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Child labour in Pakistan: Addressing supply and demand side labour market dynamics

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Abstract

This article uses empirical evidence, based on labour market indicators, to analyse the factors influencing the incidence of child labour in Pakistan, from both supply and demand sides. The level of demand for child labour is shown to be linked mainly to adult wage levels, the adult unemployment rate in an area, and the size of the informal and agriculture sectors. The supply of child labour is seen to be positively linked to the proportion of adult unemployment in the household. Unlike previous studies, the article analyses both demand and supply side factors in a context of poverty and takes account of the co-existence of formal and informal labour markets. Furthermore, to generalise the issue for a longer span of time (which previous studies fail to do), it adopts the methodology of a pseudo-panel approach based on that proposed by Deaton. This approach makes it possible to pinpoint more accurately the factors, and their interaction, that need to be considered in any effective policy approach to the issue of child labour. To prevent unintended consequences, a multi-faceted development approach is required.

JEL Codes: F16, I30, J13, J22, O10

Keywords

Child labour, informal sector, pseudo-panel data analysis, unemployment rate, wage levels

Introduction

The issue of child labour has attracted much attention from academics, policy makers, social activists and anthropologists in Pakistan, over many years. The extensive literature addressing the economics of child labour tends on the whole to overlook the effects of

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local labour market indicators. Much of the literature merely focuses on poverty, household characteristics and the child's own characteristics as major determinants – mainly emphasising the supply side and ignoring the demand side. Demand for child labour is usually described as arising from labour market conditions, such as segmentation of the economy between the formal and informal sectors, the degree of substitution between adult and child labour (eventually leading to adult unemployment) and most importantly the wage structure. Any change in labour market factors will have effects on both the supply side and the demand side. For example, an improvement in market wages will enhance the welfare of people, and in turn result in a decline in the child labour supply, as parents will be in a better position to take the decision to pull their children out of the labour force. But the net result depends on how much the income effect, affecting child labour supply, outweighs the substitution effect, influencing child labour demand by creating an incentive for employers to substitute cheaper child labour for the adults who now cost more to employ. Approaches to child labour thus need to be multi-factored and well-coordinated.

Conceptually, higher adult market wage rates will either reduce the incidence of child labour by enhancing the welfare of households, or alternatively mean that more children enter the labour market. However, this latter result will happen only if employers, to remain cost competitive, substitute adult labour by cheap child labour. Adult wages may thus have two opposite effects. One arises from the income effect, while the other arises because of the substitution effect. The substitution effect will result in higher adult unemployment as well. The substitution is likely to be more evident in the informal sector than in the formal sector. The informal sector, with its low skill requirements and disorganised nature, remains outside the control of the legal and regulatory framework and hence accommodates most of the child labour in an economy. Therefore, the higher the size of this sector, higher the probability of use of child employment as a response to wage increases, assuming intersectoral factor mobility.

I undertake an empirical assessment of the above analysis, using data for children aged 10–14 years from the Labour Force Survey (LFS) of Pakistan, covering the period from 1997–1998 to 2012–2013. The empirical evidence provided in this study supports the argument that child labour is affected by labour market factors, which reflect and influence both supply side and demand-driven effects. I show that the demand-driven effect is more apparent than the supply side effect; specifically, the substitution effect outweighs the income effect. The substitution is evident mainly in the informal sector.

In short, fundamentally, poverty has always been considered as the main cause of the incidence of child labour in Pakistan; as a result, some of the key issues behind its prevalence have remained unexplored, especially those generating child labour demand. This identification of previously ignored sources of demand is the article's main empirical contribution. It also makes a methodological contribution; to the best of our knowledge, this is the first study that takes into account labour market conditions using a longitudinal data set. Such an analysis provides a better understanding of the impact on child labour over time of the changing structure of labour market across regions over time.

The analysis has significant policy implications. Though there are number of policies designed to influence the incidence of child labour, these are mostly based on supply side factors. The empirical findings of this study indicate, however, the importance of taking

account of the fact that the incidence of child labour is influenced by both supply and demand side determinants. Hence, policies designed on the basis of one dimension are less likely to be effective in reducing the incidence of child labour. Empirical studies in Pakistan rarely include policy recommendations to offset the demand for child labour.

Finally, the main limitation that studies face in analysing the issue over a longer span of time is the non-existence of true panel data. The LFS of Pakistan is only a cross-sectional survey – it does not follow the same household every year, and so a true longitudinal panel does not exist. To overcome this limitation, a pseudo-panel has been constructed as proposed by Deaton (1985), an innovative approach which this study has adopted.

The rest of the article is organised as follows. The section 'Theoretical foundations' draws both theoretical and empirical points from the literature to build the model. The section 'Data and methodology' provides a detailed outline of the data employed and the construction of the pseudo-panel, as well as specifying the econometric technique used to estimate the model. The section 'Results' discusses the results, and finally, the section 'Conclusions' concludes the study, using its findings to offer some viable polices to curb the incidence of child labour.

Theoretical foundations

Based on the existing literature, this section will help build an understanding as to how the factors reflected by labour market indicators impact child labour. The section first cites international evidence, then proceeds to highlight evidence from Pakistan and ends by highlighting gaps in the existing literature.

Working on wage structures, Cain and Mozumder (1980) have argued that the economic value of children cannot be properly assessed without reference to the structure of the labour market. This structure determines the level of wages, which in turn determines the contribution of child labour to household income. Basu and Van (1998) have stressed the role of adult market wages as one of the major determinants of child labour supply. They assume that a household sends children to work only when adult market wages are below the wages required for a subsistence level of living. But what would happen, if there existed a demand side effect of adult market wages? In such a case, any increase in adult wages would ultimately reduce the demand for adult labour. This situation might lead to an increase in the incidence of child labour, at least in those sectors where adult labour can be substituted by child labour.

Galli (2001), addressing the economic consequences of child labour, also argues that unemployment in the adult labour market is due to the presence of child labour, which often displaces adult labour. In order to remain cost competitive, employers prefer hiring children in place of adults. Children can be hired on relatively low wages as compared to adult labour, mostly for the *same* type of work. In areas where an informal sector exists, child labour can have a negative impact on adult employment and wage rates. Activities performed in the informal sector require less skill or training – such activities are mostly unskilled. Thus, it is relatively easy to substitute adult labour with child labour. As a result, child labour leads to an increase in adult unemployment, which further forces adults to put their children to work, thus generating a vicious

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circle. Kar and Guha-Khasnobis (2003) have pointed out that demand for child labour is mainly generated by the segmentation of the economy into formal and informal sectors. They highlight the role of the degree of informality in the production process as a major demand side factor. The informal sector does not adhere to any regulation for various interests of its own, often relying on cheap child labour. In addition to this, in many developing countries, there is a tendency towards informalisation of production methods, with formal enterprises either breaking up into smaller units or subcontracting to households or informal enterprises. In such conditions, the demand for child labour may increase. Kar and Guha-Khasnobis (2003) and Hussain (1998) spell out the mechanisms in greater detail.

Chaudhuri (2009) considers a case of two sectors: formal and informal – and three factors of production: adult labour, child labour and capital. The informal sector employs both adult labour and child labour, apart from capital. The formal sector produces by means of capital and adult labour only. Wages in the formal sector are higher than wages in the informal sector. Adult workers employed in an informal sector earn less and are, therefore, compelled to send their children to work. Wages in the formal sector are assumed to be higher because of the existence of well-organised trade unions to bargain with employers in respect of working conditions, benefits and wages. Chaudhuri (2009) concludes that any labour policy lowering the bargaining power of unions will lower wages. Hence, returns to capital will rise in the manufacturing sector. Producers in the two sectors will be able to employ less capital-intensive techniques than before. The capital-output ratios in the two sectors will therefore decrease. There will be an excess supply of capital because of which the manufacturing sector will expand while the informal sector contracts. As the informal sector contracts, the demand for adult and child labour falls in that sector, exerting downward pressures on the wages for both adults and children. Although producers will start replacing capital by both adult and child labour, the degrees of substitutability for capital from the two types of labour will differ. Raising the two labour-output ratios will lead to increases in the demand for each type of labour at any output level. As a result of these two opposite effects, the net outcome on the two wages would remain ambiguous.

Dwibedi and Chaudhuri (2010) use a three sector general equilibrium framework to show that reduction in poverty does not necessarily transfer into a reduction in the incidence of child labour. They argue however that economic reforms resulting in an inflow of capital can affect the incidence of child labour by lowering opportunities for child work.

Historically in Pakistan, there exists an extensive literature exploring the supply side determinants of child labour. For example, Moazam et al. (1994), Ranjan (2000, 2001), Khan (2001, 2003), Bhalotra (2004), Ali and Khan (2004), Toor (2005) and Hai et al. (2010) have addressed the links among poverty, human capital and child labour. Bhalotra (2004) has also explored the impact of altruistic behaviour by parents on child labour; Hou (2009) has explored the relationship between wealth, child labour and schooling, while Iram and Fatima (2008) have explored the links among trade liberalisation, foreign direct investment and child labour. The relatively few articles exploring demand side factors include the following: Ghayur (1996); Hussain (1998); Bhalotra (2007) and Bhalotra and Heady (2003).

Ghayur (1996) worked on data from the Child LFS of 1996 and concluded that the labour market in Pakistan is unable to absorb the current labour force, causing problems of both unemployment and underemployment. According to Ghayur, unemployment leads to an increase in the incidence of poverty, which in turn increases child labour supply. Hussain (1998), based on a survey of 400 child workers in 200 small-scale establishments in the Lahore District, during 1990 concluded that the major demand for child labour came from small-scale, unregistered establishments in the informal sector, paying a very low average monthly income (the equivalent of USD21 at the time of the survey). Bhalotra and Heady (2003) clarified the role of land, income and household size in the demand for child labour, again using data from the early 1990s. According to them, children of land-rich households often work more than the children of land poor households. They referred to this phenomenon as the wealth paradox: landholding, whether based on ownership or operation, appears to increase the probability that children, particularly girls, will work and not attend school. These authors attributed the paradox to imperfections in land and labour markets, resulting in a dominance of current-period over future-period calculations. Difficulties in hiring farm labour and uncertain returns to education lead landholders to employ their own children; this incentive is stronger among larger landowners, as the marginal product of labour increases with farm size. Thus, asset-rich households may have more children in work than asset-poor households. Bhalotra (2007) estimated the wage elasticity of child labour supply using data for rural households for the period 1991. She tested the hypothesis that children work because their household's income falls below subsistence requirements. An increase in the market wage leads to an increase in household income which in turn leads to a reduction in child labour. She tested the hypothesis both for girls and boys. According to her results, the wage elasticity was negative and significant for boys, while insignificant for girls, indicating a stronger relationship between poverty and work for boys than for girls.

Overall, it can be concluded that, at least in Pakistan, higher adult market wage rates will either reduce child labour incidence by augmenting the income of the household or else it could also attract more children to work. This will happen when employers substitute adult labour with cheap child labour. Any economic reforms altering adult wages, therefore, would result in two opposite effects. One arises due to an income effect, while the other arises because of the substitution effect. The substitution effect results in higher adult unemployment, as well. The substitution will be more apparent in the informal sector than the formal sector. The informal sector being disorganised in nature, with low skill requirement will accommodate most of the child labour in an economy. Therefore, the higher the degree of informalisation, higher will be the demand for child labour. Though recent literature is now exploring ways to include demand theories to explain the incidence of child labour incidence, the empirical evidence from Pakistan remains scanty. The analyses discussed above are based on data that are now a quarter of a century old. This study is therefore important not only in bringing together supply and demand side analyses but also in testing a combined model using recent evidence.

Data and methodology

In order to explore empirically the linkages between labour market indicators and the incidence of child labour in Pakistan, this study uses a sample data set compiled from

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Pakistan's LFS (Pakistan Bureau of Statistics (PBS), 1996, 1997–1998, 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008 and 2012–2013). The LFS provides comprehensive information on various aspects of the labour force (including children). The survey is also helpful in assessing the role and importance of the informal sector in employment generation. It includes historical data from 1963 onwards, so it provides information suitable for analysing the impact of labour market changes on the incidence of child labour over time. Such inter-temporal analysis is important, as since independence the country has gone through many changes. In the early phases, industrialisation created employment opportunities for unskilled labour including children. As the process of industrialisation continued, the demand for skilled labour started growing, creating less space for children, especially in the formal sector. Hence, a quasi-longitudinal study, such as is adopted here, will be helpful in understanding the impact of the changing structure of the labour market over time on the incidence of child labour.

As already indicated, the data set has the one limitation that it is built from successive cross sections since each year different households are surveyed. The key methodological issue in using the LFS, therefore, is that estimation of cross-sectional data may result in the unobserved individual heterogeneity problem. To overcome this problem, Deaton (1985) has suggested estimation of empirical relationships based on 'cohort means' rather than on individual observations. According to Deaton (1985), pseudo-panels do not suffer from the attrition problem that genuine panels have, and are usually available over longer time periods. Hence, for the assessment purpose, seven cross section surveys, 1997–1998, 1999–2000, 2001–2002, 2003–2004, 2005–2006, 2007–2008 and 2012–2013, are used to form a pseudo-panel.

The advantage of using the pseudo-panel approach over simple cross-sectional data is its ability to explain the past characteristics, while simultaneously predicting the future behaviour. Deaton (1985) considers the pseudo-panel an appropriate form for predicting behaviour, noting that

> … the values of estimated coefficients from cross-sections tend to differ substantially from those estimated using time series. Such contradictions were first extensively documented by Kuznets (1962), not only for aggregate consumption, but also for the components of consumption … For example, the food share in England in 1955 was almost identical to its value a century earlier in spite of a manyfold increase in real income … (p. 112)

Repeated cross sections are substantially large, both in terms of the number of individuals or households covered and the time period that they span. Following the sampling distribution used by the Pakistan Bureau of Statistics (PBS, 2008–2009), this study has identified the City, the Division and the District as cohort.[1] After fixing the sample size at provincial level, the Bureau further distributes the sample into different strata in rural and urban domains. In the urban domain, the population of large cities is removed from the administrative divisions in order to group the remaining urban population to form a stratum. However, in the rural domain, each administrative district is considered an independent stratum except in Balochistan province, where each administrative division constitutes a stratum.

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Use of the pseudo-panel approach

Using Deaton's approach, the data set to be used in the analysis is compiled by grouping households sharing some common features into cohorts. Here, divisions/districts/cities are used as cohorts, after confirming that there was a sizable number of individuals in each cohort. The averages within these cohorts are then treated as observations in a pseudo-panel. Using this approach, the average value of all the observed variables in cohort c in period t, becomes the observation.

Consider the following simple model

$$y_{it} = x_{it}\beta + \alpha_i + \varepsilon_{it} \quad t = 1 \ldots T \tag{1}$$

where y_{it} is the dependent variable and x_{it} is a $(K \times 1)$ vector of explanatory variables, assumed to be exogenous, i is an index of individuals (children aged 10–14 years in this case) and t refers to time periods. Following Deaton (1985), cohorts C, based on divisions/districts/city are therefore identified, such that child i is a member of one and only one cohort for each t. Averaging over the cohorts gives

$$\bar{y}_{ct} = \bar{x}_{ct}\beta + \bar{\alpha}_{ct} + \varepsilon_{ct} \quad c = 1 \ldots C \tag{2}$$

Let the size of the group c at time t be n_{ct} such that the average value of all observed x_{it}s in cohort c at time t can be written as

$$\bar{x}_{ct} = n_{ct}^{-1} \sum_{i \in c}^{s=t} x_{is} \tag{3}$$

The resulting data set is a pseudo-panel with repeated observations over T periods and C cohorts. The main problem in estimating equation (2) is that $\bar{\alpha}_{ct}$ depends on t and could be correlated with x_{ct}. Considering $\bar{\alpha}_{ct}$ as a random error term would lead to inconsistent estimators, while considering them as fixed unknown parameters would result in an identification problem unless the variation over t can be ignored $\left(\bar{\alpha}_{ct} = \bar{\alpha}_c\right)$. This assumption holds only if the number of observations used to create cohort averages is large. Verbeek and Nijman (1993) have modified Deaton's estimator to achieve consistency for a fixed t and a fixed i per cohort. If the number of children in each cohort is large, then the size of the cohort $n_c = N/C$ tends to infinity, and the measurement errors as well as their estimates tend to zero. This yields the cohort estimator β, which is asymptotically identical to the Deaton (1985) estimator of

$$\hat{\beta} = \left(\sum_{c=1}^{C} \sum_{t=1}^{T} n_{ct} \left(\bar{x}_{ct} - \bar{x}_c \right)^2 \right)^{-1} \left(\sum_{c=1}^{C} \sum_{t=1}^{T} \left[n_{ct} \left(\bar{x}_{ct} - \bar{x}_c \right) \left(\bar{y}_{ct} - \bar{y}_c \right) \right] \right) \tag{4}$$

where $\bar{x}_c = \left(\sum_{t=1}^{T} \left(n_{ct} \right)^{-1} \sum_{t=1}^{T} \bar{x}_{ct} n_{ct} \right)$, the temporal average of the observed cohort means for cohort c. The properties of the β estimator depend upon the asymptotic properties employed. Deaton (1985) considers the asymptotic properties when the number of

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cohorts C tends to infinity, that is, the number of individuals tends to infinity with constant cohort sizes. Furthermore, Moffitt (1993) assumes that the number of cohorts should be fixed (114 in this case), while the cohort sizes should increase with the increase in the number of individuals. In the Moffitt approach, the problem of errors in variables disappears.

Furthermore, Verbeek and Nijman (1993) has suggested that when the cohort size is at least 100 individuals, and the time variation in the cohort means is sufficiently large, the bias in the standard fixed effects estimator is small enough so that the measurement error can be ignored. Given the size of the LFSs and of the divisions/districts/cities chosen as cohorts, this size criterion is fulfilled. The construction of pseudo-panel data is done by computing cohort or cell means in each available cross section, where the cells are defined by district codes. This yields a balanced panel consisting of 114 groups (cohorts) for seven time periods, having a total of 798 observations.

Finally, in order to see how labour market factors influence child labour behaviour, a fixed effect approach, as suggested by Verbeek and Vella (2005), is applied. Verbeek and Vella (2005) suggest that the fixed effects estimator based on the pseudo-panel of cohort averages provides an attractive choice for estimation. When the sizes of the cohorts are large, the sample mean of the fixed effects provides a consistent estimator of the time-invariant population mean. Therefore, when n_c is large, the errors-in-variables problem caused by the possible time variation in $\bar{\alpha}_{ct}$ is usually ignored and standard estimators like the fixed effect (within) estimators are usually used. Therefore, the relationship among the variables of interest is estimated by the standard fixed effects estimator.

Econometric specification

Based on the discussion in section 'Theoretical foundations', the study has formulated a simple regression model to understand how the labour market indicators, along with some other control variables, impact on child labour incidence. The significance of each variable with its endogenous/exogenous relation with child labour incidence is discussed in detail below. The model is specified thus

$$CL_{ct} = WG_{ct}\beta_1 + UN_{ct}\beta_2 + IFS_{ct}\beta_3 + AGR_{ct}\beta_4 + CT_{ct}\beta_5 + \varepsilon_{ct} \quad (5)$$

The dependent variable child labour CL consists of the average number of children aged 10–14 years engaged in work, including both paid and unpaid employment and work in household enterprises (including farms), in a cohort. In the above model, WG (based on the Davidson and Mackinnon (1985) test, the log function of wages is included), UN, IFS, AGR and CT are the time-varying exogenous variables (averages over cohorts) representing adult wages, unemployment rate, size of the informal sector, size of the agriculture sector and some control variables such as the child's own and household characteristics, respectively. Here, sizes are measured in terms of proportion of adult employment in the respective sectors. βs are the set of coefficients and ε is the unobservable error term.

As far as the independent variables explaining the effect of the labour market are concerned, first the effect of monthly adult wages is explored. Monthly adult wages of

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paid employees are used here because the LFS reports the wages of paid employees only. Use of this information results in a missing data problem. To overcome this problem, individual monthly wages of adults are regressed on personal and household characteristics. More specifically, the explanatory variables of the wage equation include age, age squared, gender, household size, gender of the head of the household and education level. The predicted wages from the wage equation are then aggregated at household level to come up with household wages (income).

The main hypothesis regarding wages is that the higher the household wages, the less will be the child labour supply. But, this is the supply side effect. There may also exist a demand side effect which will be generated when higher wages result in a higher cost of production, pushing employers to substitute adult labour with cheap child labour. This could result in an ambiguous net effect. Children either substitute for adults in the case of unskilled labour, or they may enter into employment as parents are priced out of the market and become unemployed. In order to check whether or not the demand side effect exists, median wages at division/district/city level were also included in the model. Here, real wages were used instead of nominal wages, using the CPI (Consumer Price Index) as a deflator.

As the effect of wages may vary with skill composition, in the preliminary analysis both median wages of skilled and unskilled labour were included in the model. Skilled wages are represented by median wages earned by labour having secondary education across divisions/districts/cities, while unskilled wages are represented by median wages of the illiterate (as defined by PBS: those persons 10 years of age and above who could not read and write in any language with understanding labour force across divisions/districts/cities). As the effect remains insignificant in the main analysis, only adult wages at household and division/district/city level in real terms are included in the model. Furthermore, in the latter, household wages were also dropped from the main analysis as well, first, because household wages did not show any significant effect, and second, because the study acknowledges that household wages may include the contribution of unpaid child family work and hence inclusion of this variable may overestimate the effect of household wages on child labour supply.

The unemployment rate in equation (5) represents the ratio of the unemployed adult labour force to the total adult labour force. Adult unemployment could again exert two types of effects: supply side and demand side. First, the higher the adult unemployed proportion in an area, the harder it is for children to find employment, especially in the sectors where they are substituted by unemployed adults. Therefore, the higher the adult unemployed proportion in an area, the lower will be the demand for child labour. Second, and on the other hand, the higher adult unemployment rate also means a lower household income, forcing parents to send more and more children to work, in order to overcome the loss in income. In order to check how adult unemployment affects the child labour supply, the proportion of unemployed adults within the household (showing the supply side effect) is also included in the model.

Points discussed above also raise a question regarding the availability of work opportunities, that is, 'where do children get jobs?' The available variable that best reflects employment opportunity for children is the degree of informalisation in the economy. As

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explained earlier, this sector absorbs a high proportion of child labour. Children often start working in this sector to acquire skill, but after some time become regular workers (Burki,1989). The LFS defines the informal sector as enterprises owned and operated by employers with less than 10 persons engaged.[2] As there is a low skill requirement in this sector, children more easily gain employment and may sometimes substitute for adult unskilled labour. Therefore, the higher the proportion of the informal sector in an economy, the higher will be the probability of child labour. The relation could however be the other way around as well. For example, owing to the high incidence of child labour, the informal sector may experience growth. In order to overcome this problem, the size of the informal sector was measured in terms of adult employment (excluding child labour) in the informal sector, as a proportion of the total adult employed labour force across divisions/districts/cities.

Furthermore, in order to empirically analyse the effect of the indicators outlined above, one cannot ignore the importance of the agriculture sector, as almost 67% of the children in the sample were working in this sector. Such a high proportion suggests that larger the size of this sector, the higher will be the probability of child work. In addition then, some control variables are also included in the model, grouped to capture variations at the household and child level. To control for the effect of household characteristics, the following variables are included: average household size in a cohort, the average years of schooling of male and female heads of the house in a cohort, average years of schooling of the spouse (female only) of the heads in a cohort and average number of male headed household in a cohort. To control for the effects of the child's own characteristics, age of children and average number of male children in a cohort were also included in the model.

This study also acknowledges the possible problem of endogeneity in the relationship between child labour (denoted by CL in equation (5)) and four of the explanatory variables in equation (5). Adult wages have an element of endogeneity as the higher the adult wages, the higher will be the demand for child labour as explained earlier. Recall the substitution effect discussed earlier, that is, higher adult wages lead to higher costs of production and the substitution of cheap child labour for more costly adult labour. Hence, higher wages are hypothesised to reduce the demand for adult labour, thus affecting wages. This simultaneity issue is also present with the adult unemployment variable. Another variable, household size, was also checked for presence of endogeneity because parents often prefer more children in order to earn more. Use of the Davidson and Mackinnon test of exogeneity (Appendix A-1, Supplementary Files (http://journals.sagepub.com/doi/suppl/10.1177/1035304617690332)) resulted in rejection of the presence of endogeneity among the variables; therefore, the main analysis was performed assuming exogeneity among the variables.

Results

This section begins by providing some stylised facts relating to the sampled children aged 10–14 years and by giving some descriptive analysis of the variables used. It is followed by a discussion of the estimated results of equation (5) and reference to the use of a robustness test.

Table 1. Number and proportion of economically active children in the sample.

Cohort	Not in LF	In LF	Total
1997–1998	12,161 (91%)	1247 (9%)	13,408
1999–2000	13,640 (93%)	1049 (7%)	14,689
2001–2002	14,450 (92%)	1259 (8%)	15,709
2003–2004	15,124 (91%)	1536 (9%)	16,660
2005–2006	25,398 (88%)	3350 (12%)	28,748
2007–2008	30,877 (89%)	3834 (11%)	34,711
2012–2013	27,690 (92%)	2427 (8%)	30,117
Total	139,340 (90%)	14,702 (10%)	154,042

Source: Author's estimation drawn from Labour Force Survey (Calculated from PBS, 1997–1989 to 2012–2013).
LF: labour force; Not in LF: children aged 10+ years in school or idle (International Labour Organisation/ International Program on the Elimination of Child Labour-Statistical Information and Monitoring Programme on Child Labour (ILO/IPEC-SIMPOC), 2007).
Row percentages in brackets.

Descriptive analysis

Before averaging against cohort and time, the individual characteristics of the children were also explored. Specifically, the number of economically active children[3] in the sample, their hours of work per week and their education status are set out in Tables 1 to 3. The tables were extracted after selecting the specific variables from individual data sets. The data sets were pooled to extract the information and extract the variables. See Supplementary Files Table A-2 for details of the construction of the variables (http://journals.sagepub.com/doi/suppl/10.1177/1035304617690332). The information once extracted, the variables generated were then averaged out against cohorts and time.

Tables 1 to 3 highlight that, the percentage of economically active children, after decreasing from 9% in 1997–1998 to 7% in 1999–2000, rose to 12% in 2005–2006 but again declined to 8% in 2012–2013. The average hours worked per week by children recorded in the overall sample was around 40.5 hours per week. As far as education status was concerned, economically active children were mostly not concurrently enrolled in schools.

Furthermore, the descriptive analysis presented in Table 4 indicates that on average children at work were 11 years old and belonged to households headed by males having 4 years of schooling. The average household size they belonged to was eight. The informal and agriculture sectors in their area of residence constituted 43% and 44% of the workforce, respectively, with a 9% adult unemployment rate.

Main results

Estimation of equation (5) shows (Table 5) that all the indicators of labour market had a significant effect on the incidence of child labour except adult wages measured at the household level. Specifically adult wages, household unemployment rate, size of the informal and agriculture sectors had a positive and significant effect, while the adult

Table 2. Average hours of work per week by age, children in sample.

Age	10	11	12	13	14	Overall
1997–1998	38.6	35.9	41.5	40.5	43.0	40.8
1999–2000	45.2	41.7	42.5	43.4	45.4	44.0
2001–2002	41.5	41.6	43.5	42.8	44.1	43.3
2003–2004	41.1	41.1	41.5	40.3	44.5	42.3
2005–2006	38.3	37.6	39.4	40.7	42.8	40.5
2007–2008	38.2	37.0	38.9	40.1	41.1	39.6
2012–2013	33.2	35.4	36.7	38.3	40.5	37.9
Overall	38.2	37.8	39.8	40.6	42.5	40.5

Table 3. Education status of working children (#).

	In LF	Not in LF	Total
Currently not enrolled	12,444 (28.5%)	31,245 (71.5%)	43,689
Primary	1274 (2.5%)	50,345 (97.5%)	51,619
Middle	889 (1.7%)	51,796 (98.3%)	52,685
Matriculation	95 (1.6%)	5954 (98.4%)	6049
Total	14,702 (9.5%)	139,340 (90.5%)	154,042

LF: labour force.

Table 4. Descriptive analysis for sample.

	Mean	SD	Minimum	Maximum
Child age (average years)	11.96	0.16	11.34	12.57
Average number of male child	0.54	0.06	0.30	0.86
Average # houses headed by male	0.94	0.07	0.63	1.00
Average years of education of male heads	4.22	1.88	0.45	10.16
Average years of education of female heads	0.14	0.25	0	1.60
Average years of education of spouse of the heads	1.32	1.44	0	7.61
Size of the informal sector (average)	0.43	0.18	0.08	0.83
Size of the agriculture sector (average)	0.44	0.29	0	2.04
Average district unemployment rate	0.09	0.08	0	0.59
Average household unemployment rate	0.12	0.12	0	1.19
Log of average district wages	1.33	0.40	−0.69	2.63
Average household size	8.25	1.17	5.77	15.28

unemployment rate at district level had a negative and significant effect on the incidence of child labour. The informal sector, excluding the agriculture sector, showed a positive and significant effect: the higher the size of this sector, the higher was the probability of child labour. Specifically, a 1% increase in the size of this sector was linked to an increase in the demand for child labour of around 0.07%. One standard deviation increase in the size of the informal sector increased the demand for child labour by around 1.2%.

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Table 5. Effect of labour market conditions on child labour.

Dependent variable: child labour	With household wages	Without household wages	With skilled & unskilled wages
Labour market conditions			
Size of the informal sector (average)	0.069 (0.013)*	0.071 (0.01)*	0.0442 (0.10)***
Size of the agriculture sector (average)	0.178 (0.0)*	0.184 (0.00)*	0.1817 (0.00)*
Average district unemployment rate	−0.190 (0.012)*	−0.197 (0.01)*	−0.182 (0.01)*
Average household unemployment rate	0.092 (0.062)***	0.094 (0.06)***	0.0994 (0.04)**
Log of average district wages	0.021 (0.009)*	0.0206 (0.01)*	–
Log of average household wages	−0.010 (0.209)	–	–
Log of average skilled wages	–	–	0.0076 (0.54)
Log of average unskilled wages	–	–	−0.011 (0.43)
Child characteristics			
Child age (average years)	0.023 (0.258)	0.0198 (0.32)	0.0207 (0.28)
Average number of male child	0.085 (0.18)	0.080 (0.21)	0.0863 (0.17)
Household characteristics			
Average # houses headed by male	0.050 (0.294)	0.06 (0.24)	0.0681 (0.16)
Average years of education of male heads	−0.008 (0.026)**	−0.009 (0.01)*	−0.0069 (0.02)**
Average years of education of female heads	−0.014 (0.135)	−0.012 (0.20)	−0.0097 (0.30)
Average years of education of spouse of the heads	−0.013 (0.0)*	−0.012 (0.00)*	−0.0125 (0.00)*
Average household size	0.0046 (0.162)	0.0049 (0.14)	0.0028 (0.38)
Year dummies			
Year 1999–2000	−0.024 (0.002)*	−0.023 (0.00)*	−0.0242 (0.00)*
Year 2001–2002	−0.016 (0.034)**	−0.011 (0.08)***	−0.0116 (0.08)***
Year 2003–2004	0.038 (0.001)*	0.031 (0.01)*	0.0291 (0.01)*
Year 2005–2006	0.026 (0.014)*	0.030 (0.00)*	0.0280 (0.00)*
Year 2007–2008	0.020 (0.052)**	0.019 (0.07)***	0.0230 (0.02)**
Year 2012–2013	0.070 (0.194)	0.003 (0.84)	−0.0060 (0.96)
Constant	−0.371 (0.143)	−0.364 (0.15)	−0.340 (0.18)
R^2: within	0.24	0.23	0.24
Between	0.47	0.48	0.50
Overall	0.37	0.38	0.39
Number of obs.	798	798	791
Number of groups	114	114	114
F-test (Prob. F-test)	10.96 (0.00)	10.89 (0.00)	10.78 (0.00)

*, ** and *** represent significance at 1%, 5% and 10% significance level, respectively. #s in parenthesis are p-values. The estimation technique employed is the fixed effect model.

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Next, the size of the agriculture sector showed a positive link to the probability of child labour. Specifically, a 1% increase in the size of the agriculture sector increased the demand for child labour by around 0.18%. One standard deviation increase in the size of the agriculture sector was associated with an increase in the incidence of child labour by around 5.1%.

In order to separate the demand and supply side effects of the adult unemployment rate, two variables were included in the framework. First, the proportion of the unemployed adult population in an area was added in order to predict the demand side effect. Second, the effect of the unemployed adult proportion in households was included to predict the supply side effect. The effect of the adult unemployment rate in an area was found to be negative and significant. Thus, the higher the adult unemployment in an area, the lower will be the demand for child labour as the active search for employment in the adult labour supply reduced the probability for a child to find employment. Specifically, a 1 point increase in this variable reduces the demand for child labour around 0.19 points (i.e. one standard deviation increase in the proportion of adult unemployed labour force reduces the demand for child labour by 1.5%).

As far as the average adult unemployment rate at household level in a cohort is concerned, it was shown to have a positive significant effect in predicting the supply side phenomenon. Income loss due to an adult becoming unemployed was found to be likely to be a factor pushing families to rely on child labour; therefore, supply of child labour will increase. A one point increase in the household adult unemployed proportion was found to increase the supply of child labour by around 0.09 points (i.e. a 1 standard deviation increase in the household adult unemployed proportion increased the supply of child labour by around 1.1%).

The same strategy was followed to predict the effect of adult wages, capturing the demand and supply side effects separately for average adult wages at household level in a cohort and at the aggregate level. Results showed an insignificant effect of average household wages in a cohort, while the effect of aggregate level wages was significant. As the effect of adult wages at household level may have been overestimated because it included children's contribution, as a next step, the household level impact was dropped from the framework. The result therefore showed the demand side effect only. The positive and significant effect of adult wages in an area may be interpreted in this way: the higher the market wages for adults, the higher will be the probability that the employer will substitute adult labour by cheap child labour.

The positive effect capturing the demand side effect is not difficult to understand. In countries such as Pakistan, any increase in wages would be likely to make a firm less cost competitive, and likely to downsize, shut down or sub-contract to the informal sector, where adult labour can easily be substituted by cheap child labour. Any of these responses would result in expansion of the informal sector and in turn increase the demand for child labour. Neither skilled nor unskilled wages showed any significant difference in effect, perhaps because this study used education to measure skill composition, which is very low in Pakistan.

Finally, in estimating equation (5), in addition to the labour market indicators a set of control variables was also included. The controls included the child's own and household characteristics. The results indicated that the child's own characteristics did not influence

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the probability of child work significantly but the probability of child labour was significantly affected by the household level variables such as average years of schooling of the male head and his spouse. A 1-year increase in the number of years of schooling of the male head and his spouse reduced the incidence of child labour by around 0.008 and 0.01 points, respectively. The objective of including spouse education was to evaluate the claim that the impact of father's and mother's behaviour will be very different on child labour supply. The impact depends on their relative bargaining power. The slightly higher negative significant effect of spouse education confirms this argument.

To summarise, the findings suggest that the factors represented by the chosen labour market indicators significantly affect the incidence of child labour, through affecting either demand or supply. In order to determine the robustness of the analysis, a sensitivity check was undertaken by changing the estimation technique to use of the Tobit model. The outcomes were the same, indicating that the effects of the labour market factors estimated by the fixed effect model were robust. See Online Appendix A-3 (http://journals.sagepub.com/doi/suppl/10.1177/1035304617690332).

Conclusion

The evidence provided in this study supports the argument that child labour is affected by the labour market factors represented by the indicators chosen. Both supply and demand-driven effects were apparent. The demand for child labour was seen to arise mainly from high adult wages, the adult unemployment rate in an area, and the size of the informal and agriculture sectors. The supply of child labour arose predominantly because of the high proportion of adults unemployed in the household. Specifically, the main points raised and empirically tested in this study are that higher adult wages induce employers to substitute cheap child labour for adult labour. The replacement of adults by children appears to lead to an increase in the proportion of unemployed adults in the household. This compels poor families to increase their supply child labour. As the informal sector is the unregulated sector of the economy, the substitution is more evident in this sector. On the other hand, the higher adult unemployment rate in an area also pushes adults to work on low wages – offsetting the demand for child labour.

Child labour may be less likely to displace adult labour if there is some flexibility in adult wages, albeit above a fixed minimum. If adult wages are rigidly determined or fixed at too low a level, employers may replace adults with children, as adults will not work for the wages set in the market. Furthermore, if wages are fixed at a minimum level, the hiring of children will depend only on the employer's preference for children. On the other hand, high wages may not always have a negative effect. For example, higher wages will reduce the pressure on parents to send children to work as well. Moreover, while poverty traps may exist in the short term, with threatened increases in child labour being used as a deterrent to claims for higher wages, substitution of lower-paid child labour may not be frictionless or even feasible. Labour market segmentation between the formal and informal sectors, between agricultural and factory or service production, and between jobs requiring different levels of education and skill may make the substitution of child labour difficult. Based on this analysis, the study recommends that as most of the industries experiencing a high incidence of child labour are informal

(labour intensive), technological advancement may lead to a decreased dependence on child labour by decreasing the overall demand for labour, mainly unskilled labour. However, for technological improvement to have desirable results, availability of credit is a pre-condition. This is because a decrease in demand for labour will reduce the income of poor families. If loss of income is compensated through credit and subsidised educational programmes, technological improvement will result in a reduction in the incidence of child labour. Thus, the outcome of market mechanisms in a segmented economy cannot be predicted without attention to institutional and policy.

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Notes

1. For further details on the design of the Labour Force Survey, see Pakistan Bureau of Statistics (PBS, 2008–2009).
2. According to the Resolution adopted by the 15th International Conference of Labour Statisticians (ICLS), the informal sector comprises units, such as households enterprises, engaged in the production of goods and services with the primary objective of generating employment and income to the persons concerned, not necessarily with the deliberate intention of evading the payment of taxes or other legislative or administrative provision. These units typically operate at a low level of organisation, on small scale. The assets used do not belong to the production units as such but to their owners. This concept is formulated into an operational definition based on three criterions, first household enterprise, and the two others size and registration. These three criterions can be used optionally, alone or in combination. Given the ambiguity of the registration criterion in Pakistan, the definition of the informal sector is formulated in terms of the first two criteria, namely, household enterprise and size of employment. Hence, all household enterprises owned and operated by own-account workers and employee less than 10 persons are informal. It excluded all household enterprises engaged in agricultural activities (For more detail, see Hussmanns, 2003 and the discussion of labour force survey concepts and definitions in PBS, 2007–2008).
3. The definition of economically active children includes all forms of work in both the formal and informal economy, inside and outside family settings, work for pay or profit (in cash or in kind, part-time or full-time), or as a domestic worker outside the child's own household or for an employer (with or without pay). The terms 'working children', 'children in economic activity' and 'children in employment' are used interchangeably by the ILO (International Labour Organisation/International Program on the Elimination of Child Labour-Statistical Information and Monitoring Programme on Child Labour (ILO/IPEC-SIMPOC), 2007).

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