POLICY RESEARCH WORKING PAPER 4399

Analyzing the Impact of Legislation on Child Labor in Pakistan

Tazeen Fasih

Abstract

This paper exploits a natural experiment approach to identify the impact of legislation (Employment of Children Act 1991) in Pakistan on participation of children in the labor markets. The law prohibits employment of children less than 14 years of age in sectors other than agriculture or household enterprises.

With micro-data, making use of regression discontinuity data design, the study finds some evidence that the Employment of Children Act 1991 helped in reducing the employment of children immediately after its implementation.

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1 - Introduction

Child labor is a complex socio-economic issue that not only violates the basic human rights of individual children by hindering their educational, physical and psychological development, but also impedes the development and equitable growth of economies by generating an uneducated and relatively unskilled labor force in the long run and thus helping to perpetuate poverty. Grimsrud (2002) proposes that the endogenous growth theories assume that individuals maximise lifetime welfare in the form of an inter-temporal utility function, which allows the perception of child labor as lost investment in one time period. He argues that according to Lucas's (1988) theory the more human capital society as a whole accumulates, the more productive each single member will be. Thus in endogenous growth theory human capital formation is essential for economic growth.

Historically, no region has ever been completely free of this problem, and over the 1990s there has been a worldwide movement for the eradication of the worst forms of child labor. Countries and governments have moved from a complete denial of the existence of the problem to legislation and positive action for tackling the issue. Pakistan, in this regard, provides an interesting case study. It implemented few minimum working age laws and labor legislation in general over the years until the 1980s, and considered child labor to be negligibly small. However, after ratifying the United Nation's Convention on the Rights of the Child 1989, the Government of Pakistan, in April 1991 implemented its most comprehensive nationwide law against child labor yet, in the form of the Employment of Children Act 1991. The Act provides that "no child below the age of 14 years shall be employed in any factory or mine or any

hazardous employment or in specific occupations, making employment of children a cognizable offence punishable by fine and imprisonment".[1]

The minimum age for work laws target child labor by reducing the demand and/or supply (depending on the provisions of the Act and how it is implemented) of child labor. This could help address labor market distortions by raising adult wages and reducing the need for households to send children to work for financial reasons (Basu 2000). There have been attempts to theoretically explain the impact that legislation might have on children's work. Rogers and Swinnerton (2002) develop a model of exploitative child labor. A key feature of the model is that the exploitative labor occurs because parents have imperfect information about whether the employment opportunities available to their children are exploitative or not. In such a model, a ban on exploitative child labor is desirable and leads to Pareto efficiency since it resolves the problem of imperfect information faced by parents. Basu (2005), on the other hand, cautions against imposition of fines for employing child labor since it might increase children's work in the short run. In his model a household sends a child to work to attain a particular subsistence level of consumption. A fine on firms for employing children would mean that a firm that does so is taking a risk of incurring a punishment cost if caught by the authorities. The firm thus transfers that cost to the household by reducing wages paid to children. In response, the households would have to send more children to work to attain the particular subsistence level of consumption in the presence of lower wages.

Betcherman *et al* (2004) suggest that child labor and compulsory education laws can be effective tools for reducing child labor in a number of scenarios. First, in the lines of Roger and

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[1] The occupations and processes specified in the Act are given in appendix A.

Swinnerton (2002) they suggest that it can be effective if the parents do not have full information about the benefits of education or if the parents are not altruistic and exploit children for their economic benefit. In Pakistan we expect the former to exist, in particular because of the high unemployment rates of educated youth which can act as a deterrent for the motivation of both children as well as parents towards education. The latter scenario may be true for Pakistan as well, not necessarily because of a lack of altruism, but rather since the concept of childhood in developing countries is one where the children also hold some responsibility to help the household adults in a number of ways, one of which usually is helping on household farms or enterprise, but can also extend to working in the labor market to help the household maintain a minimum subsistence level of consumption. The second scenario they suggest in which legislation can be effective id if child labor arises due to market failure such that the employers preferring to hire lower cost children rather than higher cost adults. This scenario will exist in economies where the demand for low/unskilled labor is high such as in low income countries like Pakistan, and children can easily be substituted for adult workers for much lower wages without much loss in productivity. At the same time, legislation may not be very effective unless it is implemented properly.

In Pakistan there has been a decrease in the proportion of children involved in work over the 1990s (Fasih, 2004) and against this background, it is important to investigate how this decrease has been affected by the Employment of Children Act 1991 (EoCA). This paper aims to do so by exploiting a quasi-experimental approach to analyze the extent to which the EoCA 1991 affected the decrease in child labor in Pakistan. Since the EoCA specifies a minimum age of 14 years for work, it is expected that it would affect employment rates primarily of children less

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than 14 years old. Thus, in this paper using regression discontinuity data design, we use the difference-in-difference estimator to isolate the effect of legislation from the effects of other factors influencing the child labor market. We analyze the change in probability of work participation of children affected by the law over the periods immediately before and after the implementation of the EoCA compared to the change in participation of selected control groups over the same period. The results appear to suggest that the law reduced the employment of children less than 14 years of age in Pakistan, and the law appears to be a tool in helping to reduce the employment of children.

To the best of our knowledge, this paper is one of the first attempts to analyze the impact of legislation on child labor for one of the present day developing countries after the recent movement for the eradication of child labor. Basu (2005) in his theoretical paper recommends empirical research to investigate the effects of anti-child labor legislation, since the impact of such laws has not been rigorously evaluated.

Economic historians have studied the effect of child labor laws and compulsory education laws in countries other than Pakistan, on the labor participation rates of children and educational enrolment. For instance Solmon et al. (1972) study the issues of law and social change by analyzing the effectiveness of compulsory schooling laws in the United States in the late 19th and early 20th century. Their study takes into account both, compulsory schooling laws and child labor laws enacted during that period. The results indicate that the increase in the level of schooling during the period studied was not caused by the enforcement of laws. Similarly Moehling's (1999) study of the impact of state child labor laws at the turn of 19th and 20th

century United States also concludes that legislation was not the major factor contributing to the dramatic reduction in the magnitude of child labor witnessed during the period. These studies attribute the decrease in child labor to a change in societal attitudes towards children's work and rights and also to the improvement in technology which reduced the demand for unskilled labor. A similar study by Margo et al. (1996) (using data from the 1900 Census of the United States) does not find a significant effect of the compulsory school laws on school attendance. However, they find a significant positive effect on the school attendance of children in the states where compulsory school laws were combined with child labor laws. Lleras-Muney (2001) also analyses the legislation on compulsory education and child labor in the United States (period 1915-1939). She studies the effect of changes in laws on compulsory education and child labor; such changes include, for example, increasing the minimum legal requirement for a child to be in school by increasing minimum age to obtain work permit or decreasing school entrance age. The results suggest that such changes significantly increased the education attainment of children. Results show, however, that the impact was not consistent over all races. For instance there was no impact on African American men.

Manacorda (2003 and 2006) analyses the effect of child labor on household labor supply, using the 1920 US Census data, to study the degree of parents' altruism towards their children. He uses State specific child labor laws to identify a source of exogenous variation in child labor. As a part of his analysis of labor supply responses of different household members to changes in the proportion of working children Manacorda finds a strong impact of child labor laws on children's labor market participation in the USA in 1920, such that children below the minimum age were found not to participate in work but the participation increased once the child reached

the legal working age. However, this effect is seen only for children involved in market work and not on household farms, as the minimum age laws did not affect work on household farms.

Therefore, the current literature focuses on late 19th and early 20th century USA. In most cases the analysis exploits differences in minimum age laws over the various states in the US and also on the change in minimum age specifies over the years to try to identify the impact of legislation on child labor. The evidence of the effectiveness of these laws, however, is mixed with no clear trend appearing.

The rest of the paper is organized as below; the introduction and literature review in this section is followed by section 2 which discusses the provisions of the Employment of Children Act 1991. Data and methodology is discussed in section 3. Section 4 presents the results, and the paper concludes with our main findings in section 5.

2 - Labor Laws in Pakistan

The previous labor laws enacted in Pakistan since the 1920s (in pre-partition India), were not consistent in defining a particular cut-off age for work/employment of children and applied only to a few occupations (a brief summary of the laws is given in appendix A, table A1).[2] For instance the Factories Act 1934 (amended 1997) applied only to Factories, where a factory is defined as a premises where at least 10 or more workers work on a manufacturing process. Similarly, in Pakistan, these labor laws did not apply to the establishments in the un-organised sector of the economy (Grimsrud 2002). The EoCA 1991 specifies the minimum age for work

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[2] For example the Factories Act 1934, the Employment of Children Act 1938, the Mines Act 1923 (see Hyder, 1998).

and also specifies the particular occupations and processes where children can not be employed (see appendix A for details). As such it is applicable and enforceable even in the un-organised and informal sector, and to establishments that do not come under the definition of a factory.

The EoCA 1991 is also considered more comprehensive because in terms of penalising the offenders, that is the employers, it is more severe than the other minimum age laws. For instance, the maximum penalty in case of a contravention of the Factories Act (1997) in terms of employing an underage child for work is only Rs.500; whereas, under the EoCA 1991 the penalty can extend to imprisonment for up to a year or a fine of Rs.20000 or both.[3]

The EoCA 1991 does not prohibit work in establishments or enterprises that are not related to the occupations and processes specified in the Act. It also does not prohibit children's work in the agriculture sector (except where hazardous chemical sprays are used), or work in the family business, farm or enterprise. However, the Act lays out strict regulations of conditions of work for children in these occupations.[4] For instance a child can not work for more than a period of 3 hours without a break of at least 1 hour, and the hours of work with the intervals can not exceed 7 hours a day. Also no child is allowed to work between 7p.m to 8a.m. Thus the EoCA 1991 aims to eliminate the employment of children in the most hazardous occupations and to regulate the conditions of work for children in other less hazardous occupations.

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[3] In terms of minimum wages, the minimum wage is fixed at approximately Rs.4000 per month ($66), so Rs.500 is almost 1/8 of the minimum wage.

[4] In order to better regulate the working conditions of adolescents and children more than 12 years of age who are willing to work (with permission of their legal guardians and a health certificate from a medical practitioner – see Annex A), the government introduced the Employment of Children Rules in 1995 on the basis of the EoCA 1991. These rules lay out the working conditions for children in detail and require the maintenance of a register of child workers.

The implementation of labor laws in Pakistan is the responsibility of the Ministry of Labor and Manpower (MoL).[5] The Federal Laws of Pakistan are published by the Government in a document called the Gazette of Pakistan (The Employment of Children Act 1991 was published in "*Gazette of Pakistan, 1991-04-06, Extraordinary, pp. 69-77*"). The notification and implementation is also reported in the Ministry of Labor's "Labor Gazette". Notification of a new labor Act is sent to the firms operating in a province by the provincial MoL, and district level labor officers/inspectors are responsible to monitor the implementation of labor regulations in the various establishments. In the case of EoCA 1991, in addition to the labor officer/inspector, any person or police officer is allowed to file a complaint of an offence under the Act in any court of competent jurisdiction. It is expected that given the provisions of the EoCA 1991, the immediate impact would be on the demand of child labor since it specifies the employers to be the offenders.

The monitoring and implementation capacity of the provincial and district level officials might have been low in the early 1990s.[6] Thus, we do not claim that the Act was perfectly implemented in 1991. However, given that the implementation capacity is expected to be low in any developing country, it would be instructive to see if the legal system can operate to achieve the desired objectives in a less than perfect scenario.

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[5] Since under the national constitution labor is regarded as a 'concurrent subject', which means that it is the responsibility of both the Federal and Provincial Governments. However, for the sake of uniformity, laws are enacted by the Federal Government, stipulating that Provincial Governments may make rules and regulations of their own according to the conditions prevailing in or for the specific requirements of the Provinces (http://www.ilo.org/public/english/dialogue/ifpdial/info/national/pak.htm).

[6] With the devolution of authority in the early 2000, the government is gradually transferring more authority to the local councils but even this process has been slow to-date and the capacity of officials at the district level is not strong.

3 - Data and Methodology

3.1 - Data

The empirical analysis in this paper makes use of micro-level data from the Pakistan Integrated Household Survey 1991, (PIHS 1991). The data set consists of 35,774 individuals of all ages, of which 4480 are aged 10-14 with 2348 boys and 2132 girls.[7] The PIHS 1991 was conducted throughout the year 1991, with approximately equal number of households from each region of the country interviewed each month. Thus, the data has a unique quality which can help in exploiting the regression discontinuity design and is ideal for the use of the identification strategy. Another reason for the selection of the year 1991 for such an analysis is that it was a year that was relatively free of much lobbying and international pressure against child labor in the country. This helps identify the true impact of the law, which is the main aim of the paper.

Identifying the households interviewed by months enabled the division of the data set into two groups; the households interviewed during January to April and those interviewed during May to December, giving the pre-intervention and the post-intervention periods respectively. Since the EoCA 1991 was introduced in April and implemented the same month, the two sub-groups of the data may provide suitable comparison groups for the study of post-intervention child labor situation in Pakistan. For our study different age and/or occupation groups are used from this pool of data as robustness checks for our findings.

Table 1 gives employment rates for children age 10-14 years in the months January-April and May-December in 1991. There appears to be a statistically significant decrease in the

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[7] A few individuals (12 individuals) reported age more than 100, but we exclude these observations from our analysis.

employment rates of 13 year olds in the post-intervention period. For most other ages there is an increase in employment rates in the months of May-December, but the increase is statistically insignificant. The exceptions to this are among 10 year old boys and 14 year old girls where there is a slight decrease in employment rate for these children in the months following the implementation of the Act.

Table 1: Employment rate for children age 10-14[8]

Age	1991			Jan-April			May-Dec.		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
10	12.6	20.6	16.4	14.1	14.1	14.1	12.0	23.2	17.3
	(1.4)	(1.8)	(1.1)	(2.9)	(2.9)	(2.0)	(1.6)	(2.2)	(1.3)
11	14.7	19.9	17.0	12.2	20.0	15.7	15.6	19.9	17.5
	(1.7)	(2.2)	(1.4)	(3.1)	(4.2)	(2.6)	(2.1)	(2.6)	(1.6)
12	22.4	24.7	23.4	20.2	23.0	21.5	23.2	25.3	24.1
	(1.6)	(1.9)	(1.2)	(3.1)	(3.6)	(2.3)	(1.9)	(2.3)	(1.5)
13	26.4	25.5	25.9	34.4	32.2	33.3	23.5	23.3	23.4
	(2.4)	(2.3)	(1.6)	(5.0)	(5.0)	(3.6)	(2.7)	(2.6)	(1.8)
14	33.7	33.1	33.4	25.2	36.6	31.0	36.4	31.9	34.1
	(2.4)	(2.3)	(1.7)	(4.4)	(4.8)	(4.8)	(2.8)	(2.6)	(1.9)

Note: figures in parentheses are standard errors

Figure 1 shows the monthly employment rates by age. Except for 13 year old children, there does not appear to be much decrease in employment rates of the children in the months following the implementation of the EoCA 1991. The monthly employment rates of children in the four main occupation groups (figure 2) shows some seasonal decrease in employment in agriculture in the months of June, July, and August which increases again in last four months of the year, this is not surprising since the agriculture sector is not a prohibited sector of work under the EoCA 1991. As opposed to agriculture sector, the manufacturing sector shows a slight reduction in employment rates in the post-implementation months. Similarly participation in other the other two sectors is also either steady or decreasing for all ages.

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[8] The reference period for work in PIHS 1991 is 7 days.

The sectoral distribution of working children by area of residence (given in table2) suggests that during the months of May-December the proportion of children employed in the agriculture sector in rural areas increased and there was a decrease in employment in all other sectors consistent with figure 2. In urban areas there was an increase in the proportion of children working in the personal services sector and shops, hotels and transport sectors. In both areas there is a decrease in the proportion of children in the manufacturing sector, however, the magnitude of the fall is smaller in urban areas. This pattern seems to be reflective of the fact that children's work in the agriculture sector as well as the domestic services sector is not prohibited by the EoCA 1991 (detailed tables showing the employment rates of children in different occupations in the year 1991 are given in Appendix B).

Table 2: Sectoral distribution of working children by region (age 10-14)
(Percent of employed children working in each sector)

Sector	Rural		Urban		Total	
	Jan-April	May-Dec.	Jan-April	May-Dec.	Jan-April	May-Dec.
Agriculture	55.1	70.7	17.1	13.0	39.9	56.8
Manufacturing	12.2	6.3	26.7	23.9	18.0	10.5
Personal and consumer services	8.3	2.6	10.5	15.8	9.2	5.8
Construction	2.6	2.4	5.7	1.6	3.8	2.2
Shops/hotels and transport	17.3	12.9	32.4	38.6	23.4	19.1
Undefined	4.5	5.2	7.6	7.1	5.7	5.6
	100	100	100	100	100	100

3.2 - Methodology

The objective of this paper is to test whether the EoCA 1991 has been effective in reducing the employment of children using a quasi-experimental approach. A quasi-experiment (or natural experiment) is caused by an external exogenous effect, which changes the environment in which individuals operate (Stock *et al* 2003; Meyer, 1995). Such natural experiments may be induced by introduction of, or changes in legislation, or a policy change. Thus a particular policy change may give rise to treatment and control groups and the variation

in the individual circumstances generates the randomness in the treatment assignment. A necessary condition for a quasi-experiment analysis is that there should be no systematic variation in the unobservable characteristics between the pre and post-treatment groups.

The natural experiment approach employed in this paper is based on the use of cross-sectional data from two time periods to compare the employment of children who would have been affected by the implementation of the EoCA 1991, with that of a similar group who were not affected by it. The identification strategy relies on a regression discontinuity framework applied to the pre and post-treatment period and the data used, with two pre-treatment and two post-treatment groups allows us to control for the differential trends by structuring the regression discontinuity design on a difference-in-difference approach to isolate the effect of the law on employment of children from other factors determining the labor supply decision. A direct comparison of the two groups would not be appropriate to identify the causal effect of the law since even in the absence of the law, younger children have a lower probability of working than older children, or there may be age-specific unobservables that could affect the results. The difference-in-difference estimator compares the difference in the employment probability of children in the two groups in a period after the implementation of the Act with the equivalent difference in an earlier period when the EoCA 1991 was not introduced.

To be more specific, assume that $D_i=1$ if a treatment is introduced and zero in the absence of the treatment. Let Y_{0i} be the outcome for individual i in the absence of the treatment and Y_{1i} be the outcome for the individual in the presence of the treatment. However, for any single individual only one of these outcomes is ever observed. Since both Y_{0i} and Y_{1i} are never

observed for the same individual, the basic idea behind the natural experiment is that by careful selection of treatment and control groups the average treatment effect on the treated group can be estimated. So if we are interested in estimating $E[Y_{1i} / D_i = 1] - E[Y_{0i} / D_i = 1]$, we can estimate the counterfactual by replacing the unobserved $E[Y_{0i} / D_i = 1]$ with the experience of individuals in control group j who did not experience treatment $E[Y_{0j} / D_i = 0]$.[9]

For our analysis, let y_{it} be the employment status of a child, which equals 1 if the child works and zero otherwise. In time period t^* a law is introduced which directly affects only one group of children. Let the groups be indexed by g, such that in time period $t_1 \leq t^*$, there is no law that affects the employment decision of children in any group, but in $t_2 > t^*$, only group $g=1$ is directly affected by the introduction of the policy and $g=2$ is not. We observe $E\left(y_{it_1} \middle| g = 1, t = t_1\right)$ only in time period $t_1 \leq t^*$ and $E\left(y_{it_2} \middle| g = 1, t = t_2\right)$ only in $t_2 > t^*$. The objective is to estimate the counterfactual, i.e., what would have been the employment probability of group $g=1$ in time period t_2 in the absence of the law; in other words, to estimate $E\left(y_{it_1} \middle| g = 1, t = t_2\right)$ when $t_2 > t^*$. Suppose there is a constant effect, β, on the employment probability in group 1 resulting from the implementation of the law, then:

$$E\left(y_{it_2} \middle| g = 1\right) = E\left(y_{it_1} \middle| g = 1\right) + \beta \tag{1}$$

$$E\left(y_{it_2} \middle| g = 2\right) = E\left(y_{it_1} \middle| g = 2\right) \tag{2}$$

where $t_1 \leq t^* < t_2$

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[9]Here, conditioning on observables X helps the identification process i.e., $E[Y_{0i} / D_i = 1, X] = E[Y_{0j} / D_i = 0, X]$.

The key assumption in the difference-in-difference estimate is that in the absence of a policy intervention the change in employment rate of the two groups would have been the same. Under this assumption the raw difference-in-difference estimator can be given as equation (1) – (2):

$$\hat{\beta} = \left[E\left(y_{it}|g=1,t_2\right) - E\left(y_{it}|g=1,t_1\right) \right] - \left[E\left(y_{it}|g=2,t_2\right) - E\left(y_{it}|g=2,t_1\right) \right] \qquad (3)$$

and it is an unbiased and consistent estimator of the causal effect of the treatment if the treatment is truly randomly assigned.

Using micro-level data pooled for the two time periods of before and after the implementation of the law, the raw difference-in-difference estimator given in equation (3) can be written as a regression equation.

$$y_{it} = \alpha_i + \delta_1 D_t + \delta_2 G_i + \beta D_t * G_i \qquad (4)$$

where D_t is a time dummy variable which takes value 1 for the post policy implementation period, G_i takes value 1 if the individual belongs to the group effected by the law and zero otherwise. The interaction term D_t*G_i takes the value 1 if the individual is in the treatment group in the post-intervention period. Thus the coefficient on this variable gives the difference-in-difference estimate.

This study analyses the probability of work for children affected by the EoCA 1991, so the dependent variable is dichotomous. As such the use of the linear regression model of equation (4) might have certain disadvantages. The more appropriate model to use in such an

empirical model is a logit or probit model.[10] Thus, this study estimates a difference-in-difference estimator using the following logit model

$$prob(y_i = 1) = \frac{\exp(y_i^*)}{1 + \exp(y_i^*)} \tag{5}$$

where y_i is a dichotomous dependent variable taking the value 1 if the child works and 0 otherwise, and y_i^* takes the following form:

$$y_i^* = \alpha_i + \beta_1 D_t + \beta_2 AGE_i + \beta_3 D_t * AGE_i + X_i \varphi \tag{6}$$

In equation (6), D_t is a binary variable taking the value 1 in the period after the law has been implemented, and 0 otherwise. Thus in this study it takes the value 1 for the months of May-December 1991. The discontinuity is captured by the binary variable AGE_i which is 1 if the individual belongs to the treatment age group and 0 otherwise. The variable D_t*AGE_i is 1 if an individual is in the treatment group in the post-treatment period and 0 otherwise, and X_i is a vector of other factors effecting the work decision. The marginal effects from the logit estimates offer a simple interpretation. The marginal effect of D_t represents the time series change in the employment rate of the control group, while that of AGE_i gives the difference in the probability of working between the control and treatment groups in the base period (i.e., the months of January-April). The variable of particular interest is D_t*AGE_i whose marginal effect gives the causal effect of the law, as it estimates the additional employment effect of being in the treatment group in the post-treatment period.

The EoCA 1991 specifies a minimum age of 14 years to be able to work. In addition, it also specifies certain occupations to which the law applies (for details see Appendix A). As the

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[10] The logit model is used here, but the use of probit model gives similar results.

law affects only those children who are less than 14 years old, thus the treatment group in this study is children under 14 years of age. The study examines the affect of the law on two treatment groups of children less than 14 years of age, one who work in all sectors of the economy and the other where the treatment group is restricted to the exact definition of child work as given in the EoCA 1991.

The results could depend on the definition of the pre- and post-implementation periods and also on the choice of the treatment and control groups. To address the first issue, since the EoCA was introduced in April 1991, the pre-intervention period is taken as the first four months of the year. For a robustness check, we excluded April 1991 from our analysis and the results did not change significantly.

The second issue is the choice of the treatment and control groups. Whereas in the evaluation literature the treatment group is often a well-defined group, the comparison groups selected usually need some justification since the results might be sensitive to the choice of the comparison groups. In our study, the treatment and control groups depend on age. A wider age band for the control group reduces the threat of the results picking up the spillover and substitution effects. A spillover effect might arise when parents decide to take their 14 year old children off the labor market because the 13 year olds are forced by law not to work. The substitution effect would work in the opposite direction with more 14 year old children being employed as 13 year olds are taken off the labor market. Both these effects become less likely when a wider age band is used as comparison group. On the other hand, a narrow definition of the comparison group is needed to keep the treatment and comparison groups as similar to each

other as possible. In view of this, we conduct our analysis using a range of treatment and comparison groups. The results (discussed in section 5) appear to be fairly robust to the alternative definitions of the groups used. However, the main focus is on the model where the control group is chosen to be children aged 14 years. This is so because in terms of both supply and demand, labor of 13 and 14 year olds can probably be considered close substitutes.[11] The models given in equation (5) and (6) are estimated using different sub-samples from the data set, according to the control and treatment groups used.[12]

In addition to the above specification issues, concern is that since the data used is from household survey, any introduction of a minimum age law might prompt households to systematically misreport the age of working children to avoid children from being out of work.[13] We checked the data set for any systematic decrease in children of age 13 and an increase in children age 14 after the introduction of the law. As can be seen in figure 3, the proportion of children for age 10-14 does not show any systematic shift over the months, in particular over the pre and post intervention periods.

4 - Results

4.1 - Comparing children's and adult employment over January-April and May-December 1991

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[11] Our analysis uses other control groups as robustness checks to identify if there has been a similar systematic decrease in other age groups.

[12] All of the regression results are clustered by province age and time (months or years).

[13] The age comes from actual reported age in the survey and not from the year of birth.

We start our analysis by first comparing the employment rate of children age 10-13 and age 14-17 with all adults i.e., age 18 and above.[14] The difference-in-difference estimate helps to determine if there is a significant difference in the probability of working for children age 10-13 and also 14-17 in the period May-December 1991. Marginal effects from the estimated logit model for all Pakistan are reported in table 3 which also reports the marginal effects for the models estimated for the male and female population separately.[15]

Table 3: Marginal Effects from Logit Estimates of Work – all Pakistan (individuals 10-13 years and 14-17 years vs. all adults)[16]

	Total	Male	Female
May-Dec.	0.002	-0.026	0.020
	(0.009)	(0.014)	(0.012)
Age 10-13	-0.476**	-0.658**	-0.193**
	(0.021)	(0.027)	(0.027)
Age 14-17	-0.267**	-0.429**	-0.067*
	(0.020)	(0.024)	(0.027)
May-Dec * Age 10-13	0.008	0.018	0.006
	(0.025)	(0.030)	(0.032)
May-Dec * Age 14-17	0.010	0.057*	-0.038
	(0.023)	(0.028)	(0.031)
Observations	23769	12448	11321
Pseudo R^2	0.08	0.22	0.02
Log Likelihood	-15138.3	-6083.6	-7225.6

Robust standard errors in parentheses
*significant at 5%; ** significant at 1%

The results suggest that there was little change in the relative and absolute probabilities of work over the two time periods. Children age 10-13 as well as 14-17 are less likely to be involved in work, however, the magnitude of the marginal effect at around 48 percentage points is much larger for the age group 10-13. The models estimated by gender show similar results,

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[14] In this case we can not use controls in the logit model because the controls are different for children and adults, so we estimate the regression without controls.

[15] Since our data sets are not random samples we tried using the weights (provided with the data sets) for our analysis and the results appeared quite robust to whether weights are used or not. So all our analysis uses un-weighted logit analysis. For details about using weights for regression analysis see Deaton (1997) and Angrist and Krueger (1998). In the models where we use sub-samples of particular age and occupation groups, we were unable to use the weighted analysis because of small sample sizes, since weighted analysis requires at least two or more PSU in each strata.

[16] We use an upper age-limit of 70 years for our analysis.

however, the probability of work for boys age 14-17 increased by almost 6 percentage points in the period from May-December.

Rural and urban labor markets differ significantly in Pakistan. The rural areas are predominantly agricultural, whereas the urban regions are more industrial with the formal sector mainly operating in these regions, and thus we might expect impact of the Act to be stronger in the urban areas. We estimate separate logit models for rural and urban regions, and also by gender within each region.[17] The results are reported in table 4.

Though there did not seem to be any change in the probability of work for adults in the period of May-Dec. in the case of all Pakistan (table 3), the rural-urban divide (table 4) shows that for rural areas, the probability of work participation for adults is almost 3 percentage points higher in the months from May-December. Children in both age groups are much less likely to be involved in work, but the magnitude of the marginal effect is again much higher for younger children. There does not appear to be any effect of the law, using this level of aggregation. Looking at the gender divide, women are almost 6 percentage points more likely to work in the months of May-December in the rural areas. This could be because agriculture is the major occupation in rural areas where women are often employed during the harvesting and sowing seasons when there is a need for low skilled extra labor on the farms. There are two cropping seasons in Pakistan, rabi and kharif. For the rabi crops, sowing starts from October to January

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[17] Using the log-likelihood ratio test, the test of the hypothesis of no difference between the coefficients for rural and urban regions, is rejected at the 5 percent significance level with a value of 970.6~ $\chi^2(5)$ and the hypothesis of no difference by gender for rural and urban regions is rejected at the 5 percent significance with a value of 1108.8 ~ $\chi^2(5)$ and 2920.4 ~ $\chi^2(5)$ respectively.

and they are harvested between April and June. The kharif crops are sowed from April to September and harvested in October to March.

Table 4: Logit Estimates of Work – Rural and Urban (individuals 10-13 years and 14-17 years vs. all adults)

	Rural			Urban		
	Total	Male	Female	Total	Male	Female
May-Dec.	0.027*	-0.012	0.058**	-0.034**	-0.046*	-0.036**
	(0.013)	(0.019)	(0.018)	(0.012)	(0.019)	(0.013)
Age 10-13	-0.418**	-0.527**	-0.236**	-0.519**	-0.829**	-0.120**
	(0.027)	(0.031)	(0.042)	(0.032)	(0.048)	(0.029)
Age 14-17	-0.243**	-0.344**	-0.129**	-0.269**	-0.516**	-0.005
	(0.028)	(0.031)	(0.043)	(0.026)	(0.037)	(0.026)
May-Dec * Age 10-13	0.012	-0.005	0.047	-0.061	0.041	-0.093*
	(0.031)	(0.036)	(0.047)	(0.040)	(0.055)	(0.038)
May-Dec * Age 14-17	0.027	0.029	0.044	-0.022	0.083	-0.104**
	(0.032)	(0.036)	(0.049)	(0.032)	(0.043)	(0.033)
Observations	11610	6058	5552	12159	6390	5769
Pseudo R^2	0.08	0.22	0.02	0.10	0.24	0.03
Log Likelihood	-7143.6	-2809.9	-3779.3	-7509.4	-3177.8	-2871.6

Robust standard errors in parentheses
*significant at 5%; ** significant at 1%.

The estimated model for urban females shows a significant negative effect on the difference-in-difference estimate. In particular the probability of work for 10-13 year old girls relative to women (the control group) in urban areas decreased by 9.3 percentage points after the introduction of the EoCA in April 1991. However, a similar effect is seen for girls in age group 14-17 where the probability of work decreased by 10.4 percentage points. This result might indicate a spill over effect of the implementation of the EoCA 1991. However, we have to be cautious while drawing conclusions from these results because the regression does not control for other factors determining the supply of labor.

4.2 - The difference-in-difference estimate – age 10-13 and 14 years

Pakistan

The EoCA 1991 specifies the minimum age of work as 14 years, and effective implementation of the law would mean a decrease in the employment of children in the age group 10-13 in the months following April 1991. To find the alternative difference-in-difference estimate, equation (6) is estimated only for children in the age group 10-13 and of their, assumed, closest substitutes, those aged 14 years. The results of the logit model are given in table 5. The models are estimated both with and without controls with separate models by region of residence and gender (the means and standard deviations of the control variables for the sample of children age 10-14 are given in Appendix C).[18]

Panel A in table 5 reports the results of the logit estimates for all Pakistan and for boys and girls separately (results reported in table 5, panel A).[19] The results show that for all Pakistan for children age 14 there is no significant difference in the probability of work in the two time periods and the children age 10-13 are less likely to be involved in work than the 14 year old children even in the base time period. There does not appear to be a significant impact of the EoCA 1991 on the treatment group for all Pakistan because the marginal effect on the interaction term is insignificantly different from zero. The regression estimated with controls gives similar results.

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[18] The controls used in all of our models include, head of household's child, female head of household's child, gender of child, mother's age, literate and employed mother, illiterate and employed mother, father's age, literacy and employment, region of residence including the four provinces and rural and urban regions, and the number of siblings in age groups 0-4, 5-9, 10-14, 15-17.

[19] A log-likelihood ratio test for no significant difference in the coefficients by gender is rejected at the 5 percent significance with $14.4 \sim \chi^2(3)$ for the regression without the controls, and $191 \sim \chi^2(28)$ for the regression model estimated with the control variables.

Table 5: Marginal Effects of Logit Estimates of Work (Children 10-13 and 14years)

PANEL A	Pakistan					
	Without controls			With controls		
	Total	Male	Female	Total	Male	Female
May-Dec.	0.025	0.087*	-0.039	0.018	0.079*	-0.021
	(0.031)	(0.043)	(0.044)	(0.029)	(0.039)	(0.042)
Age 10-13	-0.100**	-0.057	-0.141**	-0.096**	-0.066	-0.104*
	(0.030)	(0.042)	(0.044)	(0.029)	(0.038)	(0.042)
May-Dec. * Age10-13	-0.020	-0.096*	0.059	-0.024	-0.093*	0.025
	(0.035)	(0.048)	(0.051)	(0.032)	(0.043)	(0.046)
Observations	4480	2348	2132	4480	2348	2132
Pseudo R^2	0.01	0.02	0.01	0.18	0.12	0.30
Log Likelihood	-2380.1	-1190.6	-1182.3	-1983.6	-1067.1	-826.1
PANEL B	Urban					
	Without controls			With controls		
	Total	Male	Female	Total	Male	Female
May-Dec.	-0.052*	0.054	-0.131**	-0.021	0.081*	-0.055**
	(0.026)	(0.044)	(0.033)	(0.022)	(0.041)	(0.019)
Age 10-13	-0.098**	-0.061	-0.111**	-0.080**	-0.046	-0.050**
	(0.025)	(0.044)	(0.030)	(0.021)	(0.040)	(0.017)
May-Dec. * Age10-13	0.010	-0.056	0.054	-0.008	-0.080	0.023
	(0.031)	(0.050)	(0.040)	(0.025)	(0.046)	(0.019)
Observations	2328	1195	1133	2328	1195	1133
Pseudo R^2	0.03	0.02	0.05	0.15	0.11	0.37
Log Likelihood	-850.4	-455.2	-383.9	-741.0	-414.8	-256.8
PANEL C	Rural					
	Without controls			With controls		
	Total	Male	Female	Total	Male	Female
May-Dec.	0.137*	0.101	0.174	0.119	0.058	0.232*
	(0.058)	(0.074)	(0.089)	(0.064)	(0.074)	(0.110)
Age 10-13	-0.064	-0.060	-0.067	-0.067	-0.091	-0.017
	(0.057)	(0.072)	(0.088)	(0.064)	(0.072)	(0.111)
May-Dec. * Age10-13	-0.104	-0.130	-0.069	-0.102	-0.100	-0.137
	(0.064)	(0.082)	(0.099)	(0.070)	(0.081)	(0.120)
Observations	2152	1153	999	2152	1153	999
Pseudo R^2	0.01	0.02	0.01	0.14	0.09	0.22
Log Likelihood	-1362.7	-686.8	-660.6	-1192.1	-633.7	-520.4

Note: Robust standard errors in parentheses; * significant at 5%; ** significant at 1%

For boys, there appears to be an increase in probability of work in the control group, in the post-intervention period, where they are almost 8 percentage points more likely to work in the months of May-December. The difference-in-difference estimate, however, is significant and negative, suggesting that as a result of the enactment of the EoCA 1991, the relative probability of working fell by more than 9 percentage points and the actual probability of working for children in the age cohort 10-13 decreased by almost 0.9 percentage points (i.e., the difference in

the coefficients on time and the interaction term). Once we estimate the model controlling for other factors affecting the supply of child labor, the magnitude of the marginal effect, relative to the control group of 14 year old children, decreases slightly to 9.3 percentage points leading to a net decrease of 1.4 percentage points. The model for girls does not show a significant effect of the implementation of the law. There are more girls employed in sectors that are not prohibited by the Act (table B2 Appendix B), for example in the agriculture sector. The traditional and cultural set-up of the country also is such that girls are more likely to be involved in household chores or work in the household enterprises. Thus it appears that the EoCA 1991 affected mainly the employment of boys, because they were employed in the sectors or processes prohibited in the Act.

The rural-urban divide

As mentioned earlier, rural and urban labor markets in Pakistan differ significantly from each other. The model is thus estimated with sub-samples of urban areas and rural areas. The results for urban and rural areas are reported in table 5, panel B and C respectively.[20] Table 5 shows that during the period of May-December 1991, urban children were relatively less likely to work than during January-April, whereas rural children have a higher probability of working. However, once we add controls in our model, this effect becomes statistically insignificant. Urban children age 10-13 have a lower probability of work than children age 14 in the base period. No such effect appears in the estimation of the rural model.

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[20] We test the hypothesis of no difference between the coefficients of rural and also the urban sub-samples by gender. Using the log-likelihood ratio test we reject the hypothesis with 30.6 $\sim\chi^2(3)$ and 102.2 $\sim\chi^2(27)$ for the with and without controls models respectively for the rural region and 22.6 $\sim\chi^2(3)$ and 142 $\sim\chi^2(27)$ respectively for the with, and without control models in the urban regions.

The results with controls suggest that 14 year old boys in urban areas are more likely to work in the period of May-December. However, the probability of work for urban girls in this period is negative. Rural girls aged 14 years, on the other hand, have a 23.2 percentage point higher probability of working in the period of May-December than in the first four months of the year. Thus there appears to be seasonality in the labor market as reflected for rural women in table 4 above). In terms of the EoCA 1991, there does not appear to be any impact on employment of children once the data is disaggregated to the rural and urban level.[21]

4.3 - The difference-in-difference estimate – age 13 and 14 years

In the last section we used a treatment group of 10-13 year old children against a control group of 14 year olds. However, in terms of ability, a 10 or 11 year old child might not be the same as a 14 year old child. In other words, they cannot be considered close substitutes in the labor market. Though adding control variables in our analysis of the treatment group of children age 10-13 and control group of 14 year olds, helps in controlling for other factors effecting labor market for children, it may be that a more precise estimate of the effect of the EoCA 1991 can be found by using a treatment group of only 13 year old children and control group of 14 year olds. This is so because we assume that there is very little difference in the unobserved characteristics of 13 and 14 years old children and, if so, they can be considered a very close substitute of one another in terms of employment opportunities.

Pakistan

Equation (6) is now estimated using the sub-sample of children aged 13 and 14 years. The results are reported in table 6. Panel A of the table gives the marginal effects of the logit

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[21] This may in part be because of sample size limitations. So the difference-in-difference for boys only becomes significant in the pooled rural and urban sample.

model for all Pakistan with and without the control variables. In case of the model estimated without controls, the test of no significant difference between the coefficients of the models for boys and girls, using the log-likelihood ratio test, is accepted at the 5 percent significance with a value of $4.5 \sim \chi^2(3)$. Thus we do not estimate separate models for boys and girls in case of the equation without controls. However, in the case of the models with the control variables, we find that the coefficients of the male and female models are significantly different as the test gives a value of $78.7 \sim \chi^2(27)$.

Interesting results emerge from our analysis of the treatment group of 13 year olds as opposed to a control of 14 year olds in the full sample for Pakistan. Both the models estimated with and without controls show a significant impact of the Act in terms of a lower probability of work for boys in the treatment group. The results suggest that the probability of working for 13 year old children in the post-intervention period has decreased by 13.2 percentage points (and by around 10 percentage points in absolute terms), relative to the control group of 14 year olds. The estimated model controlling for other factors gives an even greater effect for the interaction term of almost 15 percentage points. Thus, the results point to some impact of the EoCA 1991 in reducing the magnitude of child labor of those at the upper age limit.

Table 6: Marginal effects from logit estimates of work (Children 13 and 14 years)

PANEL A	Pakistan				
	Without controls		With controls		
	Total		Total	Male	Female
May-Dec.	0.030		0.040	0.116*	-0.027
	(0.037)		(0.038)	(0.054)	(0.054)
Age 13	0.022		0.027	0.079	-0.024
	(0.046)		(0.048)	(0.068)	(0.067)
May-Dec. * Age13	-0.132*		-0.146**	-0.238**	-0.055
	(0.054)		(0.055)	(0.079)	(0.074)
Observations	1514		1514	743	771
Pseudo R^2	0.01		0.18	0.14	0.32
Log Likelihood	-915.2		-758.8	-391.4	-318.2
PANEL B	**Urban**				
	Without controls		With controls		
	Total		Total		
May-Dec.	-0.070*		-0.020		
	(0.035)		(0.031)		
Age 13	-0.036		-0.019		
	(0.045)		(0.041)		
May-Dec. * Age13	-0.066		-0.085		
	(0.056)		(0.051)		
Observations	802		802		
Pseudo R^2	0.03		0.16		
Log Likelihood	-365.1		-314.8		
PANEL C	**Rural**				
	Without controls		With controls		
	Total		Total		
May-Dec.	0.150*		0.131		
	(0.064)		(0.073)		
Age 13	0.100		0.121		
	(0.079)		(0.093)		
May-Dec. * Age13	-0.224*		-0.251*		
	(0.090)		(0.104)		
Observations	712		712		
Pseudo R^2	0.01		0.14		
Log Likelihood	-482.1		-419.7		

Note: Robust standard errors in parentheses
 * significant at 5%; ** significant at 1%

Disaggregating our sample of 13 and 14 year olds by gender shows no impact of the Act on girls but suggests that the probability of work for 13 year old children decreased by almost 12.8 percentage points. This difference between the estimates for boys and girls might be due to the fact that 13 year old girls are less likely to be involved in occupations that are prohibited by law (see appendix B for summary tables of employment in different occupations).

Rural and urban regions

Since rural and urban labor markets are assumed to be significantly different in terms of employment opportunities, so the models for 13 and 14 year olds are again estimated on sub-samples of rural and urban regions. Because of small sample sizes we do not estimate the rural and urban models by gender. The results of the estimation are reported in table 6, panel B and C.

The model estimated for urban children, without controlling for other factors, shows that 14 year old children are 7 percentage points less likely to work in the time period of May-December. This effect, however, becomes insignificant once the control variables are added.

Results for the rural model in Panel C suggest that the employment of 13 year old children in the rural areas fell by almost 25 percentage points, relative to the control group of 14 year olds after the implementation of the law. Children are more often employed in the informal and un-organised sectors of the economy and formal sector offers little opportunities for working children. The informal sector is mainly concentrated in rural areas of Pakistan in small villages and towns. The significant impact of the EoCA 1991 in the rural areas appears to suggest that there was a decrease in employment of children in these sectors. Rural areas are mainly agricultural areas with farms and agro-based industries. This strong effect could suggest a decrease in children's work in the sectors other than agriculture, since the percentage of working children in the agriculture sector had actually increased in the rural areas in the months of May-December (table 2), thus pointing towards a significant impact of the law on child labor.

It is interesting to observe such an immediate decrease in labor participation for children after the imposition of the law; and though it is not unique (there is anecdotal evidence of children being laid-off from work in Bangladesh when the threat of import sanctions was introduced by the US in 1994), it certainly is unexpected for a law that did not involve international lobbying and pressure. We therefore try to untangle the possible pathway or the theory of change behind this immediate effect. It is interesting to note that Basu (2005) in his theoretical model suggests that the imposition of fines might increase child labor in the short run, but we do not find such an effect. We assume that in the case of Pakistan the effect worked in the following way. The employers were informed of the imposition of a law against child labor, where employing children age 13 or less would lead to a fine being imposed on the employer. The employers react by substituting 13 year old children by 14 year old children. The physical and mental capabilities of the two ages are assumed to be marginally different and can easily be used as perfect substitutes. We also assume that the supply of 14 year old laborers would not be limited to prevent the employers from substitution (based on the fact that only 49.5 percent of 14 year olds report being enrolled in the 1991 PIHS). Further assumption is that since it is too soon for the households to be aware of the legislation (see section 2 for mechanism of introduction and information on laws passed), the supply would not be effected in terms of the wages demanded. In other words, if households know that it is illegal to let a 13 year old work, but legal to send a 14 year old to work, they would demand higher wages for their 14 year olds. But just one month after the creation of the legislation, information might not have trickled down to individual households. Thus, as opposed to reduction in wages by employers as punishment cost, it appears that when there is excess supply of child labor, in the short run the effect could be positive by reducing children's work for the prohibited age group and increasing it for the age

that is legal to be employed - given that the minimum age is low enough (14 years in the case of Pakistan) such that the employers do not have to pay adult wages.[22] (Basu (2005) also suggests that the wages of children will decrease in the short run. Unfortunately, we do not have the wage data to verify this claim since very few working children in our data set report earning any wages whether in cash or kind.

5 - Conclusions and certain policy implications

The objective of this paper is to try to identify whether the Employment of Children Act, implemented in April 1991, had the desirable impact of reducing children's employment. Exploiting a quasi-experimental approach, we use regression discontinuity design generated by the legislation defining 14 year of age as the minimum age for work and use the difference-in-difference estimation to isolate the effect of law from other factors affecting the employment of children. Our empirical analysis uses micro-level data from the Pakistan Integrated Household Survey 1991 and the data is divided in pre-intervention (January-April) and post-intervention (May-December) periods. Since the EoCA 1991 specifies the minimum age of work as 14 years, so a treatment group of less than 14 year old children is compared against various control groups.

The results, using a treatment group of children age 10-13, shows a significant decrease in work for boys in the sample. Since the socio-economic set-up of the country is such that girls are less likely to be involved in work outside the household (the law does not prohibit children working with the family on family enterprise), so the results suggest that the law affected only boys. The model estimated taking control group of 14 year old children and treatment group of

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[22] In other words, if the minimum work age was 17 years, substituting 17 for an 18 year old would mean paying the 18 year old adult wages, thus increasing the cost of hiring that person. In such case Basu's punishment cost appears to be the model that might be followed by the employers.

13 year olds shows a stronger decrease. For all Pakistan there appears to be a significant decrease in the probability of working for 13 year old children in the months after the implementation of the law. This effect is again concentrated among boys. Since we assume that the children age 13 and 14 are close substitutes in terms of work ability in the labor market, we consider this result to be an indication of the effectiveness of the law.

The Employment of Children Act 1991 appears to affect boys more than girls. This suggests a need of a more comprehensive legislation, which includes domestic services as well since it is the sector where young girls are more often employed. This paper points towards the importance of more in depth research on the impact of anti-child labor legislation by identifying some impact of such legislation in the short run.

Appendix A
Table A1: Laws and Legislations in Pakistan restricting employment of children

Act/Law	Minimum age for work	Occupations	Special provisions
Children (pledging of labor) Act 1933	15 years	Any occupation, but applies only to pledging of labor of a child in return for payment or benefit received by the parent or guardian	Allows children to work in return for regular and reasonable wages
Mines Act 1923	15 years and a child age 15-17 considered as a young person	Work in mines and for children even the presence of children in parts of mines that are underground	A young person can work in a mine only if he/she has a certificate of fitness from a medical practitioner
Factories Act 1934	15 years for a child and a person age 15-17 years is considered an adolescent	Any kind of work in factories	Allows work if the child/adolescent can get a certificate of fitness for work by a certified medical practitioner. A child can not work more than 7 ½ hours a day and after 7p.m or before 6a.m
Shops and Establishments Ordinance 1969	14 years	Work in shops and establishments (where the term establishments encompasses a wide range of businesses, firms and commercial establishments)	
Employment of Children Act (1938) 1991	14 years and person age 15-18 is considered an adolescent	Work in or near railway lines and station, on ports and in a wide range of production processes which can be deemed harmful for the health of a child and include work with chemicals and weaving etc. However, it does not include any establishment where work is done by the family members (household enterprise).	A child can work on a family establishment or a school recognised by the government, if s/he or parents/guardians seek work for him/her, only if a medical practitioner gives a certificate of fitness and certifies that the child has attained 12 years of age (or 14 years in case of adolescents). The child can not work for more than a period of 3 hours without a break of at least 1 hour, and the hours of work with the intervals can not exceed 7 hours a day. Also no child is allowed to work between 7p.m to 8a.m

Source: Shafi, M and P. Shafi (2000)

Prohibited Occupations and Processes as specified in the Employment of Children Act 1991:

Any occupation connected with:
- transport of goods, passengers or mails by railway
- cinder picking, cleaning of an ash-pit or building operation in a railway premises
- work in a catering establishment at a railway station
- work relating to the construction of a railway station or any other such work where such work is done in close proximity to or between railway lines
- a port authority within the limits of any port
- work relating to selling of crackers and fire-works in shops with temporary licences

Processes
- Bidi making
- Carpet weaving
- Cement manufacture including bagging of cement
- Cloth printing, dyeing and weaving
- Manufacture of matches, explosive and fireworks
- Mica-cutting and sploting
- Soap manufacturing
- Wool-cleaning
- Building and construction industry
- Manufacture of slate pencils, including packaging
- Manufacture of products from agate
- Manufacturing processes using toxic metals and substances such as lead, mercury, manganese, chromium, pesticides and asbestos

Appendix B

Table B1: Percentage Distribution of Children working in different occupations (age 10-17 years)

Occupation	1991	
	Children as percent of total employees in each sector	% of working children
Agriculture	20.1	62.9
	(0.5)	(1.1)
Manufacturing	25.9	16.1
	(0.8)	(0.8)
Electricity/gas/water	20.2	0.6
	(1.9)	(0.2)
Construction	13.2	4.2
	(1.0)	(0.5)
Trade/restaurants etc	27.2	15.4
	(0.7)	(0.8)
Transport/communication	23.6	6.7
	(1.1)	(0.6)
Business/self-employed	21.2	0.4
	(2.5)	(0.1)
Community/social/personal services	14.9	7.0
	(0.7)	(0.6)

Note: standard errors in parentheses

Table B2: Percentage Distribution of Children working in different occupations (age 10-17)

Occupation	1991			
	Boys as % of total working children in each sector	Girls as % of total working children in each sector	Boys as % of total working boys	Girls as % of total working girls
Agriculture	50.1	49.9	54.4	73.3
	(1.8)	(1.8)	(1.5)	(1.5)
Mining etc.	100	0	0.4	0
			(0.2)	
Manufacturing	64.3	35.6	19.3	12.1
	(4.0)	(4.0)	(1.2)	(1.1)
Electricity/gas/water	75.6	24.4	0.9	0.3
	(8.3)	(8.3)	(0.3)	(0.2)
Construction	95.2	4.7	6.8	0.9
	(2.2)	(2.2)	(0.8)	(0.3)
Trade/restaurants etc	69.5	30.5	18.8	11.0
	(3.3)	(3.3)	(1.2)	(1.1)
Transport/communication	68.2	31.8	8.1	5.0
	(5.3)	(5.3)	(0.8)	(0.8)
Business/self-employed	79.6	20.3	0.3	0.5
	(19.3)	(19.3)	(0.2)	(0.2)
Community/social/personal services	67.4	32.6	9.3	4.4
	(7.1)	(7.1)	(0.9)	(0.7)

Note: standard errors in parentheses

Table B3: Percentage Distribution of Children working in Different Occupations by Province

Occupation	% of total children - 1991			
	Punjab	*Sindh*	*NWFP*	*Baluchistan*
Agriculture	19.3	18.9	18.3	8.2
	(0.7)	(0.9)	(1.1)	(1.2)
Mining etc.	0.01	0	0.2	0.2
	(0.04)		(0.1)	(0.2)
Manufacturing	14.6	5.8	6.5	9.2
	(0.6)	(0.6)	(0.7)	(1.3)
Electricity/water	1.6	0.8	0.9	0.8
	(0.2)	(0.2)	(0.3)	(0.4)
Construction	1.9	1.6	2.7	3.6
	(0.2)	(0.3)	(0.5)	(0.8)
Trade/restaurants etc	18.2	13.3	17.8	6.4
	(0.7)	(0.8)	(1.1)	(1.1)
Transport/communication	6.2	3.6	6.5	1.4
	(0.4)	(0.4)	(0.7)	(0.5)
Finance and business	0.5	1.5	0	3.0
	(0.1)	(0.3)		(0.7)
Community/social/personal services	6.6	4.2	6.1	3.8
	(0.1)	(0.5)	(0.1)	(0.8)

Note: standard errors in parentheses

Appendix C

Table C1: Means and Standard Deviations of Control variables (for children age 10-14)

	1991			January- April			May-December		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Head of household's child	0.84	0.84	0.84	0.84	0.86	0.85	0.84	0.84	0.84
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Female Head of Household's child	0.04	0.03	0.04	0.03	0.04	0.04	0.03	0.02	0.03
	(0.004)	(0.003)	(0.003)	(0.007)	(0.007)	(0.005)	(0.004)	(0.004)	(0.003)
Mother's age	38.1	37.1	37.6	37.2	36.7	37	38.4	37.2	37.8
	(11.4)	(12.1)	(11.8)	(11.8)	(11.6)	(11.7)	(11.3)	(12.2)	(11.8)
Literate and Employed Mother	0.03	0.03	0.03	0.04	0.05	0.04	0.02	0.02	0.02
	(0.004)	(0.003)	(0.004)	(0.008)	(0.01)	(0.01)	(0.003)	(0.004)	(0.003)
Illiterate and Employed Mother	0.41	0.39	0.40	0.40	0.38	0.39	0.42	0.40	0.41
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
No Mother	0.05	0.06	0.05	0.05	0.06	0.06	0.04	0.06	0.05
	(0.004)	(0.005)	(0.003)	(0.01)	(0.01)	(0.01)	(0.005)	(0.006)	(0.004)
Father's age	42.4	41.4	41.9	41.4	41.5	41.5	42.7	41.3	42.0
	(14.6)	(15.6)	(15.1)	(15.8)	(16.2)	(16.0)	(14.1)	(15.4)	(14.8)
Literate Father	0.15	0.16	0.16	0.17	0.16	0.16	0.15	0.17	0.16
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Employed Father	0.86	0.84	0.85	0.84	0.83	0.83	0.87	0.84	0.86
	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Father's Occupation									
Technical worker	0.08	0.09	0.09	0.10	0.10	0.10	0.08	0.09	0.08
	(0.006)	(0.006)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)
Service workers	0.06	0.06	0.06	0.04	0.05	0.06	0.06	0.07	0.07
	(0.005)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.004)
Skilled agriculture worker	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.03	0.04
	(0.003)	(0.004)	(0.004)	(0.01)	(0.01)	(0.01)	(0.004)	(0.005)	(0.003)
Craftsmen	0.03	0.03	0.03	0.04	0.03	0.04	0.03	0.03	0.03
	(0.004)	(0.004)	(0.002)	(0.01)	(0.01)	(0.01)	(0.004)	(0.004)	(0.003)
Elementary occupations	0.10	0.10	0.10	0.11	0.10	0.11	0.10	0.10	0.09
	(0.01)	(0.01)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)

	1991			January- April			May-December		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
No Father	0.07	0.09	0.08	0.09	0.10	0.10	0.09	0.07	0.08
	(0.01)	(0.01)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.005)
Log household income (excluding child labor)	6.72	6.85	6.79	6.77	7.16	6.95	6.70	6.75	6.72
	(4.7)	(4.6)	(4.7)	(4.6)	(4.4)	(4.5)	(4.7)	(4.7)	(4.7)
Number of children age 0-4	1.14	1.12	1.13	1.05	1.2	1.12	1.17	1.10	1.14
	(1.3)	(1.3)	(1.3)	(1.2)	(1.5)	(1.3)	(1.4)	(1.3)	(1.3)
Number of children age 5-9	1.61	1.64	1.63	1.6	1.7	1.63	1.62	1.62	1.62
	(1.4)	(1.4)	(1.4)	(1.3)	(1.5)	(1.4)	(1.4)	(1.3)	(1.4)
Number of children age 10-14	1.25	1.25	1.25	1.20	1.29	1.24	1.27	1.23	1.25
	(1.05)	(1.1)	(1.06)	(1.0)	(1.1)	(1.05)	(1.1)	(1.1)	(1.1)
Number of children age 15-17	0.96	0.94	0.95	0.93	0.94	0.94	0.97	0.94	0.95
	(0.82)	(0.78)	(0.80)	(0.80)	(0.77)	(0.79)	(0.78)	(0.81)	(0.83)
Rural	0.49	0.47	0.48	0.46	0.41	0.44	0.50	0.49	0.49
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Punjab	0.49	0.49	0.49	0.52	0.54	0.53	0.47	0.48	0.45
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Sindh	0.26	0.26	0.26	0.24	0.26	0.25	0.27	0.26	0.26
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
NWFP	0.17	0.17	0.17	0.17	0.16	0.16	0.17	0.18	0.18
	(0.01)	(0.01)	(0.01)	(0.02)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Baluchistan	0.08	0.07	0.07	0.06	0.07	0.06	0.08	0.07	0.08
	(0.01)	(0.01)	(0.004)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)

Note: standard errors in parentheses
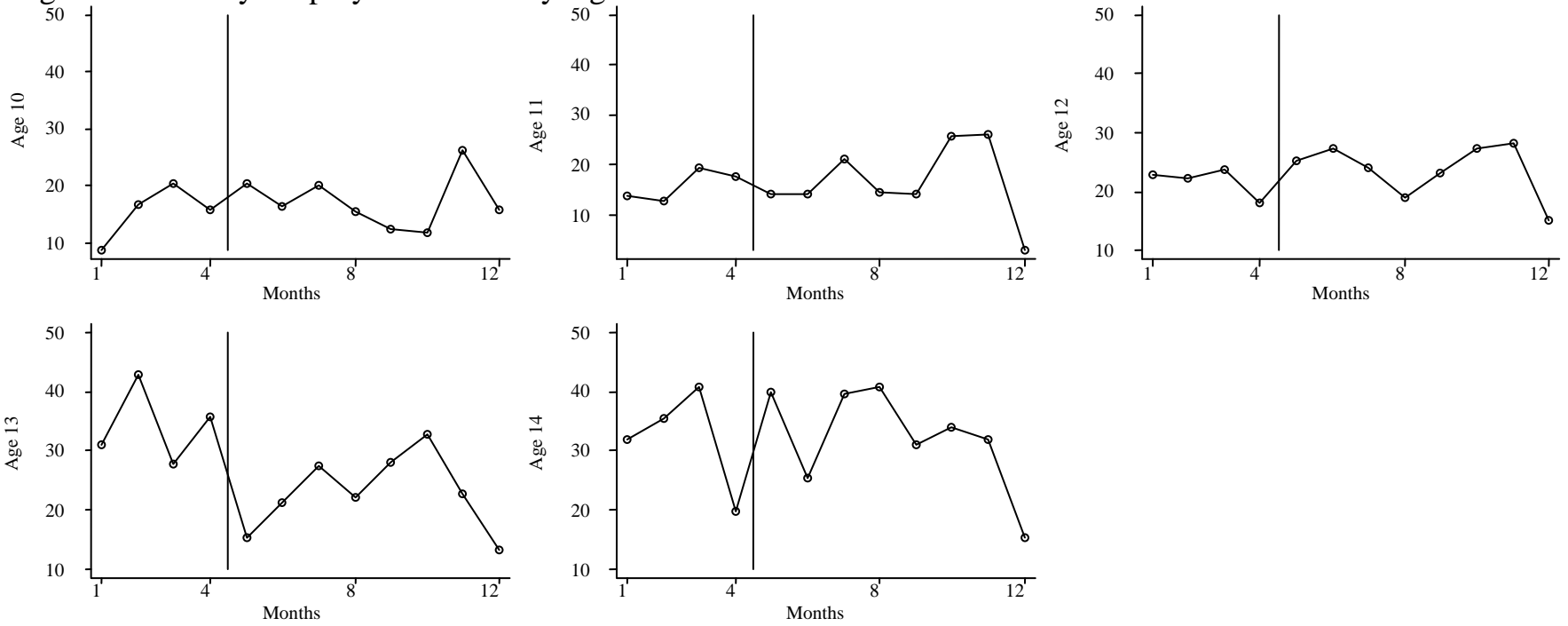
Figure 1: Monthly Employment Rates by Age

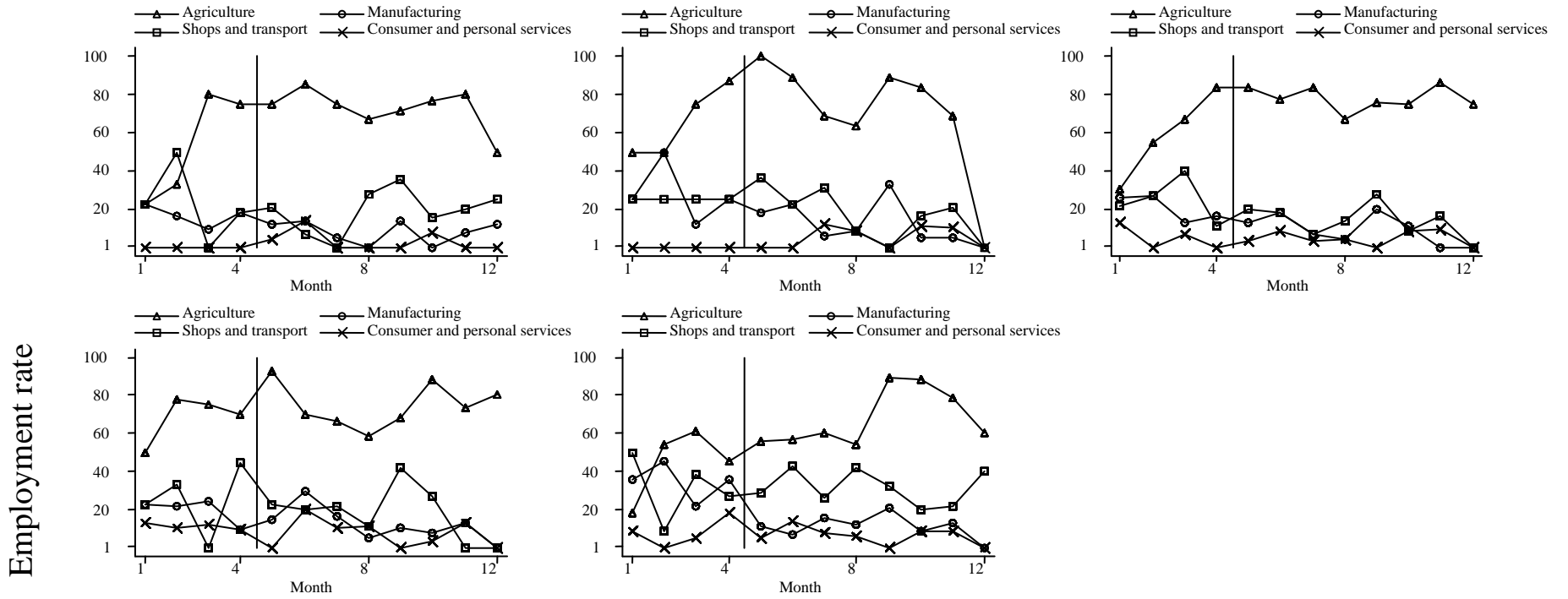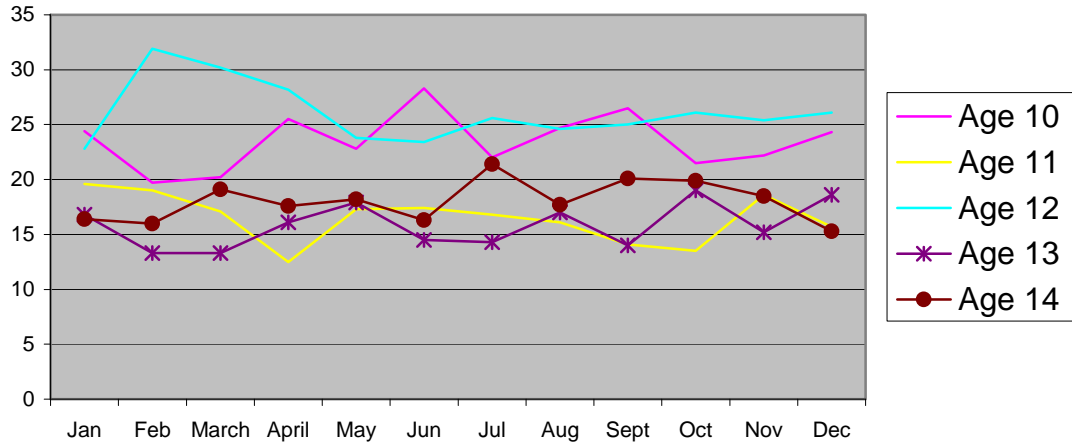# Figure 2: Monthly Employment Rates in different Occupations by Age

Employment rate

Figure 3: Proportion of children age 10-14 in the months Jan - Dec.

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