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Child Labor and Schooling: Land Redistribution and Trade Liberalization in Agrarian Economies[†]

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Abstract

This study develops an overlapping-generations model to analyze the determinants of agricultural child labor in developing economies, focusing on the interplay between land distribution, trade policies, and schooling decisions. We identify a U-shaped relationship between farm size and child labor prevalence, driven by opposing income and substitution effects. For smallholder farmers, larger farms reduce child labor by easing schooling costs through a dominant income effect, while for largeholders, a substitution effect increases child labor as farm size rises. This U-shaped pattern implies that land redistribution policies homogenizing farm sizes can reduce child labor by mitigating extreme disparities and also is consistent with the wealth paradox, where land-rich households are more likely to employ child labor. Trade sanctions, by worsening terms of trade, increase child labor among smallholders but reduce it among largeholders, rendering their net effect ambiguous and dependent on land distribution. Conversely, trade liberalization can reduce child labor by fostering capital deepening, which enhances returns to education, particularly when integrated with global capital markets. Institutional reforms that strengthen property rights, reduce barriers to skilled labor, and improve school quality and affordability further mitigate child labor. These findings highlight the need for nuanced policies –such as land redistribution, comprehensive trade integration, and institutional improvements– to address child labor effectively in agrarian economies.

Keywords: Child labor, schooling, trade sanctions, trade liberalization, land distribution, wealth paradox, human capital, developing economies.

JEL classification: J22, J24, O15, F16, Q17, D60.

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1 Introduction

Child labor remains a pressing global challenge, with 160 million children engaged in work worldwide as of 2020, representing nearly 10% of children aged 5-17 years. Sub-Saharan Africa bears the highest burden: it accounts for 70% of global child labor, with 86.6 million children involved in child labor –23.9% of those aged 5-17–, predominantly in unpaid family farm work [ILO and UNICEF, 2021].[1] This pervasive issue, often linked to exclusion from education, undermines human capital development and perpetuates poverty cycles, particularly in agrarian economies reliant on smallholder farming.[2] Overall, more than a quarter of children aged 5 to 11 and over a third of children aged 12 to 14 who are in child labor are out of school. In the case of Sub-Saharian Africa, around 28% of children aged 5 to 14 in child labor do no attend classes.[3] Most of the child labor involves activities related to the primary sector, such herding or crop collection, in farms with different sizes. In many developing countries, globalization resulted in a significant increase of export-oriented agricultural sectors, made up primarily of smallholder farmers. These small-scale farmers often face the pressures of global markets, while lacking access to infrastructure, credit funds, or protections. This environment exacerbates the prevalence of child labor.[4] As developing countries integrate into global markets, the interplay between international trade, land distribution, and child labor demands urgent attention from policymakers seeking sustainable solutions.

This study introduces a novel overlapping-generations model to examine the determinants of agricultural child labor in developing economies, focusing on the complex relationships between farm size, trade policies, and schooling decisions. Our analysis reveals a U-shaped relationship between farm size and child labor prevalence, driven by opposing income and substitution effects. For smallholder farmers, an increase in farm size reduces child labor due to a dominant income effect, as higher income eases the financial burden

[1] Fors [2007] examined the determinants of rural child labor

[2] Putnick and Bornstein [2015] find a negative relation between child labor and school enrollment in low- and middle-income countries. Baland and Robinson [2000] argue that there may exist an inefficient excess of child labor when appropriability problems arise, because parents cannot fully capture the benefits of their children's education. This issue is specially aggravated in the case of countries with underdeveloped financial markets and old-age protection, as children are also demanded for an old-security motive (see Nugent 1985). In a proposal in tune with Becker and Murphy [1988]'s view of the State as an "aggregate family," Conde-Ruiz et al. [2010, Sec.5] demonstrates that an efficient decentralized mechanism to mitigate the inefficient posed by Baland and Robinson [2000] consists on linking the education provision of the present generation of children with the future pension receipts received by the generation that funded such education provision.

[3] Nankhuni and Findeis [2004] find that Malawian children are significantly involved in resource-collection work and their likelihood of attending school decreases with increases in hours allocated to this work.

[4] Some examples are Bangladesh Karim 2006, Bolivia Stöcker et al. 2024, Côte d'Ivoire (Food and Organization 2022 and Nkamleu and Kielland 2006), Ehiopia Harter 2024, Kenya Waceke 2024, or Vietnam Standen and Falak 2022.

of schooling costs. Conversely, for largeholder farmers, a substitution effect prevails, increasing child labor as the marginal productivity of household labor rises with farm size. This dynamic is consistent with the "wealth paradox" Bhalotra and Heady [2003], where land-rich households are more likely to employ child labor, challenging the conventional poverty-driven narrative of child labor.

The implications of international trade policies are equally nuanced. Trade sanctions, often proposed to combat child labor by reducing demand for goods produced with child labor, have an ambiguous net effect.[5] By lowering the terms of trade for agricultural exports, sanctions increase child labor among smallholder farmers due to a dominant income effect, while reducing it among largeholders where the substitution effect prevails Grossmann and Michaelis [2007]. This heterogeneity underscores the need for careful policy design, as sanctions may inadvertently exacerbate child labor among the poorest households. In contrast, trade liberalization can reduce child labor and promote schooling by fostering capital deepening, either by reducing the rental price of capital or by reducing the relative price of investment goods Edmonds and Pavcnik 2005. However, its direct effect on child labor through improved terms of trade remains ambiguous, hinging on land distribution patterns.

Our findings offer critical insights for policymakers aiming to reduce rural child labor in emerging economies. The U-shaped relationship between farm size and child labor suggests that land redistribution policies that homogenize farm sizes could mitigate child labor prevalence. Moreover, a comprehensive trade liberalization strategy that integrates developing economies into global capital and investment markets –beyond mere agricultural trade– can enhance human capital accumulation by increasing the returns to education. Institutional reforms that strengthen property rights and reduce barriers to skilled labor utilization further amplify these benefits Espinosa-Vega and Barnett [2005]. Coupled with investments in school quality and affordability, such policies form a holistic framework to address child labor effectively.[6]

This paper also contributes to the literature by providing a unified model that links land distribution, trade policies, and institutional determinants of child labor outcomes, offering actionable guidance for policymakers. By highlighting the ambiguous impacts of trade sanctions and the potential of integrated trade and institutional reforms, our analysis underscores the importance of tailored, evidence-based strategies to achieve Sustainable

[5]We can illustrate two recent examples. In 2023, advocacy groups filed a lawsuit against the U.S. government, urging the enforcement of a 1930s law that prohibits the importation of goods produced with child labor. The lawsuit specifically targeted cocoa harvested by children in West Africa, arguing that companies like Hershey, Mars, and Nestlé were benefiting from these practices. In April 2025, several US labor groups filed a lawsuit against the federal government for terminating international labor rights programs aimed at combating child labor. These programs, overseen by the Bureau of International Labor Affairs, were crucial in enforcing labor standards globally. The cuts were seen as undermining efforts to combat child labor in supply chains.

[6]For instance, Dammert et al. [2018] analyses the effects of public policies on child labor.

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The remainder of the paper is structured as follows: Section 2 reviews related literature, Section 3 presents the model, Section 4 conducts comparative statics, and Section 5 concludes concludes the paper summarizing the main findings and considering a way forward.

2 Related Literature

In this section, we briefly review the literature that related child labor with farm size, trade openness and sanctions, and the return of education.

2.1 Farm size

Previous related work has debated the extent to which poverty compels child labor and, challenging this view, the effect that farm size has on (household-farm) child labor in the presence of failures in the factor markets for land, labor and credit. Regarding poverty and farm size, Basu and Van [1998] formulated the compelling *poverty hypothesis* in theoretical terms –land-poor farmers are more prone to engage in child labor than land-rich farmers–, and many empirical studies aimed to appraise it. Challenging this hypothesis, Bhalotra and Heady [2003] posed a *wealth paradox* –land-rich farmers are more prone to engage in child labor than land-poor farmers–; accordingly, greater land wealth leads to higher child labor.

Many empirical works have supported this *wealth paradox*, where increased household wealth is positive correlated with higher child labor participation. Bhalotra and Heady [2003] have found some evidence of the *wealth effect* in Ghana and Pakistan.[7] Dumas [2007] also found supporting evidence of the *wealth paradox* in Burkina Faso. More recently, Toh [2018] found evidence that, after land reforms in the 1990s on Vietnam's rural areas, households with increased land holdings had higher child labor participation. This study attributed this finding to the increased opportunity cost of children's time, leading to more labor involvement instead of schooling. Shumetie and Mamo [2019] also found that children from eastern Ethiopia that live in wealthier households –in terms of cropland and livestock–, spent more time on domestic and farm work, with less time allocated to schooling. Finally, Hailu and Girma [2022] find that Ethiopian households owning assets such as land and livestock were more likely to employ children in labor.

Some research has stated that there exists an inverted U-shaped relationship between farm size and child labor. In particular, Bhalotra and Heady [2003] and Bar and Basu [2009]

[7] Self and Grabowski [2009] examine the effect of different agricultural technologies on child labor in India. Although their work is not specifically concerned with child labor, Ruml and Qaim [2021] find that the increase in contractual agreements between smallholder farmers and agribusiness companies in Ghana's palm oil sector fosters saving-labor technologies, and household labor is more affected by labor savings than hired labor.

argue that, as farms become very large, farmers substitute child labor for paid adult labor. Using data from India, Basu et al. [2010] test their theory.[8] Differently from this literature, our model predicts a $U-$shaped relationship between family-farm size and the prevalence of child labor. In our model, farmers do not hire adult workers from the market. We implicitly assume that their farms are too small for hiring to be possible or profitable.

Drawing on our research and cited studies, we conclude that theoretical arguments suggest a complex, nonlinear relationship between farm size and child labor prevalence. Specifically, increasing farm size for low-wealth farmers may encourage sending children to school and reducing child labor due to a dominant income effect. Conversely, for middle-wealth farmers, larger farm sizes may lead to increased child labor due to a prevailing substitution effect, as outlined in our work. However, for high-wealth farmers, further expanding farm size might reduce child labor by enabling the hiring of external workers, allowing children to attend school. Empirical evidence supports this complex, nonlinear relationship. For instance, Oryoie et al. [2017] find that in rural Zimbabwe, household assets influence child work nonlinearly, with middle-wealth households more likely to withdraw children from school, modulated by the child's gender and agro-ecological conditions.

2.2 Trade openness and trade sanctions

The effect of international trade on the incidence of child labor in poor, predominantly agricultural countries as well as the efficacy of trade sanctions to fight child labor has stirred a heated debate.[9] As argued by Edmonds and Pavcnik [2005], the effect of higher international trade openness or trade sanctions on child labor is a priori ambiguous, as it depends on the magnitude of both income and substitution effects when the price of the export good changes.

In the present paper, we argue that trade openness modifying the terms of trade has important distributive consequences for child labor in developing countries and that its net effect on the prevalence of child labor is ambiguous. Higher international trade openness, which improves the terms of trade of farmers producing a tradable agricultural good, reduces the incidence of child labor among land-poor farmers's children (i.e., among whom the income effect predominates); conversely, it increases the incidence of child labor among land-rich farmers' children (i.e. among whom the substitution effect predominates).

Therefore, according to our model, trade barriers to agricultural imports from African countries, trade sanctions against agricultural sectors using child labor or even unregulated

[8] Benali et al. [2018] find that participation in export supply chains positively affects farmers'decision to hire labor from all age groups in Northern Tanzania.

[9] Cifarelli [2025] finds that the provision of information regarding the use of child labor in foreign production leads to a significant decrease in US imports, not due to any change in price but driven by a reduction in both US firms' intermediate input demand and demand by US final consumers.

oligopsonistic agricultural markets worsen the terms of trade for developing countries, and will have different consequences for rich farmers and poor farmers. Although the impact of trade barriers and sanctions on child labor and schooling is a priori ambiguous, these trade policies will reduce the poor farmers' income and will increase the incidence of child labor among their children.

Other economic models have proposed different channels for trade sanctions to influence child labor. Grossmann and Michaelis [2007] present a model indicating that while trade sanctions can reduce child labor by lowering the demand for goods produced with child labor, trade sanctions may simultaneously decrease household incomes, leading to an increase in child labor as families seek to compensate for lost income. This suggests that the overall impact of sanctions on child labor is not straightforward and can vary depending on specific circumstances. Chatterjee and Ray [2016] developed a general equilibrium model indicating that trade restrictions can alter the supply of child labor, depending on the utility functions of parents and the structure of the economy. Ranjan [2001] argues that, if farmers face credit constraints, then higher openness to goods exported by developing countries might reduce child labor and, consequently, trade sanctions against developing countries will not be an effective policy tool to fight child labor.

Differently from this literature, we contend in this paper that the impact of trade openness on child labor extends well beyond the ambiguous effects driven by changes in the terms of trade. In particular, external openness leading to reductions in the interest rate or in the relative price of investment, clearly reduces child labor and increases schooling. The reason is that capital deepening, fostered by reductions in the interest rate or the relative price of investment, increases productivity in the modern sector and thus encourages schooling by increasing the expected returns to education.

There is a large body of empirical literature examining the relationship between child labor and trade openness and sanctions. Using cross-country data, Cigno et al. [2002] finds that international trade slightly reduces child labor, or has no effect. Neumayer and de Soysa [2005] find that countries that are more open to trade and have higher levels of foreign direct investment also have a lower incidence of child labor. Their result holds for various measures of child labor, including labor force participation rates and school attendance. Similarly, Ugarte et al. [2023] find that as gross exports increase, child labor declines. This relationship holds even after controlling for income effects, suggesting that the reduction in child labor is not solely due to higher incomes but also to other factors associated with increased trade openness. Edmonds and Pavcnik [2005] find that an increase in the export price of rice in Vietnam led indeed to a significant decline in child labor, particularly in households that are net producers of rice. However, Lin [2022] finds that increased agricultural exports can lead to a reduction in school attendance and an increase in child labor, as higher demand

for agricultural products raises the opportunity cost of schooling.[10]

2.3 Returns to education, capital deepening and institutions

The literature have also emphasized the influence of the costs and expected returns to education on child labor. Psacharopoulos and Patrinos [2004] provide a comprehensive review of the returns to investment in education, highlighting the importance of human capital. These authors note that while the returns to education are generally positive, they vary across countries and depend on factors such as the level of education and the economic context. Their findings suggest that in environments where the returns to education are low, families may be less prone to invest in schooling, thereby increasing the likelihood of child labor.[11] Espinosa-Vega and Barnett [2005] argues that removing barriers to capital accumulation would not only lead to economic growth but also enhance human capital accumulation by reducing the incidence of child labor.

In our model, the incidence of child labor in agriculture depends crucially on the returns to education. These returns depend on labor productivity in the capital-intensive sector. This entails that policies that encourage capital deepening reduce child labor. In addition, the returns to education depend on the opportunities available to educated children as adults. Thus, barriers to entrepreneurship contribute to increased child labor. Finally, the incidence of child labor is higher in environments that make it difficult to appropriate the returns to education. Therefore, institutional frameworks that protect property rights and enforce contracts will discourage child labor. It is largely recognized that poor countries have worse formal institutions securing property rights than rich countries (see, for example, Shirley 2005). Moreover, business regulations are more and worse in poor countries than in rich countries and countries with heavier regulation of entry have higher corruption and larger unofficial economies, but not better quality of public or private goods (see Djankov et al. 2002).[12]

3 The model

We consider a small-open, overlapping-generations dualistic developing economy where domestic households cannot borrow. Time is discrete and there is an infinite time horizon. Individuals live for three periods: in the first period (childhood), individuals go to school or

[10] See also Maskus [1997], Basu and Van [1998], Brown [2000], Dixit [2000], Baland and Robinson [2000], Ranjan [2001] and Bommier and Dubois [2004].

[11] Emerson and Knabb [2006] focus on the importance of differences among households in the expected returns to education to understand the incidence of child labor.

[12] Using cross-country data, del Río [2018] assesses the losses of output and consumption caused by predation. This paper shows that these losses are higher in poor countries than in rich countries (see also del Río 2021).

work in the household farm; in the second period (adulthood), each individual works, has one child, decides if her child works or goes to school, consumes and saves for retirement; in the third period (retirement), individuals do not work and each consumes her previous savings, capitalized at a prevailing interest rate. The domestic economy has an agricultural (traditional) sector and a modern sector. The agricultural sector is composed of farms with different land sizes, and engages all unschooled adults and some children. The modern sector engages only adults who have gone to school in childhood, uses physical capital, and work for a perfect competitive firm. There are two types of household: household-farm household and modern-sector household. Each household is comprised by a single adult and a single child. Children who attend to school obtain human capital that allows them to open firms in the modern sector as adults.

3.1 Prices

The modern good is the numeraire in the model ($p_M = 1$). In this small-open economy, the price of the traditional tradable output (p_A), the price of the capital good used in the modern sector (p_I), and the interest rate (i) are all exogenous and constant. The consumption good is a composite commodity, a mix of agricultural and modern goods, $c = C(A, M)$, where A is the consumption of agricultural good, M is the consumption of modern good. The aggregate function C is a homogeneous of degree 1 function, and the consumption good is increasing in both goods (i.e., $C_1 > 0$ and $C_2 > 0$).[13] The consumption price index is $p_C = P(p_A, p_M)$ such that $p_C c = p_A A + p_M M$, where the aggregation function P is a homogeneous of degree 1 function satisfying $P_1 > 0$ and $P_2 > 0$. The consumption price index is constant because p_A and $p_M = 1$ are also constant. The rental price of physical capital is constant and equals its user cost, $p_I(i + \delta)$ with $0 < \delta < 1$ being the economic depreciation rate of capital.

3.2 Household Income

Agriculture sector. Each household farm is comprised by a single adult and a single child. The adult works, and the child may either go to school ($e_t = 1$) or work in the farm with his parent ($e_t = 0$). The output of the farm is

$$\mathbf{q}(\mu, e_t) = \begin{cases} \mu & \text{if } e_t = 1 \\ q(\mu) = (1 + \eta)\mu & \text{if } e_t = 0 \end{cases},$$

[13] An example of aggregator C is the Dixit-Stiglitz aggregator.

where $0 < \eta < 1$, meaning that a child's contribution to output is lower than an adult's contribution. The land size of each farm is heterogeneous, and belongs to the interval $\mu \in (\mu_0, \infty)$, with $\mu_0 > 0$. The adult farmer is the owner of the farm, so she accrues the household income $p_A q(e_t, \mu)$, being p_A the price of the agricultural good.

In the case a child who does not go to school ($e_t = 0$) and works in her parent's farm, then he gets no stock of modern human capital but inherits the family farm when he becomes an adult. In the case a child who goes to school ($e_t = 1$) and does not work in the farm leads, then he will not inherit his parent's farm, his parent must finance a schooling cost of $\chi > 0$, and he gets $\varepsilon\pi$ units of modern human capital in his adulthood, being $\pi > 0$ the quality of school he attends and $\varepsilon > 0$ being her talent drawn from an heterogeneous distribution satisfying $E(\varepsilon) = 1$.

Both farm size μ and talent ε are heterogeneous among dynasties, but constant across generations within a dynasty. Therefore, each dynasty is characterized by a pair (μ, ε). Observe that the parameter μ has been called *farm size*, but it could also reflect the quality of the land owned by the farmer, or any other idiosyncratic feature influencing the productivity of the farm's (adult and child) labor; in a similar way, parameter ε has been considered to represent *talent*, but it actually reflects any feature of a dynasty that might influence the effect of schooling on adult productivity. The dynasty-specific productivity of schooling might vary among dynasties depending on the region of the country, the ethnic group, or the income class an individual belongs to or depending discrimination certain groups face in the labor market(see Emerson and Knabb 2006). Therefore, the distribution of ε can reflect the distribution of opportunities across dynasties.

Modern sector. Each household working in the modern sector is also comprised by a single adult and a single child. The adult works, and the child always attend to school. A school-educated adult opens a firm in the modern sector, with the quantity of firms given by the adult's modern human capital, $\varepsilon\pi$. Opening any firm requires to pay a fixed entry cost $\lambda > 0$. This parameter reflects the costs of overcoming any barrier –regulatory or not– in which a new entrant must incur to open a firm.

Each firm in the modern sector produces $f(k_t)$ units of output, with k_t being the physical capital used by the firm, and suffers expropriation of a fraction of its output $0 < \tau < 1$ due to predatory activities carried out by government officials or other agents. The risk of expropriation is present in the modern sector, but not in the traditional agricultural sector. This reflects that formal institutions securing property rights do not work correctly in the agricultural sector and, instead, informal institutions play this role in the traditional agricultural sector.[14] The parameter τ could simply be a tax rate on output in the modern sector

[14] Benson [1989] shows that customary law successfully defined and enforced property rights in primitive societies. Ensminger [1997] discusses the role of informal rights to land in Africa, while Maclean [2010] analyzes the role of informal institutions in Ghana and Côte d'Ivoire.

of the economy. There is empirical evidence that agriculture is lightly taxed across much of the developing world today, although it contributes substantially to GDP.[15] The production function satisfies Inada conditions, including that the marginal product of physical capital is positive and decreasing on capital ($f'(k_t) > 0$, $f''(k_t) < 0$). Firms in the modern sector take prices as given and maximize their profits after predation, $(1-\tau) f(k_t) - p_I(i+\delta)k_t$, then optimally hiring physical capital until the value of its marginal product after predation equals the common rental price,

$$(1-\tau) f'(k_t) = p_I(i+\delta). \tag{1}$$

It follows that capital per firm is constant, $k = f'^{-1}(p_I(i+\delta))$, and the firm profits before predation are simply given by

$$w = f(k) - kf'(k). \tag{2}$$

Income of an adult in the modern sector depends then on profits per firm –net of the entry costs if she is a new entrant– and his modern-specific human capital $\varepsilon\pi$. In notation, his income is given by $((1-\tau) w - \lambda j_t)\varepsilon\pi$, with $j_t = 1$ if the individual is a new entrant in time t and $j_t = 0$ otherwise. It is assumed that the firm profits after predation exceeds the entry costs, $(1-\tau) w > \lambda$; otherwise, there exists no incentive to open firms. The average private return rate of modern human capital for a new entrant equals the average number of firms times the profits per firm after predation and payment of the entry costs,

$$r_e = [(1-\tau) w - \lambda]\pi. \tag{3}$$

Proposition 1 *The average private return rate of modern human capital for a new entrant, r_e, is a decreasing function of the relative price of investment, p_I, the interest rate, i, the economic depreciation rate of capital, δ, the entry costs, λ, and the predation rate, τ*

Proof. Proposition 1 follows from (1), (2) and (3) taking into account that $f'(k_t) > 0$ and $f''(k_t) < 0$. ■

To summarize the sources of household's income: earnings of an adult of generation t depend on the sector (s) in which she is working. If she is working in the traditional sector ($s = A$), then her net income (net of schooling costs if the children go to school) depends on (i) the price of the traditional good (p_A); (ii) on the size of her farm (μ); (iii) on whether her child goes to school or works in the farm (e); and, (iv) on the cost of sending the children to school (χ) in the case the child attends to school. If the adult is working in the modern sector ($s = M$), then her income depends on (i) her (modern) human capital –given by her talent (ε) and the quality of the school she attended (π)–; (ii) the cost of entering the

[15] See, for instance, Bird 1974, Khan 2001, OECD 2020, Rajaraman 2005, and Stewart-Wilson and Waiswa 2021.

modern sector provided she is a new entrant ($j_t = 1$); (iii) the return rate before predation of modern human capital (w); and, (iv) the predation rate in the modern sector (τ). In our notation, an adult of generation t receives an income net of schooling costs, I_t, given by:[16]

$$\mathbf{I}_t(s, \varepsilon, \mu, j_t, e_t) = \begin{cases} I_t(A, \mu, e_t) = p_A \mathbf{q}(\mu, e_t) - \chi e_t & \text{if } s = A \\ I_t(M, \varepsilon, j_t) = [(1-\tau)w - \lambda j_t]\, \varepsilon\pi - \chi & \text{if } s = M \end{cases} \tag{4}$$

3.3 Preferences and household consumption

Our model allows for intergenerational altruism, such that each adult of generation t is concerned not only with her own consumption –both as adult $c_{1,t}$ and as retired $c_{2,t+1}$– but also with the real income of her child $\mathbf{I}_{t+1}/p_c$. In particular, the adult's utility is determined by two multiplicative factors: a selfish component u, and an altruistic component that discounts the child's real income as adult,[17]

$$U(c_{1,t}, c_{2,t+1}, \mathbf{I}_{t+1}/p_c) = u(c_{1,t}, c_{2,t+1})(\mathbf{I}_{t+1}/p_c)^{\sigma}, \tag{5}$$

where $0 < \sigma < 1$ is the degree of altruism and u is a homothetic function, $u_1 > 0$, $u_2 > 0$, $u_{11} < 0$, and $u_{22} < 0$. At each period, there is a subsistence level of consumption (c_m). If an adult's consumption is less than the subsistence level of consumption, then both the adult and the child die and the dynasty disappears. The model abstracts from child consumption to increase tractability. A retired person consumes what he has saved in adulthood, consumption in retirement at time $t+1$, $c_{2,t+1}$, is the capitalized value of her saving at time t,

$$p_c c_{2,t+1} = (1+i)(\mathbf{I}_t - p_c c_{1,t}). \tag{6}$$

To maximize intertemporal utility (5) subject to the intertemporal budget constraint (6), an adult equals the marginal relation of substitution between present and future consumption to the gross interest rate,

$$\frac{u_1\left(c_{1,t}, c_{2,t+1}\right)}{u_2(c_{1,t}, c_{2,t+1})} = 1 + i,$$

which is the Euler condition of the household maximization problem.

Because of preferences are homothetic, the Euler condition allows to define adult and retirement consumptions as functions of the interest rate and income, $c_{1,t} = c(1+i)\mathbf{I}_t p_c^{-1}$ and, combining her intertemporal budget constraint (6), consumption when old-adult results

[16] Recall that adults in the modern sector always send their children to school, as argued below.

[17] Therefore, we do not consider a Beckerian dynastic altruism (i.e., a concern for the well-being of the child), but non-dynastic altruism which is also frequently used in the economic literature. Pioneering works considering non-dynastic altruism are Arrow [1973] and Dasgupta [1974]. More recently, see Doepke and Tertilt [2016]. Frempong and Stadelmann [2021] investigated how parental risk preferences influence child labor decisions.

in $c_{2,t+1} = (1+i)[1-c(1+i)]\mathbf{I}_t p_c^{-1}$. For a given interest rate, both consumption as adult and consumption as retired are proportional to adult income. The utility function (u) evaluated in the optimum is a linear function of income because u is a homothetic function, $u(c_{1,t}, c_{2,t+1}) = v(1+i)\mathbf{I}_t p_c^{-1}$, where $v' > 0$ and $v'' < 0$. Therefore, the indirect utility function of an individual becomes

$$V(1+i, \mathbf{I}_t, \mathbf{I}_{t+1}) = v(1+i)p_c^{-(1+\sigma)}\mathbf{I}_t \mathbf{I}_{t+1}^{\sigma}. \tag{7}$$

3.4 Schooling Decision

For an adult farmer to send her child to school, it is a necessary condition that the net income she can generate with the children attending school, $p_A\mu - \chi$, is at least equal to subsistence income, $p_c c_m$. This means that for a farmer to be able to send her child to school her land size needs to be above a minimum threshold, $\mu \geq \mu_m$, where

$$\mu_m \equiv \frac{p_c c_m + \chi}{p_A}. \tag{8}$$

Proposition 2 *The minimum threshold of the farmland, μ_m, is a decreasing function of the relative price of the agricultural good (p_A), and an increasing function of the schooling costs (χ).*

Proof. The consumption price index is $p_c = P(p_M, p_A)$, which implies that $\frac{p_c}{p_A} = P\left(\frac{p_M}{p_A}, 1\right)$ because P is a homogeneous of degree 1 function. Moreover, (i) $\frac{p_c}{p_A}$ is a decreasing function of p_A because $P_1 > 0$. Proposition 2 follows from (i) and (8). ■

We will assumed that there exists households above the subsistence income in the presence of child labor; that is, households are in a subsistence child-labor trap. In our notation, being the size of the smallest farm $\mu_0 > 0$, we will assume that $\mu_0 < \mu_m$ (at least one farm is below subsistence level in the absence of child labor) and that $(1+\eta)\mu_0 > p_c c_m / p_A$ (but this farm reaches subsistence level in the presence of child labor).

An adult farmer sends her child to school if both the household income exceeds the subsistence ($\mu \geq \mu_m$) and sending the child to school increases her overall utility of the adult, accounting for her intergenerational altruism. In terms of the indirect utility function

$$V(1+i, I_t(A, \mu, 1), I_{t+1}(M, \varepsilon, 1)) \geq V(1+i, I_t(A, \mu, 0), I_{t+1}(A, \mu, e_{t+1})),$$

this means that an adult farmer above subsistence income sends her child to school if the increase in altruistic utility derived from the higher future income that the child will receive as a schooled adult in the modern sector more than offsets the decrease in selfish utility derived from the lower present parent's consumption due to the absence of the child's production

contribution, together with the direct cost of sending her child to school. More specifically, a farmer above subsistence income will send her children to school if the talent (resp. farm size) of her dynasty is high (resp. low) enough to obtain a positive net contribution to her total utility.

From the indirect utility function (7) and the household income equation (4), the above condition implies that the sufficient condition for a farm household to send her child to school is

$$\left[\frac{r_e\varepsilon-\chi}{p_A\mathbf{q}(\mu,e_{t+1})-e_{t+1}\chi}\right]^{\sigma}\geq\frac{p_A\left(1+\eta\right)\mu}{p_A\mu-\chi}$$

Depending on the parent's expectation on the schooling decisions of her offspring, multiple equilibria can exist. However, given that in the equilibrium with unschooled offspring, not sending her child to school ($e_{t+1}=0$) turns out to be Pareto dominates all other equilibria, we will pick this equilibrium. Therefore, a parent from a farm household above the subsistence income will send her children to school when the discounted relative benefits of a child attending school exceed the relative benefits for a parent from having his child work in the farm; that is, when talent exceeds a minimum threshold that depends on the farm size, $\varepsilon\geq\varepsilon_m\left(\mu\right)$

$$\varepsilon_m\left(\mu\right)=\left[\left(\frac{\left[p_A\left(1+\eta\right)\mu\right]^{1+\sigma}}{p_A\mu-\chi}\right)^{\frac{1}{\sigma}}+\chi\right]r_e^{-1},\tag{9}$$

and satisfies that (i) it is a continuous and strictly convex function; (ii) $lim_{\mu\to\mu_l}\varepsilon_m\left(\mu\right)=\infty$, where $\mu_l\equiv\frac{\chi}{P_A}<\mu_m$; (iii) $lim_{\mu\to\infty}\varepsilon_m\left(\mu\right)=\infty$, (iv) it is a decreasing (resp., increasing) $\varepsilon_m^{'}(\mu)<0$ (resp., >0) if and only $\mu<\mu^*\equiv\frac{\chi}{p_A}\frac{1+\sigma}{\sigma}$ (resp., $\mu>\mu^*$). The threshold (9) states that the minimum talent required for the adult farmer to send her child to school is relatively high when: (1) the average private return rate of modern human capital for a new entrant (r_e) is low, and (2) the explicit cost of schooling χ is high or the implicit cost (in terms of lost farm output) $p_A\left(1+\eta\right)\mu$ is high.

It must be pointed out that only some farmers send their child to work and not to school. Differently, an adult in the modern sector always sends her child to school because if the child does not attend school then the he will obtain a positive income when adult, and hence his parent will not accrue any altruistic utility from her child's income.

The following proposition establishes which agriculture dynasties send their children to school.

Proposition 3 *Adults in the agricultural sector send their children to school if and only if they belong to dynasties with* (ε,μ) *such that and* $\varepsilon\geq\varepsilon_m\left(\mu\right)$ *and* $\mu\geq\mu_m$*, where* $\varepsilon_m\left(\mu\right)=\left[\left(\frac{(p_A(1+\eta)\mu)^{1+\sigma}}{p_A\mu-\chi}\right)^{1/\sigma}+\chi\right]r_e^{-1}$ *and* $\mu_m=\frac{p_cc_m+\chi}{p_A}$.

Proof. Proposition 3 follows from (8) and (9). ■

Figure 1 illustrates the regions of the distribution of (μ, ε) for which children go to school or work. Area I in Figure 1 depicts the poor farmers immerse in a subsistence trap who would like to send their children to school, but whose income is too small to confront its costs. Areas II and III depict farmers whose children are not talented enough to send them to school. However, farmers in Area II are immerse in a subsistence trap, while farmers in Area III are not. Finally, Area IV depicts farmers who are not in a subsistence trap and whose kids have enough talent to send them to school.

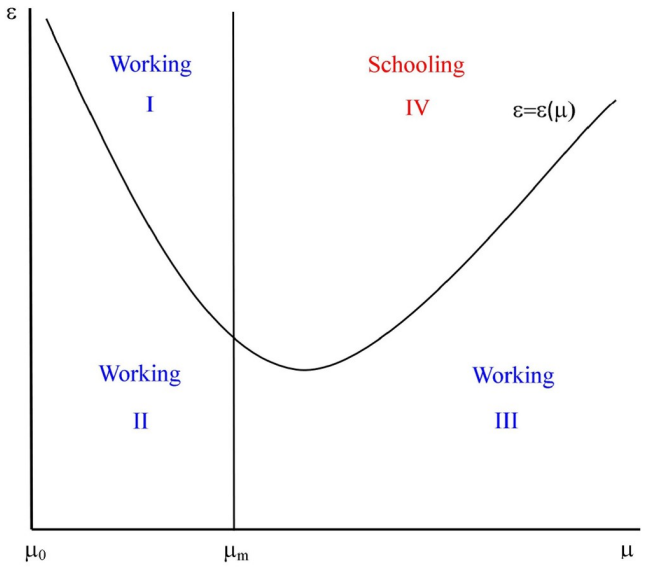

Figure 1: Schooling vs. Working

4 Comparative statics

In this section, we perform some exercises of comparative statics in order to understand how the exogenous variables influence the school-labor decision. First, we analyze the relationship between the farmland size (or its productivity) with schooling and child labor, and find that this relationship is not monotonic. Second, we show that trade sanctions that alter the price of the agricultural tradable good affect differently the decisions of small and large farmers. Specifically, a decrease in the price of the tradable agricultural good increases child labor among poor farmers, while it decreases child labor among rich farmers. Finally, other results of comparative statics are established in Proposition 6.

4.1 The farmland size

The following Proposition 4 states that, provided the conditional distribution of educational talent given the farmland size is non-degenerate, the relationship between the probability for a child to be a child laborer and the farm size is not monotonic; specifically, it is U-shaped (see Figure 1).

Proposition 4 *Let $F(\varepsilon;\mu)$ be the conditional distribution function of educational talent for each given the farmland size. If $F'(\varepsilon;\mu) > 0$ for all ε, then it is satisfied that $F(\varepsilon_m(\mu_2);\mu_2) > F(\varepsilon_m(\mu_1);\mu_1)$ for any μ_1 and μ_2 greater than $\frac{\chi}{p_A}$ (μ_1, $\mu_2 > \frac{\chi}{p_A}$), provided it is hold either $\mu_1 < \mu_2 < \mu^* \equiv \frac{\chi}{p_A}\frac{1+\sigma}{\sigma}$ or $\mu_1 > \mu_2 > \mu^*$.*

Proof. Proposition 4 follows from Proposition 3 and Figure 1. ■

An increase in farmland size has two opposite effects on the schooling-labor decision: an *income effect* and a *substitution effect*. The *income effect* tends to reduce child labor because as the farm size increases, farmers can achieve the same level of income with less child labor, and schooling is relatively less expensive. The *substitution effect* tends to increase child labor given that, as the farm size increases, the marginal product of (child) labor increases, then also increasing the incentive to employ child labor.

According to our model, the *income effect* predominates for small farmers, while the *substitution effect* predominates the larger the farm. In particular, according to our model, farmers with farmland size μ below a threshold $\mu^* = \frac{\chi}{p_A}\frac{1+\sigma}{\sigma}$, find out that an increase in farm size makes them more prone to send their children to school; differently, farmers with farm size μ above this threshold μ^*, find out that an increase in farm size makes them less prone to send their children to school.

In our model, in the absence of schooling costs ($\chi = 0$), the *substitution effect* predominates for any level of farm productivity and child labor is strictly increasing with the size of the land. This result stems from our assumption concerning the child productivity in any farm is a linear function of the farmland size (i.e., the farm output with the child working is $q(\mu) = \mu + \mu\eta$). This assumption could be replaced by a more general assumption: the productivity of a child in the farm is a concave function of the farmland size. For instance, it could be assumed that $q(\mu) = \mu + \theta\mu^{1-\kappa}$, where $\theta > 0$ and $0 < \kappa < 1$. In this case, the minimum threshold of talent is given by

$$\varepsilon_m(\mu) = \left[\left(\frac{\left(p_A\mu\left(1+\theta\mu^{-\kappa}\right)\right)^{1+\sigma}}{p_A\mu - \chi}\right)^{1/\sigma} + \chi.\right] r_e^{-1},$$

and the relationship between the threshold of talent and the farmland size will still be U-shaped even the explicit cost of schooling are null. In particular, if $\chi = 0$, then the relationship between the ε_m and μ is U-shaped provided $\kappa > \frac{\sigma}{1+\sigma}$.

Moreover, we could assume a general technology $q(\mu) = \mu + z(\mu)$, being $z(\mu)$ the child's contribution to output that satisfies (i) it is an increasing and concave function of the land size of the farmer ($z'(\mu) > 0$ and $z''(\mu) < 0$), (ii) it is lower than the the adult's contribution to output (i.e., $lim_{\mu \to 0} z(\mu) = 0$ and $lim_{\mu \to 0} z'(\mu) = \rho < 1$), and (iii) it is bounded (i.e., $lim_{\mu \to \infty} z(\mu) = \eta > 0$). These properties of the function $z(\mu)$ implies that $q'(\mu) > 1$, $q''(\mu) < 0$, $lim_{\mu \to 0} q(\mu) = 0$, $lim_{\mu \to 0} q'(\mu) = 1 + \rho > 1$, and $lim_{\mu \to \infty} q(\mu) = \infty$. With this more general formulation, the analysis holds similar to that already carried out and the qualitative conclusions remain unchanged. Yet, we have preferred to retain the linearity hypothesis of $q(\mu)$ in order to keep the analysis as simple as possible.

4.2 Trade sanctions

Trade sanctions reduce the relative price of the tradable agricultural good. The effects are displayed in Figure 2 and summarized in the following Proposition 5. of

Proposition 5 *There exists a farm size $\bar{\mu} > \mu_m$ beyond of which $\frac{\partial \varepsilon_m(\mu)}{\partial p_A} > 0$ (resp. below of which $\frac{\partial \varepsilon_m(\mu)}{\partial p_A} < 0$).*

Proof. Proposition 5 follows from Proposition 3 and Figure 2. ■

A decrease in the price of the agricultural tradable good (p_A) has two opposite effects on the schooling decisions. On the one hand, a *substitution effect* impels farmers to send their children to school as the relative return of working in the farm decreases vis-a-vis that of working in the modern sector. On the other hand, an *income effect* impels farmers to put their children to work because schooling is now relatively more expensive with regard to their income. The *substitution effect* predominates among the rich farmers (with large farms) and the *income effect* predominates among the poor farmers (with small farms). Moreover, an decrease in the relative price of the tradable agricultural good (p_A) reduces the value of the land and strengthens the subsistence constraint (8) (see Proposition 2), leading some farmers into of the subsistence trap, hence encouraging them to increase the demand for child labor.

Consequently, a decrease in the price of the tradable agricultural good (p_A) increases child labor among poor farmers, while a decrease among rich farmers has a priori an ambiguous impact on child labor and schooling. The net effect depends on the distribution of land among farmers and on the conditional distribution of educational talent given the farmland size among their children.

Proposition 5 has at least one clear and interesting economic policy implication: trade sanctions against countries where child labor is prevalent have an ambiguous effect on child labor; they may increase or decrease child labor, but trade sanctions will definitively increase child labor among children of poor farmers.

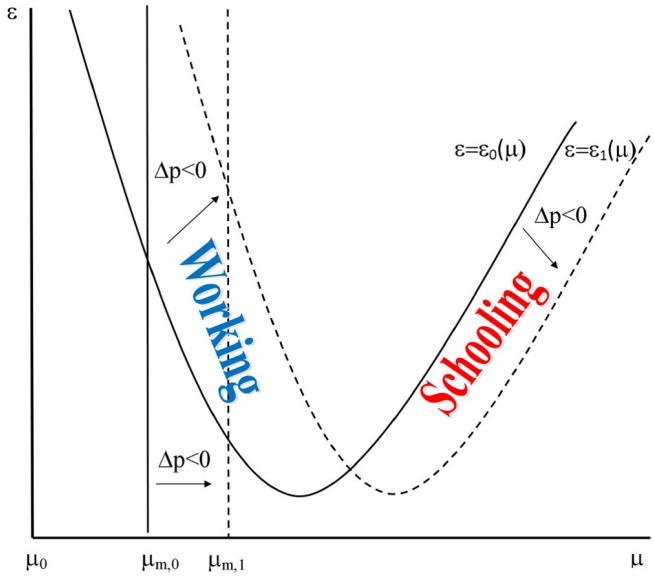

Figure 2: The effect of a change in the price of agricultural output

4.3 Other exogenous variables

The following Proposition 6 summarizes how changes in different parameter of the model (namely, increasing the expected returns to education or decreasing the explicit or implicit costs of education) increase schooling an reduce child labor. The proposition also establishes the effect of an increase in the degree of altruism (σ) on schooling and child labor.

Proposition 6 *The following holds: (i)The talent threshold function $\varepsilon_m(\mu)$ decreases after an (exogenous) increase in school quality (π) and the degree of altruism (σ); (ii) The talent threshold function $\varepsilon_m(\mu)$ increases after an (exogenous) increase in the interest rate (i), the relative price of investment (p_I), the economic depreciation rate of capital (δ), the direct cost of school (χ), the predation rate (τ), the average productivity of children in farms ($\eta - 1$), and the entry costs in the modern sector (λ).*

Proof. Proposition 6 follows from Proposition 1 and Proposition 3. ■

According to Proposition 6, an increase in the schooling quality (π), a decrease in the interest rate (i), the relative price of investment (p_I), the economic depreciation rate of capital (δ), the predation rate (τ), or the entry costs in the modern sector (λ), provokes an increase of the expected private return rate of modern human capital for a new entrant in the modern sector; consequently, it incentives schooling and discourages child labor. A decrease in the schooling costs (χ), or a decrease in the average productivity of children in farms ($\eta - 1$), incentives schooling and discourages child labor because the explicit costs or the implicit costs of schooling decrease. Moreover, a decrease in the schooling costs also

fosters schooling because eases the subsistence constraint. Finally, according to Proposition 6, an increase in the degree of altruism (σ) incentives schooling and discourages child labor because the discounted return rate to education increases.

Proposition 6 has two significant implications. On the one hand, it implies that the incidence of child labor does not only rely on the international terms of trade, but also on the determinants of capital intensity. In particular, international openness fostering capital deepening (e.g. via changes in the interest rate or in the relative price of capital goods) also impact on schooling and child labor because the expected return rate of schooling increases. On the other hand, it highlights that both reducing barriers to human capital and reducing the risk of expropriation, also contribute to increase the expected private return to schooling and, hence, encourage schooling and discourage child labor. Therefore, strengthening the protection of property rights and improving business regulations cannot only foster economic growth, but also reduce child labor in the agriculture sector.

5 Conclusion

This study employs an overlapping-generations model to investigate the determinants of agricultural child labor in developing economies, with a focus on land distribution, trade policies, and schooling decisions. Our findings reveal a U-shaped relationship between farm size and child labor prevalence, driven by a dominant income effect reducing child labor among smallholders and a substitution effect increasing it among largeholders. This dynamic is consistent with the wealth paradox, where land-rich households are more likely to employ child labor. Trade sanctions, by worsening terms of trade, increase child labor among smallholders while reducing it among largeholders, resulting in an ambiguous net effect contingent on land distribution. In contrast, trade liberalization fosters capital deepening, enhancing returns to education and reducing child labor, particularly when developing economies integrate into global capital markets.

These findings carry significant policy implications. The U-shaped relationship suggests that land redistribution policies promoting equitable land distribution can effectively reduce child labor by mitigating extreme disparities in farm sizes. Comprehensive trade liberalization, encompassing access to global capital and investment markets, is crucial for increasing human capital accumulation and curbing child labor. Additionally, institutional reforms that strengthen property rights, reduce barriers to skilled labor, and enhance school quality and affordability are essential complements to these policies. For developing countries integrating into global agricultural supply chains, our results underscore the need to consider land distribution patterns, as trade-induced changes in terms of trade can either exacerbate or alleviate child labor depending on farm size heterogeneity.

Future research could explore the role of gender-specific factors in child labor decisions,

given evidence of differential impacts by gender, as seen in rural Zimbabwe [Oryoie et al., 2017]. Incorporating credit market imperfections explicitly into the model could further elucidate the constraints faced by smallholders. Additionally, empirical studies testing the U-shaped relationship across diverse agrarian economies would strengthen the generalizability of our findings and inform tailored policy interventions.

References

Kenneth J. Arrow. Rawls's principle of just saving. *The Swedish Journal of Economics*, 75(4):323–335, 1973. ISSN 00397318. doi: 10.2307/3439143. URL https://doi.org/10.2307/3439143.

Jean-Marie Baland and James A. Robinson. Is Child Labor Inefficient? *Journal of Political Economy*, 108(4):663–679, 2000. ISSN 00223808, 1537534X. doi: 10.1086/316097.

Talia Bar and Kaushik Basu. Children, education, labor, and land: In the long run and short run. *Journal of the European Economic Association*, 7(2-3):487–497, 2009. doi: 10.1162/JEEA.2009.7.2-3.487.

Kaushik Basu and Pham Hoang Van. The economics of child labor. *American Economic Review*, 88(3):412–427, 1998. doi: 10.1257/aer.88.3.412.

Kaushik Basu, Sanghamitra Das, and Bhaskar Dutta. Child labor and household wealth: Theory and empirical evidence of an inverted-u. *Journal of Development Economics*, 91(1):8–14, 2010. doi: 10.1016/j.jdeveco.2009.01.006.

Gary Becker and Kevin Murphy. The Family and the State. *Journal of Law and Economics*, 31 (1):1–18, 1988. doi: 10.1086/467147.

Marwan Benali, Bernhard Brümmer, and Victor Afari-Sefa. Smallholder participation in vegetable exports and age-disaggregated labor allocation in northern tanzania. *Agricultural Economics*, 49(5):549–562, September 2018. doi: 10.1111/agec.12441.

Bruce L. Benson. Enforcement of private property rights in primitive societies: Law without government. *Journal of Libertarian Studies*, 9(1):1–26, 1989.

Sonial Bhalotra and C. Heady. Child farm labor: The wealth paradox. *World Bank Economic Review*, 17(2):197–227, 2003. doi: 10.1093/wber/lhg017.

R. Bird. Agricultural taxation in developing countries. *Finance and Development*, 11(3):35–37, 1974.

Antoine Bommier and Pierre Dubois. Rotten parents and child labor. *Journal of Political Economy*, 112(1):240–248, 2004. doi: 10.1086/379937.

D. Brown. *A Transaction Costs Politics Analysis of International Child Labor Standards*. Ann Arbor: University of Michigan Press, 2000.

Biswajit Chatterjee and Runa Ray. *Impact of Trade Restriction on Child Labour Supply and the Role of Parents' Utility Function: A Two Sector General Equilibrium Analysis*, pages 315–329. Springer India, New Delhi, 2016. ISBN 978-81-322-2797-7. doi: 10.1007/978-81-322-2797-7_15.

Flavia Cifarelli. Keep calm and make a blacklist: Child labour and international trade. *The World Economy*, n/a(n/a), 2025. doi: 10.1111/twec.13665.

Alessandro Cigno, Furio C. Rosati, and Lorenzo Guarcello. Does globalization increase child labor? *World Development*, 30(9):1579–1589, 2002. doi: 10.1016/S0305-750X(02)00063-0.

José I. Conde-Ruiz, Eduardo L. Giménez, and Mikel Pérez-Nievas. Millian efficiency with endogenous fertility. *Review of Economic Studies*, 77(1):154–187, 2010. doi: 10.1111/j.1467-937X.2009.00568.x.

Ana C. Dammert, Jacobus de Hoop, Eric Mvukiyehe, and Furio C. Rosati. Effects of public policy on child labor: Current knowledge, gaps, and implications for program design. *World Development*, 110:104–123, 2018. ISSN 0305-750X. doi: 10.1016/j.worlddev.2018.05.001.

Partha Dasgupta. On some alternative criteria for justice between generations. *Journal of Public Economics*, 3(4):405–423, 1974. doi: 10.1016/0047-2727(74)90007-3.

Fernando del Río. Property rights, predation, and productivity. *The Scandinavian Journal of Economics*, 120(4):1153–1188, 2018. doi: 10.1111/sjoe.12243.

Fernando del Río. The impact of rent seeking on social infrastructure and productivity. *Review of Development Economics*, 25(3):1741–1760, 2021. doi: 10.1111/rode.12772.

A. Dixit. *Comment on 'A Transaction Costs Politics Analysis of International Child Labor Standards'*. Ann Arbor: University of Michigan Press, 2000.

Simeon Djankov, Rafael La Porta, Florencio López-de Silanes, and Andrei Shleifer. The regulation of entry. *The Quarterly Journal of Economics*, 117(1):1–37, 2002. doi: 10.1162/003355302753399436.

Matthias Doepke and Michèle Tertilt. Families in macroeconomics. In *Handbook of Macroeconomics*, volume 2, pages 1789–1891. Elsevier, 2016. doi: 10.1016/bs.hesmac.2016.04.006.

Christelle Dumas. Why do parents make their children work? a test of the poverty hypothesis in rural areas of burkina faso. *Oxford Economic Papers*, 59(2):301–329, 2007. doi: 10.1093/oep/gpm006.

Eric V. Edmonds and Nina Pavcnik. The effect of trade liberalization on child labor. *Journal of International Economics*, 65(2):401–419, 2005. doi: 10.1016/j.jinteco.2004.04.001.

Patrick M. Emerson and Shawn D. Knabb. Opportunity, inequality and the intergenerational transmission of child labour. *Economica*, 73(291):413–434, 2006. doi: 10.1111/j.1468-0335.2006.00518.x.

Jean Ensminger. Changing property rights: Reconciling formal and informal rights to land in africa. *The Frontiers of the New Institutional Economics*, 1997.

Marco A. Espinosa-Vega and Richard C. Barnett. Barriers to capital accumulation and the incidence of child labor. Technical Report 220, International Monetary Fund, November 2005.

Food and Agriculture Organization. Building a resilient cocoa culture in côte d'ivoire. July 2022.

Heather Congdon Fors. The determinants of rural child labor: An application to india. *Journal of Economic Literature*, 2007.

Raymond Boadi Frempong and David Stadelmann. Risk preference and child labor: Econometric evidence. *Review of Development Economics*, 25(2):878–894, 2021. doi: 10.1111/rode.12746.

Harald Grossmann and Jochen Michaelis. Trade sanctions and the incidence of child labor. *Review of Development Economics*, 11(1):49–62, 2007. doi: 10.1111/j.1467-9361.2006.00352.x.

Ziade Hailu and Tilahun Girma. Wealth-induced child labour: Evidence from ethiopia. *International Journal of Social Economics*, 49(9):1401–1413, 2022. doi: 10.1108/IJSE-09-2020-0647.

Fred Harter. We Would Not Survive without Coffee: How Rules Made in Europe Put Ethiopian Farmers at Risk. *The Guardian*, April 2024. URL https://www.theguardian.com/global-development/2024/apr/09/coffee-how-rules-made-in-europe-put-ethiopian-farmers-at-risk.

ILO and UNICEF. Child labour: Global estimates 2020, trends and the road forward. Technical report, International Labour Office and United Nations Children's Fund, New York, USA, 2021.

Mahmudul Karim. Despite challenges, long-running industry works to expand in global market. *Global Seafood Alliance*, April 2006.

Mahmood Hasan Khan. Agricultural taxation in developing countries: A survey of issues and policy. *Agricultural Economics*, 24(3):315–328, 2001. doi: 10.1111/j.1574-0862.2001.tb00033.x.

Faqin Lin. Agriculture exports, child labor and youth education: Evidence from 68 developing countries. *Review of International Economics*, 30(2):490–513, 2022. doi: 10.1111/roie.12572.

Lauren Maclean. *Informal Institutions and Citizenship in Rural Africa: Risk and Reciprocity in Ghana and Côte d'Ivoire*. Cambridge University Press, New York, 2010. doi: 10.1017/CBO9780511730306.

Keith E. Maskus. Should core labor standards be imposed through international trade policy? *World Bank Policy Research Working Paper*, (1817), 1997.

Flora J. Nankhuni and Jill L. Findeis. Natural resource-collection work and children's schooling in malawi. *Agricultural Economics*, 31(2-3):123–134, 2004. doi: 10.1016/j.agecon.2004.09.022.

Eric Neumayer and Indra de Soysa. Trade openness, foreign direct investment and child labor. *World Development*, 33(1):43–63, 2005. ISSN 0305-750X. doi: 10.1016/j.worlddev.2004.06.014.

Guy B. Nkamleu and Anne Kielland. Modeling farmers' decisions on child labor and schooling in the cocoa sector: A multinomial logit analysis in côte d'ivoire. *Agricultural Economics*, 35(3): 319–333, November 2006. doi: 10.1111/j.1574-0862.2006.00165.x.

Jeffrey B. Nugent. The old-age security motive for fertility. *Population and Development Review*, 11(1):75–97, March 1985. doi: 10.2307/1973379.

OECD. Taxation in agriculture. Technical report, OECD Publishing, Paris, 2020.

A. R. Oryoie, J. Alwang, and N. Tideman. Child labor and household land holding: Theory and empirical evidence from zimbabwe. *World Development*, 100:45–58, 2017. doi: 10.1016/j.worlddev.2017.07.025.

George Psacharopoulos and Harry Patrinos. Returns to investment in education: A further update. *Education Economics*, 12(2):111–134, 2004. doi: 10.1080/0964529042000239140.

Diane L. Putnick and Marc H. Bornstein. Is child labor a barrier to school enrollment in low- and middle-income countries? *International Journal of Educational Development*, 41:112–120, 2015. doi: 10.1016/j.ijedudev.2015.02.001.

Indira Rajaraman. Taxing agriculture in a developing country: A possible approach. In *Taxing the Hard-to-Tax: Lessons from Theory and Practice*, Contributions to Economic Analysis, pages 245–268. Emerald Group Publishing Limited, May 2005. doi: 10.1016/S0573-8555(04)68812-2the2.

Priya Ranjan. Credit constraints and the phenomenon of child labor. *Journal of Development Economics*, 64(1):81–102, 2001. ISSN 0304-3878. doi: 10.1016/S0304-3878(00)00125-5.

Anette Ruml and Matin Qaim. New evidence regarding the effects of contract farming on agricultural labor use. *Agricultural Economics*, 52(1):51–66, January 2021. doi: 10.1111/agec.12606.

Sharmistha Self and Richard Grabowski. Agricultural technology and child labor: Evidence from india. *Agricultural Economics*, 40(1):67–78, January 2009. doi: 10.1111/j.1574-0862.2008.00360.x.

Mary M. Shirley. Institutions and development. In *Handbook of New Institutional Economics*, pages 611–638. Springer, 2005. doi: 10.1007/0-387-25092-1_24.

A. Shumetie and K. Mamo. Effect of cropland and livestock ownership on child labour in eastern ethiopia: Empirical examination of the wealth paradox. *International Journal of Child Care and Education Policy*, 13(5), 2019. doi: 10.1186/s40723-019-0061-x.

Timothy Standen and Ayman Falak. Vietnam's coffee market faces challenges despite strong exports, domestic growth. *Vietnam Briefing*, July 2022. URL https://www.vietnam-briefing.com/news/

vietnams-coffee-market-faces-challenges-despite-strong-exports-domestic-growth.html.

Graeme Stewart-Wilson and Ronald Waiswa. Taxing agricultural income in the global south: Revisiting uganda's national debate. Technical report, The Institute of Development Studies and Partner Organisations, Brighton, 2021.

Nadine Stöcker, Humberto Reyes Hernández, and Juan Carlos Torrico-Albino. The bolivian organic quinoa in the fairtrade market, implications for the weakest link in the value chain: Small-scale farmers. *Tropical and Subtropical Agroecosystems*, 27(3), 2024. ISSN 1870-0462. doi: 10.56369/tsaes.5814.

Yin Li Toh. The role of land wealth on child labour in vietnam. *Atlantic Economic Journal*, 46: 247–248, 2018. doi: 10.1007/s11293-018-9575-9.

Cristian Ugarte, Marcelo Olarreaga, and Gady Saiovici. Child labour and global value chains. *The World Economy*, 46(4):941–968, 2023. doi: 10.1111/twec.13401.

Department of Economic United Nations and Social Affairs. The sustainable development goals report 2024. Technical report, Department of Economic and Social Affairs, New York, USA, June 2024.

Waceke. Why Is Kenya's Tea Industry Dominated by Small-Scale Farmers? A Comprehensive Analysis. *Business Radar*, August 2024. URL https://www.businessradar.co.ke/blog/2024/08/10/why-is-kenyas-tea-industry-dominated-by-small-scale-farmers-a-comprehensive-analysis/.