household characteristics, as well as individual level variables that are related to labor market outcomes.

Each individual reports up to five activities and the time spent in each activity. Because we are interested in the market labor provided by the mother and father, even when it is not their most important activity, we exploit this aspect of the data when determining the parental labor supply levels. The types of activities include: working in a household enterprise as an own account worker, employer, or unpaid family worker; working as a regular salaried/wage employee; working as a casual wage laborer in public works or in other types of work; attending an educational institution; attending to domestic duties; and engaging in the free collection of goods for household use.

Once we determine the parental labor market variables for each child, we then convert the individual level data so that each observation is for one child, and all of the other variables, such as the education level, parental labor market variables, and household characteristics, are also specified for each child. We exclude multiple family households, as the interaction between different families within these households may alter the child outcomes. We also exclude households in which one of the parents is absent.

[2]The above result represents the substitution effect and rules out the income effect due to quasi-linear preferences.

[3]In addition to the quinquennial surveys based on *thick samples*, the NSS Organization also implements additional surveys between the successive quinquennial rounds that are based on much smaller *thin samples*.

Table 1 shows the activities of children by age groups and gender for each year. For both boys and girls, the schooling rate increased with age and the percentage that are idle decreased with age. The schooling rates among children between 0 and 6 years old primarily reflect those who attend kindergarten and children who began primary school early. There was a significant improvement in the schooling rates for children between the ages of 7 and 10 from 1988 to 2000, with an increase from 52 percent to 79 percent for girls, and from 59 percent to 86 percent for boys. Market work and domestic work are found to be important only among older children between the ages of 11 and 14. In 1988, 9 percent of girls and 12 percent of boys in this age group were engaged in market work. These percentages decreased to 5 and 7 percent, respectively, in 2000. There was also an improvement in the schooling rate of this age group, with a 14 percentage point increase for girls and an 8 percentage point increase for boys over this period. However, these increases were not as large as the increases among younger children. The improvement for older children was primarily due to a substitution away from market work for boys and domestic work for girls.

Our identification strategy relies on the tariff rates in parental industries; therefore, the indirect effect of tariffs on children's educational outcomes through parental labor supply should be significant, but the direct effect should be minimal or insignificant. We focus on children between the ages of 7 to 10 years old, because this age group is unlikely to actively participate in the labor market, especially in menial labor, while they are old enough to attend primary school.[4] Table 1 shows that children within this age group are mostly idle if they are not attending school. This can be seen in Table 1. The schooling rates among girls in this age group increased by 27 percentage points, while the percentage of children who are idle decreased by 25 percentage points. The changes in terms of percentage points were also approximately the same for boys. There was very little change in market or domestic work for this age group, and almost the entire improvement in schooling came from children who were previously idle and not actively participating in domestic work or market labor. On the other hand, a significant proportion of children between the ages of 11 and 14 are engaged in child labor, thus facing a tradeoff between schooling and work.

Household characteristics, including parental labor market activity, also changed significantly. The upper left panel of Table 2 reports the fertility rates by year and sector. Over the sample period, the average number of children per household decreased by 0.21 for urban households and 0.08 for rural households. Rural households have higher levels of fertility and lower per capita income levels in all

[4]Although some children are reported to attend school at ages 5 or 6, we do not include this age group in our analysis, as a significant proportion of these children are attending pre-school from which some parents may opt out even when they have strong preferences towards education.

Table 1: Activities of Children by Age Groups

	Girls				Boys			
Age Group	Schooling	Market Work	Domestic Work	Idle	Schooling	Market Work	Domestic Work	Idle
Year: 1988								
$0-6$	0.10	0.00	0.00	0.89	0.12	0.00	0.00	0.88
$7-10$	0.52	0.02	0.03	0.43	0.59	0.02	0.01	0.38
$11-14$	0.60	0.09	0.18	0.13	0.76	0.12	0.01	0.11
Year: 2000								
$0-6$	0.21	0.00	0.00	0.79	0.22	0.00	0.00	0.77
$7-10$	0.79	0.01	0.02	0.18	0.86	0.01	0.00	0.13
$11-14$	0.74	0.05	0.11	0.10	0.84	0.07	0.01	0.09

Notes: The table represents the proportion of children within an age/gender group engaged in different activities. The schooling category includes children who reported schooling as their principal activity (code 91). The market work category corresponds to the following activities: worked in a household enterprise as a paid or unpaid worker, worked as a regular wage/salaried employee, worked as a casual wage laborer in public works or in other types of work, and worked as a beggar, etc. (codes 11-51 and 96). The domestic work category corresponds to the following activities: attended to domestic duties, engaged in the free collection of goods, sewing, tailoring, or weaving for household use (codes 92-93).

rounds. We observe a significant increase in the per capita income levels for both rural and urban households, even after correcting for inflation.

Parental education is an indicator variable that takes the value of one if the parent had any past education. Using this definition, the percentage of urban mothers who had any schooling was 58 percent in 1988 and 67 percent in 2000. On the other hand, the percentage of urban fathers who had any schooling was 80 percent in 1988 and 83 percent in 2000. Only 24 percent of rural mothers reported that they had any schooling in 1988, with this ratio increasing to 34 percent by 2000. Among rural fathers, only 53 percent had any education in 1988, while this ratio increased to 60 percent in 2000. This clearly shows that education levels are substantially higher among fathers, which will be taken into account in the empirical analysis.

The NSS reports the weekly labor supply for each individual for different activities. Because we are interested in labor supply which can generate bargaining power within the household, we exclude domestic labor and labor provided to household enterprises. It is not likely that these types of activities improve female autonomy and move the child quality/quantity equilibrium towards her preferences.

The participation and labor supply variables reported in Table 2 are based on market activities only (excluding the labor supplied to household enterprises). Only 12 percent of urban mothers and 26 percent of rural mothers participated in these activities in 1988. These rates increased to 14 percent and 32 percent by 2000, indicating a 2.1 and 6.4 percentage point increase, respectively, over twelve years.

Participation in market activities is much higher among fathers. Fifty-nine

Table 2: Household Characteristics and the Labor Market Activity of Parents

	Number of Children		Average Per Capita Expenditure (log)		Parental Education			
					Urban		Rural	
Year	Urban	Rural	Urban	Rural	Mothers	Fathers	Mothers	Fathers
1988	2.396	2.517	5.292	4.917	0.581	0.805	0.241	0.527
	(1.277)	(1.301)	(0.794)	(0.728)	(0.493)	(0.396)	(0.428)	(0.499)
2000	2.183	2.441	5.528	5.068	0.671	0.830	0.344	0.595
	(1.184)	(1.278)	(0.556)	(0.450)	(0.470)	(0.375)	(0.475)	(0.491)

	Participation in Market Work				Labor Supply in Market Work (days/week)			
	Urban		Rural		Urban		Rural	
Year	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers	Mothers	Fathers
1988	0.118	0.587	0.261	0.410	0.534	3.395	0.765	2.253
	(0.323)	(0.492)	(0.439)	(0.492)	(1.729)	(3.080)	(2.029)	(3.015)
2000	0.140	0.587	0.325	0.467	0.606	3.572	0.870	2.560
	(0.347)	(0.492)	(0.468)	(0.500)	(1.862)	(3.254)	(2.082)	(3.084)

Notes: The per capita expenditure variable is corrected for inflation. Parental education is an indicator variable that takes the value of one if the parent had any schooling. The labor market variables are based on market work only. The following categories are included as market work: worked as a regular wage/salaried employee, and worked as a casual wage laborer in public works or in other types of work (codes 21-51). Standard errors are presented in parentheses.

percent of urban fathers and 41 percent of rural fathers participated in market activities in 1988. By 2000, the rate for rural fathers increased to 47 percent, while the rate for urban fathers remained constant. An interesting observation is that, in urban areas, participation in market activities is lower among mothers and higher among fathers relative to rural areas. This may be due to lower overall labor market production among females in urban areas. In fact, if we include labor provided to household enterprises in our definition, the participation ratio of urban mothers remains significantly lower than rural mothers (17 percent and 37 percent), while the participation ratios of urban and rural fathers are very similar (97 percent and 98 percent).

The labor supply in market activities is reported in terms of days per week and includes non-participation.[5] In rural areas, maternal labor supply in market activities was 0.77 days a week in 1988 and 0.87 days a week in 2000, indicating a 13 percent increase. On the other hand, urban fathers supplied much more labor than urban mothers and had a relatively modest increase of 5 percent. In rural areas, both maternal and paternal labor supply in market activities increased by approximately 13 percent. Because we focus only on market activities, the labor supply levels reported in Table 2 are lower than the overall labor supply.

[5]The NSS reports labor supply as the number of days in a week, which we use throughout this study. One could multiply these numbers by the usual work hours per day in India, in order to represent the results in hours instead of days.

5 Trade Liberalization and Labor Markets

Indias post-independence development strategy has relied mainly on self sufficiency. There were heavy restrictions on almost all of the tradable sectors prior to the trade reform. In 1988, the average ad-valorem tariff for the agriculture sector was 116.2 percent, while it was 117.5 percent in manufacturing. In 1991, India went through a very extensive trade liberalization in compliance with the conditions of the International Monetary Fund (IMF). Subsequently, the average tariff in the agricultural sector was reduced to 35.9 percent by 2000, and the average tariff in the manufacturing sector was reduced to 38.3 percent. This trade liberalization came as a surprise to the political community as well as to the production markets. As a result, there was little to no room for political economy concerns in the extent and dispersion of the tariff reductions. The IMF conditions required reductions in all industries regardless of their pre-reform tariff rates. Therefore, the tariff reductions were not significantly correlated with the initial tariff rates or the initial productivity levels of the industries (Topalova and Khandelwal, 2011).

As far as the overall employment effects are concerned, the literature on India suggests that the impact on its labor markets was not entirely consistent with the predictions of the Hecksher-Ohlin model. One crucial assumption of this model, perfect factor mobility, may be violated due to Indias rigid labor laws and industry regulations. In fact, it has been argued that the varying labor regulations across states caused differences in the flexibility of its labor markets (Besley and Burgess, 2004; Hasan et al. 2007). Although a comprehensive review of these regulations is beyond the scope of this paper, the implications in terms of the trade-employment relationship have been widely studied in the literature. Kumar and Mishra (2008) showed that manufacturing workers benefited from trade liberalization, and that these effects were relatively higher for unskilled workers. Further, Hasan et al. (2012) looked at the effect of trade liberalization on unemployment in India and found that unemployment decreases with reduced protection, especially in states with flexible labor markets and in urban areas.

In addition, within-industry employment can rise with trade liberalization due to the high productivity gains that were experienced in India (Felbermayr et al., 2008). If trade reduces variable costs and induces more productive firms to enter, then trade liberalization will increase employment. Topalova and Khandelwal (2011) found that tariff reductions in India increased total factor productivity through a pro-competitive effect due to lower output tariffs, and through access to better inputs due to lower input tariffs. Other studies, such as Bishwanath (2002), showed that growth in employment accelerated in India after 1991, and that export-oriented industries employed relatively more women than import-competing industries.

We first present the composition of the Indian tariff reductions and the gender-

specific labor market outcomes across sectors. The tariff rates used in this paper are from Hasan et al. (2007). The original data is published by the Indian input-output industrial product groups, whereas the Indian NSS survey reports industry affiliations by National Industry Classification (NIC) categories. In order to match the corresponding tariff rates to the parental industries, a tariff rate for each of the NIC categories is computed using the tariffs in both inputs and outputs, and then aggregated by using the imports in each input-output category as weights. For example, the industrial category 'cotton textiles' includes both machinery and chemicals as inputs. The average tariff rate for this industry is therefore composed of tariffs in finished products as well as these inputs. Because each round of the survey data reports a different version of the NIC classifications, the concordance tables are used in order to make these classifications consistent across rounds. The final child-level data includes one set of tariffs for maternal industries, and one set of tariffs for paternal industries by the two-digit NIC 1987 classification.

The share of female labor, the labor supply by gender, the initial tariff rates in 1988, and the tariff reduction between 1988-2000 are presented for each industry in Table 3.[6] Column (5) shows that all industries had substantially tariff rates in 1988, which are observed across the manufacturing industries (eg. manufacturing of rubber, plastic) and the agricultural industries (eg. plantations). Industries across the entire spectrum of protection received significant tariff reductions after trade liberalization, although these reductions were relatively uniform across industries. The female dominant industries are in the agricultural sector, with the exception of fishing, as 47 percent of livestock production and 35 percent of plantation workers were female. The male dominant industries were in coal mining and certain manufacturing industries, especially metal products, machinery, and transportation equipment. Interestingly, women in the male dominant industries worked long hours, as women's weekly labor supply was highest for the manufacturing of transportation equipment and coal mining. Average male labor supply was higher than female labor supply in all industries, and the highest levels of male labor supply were in crude petroleum and coal mining.

Although all industries experienced very high tariff reductions, there was no differential tariff reduction between the male dominated and female dominated industries. The average tariff reduction for industries with a below-median share of female labor (15 percent) was approximately 77 percent, while it was approximately 72 percent for industries with an above-median share of female labor. The average initial tariff rates were also similar, at 138 percent and 141 percent, respectively. In addition, it does not appear that industries to which workers supplied relatively high labor hours per week, on average, were relatively more protected

[6]Some industries have a very low number of females, which is especially true for mining industries. In this table, these particular industries are combined.

Table 3: Industry Composition

		(1)	(2)	(3)	(4)	(5)
Industry Codes	Industries	Share of Female	Female Labor Supply	Male Labor Supply	Tariff Reduction (%)	Initial Tariffs (%)
0	Agricultural Production	0.31	1.87	1.77	45.78	74.67
1	Plantation	0.35	3.81	3.06	74.27	175.20
2	Livestock Production	0.47	2.06	2.68	70.51	114.64
5	Forestry and Logging	0.27	2.13	3.50	77.91	110.00
6	Fishing	0.09	1.33	1.65	66.25	106.67
10	Coal Mining	0.05	7.00	6.38	77.33	90.00
11	Crude Petroleum and Natural Gas	0.04	0.00	6.00	85.32	105.03
12	Metal Ore Mining	0.11	5.00	5.32	85.64	130.00
$13-19$	Other Mining	0.19	3.50	5.51	85.72	131.14
$20-21$	Mfg. Food Products	0.19	1.80	2.26	72.08	171.96
22	Mfg. Beverages and Tobacco	0.69	1.21	1.99	55.97	150.00
$23-25$	Mfg. of Textiles	0.29	1.18	2.91	73.97	138.85
26	Mfg. Textile Products	0.27	1.15	2.16	73.58	140.93
27	Mfg. Wood and Wood Prods	0.16	0.42	1.31	70.54	135.30
28	Mfg. Paper and Paper Prods	0.12	5.25	4.69	79.44	159.79
29	Mfg. Leather and Leather Prods	0.10	1.33	3.08	75.89	145.00
30	Mfg. Rubber, Plastic, Pet	0.25	2.28	5.61	82.00	201.56
31	Mfg. Chemicals and Chem. Prods	0.11	4.14	5.37	74.28	141.23
32	Mfg. Non-Metallic Mineral Prods	0.22	2.36	3.60	73.86	145.61
33	Basic Metal / Alloys Industries	0.04	3.50	4.34	82.77	212.17
34	Mfg. Metal Prods	0.04	1.50	3.38	77.88	162.15
35	Mfg. Machinery, Mach. Tools	0.07	3.44	4.27	75.85	139.51
36	Mfg. Elec. Mach., Apparatus	0.04	3.20	4.20	77.48	143.17
37	Mfg. Transp. Equip and Parts	0.13	6.75	5.59	70.39	129.96
38	Other Manufacturing Industries	0.15	1.53	2.72	76.69	149.05
> 38	Nontraded Industries	0.59	3.49	3.36	NA	NA

Notes: The industry codes represent the NIC 1987 categories. Industry categories between rounds are made comparable using the concordance tables. Some categories are combined if there are not enough observations in the survey data. The tariff data is from Hasan et al. (2007). The individual data includes males and females between the ages of 15 and 65. The female share for each industry and the labor supply values are presented for the year 2000. The labor supplies are presented in terms of days per week. The initial tariffs are the rates in 1988, and the tariff reductions are between 1988 and 2000. Sampling weights are used in the estimations of the average values.

prior to trade liberalization, nor had they experienced higher reductions in their tariff rates.

We next investigate the impact of tariff reductions on parental labor market outcomes by estimating the following model for male and female workers:

$$L_{ljt} = \beta_0 + \beta_1 \log \tau_{jt-2} + \beta_2 X_{lt} + \gamma_{drt} + \varphi_{ljt} \tag{6}$$

where L_{ljt} is the labor market outcome of the worker $i = m, p$ in industry j at time t, τ_{jt-2} is the tariff rate in industry j at time $t-2$, X_{lt} is a vector of individual and household characteristics. Differential changes across geographical regions independent of tariff reductions are controlled by district, year, and rural fixed effects denoted by γ_{drt}. Finally, φ_{ljt} donotes the $i.i.d.$ error term. We run this model for both genders, distinguishing between the labor market activities outside of the household and the activities within the household enterprise. Because the impact of tariffs on labor market outcomes cannot be immediate, we use the two-year lags of the tariff rates in our analysis. [7]

While estimating the impact of tariffs on labor supply, it is important to adjust for self-selection into the labor market. The labor market outcomes are not observed for individuals who decide not to participate in the labor market, so these variables are censored at zero. It is not appropriate to focus only on participants, because the outcomes of individuals who work may not necessarily give valid estimates for individuals who self-select themselves out of the labor market. We estimate the above model with the Heckman (1979) two-step selection model which takes into account the participation as well as the labor supply decisions.[8] This method involves estimating a probit model that predicts the probability of being employed, and then uses these estimates to compute the inverse Mills ratio to be included as a covariate in the labor supply equation. We use an exactly identified model, meaning that all of the explanatory variables in the labor supply model are also included in the selection model. Both the OLS and Heckman results are presented in Table 4 for males and females, distinguishing between the labor supplied to the market and household enterprises.

The results suggest that the tariff reductions are associated with an increase in wage-earning market activities outside of the household, as indicated by the

[7] Specifically, we use the 1986 tariffs for the 43^{rd} round, and the 1998 tariffs for the 55^{th} round. The 1986 tariff rates are extrapolated using the percentage reduction between 1988 and 1989. Because the tariff rates remained constant prior to the trade liberalization in 1991, there was little or to change over this time period. We additionally used the one-year and three-year lags and found that they provide similar results.

[8] The results from censored Tobit model turned out to be very similar to the Heckman model. In this paper, the Heckman model is preferred, as it provides a more flexible framework to account for selection in the subsequent analysis.

negative coefficient on tariffs, while reducing labor supplied to household enterprises. Considering that tariffs were reduced by roughly 70 percent between 1988 and 2000, the results indicate that trade liberalization increased weekly maternal labor supply by approximately 1.2 days per week in market activities and reduced 1.8 days per week in household activities. The magnitudes turned out to be smaller for paternal outcomes, although they are still significant. Evaluating at the realized tariff reductions during this period, labor supply increased by 0.2 days per week in market employment and 0.4 days per week in household employment.

Female labor supply was positively associated with age for the market, household, and total labor supply. On the other hand, older male workers tend to work more for wages and less for household enterprises. Females who attended school tend to work less, potentially due to the higher compensation rates for these individuals. The results for males were more substantial in that schooling lead to about a half a day per week increase in their labor supplied for wages and about half a day per week decrease in their labor supplied to household enterprises. As expected, more land ownership is associated with less labor supplied to market activities. A doubling of the land owned by a household is associated with a 0.7 days per week increase in labor supplied at the household enterprise while decreasing market labor supply by about a half a day per week. In general, the nature of employment turned out to be a very important factor in determining how individual and household characteristics influence work hours for both men and women. While the impact on total labor supply may be negligible for some of the variables, we observe a significant impact conditional on the type of the employment.

The trade-induced shift towards wage-earning labor may be a result of both push and pull factors. Most of the household enterprises are small scale farms, and reduced agricultural prices due to international competition may have rendered these farms unprofitable, causing households to move away from these activities. A family which is not able to generate income from the household farm may be forced to search for outside employment opportunities. On the other hand, the increases in wages and employment opportunities in market activities may have made wage employment more attractive, by increasing the opportunity cost of both leisure and household-based jobs. Overall, these effects were higher in magnitude for female workers. This is potentially due to the differential expansion in female relative-advantage industries, as previously discussed, lower levels of initial labor supply by female workers, or a differential increase in the compensation and job opportunities for female workers.

Table 4: The Impact of Tariff Reductions on Parental Labor Supply

	(1)	(2)	(3)	(4)	(5)	(6)
	Total	Market	Household	Total	Market	Household
Mothers						
Tariffs (log)	0.8999***	-1.7947***	2.6946***	0.9308***	-1.6732*	2.6040**
	(0.073)	(0.084)	(0.087)	(0.075)	(1.008)	(1.083)
Age	0.0857***	0.0961***	-0.0103	0.0523***	0.0350	0.0173
	(0.021)	(0.021)	(0.019)	(0.018)	(0.244)	(0.262)
Age-squared/100	-0.0876***	-0.1451***	0.0574**	-0.0484*	-0.0640	0.0155
	(0.028)	(0.028)	(0.026)	(0.025)	(0.337)	(0.362)
Attended School	-0.1937***	-0.1628***	-0.0309	-0.1706***	-0.4480	0.2774
	(0.058)	(0.060)	(0.062)	(0.050)	(0.676)	(0.726)
Land Owned (log)	0.1564***	-0.4982***	0.6547***	0.1293***	-0.5270***	0.6563***
	(0.017)	(0.018)	(0.015)	(0.014)	(0.193)	(0.207)
Household Characteristics	x	x	x	x	x	x
District-Year-Rural FE	x	x	x	x	x	x
R-squared	0.032	0.181	0.253			
Wald-Chi2 (Heckman)				2,347	3,143	4,176
Observations	78,580	78,580	78,580	78,580	78,580	78,580
Fathers						
Tariffs (log)	0.3318***	-0.3830***	0.7148***	0.1270***	-0.3973***	0.8582***
	(0.042)	(0.075)	(0.079)	(0.004)	(0.005)	(0.006)
Age	0.0314***	0.0610***	-0.0296**	-0.0035***	0.1317***	-0.1058***
	(0.010)	(0.013)	(0.013)	(0.001)	(0.002)	(0.002)
Age-squared/100	-0.0356***	-0.1127***	0.0771***	0.0165***	-0.2196***	0.1917***
	(0.012)	(0.016)	(0.016)	(0.001)	(0.002)	(0.002)
Attended School	0.0532*	0.4329***	-0.3797***	0.0239***	0.5019***	-0.4485***
	(0.029)	(0.033)	(0.036)	(0.002)	(0.004)	(0.004)
Land Owned (log)	0.1146***	-0.6690***	0.7836***	0.0606***	-0.5408***	0.6693***
	(0.010)	(0.013)	(0.012)	(0.001)	(0.001)	(0.001)
Household Characteristics	x	x	x	x	x	x
District-Year-Rural FE	x	x	x	x	x	x
R-squared	0.175	0.253	0.350			
Wald-Chi2 (Heckman)				3,828	2,572	5,997
Observations	76,516	76,516	76,516	76,516	76,516	76,516

Notes: The dependent variables are indicated as column names. Columns (1) to (3) presents results of OLS models while Columns (4) to (6) presents results of Heckman selection model. Market activities are defined as the following activities: worked as regular a salaried/wage employee, worked as a casual wage laborer in public works and in other types of works (activity codes 31-51). Household activities are defined as the following activities: worked in household enterprise as own account worker, employer or unpaid family worker (activity codes 11-21). Labor supply is defined as days/week. Household controls include religion and social group of the household (caste, tribe), number of children in the household, and log per capita expenditure. The sample is not restricted by the number of children. All standard errors are corrected for heteroscedasticity. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

6 Parental Labor Supply and Child Schooling

6.1 Baseline Specification

Child schooling can be influenced by a variety of factors, including the cultural background, parental education, and income level of a household. There may be differential changes in schooling investments across geographical regions, leading to

differences in access to schooling, not only in terms of rural versus urban settings, but also across states and districts. The schooling probability of each child may be negatively associated with the number of siblings within households due to binding time and budget constraints. A childs age and gender, as well as the labor market characteristics of their parents, may also influence the schooling probability of children. Consider the following child schooling regression:

$$y_{iht} = \alpha_0 + \alpha_1 m_{hjt} + \alpha_2 p_{hkt} + \alpha_3 n_{ht} + \alpha_4 X_{ht} + \alpha_5 C_{iht} + \phi_{jt} + \phi_{kt} + \gamma_{tdr} + \varepsilon_{iht} \tag{7}$$

where y_{iht} is a binary variable for whether or not child i in household h at time t attends school. m_{hjt} is the labor supply of a mother in household h and industry j at time t and p_{hkt} is the labor supply of a father in household h and industry k at time t. n_{ht} is the number of children in household h at time t. X_{ht} is a variable of household characteristics such as religion, social class, and per capita expenditure, as well as the labor market characteristics of the mother and father such as education and age. C_{iht} represents the characteristics of the child including age and age-squared and a binary variable for boys. ϕ_{jt} and ϕ_{kt} control for industry specific shocks other than the tariff reductions in the maternal industry j and the paternal industry k, γ_{tdr} is a vector of district, year, and rural fixed effects which controls for macroeconomic shocks common to all individuals within each district in rural and urban areas. Finally, ε_{iht} is an $i.i.d.$ error term that is assumed to be uncorrelated with child schooling.

The household survey we use reports the industry affiliation for each individual, allowing us to merge the tariff rates to parental industry affiliation for each child. This restricts our sample to children whose parents are working in traded industries, reducing our sample size to roughly 37 thousand children, about 20 thousand of which are between the ages of 7 and 10. The above equation is estimated with and without the district level fixed effects using the linear probability model. Following Glick and Shan (1998), the inverse Mills ratios are included in each regression to correct for the selection bias due to censored labor supply variables. In order to account for within-household correlation, all reported standard errors are clustered at the household level. The results for children between the ages of 7 and 10 are reported in Table 5. According to columns (1) and (2), maternal labor supply is estimated to have a positive and significant effect on child schooling. A one day per week increase in maternal labor supply increases the child schooling rate by approximately 0.2 to 0.3 percentage points. The effect of paternal labor supply was insignificant under all of the specifications.

The household characteristics have the expected effects on the schooling probability. Each additional child reduced the schooling probability by approximately 3.6 percentage points. A one percent increase in per capita household expenditure

Table 5: Child Schooling and Parental Labor Supply - OLS Results for Ages 7-10

	(1)	(2)	(3)	(4)	(5)	(6)
Maternal Labor Supply	0.0032**	0.0024*	0.0022**			
	(0.002)	(0.001)	(0.001)			
Paternal Labor Supply	-0.0002	-0.0005		0.0012		
	(0.002)	(0.002)		(0.001)		
$MPLS = I(MLS - PLS > 1)$					0.0270**	0.0210*
					(0.012)	(0.012)
Number of Children		-0.0358***	-0.0356***	-0.0338***		-0.0359***
		(0.003)	(0.003)	(0.003)		(0.003)
Household Characteristics						
Per-Cap Expenditure (log)	0.0532***	0.0367***	0.0368***	0.0336***	0.0524***	0.0362***
	(0.013)	(0.010)	(0.010)	(0.010)	(0.014)	(0.010)
Land Owned (log)	0.0139***	0.0150***	0.0155***	0.0156***	0.0121***	0.0140***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Child Characteristics						
Boy	0.1244***	0.1194***	0.1206***	0.1189***	0.1244***	0.1194***
	(0.010)	(0.008)	(0.008)	(0.008)	(0.010)	(0.008)
Age	-0.0042	0.0150	0.0148	0.0143	-0.0040	0.0153
	(0.156)	(0.154)	(0.154)	(0.155)	(0.156)	(0.154)
Age-Squared	0.0020	0.0008	0.0008	0.0008	0.0020	0.0008
	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Parental Characteristics						
Mother Age	-0.0101***	-0.0096***	-0.0097***	-0.0101***	-0.0101***	-0.0096***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Father Age	0.0072***	0.0066***	0.0065***	0.0072***	0.0073***	0.0066***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Mother Attended School	0.1495***	0.1368***	0.1367***	0.1450***	0.1494***	0.1367***
	(0.025)	(0.023)	(0.023)	(0.026)	(0.025)	(0.023)
Father Attended School	0.1652***	0.1667***	0.1663***	0.1683***	0.1637***	0.1657***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)
Maternal Industry Fixed Effects	x	x	x	x	x	x
Paternal Industry Fixed Effects	x	x	x	x	x	x
District-Year-Rural Fixed Effects	x	x	x	x	x	x
Number of Observations	20,084	20,084	21,359	20,139	20,084	20,084
R-squared	0.270	0.277	0.278	0.276	0.270	0.277

Notes: The dependent variable, child schooling, is an indicator variable which is constructed based on the principal activity of the child (code 91). The results are presented for children between the ages of 7 and 10. Labor supply is defined as days of the week spent in the following labor market activities: worked as regular a salaried/wage employee, and worked as a casual wage laborer in public works and in other types of works (codes 31-51). MPLS is an indicator variable that marks the households in which the difference between maternal labor supply and paternal labor supply is positive and larger than one work day per week. Additional controls include religion and social group of the household (i.e. caste, tribe). Each regression includes inverse Mills ratios to correct for the selection bias. All standard errors are corrected for heteroscedasticity and are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

increases the schooling probability by approximately 5 percent, and a one percent increase in land ownership increases the schooling probability by approximately

1.4 percent. Children were about 16 percent more likely to go to school if their parents had any schooling. Boys were approximately 12 percent more likely to attend school. The age controls turned out to be insignificant for the children in this age group. There were significant differences between the mothers and fathers in terms of the effect of their characteristics, with the schooling probability being negatively associated with the mother's age but positively correlated to the father's age. This may be due to the fact that children with older mothers are more likely to have older siblings, who can assume childcare responsibilities, offering a less costly alternative to sending the child to school.

The main coefficients of interest in equation (7) are α_1 and α_2. However, the variables associated with these coefficients, maternal and paternal labor supply, may be considered as substitutes for one another. A higher labor supply for fathers may lower the labor supply for mothers, reducing the effect of maternal labor supply. In columns (3) and (4), we include the labor supply variables separately in order to understand whether this substitution effect is influencing the results. The results show that the effect of maternal labor supply is slightly lower but still significant under this specification, and the effect of paternal labor supply is still insignificant.

In order to reduce the dimensionality of the problem, we define a new variable which indicates when the mother supplies more market labor than the father. This new variable, maternal minus paternal labor supply, which we call $MPLS$, is defined as follows:

$$MPLS_{ht} = \begin{cases} 1 & \text{if } (m_{ht} - p_{ht}) > 1 \\ 0 & \text{if } (m_{ht} - p_{ht}) \leq 1 \end{cases} \tag{8}$$

This variable essentially marks the households in which the female supplies one day or more in market labor per week than the male. It allows us to compare these households to the households in which the female supplies an equal amount of market labor, meaning that the difference is less than one work day per week. If the labor supplied to the market is a source of bargaining power, households with $(m_{ht} - p_{ht}) > 1$ should have children with higher levels of schooling after controlling for per capita household expenditure. These results are presented in columns (5) and (6) of Table 5. The results indicate that children in households in which the mother supplied more market labor than the father had approximately 2.7 percentage points higher schooling rate relative to other households (column 5). This estimate decreases to 2.1 percentage points if we control for the number of children (column 6), indicating that there is some re-allocation between home and market production.

The summary statistics in Table 1 showed that the increase in schooling rates for older children between the ages of 11 and 14 is primarily due to a reduction

Table 6: Child Schooling and Parental Labor Supply - OLS Results for Ages 11-14

	(1)	(2)	(3)	(4)	(5)	(6)
Maternal Labor Supply	-0.0019	-0.0030	-0.0057**			
	(0.003)	(0.003)	(0.002)			
Paternal Labor Supply	-0.0040	-0.0040		-0.0058***		
	(0.003)	(0.003)		(0.002)		
$MPLS = I(MLS - PLS > 1)$					-0.0227	-0.0301
					(0.025)	(0.024)
Number of Children		-0.0393***	-0.0396***	-0.0388***		-0.0389***
		(0.002)	(0.002)	(0.003)		(0.003)
Household Characteristics						
Per-Cap Expenditure (log)	0.0698***	0.0475***	0.0496***	0.0481***	0.0726***	0.0509***
	(0.008)	(0.005)	(0.005)	(0.005)	(0.008)	(0.005)
Land Owned (log)	0.0087***	0.0092***	0.0103***	0.0095***	0.0127***	0.0137***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Child Characteristics						
Boy	0.2380***	0.2295***	0.2285***	0.2300***	0.2377***	0.2292***
	(0.026)	(0.027)	(0.026)	(0.027)	(0.026)	(0.026)
Age	-0.2572***	-0.2948***	-0.2945***	-0.2969***	-0.2585***	-0.2962***
	(0.055)	(0.049)	(0.050)	(0.052)	(0.054)	(0.047)
Age-Squared	0.0078***	0.0092***	0.0092***	0.0093***	0.0078***	0.0093***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Parental Characteristics						
Mother Age	-0.0022**	-0.0029***	-0.0027**	-0.0029***	-0.0020*	-0.0027**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Father Age	0.0034***	0.0012	-0.0006	0.0011	0.0033**	0.0011
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mother Attended School	0.1611***	0.1491***	0.1484***	0.1492***	0.1615***	0.1497***
	(0.023)	(0.021)	(0.022)	(0.021)	(0.024)	(0.022)
Father Attended School	0.1961***	0.1934***	0.1896***	0.1944***	0.1984***	0.1961***
	(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.011)
Maternal Industry Fixed Effects	x	x	x	x	x	x
Paternal Industry Fixed Effects	x	x	x	x	x	x
District-Year-Rural Fixed Effects	x	x	x	x	x	x
Number of Observations 15,888	15,888	16,826	15,934	15,888	15,888	
R-squared	0.216	0.226	0.226	0.225	0.215	0.225

Notes: The dependent variable, child schooling, is an indicator variable which is constructed based on the principal activity of the child (code 91). The results are presented for children between the ages of 11 and 14. Labor supply is defined as days of the week spent in the following labor market activities: worked as regular a salaried/wage employee, and worked as a casual wage laborer in public works and in other types of works (codes 31-51). MPLS is an indicator variable that marks the households in which the difference between maternal labor supply and paternal labor supply is positive and larger than one work day per week. Additional controls include religion and social group of the household (i.e. caste, tribe). Each specification includes inverse Mills ratios to correct for selection bias. All standard errors are corrected for heteroscedasticity and are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

in domestic work for girls and in market work for boys. If the labor supplied by these children is a substitute for parental labor, there may be a differential effect in terms of the relationship between parental labor supply and child schooling.

The results for these older children are presented in Table 6. The effect of parental labor supply on their schooling rates is insignificant, with the exception of the negative relationship with parental labor supply in specifications (3) and (4), which may suggest a substitution between the work of older children and their parents labor. This effect disappears when both labor supply variables are included. The age of the child affected the schooling probability for this age group, albeit negatively, indicating a higher drop-out rate among older children. The coefficient for mothers age, on the other hand, was smaller, and the effect of paternal age was insignificant. This evidence implies that, once the combined household expenditure and parental labor market characteristics are controlled for, there are no significant effects on the schooling rates of older children. In addition, changes in parental labor supplied to household enterprises have insignificant effect on child schooling. These insignificant results hold throughout the rest of the analysis. In what follows, the results are only presented for younger children, and for parental labor supplied to the market for brevity.

6.2 Tariff Reductions as an Instrument for Parental Labor Supply

Individuals face a tradeoff between home and market production due to binding time and budget constraints. Considering this mechanism within a household, it follows that the parental labor supply and child schooling are simultaneously determined and thus the causal relationship is not exactly identified. In order to ensure identification, we use the exogenous variation in tariff rates to instrument for the changes in parental labor supply. Lower tariff rates will increase the amount of labor supplied to the market, making tariffs an important determinant of maternal and paternal labor supply in market activities. These tariffs are unlikely to directly affect the schooling outcomes for younger children, conditional on household characteristics, as the improvement in schooling rates among this group was due to a reduction in idle children, rather than a reduction in child labor as it was for older age group. Conditional on a wide set of controls for family background, as well as child and parent characteristics, these tariffs are unlikely to be correlated with unobservables as they are determined at the national level and are specific to the industry affiliation of parents.

In order to account for other changes in parental industries, such as productivity improvements and changes in other policies, we include a full set of industry fixed effects for both maternal and paternal industries. While tariffs are determined at the national level, it may be the case that some regions are more or less impacted due to the differences in their industry-specific employment shares. There may be differential changes across geographical regions independent of tar-

iff reductions. In order to account for these regional differences, and identify the effects within districts, we control for district, year and rural fixed effects.[9] We use two-year lagged tariff rates because the impact of tariffs on labor supply outcomes cannot be immediate. Using lagged tariffs is also necessary to ensure that it is pre-determined and exogenous to a worker's decisions at the time it was set. The selection of employment into industries is not a concern in our case as we use 2-digit broad industry categories and there is little change across industries over time. Because the selection into employment is still a concern, we instrument for parental labor supply while accounting for selection in both the first stage labor supply regression and the second stage child schooling regression.[10]

Equation (7) is estimated using two-stage least squares by instrumenting the labor supply variables with a two-year lag of the log tariff rates, $ln(\tau_{j,t-2})$ and $ln(\tau_{k,t-2})$, in the maternal and paternal industries j and k, respectively. The results in Table 7 suggest that the tariff rates serve as a strong instruments for parental labor supply, as implied by the high first stage F-statistics. The first column of Table 7 suggest that the effect of maternal labor supply remains positive and significant with a higher magnitude. A one day per week increase in maternal labor supply corresponds to a 5.5 percentage point increase in the child schooling probability. If paternal labor supply is not included in the regression, the effect remains significant, although it is somewhat reduced to a 5 percentage point increase. Paternal labor supply remains insignificant under all specifications.

The impact of maternal labor supply on schooling probability is comparable in magnitude to some of the other coefficients in the model. Controlling for the other covariates, increasing maternal labor supply by one day per week has an effect that is similar in magnitude to a percent higher per capita expenditure, or one percent higher land ownership. This implies that, in improving schooling rates, the allocation of resources within households can be as important as the wealth of the households. However, among all determinants, parent's education, especially father's education, is the most important factor in determining whether or not a child attends school.

The estimates are higher once the endogeneity of parental labor supply is accounted for, which suggests that the covariance between female labor supply and the error term was negative in the baseline OLS specification. In addition to the

[9]The NSS does not directly provide the village codes, therefore village-time fixed effects cannot be included. While the NSS data do contain First Stage Sampling Unit (FSU) codes, which are villages in rural settings and hospital areas, school areas, etc. in urban settings, the variable presents false FSU codes for privacy reasons, making it impossible to match them across rounds. We therefore use the district codes in our analysis.

[10]While Glick and Sahn (1998) used assets and non-labor household income as instruments, they suggest prices as plausible instruments as well. Tariff rates are strongly linked to domestic prices through cost minimization, as suggested by the tariff pass-through literature.

Table 7: IV Results - Using the Tariff Reductions in Parental Industries

	(1)	(2)	(3)	(4)	(5)	(6)
Maternal Labor Supply	0.0551**	0.0500**		0.0543***	0.0504***	
	(0.023)	(0.019)		(0.013)	(0.012)	
Paternal Labor Supply	-0.0080		0.0404	-0.0155		0.0126
	(0.011)		(0.035)	(0.014)		(0.012)
Number of Children	-0.0297***	-0.0294***	-0.0310***	-0.0300***	-0.0290***	-0.0327***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Household Characteristics						
Per-Cap Expenditure (log)	0.0620***	0.0641***	0.0655***	0.0486***	0.0557***	0.0402***
	(0.007)	(0.005)	(0.006)	(0.011)	(0.012)	(0.011)
Land Owned (log)	0.0416***	0.0445***	0.0434***	0.0371***	0.0464***	0.0240**
	(0.010)	(0.012)	(0.011)	(0.008)	(0.008)	(0.009)
Child Characteristics						
Boy	0.1203***	0.1211***	0.1168***	0.1208***	0.1213***	0.1185***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)
Age	-0.0067	-0.0030	0.0236	-0.0077	-0.0041	0.0169
	(0.165)	(0.163)	(0.155)	(0.153)	(0.155)	(0.156)
Age-Squared	0.0020	0.0018	0.0002	0.0021	0.0018	0.0007
	(0.010)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)
Parental Characteristics						
Mother Age	-0.0111***	-0.0112***	-0.0117***	-0.0086***	-0.0084***	-0.0096***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Father Age	0.0076***	0.0079***	0.0089***	0.0054***	0.0056***	0.0065***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)
Mother Attended School	0.1543***	0.1535***	0.1460***	0.1521***	0.1508***	0.1445***
	(0.026)	(0.026)	(0.026)	(0.023)	(0.023)	(0.026)
Father Attended School	0.1861***	0.1877***	0.1871***	0.1798***	0.1857***	0.1719***
	(0.010)	(0.011)	(0.011)	(0.007)	(0.006)	(0.008)
Maternal Industry Fixed Effects	x	x	x	x	x	x
Paternal Industry Fixed Effects	x	x	x	x	x	x
Year-Rural Fixed Effects	x	x	x			
District-Year-Rural Fixed Effects				x	x	x
Number of Observations	20,084	21,359	20,139	20,084	21,359	20,139
R-squared	0.259	0.260	0.257	0.277	0.277	0.276
First Stage F Statistics						
Maternal	122.42	124.97		52.11	52.50	54.15
Paternal	130.69		132.36	54.08		54.15

Notes: The dependent variable, child schooling, is an indicator variable which is constructed based on the principal activity of the child (code 91). The results are presented for children between the ages of 7 and 10. Labor supply is defined as days of the week spent in the following labor market activities: worked as regular a salaried/wage employee, and worked as a casual wage laborer in public works and in other types of works (activity codes 31-51). The tariff rates in maternal and paternal industries are defined in terms of their 2-digit industry affiliations by NIC 1987 classifications. Additional controls include religion and social group of the household (i.e caste, tribe). Each specification includes inverse Mills ratios to correct for selection bias. All standard errors are corrected for heteroscedasticity and are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

mechanism described above, this can happen when women with a low amount of labor supply have disproportionately high schooling levels among their children due to some unobserved characteristics. For example, women with less of a labor

market attachment may have relatively high bargaining power due to the assets brought into the marriage, or other factors that may affect female autonomy which are not observable. If these women also have a lower tendency to participate in the labor market, then OLS would underestimate the impact. Another potential explanation is endogenous family formation. If women with less of an interest in the labor market are matched to men with relatively high preferences towards child quality, then the selection would bias the estimates downward.

These results suggest that trade liberalization helped improve the schooling rates among children between the ages of 7 and 10 by increasing the maternal labor supplied to the market, either through increased bargaining power within household or through a reduction in the time available for childcare. The results thus imply that the impact of trade liberalization on schooling may be non-uniform, in the sense that it may have differentially reduced schooling among older children, as documented by Edmonds et al. (2011), while increasing attendance rates among the younger age group. More importantly, the results suggest that the substitution effect of increasing maternal labor hours, after controlling for factors that relate to the general well-being of the household, is a significant determinant of the schooling rates for children of this age group.

Within this time period, the tariff rates were reduced by approximately 70 percent. According to our first stage estimates, this increased maternal labor supply to the market by approximately 1.2 days per week. The second stage then suggests this impact is associated with an increase in schooling probability of children between the ages of 7 and 10 by approximately 6 percentage points. Male labor supply also increased as a result of the tariff reduction, but this had no significant impact on the child schooling probability. Considering that the total improvement in child schooling was 27 percentage points, these estimates corresponds to approximately one fifth of the improvement in schooling rates.

6.3 Endogenous Fertility and Gender Composition

When analyzing the effect of parental labor supply on child schooling, the number of children within a household is a potential source of bias, as it changes the value of household labor. In households with a large number of children, the value of home production is relatively higher, therefore we should see less market labor supply, especially for the mother. In addition, the specialization between the mother and father will be more significant for households with a larger number of children. Both of these effects point to a lower labor supply for mothers in households with a larger number of children. The tradeoff between child quality and quantity will then lead to lower schooling rates for children with more siblings. In addition, household with more children may be composed of parents who have weak preferences for schooling. Hence, the fertility and schooling rates may be

simultaneously determined, which would bias the estimates if these households are also structurally different in terms of their labor supply.

Within the empirical literature, the link between labor supply decisions and the child quality-quantity tradeoff has been widely studied. Angrist and Evans (1998) used the gender composition of first two children as an instrument for fertility. If parents prefer a mixed-gender composition among their children and if the first two children are of the same gender, then the family will have a higher probability of having a third child. In fact, they show that having two boys or two girls increases the probability of having a third child by about 6 percent in the U.S. Using this instrument, they found that having an additional child reduced the probability of female labor market participation by 12 percent and their labor supply by about 5 hours per week.

This tradeoff between child quality and quantity is presented for India in Figure 1, where the schooling rates are shown for children between the ages of 7 and 10 only. It is clear from the figure that the probability of a child attending school decreases significantly as the number of children within a household increases. For example, in urban areas in 1988, the average schooling rate for households with one child was approximately 82 percent, whereas it was 61 percent for households with seven children. This negative relationship holds in both rural and urban households for each survey round. In general, attendance rates are lower in rural areas than in urban areas. However, they possess a similar structure in terms of the child quality and quantity tradeoff.

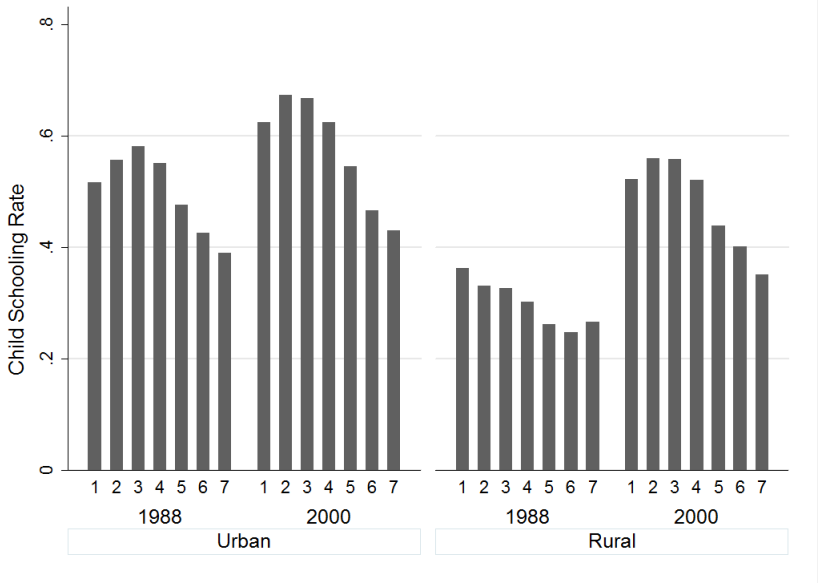
We construct a gender composition variable by following the definition of Angrist and Evans (1998) and define the gender composition as the following:

$$s_h = b_{1h}b_{2h} + g_{1h}g_{2h} = b_{1h}b_{2h} + (1 - b_{1h})(1 - b_{2h}) \tag{9}$$

where b_{1h} is an indicator variable that marks the households in which the first child is a boy, b_{2h} marks the households in which the second child is boy, g_{1h} marks the households in which the first child is a girl, and g_{2h} marks the households in which the second child is a girl. Naturally, we have $g_{1h} = 1 - b_{1h}$ and $g_{2h} = 1 - b_{2h}$. Our first gender composition variable, s_h, will be an indicator variable which takes the value of one if the first two children are of the same gender. In what follows, we will refer to these households as *same-gender* households.

What makes the gender composition a strong exogenous determinant for fertility is that it is given to the family by nature. If the gender composition is completely random, then the only way it can affect child schooling would be through fertility, making it a strong exclusion restriction. The argument is as follows: if families have a preference for a mixed-gender composition among their children, and if the first two children are of the same gender, then they will have a higher probability of having a third child and, on average, they will have higher fertility

Figure 1: Schooling and Number of Children



Notes: The figure is based on 43rd and 55th rounds of the NSS data. The schooling rates are shown for children between the ages of 7 and 10. Each bar represents the schooling rate within a cell specified by year, sector, and the number of children. Households with more than 7 children are not shown due to the low number of observations within these cells.

rates. Because this instrument is an indicator variable, our identifying assumption is straightforward. Identification requires that same-gender households are not structurally different than other households after controlling for household and parental characteristics. In other words:

$$\mathbb{E}[y_{iht}|X_h, X_{mjh}, X_{pkh}, n_h; s_h = 0] = \mathbb{E}[y_{iht}|X_h, X_{mjh}, X_{pkh}, n_h; s_{ht} = 1] \qquad (10)$$

where y_{iht} is a binary variable for whether or not child i in household h in time t attends school, X_h contains household characteristics, X_{mjh} and X_{pkh} are labor market characteristics and industry characteristics of the mother and father who are working in industry j and industry k, respectively, and n_h is the number of children in household h.

In order to test for the validity of the same-gender variable as an instrument for fertility, we decompose s_h into households in which the first two children are both boys or both girls and test whether there are structural differences between these families and the rest of the population. We will refer to these households as *two-boy* and *two-girl* households. Table 8 presents some summary statistics for the three gender composition variables. Same-gender households have 0.12 more children on average, which is statistically significant. Two-girl households have

Table 8: Fertility and Household Characteristics by Gender Composition

Gender composition of first two children	Percentage of Households	Average number of children within each household	Per Cap Expenditure (log)	Maternal Education	Paternal Education
Same Gender =1	0.498	2.664	5.260	0.153	0.393
		(0.016)	(0.009)	(0.005)	(0.006)
Same Gender =0	0.502	2.542	5.279	0.167	0.412
		(0.015)	(0.009)	(0.005)	(0.007)
Difference		0.122***	-0.019	-0.014**	-0.027***
		(0.021)	(0.013)	(0.007)	(0.009)
Two Girls=1	0.758	2.674	5.262	0.164	0.394
		(0.024)	(0.014)	(0.007)	(0.009)
Two Girls=0	0.242	2.580	5.271	0.159	0.410
		(0.012)	(0.007)	(0.004)	(0.005)
Difference		0.094***	-0.009	0.006	-0.015
		(0.025)	(0.015)	(0.008)	(0.010)
Two Boys=1	0.743	2.655	5.257	0.142	0.391
		(0.020)	(0.013)	(0.006)	(0.005)
Two Boys=0	0.257	2.585	5.273	0.167	0.411
		(0.013)	(0.008)	(0.004)	(0.005)
Difference		0.070***	-0.015	-0.024***	-0.019**
		(0.025)	(0.015)	(0.008)	(0.011)

Notes: Standard errors are presented in parentheses. Maternal and paternal education are measured as indicator variables that takes the value of 1 if they had any schooling. The difference between group averages is tested against the t-distribution. The asterisk denote that the difference is significant at the 10 percent, 5 percent, and 1 percent levels, respectively.

0.09 more children on average, and two-boy households have 0.07 more children on average, both of which are statistically significant. The first piece of evidence towards preference for boys is that two-girl households tend to have more children than two-boy households.

In terms of the average per capita expenditure, there is no statistically significant difference between same-gender (two-boy or two-girl) households relative to the rest of the households. However, we observe an interesting pattern in the maternal and paternal education variables: parents in two-boy households have significantly less education, where education is defined as an indicator variable that takes the value of one if the parent had any schooling. Specifically, in two-boy households, 2.4 percent fewer mothers and 1.9 percent fewer fathers had any education under this definition. The education levels of families with two girls are not significantly different than the rest of the population. Further, there is a disproportionately high number of households with two boys. Assuming that there is a 50 percent probability for each gender, the probability of two-boy and two-girl combinations should each be 25 percent. However, about 26 percent of households had two boys and 24 percent of households had two girls in the first two births.

The data do not contain information on gender selection prior to birth. The evidence, however, point toward a preference for male children. The data also

suggest that gender selection specifically occurs among less educated households. The two-girl indicator is thus our preferred instrument for fertility. In order to account for endogeneous fertility, we now incorporate the gender composition instruments. The specifications presented in Table 9 include the instruments with the two-girl indicator or the same-gender indicator. The results are not presented for only the gender composition instrument (and no tariffs), as the coefficients on the labor supply variables are almost identical to the OLS results which were presented under the baseline specification. These results are, however, available upon request.

The first three columns of Table 9 report the results with our preferred instrument, the two-girl indicator. The inclusion of this instrument increased the effect of maternal labor supply. A one day per week increase in labor supplied outside of the household was associated with an increase between 15 and 24 percentage points in the child schooling probability. The impact of paternal labor supply on child schooling still has an insignificant effect. The effect of the number of children, once instrumented, becomes insignificant. The first stage results suggest that the same-gender indicator is a strong determinant of the number of children, and that same-gender households have approximately 0.17 more children than other households. The results with the two-boy indicator are not presented due to the weakness of this instrument, with first stage F-statistics of 0.10.

While the magnitude of the estimates are larger for maternal labor supply under this specification, the direction and the significance remained robust. These results, along with the comparable specification in column (2) of Table 7, suggest that a one day per week increase in maternal labor supply increases the schooling probability of children between the ages of 7 and 10 by approximately 5 to 25 percentage points. We can therefore interpret the previously presented 5 percentage point estimate as the lower bound of the maternal labor supply effect on child schooling.

The other covariates still have the expected impacts upon child schooling. Boys and the children of educated parents are more likely to attend school. The impacts of land ownership and per capita expenditure are less significant and larger in magnitude under this specification, potentially due to their high correlation with the number of children. The impact of maternal age has an insignificant effect once we account for endogenous fertility, although paternal age is still an important determinant. Overall, the results suggest that, maternal labor supplied to the market is a significant determinant of child schooling after accounting for factors that relate to fertility, a households general well-being, and the labor market characteristics of the mother and father.

Table 9: IV Results - Using the Gender Composition Among Children

	(1)	(2)	(3)	(4)	(5)	(6)
Maternal Labor Supply	0.1822***	0.2419**		0.1571**	0.2073**	
	(0.086)	(0.123)		(0.082)	(0.110)	
Paternal Labor Supply	0.3497		0.4725	0.2779		0.3954
	(0.298)		(0.355)	(0.257)		(0.459)
Number of Children	0.0944	0.0657	0.0927	0.0700	0.0486	0.0716
	(0.101)	(0.075)	(0.097)	(0.087)	(0.064)	(0.121)
Household Characteristics						
Per-Cap Expenditure (log)	0.3596	0.1823*	0.3496	0.2984	0.1595*	0.2977
	(0.253)	(0.100)	(0.238)	(0.218)	(0.085)	(0.317)
Land Owned (log)	0.3833	0.1603*	0.3611	0.3152	0.1397*	0.3046
	(0.283)	(0.091)	(0.260)	(0.243)	(0.077)	(0.337)
Child Characteristics						
Boy	0.1208***	0.1357***	0.1133***	0.1208***	0.1331***	0.1142***
	(0.008)	(0.013)	(0.009)	(0.008)	(0.012)	(0.015)
Age	-0.0335	-0.1142	0.0495	-0.0285	-0.0943	0.0440
	(0.070)	(0.110)	(0.069)	(0.068)	(0.099)	(0.172)
Age-Squared	0.0033	0.0082	-0.0014	0.0031	0.0070	-0.0010
	(0.004)	(0.006)	(0.004)	(0.004)	(0.006)	(0.011)
Parental Characteristics						
Mother Age	0.0081	-0.0021	0.0056	0.0048	-0.0032	0.0031
	(0.014)	(0.005)	(0.012)	(0.012)	(0.004)	(0.016)
Father Age	0.0033	0.0032	0.0071***	0.0037*	0.0036*	0.0070***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Mother Attended School	0.1651***	0.1900***	0.1393***	0.1625***	0.1829***	0.1401***
	(0.016)	(0.033)	(0.012)	(0.015)	(0.029)	(0.028)
Father Attended School	0.4009**	0.2602***	0.3859**	0.3574**	0.2468***	0.3500
	(0.180)	(0.060)	(0.165)	(0.156)	(0.051)	(0.212)
Maternal Industry Fixed Effects	x	x	x	x	x	x
Paternal Industry Fixed Effects	x	x	x	x	x	x
District-Year-Rural Fixed Effects	x	x	x	x	x	x
Number of Observations	21,217	21,362	21,273	21,217	21,362	21,273
R-squared	0.217	0.235	0.211	0.238	0.249	0.231
First Stage F Statistics						
Two-Girl Indicator	17.53	25.30	17.80			
Same-Gender Indicator				22.12	32.50	51.92

Notes: The dependent variable, child schooling, is an indicator variable which is constructed based on the principal activity of the child (code 91). The results are presented for children between the ages of 7 and 10. Columns (1) to (3) use the two-girl indicator as an instrument, and columns (4) to (6) use the same-gender indicator as an instrument. Labor supply is defined as days of the week spent in the following labor market activities: worked as regular a salaried/wage employee, and worked as a casual wage laborer in public works and in other types of works (codes 31-51). The tariff rates in maternal and paternal industries are defined in terms of their 2-digit industry affiliations by NIC 1987 classifications. Additional controls include religion and social group of the household (i.e. caste, tribe). Each specification includes inverse Mills ratios to correct for selection bias. All standard errors are corrected for heteroscedasticity and are clustered at the household level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

7 Conclusion

This paper studies the effect of changes in parental labor supply on child schooling in India using the reductions in tariff rates in maternal and paternal industries during the substantial Indian trade liberalization during the 1990s. It contributes to the literature by providing evidence that there exists a significant intra-household channel through which trade liberalization affects child schooling. This channel mainly operates through the labor market activity of mothers, as opposed to fathers, indicating that the trade-induced increases in labor market opportunities for women must be considered as an important factor behind the improvements in the child schooling rates.

The positive effects are found only for younger children who are otherwise idle, and no significant effects are found for children who are older than ten years old of age. The results of this paper show that it is important to distinguish between younger children, with a low opportunity cost of education, and older children with a high opportunity cost of education. These children are different than their younger counterparts, as they run into a tradeoff between labor and schooling as labor market conditions change. The significant effect found for younger children is an important result in a country like India, where the overall literacy rate is very low. The tariff-induced increase in maternal labor supplied outside of the household was associated with a 5 percentage point higher schooling probability for younger children over the 12-year period studied in this paper. This accounts for approximately one fifth of the improvement in the schooling probability for children in this age group.

Considering the simultaneous nature of child quality, child quantity, and the maternal labor supply decisions, this paper additionally tests whether the households' choice in their fertility level is an important factor. Using a set of instruments related to the gender composition of the first two children, we show that fertility has a significant effect on the schooling probability of children, but it does not alter the main conclusions of the paper. The larger magnitudes of the effects under this specification establish the 5 percentage point increase as the lower bound of the increase in child schooling rates attributable to the increase in maternal labor supply.

Most studies on the effect of globalization on education in developing countries have focused on the effects of the economy-wide changes in schooling outcomes or the differential changes in schooling rates across geographical regions. This paper complements the existing literature by providing evidence that there are also significant effects that work at the micro-level through the reallocation of time and resources within households. The results imply that globalization, in particular trade liberalization, can improve human capital formation in developing countries by providing better labor market opportunities for women.

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A Description of the Main Variables

Child Schooling:
This is an indicator variable that takes the value of one if the child's principal activity is reported as *schooling*, which is coded 91 in the NSS data. We generated a second schooling variable based on the question about the *current attendance to educational institution*, which specifies the school type of the registered person. This variable is 98 percent matched to the schooling variable generated by the child's principal activity. However, this is not our preferred schooling definition, as it takes the value of one when the child is registered at a school, but not necessarily pursuing a continuous education.
Parental Labor Supply:
The labor supply variable is evaluated over the following market activities: worked as a regular salaried/wage employee, and worked as casual wage laborer in public works and in other types of works, which are activity codes 31-51 in the NSS data. This variable includes non-participation. The labor supplied in market activities is included even when it is not their principal activity.
Tariffs:
The tariff data is from Hasan et al. (2007). The original tariff data is available by input-output categories and aggregated over 2-digit NIC-87 categories using imports in each of the input and output categories as weights.
Number of Children:
This variable represents the number of all children in the household who are younger than 15 years old, including children who are not of school age.
Monthly Per Capita Expenditure:
The monthly expenditure of the household is computed by the NSS through aggregating the expenditure of approximately 500 items comprising food, manufacturing, and services categories.
Land Ownership:
This variable represents land owned as of the date of the survey in hectares.
School Attendance of Parents:
Parental school attendance is constructed from the *educational status* question in the survey, which records the level of highest education attained by the members of the household, as opposed to the current attendance in their educational institution. The individuals who are literate through NFEC, AEC, TLC, and other government programs, and literate but below primary, primary, secondary, higher secondary, and post-graduate are considered to have received schooling. Individuals who cannot read and write a simple message in any language are considered illiterate and they are assigned a value of zero.

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