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Child labour, future earnings and occupation choice: evidence from Ghana

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Abstract

Purpose – The prevalence of child labour continues to feature prominently on the agenda of many sub-Saharan African countries. The problem remains critical despite existing laws and other legislative instruments that have been put in place to address the situation. The purpose of this paper is to examine a critical consequence of child labour, that is, its effect on future earnings and occupational choice.
Design/methodology/approach – The most recent round of the Ghana Living Standards Survey is used for this purpose. In addition to the Heckman model, the study employs propensity score and nearest neighbour matching techniques to account for the possible self-selection in engaging in child labour activities. Also, the multinomial logit model was employed to determine the choice of occupations of people who were engaged in child labour.
Findings – Results indicate that early labour market entry significantly reduces future earnings, possibly due to lower human capital accumulation. These results remain robust with different estimators. Additionally, results from the second objective show that child labour increases the odds of choosing low-skilled occupations.
Originality/value – In Ghana, the negative consequences of child labour on educational attainment have been well documented. Less, if at all, studied are the long-term consequences of child labour, particularly on future economic status.
Keywords Earnings, Endogeneity, Child labour, Occupational choice
Paper type Research paper

Introduction

Child labour and its related issues have become a challenge for many developing countries, including countries in Sub-Saharan Africa. In western Africa, the cocoa farms of Ghana and Cote d'Ivoire pose the greatest challenges to the eradication of the child labour problem, where in 2010, about 1.8m children were employed. In addition to these children being denied educational opportunities, they are often exploited physically and sexually. These negative early labour market experiences may, therefore, be expected to have devastating consequences on economic livelihoods when these children become adults.

The International Labour Organisation (1973), based on the Minium Age Convention (No.138), defines child labour as work that deprives children of their childhood, their potential, and their dignity, and that is harmful to their physical and mental development. This remains a policy concern for most developing countries and in spite of the progress made in the past few decades, the Sub-Saharan region maintains the lead in the incidence of child labour (Bhalotra, 2003). This has therefore created renewed interest in the field to better understand its causes and consequences for better policy formulation.

The programme to eliminate the incidence of child labour in Ghana was started in 2000, with the formulation of a legal framework – the National Plan of Action (NPA), in 2009 to

The authors of this paper have not made their research data set openly available. Any enquiries regarding the data set can be directed to the corresponding author.

guide the prevention of child labour. The NPA included guidelines such as the Ghana Child Labour Monitoring System to regularly check that workplaces are free of children; the Hazardous Activity Framework for the cocoa sectors of Ghana, where over 62.5 per cent of all child workers are found, according to the 2003 Ghana Child Labour Survey (GSS, ILO and SIMPOC, 2003); and the Standard Operating Procedures and Guidelines for Child Labour Elimination in Ghana, which outlines the appropriate procedures for eliminating the worst forms of child labour in the country. The reason for these concerted efforts at the elimination of the child labour phenomenon is the negative impacts that the practice is known to have on children. In Ghana, the negative consequences on educational attainment have been well documented by Heady (2000, 2003) and Boozer and Suri (2001). Less, if at all, studied are the long-term consequences of child labour, particularly on future economic status. The finding of negative effects of child labour on earnings capacities would provide greater impetus for additional attention on child labour issues in the country. Additionally, this study is also relevant and contributes to the current discourse on structural transformation of the economy. Ghana has been noted to be undergoing more of a structural shift than a transformation, as a result of the growth of the service sector, but the prevalence of low-skill and low-productivity activities in this sector is high. Results from the study suggest that child labourers typically go into agricultural and low-skilled occupations when they reach adulthood, compared to highly skilled activities, which has implications for policy. Ghana's National Employment Policy, which was initiated in 2015, aims to ultimately raise the productivity of Ghana's working sector, using research-based evidence from studies such as ours. The findings from this would, therefore, feed into action plans aimed at mitigating the effects of workers who may have had early labour market experiences. The present study seeks to explore some of these consequences. First, we examine the effect of child labour on future earnings. Second, we examine future occupational placements among individuals who were engaged in economic activities at young ages. The remainder of the paper is structured as follows: the second section reviews the existing literature and provides some background information on child labour in Ghana. The third section describes the data and the fourth and fifth sections discuss the methodology and the results. The last section, concludes the paper with some policy recommendations.

Literature review

Basu (1999) observed that although literature on child labour is widespread, empirical evidence is deficient in the Sub-Saharan African region. Of the studies on child labour that exist, several focus on the trade-off between child labour and human capital accumulation (Patrinos and Psacharopoulos,1995; Akabayashi and Psacharopoulos, 1999; Heady, 2003). Beegle *et al.* (2006), however, observed that these studies have examined correlations, rather than causal relationships. Few studies have examined the long-term consequences of child labour (Beegle *et al.*, 2007). One study by Emerson and Souza (2003) found a negative effect of child labour on adult earnings in Brazil, where child labour was measured using the age at which children became engaged in economic activities. However, a limitation of this study was the failure to address endogeneity issues, given their reliance on the OLS estimation technique. In an adapted version, Emerson and Souza (2006) examined a similar relationship using a nationally representative data set from Brazil and employed the instrumental variable technique. The finding of a negative effect of child labour on adult earnings was confirmed. An explanation for this negative effect is that child labour may hinder the acquisition of formal education and cause irreversible damage to health which results in reduced human capital development (Spindel, 1985). The reduced human capital formation, therefore, leads to reduced future earnings. The study by Emerson and Souza (2006) also alluded to possible heterogeneity of the effects of child labour. For instance, while the negative effect was significant for male children, it was not significant for female children.

The negative results also showed a reverse impact on earnings within the age bracket of 12–14 years.

The findings of a negative effect of child labour on future earnings are, however, not conclusive. In Vietnam, Beegle *et al.* (2009), however, found a positive effect on earnings arguing that the returns to experience, through child labour, are higher than the returns to schooling. The authors measured child labour hours as the total hours the child was engaged in income-generating work, including work on the family business or farm. Their study also dealt with the possible endogeneity problem of the decision to participate in the labour market at a young age. A limitation of their study, however, is that the five-year interval between the two rounds of data employed for the study implied an extrapolation of the long-term effects, rather than an actual estimation. In an attempt to overcome this limitation, Beegle *et al.* (2007) used a longer time period after the child labour experience on their study of Tanzania; here, they found no significant effect of child labour on earnings. Ilahi *et al.* (2003) also found a positive effect of child labour on life time earnings, consistent with Mincer (1974), who argued that that experiences gained from learning by doing may increase human capital and therefore increase wages.

The related issue of the long run consequence of child labour on occupation choice has been even less explored. The study that comes closest to this is by Beegle *et al.* (2007), who examined the empirical relationship between child labour and employment choices. This variable on employment choice was measured as the choice between subsistence farming and cash cropping farming and whether or not the individual had a wage or salary job. In Ghana, child labour studies have largely focused on causes and determinants of child labour (Takyi, 2014; Krauss, 2013; Kangsangbata, 2008; Ray, 2003; Canagarajah and Coulombe, 1997; Chao and Alper, 1998) and its effect on education enrolment and attainment (Heady, 2003; Boozer and Suri, 2001). To the best of our knowledge, no study has rigorously examined the relationship between child labour and its long-term consequence of earnings and occupational choice, paying particular attention to possible issues of endogeneity.

Child labour in Ghana
The passage of the Children's Act, 1998 (Act 560) and the ratification of the ILO Convention on Rights of the child (1990) which prohibits the labour or economic activity that jeopardises the physical and mental well-being of the child has yielded very little results in terms of eliminating the child labour problem in Ghana. For example, according to Asuming-Brempong *et al.* (2007), the phenomenon is rife in all the ten regions of the country. Evidence from Ghana Statistical Service (2008) shows that about 89.3 per cent of child labour is found in the agricultural sector. Its worst forms, however, are more prevalent in the form of head porters *(kayayei),* child domestic labour, ritual servitude *(trokosi)*, commercial sexual exploitation, quarrying and small-scale mining *(galamsey),* fishing and cash-crop agriculture.

The severity of the situation necessitated the establishment of the NPA in 2009 to provide the framework and create the dynamic impetus required for the effective and timely realisation of the national goals on child labour. The NPA was created to inform child labour policy from 2009–2015 with the second phase slated for 2017–2022. Progress towards the achievement of these goals has, however, been uneven and inadequate according to the NPA against child labour (NPA, 2009–2015). One reason for this is the lack of adequate empirical research into the causes, incidence and consequences of this phenomenon, on which to design relevant policies. Findings from this study are expected to provide information on the long-term effects and consequences of child labour on labour market outcomes.

According to the 2013 Ghana Living Standards Survey (GLSS 6) report, about 28.5 per cent of children within the age bracket of 5–17 years are economically active within the last seven days during which the data were collected, with a slightly higher proportion of males (29.2 per cent) than females (27.9 per cent). At the locality level, about 17 per cent of

urban children are engaged in child labour, compared to 39 per cent of rural children. There are also variations by age – the proportion of children who engaged in economic activities among the 15–17 year age group is about 44 per cent, compared to 10 per cent in the 5–7 year age group. The regions with the highest incidences of child labour were the Upper West (45 per cent), Upper East (45 per cent) and Brong-Ahafo (42 per cent) regions. Child labour appears to be a private sector (informal and formal) phenomenon, with the private sector hiring about 84 per cent of all children 5–17 years of age who were engaged in economic activities, while the agribusiness sector employs about 14.6 per cent and the rest in other sectors (GLSS 6). This indicates some scope for policy formulation and enforcements on existing laws against child labour in the private sector. The private informal sector employs a higher proportion of females (82 per cent) compared to males (73 per cent). Existing data also indicate that school attendance is higher among children aged 5–17 years who are not involved in economic activities (92 per cent), compared to those children who are (82 per cent). We, therefore, anticipate that this may have negative implications for earnings potential in the future.

Data
The study uses the sixth round of the GLSS 6. Since its inception in 1987, Ghana has conducted six rounds of the living standards surveys. The current round was carried out from October 2012 to September 2013. The GLSS is a nationally representative sample, spanning across all ten regions of the country. The survey contains data on about 18,000 households in 1,200 enumeration areas. The enumeration areas were selected as primary sampling units, using a two-stage stratified sampling design. In all, 15 households each were then systematically selected from each primary sampling unit. The data contain detailed information on households' demographic characteristics, education, health, employment and time use, migration and tourism, housing conditions, household agriculture and access to financial services and asset ownership. Each round of the survey is known to have a particular focus. For example, in the fifth round, the focus was on non-farm enterprises. In the current round, the focus changed to labour force issues. Its concentration on the labour force makes the data from this current round suitable for providing answers to the research questions proposed in this study as it contains the required variables for this research. Particularly, the labour force module of this round of the survey provides very detailed information on labour force issues including age at which individuals started working, wages and earnings, occupation types as well as other related labour information.

The dummy variable for child labour is constructed from the Ghana Statistical Service definition of child labour, using the information contained in the GLSS data set, i.e. at what age did you first start work? The dummy variable assumes the value of 1 if the individual worked when they were less than 12 years and 0 otherwise[1]. From Table I, it is observed that about a quarter (26 per cent) of the sample were economically active when they were younger. With respect to differences in earnings, the data suggest a significant difference between children who were exposed to early market labour experiences and those who were not. Figure 1 shows the distribution of working children, by region. The three northern regions, including the Brong-Ahafo region, recorded the highest incidence of children with early labour market experiences. The Upper East region recorded the largest incidence at 47 per cent, followed by Upper West, Brong-Ahafo and Northern region which recorded 45, 37 and 33 per cent, respectively.

The paper considers seven different occupation categories broadly classified as technical and professional, which comprise jobs such as managers, and professional jobs such as commissioned armed forces, senior government officials, finance managers as well as other relatively high-skilled jobs such as medical practitioners and lawyers. The other occupation

Table I.
Descriptive statistics

Study variables	Full sample		No child labour		Child labour		Difference	t-value
	Mean	SD	Mean	SD	Mean	SD		
Child labour (chdlab)	0.255	0.44						
Log of monthly earnings (ln_earn)	5.369	1.47	5.444	1.44	5.119	1.58	0.325***	−9.12
Age of mother (age)	33.122	13.691	33.009	13.57	33.157	14.08	−0.148	(−0.90)
Age squared (age_sq)	1284.667	1021.11	1273.787	1016.44	1297.699	1048.31	−23.91	(−1.94)
Household size (hhlsize)	5.68	3.3	5.384	3.11	6.464	3.6	−1.081***	(−27.74)
No education (none_r)	0.011	0.1	0.012	0.11	0.009	0.09	0.0029	−1.87
Prebasic education (prebasic_r)	0.175	0.38	0.142	0.35	0.277	0.45	−0.135***	(−24.40)
Basic education (basic_r)	0.579	0.49	0.574	0.49	0.582	0.49	−0.00816	(−1.11)
Secondary education (secondary_r)	0.167	0.37	0.191	0.39	0.102	0.3	0.0892***	−15.98
Post-secondary education (postsec_r)	0.068	0.25	0.081	0.27	0.03	0.17	0.0510***	−13.48
Mother's education: no education (none_mm)	0.794	0.4	0.75	0.43	0.898	0.3	−0.148***	(−25.56)
Mother's education: prebasic (prebasic_mm)	0.007	0.09	0.008	0.09	0.006	0.07	0.00277*	−2.23
Mother's education: basic (basic_mm)	0.176	0.38	0.211	0.41	0.088	0.28	0.123***	−22.51
Mother's education: secondary (secondary_mm)	0.013	0.11	0.017	0.13	0.004	0.06	0.0134***	−7.99
Mother's education: post-secondary (postsec_mm)	0.01	0.1	0.013	0.11	0.004	0.06	0.00897***	−6.1
Father's education: no education (none_ff)	0.637	0.48	0.576	0.49	0.79	0.41	−0.214***	(−32.26)
Father's education: prebasic (prebasic_ff)	0.004	0.06	0.004	0.06	0.004	0.06	−0.000104	(−0.12)
Father's education: basic (basic_ff)	0.269	0.44	0.309	0.46	0.167	0.37	0.142***	−23.04
Father's education: secondary (secondary_ff)	0.043	0.2	0.054	0.23	0.019	0.14	0.0347***	−12
Father's education: post-secondary (postsec_ff)	0.046	0.21	0.057	0.23	0.02	0.14	0.0370***	−12.45
Father's occupation: agriculture (agric_ff)	0.686	0.46	0.627	0.48	0.84	0.37	−0.213***	(−33.70)
Father's occupation: manufacturing (manuf_ff)	0.034	0.18	0.037	0.19	0.024	0.15	0.0123***	−4.95
Father's occupation: wholesale/retail (whole_ff)	0.053	0.22	0.065	0.25	0.02	0.14	0.0444***	−14.27
Father's occupation: services (service_ff)	0.227	0.42	0.272	0.44	0.115	0.32	0.157***	−27.12
Mother's occupation: agriculture (agric_mm)	0.633	0.48	0.563	0.5	0.808	0.39	−0.245***	(−36.34)
Mother's occupation: manufacturing (manuf_mm)	0.012	0.11	0.012	0.11	0.011	0.1	0.00118	−0.78
Mother's occupation: wholesale/retail (whole_mm)	0.293	0.46	0.349	0.48	0.153	0.36	0.197***	−30.63
Mother's occupation: services (service_ff)	0.062	0.24	0.076	0.26	0.028	0.17	0.0471***	−13.56
Akan ethnic group (akan)	0.373	0.48	0.428	0.49	0.23	0.42	0.198***	−34.42
Ga ethinic group (ga)	0.06	0.24	0.071	0.26	0.03	0.17	0.0406***	−14.15
Ewe ethnic group (ewe)	0.12	0.32	0.129	0.34	0.089	0.28	0.0401***	−10.29
Northern ethnic group (north)	0.427	0.49	0.351	0.48	0.629	0.48	−0.278***	(−48.09)

(continued)

Child labour

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Study variables	Full sample		No child labour		Child labour		Difference	t-value
	Mean	SD	Mean	SD	Mean	SD		
Other ethnic group (other)	0.021	0.14	0.02	0.14	0.021	0.14	-0.000971	(-0.57)
Age (age)	33.123	13.7	33.009	13.57	33.157	14.08	-0.148	(-0.90)
Square of age (age_sq)	1284.665	1024.01	1273.787	1016.44	1297.699	1048.31	-23.91	(-1.94)
Gender of respondent (Male)	0.468	0.5	0.458	0.5	0.498	0.5	-0.0408***	-6.82
Locality of residence (urban)	0.414	0.49	0.499	0.5	0.208	0.41	0.291***	-50.74
Western region (west)	0.098	0.3	0.105	0.31	0.078	0.27	0.0266***	-7.45
Central region (central)	0.087	0.28	0.115	0.32	0.022	0.15	0.0927***	-27.11
Greater accra region (g_accra)	0.105	0.31	0.141	0.35	0.022	0.15	0.119***	-32.05
Volta region (volta)	0.089	0.29	0.086	0.28	0.093	0.29	-0.00723*	(-2.12)
Eastern region (east)	0.098	0.3	0.111	0.31	0.06	0.24	0.0514***	-14.45
Ashanti region (ashanti)	0.107	0.31	0.114	0.32	0.072	0.26	0.0418***	-11.47
Brong-Ahafo region (b_ahafo)	0.095	0.29	0.078	0.27	0.136	0.34	-0.0582***	(-16.77)
Northern region (northern)	0.123	0.33	0.108	0.31	0.159	0.37	-0.0516***	(-13.21)
Upper East region (u_east)	0.093	0.29	0.066	0.25	0.169	0.38	-0.104***	(-30.18)
Upper West region (u_west)	0.105	0.31	0.077	0.27	0.188	0.39	-0.111***	(-30.48)
Technical and professional occupation (tech_prof)	0.062	0.24	0.075	0.26	0.03	0.17	0.0455***	-15.59
Clerical (clerical)	0.008	0.09	0.01	0.1	0.003	0.06	0.00659***	-6.03
Low-skilled occupation (lowskill)	0.151	0.36	0.165	0.37	0.108	0.31	0.0572***	-13.35
Agriculture (agric)	0.409	0.49	0.277	0.45	0.731	0.44	-0.454***	(-84.62)
Semi-skilled occupation (semi_skill)	0.092	0.29	0.096	0.3	0.078	0.27	0.0187***	-5.41
Plant and machine-related occupation (plant_mach)	0.028	0.16	0.033	0.18	0.015	0.12	0.0174***	-8.74
Unskilled (unskilled)	0.25	0.43	0.344	0.48	0.036	0.19	0.308***	-61.03
Observations	39,393		27,239		9,305		36,544	

Notes: t-statistics in parenthesis. *p < 0.05; **p < 0.01; ***p < 0.001

Table I.

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Percentage of Economically Active Children
by Region

Figure 1.
Distribution of
economically active
children by region
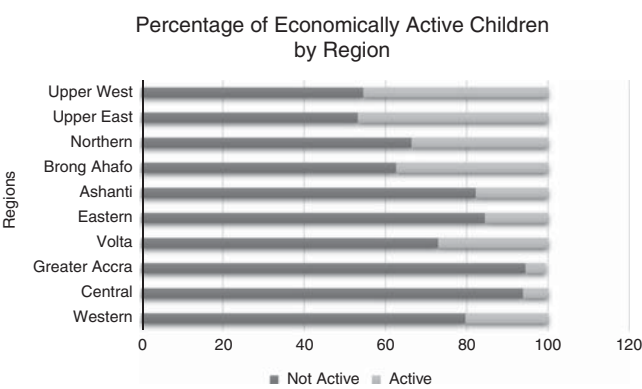
categories include clerical (mainly those who are engaged in clerical duties), agricultural-related
jobs (mainly non-mechanised agriculture), semi-skilled jobs (mainly craft related jobs such as
carpenters, plumbers, welders, motor vehicle repairers), low-skilled jobs (mainly bartenders,
cooks and domestic workers, security guards), plant and machine operators (mainly comprised
of wood processing plant operators, mechanical machinery assemblers, plastic products
machine operators) and unskilled jobs (domestic cleaners and helpers, mining and quarrying
labourers, refuse sorters).

As shown in Figure 2, children who are exposed to early labour market experiences
are disproportionately higher in the agricultural sector. Also, the figure shows a higher
distribution of technical and professional occupation for people who did not report
early labour market engagements. Interestingly, however, there seem to be a higher
distribution of people who were not economically active when they were young
(5–12 years) in the unskilled occupation category. This may lend credence to the argument
that children who work are likely to build relevant experiences and skills for their
future jobs.

The paper also controls for other relevant individual, household characteristics and
locational variables, including age, household size, education of respondent and education
of respondent's parents, ethnic groupings as well as the region and location of residence.
The average age in the sample is about 33 years, while the average household size is about
six people. Almost a half (47 per cent) of the sample are male and about 41 per cent live in
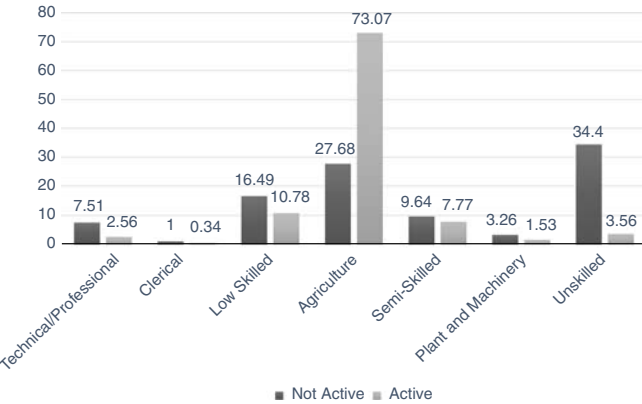

Figure 2.
Distribution of
occupation type by
economically active
children (5–12 years)

the urban areas. Due to the established correlation between ethnicity and occupation choice in the literature, the study also controls for the ethnicity of the respondents. From the study sample, about 37 per cent are Akans, 43 per cent are northerners, 12 per cent are Ewes, 6 per cent are Gas and about 2 per cent are from other ethnic groups. The data also show that majority (41 per cent) of the respondents are found in agriculture, while people in the technical and professional occupations make up only about 6 per cent of the sample. Also, the data indicate that about 25 per cent of people represented in the study are unskilled, while people who are described as low-skilled and semi-skilled are approximately 15 and 9 per cent, respectively. The rest of the sample is represented by those involved in clerical and plant and machinery occupations. Test of differences in the distribution of occupation choice between those who were exposed to early labour market experiences and those who were not exposed is statistically significant at the 1 per cent significance level.

Methodology

Overall, the paper aims to study the relationship between child labour and some labour outcomes. Specifically, the research objectives are twofold. The first research objective is to examine the impact of child labour on future earnings, while the second is to investigate the effect of child labour on occupation choice. The estimation equation of the first objective is generally represented as follows:

$$Earnings = \beta_0 + \beta_1\, childlabour + \beta_2\, Individual + \beta_3\, location + \varepsilon \tag{1}$$

where *Earnings* is the dependent variable, which represents the natural log of earnings. The main variable of interest in Equation (1) is *childlabour*. This is a dummy variable which takes on a value of 1 if the respondent indicated that they started working when they were below 12 years, and 0 otherwise. The variable *individual* is a vector of variables which represents relevant individual characteristics such as age, gender and education, while *location* represents the area of residence as well as the region of residence.

In the experimental data, the coefficient β_1 would accurately capture the true effects of child labour on future earnings. However, in studies which rely on observational data such as this, β_1 does not necessarily reflect the true effect of child labour on earnings due to the possible selectivity bias in the decision to work as a child or not. The study therefore deals with this problem of endogeneity by employing two econometric techniques – the propensity score matching approach and the Heckman correction technique. The former approach was first developed by Rosenbaum and Rubin (1983) and used by Dehejia and Wahba (1999), Smith and Todd (2001) to obtain unbiased estimates of programme effects using the counterfactual framework – addressing the issue of what would have been the outcome if those who were engaged in child labour activities had not participated in the labour market at an early age and vice versa.

The propensity score matching approach involves finding the counterfactual framework by the estimation of propensity scores, defined as the probability of assignment into treatment and control groups. These scores are estimated conditioned on a set of observed covariates and estimated based on a logit or probit regression where the treated and control subjects are then matched based on similar propensity scores (probabilities). The random assignment into treatment and control groups based on (similar) predicted probabilities eliminates the bias in the coefficients.

The propensity scores then allows for the estimation of the average treatment on the treated (Imbens, 2004). This precisely allows for the measurement of the effect of any intervention or treatment (represented by whether or not the respondent worked as a child in this case). Despite the advantage of being able to directly estimate the treatment or

programme effect, the propensity score matching technique makes a strong assumption that unobservable differences does not exist between the treated and control groups (Joffe and Rosenbaum, 1999) and as such does not balance on the unobserved characteristics. The estimation adopted a maximum of two matches (based on the propensity score matching and nearest neighbour matching estimators). This means that for each score, a maximum of two matches are considered. Also, the propensity scores were estimated on a constrained set of variables such as parents education and other individual characteristics which would have most likely influenced the decision about whether or not the child should work. The balancing test[2] results indicate that the treatment and control groups are very similar after the matching process. In addition to the propensity scores, the paper also accounts for unobservables in the matching process and also estimates a Heckman model for comparability.

Studies such as Heckman (1979) have, however, argued that there may be some unobserved and omitted characteristics (such as ability and motivation of the child) based on which households decide if a child should work or not. Therefore, using a dummy to pick up the effect of child labour in a sample consisting of both people who entered the labour force at an early age and those who did not may not be appropriate. This is because of the non-random self-selection of children to early labour market participation based on some unobserved and omitted characteristics, which has been described by Antonakis *et al.* (2010) to constitute a specific form of endogeneity. This, if not accounted for, may lead to biased estimates especially if the omitted variables are also correlated with the outcome variable (which is earnings). Earnings, in this case, are only observed for those who worked at an early age and are currently working for wages. We do not observe the wages of those who participated in the labour force at an early age and are currently not working. To obtain unbiased estimates, the Heckman correction model is estimated by simultaneously predicting the probability of early labour market entry in the first stage, using a probit model and a restriction exclusion and the earnings equation in the second stage. The exclusion restriction in this particular context are the variables that affect the probability of early labour market participation but not earnings. Variables such as household size, ethnicity, parents education according to Takyi (2014), Krauss (2013) and Kangsangbata (2008) are directly associated with the likelihood of being in child labour but does not directly affect earnings:

$$Child\ labour = \alpha_0 + \alpha_1 X + \varepsilon \tag{2}$$

$$Earnings = \beta_0 + \beta_1\ childlabour + \beta_2\ Age + \beta_3\ Agesquared + \beta_4\ Education$$
$$+ \beta_5\ location + \beta_6 \lambda \varepsilon \tag{3}$$

In the first stage (obtained by estimating Equation (2), where X is a vector of covariates such as household size, gender, ethnicity, parents' education and sector of employment), the dependent variable is whether or not the respondent was engaged in the labour force before the age of 12 years. Probabilities of early labour market participation for the entire sample are obtained. The first stage (also known as the selection equation) calculates the sample selection correction factor (the inverse Mills ratio, λ), which is then inserted in the second stage (estimated by Equation (3)) as a separate predictor (Wooldridge, 2009). If the coefficient on λ is statistically significant, it indicates evidence of sample selection bias. However, if the coefficient on the inverse Mills ratio is not significant, it suggests that there is no evidence of sample selection endogeneity.

The second objective employs a multinomial regression model (MNL) in which workers are sorted into seven distinct principal occupations using the International Standard Industrial Classification codes. The MNL model allows the dependent variable to

adopt three mutually exclusive values, $j = 1, 2, 3, \ldots, 7$, defined for the ith individual as follows:

$$Y_i = \frac{e^{\beta_{j} X_i}}{\sum_{m=1}^{9} e^{\beta_m X_i}} \tag{4}$$

where $Y_i = 1$ represents the probability that the individual is in one of the distinct principal activities. X_i represents the explanatory variables. The explanatory variables controlled for include the dummy variable capturing whether or not the individual worked as a child, gender, age, education, and parent's education, parent's economic sector of employment, location and region of residence as well as ethnicity.

Results and discussion

After controlling for a host of relevant socioeconomic and demographic characteristics, results from estimations (shown in Table II) based on the first research objective suggest a negative and significant effect of early labour market entry on future earnings. Particularly, based on results from the Heckman, propensity score matching and nearest neighbour matching models, entry into the labour force before the age of 12 reduces future earnings by about 15, 16 and 12 per cent, respectively. The Heckman model was estimated to account for the lack of information on wages for early labour market entrants who are either currently not participants of the labour force or have no reported income. The non-significant λ suggest that problem of selectivity bias in deciding to work as a child or not is not an issue in this particular case. Estimations from the propensity score matching and nearest neighbour matching techniques which rely on a counterfactual framework to deal with the problem of selectivity bias also show a negative and negative and significant effect of child labour on future earnings.

The first stage results (from the Heckman estimations) suggest that people who reside in the urban areas are about 54 per cent more likely to start working before the age of 12 years. With respect to gender, males are about 22 per cent more likely to participate in the labour force before the age of 12 years compared to females. Other socioeconomic factors such as household size, parent's education, sector of parent's employment appear to be important factors influencing the decision to work at an early age or not. In respect of differences in earnings, people who live in the urban areas earn about 21 per cent more than their counterparts in the rural areas. Expectedly, education, age and gender are significant determinants of adult earnings. The overall negative impact of child labour on future earnings found in this paper is consistent with findings from Beegle *et al.* (2009) in Tanzania and Emerson and Souza (2006) in Brazil.

Education generally develops a child's mental and physical capabilities, as well as talents and prepares him or her to contribute economically in society while enhancing his or her overall welfare. Given the mutually exclusive nature of early labour market participation and schooling, child labour reduces the opportunity for skill and talent development. As a result, early labour market entrants may not have the required skills for better economic opportunities in the future. Children from poor households are often forced to participate in the labour market at early age in order to support their family (United Nations Children's Fund (UNICEF) Office of Research, 2007). Their early participation in the labour force may therefore have adverse implications for educational outcomes such as enrolment and school attendance, as argued by Bezerra *et al.* (2009) and Putnick and Bornstein (2015) despite the counter argument of a complementary relationship between economically active children and schooling put forward by Ravallion and Wodon (2000).

Nonetheless, early labour market experiences may negatively influence the child's educational attainment in the long run, which may have a direct influence on his or her

Independent variables	Results from Heckman		Results from matching estimators (ATET)	
	First stage Selection	Second stage Log earning	Propensity Scores matching	Nearest Neighbour matching
ChildLabour		−0.147*** (−3.326)	−0.157*** (−3.710)	−0.120** (−2.479)
Age		0.118*** (12.373)		
Age_sq		−0.001*** (−11.359)		
Prebasic_r		−0.120 (−0.692)		
Basic_r		−0.046 (−0.270)		
Sec_r		0.172 (1.002)		
Postsec_r		0.978*** (5.658)		
Urban	0.537*** (23.444)	0.212*** (4.197)		
Male	0.225*** (11.176)	0.539*** (16.318)		
hhsize	−0.052*** (−13.610)			
Ga	−0.236*** (−5.389)			
Ewe	0.061 (1.545)			
Northern	−0.272*** (−8.010)			
Other	−0.190** (−2.529)			
Prebasic_mother	0.038 (0.351)			
Basic_mother	−0.013 (−0.437)			
Sec_mother	−0.139 (−1.632)			
Postsec_mother	0.163 (1.606)			
Prebasic_father	0.131 (0.867)			
Basic_father	0.171*** (6.028)			
Sec_father	−0.022 (−0.405)			
Postsec_father	0.175*** (3.187)			
manufacturing	0.280*** (2.899)			
Whole/Retail	0.309*** (11.669)			
Services	0.282*** (5.998)			
Manufacturing	0.196*** (3.407)			
Whole/Retail	−0.001 (−0.030)			
Services	0.190*** (6.251)			
Central	−0.174*** (−3.914)	−0.133* (−1.917)		
G_Accra	0.187*** (4.216)	−0.060 (−1.048)		
Volta	−0.085 (−1.618)	−0.203*** (−3.021)		
Eastern	0.139*** (3.347)	−0.301*** (−5.008)		
Ashanti	0.123*** (3.014)	0.026 (0.440)		
Brong-Ahafo	−0.414*** (−9.402)	−0.200** (−2.472)		
Northern	−0.679*** (−12.598)	−0.282*** (−2.632)		
Upper East	−0.563*** (−10.108)	−0.004 (−0.040)		
Upper West	−0.491*** (−8.852)	−0.098 (−0.911)		
λ		−0.095 (−1.156)		
Constant	−0.523*** (−12.934)	2.829*** (10.656)		
Observations	21,520	21,520	8494	9447

Notes: z-statistics in parentheses. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table II.
Regression results – Heckman and matching estimations

future earnings. Disaggregating educational attainment by whether or not the individual started working before the age of 12 years, the data show that about 27 per cent of those who did not start working early have secondary or post-secondary education compared to only 13 per cent for those who entered the labour force at an early age. This is likely to have a direct bearing on their adult earnings.

Result from the multinomial logit estimation, which was employed to examine the effect of child labour on occupational choices, is represented in Table III. The marginal effects of these estimations are presented in Table AI. The results show the relative risk ratios (RRR). An RRR greater than 1 indicates that the relative risk of falling into the group of interest

Variables	Clerical worker	Low-skilled Worker	Agriculture worker	Semis-killed worker	Plant and machinery	Unskilled worker
Childlabour	1.178 (0.660)	1.353*** (2.611)	2.374*** (7.895)	1.289** (2.113)	0.850 (−0.988)	0.213*** (−10.734)
Household size	0.941 (−1.626)	1.026 (1.555)	1.107*** (6.390)	1.034* (1.921)	0.986 (−0.653)	1.092*** (5.536)
Age	0.930*** (−3.667)	1.025* (1.890)	0.956*** (−3.502)	1.013 (0.982)	0.984 (−1.102)	0.720*** (−18.418)
Age squared	1.001*** (2.901)	0.999*** (−3.129)	1.001*** (3.215)	0.999*** (−2.798)	1.000 (−0.957)	1.004*** (16.081)
Male	0.643*** (−2.732)	0.171*** (−21.819)	1.196*** (2.241)	0.864* (−1.764)	12.103*** (17.986)	0.585*** (−6.923)
Urban	2.014*** (3.368)	1.650*** (5.789)	0.237*** (−16.784)	1.273*** (2.664)	1.184 (1.448)	1.171* (1.825)
Ga	0.834 (−0.604)	0.846 (−1.113)	1.790*** (3.543)	1.084 (0.477)	0.895 (−0.557)	1.144 (0.900)
Ewe	1.269 (0.922)	0.854 (−1.172)	0.807 (−1.534)	1.466*** (2.756)	0.934 (−0.372)	1.007 (0.054)
North	1.163 (0.595)	0.816 (−1.449)	1.069 (0.483)	1.169 (1.072)	0.848 (−0.924)	1.032 (0.228)
Other	0.387 (−0.902)	1.147 (0.441)	1.070 (0.209)	1.627 (1.552)	0.652 (−1.036)	1.190 (0.561)
Prebasic	0.394 (−1.217)	12.374*** (9.151)	8.579*** (8.205)	5.054*** (6.079)	1.131 (0.415)	5,387.743*** (21.201)
Basic	1.108 (0.360)	6.037*** (8.101)	3.006*** (5.284)	2.683*** (4.793)	0.717 (−1.577)	2,237.649*** (20.652)
Secondary	1.182 (0.553)	1.570* (1.951)	0.444*** (−3.608)	0.452*** (−3.630)	0.106*** (−9.748)	577.093*** (16.504)
Post_Sec	0.492** (−2.330)	0.133*** (−7.882)	0.032*** (−12.666)	0.039*** (−12.425)	0.007*** (−14.196)	120.326*** (11.976)
Mother's education						
Prebasic	3.367* (1.705)	0.918 (−0.185)	1.811 (1.297)	1.315 (0.549)	2.774* (1.914)	1.524 (0.939)
Basic	0.768 (−1.274)	1.058 (0.561)	0.888 (−1.082)	1.066 (0.599)	0.961 (−0.291)	0.921 (−0.822)
Secondary	0.768 (−0.610)	0.864 (−0.609)	0.307*** (−2.878)	0.669 (−1.398)	0.645 (−1.101)	1.037 (0.168)
Post-secondary	0.905 (−0.242)	0.587* (−1.869)	0.887 (−0.287)	0.504** (−2.009)	0.664 (−0.976)	0.711 (−1.410)
Father's education						
Prebasic	0.000*** (−21.323)	1.543 (0.685)	0.691 (−0.519)	1.195 (0.270)	0.650 (−0.518)	0.897 (−0.159)
Basic	1.007 (0.031)	1.193* (1.700)	0.966 (−0.328)	1.312** (2.449)	1.120 (0.823)	1.226* (1.940)
Secondary	1.188 (0.522)	0.984 (−0.092)	0.862 (−0.716)	1.102 (0.517)	0.726 (−1.218)	1.359* (1.843)
Post-secondary	1.237 (0.689)	0.966 (−0.215)	1.023 (0.116)	1.143 (0.743)	0.960 (−0.162)	1.161 (0.926)
Father's occupation						
Manufacturing	0.976 (−0.058)	1.205 (0.909)	0.675* (−1.691)	1.693** (2.467)	1.472 (1.454)	1.211 (0.939)
Wholesale/Retail	1.413 (1.186)	1.208 (1.212)	0.527*** (−3.141)	1.036 (0.208)	0.925 (−0.337)	1.120 (0.733)
Services	1.017 (0.074)	0.891 (−1.118)	0.613*** (−4.426)	0.969 (−0.285)	0.960 (−0.289)	0.914 (−0.852)
Mother's occupation						
Manuf_mm	0.588 (−0.698)	0.911 (−0.296)	0.361*** (−3.027)	0.842 (−0.514)	0.713 (−0.706)	0.934 (−0.217)

(continued)

Table III.
Multinomial results –
relative risk ratios of
occupation choice
(base category:
technical and
professional)

Variables	Clerical worker	Low-skilled Worker	Agriculture worker	Semis-skilled worker	Plant and machinery	Unskilled worker
Whole_mm	0.734 (−1.462)	1.292*** (2.701)	0.399*** (−9.205)	0.991 (−0.094)	0.878 (−1.006)	1.084 (0.849)
Service_mm	0.842 (−0.585)	1.106 (0.643)	0.451*** (−4.434)	1.106 (0.608)	1.214 (0.904)	1.054 (0.358)
Region						
Western	0.533** (−2.068)	0.761* (−1.861)	7.808*** (10.681)	1.011 (0.073)	0.561*** (−2.992)	1.077 (0.499)
Central	0.688 (−1.250)	0.652*** (−2.725)	9.876*** (11.484)	0.886 (−0.724)	0.415*** (−4.046)	0.888 (−0.750)
Volta	0.846 (−0.478)	1.052 (0.290)	12.179*** (11.453)	1.486** (2.210)	0.849 (−0.685)	1.371* (1.796)
Eastern	0.358*** (−2.902)	0.933 (−0.518)	9.990*** (12.373)	1.024 (0.166)	0.683** (−2.139)	0.775* (−1.786)
Ashanti	0.968 (−0.133)	1.133 (0.913)	7.110*** (10.305)	1.066 (0.429)	0.697** (−2.029)	1.188 (1.205)
Brong-Ahafo	0.453** (−2.343)	0.698** (−2.286)	9.913*** (11.631)	0.843 (−1.011)	0.613** (−2.388)	0.750* (−1.734)
Northern	1.001 (0.003)	1.557* (1.948)	12.881*** (9.872)	1.531* (1.801)	0.675 (−1.277)	1.791*** (2.612)
Upper East	0.906 (−0.242)	0.927 (−0.344)	7.097*** (8.029)	1.335 (1.299)	0.470** (−2.289)	2.078*** (3.479)
Upper West	0.509 (−1.625)	0.665* (−1.853)	5.449*** (7.035)	1.034 (0.148)	0.387*** (−2.903)	1.366 (1.542)
Observations	14,432	14,432	14,432	14,432	14,432	14,432

Notes: Robust z-statistics in parentheses. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table III.

relative to the comparison group increases, while an RRR less than 1 suggests that the relative risk of falling into the group of interest relative to the comparison group decreases holding the effect of other variables constant. The comparison group for the study is technical and professional occupations. An RRR above 1 shows that economically active children have increased risks of being in the other occupations relative to being in technical and professional occupations and vice versa.

The results suggest that people who are associated with early labour market entry are 1.353, 2.374 and 1.289 times more likely to work in low-skilled, agricultural and semi-skilled occupations, respectively, compared to being in technical and professional occupations. Also, the results indicate that early labour market entrants are 0.213 times less likely to be unskilled workers in the future compared to the base group of technical and professional occupations. Similar to the explanation offered earlier, the increased odds of economically active children being in relatively low-skilled jobs may be associated with their low educational attainment. Entry into the labour force before.

Conclusion
The study aimed to answer two main research questions. The first research objective was to examine the impact of early labour market entry on future earnings, while the second objective is to determine the impact of early labour market entry on choice of occupation. Overall, the study finds a negative relationship between early labour market entry and future earnings. Specifically, the study provides evidence which indicates (on average) a 14.3 per cent[3] reduction in earnings of people who enter the labour force before the age of 12 years. These results are quite robust as estimations from Heckman model which accounts for self-selection and the matching techniques, which creates a counterfactual scenario, all point to similar results. With respect to the second research objective, the study finds that people who entered the labour force before the age of 12 years have increased odds of being in relatively low-skilled jobs in the future compared to being in technical and more professional jobs. However, findings from the study suggest that early labour market entry may have some positive implication in terms of acquiring skills through learning by doing, which therefore reduces the odds of being an unskilled worker compared to someone who entered the labour force after 12 years.

Findings from this study has useful policy implications especially for the second phase of the NPA for formulating child labour-related policies. According to NPA (2009–2015), there has been slow achievement of its goals of reducing child labour due to the lack of empirical evidence on the causes and consequences of child labour. The robust evidence of the negative impact of child labour on future earnings will, therefore, aid in the formulation of relevant policies to reduce the negative long-term consequences of early labour market entry. The direct policy recommendation would, therefore, be to design policies, perhaps, using education as a tool in order to reduce child labour activities.

Also, findings from the second research objective have very direct policy implications with regards to Ghana's quest to structurally transform its economy through increased productivity. Given that this study finds that child labourers tend to end up in relatively low-skilled jobs, action plans and policies may be designed to raise their productivity levels and reduce the incidence of early labour market participation.

Notes
1. The concept of child labour (by ILO standards) does not necessarily refer to simply any work done by a child, but, rather, to work that stunts or limits the child's development or puts the child at risk. However, in household survey data it is difficult (perhaps impossible) to appropriately isolate the portion of time spent working on the farm that qualifies under this very nuanced definition

(Beegle *et al.*, 2007). In this paper, we make use of the definition used by the Ghana Statistical Service which defines child labour as children (ages of 5–12 years) who are economically active.

2. Balancing plot provided in Figure A1.

3. This is an average of the three models (15 per cent from the Heckman Model, 16 per cent from the propensity score model and 12 per cent from the nearest neighbour model) estimated from Table II.

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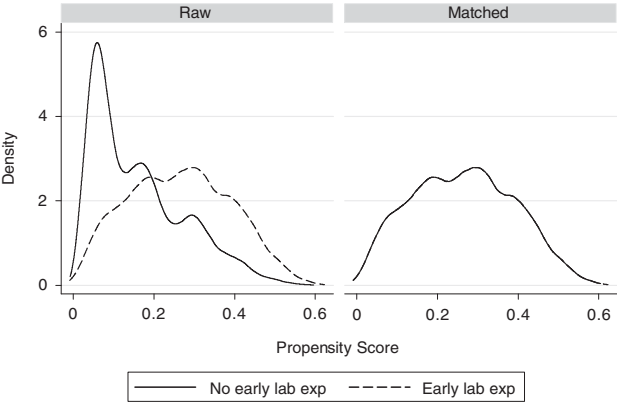Maddala, G. (1983), *Limited-dependent and Qualitative Variables in Econometrics*, Cambridge University Press.

Appendix 1

Figure A1.
Balance plots

Appendix 2

Independent variables	Clerical	Low-skilled	Agricultural	Semi-skilled	Plant and machines	Unskilled
childlab2	-0.00463 (-0.76)	0.00197 (0.59)	0.0234*** (2.78)	0.164*** (20.22)	0.0103 (1.40)	-0.0146*** (-3.64)
Age	0.0123*** (10.40)	0.000683 (1.47)	0.0149*** (10.24)	0.000906 (0.66)	0.00992*** (7.74)	0.00964*** (9.36)
Age_sq	-0.000130*** (-8.97)	-0.00000647 (-1.13)	-0.000186*** (-9.75)	0.0000239 (1.36)	-0.000137*** (-7.94)	-0.000127*** (-9.19)
hhsize	-0.00310*** (-3.25)	-0.00114** (-2.33)	-0.00509*** (-4.02)	0.00892*** (7.65)	-0.00182 (-1.59)	-0.00162** (-2.50)
Male	0.0373*** (8.49)	0.000478 (0.24)	-0.229*** (-38.00)	0.0991*** (16.08)	0.0335*** (6.29)	0.0883*** (26.07)
Urban	0.0163*** (3.37)	0.0116*** (4.96)	0.154*** (23.78)	-0.333*** (-47.33)	0.0665*** (11.60)	0.0349*** (10.01)
Prebasic	0.0109 (1.26)	0.00114 (1.39)	0.0236 (0.79)	-0.0222 (-0.68)	-0.0504 (-1.59)	-0.00841 (-0.41)
Basic	0.0348*** (4.19)	0.00694*** (5.90)	0.0369 (1.26)	-0.0789** (-2.47)	-0.0334 (-1.07)	0.00651 (0.33)
Secondary	0.162*** (14.40)	0.0290*** (6.41)	0.0445 (1.46)	-0.194*** (-5.88)	-0.0766** (-2.44)	-0.0161 (-0.80)
PostSec	0.573*** (33.75)	0.0414*** (5.17)	-0.107*** (-3.57)	-0.332*** (-10.02)	-0.147*** (-4.72)	-0.0464** (-2.32)
Prebasic_m	-0.0169 (-0.71)	0.0170 (0.94)	-0.0615*** (-2.67)	0.0343 (1.19)	-0.00281 (-0.11)	0.0293 (1.50)
Basic_m	0.00720 (1.24)	-0.00298 (-1.24)	0.0253*** (3.12)	-0.0469*** (-5.19)	0.0202*** (2.78)	0.00523 (1.21)
Sec_m	0.0324** (2.02)	-0.00207 (-0.41)	0.0410 (1.58)	-0.168*** (-5.23)	0.0123 (0.51)	0.00383 (0.27)
Postsec_m	0.0388** (2.28)	0.00540 (0.84)	-0.0183 (-0.68)	-0.0527 (-1.16)	-0.0127 (-0.52)	0.0156 (0.90)
Prebasic_f	0.00248 (0.06)	-0.0131*** (-5.60)	0.0813 (1.57)	-0.0770* (-1.81)	0.0499 (1.20)	-0.0148 (-0.95)
Basic_f	-0.000698 (-0.13)	0.000402 (0.16)	0.0235*** (3.06)	-0.0672*** (-8.50)	0.0270*** (3.96)	0.00690* (1.68)
Sec_f	0.00709 (0.73)	0.00262 (0.63)	0.0170 (1.19)	-0.0984*** (-5.36)	0.0204 (1.54)	-0.00290 (-0.39)
Postsec_f	0.00786 (0.91)	0.00569 (1.35)	0.00843 (0.61)	-0.0739*** (-3.97)	0.0262** (1.97)	0.00164 (0.21)
ga	0.000755 (0.10)	-0.00147 (-0.49)	-0.00978 (-0.90)	-0.0191 (-1.60)	0.00945 (0.97)	0.00528 (0.85)
ewe	-0.00501 (-0.84)	0.00438 (1.43)	-0.0147* (-1.70)	-0.0646*** (-7.48)	0.0657*** (7.90)	0.00920* (1.86)
north	0.00186 (0.32)	0.00412 (1.37)	-0.0275*** (-3.38)	-0.0349*** (-4.48)	0.0283*** (3.99)	-0.00405 (-0.99)
other	-0.00244 (-0.14)	-0.00316 (-0.47)	0.0159 (0.66)	-0.0700*** (-3.14)	0.0569*** (2.66)	-0.0103 (-1.09)
n	15,045	15,045	15,045	15,045	15,045	15,045
R^2 (%)	27	27	27	27	27	27

Notes: t-statistics in parentheses. *$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

Table AI.
Multinomial regression results (marginal effects) for occupational choice

Appendix 3

(a)
Adjusted Predictions of childlab2 with 95% CIs

(d)
Adjusted Predictions of childlab2 with 95% CIs

(b)
Adjusted Predictions of childlab2 with 95% CIs

(e)
Adjusted Predictions of childlab2 with 95% CIs

(c)
Adjusted Predictions of childlab2 with 95% CIs

(f)
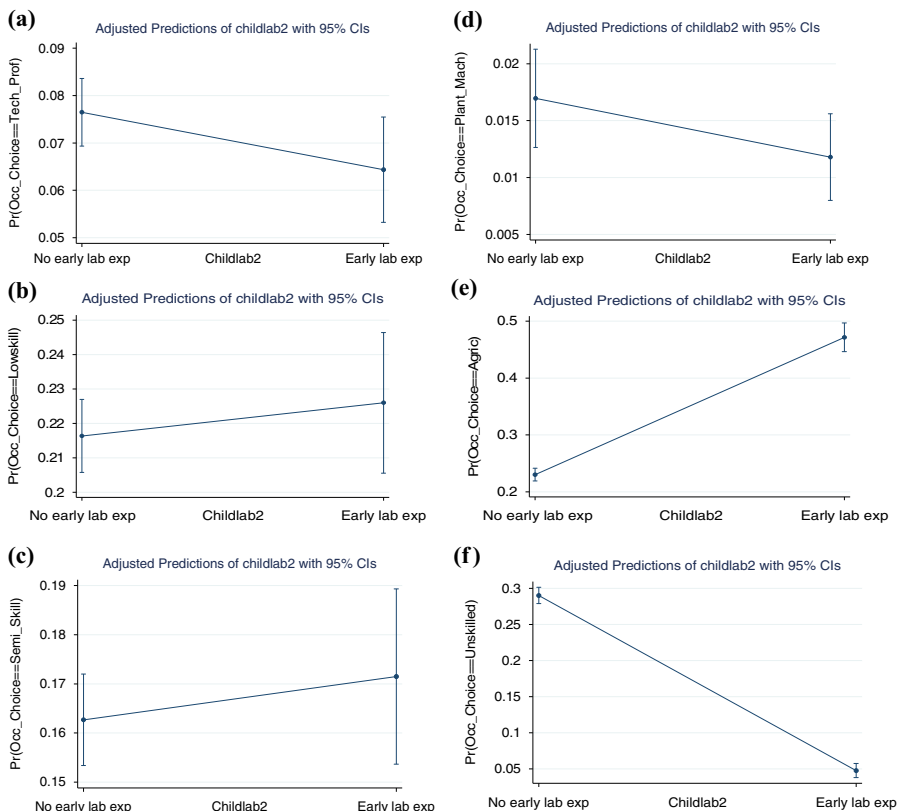Adjusted Predictions of childlab2 with 95% CIs

Figure A2.
Predicted probabilities

Notes: (a) Technical and professional jobs; (b) low-skilled jobs; (c) semi-skilled jobs;
(d) plant and machines; (e) agriculture; (f) unskilled

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