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## Entrepreneurship and human capital development in children

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**Abstract:** This paper explores the link between entrepreneurship and child human capital development. We specifically examine how operating a non-farm enterprise (NFE) as opposed to working in agriculture relates to child labour and schooling outcomes. Accounting for time-invariant unobservable characteristics in an estimation with individual fixed effects, we find a negative correlation between NFE ownership and child labour, especially in households with relatively higher levels of consumption expenditure. We find differentiated impacts by child gender and the type of enterprise: a lower incidence of child labour for boys and NFEs without employees and a lower incidence of child labour for girls and NFEs that hire at least one employee. Father-owned NFEs correlate negatively with child labour for boys, both at the extensive and at the intensive margin, and positively with a higher likelihood for school attendance for girls. Given these findings, it appears that household entrepreneurship may contribute to decreasing the severe child labour problem in Tanzania, but resolving the problem of low school attendance rates will require a different strategy.

**Keywords:** non-farm, enterprise, child labour, schooling, Tanzania

**JEL classification:** M21, I25, J20, J24, J46

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## 1 Introduction

In Tanzania, during the past 10 years, the share of the labour force working in agriculture has declined, whereas the share of the labour force working in wage jobs has increased (World Bank 2016). The implications of this transformation are substantial for several dimensions of the economy and society. Despite progress in economic development, the inefficient schooling system and child labour in Tanzania are recurrent themes. After peaking at 109 per cent in 2008, the gross enrolment ratio in primary school has declined to 87 per cent in 2013 (UNESCO 2016). The gross enrolment ratio for secondary school has declined to only 31 per cent in 2016 from 37 per cent in 2012 (Ministry of Education and Vocational Training 2016). Every third child in Tanzania is affected by child labour, according to the Tanzania National Child Labour Survey from 2014 (ILO and TNBS 2016). Children in Tanzania mainly work in agriculture, but cases of child labour have also been reported in mining, quarrying, fishing, and domestic work. The advancement in efforts to eliminate the worst forms of child labour is characterized as minimal (USDL 2016).

Child labour depends on the level of activity of the labour market and economy (Duryea and Arends-Kuenning 2003). Here, we focus on one particular aspect of the economy: the establishment of non-farm enterprises (NFEs) by households or individuals previously employed in agriculture, and investigate how this affects child labour and schooling outcomes in Tanzania. This allows us to make a relevant contribution to the policy debate on how to address child labour in the course of structural transformation.

It is not straightforward to predict the impact of NFE ownership on children. When parents shift from agriculture to operating an NFE, their profit and output are likely to change, which will either increase or decrease the total amount of resources in the household, and thereby alter the consumption decisions. As education of children can be considered a normal good, increasing income will lead to better school outcomes of children (Orazem and King 2007). Shifting to a new occupation may also alter the expectations about returns to education. Considering child education to be an investment, the parents and the child should only be interested in the expected return. Assuming that small-scale farmers less likely apply the skills acquired during school than NFE owners, the expected return to education is expected to increase upon establishing an NFE. This could improve child school outcomes and make children work less (Jensen 2010). Instead, opportunity costs of having children in school may vary depending on the occupation of the parents. Given a high degree of underemployment in the agricultural sector (Golub and Hayat 2014), it is likely that the opportunity cost of having children in school is lower when parents work in agriculture. This could lead to worse child school outcomes when parents establish an NFE.

Child labour in Tanzania has been previously studied in relation to economic and health shocks (Alam 2015; Bandara et al. 2015; Beegle et al. 2006). We depart from the earlier literature by focusing on the link between entrepreneurship and human capital development. This area of research has so far received very little empirical evidence, despite the recognized importance of entrepreneurship in economic development. Our main contribution to the literature is to distinguish the effect of operating an NFE from work in agriculture. Earlier studies have investigated the relationship between self-employment and child education without distinguishing between farm and non-farm self-employment. In one set of studies, the comparison group consists of the unemployed (Parikh and Sadoulet 2005; Qureshi et al. 2014); in another, the comparison group consists of all occupations, including for example wage work in the public or private sector (Canagarajah and Coulombe 1997). Edmonds (2005) has studied child labour in relation to economic transition in Vietnam, investigating, among other issues, the relationship between child

labour and establishing an NFE. We supplement the earlier findings with the first evidence on the relationship between NFE ownership and child outcomes from an African economy.

This paper uses three rounds of the National Panel Survey of the Tanzanian National Bureau of Statistics (TNBS), with information on household, individual, and community characteristics collected every 2 years since 2009. The sample is nationally representative, including households from both urban and rural areas as well as mainland Tanzania and Zanzibar.

We show descriptive evidence of lower prevalence of child labour and higher prevalence of school attendance among the households that operate an NFE. Accounting for time-invariant unobservable characteristics in an estimation with household fixed effects, we find a negative correlation between NFE ownership and child labour in households with relatively higher levels of consumption expenditure. We also find differentiated impacts by child gender and the type of enterprise: a lower incidence of child labour for boys and NFEs without employees and a lower incidence of child labour for girls and NFEs that hire at least one employee. Further, we find a negative effect of father-owned NFE on child labour for boys, both at the extensive and at the intensive margin, and a positive effect of father-owned NFE on an increased likelihood for school attendance for girls. By increasing wealth, household entrepreneurship may improve the severe child labour problem in Tanzania, but resolving the problem of low school attendance rates calls for a different strategy.

The rest of the paper is structured as follows. Section 2 presents the main theoretical and empirical findings on child labour. Section 3 describes the data. Section 4 presents the estimation strategy. Section 5 presents the results, and Section 6 concludes.

## **2 Literature review**

### **2.1 Theoretical considerations**

Various theories of child labour, school attendance, and school performance have been proposed and tested. The theories on child labour and school attendance are closely related because they are usually understood as substitutes. Theoretical considerations on school performance are to a large extent rooted in psychological and pedagogical research.

Two central micro-level theories on why children work are the poverty hypothesis and the socialization theory (Togunde and Carter 2006). The poverty hypothesis states that children enter the labour market when household income is too low. As such, child labour is a survival strategy, which could be avoided if the parents generated enough money for the family to meet the basic requirements of living. Compared with purchase of food and shelter, sending children to school is considered a luxury good, and children will not be sent to school as long as the family cannot buy the most basic products for living. At an aggregated level, Basu and Van (1998) present a model explaining when child labour will emerge and become an equilibrium. The income of the parents is at the centre of the hypothesis, arguing that when parents cannot earn a high enough income then children will enter the labour market and put further pressure on adult wages.

The poverty hypothesis, however, has been challenged by the socialization theory. This theory argues that child labour is also determined by household culture and characteristics of the child's social network, which is mostly influenced by the parents. These characteristics include parents' attitude towards education, expectations on returns from schooling, location of residence, and employment status of parents. Kohn (1977) argues that parent characteristics, like beliefs and social

values, influence the way children are raised. The differences in how to raise a child are defining for how the child will develop and, ultimately, how the child will perform in school and life. This theory is backed by studies arguing that parental involvement in children, parental beliefs on how best to educate students, good manners, independence, and respect are determinants for school performance of children (Brody and Stoneman 1992; Hoover-Dempsey and Sandler 1997; Okagaki and Sternberg 1993).

Both the poverty hypothesis (Bhalotra 2007; Blunch and Verner 2001; Edmonds 2005; Edmonds and Schady 2012; Jensen and Nielsen 1997; Lopez-Calva 2001) and the socialization theory (Bass 2004; Canagarajah and Coulombe 1997; Dar et al. 2002; Kis-Katos 2012; Lopez-Calva 2001; Parikh and Sadoulet 2005; Qureshi et al. 2014) have received support in the literature. However, the two explained theories are not necessarily substitutes for each other as both could influence child labour and schooling.

The choice on whether to send a child to school or work can also be analysed theoretically in a simple household utility model, where the household receives utility from total consumption, leisure of the child and schooling of the child (Parikh and Sadoulet 2005). The cost of total consumption and direct educational costs must be lower or equal to the sum of parents' income and the income generated by the child. This model could motivate both the poverty hypothesis and the socialization theory as lower parent income in the model leads to less schooling and more work. Also, better work opportunities caused by parents operating an enterprise or negative parental attitude towards schooling compared with working will increase the probability of child labour.

## 2.2 Empirical evidence

The topic of education has for a long time been a popular research area due to its obvious importance in human capital accumulation. A search on Google Scholar gives more than a million hits when searching for articles that include 'Education' or 'School' or 'Schooling' in the title. Performing a similar search on Google Scholar restricting to articles that include 'Household business(es)' or 'Household enterprise(s)' reveals that this topic has become more popular in the current decade. The search provided 66 hits when restricting to the time interval 2010–15 and only 35 hits when restricting to the previous 6 years of 2004–09, which is similar to the time interval 1998–2003. In this paper, we wish to combine these two research areas and analyse the relationship between operating a household enterprise and children's school outcomes. Some research has already been accomplished on analysing this relationship. The results, however, seem to vary among the performed studies, likely due to how operation of a household business is defined and which alternatives are identified.

Qureshi et al. (2014) look at education and self-employment of parents, but they do not distinguish between farming and non-farming self-employment. Using a probit model with cross sectional data from Pakistan, they find that self-employment of parents increases the probability for children to be working compared with parents being unemployed, arguing that this is caused by avoidance of paying a wage to an outsider employee and a safe work and training opportunity for the child. At the same time, they also find that self-employment of parents—and especially the mother—increases the probability of children to be enrolled in school. Additionally, Qureshi et al. (2014) find that both human and physical capital of the parents are negatively correlated with children working and positively correlated with children being enrolled in school.

Instead of aggregating the agricultural and non-agricultural self-employed into an overall self-employment category, Parikh and Sadoulet (2005) consider the employment categories 'Agriculture', 'Employee', 'Employer', 'Self-employed', and 'Other/missing information', where all

the categories except agriculture are disaggregated by the sector the parents work in (industry, service, or commerce). With cross-sectional data on Brazilian children aged 10–13 years and applying a probit model, the authors find that children of parents working in agriculture are more likely to be working compared with children of unemployed parents. Children of self-employed parents outside agriculture are also found to be more likely to work compared with children of unemployed parents. However, the magnitude of coefficients tends to be smaller for children of self-employed compared with children of parents working in agriculture when only examining rural households. This at least indicates that in rural areas children of self-employed parents are *not* more likely to work than children of parents working in agriculture. When examining urban households, there is a tendency for the coefficients associated with children of self-employed parents to be larger than the coefficients associated with children of parents working in agriculture. This result is potentially caused by the fact that parents working in agriculture are not very likely to live in urban areas, thereby severely reducing the number of children of parents working in agriculture in the analysis of urban households. The results of Parikh and Sadoulet (2005) further show that education of parents is negatively and significantly correlated with the probability of child labour.

Other studies find that having self-employed parents outside agriculture is negatively correlated with children working and positively correlated with children going to school when the base category is all other children except for children of self-employed parents in agriculture (Canagarajah and Coulombe 1997). The same conclusion is reached by Edmonds and Turk (2002) who compared children from households that operate an NFE with children of agricultural households in Vietnam. However, when controlling for household fixed effects, Edmonds and Turk (2002) discover that creating a new household business is positively correlated with child labour. This result could indicate that unobserved heterogeneity is present or that the effect from operating a household enterprise differs depending on how old the enterprise is and how much experience the owner has.

### 3 Data

The paper uses the Living Standards Measurement Study—Integrated Surveys on Agriculture (LSMS-ISA) dataset from Tanzania, also known as the Tanzania National Panel Survey (TZNPS). The dataset used in the paper consists of three survey rounds conducted in 2008/2009, 2010/2011, and 2012/2013. The sample consists of around 20,000 individuals in around 3,000 households in each round and as it covers all regions and districts in Tanzania, including Zanzibar, it is representative at the national level. The surveys were conducted by TNBS. The participating households were interviewed over the period of 1 year, beginning in October the first year and ending in October the year after. Approximately two thirds of the sample is from rural areas and one third is urban. The data provide the opportunity of creating a household panel as households can be uniquely identified over the three different survey rounds. Out of a total 3,234 households in survey round 1, 3,074 were re-interviewed in survey round 2, and 2,902 were re-interviewed in both survey round 2 and survey round 3.<sup>1</sup>

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<sup>1</sup> This corresponds to attrition rates of 4.9 and 5.6 per cent between survey rounds 1 and 2 and survey rounds 2 and 3, respectively. Restricting to a sample that only includes households with a school-age child (aged 7–14 years), the attrition rate drops to 3.3 and 3.4 per cent between rounds 1 and 2 and rounds 2 and 3, respectively. The attrition households differ from non-attrition households by being wealthier, better educated, and more likely to operate an NFE. As the attrition rate for the sample we investigate is very low, we do not seek to account for sample selection.

We limit our sample to children of school age in all survey rounds. Table 1 presents three sample categories for the cross-section analysis and the fixed-effect regressions: (i) the number of children aged 5–14 years; (ii) the number of children aged 7–14 years; and (iii) the number of children aged 7–14 years who are enrolled in school. All samples are further restricted to children who are not on holiday at the time of the interview. In the panel, we require the children to be present in at least two consecutive survey rounds. The first sample category is used for the regressions explaining child labour and work hours, and it is motivated by the International Labour Organization Minimum Age Convention (No. 138) from 1973. This convention states that children below 12 years of age should not be working, and children between 12 and 14 years of age are only eligible for light work. The concept of ‘light work’ is further explained in paragraphs 33–35 of Resolution 2 in the 18th International Labour Conference of Labour Statisticians (ILO 2008). In paragraph 34, a threshold of 14 hours is stated as a cut-off point. Working fewer than 14 hours per week is therefore not considered child labour for children between 12 and 14 years of age, unless the work type is considered hazardous.<sup>2</sup> As we cannot distinguish between hazardous and non-hazardous work, this paper considers all children between the ages of 12 and 14 years who are working fewer than 14 hours a week to not being engaged in child labour. Work activity includes regular employment for a wage, household agricultural work, fetching water, or fetching firewood. The second sample category is used for the regression explaining school attendance, as it is compulsory for children to attend at least 7 years of primary education—starting at the age of 7 years. However, most students finish primary school 1 year later than they were supposed to, which is why we use the age of 14 years as the upper limit instead of 13 years. The third and final sample category is used for the regressions explaining work activity of students and time spent on homework. As information on time spent doing homework is only available for survey rounds 2 and 3, data from survey round 1 are not used in the regression explaining homework. Time spent on homework is winsorized at the top 1 per cent due to outliers that reported spending as much as 70 hours per week on homework. After censoring, the top 1 per cent is equivalent to 28 hours per week.

Table 1: Number of observations for different child categories

Sample	2008	2010	2012	Total
Category 1: Age 5–14 years	2,238	2,996	3,533	8,769
Boys	1,131	1,538	1,778	4,447
Girls	1,105	1,458	1,755	4,318
Category 2: Age 7–14 years	1,674	2,228	2,705	6,607
Boys	844	1,139	1,365	3,348
Girls	829	1,089	1,338	3,256
Category 3: Age 7–14 years (only children enrolled in school)	1,359	1,771	2,030	5,160
Boys	670	876	985	2,531
Girls	689	895	1,043	2,627
Non-farm enterprise (NFE) in category 1	387 (17.29%)	628 (20.96%)	663 (18.76%)	1,678 (19.13%)
Father's NFE	293 (13.09%)	427 (14.25%)	409 (11.57%)	1,129 (12.87%)
Mother's NFE	155 (6.93%)	294 (9.81%)	349 (9.87%)	798 (9.10%)
NFE with employees	69 (3.08%)	125 (4.17%)	85 (2.40%)	279 (3.18%)
NFE without employees	318 (14.21%)	503 (16.79%)	578 (16.35%)	1,399 (15.95%)

Source: Authors' compilation based on data from TZNSP.

As the paper examines children of parents with a household enterprise in comparison to children of parents employed in agriculture, children with a parent employed in a private sector wage job or in a governmental position have been excluded. Although not of any less importance, children living without any of their parents are also excluded. Further, a few of the explanatory variables

<sup>2</sup> Hazardous work includes work activities that expose children to physical, psychological, or sexual abuse, work underground, under water, and so on [see paragraph 20 in Resolution 2 in ILO (2008) for more].

are not available for every household, and, thus, those observations are excluded. These restrictions leave us with the sample sizes provided in Table 1. The gender composition of the sample is exceptionally balanced with only slightly fewer girls than boys in the age groups 5–14 and 7–14 years. The sample of school children, however, has a slightly larger number of girls than boys.

Table 2 provides an overview of the dependent and explanatory variables, together with the sample categories used in estimations. Additionally, Table 2 provides the means and standard deviations of the considered variables. Of main interest are the five dependent variables: child labour, hours spent working in a week, school attendance, and hours spent doing homework. Around 28 per cent of children aged 5–14 years are engaged in what is considered as child labour. The trend is mildly negative, with 28 per cent of children aged 5–14 years affected by child labour in the first survey round and 27 per cent in the latest. The prevalence of child labour in the sample is higher than the average for Sub-Saharan Africa, which equalled 22 per cent in 2012 (ILO 2013). On average, including those children who are not working at all, children between 5 and 14 years of age work 5 hours a week. There is, however, a substantial variation among children in the number of hours they work. Next, we see that for children going to school, every fifth student also spent time working last week—although it might have been for 1 hour only. The children attending school constitute the majority of children between 7 and 14 years of age as 78 per cent are attending school. However, the trend suggests a serious drop from 81 per cent in survey round 1 to 75 per cent in survey round 3. The weekly average time spent on homework is almost 2 hours.

The main explanatory variable is NFE ownership, where we distinguish two main categories: NFEs with employees and NFEs without employees. The key variable denotes NFE ownership by either parent. Around 19 per cent of children from the sample have a parent operating an NFE, which includes 3 per cent of households operating an enterprise with employees and 16 per cent of households operating an enterprise without employees. As suggested by data in Table 1, the overall NFE figure has increased from 17 per cent in survey round 1 to 21 per cent in survey round 2, followed by a drop to 19 per cent in survey round 3. Table 1 also shows that father-owned NFEs are more common than mother-owned NFEs. Notice that the sum of mother- and father-owned NFEs is larger than the total number of NFEs in the sample, which arises because in some households both the mother and the father could be working in the same NFE. The NFEs from the sample are mostly engaged in construction work, food service, retail, and transport.

The sample consists of slightly fewer girls than boys, with an average age of 9 years. The average household workforce, measured as the number of household members aged 18–64 years and not disabled, is around three. Around 14 per cent of households have received a loan in the past year or belong to a credit or savings group. The annual expenditures per adult equivalent household member are 524,000 Tanzanian shillings in real terms, normalized to 2010 values. Expenditures per capita have decreased slightly from survey round 1 in 2008–09 to survey round 3 in 2012–13, with a decrease in average expenditures of around 2 per cent. The asset index is based on a principal component analysis including information on number of rooms, housing materials and characteristics, and ownership of electronics. Over time, this variable has increased indicating that households have become wealthier.



Table 2: Summary statistics

Variables	Definition	Mean	SD	Minimum	Maximum	Observations
<b>Dependent</b>						
Child labour	Dummy: 1 if a child between 5 and 12 years worked in a wage job, household agricultural activity, fetching water or fetching firewood for at least 1 hour during the last week, or if a child between 12 and 14 worked in the same line of activities for at least 14 hours during the last week	0.280	0.449	0	1	8,765
Hours per week	Number of hours a child worked last week (considering children aged 5–14 years)	4.828	10.732	0	92	8,765
Attendance at school	Dummy: 1 if child goes to school (considering children aged 7–14 years)	0.782	0.413	0	1	6,604
Homework	Number of minutes the student spent on homework last week (considering children aged 7–14 years who are going to school and are not on holiday at the time of the interview). Winsorized at the top 1%.	106.6	240.9	0	1,680	3,799
<b>Explanatory</b>						
NFE	Dummy: 1 if a parent owns <i>and</i> is predominantly occupied with a non-farming household enterprise (NFE)	0.191	0.393	0	1	8,765
NFE with employees	Dummy: 1 if a parent owns <i>and</i> is predominantly occupied with a non-farming household enterprise (NFE) with employees	0.032	0.176	0	1	8,765
NFE without employees	Dummy: 1 if a parent owns <i>and</i> is predominantly occupied with a non-farming household enterprise (NFE) without employees	0.160	0.366	0	1	8,765
Child gender (male)	Dummy: 1 if a child is a boy	0.507	0.500	0	1	8,765
Child age	Age of the child	9.135	2.909	5	14	8,765
Household workforce	Number of household members aged 18–64 years and not disabled	2.850	1.800	0	23	8,765
Credit	Dummy: 1 if the household received a loan over the past 12 months or if a household member is part of a credit or savings group	0.138	0.345	0	1	8,765
Expenditures per capita (real)	Annual consumption per adult equivalent household member (in millions Tanzanian shillings)	0.524	0.393	0.032	5.951	8,765
Asset index	Asset index number based on principal-component factors	-1.025	2.145	-3.412	7.417	8,765
No school	Neither parent has any schooling	0.116	0.320	0	1	8,765
Some primary	At least one parent has some primary education	0.127	0.333	0	1	8,765
Completed primary	At least one parent has completed primary education	0.616	0.486	0	1	8,765
Some secondary	At least one parent has some secondary education	0.082	0.274	0	1	8,765
Completed secondary	At least one parent has completed secondary education	0.052	0.223	0	1	8,765
Higher education	At least one parent has higher education	0.008	0.088	0	1	8,765
Weather Shock	Dummy: 1 if the household has been hit by a weather shock in the past 2 years	0.153	0.360	0	1	8,765
Rural	Dummy: 1 if a child lives in rural area	0.820	0.384	0	1	8,765
Agricultural plot	Dummy: 1 if the household owns an agricultural plot	0.882	0.323	0	1	8,765
Distance to major road	Distance from household to major road in kilometres	22.2	24.8	0	135.4	8,765
Distance to town	Distance from household to town in kilometres	51.7	41.6	0	200	8,765

Notes: Summary statistics for explanatory variables are for the sample of children between 5 and 14 years. Expenditures per capita are in real terms with base year 2010.

Source: Authors' compilation based on data from TZNPS.

In terms of parents' education, we notice the highest prevalence of completed primary education (62 per cent). Around 15 per cent of households have been hit by a weather shock within the past 2 years. These shocks mainly hit between 2010 and 2012 in the central and northern regions of Tanzania, where most households were affected in the Shinyanga region and the Singida region. In addition, also a large share of households on Pemba Island was hit between 2010 and 2012. The share living in rural areas is 82 per cent, whereas 88 per cent of the households own an agricultural plot. In rural areas, the share of households owning an agricultural plot is 95 per cent, which highlights the importance of agriculture in rural Tanzania. Distance from household to major road is on average 22 km, whereas the distance to the nearest town nears 52 km.

Excluding the children who are present in only one survey round does not alter the means of the variables in any meaningful way. Appendix Table A1 provides the means and standard deviations of the variables *without* children who are only present in one survey round.

#### 4 Estimation strategy

This paper uses a linear model with child fixed effects to find the effect of NFE ownership on child labour and schooling outcomes. The estimations follow the specification in Equation (1):

$$y_{it} = \alpha_i + \beta_i NFE_{it} + \delta X_{it} + \rho_j + \omega_t + \tau_i + e_{ijt} \quad (1)$$

where subscripts  $i, j$ , and  $t$  denote individual, location and survey rounds, respectively.  $\alpha_i$ ,  $\rho_j$ , and  $\tau_i$  are, respectively, child, location, and time fixed effects. As some activities may be seasonal, we include month fixed effects,  $\omega_t$ , to control for seasonality.  $e_{ijt}$  is the statistical noise term.  $y_{it}$  represents the dependent variables: child labour, hours spent working in a week, school attendance, and hours spent doing homework. As the earlier literature shows significant differences in school and child labour outcomes between genders, we separately estimate outcomes for boys and girls.  $NFE_{it}$  stands for non-farm enterprise owned by either parent. We further measure the effect of NFE with and without employees, as well as the effect of NFE depending on whether it is owned by the child's father or mother. The outcomes of NFE ownership are primarily compared with households that mainly work in agriculture. To create a precise comparison group, we exclude children whose one parent operates an NFE while the other works for wage in the private or the public sector, as wage employment could have a different mechanism of impact on children compared with the NFE ownership. In addition, wage employment has previously been linked with a lower incidence of child labour (Kambhampati and Rajan 2005).

$X_{it}$  are time-varying child and household control variables, such as age, household workforce, and access to credit. We also include time-invariant characteristics such as gender, education of parents, and location. To control for differences in household wealth, we include ownership of agricultural land and household consumption expenditures. We also include asset index, which, as argued by Filmer and Pritchett (2001), proxies for household's long-run economic status.<sup>3</sup> Following Bandara et al. (2015), we also include parents' level of education as a proxy for parental income as parents' education is predetermined and highly unlikely to be simultaneously determined with child labour. Even if parents want to educate their children, adverse events such as income and non-income

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<sup>3</sup> The asset index consists of the following indicators: two-room house, four-room house; metal, grass, tiled, and other roof type; earth, cement, and other floor type; electricity access, toilet (no, latrine, and other type); water access (piped, public, open, and other water source); cook using gas, wood, paraffin, and other fuels; owning radio, fridge, television, phone, car, motorbike, bicycle, a watch, and livestock.

shocks may lead to child labour (Baland and Robinson 2000; Bandara et al. 2015; Beegle et al. 2006; Dillon 2013). That is why we control for adverse weather events that the household may have experienced in the past 5 years. As households in remote areas are less likely to participate in the non-agricultural sector (Abdulai and CroleRees 2001), we control for location (region and urban/rural) and infrastructure availability through two proxies: distance to the nearest market and town.

Including such a broad range of controls allows the reduction of potential omitted variable bias to the largest possible extent, while including region fixed effects allows controlling for all time-invariant unobservables at the region level that could be correlated with child outcomes and NFE ownership, such as differences in social norms with respect to child labour, infrastructure, and the availability of governmental and non-governmental entrepreneurship programmes or campaigns against child labour. The individual (child) fixed effects allow us to control for time-invariant characteristics, such as gender, child birth order effects, general health status, parental characteristics and preferences, and any other time-invariant unobserved heterogeneity that could bias the results. We cluster standard errors at the individual level, but the results with standards errors clustered at the household level are not very different.<sup>4</sup>

## 5 Results

This section is divided into four parts. First, we present descriptive evidence on the relationship between NFE ownership and child outcomes. Second, we show estimates of the determinants of NFE ownership in general, as well as the ownership of NFE with and without employees. Third, we show the results of an ordinary least square (OLS) model and a child fixed-effect model in which we regress child labour and schooling outcome variables on whether the parents of the children own an NFE. Fourth, we explore heterogeneous effects of NFE ownership by looking at different NFE types.

### 5.1 Descriptive evidence

We illustrate in Table 3 differences between households in terms of the key characteristics and child outcomes with respect to NFE ownership. The immediate message is that NFE and non-NFE households differ significantly with respect to both child outcomes and household characteristics. First, NFE households tend to have two times lower share of children engaged in child labour. Even if their children work, the amount of work in a week is five times lower than in non-NFE households. NFE households have an 18 per cent (14 percentage points) higher share of children enrolled in school. Children from these households spend twice as much time doing homework. Although these differences cannot be interpreted as impacts, they provide an indication of structural differences in child outcomes between NFE and non-NFE households.

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<sup>4</sup> We do not report these results, but they are available from the authors upon request.

Table 3: Differences in child outcomes and household characteristics by NFE ownership (*t*-test)

Variables	No NFE	NFE	Difference	<i>t</i> -value	Observations
(a) Unbalanced panel					
Child labour	0.312	0.141	0.171	14.20***	8,765
Hours per week	5.566	1.707	3.859	13.38***	8,765
Attendance at school	0.755	0.897	-0.141	-11.06***	6,607
Homework (minutes)	86.752	174.277	-87.525	-9.49***	3,801
Household workforce	2.824	2.962	-0.138	-2.82***	8,765
Agricultural plot	0.980	0.466	0.514	75.19***	8,765
Credit	0.122	0.203	-0.080	-8.62***	8,765
Expenditure per capita (real, million TZS)	0.449	0.842	-0.393	-39.96***	8,765
Asset index	-1.660	1.657	-3.317	-71.79***	8,765
Weather shock	0.172	0.069	0.103	10.65***	8,765
No school	0.133	0.044	0.089	10.33***	8,765
Some primary	0.139	0.073	0.067	7.41***	8,765
Completed primary	0.638	0.522	0.116	8.84***	8,765
Some secondary	0.057	0.186	-0.129	-17.64***	8,765
Completed secondary	0.030	0.147	-0.117	-19.82***	8,765
Higher education	0.003	0.029	-0.026	-10.90***	8,765
Rural	0.913	0.426	0.487	53.91***	8,765
Distance to major road	25.100	9.889	15.212	23.32***	8,765
Distance to town	58.695	22.096	36.599	34.60***	8,765
(b) Balanced panel					
Child labour	0.335	0.170	0.165	10.05***	5,712
Hours per week	5.631	1.804	3.827	9.99***	5,712
Attendance at school	0.777	0.925	-0.148	-8.74***	4,050
Homework (minutes)	99.547	200.278	-100.731	-7.64***	2,253
Household workforce	2.787	2.946	-0.159	-2.45***	5,712
Agricultural plot	0.982	0.514	0.468	55.54***	5,712
Credit	0.117	0.207	-0.090	-7.43***	5,712
Expenditure per capita (real, million TZS)	0.443	0.810	-0.367	-31.50***	5,712
Asset index	-1.699	1.539	-3.237	-54.23***	5,712
Weather shock	0.165	0.066	0.099	7.75***	5,712
No school	0.136	0.045	0.090	7.74***	5,712
Some primary	0.143	0.064	0.079	6.56***	5,712
Completed primary	0.635	0.541	0.094	5.40***	5,712
Some secondary	0.056	0.201	-0.145	-15.25***	5,712
Completed secondary	0.028	0.130	-0.102	-13.99***	5,712
Higher education	0.002	0.018	-0.016	-6.44***	5,712
Rural	0.916	0.478	0.438	37.70***	5,712
Distance to major road	26.234	10.961	15.273	17.04***	5,712
Distance to town	60.255	24.036	36.219	25.42***	5,712

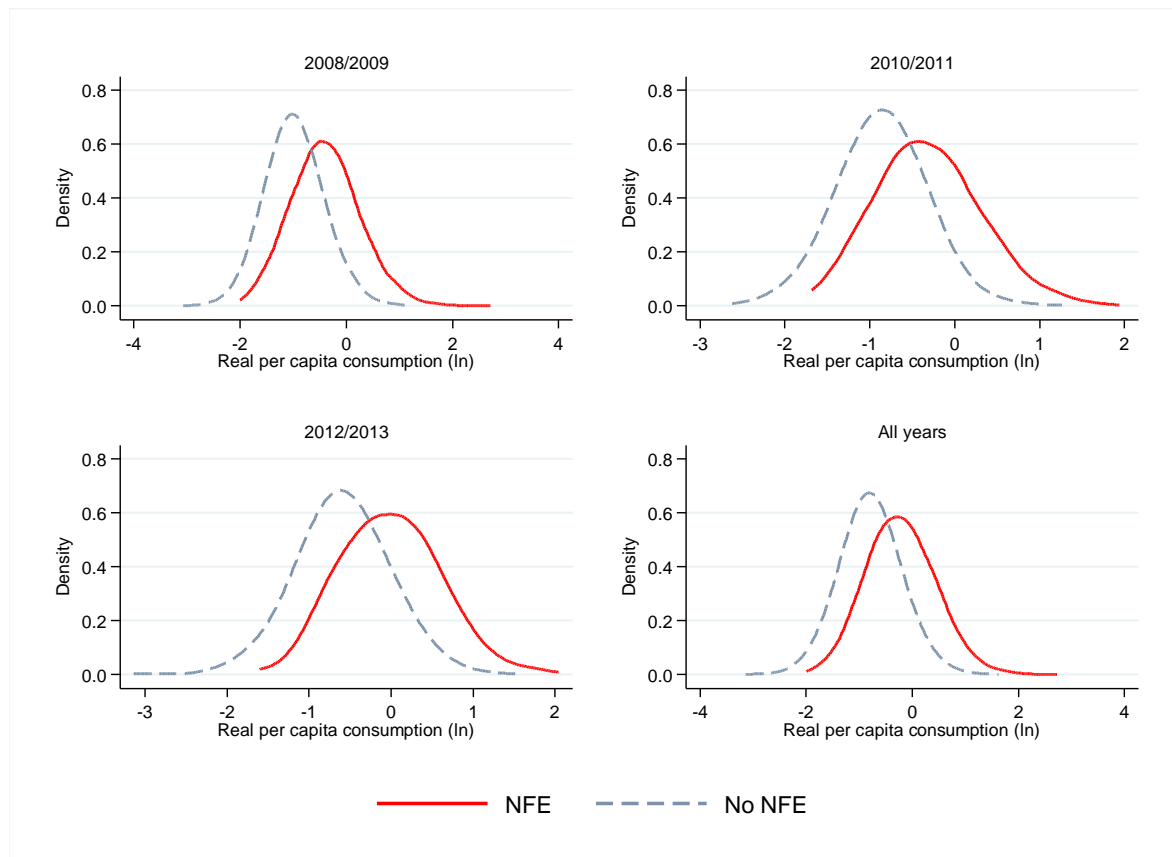
Notes: TZS, Tanzanian shilling. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

NFE and non-NFE households also differ with respect to available household workforce, with NFE households being slightly larger. The prevalence of credit use is significantly higher among households that own an NFE. These households also have on average larger value of consumption expenditure than non-NFE households (shown in Figure 1), and they also have on average larger value of the asset index (shown in Figure 2). The education level of NFE households tends to be higher in terms of both secondary and tertiary education. Only 6 per cent of non-NFE parents have completed secondary school, whereas less than 1 per cent have some tertiary education. Almost 3 per cent of parents in NFE households have higher education and 15 per cent have completed secondary education. It is more common for non-NFE households to own an agricultural plot than for NFE households. Households that own NFEs have had twice as low exposure to weather shocks as non-NFE households. This is connected with the fact that non-NFE households tend to be located in more remote rural areas. An average non-NFE household is located 25 km away from the nearest major road, whereas this distance averages at 10 km for an

average NFE household. Similarly, NFE households tend to be located much closer to the nearest population centre.

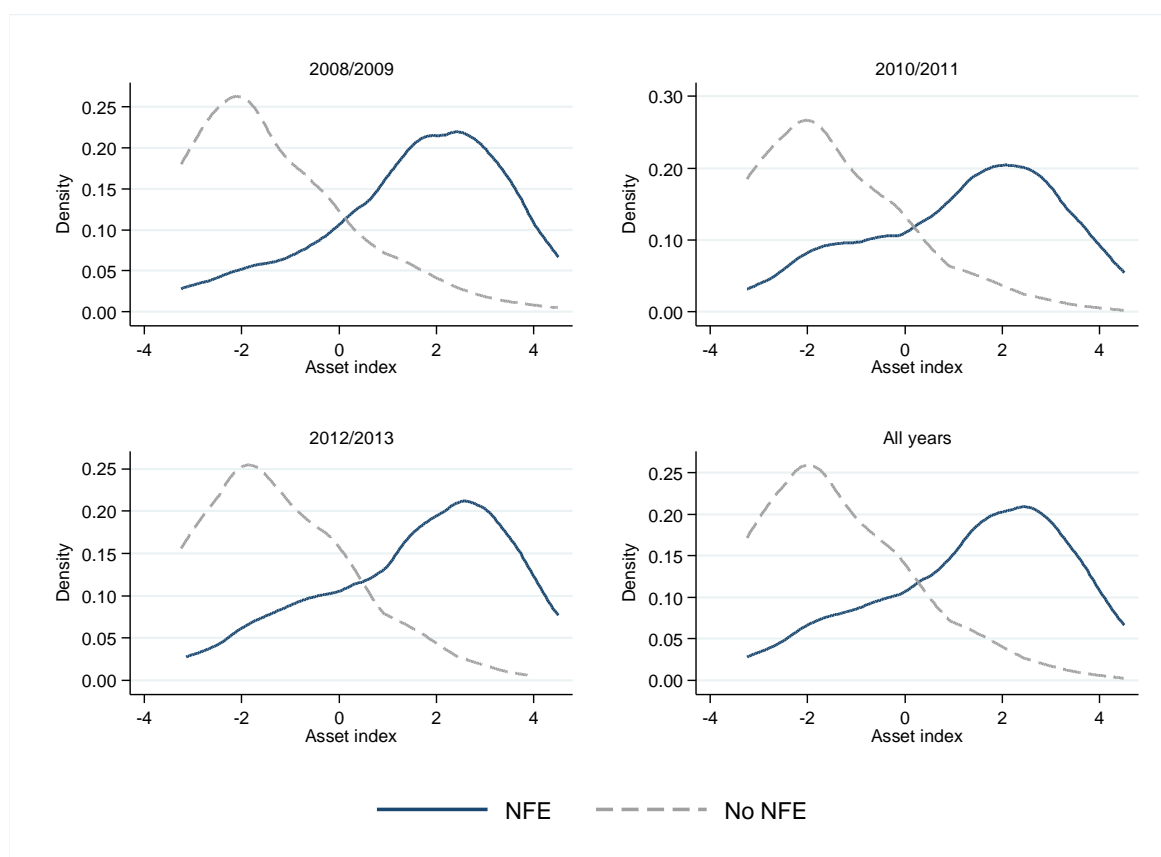
Figure 1: Per capita consumption and NFE ownership



Source: Authors' compilation based on data from TZNPS.

An unconditional comparison of NFE and non-NFE households in Appendix Table A2 shows that two survey rounds before establishing an NFE, these households were different from households that never established an NFE in terms of household characteristics, such as having higher rate of access to credit, higher asset ownership, higher rate of secondary education, and better infrastructure access. These differences become even more pronounced in the next period. This indicates that NFE and non-NFE households were likely starting from different socio-economic positions, which an efficient estimation needs to account for.

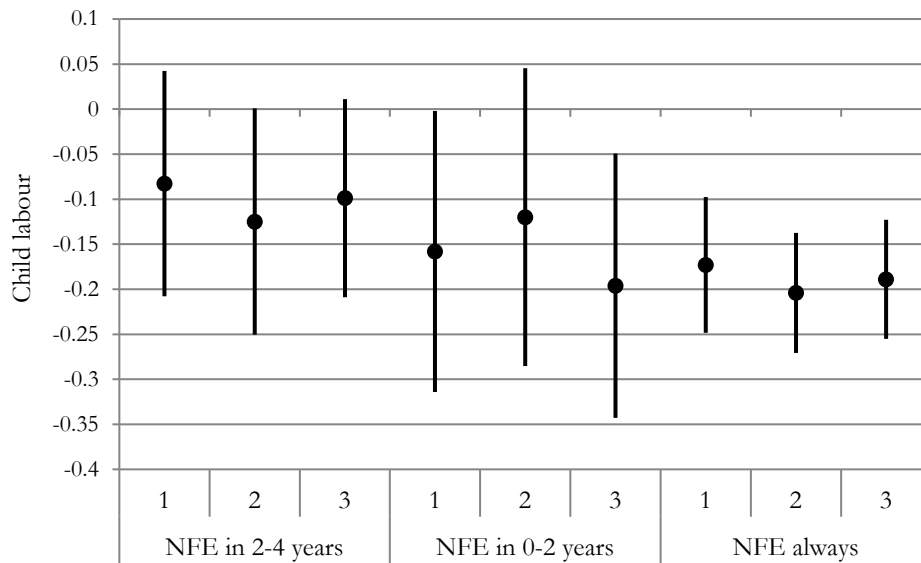
Figure 2: Asset index and NFE ownership



Source: Authors' compilation based on data from TZNPS.

Appendix Table A3 shows conditional differences between non-NFE and NFE households at the time before the NFE was established. Two periods before establishing an NFE, there were no statistically significant differences between the two types of households in terms of the incidence of child labour, hours spent in child labour, and school attendance. One period before establishing an NFE, the two types of households show differences only with respect to child labour, with the 'future' NFE households showing a lower incidence. These trends are illustrated in Figure 3, which further shows that after the parents establish an NFE, the children start working slightly more compared with the survey round before the parents have established an NFE. This is also evident for children who had no parent with an NFE in survey round 1, but have a parent with an NFE in survey rounds 2 and 3. We notice that in survey round 1, these children are less engaged in child labour than the comparison group. In survey round 2, when at least one parent operates an NFE, the children are not less engaged in child labour compared with children with parents not operating an NFE in any survey round. After having operated the NFE for one survey round, however, the children become less engaged in child labour. Children of parents who are always operating an NFE are less engaged in child labour independent of the survey round, which is consistent with the information in Table 3.

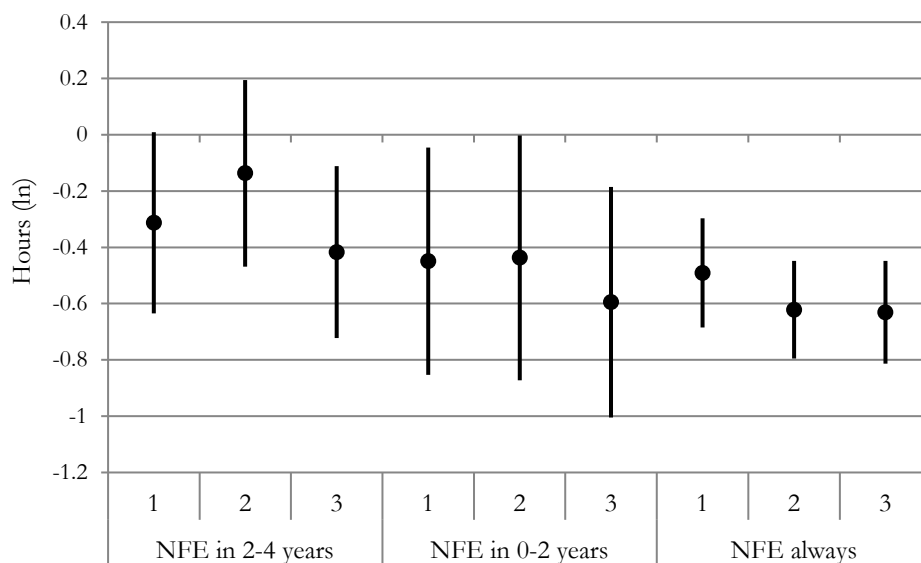
Figure 3: Child labour and NFE ownership



Source: Authors' compilation based on data from TZNPS.

Figure 4 shows that with respect to hours worked per week, children who have parents with an NFE in survey round 3, but not before that, are working less than the comparison group in survey round 1. In survey round 2, however, we cannot say that they are working less than the comparison group. In survey round 3, there is a sharp decline in hours worked compared with the comparison group, which could be a result of parents now operating an NFE. For children of parents with an NFE in survey rounds 2 and 3, but not in survey round 1, we notice that they are working significantly less than the comparison group for all survey rounds. The log of hours worked per week is approximately 0.4 lower for these children relative to the comparison group in survey rounds 1 and 2. In survey round 3, one survey round after the start of NFE, the difference in log to hours worked per week increases to 0.6. For children of parents who have had an NFE in all periods, we see again that they are working less than the comparison group, consistent with Table 3.

Figure 4: Hours spent on child labour per week and NFE ownership



Source: Authors' compilation based on data from TZNPS.

## 5.2 Determinants of NFE ownership

While there is no single widely accepted theory of entrepreneurship, a number of institutional, social, and individual variables have been identified to positively affect entrepreneurial activities, such as credit access, wealth, and human capital (Banerjee and Duflo 2007; Calderon et al. 2016; Djankov et al. 2005; Ghani et al. 2013). Table 4 presents the average marginal effects from a binary probit model and the regression results from the linear probability model and the household fixed-effect model.

Table 4: Determinants of owning a non-farm enterprise (NFE)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Any NFE			NFE with employees			NFE without employees		
Household workforce	-0.005 (0.004)	-0.005* (0.003)	0.002 (0.006)	-0.003 (0.002)	-0.001 (0.002)	-0.002 (0.006)	-0.003 (0.003)	-0.003 (0.002)	0.004 (0.008)
Agricultural plot	-0.210 *** (0.016)	-0.369** * (0.031)	-0.161** * (0.051)	-0.012 (0.009)	-0.045** (0.023)	-0.031 (0.038)	-0.184** * (0.015)	-0.323** * (0.034)	-0.130** (0.054)
Credit	0.015 (0.014)	0.014 (0.016)	-0.004 (0.019)	-0.009 (0.008)	0.004 (0.010)	0.026 (0.017)	0.024 (0.015)	0.010 (0.018)	-0.030 (0.025)
Expenditures (ln)	0.020* (0.011)	0.048*** (0.010)	0.030** (0.013)	0.022*** (0.008)	0.018*** (0.005)	0.023** * (0.009)	0.002 (0.011)	0.030*** (0.010)	0.007 (0.014)
Asset index	0.021** * (0.004)	0.041*** (0.005)	0.017** (0.008)	0.010*** (0.002)	0.012*** (0.003)	0.003 (0.008)	0.014*** (0.004)	0.029*** (0.005)	0.014 (0.011)
Weather shock	0.000 (0.015)	-0.026** (0.012)	-0.042** * (0.016)	-0.041** * (0.015)	-0.011** * (0.003)	-0.011* (0.006)	0.008 (0.016)	-0.016 (0.012)	-0.030* (0.016)
Rural	-0.070 *** (0.014)	-0.142** * (0.023)		-0.040** * (0.011)	-0.014 (0.014)		-0.062** * (0.015)	-0.128** * (0.024)	
Some primary school	-0.026 (0.016)	0.010 (0.016)		-0.017 (0.012)	0.000 (0.006)		-0.011 (0.017)	0.010 (0.016)	
Completed primary school	0.032** (0.016)	0.009 (0.014)		0.015 (0.013)	0.001 (0.006)		0.032** (0.015)	0.008 (0.014)	
Some secondary school	0.056** (0.026)	0.052* (0.029)		0.023 (0.019)	0.017 (0.018)		0.035 (0.024)	0.035 (0.028)	
Completed secondary school	-0.030 (0.024)	-0.011 (0.034)		-0.001 (0.013)	0.005 (0.022)		-0.015 (0.023)	-0.017 (0.032)	
Higher education	0.021 (0.045)	0.052 (0.070)		0.024 (0.027)	0.131* (0.073)		-0.015 (0.038)	-0.079 (0.096)	
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Distance to major road	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Distance to town	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. observations	6,932	8,765	5,852	5,841	8,765	5,852	6,932	8,765	5,852
Adjusted $R^2$		0.55	0.04		0.13	0.02		0.41	0.02
Pseudo $R^2$	0.54			0.34			0.43		

Notes: Columns (1), (4), and (7) show marginal effects after bivariate probit. Columns (2), (5), and (8) show OLS estimates. Columns (3), (6), and (9) show estimates with household fixed effects. No education is the base category. Standard errors clustered at the household level are in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.



The results show that the likelihood of NFE ownership declines with agricultural plot ownership and increases with household consumption expenditures, asset index, and education level of the NFE owner, which is in line with earlier studies (Djankov et al. 2005; van der Sluis et al. 2005). This indicates that wealthier households are more likely to own an NFE and reiterates that it is necessary to control for several aspects of household well-being in estimating the effects of NFE ownership. Having experienced a weather shock decreases the likelihood of establishing an NFE, as adverse weather events are likely to exacerbate liquidity constraints. NFE ownership is less prevalent in rural areas, which is in line with earlier studies (Abdulai and CroleRees 2001). The results follow the same pattern for both NFEs with and without employees. Overall, the OLS estimates are similar to the average marginal effects from the binary probit model, which motivates us to proceed with a fixed-effect regression to take account of potential unobserved heterogeneity.

### 5.3 Impact of NFE on child labour and schooling outcomes

Table 5 presents the regression results of the pooled OLS model in odd columns and of the fixed-effect estimations in even columns.

Table 5: Impact of entrepreneurship on child labour and schooling outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child labour		Attend school		Hours worked (ln)		Homework	
NFE	-0.043** (0.019)	0.011 (0.040)	-0.146*** (0.053)	-0.016 (0.111)	0.012 (0.019)	0.006 (0.030)	0.300 (0.193)	0.104 (0.461)
Household workforce	-0.010*** (0.003)	0.001 (0.013)	-0.017* (0.010)	0.001 (0.035)	-0.002 (0.003)	0.007 (0.009)	-0.012 (0.024)	0.108 (0.148)
Agricultural plot	0.050** (0.023)	0.103 (0.064)	0.120** (0.058)	0.239 (0.178)	0.039* (0.021)	-0.000 (0.039)	0.123 (0.207)	-0.163 (0.657)
Credit	0.016 (0.016)	0.039 (0.031)	0.051 (0.042)	0.140* (0.074)	0.008 (0.015)	0.004 (0.021)	0.017 (0.143)	-0.067 (0.312)
Expenditures (ln)	0.048*** (0.012)	0.070*** (0.022)	0.156*** (0.033)	0.258*** (0.059)	0.033** (0.013)	-0.018 (0.019)	0.310*** (0.101)	-0.109 (0.218)
Asset index	-0.004 (0.016)	-0.010 (0.025)	0.032 (0.045)	-0.004 (0.064)	-0.009 (0.016)	0.027 (0.021)	0.177 (0.136)	0.340 (0.254)
Weather shock	0.034* (0.018)		0.097** (0.048)		0.004 (0.016)		-0.099 (0.158)	
Rural	0.252*** (0.011)		0.217*** (0.027)		0.331*** (0.041)		-0.086 (0.158)	
Chid age	-0.012*** (0.001)		-0.003** (0.001)		-0.015*** (0.002)		0.019** (0.008)	
Chid age <sup>2</sup>	-0.012*** (0.001)		-0.003** (0.001)		-0.015*** (0.002)		0.019** (0.008)	
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent education	Yes	Yes	Yes	Yes	No	No	No	No
Distance to major road	Yes	Yes	Yes	Yes	No	No	No	No
Distance to nearest town	Yes	Yes	Yes	Yes	No	No	No	No
Constant	-0.867*** (0.070)	0.346*** (0.080)	-0.737*** (0.177)	0.837*** (0.228)	-1.194*** (0.216)	0.725** * (0.058)	0.251 (0.915)	1.202 (0.971)
No. observations	8,765	5,852	8,765	5,852	6,604	4,134	3,799	2,252
No. clusters	2,316	1,338	2,316	1,338	2,045	1,119	1,621	894
Adjusted R <sup>2</sup>	0.14	0.01	0.24	0.03	0.16	0.00	0.18	0.02

Notes: OLS estimates on the unbalanced panel in odd columns. Fixed-effect estimates on the balanced panel in even columns. Homework is measured as (ln) hours spent doing homework per week. Entrepreneurship is compared with agriculture, mining, and fisheries. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ . Source: Authors' compilation based on data from TZNPS.

The results in column (1) show a negative correlation between contemporaneous NFE ownership and child labour, whereas column (3) shows a negative correlation with the number of hours a child has worked in a week. Combined, these results indicate that NFE could decrease child labour both at the extensive and at the intensive margin. Accounting for time-invariant household characteristics preserves the direction of the relationship, but the size of coefficients is not significantly different from zero. The non-significant results in the fixed-effect estimations could come from accounting for unobserved heterogeneity, but also from too few households changing occupation in the short period we observe. Another explanation could be that the type of income-generating activity is secondary to fundamental characteristics of the parents, such as beliefs and social values, which influence the way of raising children (e.g. see Kohn 1977). There is no significant correlation between owning an NFE and school attendance, as shown in columns (5) and (6). Similarly, the correlation between the number of hours spent doing homework and NFE ownership is not significant, as shown in columns (7) and (8).

In terms of the control variables, we find that household expenditure correlates positively with child labour and working hours. The earlier literature explains that this may arise due to differential effects of pure income changes and substitution (Soares et al. 2012). Positive changes in full household income are expected to increase the demand for schooling and reduce child labour (Bourguignon et al. 2003; Cardoso and de Souza 2009; Edmonds 2005), whereas the substitution effect due to, for example, short-term fluctuations in wages, income, or economic growth can increase the opportunity cost of children's time and lead to increased child labour (Duryea and Arends-Kuenning 2003; Kruger, 2007; Rogers and Swinnerton 2004; Soares et al. 2012). The positive correlation between household well-being and child labour can depend on the type of activity. Del Carpio et al. (2016) have found that increasing household wealth through conditional cash transfers leads to lower rates of child labour in household chores and traditional farming, but to higher rates of child labour in non-traditional activities related to commerce and retail.

Other control variables show that child labour is more likely in households with smaller workforce. The ownership of agricultural land and living in rural areas correlate positively with child labour in our sample, which corresponds to earlier evidence (ILO 2013). Asset ownership correlates negatively with child labour and positively with homework, but these relationships are not precisely determined.

Table 6 shows the regression results with lagged values of the NFE variable. We can observe a negative correlation of owning an NFE in the previous period on child labour when time-invariant unobservable characteristics are accounted for.

Table 6: Impact of entrepreneurship on child labour and schooling outcomes (lagged values)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child labour		Attend school		Hours worked (ln)		Homework	
NFE <sub>t-1</sub>	-0.063** (0.025)	-0.116** (0.053)	-0.189*** (0.066)	-0.150 (0.146)	0.019 (0.021)	-0.010 (0.044)	0.338 (0.231)	-0.442 (0.541)
Household workforce	-0.009** (0.004)	-0.008 (0.020)	-0.019 (0.013)	-0.032 (0.053)	0.001 (0.004)	0.001 (0.016)	-0.007 (0.029)	0.136 (0.148)
Agricultural plot	0.025 (0.034)	0.100 (0.082)	0.085 (0.088)	0.280 (0.215)	0.034 (0.027)	-0.059 (0.066)	0.048 (0.251)	-0.330 (0.887)
Credit	-0.005 (0.022)	0.031 (0.041)	0.007 (0.057)	0.139 (0.100)	0.006 (0.019)	0.033 (0.032)	0.074 (0.162)	-0.082 (0.341)
Expenditures (ln)	0.056*** (0.015)	0.121*** (0.032)	0.173*** (0.044)	0.395*** (0.086)	0.034** (0.017)	-0.008 (0.028)	0.315*** (0.113)	0.101 (0.236)
Asset index	0.013 (0.020)	0.046 (0.036)	0.070 (0.053)	0.070 (0.097)	-0.007 (0.021)	0.046 (0.029)	0.166 (0.152)	0.483 (0.295)
Weather shock	0.008 (0.025)		0.089 (0.065)		-0.027 (0.021)		0.063 (0.172)	

Rural	0.278*** (0.015)		0.262*** (0.037)		0.405*** (0.030)		−0.361* (0.186)	
Child age	−0.014*** (0.001)		−0.006*** (0.002)		−0.019*** (0.001)		0.032*** (0.009)	
Child age <sup>2</sup>	−0.012*** (0.001)		−0.003** (0.001)		−0.015*** (0.002)		0.019** (0.008)	
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parent education	Yes	Yes	Yes	Yes	No	No	No	No
Distance to major road	Yes	Yes	Yes	Yes	No	No	No	No
Distance to nearest town	Yes	Yes	Yes	Yes	No	No	No	No
Constant	−0.989*** (0.092)	0.429*** (0.122)	−0.961*** (0.233)	1.334*** (0.321)	−1.567*** (0.164)	0.786*** (0.103)	1.623 (1.061)	1.614 (1.193)
No. observations	5,012	3,932	5,012	3,932	3,793	2,807	2,950	2,068
No. clusters	1,611	1,295	1,611	1,295	1,423	1,088	1,249	888
Adjusted R <sup>2</sup>	0.16	0.01	0.26	0.02	0.19	0.01	0.19	0.02

Notes: OLS estimates on the unbalanced panel in odd columns. Fixed-effect estimates on the balanced panel in even columns. Homework is measured as (ln) hours spent doing homework per week. Entrepreneurship is compared with agriculture, mining, and fisheries. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Appendix Table A4 shows contemporaneous and dynamic estimates of the relationship between entrepreneurship and child outcomes for boys and girls. We can observe a negative correlation between NFE and child labour for girls, both at the extensive and at the intensive margin in the estimates with NFE values from the previous time period. The relationship between NFE and child labour as well as the hours spent working for boys is negative and statistically significant, but sensitive to the inclusion of household fixed effects.

#### 5.4 Heterogeneous effects

Tables 7 and 8 show the results for the relationship between child outcomes and the type of NFE for boys and girls. Odd columns show OLS estimates on the unbalanced panel, whereas even columns show estimates with household fixed effects on the balanced panel. The fixed-effect results for both boys and girls show a negative relationship between child labour and the ownership of an NFE without employees. Owning an NFE without employees correlates with 12 per cent lower likelihood of child labour. These findings indicate that the outcomes of NFE ownership come from a specific type of NFEs—newly established NFEs that do not employ additional workers. The ownership of an NFE with at least one employee leads to 24 per cent less child labour for girls, illustrating a differential impact by the type of NFE for boys and girls. A possible explanation could be that the type of NFE variable captures to a certain extent the type of the main activity of the NFE, which is not present in the data, but which could be more in line with the kind of work more suitable for boys or the kind of work more suitable for girls.

Table 7: Child outcomes and the type of NFE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child Labour		Hours worked (ln)		Attend school		Homework	
Both boys and girls								
NFE <sub>t-1</sub> with employees	-0.171*** (0.044)	-0.104 (0.068)	-0.473*** (0.110)	-0.208 (0.165)	0.023 (0.029)	-0.057 (0.061)	0.576 (0.476)	-0.143 (0.763)
NFE <sub>t-1</sub> without employees	-0.061** (0.031)	-0.117** (0.054)	-0.188** (0.081)	-0.144 (0.149)	0.038 (0.025)	-0.004 (0.045)	0.338 (0.272)	-0.483 (0.541)
Boys								
NFE <sub>t-1</sub> with employees	-0.124*** (0.048)	-0.061 (0.101)	-0.425*** (0.129)	-0.186 (0.224)	0.055 (0.043)	-0.071 (0.093)	-0.137 (0.578)	0.722 (0.722)
NFE <sub>t-1</sub> without employees	-0.053 (0.040)	-0.112 (0.081)	-0.159 (0.100)	-0.230 (0.181)	0.068** (0.034)	-0.019 (0.055)	0.189 (0.326)	-0.104 (0.511)
Girls								
NFE <sub>t-1</sub> with employees	-0.235*** (0.061)	-0.239** (0.106)	-0.536*** (0.154)	-0.364 (0.232)	-0.041 (0.047)	0.045 (0.066)	1.393** (0.612)	-1.244 (1.155)
NFE <sub>t-1</sub> without employees	-0.062 (0.040)	-0.128 (0.085)	-0.200* (0.106)	-0.174 (0.212)	-0.005 (0.037)	0.071 (0.074)	0.494 (0.377)	-1.456 (0.909)

Notes: Separate estimations for boys and girls. All controls as in Table 5. Odd columns show OLS estimates on the unbalanced panel. Even columns show estimates with household fixed effects on the balanced panel. Fixed-effect estimations do not include region, parent education, and distance variables. Homework is measured as (ln) hours spent doing homework. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Table 8: Child outcomes and the ownership of NFE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child Labour		Hours worked (ln)		Attend school		Homework	
Both boys and girls								
Father's NFE <sub>t-1</sub>	-0.050* (0.029)	-0.135** (0.056)	-0.145** (0.072)	-0.215 (0.146)	0.035 (0.022)	0.041 (0.053)	0.537** (0.264)	-0.612 (0.618)
Mother's NFE <sub>t-1</sub>	-0.054* (0.032)	0.002 (0.046)	-0.201** (0.087)	0.011 (0.125)	0.035 (0.027)	0.004 (0.045)	-0.027 (0.286)	-0.244 (0.483)
Boys								
Father's NFE <sub>t-1</sub>	-0.029 (0.037)	-0.168* (0.086)	-0.115 (0.091)	-0.355* (0.191)	0.077*** (0.029)	0.017 (0.060)	0.528* (0.316)	0.145 (0.545)
Mother's NFE <sub>t-1</sub>	-0.027 (0.041)	0.102 (0.073)	-0.187* (0.105)	0.057 (0.173)	0.031 (0.034)	-0.014 (0.060)	-0.416 (0.387)	-0.284 (0.612)
Girls								
Father's NFE <sub>t-1</sub>	-0.072* (0.039)	-0.123 (0.100)	-0.176* (0.097)	-0.143 (0.217)	-0.024 (0.036)	0.164** (0.081)	0.449 (0.369)	-1.972** (0.973)
Mother's NFE <sub>t-1</sub>	-0.078** (0.039)	-0.070 (0.057)	-0.199* (0.112)	-0.091 (0.168)	0.029 (0.041)	0.003 (0.059)	0.426 (0.408)	-0.643 (0.747)

Notes: Separate estimations for boys and girls. Odd columns show OLS estimates on the unbalanced panel. Even columns show estimates with household fixed effects on the balanced panel. All controls as in Table 5. Fixed-effect estimations do not include region, parent education, and distance variables. Homework is measured as (ln) hours spent doing homework. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Women contribute proportionally more of their entrepreneurial income to their household (Espinal and Grasmuck 1997), but as entrepreneurs they may not be equally successful as men (Bardasi et al. 2011; Klapper and Love 2004). This means that child outcomes may differ

depending on whether their father or their mother owns an NFE. Children could benefit from the mother's business, but the benefits may not arise if the enterprise is not successful. The results in Table 8 show a lower incidence of child labour when the father owns an NFE, which primarily holds for boys. The correlation coefficient measuring the relationship between NFE ownership and the duration of child labour is also statistically different from zero in the fixed-effect estimation for boys, indicating that the positive effect of father-owned NFE on child labour occurs both at the extensive and at the intensive margin. In households where a father owns an NFE, girls are more likely to go to school, but to spend less time on homework, as shown in columns (6) and (8), respectively. Mother's NFE correlates negatively with child labour and hours worked for girls, but the correlation becomes indistinguishable from zero when time-invariant unobservable household characteristics are accounted for, as shown in columns (2) and (4). These findings illustrate that parental differences in NFE ownership could differently affect boys and girls.

The estimations with household fixed effects focus only on within-household variation, which is less sensitive to omitted variable bias but it discards some potentially valid variation in child outcomes, which could yield less precise estimates. At the household level, a significant portion of variation in child outcomes and NFE is averaged out, which motivates the introduction of the NFE–expenditure interaction in Table 9. This allows differentiating the effects of NFE ownership within households by consumption expenditures.

Table 9: Child outcomes, NFE ownership, and consumption expenditure

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child Labour		Hours worked (ln)		Attend school		Homework	
Both boys and girls								
NFE <sub>t-1</sub> ×Expenditure	-0.134* ** (0.037)	-0.254** * (0.076)	-0.387** * (0.097)	-0.378** (0.164)	-0.008 (0.030)	-0.062 (0.071)	0.557* (0.331)	-1.130 (0.734)
NFE <sub>t-1</sub>	0.072*** (0.019)	0.137*** (0.034)	0.235*** (0.056)	0.421*** (0.090)	0.033* (0.020)	-0.002 (0.028)	0.285* (0.147)	0.217 (0.238)
Expenditure	-0.089* * (0.035)	-0.173** (0.069)	-0.252** * (0.089)	-0.284 (0.175)	-0.071** (0.029)	-0.068 (0.079)	0.312 (0.307)	-0.956 (0.633)
Boys								
NFE <sub>t-1</sub> ×Expenditure	-0.105* * (0.046)	-0.284** * (0.106)	-0.331** * (0.124)	-0.382* (0.209)	0.038 (0.039)	-0.108 (0.078)	0.233 (0.397)	0.355 (0.627)
NFE <sub>t-1</sub>	0.078*** (0.023)	0.157*** (0.051)	0.281*** (0.071)	0.522*** (0.122)	-0.000 (0.025)	-0.005 (0.036)	0.462** (0.194)	0.107 (0.295)
Expenditure	-0.064 (0.042)	-0.223** (0.093)	-0.208* (0.109)	-0.196 (0.236)	-0.047 (0.039)	-0.104 (0.095)	0.159 (0.379)	0.507 (0.678)
Girls								
NFE <sub>t-1</sub> ×Expenditure	-0.168* ** (0.051)	-0.273* (0.161)	-0.468** * (0.127)	-0.621** (0.306)	-0.077* (0.043)	0.033 (0.095)	0.818* (0.462)	-3.109** * (1.105)
NFE <sub>t-1</sub>	0.073*** (0.026)	0.107** (0.046)	0.212*** (0.074)	0.317*** (0.121)	0.066** (0.027)	0.010 (0.037)	0.144 (0.202)	0.224 (0.361)
Expenditure	-0.133* ** (0.048)	-0.168 (0.133)	-0.355** * (0.113)	-0.530* (0.283)	-0.105** (0.042)	-0.047 (0.106)	0.329 (0.475)	-2.373** * (0.846)
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Month	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region	Yes	No	Yes	No	Yes	No	Yes	No
Parent education	Yes	No	Yes	No	Yes	No	Yes	No
Distance to major road	Yes	No	Yes	No	Yes	No	Yes	No
Distance to nearest town	Yes	No	Yes	No	Yes	No	Yes	No

Notes: Separate estimations for boys and girls. All controls as in Table 5. Odd columns show OLS estimates on the unbalanced panel. Even columns show estimates with household fixed effects on the balanced panel. Fixed-effect estimations do not include region, parent education and distance variables. Homework is measured as (ln) hours spent doing homework. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Appendix Table A5 shows fewer hours of child labour in higher consumption expenditure quintiles and the results in Table 9 show a negative relationship between the NFE–expenditure interaction and child labour both at the intensive and at the extensive margin. The relationship is observed for boys and girls. This result is in line with the poverty hypothesis and earlier findings that children are significantly less engaged in household work if the household is relatively wealthier (Webbink et al. 2012). There are no expenditure-differentiated effects of NFE ownership in terms of school attendance and hours spent doing homework, apart from fewer homework hours for girls, shown in column (8). The findings are overall supportive of the earlier literature based on which we would expect a decrease in child labour when household wealth increases.

## 6 Conclusion

On the one hand, moving out of agriculture and establishing an NFE is seen as welfare improving for households, which are, under better economic circumstances, expected to be more likely to

send their children to school and pull them out of child labour. On the other hand, labour market imperfections and higher opportunity costs of having children in school when parents start operating an NFE may lead to negative child outcomes. Not much empirical evidence on the subject exists so far, despite the established importance of entrepreneurship in the economic development literature. We address this significant research gap by investigating the impact of NFE ownership on child labour and schooling outcomes using the panel data from three rounds of the TZNPS.

First, we find significant differences between households in terms of the main observable characteristics of child labour and schooling. Households that operate an NFE tend to be wealthier than non-NFE households and to have a lower prevalence of child labour, mirrored by higher school attendance. Second, we find a negative correlation between NFE ownership and child labour in households with higher levels of consumption expenditure. This reaffirms earlier findings that children from relatively wealthier households engage significantly less in household work (Webbink et al. 2012). Third, we find differentiated impacts by child gender and the type of enterprise: a lower incidence of child labour for boys and NFEs without employees and a lower incidence of child labour for girls and NFEs that hire at least one employee. Further, we find a negative effect of father-owned NFE on child labour for boys, both at the extensive and at the intensive margin. Finally, we separately measure child labour and school attendance. The results show that less child labour may not result in increased school attendance in all cases. The only exception is a positive effect of father-owned NFE on an increased likelihood for school attendance for girls.

Overall, the findings presented in this paper are favourable to establishing NFEs as opposed to gaining livelihoods from agriculture in terms of reducing the incidence of child labour. However, less child labour may not mean more schooling, as we find that only girls benefit from father-owned enterprises in terms of school attendance. Given these results, it appears that, by increasing wealth, household entrepreneurship may improve the severe child labour problem in Tanzania. However, resolving the problem of low school attendance rates requires other types of policy actions.

Households could simultaneously change their preferences for enterprise ownership, child labour, and schooling. They could establish an enterprise because they have more children they could employ, not because that would enable them to increase wealth and be more likely to send the children to school. To disentangle the direction of the relationship one would need an external variable that explains the choice of households to establish an enterprise independently of their decision to pull the children out of school and employ them in the enterprise. Despite best efforts, we were unable to find such a variable in the available dataset, so the results are best interpreted with caution. Studying this phenomenon on a dataset that covers more years would likely give more robust results because establishing an enterprise and observing the consequent effects on children are processes that take time.

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## Appendix: Additional information

Table A1: Summary statistics for the balanced panel

Variables	Mean	Standard deviation	Minimum	Maximum	Observations
Dependent					
Child labour	0.308	0.462	0	1	5,712
Hours week	5.012	10.754	0	92	5,712
Attend school	0.801	0.399	0	1	4,047
Homework	119.712	253.976	0	1,680	2,251
Explanatory					
NFE	0.162	0.368	0	1	5,712
NFE with employees	0.029	0.168	0	1	5,712
NFE without employees	0.133	0.339	0	1	5,712
Gender (male)	0.517	0.500	0	1	5,712
Age	9.231	2.650	5	14	5,712
Household workforce	2.813	1.805	0	23	5,712
Agricultural plot	0.907	0.291	0	1	5,712
Credit	0.131	0.338	0	1	5,712
Expenditures per capita	0.503	0.351	0.032	5.951	5,712
Asset index	-1.175	2.045	-3.246	4.512	5,712
Weather shock	0.149	0.356	0	1	5,712
No school	0.121	0.326	0	1	5,712
Some primary	0.130	0.336	0	1	5,712
Completed primary	0.620	0.485	0	1	5,712
Some secondary	0.079	0.271	0	1	5,712
Completed secondary	0.044	0.206	0	1	5,712
Higher education	0.005	0.070	0	1	5,712
Rural	0.846	0.361	0	1	5,712
Distance to major road	23.763	25.569	0	135.4	5,712
Distance to town	54.396	41.832	0.300	192.8	5,712

Note: NFE, non-farm enterprise.

Source: Authors' compilation based on data from TZNPS.

Table A2: Differences in child outcomes and household characteristics between NFE and non-NFE owners before establishing the NFE (*t*-test)

Variables	No NFE	NFE	Difference	<i>t</i> -value	Observations
(a) NFE established two periods after					
Child labour	0.305	0.222	0.083	1.30*	1,346
Hours week	4.624	1.941	2.683	2.07**	1,346
Attend school	0.798	0.846	-0.048	-0.73	985
Household workforce	2.558	2.426	0.132	0.75	1,346
Agricultural plot	0.989	0.963	0.026	1.74**	1,346
Credit	0.108	0.185	-0.078	-1.78**	1,346
Expenditure per capita (real, million TZS)	0.466	0.495	-0.028	-0.74	1,346
Asset index	-1.614	-1.043	-0.571	-2.96***	1,346
Weather shock	0.120	0.259	-0.139	-3.03***	1,346
No school	0.132	0.093	0.040	0.85	1,346
Some primary	0.143	0.093	0.051	1.05	1,346
Completed primary	0.632	0.667	-0.034	-0.51	1,346
Some secondary	0.069	0.074	-0.005	-0.15	1,346
Completed secondary	0.022	0.074	-0.052	-2.41***	1,346
Higher education	0.001	0.000	0.001	0.20	1,346
Rural	0.943	0.778	0.166	4.95***	1,346
Distance to major road	24.586	18.841	5.745	1.66**	1,346
Distance to town	57.197	45.828	11.369	2.16**	1,346
(b) NFE established one period after					
Child labour	0.328	0.209	0.120	3.42***	3,701
Hours week	5.382	3.113	2.268	2.90***	3,701
Attend school	0.781	0.844	-0.063	-1.78**	2,766
Homework (hours)	82.289	121.981	-39.692	-1.49*	1,202

Household workforce	2.760	2.578	0.183	1.32*	3,701
Agricultural plot	0.983	0.941	0.042	4.12***	3,701
Credit	0.111	0.193	-0.081	-3.39***	3,701
Expenditure per capita (real, million TZS)	0.445	0.508	-0.063	-3.45***	3,701
Asset index	-1.698	-0.621	-1.077	-10.23***	3,701
Weather shock	0.132	0.139	-0.007	-0.27	3,701
No school	0.139	0.102	0.038	1.45*	3,701
Some primary	0.145	0.128	0.017	0.64	3,701
Completed primary	0.632	0.615	0.017	0.48	3,701
Some secondary	0.055	0.091	-0.035	-2.03**	3,701
Completed secondary	0.025	0.064	-0.039	-3.22***	3,701
Higher education	0.003	0.000	0.003	0.73	3,701
Rural	0.933	0.722	0.211	10.68***	3,701
Distance to major road	25.432	19.599	5.832	3.09***	3,701
Distance to town	58.739	37.104	21.636	7.25***	3,701

Notes: TZS, Tanzanian shilling. One period is one survey round, which is equal to two calendar years. There was no information for hours spent doing homework in the first survey round, so this variable is omitted from panel (a) data. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Table A3: Conditional differences in child outcomes between non-NFE and NFE owners before establishing the NFE

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Child labour	Hours worked (ln)	Attend school	Child labour	Hours worked (ln)	Attend school	Homework
NFE established two periods after	-0.028 (0.063)	-0.192 (0.126)	0.031 (0.047)				
NFE established one period after				-0.062* (0.034)	-0.089 (0.088)	0.008 (0.030)	0.376 (0.427)
No. observations	1,346	1,346	1,346	3,701	3,701	3,695	1,321
No. clusters	705	705	705	1,206	1,206	1,206	753
Adjusted $R^2$	0.12	0.20	0.45	0.14	0.24	0.39	0.19

Notes: One period is one survey round, which is equal to two calendar years. There was no information for hours spent doing homework in the first survey round, so the differences for NFE established two periods after exclude homework. Separate estimations for different time periods. OLS estimates on the unbalanced panel. All controls as in Table 5. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Table A4: Impact of entrepreneurship on child labour and schooling outcomes for boys and girls

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Child Labour		Hours worked (ln)		Attend school		Homework	
Boys								
NFE	-0.072*** (0.025)	-0.021 (0.032)	-0.146*** (0.053)	-0.086 (0.089)	0.012 (0.019)	0.006 (0.031)	0.300 (0.193)	-0.069 (0.438)
NFE <sub>t-1</sub>	-0.052 (0.032)	-0.106 (0.080)	-0.168** (0.082)	-0.225 (0.175)	0.048* (0.029)	-0.025 (0.054)	0.156 (0.269)	-0.013 (0.494)
Girls								
NFE	-0.072*** (0.025)	-0.021 (0.032)	-0.146*** (0.053)	-0.086 (0.089)	0.012 (0.019)	0.006 (0.031)	0.300 (0.193)	-0.069 (0.438)
NFE <sub>t-1</sub>	-0.069** (0.035)	-0.095** (0.048)	-0.189*** (0.066)	-0.161 (0.136)	0.019 (0.021)	-0.011 (0.047)	0.338 (0.231)	-0.543 (0.488)

Notes: Separate estimations for each model. OLS estimates on the unbalanced panel. All controls as in Table 5. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.

Table A5: The impact of entrepreneurship on child labour and schooling outcomes by location and consumption expenditure quintiles

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Rural	Urban	Lowest	Second	Middle	Fourth	Highest
Child labour	-0.047 (0.030)	-0.081 (0.051)	0.069 (0.076)	-0.107** (0.044)	-0.052 (0.052)	-0.075 (0.047)	-0.103 (0.064)
Hours worked (ln)	-0.127 (0.078)	-0.292** (0.123)	0.172 (0.213)	-0.254** (0.111)	-0.136 (0.126)	-0.299** (0.126)	-0.311* (0.158)
Attend school	0.005 (0.025)	0.077** (0.036)	-0.018 (0.065)	0.019 (0.044)	0.057 (0.041)	0.083* (0.046)	-0.094* (0.052)
No. observations	4,247	756	1,464	1,305	1,217	648	369
No. clusters	1,314	314	550	526	448	260	158
Homework	0.371 (0.266)	0.315 (0.366)	-0.253 (0.449)	0.056 (0.361)	1.091** (0.438)	0.000 (0.434)	-0.717 (0.594)
No. observations	2,688	628	752	802	901	518	342
No. clusters	1,057	285	378	402	385	231	154

Notes: Entrepreneurship at  $t-1$  is compared with agriculture, mining, and fisheries. OLS estimates with  $NFE_{t-1}$  on the unbalanced panel. Year, month, and region fixed effects included. All controls as in Table 5. Homework is measured as (ln) hours spent doing homework per week. Standard errors clustered at the household level in parentheses. Significance levels: \* $p < 0.10$ , \*\* $p < 0.05$ , \*\*\* $p < 0.01$ .

Source: Authors' compilation based on data from TZNPS.