Child Labor and the Minimum Wage: Evidence from India

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Abstract. This study examines how changes in the minimum wage affect child labor in India. The analysis uses repeated cross sections of India's NSSO employment data from 1983 to 2008 merged with data on state-level minimum wage rates. Theoretically, the impact of the minimum wage on child work could go either way, so empirical evidence from a country with high rates of child labor and a myriad of minimum wage laws across states and industries helps to lessen the ambiguity. Results indicate that regardless of gender, in urban areas, a higher minimum wage reduces child labor in household work. In rural areas a similar result applies for girls while household labor does rise for boys. The minimum wage has virtually no impact on child work outside of the home across urban and rural areas.

1. Introduction

The past quarter century has seen a surge in scholarly interest in the impact of minimum wage legislation on employment and wages across countries. Results across these studies have varied, with some reporting large negative employment effects at one end of the spectrum and others finding small positive effects on employment.[1] In an effort to synthesize this large body of work, Belman and Wolfson (2014) conducted a meta-analysis of numerous industrialized country studies and concluded that minimum wage increases may lead to a very small disemployment effect: raising the minimum wage by 10 percent can cause employment to fall by about 0.03 to 0.6 percent, with the majority of the underlying estimates being statistically insignificant and close to zero in magnitude. In developing countries the conclusions are similar: employment effects are usually close to zero or slightly negative. Minimum wage impacts in less developed countries vary considerably not only because of labor market dynamics, but also because of inadequate enforcement and the presence of large informal sectors.

Virtually all of the previous work on the minimum wage has focused on individuals of prime working age, usually defined as ages 15 to 65. However, to the best of our knowledge, no previous empirical study has estimated the impact of minimum wages on child labor.[2] Theoretically, the implementation of minimum wage policies is likely to affect child labor but the direction of this change can go either way, especially if unpaid domestic work is added to the definition of employment. This classification of child work is consistent with the convention in a number of child labor studies distinguishing between "work" and "home care" (Basu 1999). In the theoretical model developed in Basu (2000), parents are assumed to be altruistic and want

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[1] This literature is carefully reviewed in Card and Krueger (1995) and Neumark *et al.* (2014).
[2] As discussed in Dessing (2004), data constraints are the main reason behind this lack of empirical work on the minimum wage and child labor.

their children to attend school.[3] Parents are motivated to send their children to work if they are poverty-stricken and cannot afford to provide their family with a necessary level of consumption. When adult wages rise from very low levels, parents have more funds to support the household and can afford to let their children attend school. Hence in regions marked by poverty and low wages, an increase in the adult minimum wage can cause a decline in child work. However, it is possible that a minimum wage increase could draw more adults into the labor market, resulting in the substitution of child work for adult labor, especially in domestic work within the home (Basu 1999). Hence a priori, raising adult wages through minimum wage legislation has an ambiguous effect on child labor. New evidence from a country with a relatively high incidence of child labor helps to lessen this ambiguity.

Within this broad context, our objective is to study the association between India's minimum wages and the employment of children. India has the unenviable distinction of having the largest number of child workers in South Asia, a region of the world which includes Bangladesh, Nepal, Sri Lanka, and Pakistan, where child labor levels are already very high. Statistics from 2011 indicate that about 28 million children ages 5-14 are employed in India (UNICEF 2011). Further estimates suggest that the incidence of child labor is higher for girls than boys in rural areas. Poverty, restricted access to credit, lack of education and skills, low rates of return to education, negative shocks to household income and earnings, and widespread adult unemployment are the various reasons for why child labor persists in India and other developing countries (Grootaert and Kanbur 1995; Basu and Tzannatos 2003). Understanding how the minimum wage for adults contributes to or helps to lessen these problems thus has

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[3] The model in Basu (2000), which emphasizes how child labor responds in equilibrium to the minimum wage for adults, follows closely from the model in Basu and Van (1998), which focuses on the equilibrium effects of banning child labor.

policy relevance within and beyond India, especially for other countries in Asia such as China and South Asian neighbors such as Pakistan and Nepal. Although economic development has mitigated some of the important factors that drive child work in China, continued economic vulnerability and young populations continue to fuel children's labor in Pakistan and Nepal.

India is an interesting country for this study as there is wide variation in minimum wages – India has more than 1000 different minimum wage rates across the country in any given year. This large number of rates arises from a legal framework in which India's state governments have historically enacted their own labor legislation, including minimum wage rates that vary by age (adolescents and adults), skill level, and by detailed job categories in both the formal and informal sectors. India's restrictive labor market regulations have had adverse impacts on productivity, investment and employment in both the manufacturing and retail sectors (Besley and Burgess 2004; Amin 2009). Although the wide degree of variation in minimum wage rates is a goldmine in terms of research opportunities, the variation and complexity have hindered compliance relative to a simpler system with a single minimum wage set at the national or state level (Rani *et al.* 2013; Belser and Rani 2011).

This paper contributes to a growing body of empirical work on the relationship between child labor and measures of human capital, household wealth, household income, and economic shocks. As noted above, the theoretical implications of increasing the minimum wage (and thereby securing household income) on measures of child work are ambiguous. This ambiguity is reflected in the empirical papers that consider the determinants of child labor. For example, Bacolod and Ranjan (2008) found that children are less likely to work if they have higher measures of ability and cognitive development and live in households with greater wealth; and several studies have found that a higher market wage for low-earning, low-skilled adults is

associated with a decreased likelihood that children will work (e.g. Ray 2000; Wahba 2006). Changes in the macroeconomic environment can also affect child labor. For example, positive income effects for the poor generated by Indonesia's trade liberalization are associated with a decline in child labor, as are increases in household expenditures during Vietnam's rapid economic growth during the 1990s (Kis-Katos and Sparrow 2011; Edmonds 2005). Closely related, Edmonds (2006) demonstrated that in South Africa, hours worked by children decline when the elderly become eligible for pension income transfers. Moreover Dimova *et al.* (2015) found that households are less likely to send their children to work if they experience out-migration, own a business, or receive income transfers in the form of remittances. A rise in income through a cash transfer program was also shown to delay the labor-force entry of young children enrolled in school among low-income households in Ecuador (Edmonds and Schady 2012).

However, reflecting the uncertainty predicted by theory, income transfers have not consistently been shown to reduce child labor. In the case of Brazil, the well-known conditional cash transfer program *Bolsa Escola* appears to have improved school attendance but did not reduce child labor supply, most likely because the cash transfers were too small for children to forego work so children combined schooling with paid work (Cardoso and Souza 2004). There is evidence that working at the same time as attending school has negative impacts on proficiency test scores used as a benchmark of learning (Emerson *et al.* 2017). Further, not all types of assets and economic shocks are necessarily conducive to reducing the incidence of child labor. Children in land-rich households may be more likely to work than children in land-poor households, especially in the face of credit market imperfections (Bhalotra and Heady 2003; Basu *et al.* 2010). Moreover, Beegle *et al.* (2006) showed that transitory negative shocks to

household income in the form of disruptions to farm production contribute to an increase in child labor, but households with assets can offset most of the shock. A similar result is found in Soares *et al.* (2012) where transitory increases in local economic activity in Brazil's coffee producing regions raise the opportunity cost of children's time, while child labor declines with greater permanent household income and wealth. Relatedly, Bharadwaj *et al.* (2013) estimated the effectiveness of India's 1986 national ban on child labor and found that this act had the perverse effect of increasing child labor because children's wages fell and poor households needed to use more of their children's labor to meet subsistence needs. Hence the empirical literature on child labor and household income is in keeping with the inconclusive nature of the predictions from theory.

We use six waves of household survey data spanning the 1983-2008 period merged with an extensive and uniquely-created database on minimum wage rates over time and across states and industries to shed more light on this topic. Our study uses an empirical specification that relates employment outcomes of children to productivity characteristics and minimum wages in order to identify child labor effects. We find that the impact of the minimum wage on the employment of children differs between rural and urban areas. In urban settings regardless of gender, increases in the minimum wage have negative and statistically significant effects on children's labor within the household (domestic work or work in the household enterprise). Holding other variables fixed, for a ten percent increase in the real minimum wage, the linear probability of a child engaging in work within the household decreases by 8.3 percent for boys and by 9.4 percent for girls. However, there are gender differences in minimum wage impacts in rural areas. Estimates indicate that with an increase in the adult minimum wage, girls are less likely to be engaged in household work while boys are more likely to be engaged in household

work. We find no statistically significant impact of minimum wages on the likelihood of children working outside the home (as salaried or casual workers) in urban or rural areas.

2. The Data

To examine this topic in the context of India, we conducted both a descriptive analysis and a set of econometric tests using a sample of household-level repeated cross sectional data on children ages five to fourteen years from India's National Sample Survey Organization (NSSO), merged with a newly digitized database on India's minimum wages. The household survey data include the years 1983 (38th round), 1987-88 (43rd round), 1993-1994 (50th round), 1999-2000 (55th round), 2004-05 (60th round), and 2007-08 (64th round). These are all the rounds that include the Employment and Unemployment module - Household Schedule 10, and which tally with the years for which we have minimum wage data (discussed in detail below). The Employment and Unemployment modules have detailed information on employment status, wages, and a host of individual and household characteristics. One of the steps in preparing the data entailed reconciling changes over time in NSSO state codes that arose in part from the creation of new states in India (such as the creation of Jharkhand from southern Bihar in 2000). Newly created states were combined with the original states from which they were created in order to maintain a consistent set of state codes across the years of analysis. In addition, Union Territories were combined with the states to which they are closest geographically. This reconciliation, which is commonly done, helped to facilitate the subsequent merging of other state-level datasets that had the original aggregate classification.

To construct the sample of child workers, we appended each cross section by year and retained all children ages 5-14 with measured values for all indicators in the empirical analysis. The pooled sample of children in this age-group has 851,740 observations from 1983 to 2008.

Our definition of employment is consistent with that used in a number of previous studies on child labor and includes children who report their current principal activity status as own account worker, employer, unpaid family worker, wage employee, casual wage labor, other type of worker, individual who does domestic work only, and individual who does domestic work and collects resources for the household such as fuel and water.[4] In the empirical analysis that follows, these types of work are aggregated into two separate categories of child work: within the household and outside of the household. Work within the household is defined as own account worker, employer, unpaid family worker, individual who does domestic work only, and individual who does domestic work and collects resources for the household. Work outside of the household is defined as wage employee, casual wage labor, and other type of worker.

Note that a potential problem with national statistics on child labor rates is that survey respondents, especially parents, may under-report child labor due to stigma associated with child work and the fear of penalties for non-compliance with child labor laws (Dammert and Galdo 2013). The extent to which under-reporting could affect our results is lessened by using a broader definition of child employment that includes different types of unpaid work. Our definition is broader than that of the International Labor Organization, which is limited to children who earn a wage or who produce output for the market. Under reporting is also less likely in the context of India where child labor, especially in rural areas, is relatively widespread. Moreover the identity of the NSSO survey respondents (which is parents rather than children) has not changed over time, implying that systematic differences tied to variations in the identity of survey respondents are not likely to be a factor in our case.

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[4] See for example the definitions of child employment used in Bacolod and Ranjan (2008), Beegle *et al*. (2006) and Edmonds (2006).

Sample means for the individual and household characteristics of all children in the pooled sample are reported in Table 1, and because much of our analysis distinguishes between younger (ages 5-9) and older (ages 10-14) children, the sample means are presented for these two age groups. For each entry, the table reports the group mean as a proportion unless the labels indicate otherwise, and standard deviations are indicated in parentheses. So, for example, the first column indicates that 0.5 percent of boys ages 5-9 are employed, they face an average minimum wage of 2.6 log points, and 40.6 percent are illiterate. Of particular interest is the proportion of children who are considered employed. This proportion is highest for rural girls ages 10-14 where 12.3 percent of girls are employed within the household compared to 4.2 percent of rural boys. In urban areas, girls ages 10-14 also have a higher employment rate (6.7 percent) compared to boys (1.7 percent). Boys in this age group, however, have higher employment rates than girls outside the household in both rural and urban areas. The education figures are also telling. Older children as well as parents in rural areas have considerably less schooling than their counterparts in urban areas, and girls' disadvantage in literacy is more pronounced in rural areas as well. Also of note is the considerably higher representation of rural children in Hindu households and in the disadvantaged tribe/caste group compared to urban children. As expected, land ownership is relatively more prevalent in rural areas.

Note that our database has two principal activity status variables: current status in the past week and usual status in the past year. According to Krishnamurty and Raveendran (2008), the usual status variable may have more recall error while the current status variable, which has less recall error, may prioritize employment over not working. In this paper we report results based on the current activity status largely because the key independent variable of interest – the

minimum wage – is measured per calendar year, which does not align with the one-year recall period.[5]

Merged into the NSSO data was a separate dataset on daily minimum wage rates for adults by year, industry and state. We created a database on state-level daily minimum wage rates across industries using a set of annual reports entitled "Report on the Working of the Minimum Wages Act, 1948," published by the Indian government's Labour Bureau. Only very recent issues of this report are available electronically; earlier years had to be obtained from local sources as hard copies and converted into an electronic format. For each year we obtained the minimum wage report for the year preceding the NSSO wave when possible in order to allow for adjustment lags. We used reports for the following years: 1983 (for the 1983 NSSO wave), 1986 (for the 1987-88 NSSO), 1993 (for the 1993-94 NSSO), 1998 (for the 1999-2000 NSSO), 2004 (for the 2004-05 NSSO), and 2006 (for the 2007-08 NSSO).[6]

We then merged the minimum-wage data with the NSSO data using state codes and industry codes aggregated up to eight broad categories (agriculture; fishing; forestry; mining; construction and utilities; transport, storage, and communication; services; and manufacturing). Conducting the merge with these broad industry aggregates rather than detailed industry codes was necessary because the industry codes in the NSSO data did not match the industry codes in the minimum wage reports. The databases were merged on the basis of an individual's broad industry of employment based on the mapping scheme reported in Appendix Table 1. For any person in the full sample who reported no industry of employment - usually unpaid workers in

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[5] Results with the variable for usual principal activity status were essentially the same.
[6] The 1983 and the 1985-1986 minimum wage reports indicate that there were implicit minimum wage laws even for children. These reports indicate that children were to be paid between 60 to 70 percent of the statutory wages paid to adult workers in some industries. However, this rate is not reported consistently across all industries and the subsequent years' reports do not have any such information, likely reflecting the fact that child labor was prohibited from 1986 onwards.

rural areas - this merging process entailed using the median legislated minimum wage rate for each person's state and sector (urban or rural) in a particular year.[7]

For each of the broad industry categories defined above, we use the median minimum wage rate across the detailed job categories as most states had minimum wage rates specified for multiple job types within the broad groups. Moreover, if there were missing values for the minimum wage for a broad industry category in a particular state, we utilized the value of the minimum wage for that industry from the previous time-period for which data was available for that state. Underlying this step was the assumption that the minimum wage data were recorded in a particular year only if states actually legislated a change in that year.[8] Minimum wages were converted into real terms using India's official Consumer Price Index for urban and rural areas (base year 1983).

Note that the 1983 and 1985-1986 minimum wage reports differed from the subsequent years in several ways. First, these earlier reports published rates for detailed job categories based on an entirely different set of labels. Second, the reports for the two earlier years published monthly rates for some detailed categories; these rates were converted to daily rates using the assumption of 22 working days per month. Third, the reports for the two earlier years published numerical values for piece rate compensation while the latter four reports simply specified the words "piece rate" as the compensation. For the earlier two years, the piece rate compensation was converted into daily wage values using additional information in the reports on total output

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[7] We conducted robustness tests with a sample based only on people who reported an industry of employment. These results are similar to our main results and are available on request.

[8] We conducted robustness tests in which observations that had minimum wages imputed in this manner were deleted. Results are similar to our main results and can be found in Appendix Table 4. Further checks that used observations with no imputed values at all (either at the individual level or in the minimum wage data) only strengthened the main results. These are available on request.

per day and minimum compensation rates. For the latter four reports, few detailed industries paid on a piece rate basis and those that did specified no numerical values. Only the earlier two reports from 1983 and 1985-1986 specified minimum wage rates for children.[9]

Next, merged into the NSSO data are separate datasets from other government sources on macroeconomic and regulatory variables that capture underlying labor market trends at the state level. The variables cover 15 states for each of the six years of the NSSO data and include unemployment rates by gender, indicators of minimum wage enforcement, and indicators of the regulatory environment in the labor market.[10] The state-level unemployment data merged into the sample are obtained from NSSO reports on employment and unemployment during each survey year (*Indiastat* various years; NSSO various years). Also merged into the full sample are three indicators of minimum wage enforcement by state and year, normalized by state population. These indicators include the number of inspections made, the number of irregularities detected, and the total value of fines imposed in (real) rupees. Sample means for these variables (reported by state for the years 1983 and 2008 in Appendix Table 2) indicate some positive correlation across these measures since states with more inspections tend to have more irregularities reported and greater fines. The variables on minimum wage enforcement are available from the same reports (the "Report on the Working of the Minimum Wages Act, 1948") used to construct the minimum wage dataset.

We also added data on changes in the regulatory environment in India's labor market. The motivation for adding this data is that the period of analysis overlaps with activity at the state level in interpreting and amending provisions of India's Industrial Disputes Act (IDA) of

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[9] Weiner (1991) discusses the difficulty of enforcing India's minimum wage laws for children.
[10] We also tried adding net state domestic product per capita using data from the Reserve Bank of India (2014) but this variable would up being omitted with the inclusion of state-year interaction terms.

11

1947 related to job security, labor disputes, and contract labor laws. The data was used to construct a variable we called "Adjustment" that relates to amendments to the IDA that affect the ability of firms to hire and fire workers in response to changing business conditions. Coded as a dummy variable, the value of one indicates regulatory changes that strengthen workers' job security (through reductions in firms' ability to retrench, increases in the cost of layoffs, and restrictions on firm closures), while the value of zero indicates regulatory changes that weaken workers' job security and strengthen the capacity of firms to adjust employment. We also constructed a variable called "Disputes" that relates to amendments to the IDA affecting industrial disputes. Similarly coded as a dummy variable, the value of one indicates reforms that make it easier for workers to initiate and sustain industrial disputes or that lengthen the resolution of industrial disputes, while a zero indicates state amendments that limit the capacity of workers to initiate and sustain an industrial dispute or that facilitate the resolution of industrial disputes. The underlying data are from Ahsan and Pagés (2009) and further discussion of the coding and interpretation of these variables is found in Menon and Rodgers (2013). All data sources used to create the final sample are summarized in Appendix Table 3.

3. Descriptive Statistics on Child Labor and the Minimum Wage

The empirical analysis begins with a depiction of how child workers are distributed by age, gender, and urban versus rural regions. Figure 1 shows the proportion of child workers among all children in urban and rural areas in 1983 and 2008, where a child is defined as being 5 to 14 years of age and classified as employed according to the definition above. In every year the highest percentage of child workers performing work inside and outside of the household is found among rural children who are 10-14 years old. In 1983, a total of 10 percent of rural boys and 18 percent of rural girls ages 10-14 were engaged in employment either within or outside of

the household as their primary activity, compared to 6 percent of urban boys and 10 percent of urban girls in the same age group engaged in work within or outside of the household. This set of percentages for children ages 10-14 dropped fairly steadily over the period to a total of 3 percent of rural boys, 7 percent of rural girls, 2 percent of urban boys, and 3 percent of urban girls by 2008 who are engaged in work within or outside of the household. The rates at which children work are considerably lower for younger children with very few children aged 9 and below working by 2008.

In every year proportionately more girls than boys were employed in both age groups. This assertion is supported with evidence in Table 2 which reports the primary activity status of girl and boy child workers ages 10-14 from 1983 to 2008. The table clearly shows that the dominant activity for girl workers is domestic help, while boys are more heavily concentrated in the category of household enterprise workers which includes unpaid family helpers. For example, in 1983, 68 percent of girl child workers reported domestic help as their primary activity status while 54 percent of boys reported work in a household enterprise. These percentages fluctuated somewhat over the period, but the main conclusion about the dominance of domestic work for girls and family enterprise work for boys still held in 2008. Boys are also more heavily represented among casual workers and wage employees as compared to girls.

We took a closer look at the incidence of child work across gender and household socioeconomic status as measured by household per capita expenditure quintiles (Figure 2). As expected, in both 1983 and 2008, the highest rates of child labor for household work within and outside of the household are found among the poorest households in the bottom expenditure quintile. For example, in 1983, 20 percent of girls and 12 percent of boys ages 10-14 in the poorest expenditure quintile reported some sort of labor within or outside of the household as

13

their primary activity status, compared to 11 percent of girls and 7 percent of boys in the richest households.[11] These rates had dropped by 2008 falling to 7 percent of girls and 4 percent of boys in the poorest quintile, and 3 percent of girls and 1 percent of boys in the richest quintile.

It is important to look more closely at how the minimum wage has varied across locations and time in India. Table 3 presents sample statistics for average real minimum wage rates by industry across states. In 1983, some of the highest minimum wage rates were found in Haryana, Rajasthan and West Bengal. By 2008 however, Haryana and Rajasthan were no longer in the group of states with the highest minimum wage rates and had been replaced by Kerala – known for its relatively high social development indicators – and Punjab. Among industries, minimum wage rates tend to be the highest in construction and utilities, and in transport, storage and communications. Rates tend to be lower in agriculture, fishing, and forestry.

Figure 3 presents the overall male and female wage distributions around the average minimum wage for adults in 1983 and 2008 for prime-age (15-65 years) male and female workers in India's urban and rural sectors. Following convention, we construct the kernel density estimates as the log of actual daily wages minus the log of the relevant daily minimum wage for each adult worker, all in real terms (Rani *et al*. 2013). In all four plots, the vertical line at zero indicates that a worker's wage is on par with the minimum wage in his or her industry and state

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[11] The NSSO reported household per capita expenditures as a categorical variable (expenditure classes) in 1983 and in 1987-88, and as a linear variable (actual expenditures) thereafter. In 1983 there were 14 expenditure classes and in 1987-88 there were 13 classes. Hence the construction of exact 20% quantiles was only possible after 1987-88; in the first two years of data we used breakpoints that were as close as possible to 20% intervals to create comparable categories.

in that year, indicating that the minimum wage is binding and that firms are in compliance with the legislation.[12]

The top two panels of Figure 3 show that the wage distributions around the average minimum wage are closer to zero in 2008 as compared to 1983 for both male and female workers in India's rural sector. This rightward shift in the distributions suggests that compliance has increased over time in the rural sector with proportionately more adult workers being paid the appropriately legislated wage. However, this conclusion holds more for male workers as the distribution for female workers in 2008 is still to the left of the point that indicates full compliance. The bottom two panels show the wage distributions in urban areas. Like their rural-sector counterparts, urban women saw a small shift to the right in the kernel density graph indicating that compliance has improved over time, but a large proportion of urban women still earn wages that fall below the minimum. The curve for urban women is also noticeably asymmetric with a pronounced clustering of women whose real wages in log points exceed the minimum wage by about 1 to 2 log points in 2008. Finally, the panel for urban men differs from the others in that there was little shift to the right over time as both distributions peak in the positive range at about half of a log point. Rather, the male curve became narrower over time indicating a greater clustering of urban-sector adult men who earned just slightly above the minimum wage.

These kernel density graphs are important in that they depict relative positions of real wages for adult workers in comparison to what is legally binding, with peaks at zero indicating compliance. Such compliance could come from a variety of sources including better enforcement

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[12] We follow the literature in constructing these plots. It is possible that these plots also reflect secular productivity trends, changes in how much the minimum wage "bites", and other issues associated with the fact that these are plots of real wages relative to real minimum wages.

of laws (which is included in the regression models), better agency on the part of workers (which would result from increased worker representation and unionization), changes in the regulatory environment (measured in the regression models by the Adjustment and Disputes variables), and/or from sorting of adult workers into occupations that are subject to stronger enforcement and better representation. Sorting may also result if adult workers migrate in search of favorable occupations in which they are trained. The NSSO data do not allow for consistent controls for worker agency or migration since questions on union existence, union membership and migration are not asked consistently. Migration is less of an issue since rates in India tend to be low. We control for sorting on observables by including a complete set of individual, industry, state, and time-level controls (as well as interaction effects). Although not perfect, previous work indicates that within limits, such controls may absorb variations in both observable and unobservable attributes that drive selection of this nature (Altonji and Mansfield 2014).

We end this section on descriptive statistics by examining the extent to which minimum wages "bite". This is done by examining a simplified Kaitz index, which is the ratio of the minimum wage to the median wage (Rani *et al.* 2013). If the minimum wage is binding and compliance is high, then the Kaitz index will be less than one. Intuitively, if the minimum wage is 35 percent of the median wage, for example, then the median worker is earning more than the minimum. The higher the ratio becomes, the greater is the degree of non-compliance. Rani *et al.* (2013) notes that India has a high minimum wage relative to the median wage, suggesting a high rate of non-compliance. Figure 4 plots this index separately for male and female workers by

16

sectors. As evident, the index is highest for rural women and lowest for urban men. However, this measure has fallen for all groups over time, suggesting improvements in compliance.[13]

4. Econometric Specification

The empirical analysis relates child labor to individual and household characteristics and to minimum wage regulations across industry, time and space. The determinants of employment for a child are expressed as follows:

$$E_{ist} = a + \beta_1 MW_{js(t-1)} + \beta_2 X_{ist} + \beta_3 P_{st} + \beta_4 \emptyset_s + \beta_5 Y_t + \beta_6 (\emptyset_s * Y_t) + \vartheta_{ist} \quad \text{---} \quad (1)$$

where the subscript i denotes a child, j denotes an industry, s denotes a state, and t denotes time. The dependent variable E_{ist} represents whether or not a child is classified as employed. Employment is measured as either work within the household or work outside of the household, as defined in the data section. The notation $MW_{js(t-1)}$ represents the average real minimum wage associated with the industries in the geographic region in which a child's household resides (a region is larger than a municipality which is not clearly demarcated in the data, but smaller than a state). The rationale for this specification comes from the decision-making process of parents on whether or not to send a child to work. Assuming that parents incorporate information on the minimum wages that working members of the household face in their region of residence, we specified the minimum wage variable as the average of the minimum wages reflected in the industrial composition of the geographical region in which the household resides. The notation indicates that this is lagged since we use minimum wage data from the year prior to each wave of the household survey.

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[13] A decline in the Kaitz index could also arise from fewer increases in the minimum wage over time, but this is not the case for India as the median real minimum wage across industries has increased by about 50 percent from 1983 to 2008.

The notation X_{ist} is a set of child and household characteristics that influence employment decisions. These include gender, age, education level, membership in a disadvantaged group, religion, the gender and education level of the household head, variables for the type of labor the household classifies itself as, the highest level of schooling for an adult woman in the household, and whether or not the household owns land.[14] The matrix P_{st} represents a set of control variables for a variety of state-level economic indicators: the unemployment rate, indicators of minimum wage enforcement per capita, and variables for the regulatory environment in the labor market.[15]

The notation $\emptyset_s$ is a state-specific effect that is common to all individuals in each state, and Y_t is a year dummy that is common to all individuals in each year. The state and year dummies and the state-level economic indicators control for observed and unobserved local labor market conditions that affect employment. In particular, these variables (along with the interaction of state and year) control for exogenous shocks that may be correlated with the timing of minimum wage legislation (Card 1992; Card and Krueger 1995) and capture heterogeneity in underlying economic conditions that varies systematically over time (Allegretto *et al.* 2011).[16] Finally, ϑ_{ist} is an individual-specific idiosyncratic error term. All regressions are weighted with sample weights provided in the NSSO data for the relevant years, and standard errors are clustered at the state level. Note that selection of families with child workers into and out of

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[14] Ideally we would like to include the mother's education, but our data does not directly identify a child's mother in the household, just each person's relationship to the household head.
[15] Ideally we would have liked to add indicators for the costs of education but the NSSO modules do not contain this information, and state-level data on education expenditures and schooling indicators such as student/pupil ratios are only sparsely available from 1983 to 2004.
[16] Given the structure of equation (1), between-state variation in the minimum wage drives identification of the key coefficient of interest.

states with pro-labor or pro-employer legislative activity is unlikely to contaminate results since migration rates are low in India (Munshi and Rosenzweig 2009; Klasen and Pieters 2015).

Selection could also be a problem if changes in the minimum wage lead adults to switch industries, as the families in which adults choose to change industries might be different from families in which adults do not change. However, this type of selection is unlikely because the industry categories require substantially different skill sets, and transferability of skills is infeasible when general levels of education are so low. For example, those with secondary school or higher increased from about 11 percent in 1983 to only about 22 percent in 2007. Much of the population is employed in agriculture across all years, and it is highly unlikely that a higher minimum wage in manufacturing, for example, would have caused a substantial number of adults to leave agriculture given the different types of expertise required and the overall low level of specialized education. We formally tested this argument by regressing employment shares on the minimum wage and a full set of control variables by industry, gender, state, and year and found that the minimum wage had no impact on employment shares.[17]

5. Regression Results for Minimum Wage Impacts

Before turning to the multivariate analysis, we conducted a bivariate analysis in the form of predicted values from a linear regression of whether a child works on the real minimum wage. Child work is measured as either work inside or outside the household, and we used data for 1983 and 2008. The linear fitted lines in Appendix Figure 1 indicate that in both years, the predicted value of child work for girls somewhat declines with the real minimum wage particularly for household work in 2008. However the pattern is more mixed for boys. Their

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[17] Results available on request.

predicted work inside of the household tends to fall with the real minimum wage mainly in 1983, but there is little effect on their predicted work outside of the household.

Table 4 presents the regression results for boys and girls ages 10 to 14 in rural areas. Results show that the real minimum wage has a positive and statistically significant impact on boys' likelihood of being engaged in household work as their primary activity. Holding other variables fixed, for a ten percent increase in the real minimum wage, the linear probability of a boy engaging in household work increases by 13 percent on average. A likely explanation for this result is that boys are contributing greater labor on the farm and in household enterprises because their parents responded to the minimum wage by working more away from the home. This explanation is supported with evidence in Menon and Rodgers (2017) showing that employment of adult men and women did indeed rise in rural areas with increases in the minimum wage. Another factor associated with the positive minimum wage impacts on boys' work in rural areas may be the National Rural Employment Guarantee Act (NREGA) of 2005. This Act assures all rural households at least one hundred days of paid work per year at the minimum wage, and evidence in Azam (2012) indicates that NREGA had a positive effect on adult women's labor force participation in the rural sector. However empirical tests reveal that this Act cannot have been the sole driver of results in the rural sector.[18] Interestingly, the opposite conclusion holds for girls' work within the home in the rural sector. For a ten percent increase in the real minimum wage, the linear probability of a girl engaging in household work decreases by 28.9 percent on average. The result suggests that through a higher regional minimum wage for adults, girls' work in household chores (which is likely to be primarily

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[18] We re-ran the main regression results in Tables 4 and 5 focusing on the years of data before 2005, which is when NREGA came into effect. We find that our results remain essentially unchanged.

domestic work such as collecting fuel and water) is reduced. This may happen for example if parents can now substitute towards paid alternatives such as stored water in settings where the preference is for girls not to have to travel outside of the home for these purposes.

Table 4 also shows that as the adult minimum wage increases, there is no impact on the labor of boys or girls outside the home as salaried or casual workers. One possible reason may be that such work is valued for vocational and on-the-job training purposes, not just in terms of income generation. Other variables in these models show that the likelihood of child labor within and outside of the home in the rural sector decreases with increasing levels of children's educational attainment. The probability of employment for rural boys and girls shows a strong decline when heads of households have post-primary education (except for girls engaged in work outside the household, where the effect is negative but not statistically significant). Not only does greater education of the household head matter in reducing child labor, so does education of adult women in the household when it comes to work for boys and girls within and outside the household. Children are slightly less likely to be engaged in employment in states with higher levels of male unemployment, perhaps because job prospects overall are low. Living in states with regulatory environments that are more pro-worker in cases of adjustments to the workforce is associated with a lower likelihood that rural-sector children are employed. Intuitively, the more pro-worker environment may pull more parents into the labor market which boosts household income and reduces the need for children to work.

Finally, among the coefficient estimates for the rural sector in Table 4, the results for enforcement are more nuanced without a clear story. It appears that girls' labor within the home is most responsive to the various measures of enforcement relative the other sub-samples. The estimates indicate that on net, as firms have more inspections and pay more in fines for minimum

wage violations, girls' labor within the home decreases, while this effect is partially offset by the effect of irregularities detected during inspections. The interpretation is that as rural-sector parents earn the legally mandated minimum wages in jobs where enforcement is strong, girls are less likely to work within the home. A possible reason is that when household income is secure, parents do not feel the need to employ their daughters in domestic chores and may encourage their schooling instead. The regression models also include the interaction of the enforcement variables and the minimum wage in order to ascertain whether impacts are smaller when legislation is weakly enforced. These effects are mostly insignificant except for the case of fines.

Table 5 presents results for the determinants of child employment for boys and girls in the urban sector. In this case, both boys and girls experience a reduction in work within the household in response to an increase in the minimum wage. The implication is that higher minimum wages ease the need for children to engage in household production, perhaps through the security of additional income. However, the minimum wage has no impact on child work outside of the home in response to minimum wage increases in the urban sector.

Similar to the rural-sector results, the likelihood that a child is employed decreases with the child's educational attainment, and it is also lower when household heads have a post-primary education. Moreover, belonging to the scheduled tribe/scheduled caste group has a statistically significant negative effect for boys employed outside the home. As in the rural sector, greater education of adult women in the household is associated with a lower likelihood that children work, and the result is strongest for girls engaged in domestic work. Child labor in urban areas appears to respond less to state-level variations in unemployment compared to rural areas. Finally, except for the regression for girls performing work outside of the household, enforcement of the minimum wage is not measured with statistical significance in urban areas. A

22

possible explanation for this may be that the minimum wage is already relatively more binding in these settings as compared to rural areas.

We conducted a set of specification tests to examine how the results change for alternative age groups. Coefficient estimates for the minimum wage impacts from these tests are presented in Table 6. When we focus on just younger children (ages 5-9), we find that the only statistically significant coefficient is for very young boys in the rural sector where work outside of the household decreases with an increase in the adult minimum wage. Table 6 also highlights that the results for the full child sample (ages 5-14) are broadly similar to the results for older children, especially for girls in rural areas and boys in urban settings. In a final set of checks, we conducted tests of equality of coefficients between boys and girls in rural and urban areas, and between younger and older children. The *p*-values from these tests reveal that the only instance of coefficient difference is for younger and older girls in urban areas in the case where the dependent variable measures work outside the home.

6. Conclusion

Among poor households, decisions regarding children's schooling involve a trade-off between the immediate gains to be made from having the child work for a wage against the future benefits of investing in the child's education. For a household on the edge of subsistence, the optimal choice is all too often to have the child work. Within this context, our study has examined the extent to which India's minimum wage rates across different industries and states have affected the employment of children. Results indicate that regardless of gender, in urban areas, a higher minimum wage reduces child labor in domestic chores and household enterprises. In rural areas a similar result applies for girls while boys' household labor does rise. We find that the minimum wage has virtually no impact on child labor outside of the home as salaried or

casual workers across urban and rural areas. With the exception of boys in rural areas, we conclude that higher minimum wages for adults bring beneficial impacts in terms of lower household work burdens for children 10-14 years of age.

These contrasting results for within and outside household work are consistent with arguments in Basu (1999; 2000) that increases in the minimum wage have an ambiguous impact on child labor, especially when one follows convention to include unpaid labor in the definition of employment. A higher minimum wage could improve household income enough for poor households to rely less on the labor of children to support household production, a prediction we support with our findings for all children's work inside the home in the urban sector and girls' work in the rural sector. Paradoxically, while an increase in the minimum wage may help some households escape from this low income trap, it could also contribute to greater child labor if the wage increase causes more adults to join the labor force and a substitution of child work for adult labor, especially in household enterprises and farm work. Our findings for boys within the home in the rural sector support this prediction.

These results have important policy implications that extend well beyond India to other developing countries in Asia and Sub-Saharan Africa that are plagued by relatively high levels of child labor. Child labor, even if confined to household production, is a social problem. The social gains from an educated citizenry far exceed the private gains to an individual household from educating its children. Thus child labor is socially undesirable even when rational from the household's perspective. By discouraging investments in education, child labor hinders prospects for long-term growth. The results of this research suggest that in the absence of transformative social policies and investments in infrastructure that reduce household work burdens, raising the minimum wage in India's rural areas may actually exacerbate the problem of child labor for

boys. Moreover, as argued in Baland and Robinson (2000) and Ranjan (2001), even if parents care about their children's welfare, child labor can exist in settings in which poverty is combined with imperfect capital markets and credit constraints. Taken together with our empirical findings, this argument suggests that the well-being of children in the rural areas of poor countries with persistent child labor issues would be well served if minimum wage increases were accompanied by, for example, continued rural banking reforms that improved access to credit.

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Figure 1. The Percentage of Child Workers among All Children by Urban/Rural and Gender, 1983-2008
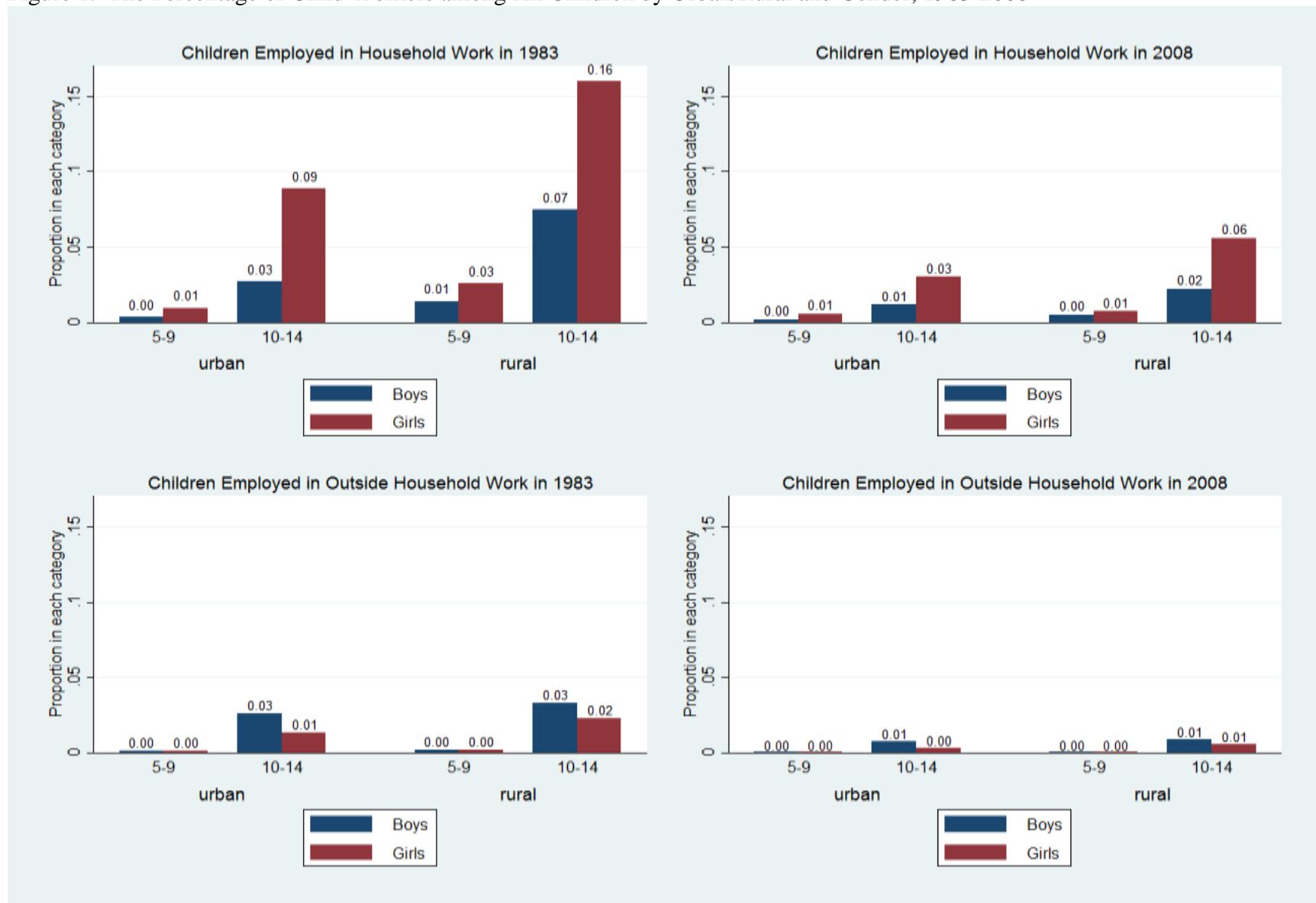
Source: Authors' calculations from NSSO (1983-2008) database. Weighted to national level with NSSO sample weights.

Figure 2. The Percentage of Child Workers among All Children Ages 10-14 by Expenditure Quintiles and Gender, 1983-2008
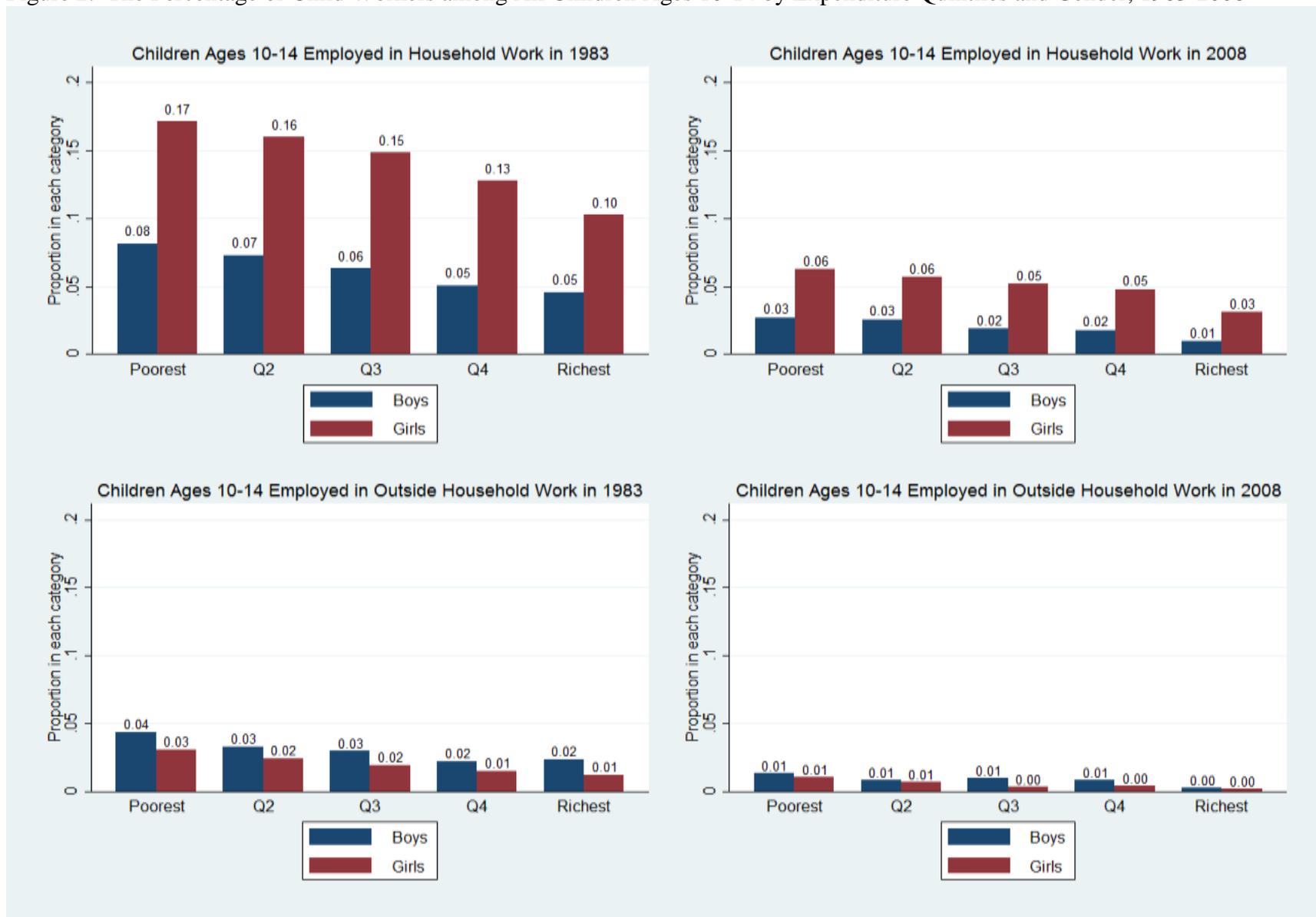
Source: Authors' calculations from NSSO (1983-2008) database. Weighted to national level with NSSO sample weights.

Figure 3. Kernel Density Estimates of the Relative Real Wage in India for Male and Female Workers by Urban/Rural Status.
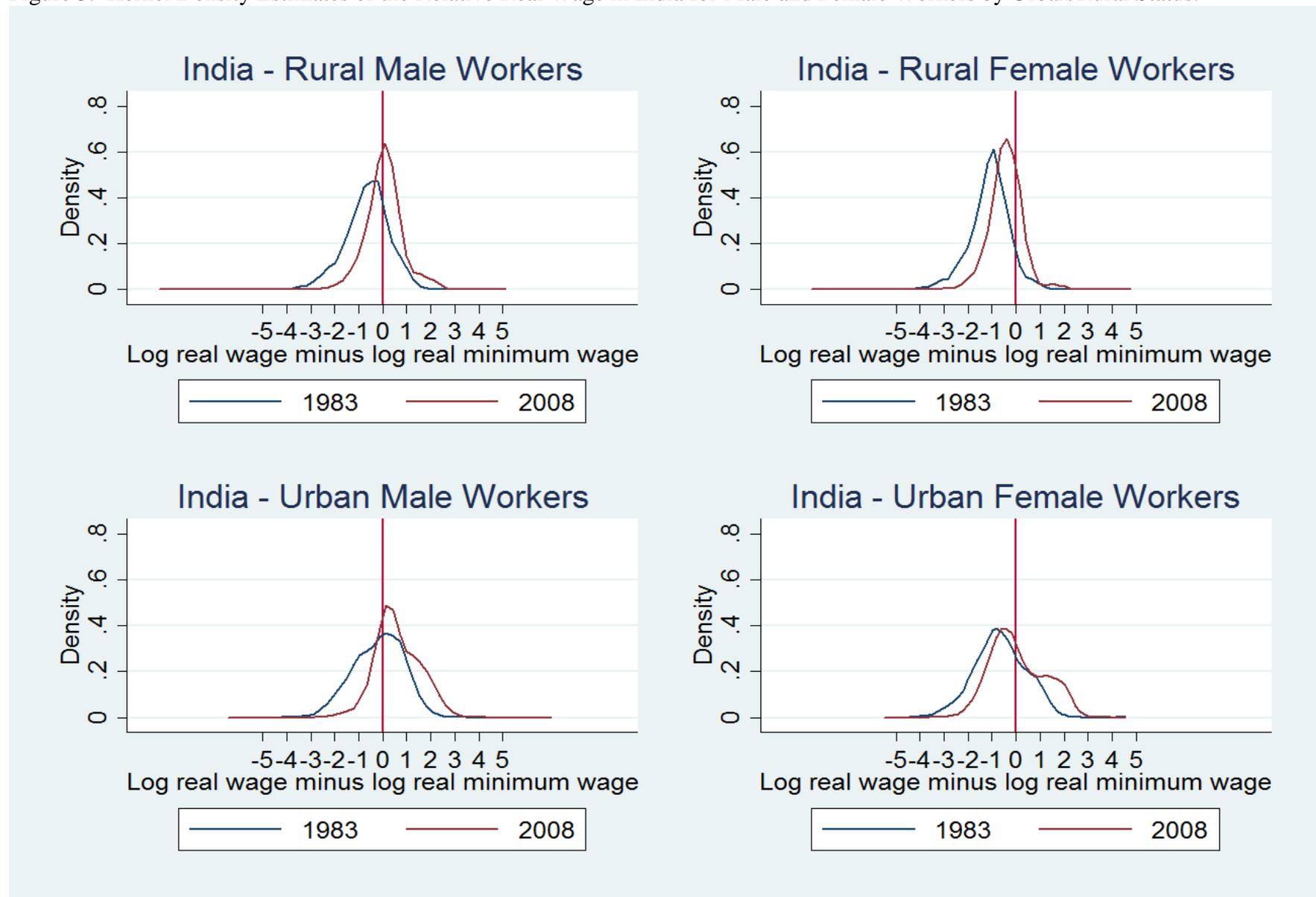
Note: Sample of workers includes those aged 15-65 years. Weighted to national level with NSSO sample weights.

Figure 4. Minimum Wage Level in Relation to the Median Wage by Sector, Gender and Year
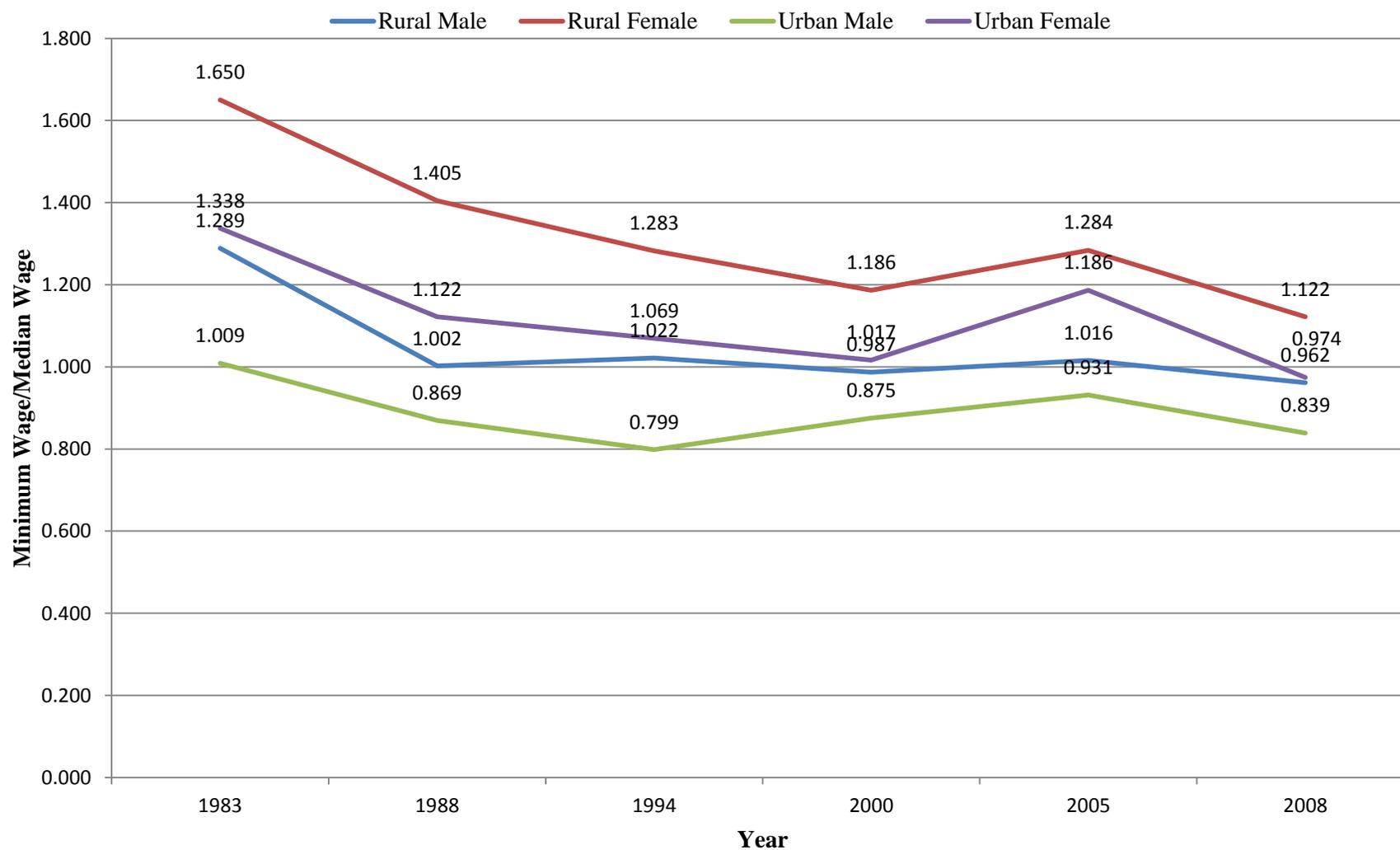
Note: Sample of workers includes those aged 15-65 years. Authors' calculations from NSSO (1983-2008) database.

Table 1. Sample Means of Individual and Household Characteristics for all Children, 1983-2008 (in % unless indicated otherwise)

	Rural				Urban			
	Boys		Girls		Boys		Girls	
	Age 5-9	Age 10-14	Age 5-9	Age 10-14	Age 5-9	Age 10-14	Age 5-9	Age 10-14
Employed within household	0.005	0.042	0.011	0.123	0.004	0.017	0.005	0.067
	(0.072)	(0.200)	(0.103)	(0.328)	(0.063)	(0.129)	(0.070)	(0.249)
Employed outside household	0.001	0.024	0.002	0.021	0.001	0.024	0.001	0.012
	(0.035)	(0.153)	(0.041)	(0.142)	(0.026)	(0.152)	(0.031)	(0.111)
Minimum wage (log points)	2.619	2.618	2.615	2.616	2.627	2.630	2.635	2.632
	(0.148)	(0.148)	(0.150)	(0.152)	(0.149)	(0.148)	(0.146)	(0.152)
Age (years)	6.927	11.870	6.929	11.897	6.969	11.974	7.022	11.985
	(1.380)	(1.446)	(1.378)	(1.433)	(1.396)	(1.422)	(1.384)	(1.441)
Education								
Illiterate	0.406	0.223	0.462	0.315	0.254	0.120	0.283	0.144
	(0.491)	(0.416)	(0.499)	(0.464)	(0.435)	(0.325)	(0.451)	(0.352)
Less than primary school	0.555	0.359	0.506	0.310	0.694	0.310	0.664	0.284
	(0.497)	(0.480)	(0.500)	(0.463)	(0.461)	(0.462)	(0.472)	(0.451)
Primary school	0.037	0.307	0.031	0.272	0.051	0.378	0.050	0.367
	(0.190)	(0.461)	(0.174)	(0.445)	(0.221)	(0.485)	(0.217)	(0.482)
Middle school	0.002	0.107	0.001	0.098	0.001	0.184	0.003	0.192
	(0.041)	(0.309)	(0.034)	(0.298)	(0.035)	(0.387)	(0.056)	(0.394)
Secondary school & above	0.000	0.005	0.000	0.004	0.000	0.009	0.000	0.012
	(0.008)	(0.068)	(0.014)	(0.066)	(0.002)	(0.094)	(0.005)	(0.111)
Scheduled tribe/scheduled caste	0.416	0.436	0.441	0.448	0.269	0.279	0.280	0.290
	(0.493)	(0.496)	(0.497)	(0.497)	(0.443)	(0.449)	(0.449)	(0.454)
Hindu	0.832	0.828	0.825	0.822	0.729	0.750	0.748	0.741
	(0.374)	(0.377)	(0.380)	(0.382)	(0.445)	(0.433)	(0.434)	(0.438)
Household headed by a man	0.962	0.959	0.959	0.957	0.960	0.949	0.959	0.952
	(0.192)	(0.199)	(0.198)	(0.202)	(0.195)	(0.220)	(0.198)	(0.214)

HH head has post-primary education	0.313	0.343	0.319	0.355	0.558	0.592	0.564	0.611
	(0.464)	(0.475)	(0.466)	(0.478)	(0.497)	(0.491)	(0.496)	(0.487)
Types of households								
HH self-employed	0.514	0.515	0.510	0.513	0.425	0.408	0.416	0.399
	(0.500)	(0.500)	(0.500)	(0.500)	(0.494)	(0.491)	(0.493)	(0.490)
HH in agriculture	0.312	0.301	0.320	0.306	0.000	0.000	0.000	0.000
	(0.463)	(0.459)	(0.466)	(0.461)	0.000	0.000	0.000	0.000
Labor HH	0.174	0.184	0.171	0.181	0.571	0.588	0.580	0.597
	(0.379)	(0.387)	(0.376)	(0.385)	(0.495)	(0.492)	(0.494)	(0.491)
HH not elsewhere specified	0.000	0.000	0.000	0.000	0.005	0.004	0.004	0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.067)	(0.062)	(0.065)	(0.063)
HH owns land	0.964	0.967	0.956	0.990	0.252	0.230	0.236	0.213
	(1.953)	(2.037)	(2.227)	(2.233)	(1.576)	(1.562)	(1.520)	(1.761)
Highest education of women in HH	4.020	4.377	4.092	4.658	7.001	7.648	7.152	7.762
(in years)	(3.916)	(3.999)	(3.917)	(4.075)	(4.914)	(4.847)	(4.930)	(4.797)
No. observations	146,365	159,071	133,977	138,580	68,270	75,717	62,223	67,537

Note: Standard deviations in parentheses. Weighted to national level with NSSO sample weights.

Table 2. Primary Activity Status Among All Child Workers Ages 10-14, 1983-2008 (in percent)

Girls	1983	1988	1994	2000	2005	2008
Attached worker	0.1	0.0	0.0	0.0	0.0	0.0
Household enterprise	19.2	19.9	22.4	22.2	23.6	13.5
Wage employee	1.7	2.2	1.8	1.2	1.8	0.8
Casual worker	10.9	12.5	13.1	13.8	10.5	8.7
Domestic helper	68.2	65.4	62.8	62.8	64.2	77.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Boys	1983	1988	1994	2000	2005	2008
Attached worker	1.5	0.0	0.0	0.0	0.0	0.0
Household enterprise	53.7	53.8	55.4	49.8	53.0	43.0
Wage employee	12.3	12.3	9.4	7.4	10.1	7.1
Casual worker	19.1	21.9	24.2	32.6	26.3	23.3
Domestic helper	13.5	12.0	11.0	10.2	10.7	26.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

Note: Sample means are weighted. An "attached worker" is attached to a landlord or money lender; the category was only included in the 1983 survey.

Table 3. Average Adult Real Daily Minimum Wage Rates by Industry and State, 1983-2008

	Agriculture		Fishing		Forestry		Mining		Construction & Utilities		Transport, Storage & Communications		Services		Manufacturing	
Real	1983	2008	1983	2008	1983	2008	1983	2008	1983	2008	1983	2008	1983	2008	1983	2008
Andhra Pradesh	14.1	14.8	32.4	19.9	19.9	9.9	12.3	18.6	14.6	20.1	35.8	18.6	16.8	19.2	11.0	18.9
Assam	11.5	14.6	12.0	12.1	30.0	11.1	13.8	11.1	12.0	14.6	11.0	11.1	20.7	11.1	11.5	11.1
Bihar	9.3	15.5	27.0	15.5	27.0	15.5	14.1	15.5	18.8	15.5	11.5	15.5	20.9	15.5	15.0	15.5
Gujarat	15.2	19.4	32.7	18.9	31.6	18.7	14.9	18.7	16.3	19.2	31.4	19.9	15.1	19.1	14.9	19.1
Haryana	19.8	19.4	19.8	19.3	42.7	19.2	21.0	19.2	21.1	19.2	42.7	19.2	28.1	19.2	23.6	19.2
Karnataka	10.0	14.7	63.3	18.5	56.6	16.4	11.2	16.0	11.8	16.8	11.5	16.2	13.2	17.3	10.5	16.3
Kerala	7.5	19.2	34.4	20.1	46.3	38.5	6.6	55.6	17.1	33.3	19.0	30.7	13.5	24.8	7.9	23.2
Madhya Pradesh	10.7	12.7	10.7	12.7	34.2	19.1	10.7	19.1	14.3	19.1	34.2	19.1	15.9	19.1	17.0	19.1
Maharashtra	10.5	18.9	10.5	18.9	13.0	8.3	9.9	17.5	21.1	17.5	21.9	18.1	12.5	17.5	13.9	17.5
Orissa	10.0	11.1	10.0	11.1	15.9	11.1	15.3	11.1	15.3	11.1	25.0	11.1	15.1	11.1	10.0	11.1
Punjab	17.1	19.8	17.1	19.8	14.7	19.8	12.6	19.8	17.1	19.8	23.3	19.8	14.0	25.6	14.5	25.6
Rajasthan	22.0	14.7	22.0	14.7	22.0	14.7	22.0	16.2	22.0	14.7	22.0	14.7	22.0	14.7	22.0	14.7
Tamil Nadu	10.0	14.3	10.0	14.3	25.8	16.2	16.6	22.1	19.0	22.9	10.0	14.5	9.5	17.4	5.5	15.5
Uttar Pradesh	9.0	17.3	9.0	17.3	19.0	17.4	9.5	22.7	9.5	20.2	14.8	23.0	11.4	20.2	14.3	20.2
West Bengal	23.0	27.1	23.0	27.1	36.2	12.0	28.0	10.7	24.8	27.1	48.4	27.1	31.5	29.1	23.6	27.1

Source: Aggregated from data in Government of India, Labour Bureau (various years). Nominal wages in rupees, real wages are pegged to price indices with a base year of 1983. The table reports weighted estimates. No nominal or real minimum wage reported for fishing in Haryana in 2008. Adults include those aged 15-65 years.

Table 4. Employment Determinants for Children Ages 10-14 in Rural Areas

	Work Within Household		Work Outside Household	
	Boys	**Girls**	**Boys**	**Girls**
Minimum Wage	0.130*	-0.289***	0.005	-0.086
	(0.069)	(0.073)	(0.077)	(0.065)
Age	0.016***	0.046***	0.012***	0.011***
	(0.002)	(0.005)	(0.002)	(0.002)
Education (reference group = illiterate)				
Less than primary school	-0.063***	-0.146***	-0.032***	-0.022*
	(0.013)	(0.019)	(0.009)	(0.011)
Primary school	-0.072***	-0.168***	-0.042***	-0.036**
	(0.012)	(0.019)	(0.009)	(0.013)
Middle school	-0.086***	-0.203***	-0.056***	-0.051**
	(0.011)	(0.019)	(0.013)	(0.018)
Secondary school & above	-0.106***	-0.223***	-0.076***	-0.066**
	(0.015)	(0.030)	(0.015)	(0.023)
Scheduled tribe/scheduled caste	0.001	-0.012*	-0.005	-0.004
	(0.004)	(0.006)	(0.005)	(0.003)
Hindu	0.004	-0.005	-0.001	0.005*
	(0.006)	(0.005)	(0.004)	(0.003)
Household headed by a man	-0.017***	-0.021	-0.008	-0.003
	(0.006)	(0.019)	(0.007)	(0.007)
HH head has post-primary education	-0.020***	-0.032***	-0.010***	-0.002
	(0.003)	(0.007)	(0.003)	(0.002)
Types of households (reference = labor households)				
HH self-employed	0.022***	0.013	-0.009*	-0.010**
	(0.004)	(0.008)	(0.005)	(0.004)
HH in agriculture	-0.012**	0.006	0.018**	0.018**
	(0.005)	(0.009)	(0.008)	(0.007)
HH not elsewhere specified	-0.068***	-0.019	-0.038***	0.012
	(0.014)	(0.079)	(0.011)	(0.023)
HH owns land	0.001	0.004***	-0.001	-0.000
	(0.001)	(0.001)	(0.001)	(0.000)
Highest education level of women in HH	-0.003***	-0.007***	-0.001*	-0.001**
	(0.000)	(0.001)	(0.000)	(0.001)
State unemployment rate for men	-0.002***	-0.004***	-0.003***	-0.003***
	(0.000)	(0.001)	(0.000)	(0.001)
State unemployment rate for women	-0.000	0.001**	0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
State regulations: Adjustments	-0.057**	-0.034	-0.065**	-0.125***
	(0.023)	(0.046)	(0.024)	(0.028)

State regulations: Disputes	0.077	0.701**	-0.194	0.102
	(0.126)	(0.308)	(0.186)	(0.339)
Enforcement: Inspections	0.624	-1.322**	-0.520	0.485
	(0.473)	(0.573)	(0.713)	(0.578)
Enforcement: Irregularities	0.014	1.576***	0.891	0.049
	(0.363)	(0.462)	(0.595)	(0.486)
Enforcement: Value of fines	0.024	-0.441***	-0.350*	-0.266
	(0.120)	(0.121)	(0.198)	(0.158)
Interaction: Inspections * Minimum Wage	-0.236	0.485**	0.175	-0.210
	(0.174)	(0.212)	(0.260)	(0.212)
Interaction: Irregularities * Minimum Wage	0.003	-0.609***	-0.356	-0.027
	(0.146)	(0.183)	(0.238)	(0.194)
Interaction: Value of fines * Minimum Wage	-0.004	0.138***	0.106*	0.090*
	(0.035)	(0.035)	(0.058)	(0.046)
No. Observations	159,071	138,580	159,071	138,580

Note: Weighted to national level with NSSO sample weights. Standard errors, in parentheses, are clustered by state and year. The notation *** is $p < 0.01$, ** is $p < 0.05$, * is $p < 0.10$. All regressions include state dummies, time dummies, industry dummies, and industry-time interaction terms. Children are ages 5-14.

Table 5. Employment Determinants for Children Ages 10-14 in Urban Areas

	Work Within Household		Work Outside Household	
	Boys	**Girls**	**Boys**	**Girls**
Minimum Wage	-0.083**	-0.094*	0.006	0.000
	(0.030)	(0.049)	(0.058)	(0.020)
Age	0.008***	0.039***	0.014***	0.006**
	(0.002)	(0.004)	(0.003)	(0.002)
Education (reference group = illiterate)				
Less than primary school	-0.052***	-0.153***	-0.055***	-0.023**
	(0.007)	(0.028)	(0.017)	(0.008)
Primary school	-0.057***	-0.173***	-0.077***	-0.031***
	(0.006)	(0.029)	(0.016)	(0.010)
Middle school	-0.063***	-0.224***	-0.098***	-0.045***
	(0.008)	(0.030)	(0.020)	(0.014)
Secondary school & above	-0.076***	-0.245***	-0.080***	-0.049***
	(0.009)	(0.041)	(0.027)	(0.014)
Scheduled tribe/scheduled caste	-0.002	-0.007	-0.013***	0.006
	(0.003)	(0.008)	(0.003)	(0.004)
Hindu	-0.004	-0.009	-0.004	0.004
	(0.003)	(0.007)	(0.004)	(0.003)
Household headed by a man	0.009**	-0.021	-0.005	-0.002
	(0.003)	(0.017)	(0.008)	(0.006)
HH head has post-primary education	-0.011**	-0.032***	-0.015*	-0.012*
	(0.005)	(0.007)	(0.007)	(0.007)
Types of households (reference = labor households)				
HH self-employed	0.019***	0.015***	-0.007*	-0.014***
	(0.003)	(0.005)	(0.004)	(0.003)
HH in agriculture	-	-	-	-
HH not elsewhere specified	0.016	0.023	-0.025***	-0.016***
	(0.029)	(0.037)	(0.008)	(0.005)
HH owns land	-0.000	0.000	-0.001*	0.000
	(0.000)	(0.001)	(0.000)	(0.000)
Highest education level of women in HH	-0.001***	-0.005***	-0.002***	0.000
	(0.000)	(0.001)	(0.001)	(0.000)
State unemployment rate for men	-0.000	-0.001	-0.002***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
State unemployment rate for women	-0.000	-0.000	-0.000	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
State regulations: Adjustments	-0.024	-0.037	-0.072***	-0.012
	(0.016)	(0.022)	(0.023)	(0.018)

|				
State regulations: Disputes	0.054	-0.085	0.130	-0.431[**]
	(0.076)	(0.364)	(0.184)	(0.152)
Enforcement: Inspections	-0.011	-0.085	0.535	0.771[**]
	(0.248)	(0.569)	(0.683)	(0.283)
Enforcement: Irregularities	-0.159	-0.434	-0.145	-0.730[***]
	(0.214)	(0.462)	(0.571)	(0.212)
Enforcement: Value of fines	-0.004	-0.048	-0.027	0.120[***]
	(0.057)	(0.149)	(0.169)	(0.039)
Interaction: Inspections * Minimum Wage	0.004	0.022	-0.209	-0.286[**]
	(0.092)	(0.207)	(0.251)	(0.105)
Interaction: Irregularities * Minimum Wage	0.059	0.157	0.059	0.285[***]
	(0.084)	(0.186)	(0.226)	(0.084)
Interaction: Value of fines * Minimum Wage	0.004	0.018	0.012	-0.030[***]
	(0.016)	(0.042)	(0.049)	(0.010)
No. Observations	75,717	67,537	75,717	67,537

Note: Weighted to national level with NSSO sample weights. Standard errors, in parentheses, are clustered by state and year. The notation [***] is $p < 0.01$, [**] is $p < 0.05$, [*] is $p < 0.10$. All regressions include state dummies, time dummies, industry dummies, and industry-time interaction terms. Children are ages 5-14.

Table 6. Specification Test Results for Alternative Age Groups: Minimum Wage Impacts

	Work Within Household		Work Outside Household	
	Boys	Girls	Boys	Girls
Rural Sector				
All children (ages 5-14)	0.040	-0.231***	-0.011	-0.058
	(0.046)	(0.065)	(0.039)	(0.045)
Younger children (ages 5-9)	-0.015	-0.038	-0.032***	-0.003
	(0.023)	(0.030)	(0.005)	(0.008)
Urban Sector				
All children (ages 5-14)	-0.038*	0.011	0.012	0.002
	(0.019)	(0.025)	(0.029)	(0.011)
Younger children (ages 5-9)	0.009	0.005	0.006	0.006
	(0.006)	(0.014)	(0.004)	(0.005)

Note: Weighted to national level with NSSO sample weights. Standard errors, in parentheses, are clustered by state and year. The notation *** is $p < 0.01$, ** is $p < 0.05$, * is $p < 0.10$. All regressions include the full set of control variables.

Online Appendix Figure 1. Predicted Child Work and Real Minimum Wage Rates by Gender, 1983-2008.
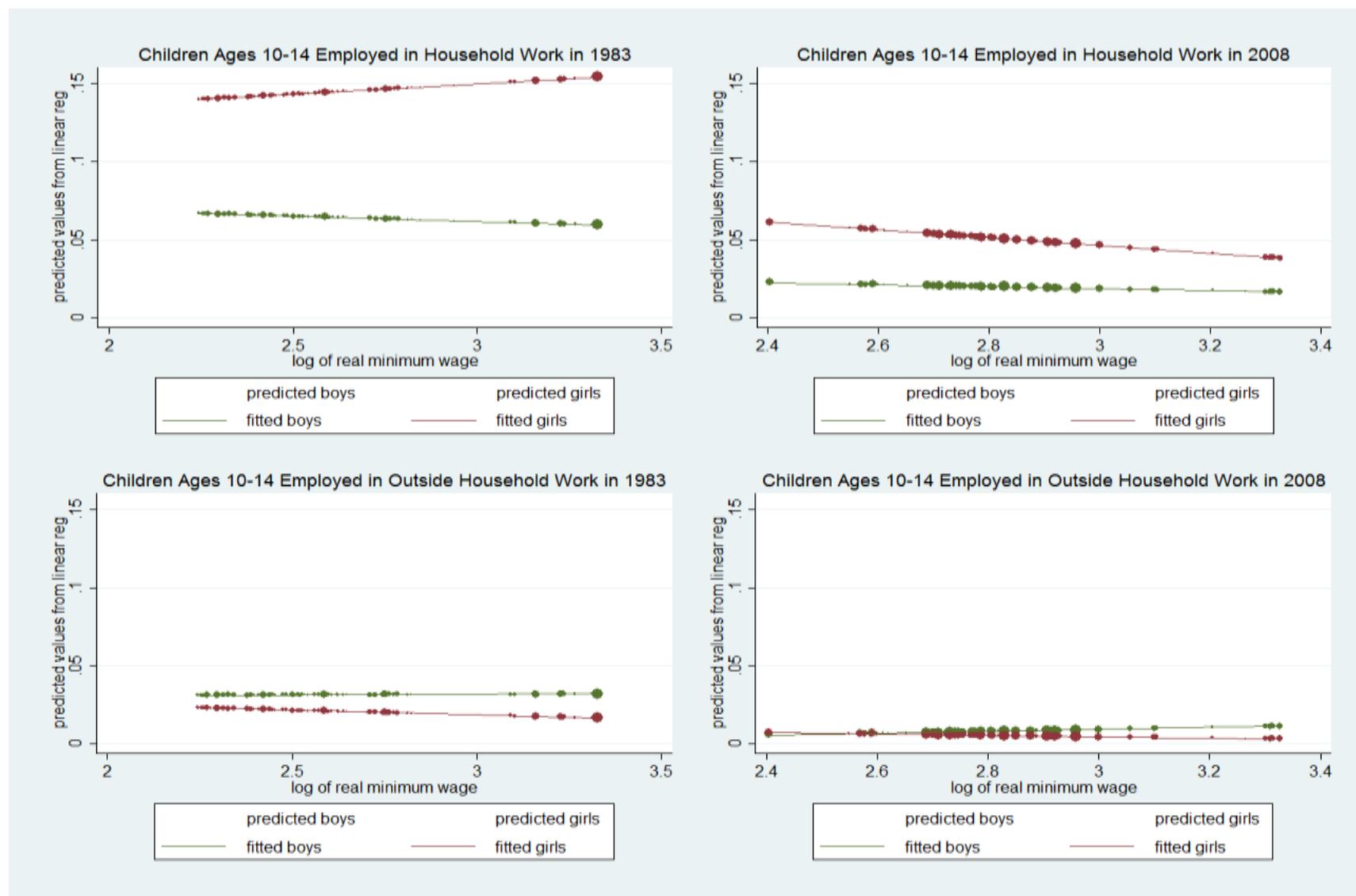
Source: Authors' calculations from NSSO (1983-2008) database. Weighted to national level with NSSO sample weights.

Online Appendix Table 1. Mapping of NIC Industry Codes Used in NSSO to Minimum Wage Industries

NIC 1970 Industry (Used in 1983, 1987-88, & 1993-94 NSSO)	Minimum Wage Industry
00,01,02,03,04 - Agriculture, Hunting	1
06 – Fishing	2
05 – Forestry	3
1 - Mining and Quarrying	4
4 - Electricity, Gas and Water	5
5 – Construction	5
7 - Transport, storage and communications	6
6 - Wholesale and Retail Trade and Restaurants and Hotels	7
8 - Financing, Insurance, Real Estate and Business Services	7
9 - Community, Social and Personal Services	7
X - Activities not adequately defined	7
Y - Repair Services	7
2&3 – Manufacturing	8

NIC 1998 Industry (Used in 1999-2000, 2004-05, & 2007-08 NSSO)	Minimum Wage Industry
01 - Agriculture, Hunting	1
05 – Fishing	2
02 – Forestry	3
10-14 - Mining and Quarrying	4
40-41 - Electricity, Gas and Water	5
45 – Construction	5
60-64 - Transport, storage and communications	6
50-52,55 - Wholesale and Retail Trade and Restaurants and Hotels	7
65-67,70-75 - Financing, Insurance, Real Estate and Business Services	7
80,85,90-93,95 - Community, Social and Personal Services	7
15-37 - Manufacturing	8
99 - Extra-territorial organizations and bodies	drop

Online Appendix Table 2. Sample Means for Variables Measuring Enforcement of the
Minimum Wage

1983	No. Inspections	No. Irregularities	Real Value of Fines
Andhra Pradesh	53,212	14,822	141,759
Assam	2,688	7,680	0
Bihar	162,752	49,149	13,225
Gujarat	23,267	44,325	428,160
Haryana	10,624	2,553	168,735
Karnataka	25,470	9,393	8,200
Kerala	42,223	27,698	13,245
Madhya Pradesh	63,853	9,402	108,562
Maharashtra	113,951	60,088	72,723
Orissa	16,724	13,317	3,175
Punjab	12,453	59	58,437
Rajasthan	11,418	324	71,343
Tamil Nadu	14,921	3,187	144,101
Uttar Pradesh	66,228	1,565	356,178
West Bengal	43,966	6,664	26,338

2008	No. Inspections	No. Irregularities	Real Value of Fines
Andhra Pradesh	78,307	14,822	208,915
Assam	427	18	0
Bihar	261,808	51,851	254
Gujarat	14,901	60,878	303,436
Haryana	2,095	117	110,644
Karnataka	43,587	12,913	34,234
Kerala	27,779	47,916	91,947
Madhya Pradesh	25,909	953	224,250
Maharashtra	1,242	5,173	50,922
Orissa	24,125	21,943	3,321
Punjab	225	161	20,033
Rajasthan	8,105	207	7,343
Tamil Nadu	97,961	9,106	313,689
Uttar Pradesh	5,777	5,216	111,493
West Bengal	120	420	73,172

Online Appendix Table 3. Data Sources

Description	Name of Source and Years of Data
Individual and household characteristics	NSSO: 1983, 1987-88, 1993-94, 1999-2000, 2004-05, 2007-08
State-level net real domestic product	Reserve Bank of India: 1983, 1987, 1993, 1999, 2004, 2007
State-level unemployment rates	Indiastat, NSSO: 1983, 1987-88, 1993-94, 1999-2000, 2004-05, 2007-08
State-level indicators of minimum wage enforcement	Labour Bureau: 1983, 1986, 1993, 1998, 2004, 2006
State-level labor market regulations on adjustment and disputes	Ahsan and Pagés (2009): 1983, 1986, 1993, 1998, 2004, 2006
State- and industry-level minimum wages	Labour Bureau: 1983, 1986, 1993, 1998, 2004, 2006

Online Appendix Table 4. Robustness Checks for Sub-Sample with no Imputed Minimum Wage rates for Missing Industries in the Minimum Wage Data

	Work Within Household		Work Outside Household	
	Boys	Girls	Boys	Girls
Rural Sector	0.122	-0.294***	0.004	-0.085
	(0.075)	(0.075)	(0.078)	(0.066)
Urban Sector	-0.083**	-0.095*	0.006	0.001
	(0.030)	(0.049)	(0.058)	(0.020)

Weighted to national level with NSSO sample weights. Standard errors, in parentheses, are clustered by state and year. The notation *** is $p < 0.01$, ** is $p < 0.05$, * is $p < 0.10$. All regressions include state dummies, time dummies, industry dummies, and industry-time interaction terms. Children are ages 5-14.