Child labour and schooling in Palestine: the role of the labour market and the conflict with Israel

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Abstract

This paper studies the impact of changes in the local labour market and in the Israeli-Palestine conflict on child labour and school attendance of Palestinian children. We use a novel dataset obtained by matching the Palestinian Labour Force Survey with a seperate data set of children (10-14 years) for the period 1999-2006. Using a bivariate probit model for child labour and schooling outcomes, we find that an increase in market wage increases child labour. We also find that increases in the military restriction imposed by Israel increases child labour, and modifies the relationship between market wage and child labour.

Keywords: Palestine, child labour, conflict, Labour Force Survey, closures

JEL Classification: J13, C35

1 Introduction

The existence of child labour naturally poses a number of ethical, social and economic questions. While the dimension of the phenomenon is well known, there is still a large disagreement concerning its main determinants. One reason is, as recent research indicates, that child labour is a more varied, country and context-specific phenomenon than usually believed. In particular, the empirical evidence suggests that not only the child and household characteristics but also the labour market situation may play a fundamental role in determining the level and dynamics of child labour. If the labour market is an important determinant of child labour, it follows that, especially in the case of weak and fragile developing countries, any factor that modifies its functioning may have an impact on child labour too. This impact is likely to be magnified in countries which are suffering a military conflict. This is the case of the Palestinian Territories.

Since the Six-Day War in 1967, the Palestinian Territories (West Bank and Gaza Strip) have been occupied by Israel. In these 40 years, periods of different intensity of conflict followed one

after other. After a decade of (relative) amelioration of the economic and political situation during the 90's, the situation had dramatically worsen since the so-called Second Intifada that began in September 2000. In fact, in response to the Second Intifada, Israel started increasingly imposing on Palestinian workers a number of mobility restrictions through different means: closures, curfews and sieges.[1] The effects of these Israeli military interventions on the Palestinian economy have recently been analyzed by both academics and international agencies. In particular, all these contributions document a large effect of the number of *closure days* on the performance of the Palestinian labour market.

The starting point of the present paper is the presumption that these effects are likely to reverberate on the child labour market dynamics. In fact, the child labour literature has increasingly emphasized that child labour and schooling decision are strongly related not only to the dynamics of household income but also to the evolution of labour market opportunities. Given the recent evidence that labour market opportunities in Palestine have *also* been affected by the Israeli military activity, in this paper we ask two main questions. First, are changes in labour market opportunities and in the intensity of the conflict with Israel related to child labour and schooling in Palestine? Second, does the number of closure days have an effect on the relationship between changes in labour market conditions and child labour (and schooling) in Palestine?

In this paper, we analyze the determinants of Palestinian child labour and school attendance for 10-14 years old children during the period 1999-2006. We use a unique dataset obtained by merging information from the Palestinian Labour Force Survey and a separate data on 10-14 years old children, both provided by the Palestinian Central Bureau of Statistics (PCBS). In addition we use time-serie data on the number of closure days for the same period. We use information on a number of individual, household and district characteristics as controls in studying how the characteristics of the labour market and the intensity of the Israeli military activity are related to child labour and schooling in Palestine.

From a theoretical point of view, a change in labor market opportunities is predicted to have two opposite effects on child labour (and schooling): the income and the substitution effect. If the child works for reaching a given level of consumption, a decrease in the (low-skilled) market wage (which is assumed to be the relevant market wage for children) will make her to work more (*income effect*). But, at the same time, a lower wage induces the child to work less since the opportunity cost of not working has decreased (*substitution effect*). Thus it is an empirical question which of the two effects prevails. Yet, given the peculiar Palestine situation, the analysis of the relationship between changes in the labour market conditions and child labour and schooling naturally calls for an additional element to be introduced, i.e. the conflict with Israel. In fact the conflict may well have an impact on child labour either directly or through its impact on the local wages. Thus we want to determine whether the response of children's time allocation to the local labor market condition changes due to the conflict. In this sense our analysis is close to the ones in which economic shocks are considered as additional elements in the analysis of children's time allocation decision. In our case the shock is the prohibition to Palestinian workers to enter Israel because of closures.

Our results clearly show that 1) the probability of child labour is strongly correlated with the labour market opportunities measured by the market wage. This can also be interpreted as evidence that an important determinants of child labour is the opportunity cost of not working. 2) the relationship between market wage and the probability of child labour is positive in West

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[1]Closure consists of banning the movement of labor and goods between the Occupied Territories and Israel, as well as between, and within, the West Bank and the Gaza Strip. Siege implies the the closing off of a town for a length of time

Bank, i.e. the substitution effect prevails; 3) conflict - measured by closure days - has a direct positive effect on the probability of child labour in West Bank; 4) the conflict also modifies the relationship between the opportunity cost of not working and child labour decision. Indeed when closure are in place the lower the market wage the higher child labour, suggesting that during the conflict periods the income effect prevails.

Our paper is one of the few contributions in the child labour literature that focuses on the characteristics of labour market rather than on household income as a possible determinant of child labour and schooling. To the best of our knowledge this is also the first paper that, using data for several years, analyzes how child labour and schooling in Palestine are affected by the intensity of the conflict and how closures impact on the relation between the labour market and child labour.[2]

The paper is structured as follows. In the next section, we briefly review the two main strands of the literature that are relevant to the present paper. In Section 3 we describe our dataset and the characteristics of child labour and school attendance in Palestine. Section 4 presents the econometric model and the set of variables we use in our estimation. Section 5 describes the results, and provides our interpretation. Section 6 concludes the paper.

2 Child labour, labour market opportunities and the conflict

This section reviews the two strands of literature that form the conceptual basis of our analysis. The first concerns the interaction between child labour and labour market in developing countries. The second is related to the analysis of the evolution of the Palestinian labour market and how it has been affected by the conflict with Israel.

Child labour and labour market opportunities   Until recently, most of the analysis of child labor has focused on testing the 'luxury axiom' introduced by Basu and Van (1998) which states that parents send their children to work when household income is low. While the luxury axiom is considered the reference point in the theoretical literature, there is no consensus in the empirical literature on the relationship between poverty and child labour (Dar *et al.* 2002).[3]

In fact, although child labour is probably a positive function of household poverty, it is also likely to be determined by other socio-economic factors: access to school, intergenerational expectations, inequality and employment opportunities. Indeed all these elements have been shown to be important components in explaining child labour (Bhatty, 1998; Ahmed, 1999; and Lieten, 2000). In particular, recent research has focused on the effect of opportunities provided by labour market as measured by the market wage. From a theoretical point of view there are two effects that are in place when wages change: the income and the substitution effect. The former prevails when a higher wage reduces child labour. The latter prevail when an increase in wage induce a child to work more since the opportunity cost of not working is decreased (*own price effect*).

Empirical evidence from developing countries reveals the dominance of own price effect over income effect. Levison (1991) and Barros *et al.* (1999) find that child labour in Brazil is higher in

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[2]Al Kafri (2003) analyzes child labour and schooling decision in Palestine comparing 2000 and 2001 (i.e. before and after the Second Intifada) focusing on supply factors at the household level. However, his analysis does not include household income, the market wage and closure days as explanatory variables. The results of the sequential-response model show an increase in the probability for male child to go to work and for female child to leave school following the beginning of the Second Intifada.

[3]Studies finding a negative relationship between household income or poverty and child labour are Jensen and Nielsen (1997), Sakellariou and Lall (1999), Levison *et al.* (2001) and Ray (2000a).

high income cities with thriving labour markets than in cities with highest poverty rates. Empirical measurement of the own price elasticity is often difficult because of limited data on children's wage. In order to circumvent this data problem, empirical researchers often resort to the expected or estimated wage as a proxy for opportunity cost (Amin *et al.* 2006; Barros *et al.* 1999; Diamond and Fayed 1997; Kassouf 1998). A few studies analyzes the relationship between adult labour market and child labour using micro data. Ray (2000b) uses the highest wage earned by household members to analyze the impact of poverty on child labour. He finds that the responsiveness of hours of child labor to changes in adult wages differs in Peru and Pakistan. Moreover the interaction between men's and children's labor markets is different from the interaction between women's and children's labor markets. Duryea and Arends-Kuennings (2003) analyze child labour and schooling decision in Brazil using a dataset comprising repeated cross-sections covering 1977-1998. They use aggregate measure of market wage in order to capture the effect of changes in labour market opportunities on child labour and schooling. They find that market wage of low-skilled workers (a proxy for child's opportunity cost of not working) has a positive and significant effect on child labour while increase in family income reduces child labour. Wahba (2006) uses individual data from the 1988 Egypt's Labour Force Survey to study the sensitivity of household supply of child labour to adult market wages. She finds that higher the adult male and female provincial wages relative to the national average, lower is the probability of child labour.

All these studies thus point to two facts. First, a strong individual country effect seems to be present (Dar *et al.*, 2002; Ray, 2000a). Second, child labor responds to the availability of jobs and to the opportunity cost of not working.

Child labour and the closure of Israel-Palestine borders   Palestine is an interesting country to be studied for both its political relevance and its unique economic features. The Palestinian economy is characterized by a peculiar labour market: Palestinian unemployment and domestic wage have long strongly responded to job opportunities and wage dynamics in Israel (Angrist 1995, 1996; Kadri and MacMillen, 1998; Sayre 2001).[4] This is not surprising considering that by the late 1990s - under conditions of relatively open but controlled borders - more than one-fifth of the total labor force was commuting daily to Israel (Ruppert Bulmer, 2003).

The recent re-surge of Palestine-Israel conflict, started by the Second Intifada in September 2000, has added another dimension of complexity to the dynamics of the Palestinian labour market. While the prohibition to enter Israel for Palestinians without a special work permit has been there since the beginning of the 90s[5], the closures that prohibit the movement of *all* Palestinians, including authorized workers, between the Palestinian Territories and Israel are now increasingly used (together with a number of other measures) in order to militarily control the area.

The closure of borders is intended to be a security measure taken in the presence of surges, or expected surges, in the Israeli-Palestinian conflict (Miaari and Sauer, 2006). But their effects obviously are much more pervasive. Recently academic researchers, international agencies and NGOs have documented how the closures have impacted the Palestinian economy (see for instance B'Tselem, 2007; OCHA, 2007; PCBS, 2001; United Nations, 2002; World Bank, 2003). In particular, academic research has mostly focused on measuring the effect of changes in the number of closure days on the performance of the Palestinian labour market. The reason is twofold. First, the labour market is the part of the economy expected to be affected the most by these measures since closures have a direct impact on Palestinian workers employment opportunities. Second, the

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[4]See also Elkhafif and Daoud (2005), Farsakh, L. (2002), Saleh (2004), Shaban (1993).

[5]Until the late 1980s, Palestinians and Israelis could move freely between each other's territories. Israel introduced permit requirements in 1991 to control the movements of Palestinian workers. After the 1993 Oslo Accords permit controls and other mobility restrictions (i.e., temporary border closures) were started to be strictly enforced.

availability of a detailed Labour Force Survey allows a careful analysis of the phenomenon. As for results, given the dependence of the Palestinian economy on Israel, it is not surprising that the Israeli border policy has been found to be a significant determinant of it.

Ruppert Bulmer (2003) calibrates the effect of changes in Israeli policy on daily Palestinian labour flows to Israel, unemployment and wages. The model predicts that closures, reducing the number of Palestinians employed in Israel, raise the total unemployment in Palestine. However, the domestic employment is predicted to be higher with decreasing wages due to the downward pressure caused by the return of workers previously employed in Israel. Aranki (2004) and Miaari and Sauer (2006) have estimated the effect of closures on the Palestinian labour market using data from the PCBS Labour Force Survey. Their results suggest that closures have a negative effect on Palestinian workers, not only on those who commute to Israel for work. In particular, closure increases the probability of being unemployed and decrease the monthly earnings of Palestinian workers regardless of their work location (Israel or Palestinian Territories).

Given that evolution of labour market affects the child labour and that the Palestine-Israel conflict has affected the dynamics in Palestinian labour market, it appears interesting to ask how child labour has evolved in a conflict ridden territory. We argue that the conflict may have a bearing on child labour in addition to that through labour market channel. The closure causes a sudden and unanticipated change in the earnings for a number of Palestinian workers. Repeated incidence of closure can encourage returning workers look for local jobs modifying the domestic labour market. At the same time, households (either directly or indirectly affected by these changes) that can not smooth consumption during temporary shocks can send their children work. The luxury axiom indeed implies that that during economic down-turns the drop in (the average) household income should induce increase in child labour and decrease in school attendance. The income and substitution effects add to the luxury axiom mechanism. Thus it is an empirical question whether the effect of changes in the market wage on the (average) household income dominates the effect of changes in the labour market condition on children's opportunity cost.

In this paper we analyze how changes in the labour market conditions - opportunity cost of not working and intensity of the conflict - are related to children's outcomes, controlling for a large number of child and household characteristics. In this sense, this paper is related to two lines of research on child labour - the effects of adult labour market dynamics on child labour (Wahba, 2006) and the impact of aggregate shocks on childrens outcomes (see i.e. Duryea and Arends-Kuenning, 2003). In addition, using all the available years from the Labour Force Survey, we have a number of observations sufficiently numerous to allow for district dummies and thus to control for district level unobservable characteristics. Our dataset is described in the next section.

3   Data description

This paper uses individual level data from the Palestinian Labour Force Survey, carried out by the Palestinian Central Bureau of Statistics (PCBS), for the period 1999-2006. Each round of the survey consists of a nationally representative sample of 7,600 households in Palestinian territories. The survey collects detailed information on employment and socio-economic characteristics of individual household members aged 15 years or more. We merged this dataset with separate data on 10-14 years old children, provided by the Palestinian Central Bureau of Statistics (PCBS). The present analysis is based on children between 10 and 14 years old for whom full information on schooling, labour participation and a number of parents' characteristics is available.[6] We consider

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[6]The Palestinian Labour Law, effective since mid-2000, prohibits the employment of children before they reach the age of 15. The Chapter on Juvenile Labour in the Palestinian Labour Law defines boys between 15-18 years

only male children for analysis since observations for female working children are very few. A child is considered working if he worked and was remunerated for at least one hour during the reference week of the survey, or was working as an unpaid family member. This is the definition of child labour adopted by the International Labour Organisation, and often followed in child labour literature. We also restricted the analysis to West Bank since the data on child labour in the Gaza Strip seems not reliable.[7]

Tables 1 presents descriptive statistics of the sample of children between 10 and 14 years old in West Bank (WB). The first column presents the characteristics of the total sample. The second and third columns present the distribution of child, parental and household characteristics for school participants and non-school participants respectively. The fourth and fifth columns present the characteristics for working children (child labour) and non-working children respectively.

Our analysis is based on a sample of 24,276 observations. In the sample school participation rate is 97.5% and child labour is 3.3%. The sample consists of 61.4% in 10-12 years group and 38.6% in 13-14 years group. School participation is higher among younger children and child labour is higher among older children. Going down the list of characteristics we observe that there is considerable variation in terms of parental characteristics. Father's education is higher for the children who attend school than for two other groups - non-school participants and child labour. It is interesting to note that among the school participants unemployed father is more prevalent than self-employed father. Also note that among the child labour percentage of children with self employed father is higher than that with unemployed father. For mother's education, it appears that mother's education is lower for child labour than for school participants. Employed mother is notably higher among the child labour as compared to school participants. In terms of break down of household characteristics for different children outcomes, number of adult unemployed is less for child labour than for school participants. The last group of descriptives gives the district and year level break down of the sample and different children outcomes. The first column in gives the percentage of children from different districts. Three districts - Hebron, Ramallah and Nablus - represent around half of the sample. The schooling in Ramallah appears more than the sample proportion, and child labour in Nablus and Hebron appears less than sample proportion. The last block of numbers shows the composition of the sample in terms of year of survey. It shows that considerable variation exists in the pool in terms of year of survey and children outcomes.

Table 2 presents the distribution of the four states that are observable for a child, namely both work and school, only work, only school and neither. The first row shows that 2.6% children are engaged in both work and school in West Bank. Less than 1% is involved in only working and 1.8% in neither work nor school. Similar pattern is observed for two age groups. A notable difference between the 10-12 years and 13-14 years groups is that the percentage of both work and school, only work, and doing neither is much higher for the latter than the former group. On the contrary, the percentage of only school is much higher among the younger group.

The last block of numbers in Table 2 shows the yearly pattern of these four states for children. Looking at the only school column we note that schooling has increased over the period 1999-2006. The state working and studying has followed a U-shaped path over the years in WB. Only work has steadily decreased over time in WB. Adding the values of both work and study with only work we get the yearly percentage of child labour. In WB, child labour has decreased from 5.6% in 1999

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as working juveniles and accordingly allows them to work but prohibits their employment in industries hazardous to their safety or health, in night work, or on official holidays (Birzeit University Development Studies Programme and UNICEF (2004)).

[7]The data for GS in the LFS are quite different from the data in the 2004 Child Labour Survey conducted by the PCBS (PCBS, 2004). The analysis of the child labour and schooling decision for Palestinian in the GS are available upon request from the authors.

Table 1: **Sample descriptive statistics**

	Total Sample	School Participants	Non-school Participants	Working	Non Working
All (%)	100.00	97.49	2.51	3.27	96.73
Child's characteristics (%)					
Age (%)					
10-12 years	61.40	62.29	27.05	31.32	62.42
13-14 years	38.60	37.71	72.95	68.68	37.58
Father's characteristics (%)					
Education					
No education	3.06	2.95	7.54	4.40	3.02
1 to 4 years	7.18	6.93	16.56	9.94	7.08
5 to 8 years	30.90	30.55	44.75	35.22	30.76
9 to 12 years	32.57	32.86	21.15	25.66	32.80
More than 12 years	26.29	26.71	10.00	24.78	26.34
Employment status					
Unemployed	20.39	20.13	30.33	11.32	20.69
Self employed	13.89	13.79	17.87	28.05	13.42
Wage earner	65.72	66.08	51.8	60.63	65.89
Mother's characteristics (%)					
Education					
No education	9.61	9.30	21.64	15.09	9.42
1 to 4 years	9.10	8.88	17.54	11.71	9.01
5 to 8 years	32.99	32.92	35.90	38.49	32.81
9 to 12 years	35.61	35.99	20.82	27.92	35.87
More than 12 years	12.69	12.91	4.10	6.79	12.89
Employment status					
Unemployed	77.97	77.91	80.66	44.15	79.12
Employed	22.03	22.09	19.34	55.85	20.88
Household's characteristics					
Male head (%)	99.86	99.86	99.67	99.87	99.86
Female head (%)	0.14	0.14	0.33	0.13	0.14
Number of children: 10-14 years	2.17	2.17	2.28	2.35	2.16
Number of children: 15-17 years	0.82	0.82	0.93	0.98	0.81
Number of unemployed adults	0.34	0.34	0.33	0.19	0.35
Size	6.58	6.57	7.06	7.10	6.56
District (%)					
Jenin	7.79	7.80	7.21	10.44	7.70
Tubas	3.52	3.55	2.30	3.77	3.51
Tulkarm	5.17	5.18	4.59	7.18	5.11
Nablus	10.85	10.83	11.64	22.52	10.46
Qalqilya	4.54	4.54	4.43	6.16	4.48
Salfit	3.44	3.46	2.62	3.52	3.44
Ramallah	12.64	12.62	13.44	7.17	12.82
Jericho	4.07	4.01	6.39	3.65	4.08
Jerusalem	13.82	13.92	9.84	2.39	14.21
Bethlehem	9.72	9.72	10.16	3.77	9.92
Hebron	24.44	24.37	27.38	29.43	24.27
Year (%)					
1999	9.27	9.06	17.7	15.85	9.05
2000	16.73	16.55	23.77	23.52	16.50
2001	13.43	13.39	14.75	5.79	13.69
2002	9.45	9.49	7.54	1.64	9.71
2003	10.92	11.01	7.54	7.17	11.05
2004	11.33	11.41	8.03	4.65	11.55
2005	13.96	14.13	7.72	12.20	14.02
2006	14.91	14.96	12.95	29.18	14.43
Sample size (N)	24.276	23.666	610	795	23.481

Table 2: **Labour and school participation rates by age group**

	Working and studying	Working only	Studying only	Neither
Total sample	2.57	0.70	94.91	1.82
Age (%)				
10-12 years	1.60	0.07	97.30	1.03
13-14 years	4.13	1.70	91.12	3.05
Year (%)				
1999	3.78	1.82	91.42	2.98
2000	3.30	1.31	93.13	2.26
2001	0.77	0.64	96.47	2.12
2002	0.22	0.35	97.78	1.65
2003	1.77	0.38	96.49	1.36
2004	1.02	0.33	97.20	1.45
2005	2.66	0.21	95.96	1.17
2006	5.83	0.58	91.99	1.60

to less than 1% in 2002, then increased to 6.4% in 2006. Similarly adding the both work and school to only school gives the percentage of children attending school. In WB it has gradually increased over time, from 95.2% in 1999 to 97.8% in 2006.

In the following sections we try to offer an explanation for this pattern focusing on the role of the labour market and of the Israeli military closures.

4   The econometric model

This section briefly describes the econometric model used to study the effect of changes in local market wage and number of closures days on child labour and schooling. The estimation method reflects the household decision making process about supplying child labour or sending child to school. Conceptually four options are available: only school, only work, both, and neither of them. In the child labour literature, children's work and schooling are often treated either as two independent decisions or as a sequential process. We deviate from these methods on the following grounds. First, a multinomial choice model requires the a unlikely assumption that child labour and schooling are simultaneous and independent to hold. Second, a sequential choice model requires a strong assumption on the hierarchy of the options which depends on the different welfare perspectives adopted (Wahba 2006).

Following Duryea and Arends-Kuenning (2003), we assume instead that the decisions (work and school) are interdependent. Accordingly, we use a bivariate probit model to estimate the probabilities of child labour and schooling. Indeed, an interesting feature of this model is that it allows for the correlation of random components and it gives a measure of the interdependence of the child labour and schooling decisions.

Let cl_i^* and sc_i^* denote two latent variables underlying the working and schooling decisions, respectively. We represent the decision making process as follows:

$$cl_i^* = g_{i1}\left(\cdot\right) + u_{i1} \tag{1}$$
$$sc_i^* = g_{i2}\left(\cdot\right) + u_{i2}$$

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where $[u_1, u_2] \sim BN\,(0, 0, 1, 1, \rho)$ and BN stands for the bivariate normal distribution. The index function for child i has the form:

$$
\begin{aligned}
g_{ij}\,(\cdot) \;=\;& \alpha_j + \beta_j X_i^{'} + \lambda_j\; hh\;\; income_i + \gamma_j\; \Omega_d^{'} + \theta_j\; mkt\; wage_d + \\
& + \delta_j\; closure + \phi_j closure\; interaction_d^{'} + district + time \qquad j = 1, 2 \qquad (2)
\end{aligned}
$$

where α is the constant, $X_i^{'}$ is a vector of child and household characteristics, $hh\;\; income_i$ represents monthly household income net of child income and the vector $\Omega_d^{'}$ includes controls at the district level. The two main explanatory variables are: $mkt\; wage_d$ which represents the average wage of low-skilled workers in the local labour market and $closure$ which indicates the number of days the borders between Israel and Palestinian Territories remained closed in a quarter. We also have a set of interaction variables (included in vector $closure\; interaction_d$) between closure days and other variables. One potential problem with using the market wage to capture the general characteristics of the local labour market - and thus the opportunity cost of not working - is that the former is likely to be correlated with un-observable characteristics at the district level. Indeed the level of the wage is likely to be associated with the general economic condition of the district: a higher wage would simply indicate a richer district. Differently from single equation cross sectional studies, we can use fixed effects at the district level to control for the heterogeneity problem and thus we are able to capture the true effect of changes in the wage. The set of dummies $district$ and $time$ represent the Palestinian districts and the year of survey, respectively. All the control variables are described in detail in the next sub-section.

Suppose now that cl_i and sc_i are the observed dummy variables for working and schooling decisions, defined as:

$$
\left\{
\begin{aligned}
cl_i &= 1 \quad if \quad cl_i^* > 0 \\
&= 0 \quad otherwise \\
sc_i &= 1 \quad if \quad sc_i^* > 0 \\
&= 0 \quad otherwise
\end{aligned}
\right.
$$

The choice probabilities for child i are:

$$
\begin{aligned}
p_{11_i} &= Pr[cl_i = 1, sc_i = 1] = \Phi\,[g_{i1}\,(\cdot)\,, g_{i2}\,(\cdot)\,, \rho] \\
p_{10_i} &= Pr[cl_i = 1, sc_i = 0] = \Phi\,[g_{i1}\,(\cdot)\,, -g_{i2}\,(\cdot)\,, \rho] \\
p_{01_i} &= Pr[cl_i = 0, sc_i = 1] = \Phi\,[-g_{i1}\,(\cdot)\,, g_{i2}\,(\cdot)\,, \rho] \\
p_{00_i} &= Pr[cl_i = 0, sc_i = 0] = \Phi\,[-g_{i1}\,(\cdot)\,, -g_{i2}\,(\cdot)\,, \rho]
\end{aligned}
$$

where $\Phi\,(\;)$ is the standardized bivariate normal distribution function. Define $q_{i1} = 2cl_i - 1$ and $q_{i2} = 2sc_i - 1$ such that q_{ij} takes value 1 or -1 depending on the value of the constituting dummy variable. Define $\rho_i^* = q_{i1}q_{i2}\rho$. The model is estimated maximizing the log likelihood function that takes the following form.

$$
LL = \sum_{i=1}^{n} ln\Phi\,[q_{i1}g_{i1}\,(\cdot)\,, q_{i1}g_{i2}\,(\cdot)\,, \rho_i^*]
$$

Since one of our focus variables, local market wage, is constructed from the individual observations, the intra-cluster correlation of the error terms can affect the estimated standard error. In our estimation we take into account and correct for this possible bias. Error correction for other aggregate variables are used as robustness checks. This includes estimation of robust standard errors taking into account household and other district level variables constructed from individual observations.

4.1 Variables

Here we describe, in more detail, the set of variables used for the estimation of child labour and schooling probabilities.

Child and household characteristics Our estimation equation incorporates a number of child and household characteristics. They are child's age, the number of siblings 10-14 years old and 15-17 years old in the household, the ratio of female children in the household, the head of the family being a female, the parents' level of education, the type of father's employment, mother being employed, and the place of work of father (WB, GS or Israel). We also have controls for the number of male unemployed adults in the household and for the household size. Dummy variables for households living in a rural or urban areas rather than in a refugee camp are also included in the estimation equation. Finally we control for the household wage income (net of child wage).

District characteristics We use two district-level variables: the average (low skilled) market wage and the unemployment rate. The market wage is one of the main variable of our analysis. It captures the tightness of labour market and thus the child's opportunity cost of not working. To measure the latter the obvious candidate would be the child wage at the district level. But, since we have too few observations on child wage, this would introduce a strong selectivity bias in the regression (Duryea and Arends-Kuennings, 2003). Rather we use the average district level wage of male worker with less than five years of education employed in the private sector as a proxy for the opportunity cost of not working for a child. Wages are in constant 1996 New Israeli Shekels (NIS), obtained by deflating nominal wages by the Consumer Price Index in West Bank provided by the PCBS. The unemployment rate variable is intended to capture the general economic situation at the district level and it is computed from the LFS.

We also use a full set of district dummies for controlling for unobserved district characteristics.[8] Using district dummies we can overcome the heterogeneity problem that single-cross section analysis encounter and we can be confident that the effect of changes in the market wage on child labour and schooling is not confounded by other district level characteristics. We also use a full set of yearly *time* dummies. These are expected to capture the presence of any time trend and effect of macro economic change on the evolution of child labour.

Closure days Since the end of the first Gulf War, Israel has used temporary closures of West Bank and Gaza Strip to restrict the movement of Palestinians between Palestinian Territories and Israel (see also Section 2). This was intended to be a security measure taken in the presence of insurgency, or expected insurgency, in the Israeli-Palestinian conflict (Miaari and Sauer, 2006). In practice, closures consist of restrictions on the movement of all Palestinians (including the Palestinian workers with legal permit to work in Israel) and goods between the West Bank, Gaza, and Israel (as well as third countries).

We used two sources for constructing the series of closure days for the West Bank. The main source was the Office of the United Nations Special Coordinator (UNSCO) in Ramallah which provided us with data for the period 1999-2004. UNSCO calculates the number of days of effective closures by netting out of comprehensive closures Saturdays, half the number of Fridays (labor and commercial flows are at about half their normal workday level on Fridays) and Jewish and Muslim holidays. We complemented these data with the information collected by B'Tselem on closure days for the period 2004 2006 checking also for consistency between the two data series.

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[8]This set of dummy variables could (although quite loosely) serves to control for the elements that would affect the demand for school - e.g. cost and quality of school, accessibility to school, etc.

Figure 1 shows the number closure days imposed by Israel on the West Bank in each quarter between 1999 and 2006. After the dramatic increase following the Second Intifada (fourth quarter of 2000), the number of closures days have fluctuated with a rather high variance during the period under consideration. In addition to the number of closure days by quarter, in the estimation equation we control for the effect of closure days in relation to the distance from the Israeli border and we include the interaction between the former and the average daily wage. The latter interaction should capture the effect of the conflict on the relationship between the labour market situation and child labour (and schooling).

Our estimation strategy implicitly assumes that, as emphasized by Miaari and Sauer (2006), the (temporary) closures of the West Bank are mostly a consequence of surges in the Israeli-Palestinian conflict that have little to do with the unobserved determinants of Palestinian labor demand.

Figure 1: Number of closure days (quarterly).
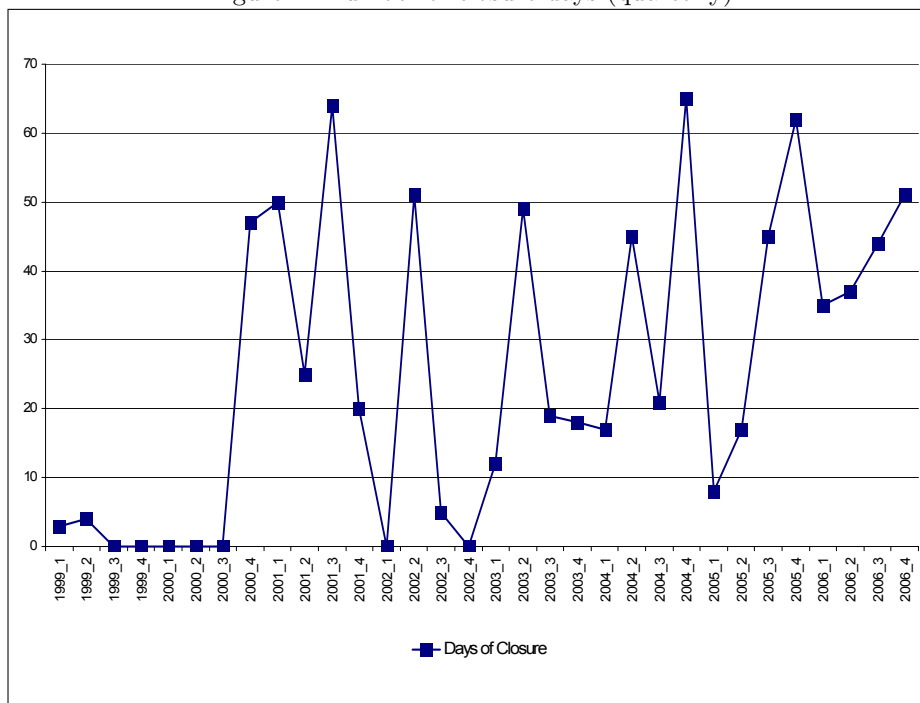
Note: effective closure days are comprehensive closures net of Saturdays, half the number of Fridays and Jewish and Muslim holidays. *Source*: UNSCO and B'Tselem.

5   Estimation results

Table 3 the presents the estimated coefficients from the bivariate probit model. The regressions pool together children across the whole period 1999-2006 and includes as explanatory variables the whole set of covariates presented in the previous section. The first two columns give the estimates and the standard errors for child labour decision, and the last two columns give the same for schooling decision. All estimation incorporates weights provided by the PCBS. The variable definition list is reported in Table 5 in the Appendix.

The error correlation between the child labour and schooling attendance decision is −0.53. The negative sign of this parameter indicates that the unobservable factors affect child labour and schooling decisions in opposite direction, i.e. there is a trade off between the two decisions. The

value of the parameter, instead, indicates that in WB child labour and schooling decisions are interdependent rather than being independent.

The first objective of our estimation exercise is to analyze whether there is a relation between child labour and schooling attendance and the labour market condition in Palestine. The second objective is to look at the effect of the Israeli-Palestine conflict on children decision and whether the conflict modifies the relation between the labour market conditions and children' choice.

Estimation results in Table 3 show that in WB the labour market situation (as proxied by the low-skilled district level average market wage) is strongly correlated with child labour. The coefficient of the market wage is positive and very significant: the higher the market wage the higher child labour. This suggests that in WB the substitution effect prevails over the income effect. The coefficient of the market wage is instead not significant for school attendance: this suggests that schooling decision is not influenced by the evolution of the labour market and that other factors probably play a more important role in determining that choice. Our estimation also indicates that child labour decision is influenced by the intensity of the conflict as proxied by the number of closure days: an increase in the number of closure days increases child labour. While the number of closure days has a direct effect on child labour, it does not affect schooling attendance. Finally our results also indicate that the Israeli-Palestine conflict has an effect on the relationship that exists between the labour market condition and child labour. The coefficient of the variable representing the interaction between market wage and number of closure days is negative and significant. This meas that when the borders are closed, i.e. when the intensity of the conflict is higher, the lower the market wage the higher child labour. The important result is that the conflict modifies child labour's response to the labour market condition.

Most of the control variables have the expected sign. As for age, the higher the age the higher is the probability of child labour and the lower the probability of schooling. Father's education has a positive effect on schooling but no effect on child labour (the sign is negative but the coefficient is not significant). This result is at odds with a number of previous studies on developing countries. In fact father's education (which is usually interpreted a proxy for permanent income at the household level) is usually found to be negatively associated with child labour. Mother's education has, on the contrary, the expected effect: child labour decreases with mother's education while school attendance increases. Interestingly, this is consistent with much of the literature on child labour that focuses on mother's education and employment (Desai and Jain, 1994). Sufficient variation in the type of father's employment allows us to use three dummy variables as controls: father self-employed, father public sector employee, and father private sector employee (father unemployed being the reference category). The association between father being self employed or employed in public sector and the probability of child labour is positive. The value of the coefficients is higher for the former than for the latter. The type of father's employment is also correlated with the probability of schooling. While being employed in public sector or being self-employed is significantly and positively correlated with the chance of attending school with respect to the case in which father is unemployed, it is when father is a private sector wage earner that the probability of child attending school is highest. We also control for the place of work of father. We find that being employed in Israel (rather than in the district of residence) has no significant correlation with the child's outcomes. On the contrary, if the father is employed in a Palestinian district which is different from the one of his residence the probability that the child works is higher and the change of attending school lower. The mother being employed is positively associated with the probability

Table 3: Bivariate probit estimation results

	Child Labour		School	
	Coeff.	SE	Coeff.	SE
Child's characteristics				
age	0.252***	0.016	-0.197***	0.019
Father's characteristics				
education	-0.005	0.005	0.033***	0.006
type of father's employment[a]				
self employed	0.292***	0.097	0.180**	0.073
employed public sector	0.182*	0.102	0.206***	0.066
employed private sector	0.096	0.084	0.212***	0.050
place of work[b]				
employed in other district	0.144**	0.064	-0.133**	0.058
employed in Israel	0.058	0.072	0.074	0.063
Mother's characteristics				
education	-0.036***	0.007	0.043***	0.006
employed	0.717***	0.054	-0.034	0.051
Household characteristics				
female head	-0.338	0.423	-0.402	0.387
children gender ratio	-0.022	0.109	-0.164*	0.100
no.children 10-14	0.094***	0.031	-0.045*	0.027
no.children 15-17	0.033	0.029	0.038	0.029
size	-0.008	0.013	0.019*	0.011
household income	0.000**	0.000	0.000	0.000
no.male adult unemployed	-1.670***	0.431	0.456	0.291
place of residence[c]				
urban	0.143	0.101	0.078	0.069
rural	0.146	0.102	0.156**	0.064
District characteristics				
market wage	0.583***	0.219	0.045	0.142
unemployment rate	-0.005	0.005	0.003	0.003
Closure				
no.closure days	0.048**	0.023	0.011	0.016
closure*wage	-0.011*	0.006	-0.002	0.004
closure interactions	YES		YES	
Districts dummies	YES		YES	
Year dummies	YES		YES	
constant	-7.713***	0.940	3.101***	0.643
Log-likehood			-367574	
Error correlation			-.531	
Number of obs.			24,276	

Note: Bivariate probit model, weights used. See equations 2 and 4. ***,**,* stand for significant at 1%, 5% and 10% level, respectively. Correction for error correlation for market wage cluster and robust standard error for all other variables used. Reference categories: [a] unemployed; [b] employed in the district of residence; [c] refugee camp.

of child labour[9] while no correlation is found with school attendance. We find that the head of a family being female does not exert a significant effect on child labour and schooling. As for the household size, it increases the chance of attending school and has no effect on child labour. We also control for the household composition. While the number of siblings in the age group 15-17 years has no effect on working and schooling decisions, the higher the number of siblings of 10-14 years the higher is the probability of child labour and lower the probability of attending school. The higher the ratio of female among the children, the lower is the probability of school attendance by the (male) child. The presence of more female siblings, though, does not have any effect on the probability of working. Interestingly, the higher the number of unemployed (male) adults in a household the lower is the probability of child labour (more below on this point).

5.1 Predicted probability of child labour

Tables 4 presents the estimated changes in predicted probabilities for child labour and schooling attendance for West Bank as derived from the results in Table 3.

The baseline case in each year is defined as a 14 years child, with both parents illiterate and unemployed, who lives in an urban area in the Ramallah district. Closure days are zero and all the other variables are at their original values.

In Table 4 we report results for several control variables but here we discuss only the effect on children decision of changes in the level of our two main variables of interest. We begin with the impact of changes in the average wage at the district level. Our results indicates that in West Bank a 10% increase in the average district (low skilled) market wage increases the probability of child labour on average by 13% over the period 1999-2006. As a way of comparison, consider the results reported in previous studies. Rosenzweig (1981), using aggregate data, finds that in rural India a 10% increase in adult male wages reduces male children' labour supply by 10%. In Duryea and Arends-Kuenning (2003) the relationship between the market wage and child labour is positive but smaller than our with a 10% increase in the market wage increasing child labour probability with respect to the baseline case by 0.7%. On the contrary, in Wahba (2006) a 10% increase in the market wage is associated with a 36% decrease in the probability of child labour for 12-14 years old children with respect to her the baseline case.

As for closures, results show that if the number of closures days in a quarter increases by 10 days the probability of child labour increases by around 5% in West Bank. Since on the period 1999-2006, the average number of closure days is 26.9 with a standard deviation equal to 22.2, the effect is quite substantial.

5.2 Discussion of the results

One of the aims of this paper was to analyze whether child labour is influenced by the characteristics of the local labour market. We used the low-skilled district average market wage to proxy the labour market situation and the children' opportunity cost. As we discussed earlier, there are two possible effects of changes in the market wage on child labour: the income effect and the substitution effect. Controlling for the household income level, for the number of male adult unemployed in the household and for district unemployment and a number of other covariates, we find that the effect of market wage is highly significant in West Bank. The substitution effect prevails: the lower the wage the less is child labour, meaning that child labour responds positively

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[9]This result is consistent with Francavilla and Giannelli (2007) who found that mother's labour market participation is associated with child labour in India. Also Manacorda (2006) finds that child labour is positively associated with the mother being employed.

Table 4: Change in predicted probabilities of child working and school attendance in West Bank (% change from baseline).

		Child Labour						**School attendance**		
Year	base^a	Mother education (+10 years)	Father self-employed	Closure (+10 days)	Household income (+10%)	Market wage (+10%)	base^a	Father education (+10 years)	Mother education (+10 years)	Father self-employed
1999	0.045	-54.0%	71.5%	4.4%	-1.8%	11.7%	0.768	11.2%	2.2%	7.4%
2000	0.038	-55.2%	75.0%	4.5%	-1.9%	12.2%	0.806	9.4%	1.8%	6.3%
2001	0.015	-60.4%	92.5%	4.9%	-2.2%	14.3%	0.800	9.7%	1.9%	6.5%
2002	0.011	-62.0%	98.4%	5.0%	-2.3%	15.0%	0.830	8.3%	1.6%	5.6%
2003	0.032	-56.2%	77.8%	4.5%	-1.9%	12.6%	0.844	7.6%	1.4%	5.1%
2004	0.015	-60.4%	92.3%	4.8%	-2.2%	14.3%	0.840	7.9%	1.5%	5.3%
2005	0.033	-56.1%	77.6%	4.5%	-1.9%	12.5%	0.855	7.2%	1.3%	4.8%
2006	0.075	-50.4%	61.9%	4.1%	-1.6%	10.5%	0.799	9.7%	1.9%	6.5%
average	0.033	-56.8%	80.9%	4.6%	-2.0%	12.9%	81.8%	8.9%	1.7%	5.9%

Note: $^a base$ is: child's age= 14, father's years of education= 0, mother's years of education= 0, father unemployed, mother unemployed, living in an urban area, in the Ramallah district, closure days= 0, other vars at their original values.

to the market wage. That the correlation between the market wage and child labour is significant confirms for the Palestinian case, as it has been found for other developing countries, the important role played by the opportunity cost of not working in determining children's choice. More generally, this evidence indicates that the choice of child labour may be related, in addition to a number of other elements, to the characteristics of the labour market. Our estimation results also show that during the conflict periods the relationship between labour market condition and child labour is modified with respect to normal days. During the closure days, the lower the market wage the higher child labour, i.e. as the condition of the labour market worsen child labour increases. This indicates that child labour is in part a response to the worsening of the general economic condition as caused by closures.

The second objective of the paper was to evaluate the effect of closures on child labour and schooling and how the number of closure days affected the relationship between the market wage - the opportunity cost of not working - and child decision. The reason for which we expect closure to affect child labour is the following. Since the Second Intifada, the possibility to work in Israel for Palestinian workers has become subject to, somehow unpredictable, military considerations. It follows that more closure days lead to more domestic unemployment, lower wages and (on average) higher poverty.[10] Our results show that increasing the number of closure days actually increases the probability of child labour. Our results also show that the effect is not related only to children whose father is employed in Israel. This means that the effect of closure reverberates on children decision through its effect on the whole West Bank economy. As for interaction variables, it is worth emphasizing that the number of closure days modifies the relationship between labour market condition and the conflict. Thus they have a really important role in shaping the way in which the economy is affected by the conflict.

Even if the main focus of the present paper is on the effect of changes in the labour market on child labour, one may also want to see if there is any evidence of child and adult labour being substitutes. While we do not perform a formal test of this hypothesis, the estimated correlation between the number of male unemployed in the household and child labour (and schooling) can give us some indication on this regard. Indeed the results indicate that the higher the unemployment at the household level the lower is the probability that a child works. This does not contradict the hypothesis that children and adult work are *substitutes*.[11] On the other hand, it is not in accordance with the hypothesis that poverty is the only driving force behind child labour. If poverty were the only factor at play, one would expect positive correlation between household adult unemployment and child labour, and a negative correlation with schooling. Furthermore, assuming that the higher adult unemployment in a household is a micro level indicator of a weak labour market, this also suggests that child labour is positively correlated with labour market opportunities. Finally also note that the higher positive correlation between self-employed and child labour rather than between unemployed father and child labour in WB is in accordance with the findings of Basu *et al* (2009). This possibility is also suggested by the evidence discussed by Edmonds and Turk (2004) that, in Vietnam, households that have their own businesses are more likely to have their children do labor.

Our results also highlight the possible differences between the determinants of child and school-

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[10]Miaari and Sauer (2006) estimates that doubling of the frequency of closures reduces the mean monthly earnings of Palestinians from the West Bank by 2.5%.

[11]While our analysis cannot be taken as revealing causality on this issue, there is no evidence in the literature on child labour that child labour affects parent's or adult household members' employment decision (see for instance Manacorda (2006)). Note that the negative correlation between child labour and unemployment at the household level implies that the child find it more difficult to get employed if adults in the same household fail to find a job. This can be interpreted as showing that the child has a lower probability of working because he belongs to a family whose members have some unobservable characteristics that make them not likely to be employed.

ing decision. It clearly emerges from our analysis that, although the two decisions are correlated, there are probably different determinants at play. Indeed, schooling decision appears not to be related either to market wage or to the number of closure days. We speculate that an analysis of the determinants of schooling attendance would probably require also additional information on the quality of education, the accessibility or the cost of education, etc. Unfortunately, all these demand for schooling variables are at the moment not available. The use of district dummies, while being only possible control, is admittedly not sufficient to account for all that characteristics that may strongly influence school attendance decision. Further analysis and data collection is needed on this important aspect.

5.3   Robustness checks and other model specifications

We performed a number of robustness checks and we also considered some alternative model specifications. To begin with, we considered the possible effect of outliers in household income. We excluded from the sample the households for which the income was larger than 15 times the average income of the sample. This does to change our results and hence the conclusion. Then we excluded the household income variable from the estimation in order to check whether our results survive in a larger sample not confined by the missing values in household income. We also estimated the model using as a set of proxies for the family economic wellbeing like the ratio of employed adult in the household, the ratio of household members employed in the private sector, in the public sector and self employed. The objective is to have proxies that do not require the household members to declare a wage. In all these cases the sign and significance of our variables of interest do not change. We estimated the model with a sample of low-income households, that is households with a monthly income equal or less than the sample average. The results about market wage and closure remain unchanged. Interestingly, household income turns out to be negatively correlated with the probability of child labor and positively correlated with schooling. In addition we estimated the model using a set of dummy variables for different intervals of household income. Results show that the probability of child labour is higher for lower income household with respect to high income ones.

   We also estimated the model including two additional interaction variables. We used interaction of closure days with household income and unemployment at the district level. The idea is to check whether during the period of intensified conflict (closure of the borders) the association between income and child labour implied by the luxury axion is reinforced or weakened and unemployment at the district level shows any associated with child labour. Both these interaction variables turn out to be insignificant while all other results remain unchanged with respect to the base model.

   It may be that child labour has a cyclical component related to the school holidays. To control for this we estimated the model including a dummy variable for the summer period. The variable turns out to be significant for child labour with all other variables maintaining their sign and significance.

   In our baseline estimation we have used correction for error correlation for market wage clusters. Since in our regression there is a number of district and household level variables which are constructed from individual data, as robustness check we also used correction for error correlation around each of these variables, maintaining robust standard error for other variables. Our results do not change over this set of robustness checks.

   As a final robustness check, we also estimated the model controlling for the characteristics of the labour demand at the district level. Since the informal sector is the more likely candidate for employing children, we estimate the model controlling for the share of informality at the district level. The variable turns out to be non-significant. Finally, following Wahba (2006), we estimated

the model including as proxies for the structures of the labour market, in addition to the informality share, also the share of workers employed in the public sector and the share of workers employed in the manufacturing sector. Results show that the latter is positively significantly correlated with child labor and negatively correlated with school attendance. Interestingly also unemployment at the district level becomes significant with negative sign, meaning that where unemployment is higher child labour is lower. This is additional evidence that confirms our results indicating the importance of the labour market conditions for child labour. All other results, and in particular the effect of market wage and number of closure days, do not change in this last set of estimations.

6 Concluding remarks and further research

In this paper we presented an analysis of the determinants of child labour and school attendance of Palestinian children in West Bank during the period 1999-2006. In particular, we studied how the characteristics of the local labour market and the intensity of the conflict are related to the children's outcome.

Some of our results confirms findings of previous studies; others are novel. One main finding is the positive and highly significant relation between the district (low-skilled) market wage and child labour. This result clearly indicates that the local labour market is an important determinant of child labour dynamics in West Bank. Since previous contributions have shown that the local labour market in West Bank is strongly influenced by the conflict, it is not surprising to find that the latter also affect child labour. The number of closure days have both a direct and an indirect impact on child labour in West Bank. For the direct effect, we find that the number of closure days increases the probability of child labour. And for the indirect effect, we find that during periods of conflict the relation between the labour market condition and child labour is reversed, with the income effect prevailing with respect to the substitution effect. Our analysis thus identifies a novel channel through which the situation of constant conflict with Israel is affecting the human capital formation, and in a broad sense the Palestinian economy.

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7 Appendix

Table 5: Variables definition

Variable	Definition
Child labour	= 1 if a child worked and was remunerated for at least one hour during the reference week of the survey, or was working as unpaid family member; 0 otherwise.
School	= 1 if a child is attending school; 0 otherwise.
Child' characteristics	
Age	age of the child
Father's characteristics	
Education	father's years of education.
Self employed	= 1 if father is self employed; 0 otherwise.
Public sector wage earner	= 1 if father is wage earner in the public sector; 0 otherwise.
Private sector wage earner	= 1 if father is wage earner in the private sector; 0 otherwise.
Employed in other WBGS district	= 1 father is not employed in the district the household lives.
Employed in Israel	= 1 if father is employed in Israel
Mother's characteristics	
Education	mother's years of education.
Employed	= 1 if mother is employed; 0 otherwise.
Household's characteristics	
Female household head	= 1 if head of the household is female; 0 otherwise.
No.children: 10-14 years	number of children in the age group 10 - 14 years.
No.children: 15-17 years	number of children in the age group 15 - 17 years.
Children gender ratio	ratio between female children in the hh and the total number of children (< 17).
No.male unemployed in the hh	number of unemployed male adults (18-64) in the household.
Size	number of people living in the household.
Rural	= 1 if the household lives in a rural area; 0 otherwise.
Urban	= 1 if the household lives in an urban; 0 otherwise.
Household income	household income net of children wages
District characteristics	
Market wage	log the district level average daily wage of male (18-64) with less than 5 years of education
Average unemployment	average unemployment at the district level
Closure days	number of days in which mobility between Israel and Palestinian Territories is prohibited also for workers with permission to work in Israel
Distance	distance of the district capital to the closest Israeli border (Km).