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Relative Contribution of Child Labour to Household Farm and Non-Farm Income in Ghana: Simulation with Child's Education

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Abstract

Child labourers play an integral role in households' income diversification process by contributing to farm and non-farm incomes but policies, including that of the ILO have focused largely on eliminating child labour from the agricultural sector through education. This study sought to ascertain the relative contribution of child labourers to farm and non-farm income using the GLSS6 data and employed a SUR estimation that simulated, empirically, with child's education. Findings showed that as a child labourer spends more time in school, every GhȻ1.00 contributed to farm income is accompanied by a GhȻ2.12 contribution towards non-farm income. By implication, child education policy removes child labourers from the farm but are likely to have a paradoxical effect of pushing these children into non-farm activities as they engage in them after school and during weekends. The suggestion is that governments must provide adequate remuneration for workers and pay a good price for agricultural products so that households do not use children as instruments to diversity their income portfolios, *since child labour acts as a push factor in the diversification process.*

JEL Classification: *I21, J21, J22, J23, Q12*
Keywords: Child labour, Farm income, Non-Farm income, *Altruistic, Non-Altruistic*

Introduction

In sub-Saharan Africa (SSA), agriculture has been the main economic activity to households, with rural households forming the majority. Just like many countries in this sub-region, the agricultural sector in Ghana is the largest employer as it employs 54.2 percent of the total population, which also translates into 45.8 percent households (Ghana Statistical Service - GSS, 2014a). In spite of the major role this sector plays in economic development, -it is bedevilled with many challenges such as land tenure, bad weather (rainfall and drought), bush fires (August-November – coinciding with peak hunting period), bad post-harvest activities, access to financial services, unavailable market, transport challenges etc. These challenges, over time, have left agricultural households with no option than to diversify their income sources by adding on non-farm activities as a risk-coping strategy (Cervantes-Godoy, Kimura, & Antón, 2013). According to Agyeman, Asuming-Brempong and Onumah (2014), agricultural households add on non-farm activities in order to accumulate funds for farm expansion and to solve pressing household needs (basic needs, health care, payment of school fees etc.). In 2012/2013, about 3.7 million households, making up 44.3 percent of households in Ghana, operated non-farm enterprises, half (50.4%) of which were in urban localities while a little over one-third (36.8%) were in rural areas (GSS, 2014a). In 2005/2006, households that operated non-farm activities were 3.2 million, representing 42 percent of all households (GSS, 2008). In Ghana, working children or child labourers play a very vital role in working to contribute to household farm and non-farm incomes (Zdunnek et al., 2008). This also means that households diversify their income portfolios having the labour of these child in mind.

The Ghana Statistical Service defines child labour by adopting the ILO Convention 138 that sets 15 years as the age below which children are not supposed to be involved in any form of work, especially economic activities that deprive the child of his/her health, education or development. All over the world, 215 million boys and girls are engaged in child labour and 115 of these children are exposed to its worst forms. Sector-wise, data indicates that the highest incidence of child labour is in agriculture (60%) and 26 percent in services. This has made the ILO in collaboration with its agencies very focused on eliminating child labour from the agricultural sector and every attempt at doing this has mainly focused on educating these children. In the ILO's *"Roadmap for Achieving the Elimination of the Worst Forms of Child Labour by 2016"*, the first action plan was to ask government to have the primary responsibility

for enforcing the right to education for all children since this will take the children out of the farms. Specifically, there was a call for the extension and improvement in access to free, compulsory, quality education for all children, with a particular focus on girls and ensuring that all children under the minimum age for employment are in full-time education (ILO, 2010). In Ghana, there is a capitation grant and a school feeding policy to increase school enrolment and sustain successes achieved. ISODEC's (2010) report has shown that pursuing a combination of the capitation grant and school feeding programmes will increase the gross enrolment rate in public primary schools to about 106 percent within a ten year period leading to the 2020/2021 academic year (rather than achieving 92 percent by providing only the capitation grant). Despite these efforts, child labour remains a challenge in Ghana, thus, calling for the child labour module in the sixth round of the Ghana Living Standards Survey (GLSS6).

Due to difficulties in and possible overlaps that will exist in an attempt to capture all categories of children who are engaged in specific light work (13 years), general employment (15 years) and hazardous work (18 years), studies have usually concentrated on children who are below 15 years but are economically engaged. The report of the GLSS6, with a special focus on child labour, also reported on economically active children. They reported on employed children aged 7 - 14 years by industry, locality of residence and sex and it showed that majority (91.2%) of the children was involved in farming (agriculture, forestry and fishing), followed by non-farm activities — wholesale and retail trade (13.2%). Among these children, the proportion of males (84.6%) involved in farm activities is greater than females (71.2%). At the household level, the time available for carrying out these activities by school-going children are as follows: after school (20%) before school (1%), before and after school (3%), on the weekend (66%), during missed school hours (3%) and during vacation (7%). As regards location, children in farm activities are more in the rural areas (88.2%) than in the urban areas (51.8%). For non-farm activities, children in the urban areas that are engaged in it is nearly five times (29.8%) their counterparts in the rural areas (6.7%). There are also more female children engaged in non-farm activities in the urban areas than in the rural areas (GSS, 2014a).

Child labourers contribute immensely to the incomes of their households by either working directly on household farms, non-farm enterprises or working outside the home and contributing to total household income. It has been widely theorized that households from which child labourers emerge, survive on incomes of these children and use them to meet subsistence

needs (Basu & Van, 1998; Duryea, Hoek, & Levison, 2005). From a study in rural Ethiopia, Cockburn (2002) showed that child labourers, on the average, contribute 4 to 7 percent of household income, with some children actually contributing up to 50 percent. It is then not surprising for Ilahi, Orazem and Sedlacek (2005) to posit that children from poor families cannot afford to grow up before entering the labour market due to the reliance of their families on their incomes to meet current consumption needs. Available figures indicate that in 2001, about 27.7 percent of Ghanaian children aged 5-14 years were economically employed (GSS, 2003) and this figure increased, marginally, to 28.8 percent in 2012/2013 among children in the same age bracket (GSS, 2014b).

With regard to households' involvement in farm and non-farm activities, studies conducted in Western Kenya (Olale & Henson, 2012) and in Mali (Abdulai & CroleRees, 2001) have shown that a household head's education level, access to credit and geographical location are factors that explain a household's farm and non-farm income diversification behaviour. Senadza (2014) used the GLSS 5 data and found that farm only, and farm combined with non-farm self-employment dominated the adoption of income strategies by households by accounting for more than 80 percent of responses. It was also found that household characteristics such as age of the household head, household size composition, educational level and other household characteristics all play a role in explaining the adoption of income strategies by households. Senedza then called for a promotion of non-farm income opportunities to augment farm incomes. In a similar study, Agyeman et al. (2014), found that 65% of households in the Western Region of Ghana engaged in non-farm income-generating activities. They also showed that non-farm income accounted for 29.05% of total household income. In addition, the age of the household head, gender, productive assets owned, number of years of schooling, the nature of road and a few others were found to be significant in explaining income diversification of farm households in the same region. Cockburn (2002) also examined the contribution of children to household income by estimating a household income with the number of child labourers as an input and found the estimated average total income contribution per child labourer to be between 4.4 and 6.8 percent. Cockburn's paper stresses on how the number of child labourers (or working children) in a given household contribute significantly to total household income.

From the information and arguments so far, it is clear that most households engage in both farm and non-farm activities as a risk-coping strategy and in doing this, child labourers and

their economic activities play a significant role in contributing to the total household income. But what has not been focused on, in previous studies, is the relative contribution of child labour to farm and non-farm incomes of households. Sendza (2014); Agyeman et al. (2014) examined households' choice of income strategies adopted by Ghanaian households and stated that household composition played a significant role in explaining income diversification strategies but the role of child labourers was not the focus of these papers. Also, the Child Labour Report of the sixth round of the Ghana Living Standards Survey only talks about the number of child labourers engaged in farm and non-farm activities but does not look at the relative contribution of these children to the incomes of households that have diversified their sources of income. Studies that come close are those of Menon, Pareli and Rosati (2005) and Cockburn (2002) but that of Cockburn is the closest as he examined the contribution of children to household income by estimating a household income with child labour as an input but did not disaggregate this contribution into farm and non-farm components.

To this end, this paper seeks to build on Cockburn's (2002) study by modelling a household income with child labour as an input and estimating the average relative magnitude per child labourer on household farm and non-farm incomes. The research question addressed in the paper is whether there is a difference in the contribution per child labourer to household farm and non-farm incomes in income-diversified households. Another question is whether ILO's policy prescription of educating children has the potency of eliminating child labour — on farm and non-farm? The paper tests the research hypothesis that the average (mean) difference in contribution per child labourer to household farm and non-farm incomes in income diversified households are statistically different from zero. The remaining sections of the paper are structured as follows. The next section examines theories related to child labour and household income, the third section discusses the methodology used in the study and is followed by the analysis and discussion of results. The last section concludes and offers recommendations.

Theoretical Considerations

The literature review is done in two levels, theoretical literature and empirical literature. Theoretically, two main issues are presented in this paper. The first has to do with the Altruistic model and Non-Altruistic model of child labour and the second has to with the Push and Pull factors that explain a household's decision to adopt an income diversification strategy rather

concentrating purely on farm activity. The empirical literature deals with child labour and household-level characteristics that influence both farm and non-farm income.

Altruistic and Non-altruistic models

The altruistic model that was started by Basu and Van (1998) and built on by others, is one in which both the quantity (the number) and the quality (the consumption) of the children enter the parents' utility function. Rosati and Tzannatos (2003) assumed in their study that parents control their children's time when they are young and time can either be spent on work or on school. Children's labour benefits current consumption while their schooling has a future effect. They also assumed that parents have control over all the incomes that accrue from the works of both adults and children. This reflects in the fact that until children mature, their activities are controlled by their parents. Rosati and Tzannatos (2003) defined child labour as work on the household farm or in the household business (in this case, non-farm enterprise). The conclusions drawn are that increment in household income should reduce child labour supplied by the household unless households have access to and make use of the capital market to engage in intergenerational transfers. Nonetheless, if parents consider their children as assets, explaining the non-altruistic aspect of parents' behaviour, an increase in household income will not necessarily reduce the supply of children's labour by the household. One point to note from the model is that when the model is extended to include cases where children work in the labour market, the results that will be obtained will not change in any relevant way. In a similar explanation, Fan (2011) stated that if parents have a greater taste for children's leisure, the less likely they are to send out their children to work and vice versa

Push and Pull factors and Income Diversification

The push and pull factors distinctively explain households reasons to engage in income diversification strategies. According to Reardon, Berdegué, Barrett and Stamoulis (2007), households' reasons to diversify in order to accumulate resources are caused by "pull factors" and these pull factors are usually a corollary of the upward spiral of incomes and assets for the households thus engaged. On the other hand, "push factors" are those that account for households' income diversification in order to manage risk, cope with shock, or escape from agriculture in stagnation or in secular decline and these factors usually come with high levels of

households' economic impoverishment. An example of the pull factors is any type that attracts households to the non-farm sector when the non-farm activities offer higher returns compared to farming (Egyei & Adzovor, 2013). Examples of the push factors are income coping mechanisms, diminishing or time-varying returns to productive assets, risk management, long-term constraints or smoothing household consumption (Ellis, 2000; Reardon et al., (2007).

Empirically, household characteristics have been documented as significantly influencing household income. In a study by Ibekwe (2010), age did not significantly explain farm income, although having a positive sign while Tuyen (2014) also explained that the income effect of the age of household members might be ambiguous because households with younger working members are more likely to undertake non-farm jobs, which in turn might earn higher incomes. With regard to sex of the household head, Aikaeli (2010) found that income was lower in female-headed households than in male-headed ones. Household members' education is often found to positively affect household income (Estudillo, Sawada, & Otsuka, 2008) but it should be noted that the educational levels of farmers in Ghana are generally low (ISSER, 2012). There is also evidence that investment in inputs, in both farm and non-farm activities, yield positive income-returns to households (Martinez, 2004).

Methodology

Data

The empirical analysis for this paper was done using data from the Ghana Living Standards Survey Round 6 (GLSS6) which was collected within twelve (12) months, from 18th October 2012 to 17th October 2013. The GLSS6, like earlier rounds focuses on the household as the key socio-economic unit and provides valuable information on the living conditions and well-being of households in Ghana. The survey, using a probability sampling approach, was designed to provide information on household and individual level indicators that are nationally and regionally representative. The topics covered in this survey included education, health, employment, housing conditions, migration, tourism, housing conditions, household agriculture, and access to financial services and asset ownership (GSS, 2014a).The GLSS6, compared to previous rounds, had a distinguishing feature of introducing a Labour Force Survey module with additional sections on Child Labour. This makes the GLSS6 the second nationwide survey that provides information on child labour. The first standalone Ghana Child Labour Survey was

conducted in 2000 by the Ghana Statistical Service. In all, a nationally representative sample of 18,000 households in 1,200 enumeration areas was covered by the survey. The survey covered a nationally representative sample of 18,000 households in 1,200 enumeration areas. Of the 18,000 households, 16,772 were successfully enumerated leading to a response rate of 93.2 percent. After merging, the number of households reduced to 2,205. Logging some of the variables also resulted in further missing observations, especially the farm income that reduced to 1,929. Since the model uses a square matrix, missing observations in specific rows reduced the final observation in model 1 to 1,658. For model 2 and 3, missing observations in the child education variable resulted in a further drop in the number of observations to 1,506 after estimation.

Model Specification

A Theoretical Model of Child Labour Allocation

The study adapts and makes significant modifications to the Newman and Gertler's (1994) household unitary decision making model for labour allocation within the household, which was also used by Kurosaki (2001). The model in this study explains the allocation of child labourers into farm and non-farm activities. We acknowledge that a household allocates other members of the household to all economic activities but the theoretical modelling in this study is done with a focus on child labourers.

In this study, a risk-neutral household derives income y from child labour (ers) $(i = 1,...,N)$ in the household. The household also derives utility $\upsilon(s_1, s_2, ..., s_N)$, from the schooling of these children — where $\upsilon(.)$ is a concave function that can be decoupled from utility from income y. Resources available to the household (including time) are allocated between all other household consumption and schooling. Also, the allocation of household consumption among children is based on the level of y, which is treated as the numéraire for measuring the net returns to child labour which are denoted in real terms.

The household faces a budget constraint and *N* time constraints, one for each child (used for economic activities and for school). Each child can be made to engage in *M* economic activities (either farm or a non-farm) each of which yields a net return to child labour f_j. More formally, the household's optimization is expressed as

$$\max_{CL_{ij}} \quad y + \upsilon(s_1, s_2, ..., s_N), \qquad (1)$$

Subject to a budget constraint

$$y_0 + \sum_{j=1}^{M} f_j(CL_{1j}, CL_{2j}, ..., CL_{Nj}; X_j) = y, \qquad (2)$$

Time constraints

$$\sum_{j=1}^{M} CL_{1j}, s_i = T_i, \quad i = 1, ..., N, \qquad (3)$$

and non-negativity conditions for child labour allocation variables, where y_0 is a non-child labour income including the sum of returns to household assets, CL_{ij} is hours of work by a child labourer i in activity j which is constrained as non-negative, X_j is a vector of household farm-level and non-farm-level characteristics such as age of the household head, number of child labourers, geographical location, gender of the household head and many others. Specifically, we make T_i the time child labourer i allocates between school and engagement in economic activities.

The first order conditions for the optimization consist of the following Kuhn-Tucker ($M \times N$) equations

$$CL_{ij} \geq 0, \qquad \frac{\partial f_i}{\partial CL_{ij}} - \frac{\partial \upsilon}{\partial s_i} \leq 0, \qquad CL_{ij}\left(\frac{\partial f_i}{\partial CL_{ij}} - \frac{\partial \upsilon}{\partial s_i}\right) = 0 \qquad (4)$$

This expression shows that the household allocates child labourers according to a comparative advantage principle, which is determined by the marginal returns to child labour $\partial f_i / \partial CL_{ij}$ For example, when a child labourer can earn more in a non-farm activity than his activity on the farm, the household allocates him/her to the non-farm employment even if the absolute level of his/her marginal contribution to farm activity is higher than those of other children in the household. This study seeks to empirically estimate the actual shape of $\partial f_i / \partial CL_{ij}$.

Since the aim of this study is to determine the relative contribution of child labour to farm and non-farm income, the estimation has to be done simultaneously and this calls for two separate models that are seemingly unrelated but are related by errors (Zellner, 1962).

The Seemingly Unrelated Regression Model

The seemingly unrelated regression (SUR) system by Zellner (1962) involves several individual relationships that are linked by the fact that their disturbances are correlated. In the case of modelling the demand of a household for different commodities, the correlation emanates from several sources such as correlated shocks to household income which has the power of affecting all models simultaneously.The motivations for using SUR are gains from efficiency in estimation by combining information on different equations and the imposition and/or testing of restrictions that involve parameters in different equations (Moon & Perron, 2006). The coefficients of a particular variable (say child labour) can be compared after conducting a t-test for equality of coefficients (Cameron & Trivedi, 2010; Stata, 2013). Yahya, Adebayo, Jolayemi, Oyejola, and Sanni (2008) present the SUR model as depicted by a system of equations made up of m dependent variables, each containing n observations denoted by the vector $Y' = (y_1, y_{2,} \ldots, y_m)$ with associated distinct vector of explanatory variables $X_1, X_2, \ldots, X_m$ respectively. According to Cameron and Trivedi (2010), the error terms are assumed to have zero mean and to be independent across individuals and are homoscedastic.

The systems of equations can be written as that presented below.

$$\overbrace{\begin{pmatrix} y_1 \\ \vdots \\ y_m \end{pmatrix}}^{Y} = \overbrace{\begin{pmatrix} X_1 & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & X_m \end{pmatrix}}^{X} \overbrace{\begin{pmatrix} \beta_1 \\ \vdots \\ \beta_m \end{pmatrix}}^{\beta} + \overbrace{\begin{pmatrix} \varepsilon_1 \\ \vdots \\ \varepsilon_m \end{pmatrix}}^{\varepsilon} \qquad (5)$$

$$mn \times 1 \qquad mn \times \sum_i p_i \qquad \sum_i p_i \times 1 \qquad mn \times 1$$

And when stacked together, the whole system becomes

$$Y = X\beta + \varepsilon \qquad (6)$$

Estimating each of the equations separately by OLS may still yield consistent but inefficient estimates of the regression parameters. The inefficiency arises from the possible correlation between the errors in the separated equations $(\varepsilon_1, \varepsilon_2, \ldots, \varepsilon_m)$ which calls for the use of the SUR model that employs the Generalised Least Squares estimation (GLS). In the SUR estimation, the correlations among the errors in different equations are used to improve the

regression estimates. Also, the greater the correlation between these errors and the more significant the error term, the more efficient the SUR estimates. In special cases where the set of explanatory variables is the same in each equation, the efficiency gains in the SUR model disappear, as per the Krusal's 1968 theorem (Moon & Perron, 2006), and the SUR estimation reduces to OLS (Cameron & Trivedi, 2010). Another possible problem has to do with the presence of multicollinearity.

Recognising the effect of multicollinearity on the efficiency of SUR estimators and the non-existence of any solution or remedy on how to select covariates in SUR to avoid multicollinearity, Yahya et al. (2008) conducted a study to determine 'Tolerable Non-orthogonal Correlation Points' (TNCP) among the predictors at which the efficiency of SUR estimators will still be preserved. Three conclusions can be drawn from their study. (1) No matter the level of multicollinearity among covariates in a given SUR system of equations, related by error terms, the SUR estimator will still be efficient when the sample size is large (when $n \geq 500$). (2) If multicollinearity in any separate equation in a system of equations fall within the end-points of ± 0.2, SUR estimators will still be efficient. (3) SUR estimator is always better than the equation-by-equation method of OLS in estimating a system of equations, which are related by error terms.

Description of the Simulation Process

In doing the simulation, three separate SUR models were estimated. The first model (Model 1) was estimated without the number of hours these child labourers spend in school. The second model (Model 2) was estimated by the introduction of the number of hours the child labourers spend in school to see the upward or downward biasedness of the education variable and how it will influence the effect the child labour variable on the response variable. Finally, the third model (Model 3) was one with an inclusion of an interaction term for number of child labourers in each household and the number of hours they spend in school. The motive here was to derive the net effect (Cameron & Trivedi, 2010) of child labour on farm and non-farm income in the situation where parents have heeded to advice/policy and have sent their wards to school.

Empirical models

The potential challenge of "disappearance of efficiency gains" and "reduction of the SUR model to OLS" is avoided in this study by making sure $l\exp nfinp$ appears only in the non-farm model because it is a non-farm specific variable and also the $l\exp finp$ appears only in the farm model for a similar reason. Also, This VIF's were generated for all separate equations in this study to see whether they violate the multicollinearity assumption so that, when they do, we can proceed to check whether they fall within the end-points of ± 0.2.

SUR Model 1: Without Child's Hours Present at School

$$\left.\begin{aligned} Y_{Nfarm} &= \alpha_0 + \alpha_1 chdl_i + \alpha_2 age_i + \alpha_3 edu_i + \alpha_4 urb_i + \alpha_5 male_i + \alpha_6 acc_i + \alpha_7 l\exp nfinp_i + \alpha_8 reg_i + e_i \\ Y_{farm} &= \beta_0 + \beta_1 chdl_i + \beta_2 age_i + \beta_3 edu_i + \beta_4 urb_i + \beta_5 male_i + \beta_6 acc_i + \beta_7 l\exp finp_i + \beta_8 reg_i + \nu_i \end{aligned}\right\} (7)$$

SUR Model 2: With Child's Hours present at School

$$\left.\begin{aligned} Y_{Nonfarm} &= \lambda_0 + \lambda_1 chdl_i + \lambda_2 age_i + \lambda_3 edu_i + \lambda_4 urb_i + \lambda_5 male_i + \lambda_6 acc_i + \lambda_7 l\exp nfinp_i + \lambda_8 schrs_i \\ &\quad + \lambda_9 reg_i + \gamma_i \\ Y_{farm} &= \kappa_0 + \kappa_1 chdl_i + \kappa_2 age_i + \kappa_3 edu_i + \kappa_4 urb_i + \kappa_5 male_i + \kappa_6 acc_i + \kappa_7 l\exp finp_i + \kappa_8 schrs_i \\ &\quad + \kappa_9 reg_i + \eta_i \end{aligned}\right\} (8)$$

SUR Model 3: With Interaction of number of Child labourers and Hours Present at School

$$\left.\begin{aligned} Y_{Nonfarm} &= \phi_0 + \phi_1 chdl_i + \phi_2 age_i + \phi_3 edu_i + \phi_4 urb_i + \phi_5 male_i + \phi_6 acc_i + \phi_7 l\exp nfinp_i + \phi_9 schrs_i \\ &\quad + \phi_{10} chdlschrs_i + \phi_{11} reg_i + \tau_i \\ Y_{farm} &= \delta_0 + \delta_1 chdl_i + \delta_2 age_i + \delta_3 edu_i + \delta_4 urb_i + \delta_5 male_i + \delta_6 acc_i + \delta_7 l\exp finp_i + \delta_9 schrs_i \\ &\quad + \delta_{10} chdlschrs_i + \delta_{11} reg_i + \varepsilon_i \end{aligned}\right\} (9)$$

Table 1: Definition, Measurement and A' Priori Signs of Variables

Variables	Definition of the Variables A Priori Sign	A Priori Sign
Y_{Nfarm}	Log of gross household non-farm income	—
Y_{farm}	Log of gross household farm income	—
chdl	Number of child labourers in each household	Positive
age	Age of the household head	Positive
edu	A four-level categorical variable for the education of the head of the household (0=no education, 1=primary, 2=secondary, 3=post-secondary/tertiary)	Indeterminate
urb (location)	A dummy variable that captures the location of the household (1=urban, 0=rural)	Indeterminate
male (sex)	A dummy variable that captures the sex of the household head (0=male, 1=female)	Indeterminate
acc	A binary variable for ownership of account by the head of the household (1=owns account, 0=no account)	Positive
lexpnfinp	Log of total value/cost of investment in all non-farm inputs – e.g. technology	Positive
lexpfinp	Log of total value/cost of investment in all farm inputs – e.g. land & seeds	Positive
schrs	child hours present at school	Negative
chdlschrs	An interaction (moderation) of number of child labourers in each household and child hours present at school	Positive
Region	Categorical variable that captures regional effect	Indeterminate

Source: Authors' construct (2015)

Results and Discussion

The analysis is done (Table 2) on the child labour variable with reference to all the three models but Model 3 is the model of focus for the other covariates. The Breusch-Pagan test of independence for all the three models are significant at one percent, which indicates the existence of a correlation of the residuals in the non-farm and farm income models and that we reject the null hypothesis that this correlation is zero. The VIF's for the separate models in all the three models were less than ten (10) which indicates, by extension, that none of the SUR models suffered from multicollinearity. Apart from Model 1 that had the t-test for child labour being significant at 10 percent, the t-test for child labour in the other models were all significant at one percent which gives credence to the comparison of relative contributions of child labour. The t-test for the interaction term is also significant at one percent and allows for the derivation of the net-effect of child labour on the response variables.

All the three models indicated how child labourers contribute significantly to household income, whether farm or non-farm. This confirms the findings of Duryea et al. (2005) and Cockburn (2002). Model 1 shows that for every Gh₵1.00 a child labourer contributes to farm income, that child contributes Gh₵1.24 to non-farm income (β_1/α_1). This was when the education of the child (number of hours present at school) had not been factored into the model. After the education of the child labourer was introduced in Model 2, the gap between the relative contributions widened to a ratio of Gh₵1.00:Gh₵2.33 (κ_1/λ_1) for farm and non-farm income respectively. In Model 3, the relative contribution of child labour was moderated by the introduction of an interaction of Child labour and child education. This was done to know the relative contribution of a school-going child labourer as he/she spends more time in school (based on the derived net effect). After doing this, the gap narrowed slightly to a ratio of Gh₵1.00:Gh₵2.12 (see calculation in appendix) for farm and non-farm income respectively. This still shows that school-going child labourers in income-diversified homes contribute more to household non-farm income than they do for farm income. Several implications can be drawn from this.

First of all, after these child labourers spend time at school they do not go to the farm, but rather engage in non-farm economic activities for the household that yield returns. In Ghana and many other SSA countries, farming is done from morning till late afternoon when farmers are preparing to return to the household. Perhaps parents diversify their income portfolios having these children in mind based on returns from their services. Some children also go out of their way to engage in other jobs outside the home to add to household income. In this wise, it should also be pointed out that they are likely to be engaged in non-farm related activities because time after school makes it difficult to go working on any farm. The second reason is that most farms are very far from home and thus becomes a disincentive to ask a child to go to the farm after school. In this case, non-farm activities make parents non-altruistic towards children since they consider these children as assets in the income-diversification process. Again, child labour acts as a push factor when parents add on non-farm activities as a risk-coping strategy.

We can say that it seems policy regarding the moving of child labourers from farms by educating them is having an impact but this child labour education policy may have a paradoxical effect as it can end up pushing these child labourers into non-farm related activities.

An increase in age of the household head by a year reduces non-farm income (at 1%) but increases farm income at a 10 percent alpha level. With regard to education, higher levels of education are related to higher non-farm income levels but when it comes to farm income, those with higher levels of education rather had lower income. This is because farming activities in Ghana are dominated by people with lower levels of education (ISSER, 2012). Those in the urban locations experienced non-farm income levels that were Gh₵0.2457 higher than their rural counterparts while urban household realised farm incomes that were Gh₵0.2269 lower than that of their rural counterparts. This is also not surprising because farming has predominantly been a rural phenomenon in Ghana and SSA at large. Male-headed households realized incomes that were 0.24 more that female headed households, confirming Aikaeli's (2010) finding. Household heads that own account earn non-farm incomes of 0.35 more than those without accounts at one percent alpha level but account ownership was not significant in explaining household farm income.

A percentage change in the cost of non-farm inputs also increase non-farm incomes by 40 percent at an alpha level of one percent. A percentage change in the cost of farm inputs also increases farm incomes by 47 percent at an alpha level of one percent. This is because investing in key inputs increase productivity and hence increase income (Martinez, 2004). With regard to the regional dummies, all other regions made lower non-farm incomes compared to households in the Western Region. For the regional dummies and farm income, all households in other regions earned lesser incomes than those in the Western region. This is expected because agriculture (from cocoa, timber to palm) thrives very well in the Western Region of Ghana.

Conclusion and Recommendation

This paper aimed at estimating the relative contribution of child labour to household farm and non-farm income and to ascertain whether ILO's policy prescription of educating children has the potency of eliminating child labour – calling for a simulation with child education. The findings confirmed that child labourers contribute significantly to household income, whether farm or non-farm (Duryea et al., 2005; Cockburn, 2002). Specifically, as a child labourer spends more time in school, every Gh₵1.00 contributed to farm income is accompanied by a Gh₵2.12 contribution towards non-farm income. Without considering the education of the child labourer, the story is different as the relative contributing is in the ratio of Gh₵1.00:Gh₵1.24 for farm and

non-farm income respectively. Once parents find children's labour in non-farm activities as contributing more to the household total income, it is likely to serve as a push factor that will motivate parents to direct these children into engaging more in these activities (wholesale and retailing). This, then, means that any policy of educating children is effective in eliminating child labour in the agricultural sector, as recommended by the ILO, but has the paradoxical possibility of getting these child labourers into non-farm economic activities. The reason is that most of these non-farm jobs are done by children after school and over the weekends. One issue to also note is that spending more time in school is a necessary condition but, sufficiently, academic activities continue in the house and what time will these children have to continue academic life at home when they are busily working to earn a living?

The policy from this finding is that governments must provide adequate remuneration for workers and pay a good price for agricultural products so that households do not diversify their income portfolios, having children in mind. Also state agencies, including the ministry of education and international bodies like the ILO must work at providing a holistic child education policy that will seek to sensitise parents on the need to educate their children and desist from the act of asking children to combine school with work that may be deleterious to their current education and future livelihood as adults.

Table 2: SUR Model for Relative Contribution of Child Labour to Household Farm and Non-Farm Income

VARIABLES	Without Child's Hours Present at School		With Child's Hours present at School		With Interaction of Child labour and Hours Present at School	
	Log (gross non-farm income (Coefficients)	Log (gross Farm income (Coefficients)	Log (gross non-farm income (Coefficients)	Log (gross Farm income (Coefficients)	Log (gross non-farm income (Coefficients)	Log (gross Farm income (Coefficients)
Number of child labourers	0.0480*	0.0386*	0.1452***	0.0622**	0.6495***	0.5309***
	(0.0269)	(0.0231)	(0.0347)	(0.0297)	(0.1399)	(0.1186)
Age of household head	-0.0092***	0.0032	-0.0086***	0.0045*	-0.0086***	0.0045*
	(0.0028)	(0.0024)	(0.0029)	(0.0025)	(0.0029)	(0.0025)
Education of household head (Base=No education)						
Primary School	0.2034**	0.1775**	0.1260	0.1067	0.1129	0.0944
	(0.0938)	(0.0800)	(0.1001)	(0.0849)	(0.0997)	(0.0845)
Secondary School	0.2730**	-0.1172	0.2552**	-0.2179**	0.2457**	-0.2269**
	(0.1071)	(0.0914)	(0.1130)	(0.0958)	(0.1125)	(0.0953)
Post-Sec and Tertiary	0.3669*	-0.1771	0.2169	-0.2945*	0.1963	-0.3136*
	(0.1875)	(0.1593)	(0.1992)	(0.1681)	(0.1984)	(0.1673)
Urban (1=urban, 0=rural))	0.1104	-0.5521***	0.2440***	-0.4766***	0.2307**	-0.4890***
	(0.0849)	(0.0722)	(0.0937)	(0.0794)	(0.0933)	(0.0791)
Male (1=male, 0=female)	0.1414	0.4709***	0.1791*	0.5536***	0.1599	0.5361***
	(0.0938)	(0.0824)	(0.0987)	(0.0865)	(0.0984)	(0.0861)
Account ownership	0.3624***	0.0722	0.3568***	0.0402	0.3549***	0.0387
	(0.0781)	(0.0674)	(0.0809)	(0.0697)	(0.0806)	(0.0693)
Log(total value/cost of investment in all non-farm inputs – e.g. technology)	0.3739***	—	0.3995***	—	0.3997***	—
	(0.0221)	—	(0.0241)	—	(0.0240)	—
Log(total value/cost of investment in all farm inputs - land & seeds)	—	0.4822***	—	0.4754***	—	0.4749***
	—	(0.0232)	—	(0.0245)	—	(0.0244)
Log(child weekly hours present at school)	—	—	-0.1914***	0.0156	0.1120	0.2976***
	—	—	(0.0516)	(0.0438)	(0.0964)	(0.0816)
Child labourers X child hours at school	—	—	—	—	-0.1139***	-0.1058***
	—	—	—	—	(0.0306)	(0.0259)

Region(Base=Western)						
Central	-1.0834***	-0.0328	-1.2351***	-0.0819	-1.2400***	-0.0870
	(0.2140)	(0.1845)	(0.2195)	(0.1881)	(0.2185)	(0.1871)
Greater Accra	-0.6314***	-0.6660***	-0.8107***	-0.6855***	-0.8026***	-0.6778***
	(0.2339)	(0.1955)	(0.2471)	(0.2047)	(0.2460)	(0.2036)
Volta	-0.5602***	-0.5560***	-0.6694***	-0.4749***	-0.6360***	-0.4436***
	(0.1438)	(0.1220)	(0.1530)	(0.1295)	(0.1526)	(0.1290)
Eastern	-0.7882***	-0.2942**	-1.0139***	-0.2937**	-0.9834***	-0.2653**
	(0.1392)	(0.1166)	(0.1468)	(0.1214)	(0.1463)	(0.1209)
Ashanti	0.0751	-0.5687***	-0.0670	-0.5918***	-0.0539	-0.5797***
	(0.1436)	(0.1225)	(0.1501)	(0.1270)	(0.1494)	(0.1264)
BrongAhafo	-0.1613	-0.0411	-0.2823*	-0.0940	-0.2803*	-0.0921
	(0.1474)	(0.1256)	(0.1521)	(0.1288)	(0.1514)	(0.1281)
Northern	-0.3848**	-0.2896**	-0.5035***	-0.4018***	-0.4440***	-0.3464**
	(0.1526)	(0.1299)	(0.1635)	(0.1383)	(0.1635)	(0.1382)
Upper East	-0.4483**	-0.6390***	-0.5522***	-0.6222***	-0.5566***	-0.6265***
	(0.1928)	(0.1641)	(0.2039)	(0.1728)	(0.2029)	(0.1718)
Upper West	-0.2819	-0.9982***	-0.4986**	-1.0938***	-0.5945***	-1.1827***
	(0.1860)	(0.1584)	(0.2003)	(0.1696)	(0.2011)	(0.1701)
Constant	0.8586***	4.4509***	1.4786***	4.3332***	0.1989	3.1470***
	(0.2227)	(0.2308)	(0.3155)	(0.3013)	(0.4658)	(0.4164)
Observations	1,658	1,658	1,506	1,506	1,506	1,506
R-squared	0.2307	0.3496	0.2388	0.3524	0.2457	0.3595
VIF	1.62	1.64	1.61	1.64	4.76	4.70
Breusch-Pagan test (independence of errors)	[chi2(1) =10.203Pr = 0.0014]		[chi2(1) =9.899 Pr = 0.0017]		[chi2(1) =7.805 Pr=0.0052]	
Paired t-test of child Labour	[chi2(2)=5.56 Pr =0.0621]		[chi2(2)= 20.62Pr =0.0000]		[chi2(2) =38.82 Pr=0.000]	
Paired t-test of Child labourers X child hours at school					[chi2(2) =28.47Pr=0.000]	
Standard errors in parentheses						

*** p<0.01, ** p<0.05, * p<0.1

Source: Authors' computation using GLSS6 data

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Appendix

Table 3. Descriptive Statistics of Variables used in Estimating the Relative Contribution of Child Labour to Household Farm and Non-Farm Income

Variables	Observations	Mean	Std. Dev.	Min	Max
gross non-farm income	1,056	17.1775	98.4213	0.013	2,963.2
gross non-farm income	1,056	5,656.56	23,307.6	2.43333	472,380
Number of child labourers	1,056	2.39476	1.3088	1	7
Age of household head	1,056	48.775	13.0225	21	90
Total value/cost of investment in all non-farm inputs - technology)	1,056	57.6731	213.41	0.04	2,931.59
Total value/cost of investment in all farm inputs - land & seeds)	1,056	3,041.86	40,745.5	0.66667	925,600
child weekly hours present at school	1,056	4.3123	0.8716	0	6.3869
Child labourers X child hours at school	1,056	10.8249	6.8420	0	38.3213
Education of household head (Base=No education)					
Primary School	1,056	—	—	0	1
Secondary School	1,056	—	—	0	1
Post-Sec and Tertiary	1,056	—	—	0	1
Urban (1=urban, 0=rural))	1,056	—	—	0	1
Male (1=male, 0=female)	1,056	—	—	0	1
Account ownership (1=account, 0=no account)	1,056	—	—	0	1
Region(Base=Western)					
Central	1,056	—	—	0	1
Greater Accra	1,056	—	—	0	1
Volta	1,056	—	—	0	1
Eastern	1,056	—	—	0	1
Ashanti	1,056	—	—	0	1
BrongAhafo	1,056	—	—	0	1
Northern	1,056	—	—	0	1
Upper East	1,056	—	—	0	1
Upper West	1,056	—	—	0	1

Source: Authors' computation using GLSS6 data

Net effect of child labour on farm and Non-farm income

$$\text{Net effect of child labour} = \frac{\delta_1 + \delta_{10} schrs}{\phi_1 + \phi_{10} schrs}$$

$$\frac{0.5309 - 0.1058 * 4.3123}{0.6495 - 0.1139 * 4.3123} = \frac{1}{2.12}$$