Bargaining Power and Inheritance Norms: Evidence from Polygamous Households in Nigeria*

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Abstract

We investigate the interaction between inheritance norms and women's bargaining power in determining child labor supply across siblings. With child labor improving the household's future inheritable assets, we develop a theoretical model to capture bargaining power dynamics within complex household structures. Our results suggest that mothers' relative bargaining power increases children's labour supply, especially when inheritance norms assign a greater share to the mother's child.

Using data from Nigeria and the variation in mothers' bargaining power and inheritance norms, we find that children of the more powerful mother work more than children of other mothers within polygamous households. This result is more pronounced for boys, landed households and when first wives can directly increase their returns to future inheritance.

1 Introduction

Family decisions regarding resources accumulation and their distribution are driven by individual decision-making power within the household. Power is a function of individual characteristics, such as relative incomes or education as well as formal and informal institutions, like the rule of law and traditional practices (Browning et al. 2014). Especially for women, informal institutions (i.e., social norms) are crucial for determining their role in the society with substantial consequences for

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child outcomes (Alesina et al. 2018, Lowes 2020, Ashraf et al. 2020) and depending on their relative power to influence household choices (Duflo 2003, Armand et al. 2020).

This paper analyses the interaction between social norms – in particular inheritance norms – and women's bargaining power in determining children's labor supply across siblings within households. Our contribution is to analyse the determinants of child labour supply within complex household structures, where decisions are the outcome of a negotiation in which bargaining power dynamics are not limited to husband and wife but include those between co-wives. This allows to identify the variation in bargaining power within the household and analyse its effect on the variation in child outcomes when inheritance norms affect siblings and mothers to a different extent.

Our identification strategy relies on two key assumptions. As bargaining power is assigned by the rank within the marriage order, it can be regarded as exogenous to child outcomes. The assumption of exogeneity of mother's bargaining power for child outcomes may be challenged by the fact that mother characteristics, in particular fertility outcomes, affect the decision to have multiple wives. We condition on fertility outcomes as well as mother characteristics and employ different estimation strategies to alleviate this concern. The second assumption is that given differences in inheritance norms that vary by gender and legal relation, access to inheritance can vary across siblings within the polygamous household. This variation is exogenous to child outcomes, once unobservable household characteristics have been taken into account. To validate this assumption, we guide our empirical analysis by a theoretical household model in which land quality depends on child labor and bargaining power varies across mothers. Children (and mothers) are entitled to a varying degree of inheritance depending on the existing setting. The model predicts that the higher the bargaining power of one mother relative to her co-mothers, the longer are the hours worked on the farm by her children. This occurs regardless of the other wife's relative bargaining power and as long as the husband's preferences do not favour education over working on the land.

We analyse the model's predictions using several waves of household survey data from Nigeria. Nigeria is the best possible case to validate our results because it is a country with polygamy affecting around 28 percent of the population (Kramer 2020), first wives have been found to be more powerful (Munro et al. 2019), and multiple overlapping norms regarding inheritance rights coexist. We explore the variation in child labour supply due to differences in mothers' bargaining power within the household and inheritance norms drawing upon a variety of data sources, including inheritance measures at the level of the land area within the household, the community, and the ethnic group.

Contrasting previous evidence that junior wives' child labour supply compensates for the educational investments made for children of more senior wives (Mammen 2009), we find that children of the first wife work longer hours than children of other wives. This result is driven by gender (i.e. being a boy), can be explained by landed households and is more likely to emerge when mothers have direct access to a (diminutive) share of inheritance. Our results withstand a variety of robustness and specification checks including inheritance measures based on matched ethnographic

information, different functional forms and addressing endogeneity of wife status. Using disaggregated data at the household-plot-child-level, we find that children, and especially boys, work more when they are entitled to inherit a particular piece of land, and that first wives' sons are 8.6 percentage points more likely to do so compared to sons of other mothers.

Our paper contributes to the growing literature on how social norms and institutions impact on parental investments in human capital across siblings. Recent work shows that the expansion of individual property rights led to significantly higher survival chances for male children in families without a first born son in a setting in which sons are entitled to inherit the land (Bhalotra et al. 2019). While progressive legislation aimed at improving inheritance rights of women had only limited direct effects on inheritance, it increased human capital investments in daughters as parents compensate their daughters by increasing their education (Roy 2015). La Ferrara & Milazzo (2017) find that boys in landed households who belong to the ethnic group most impacted by a land reform in Ghana, tend to experience a substantial reduction in schooling. In line with these findings, Jensen & Miller (2017) find that increasing the perceived returns to education in urban areas reduces school enrolment of boys as parents initially hoped they would remain at home to tend to the farm in the rural setting of India. While we do not analyse the effect of exogenous *changes* to social norms or institutions on the variation in child outcomes across gender, we focus on the effect of mother status and inheritance norms, both of which are unrelated to unobservables affecting outcomes across siblings *within* the polygamous household, once fertility decisions have been made.

More generally, our paper also contributes to the theoretical literature on child labour supply in developing countries (Basu 1999). We extend a standard collective model to a polygamous household that consists of more than two decision-makers. Unlike previous models that analyse the education-child-labour-trade-off (Reggio 2011), we assume that child labour not only generates disutility to the household (as it hampers the accumulation of human capital) but also utility, because it improves the quality of land and thus, the future value of the family inheritable asset. By doing so, child labour acts as long-term investment particularly attractive to mothers of children who are more likely to inherit the land. While our findings are based on polygamous households, they can be extended to settings in which gender-biased inheritance norms, differences in preferences and power within the household coexist. Basu (2006), for example, finds that when the distribution of power is skewed towards one parent, child labour supply can increase since the powerful parent can appropriate the resulting additional income. We expand this finding by showing that when there is uncertainty in the access to inheritance of mothers, working the land may appear to the relatively more powerful mother an attractive alternative to education, especially if it serves to provide her a greater return to future inheritance.

The paper proceeds as follows. Section 2 discusses power dynamics and inheritance norms in polygamous households with a focus on Nigeria. Section 3 presents the theoretical model and its key results. Section 4 contains our empirical framework, which is followed by a discussion of the sample and data characteristics in Section 5. Section 6 summarizes the empirical results and robustness checks. A final section concludes.

2 Polygamous households

A polygamous household allows to study the bargaining dynamics not only between husband and wife but also among co-wives.

2.1 Polygamy and the marriage market in Nigeria

Polygamy, in combination with bride price payments, shapes the wife composition in the Nigerian marriage market (Rexer 2022). Many factors that are not observable at the time of the first marriage (but that may be revealed during the course of the marriage) can affect whether a household becomes polygamous. For instance, fertility differences across wives – in particular the lack of a son or infertility of the first wife – have been repeatedly highlighted to affect selection into polygamy and the resulting wife composition (Munro et al. 2019).

Reproduction is one of the main reasons of marriage in Nigeria and to maximize the number children a couple may have, many women enter the marriage market as soon as physically ready. Therefore, in rural areas, early marriages are still common with an average age of marriage ranging between 15 and 17 years (Isiugo-Abanihe et al. 2022). Parental wealth, together with education, also affects the age of women's marriage and higher wealth is associated with a later age of first marriage (Corno et al. 2020). A similar role is played by education, since women with a higher level of education tend to enter the marriage market later in life and this is likely affecting their chances to enter a polygamous marriage.

Because of early marriage and household responsibilities, women lose out on education and labour market opportunities. The high proportion of women involved in farming activities and the disparity in the education received trap most women in low-paid occupations, small household enterprises and non-farm business characterised by low productivity and potential to grow (Enfield 2006), increasing their reliance on husbands and children (Grossbard-Shechtman 1976).

Women's vulnerability is particularly pronounced in the case of widowhood, when most women lose all that was acquired by themselves and their husbands (Onyima 2019). Because of the lack of inheritance rights and inferior social position, widows face severe discrimination and may, as a result, remarry constituting a fraction of the second wives in the polygamous marriage market (Milazzo & van de Walle 2021). Decisions regarding remarriage of widows are in most instances taken by the relatives of the deceased husband and are often made with the aim of increasing socioeconomic networks of the household (Onyima 2019). For instance, in rural Nigeria, to ensure the continuation of the kinship-based line of descent, the practice of widow inheritance is widespread (Lesthaeghe et al., 1994).

As a result, second wives may come from less privileged backgrounds to start with affecting and reflecting the relative distribution of bargaining power across wives within the polygamous household (analyzed in more detail in Section 6.4).

2.2 Within the Nigerian household

Cooperation among co-wives on household duties has been repeatedly reported as a way to optimally manage resources and energies over time in polygamous households (Ware 1979). Akresh et al. (2011) report a higher level of agricultural productivity obtained by polygamous compared to monogamous households due to higher co-operation among co-wives compared to husbands and wives. Although cooperation might occur in certain domestic spheres, rivalry among co-wives can still arise in other domains (Becker 1981). Fertility competition across co-wives has been found to have negative externalities on child welfare in polygamous households resulting in increased child mortality, gender-biased child preferences and reduced birth intervals (Rossi 2019, Arthi & Fenske 2018, Milazzo 2014). Evidence of human capital investments in polygamous households suggests that children of more senior wives fare better than children of other mothers (Mammen 2009, Matz 2016).

The dynamics of competition and rivalry among wives observed in other polygamous societies seem confirmed in the Nigerian household across a range of its ethnic groups. Competition for affection and resources from the husband between nuclear family units headed by wives of different rank position is widespread among the Igbo (Egboh 1972). A survey conducted in Ibadan found that among the Yoruba co-wife jealousy is primarily driven by competition over shares of economic resources (Ware 1979). Yoruba wives have been found to earn incomes and contribute to the household budget, but tend to hide their incomes from their husbands to gain autonomy in decision making (van Staveren & Ode bode 2007). Also, among the Nupe in Western Nigeria limited cooperativeness among co-wives compared to husbands and wives has been observed in a series public-good-style investment games (Barr et al. 2019). Still, Yoruba wives cooperate in domestic tasks such as the provision of child care and food preparation within households (Saito et al. 1994). Similar observations have been made for the Hausa where "wives cook or sweep and do domestic work in rotation" (Otite 1991, p.21).

Seniority rankings among wives affect the distribution of resources within the Nigerian household with first wives having been repeatedly reported to be more powerful than other wives: "[. I]n a polygynous family [wives] are ranked according to their order of marriage, with the shelter of the senior one containing the most valuable property of the family." (Otite 1991, p.30). First wives were also found to do less work and their children receive preferential treatment (Ware 1979). Evidence from Kano, Northern Nigeria, suggests that in polygamous households, in which men control the allocation of resources, first wives secure a relatively greater resource share than second wives (Munro et al. 2019). While the study finds that fertility and age affect the resource allocation in these household, these factors do not outweigh the first wife advantage.

2.3 Inheritance norms

The set of inheritable rights in Nigeria is mainly dictated by land tenure and marriage form. Land is divided into 3 major types: communal land, individual (or private) land or public (state) land. Beside those, there is also customary land, held as a corporate aggregate across descent lines and family systems, which can be used

jointly by any member. Eviction from such land is not possible without consent of the community. Private tenure in customary systems assigns the management of the land mainly to the family instead: the family head distributes rights to land that are inheritable to children but not alienable without consent of the head of the household.[1] The private rights referred to are mostly limited to usufructuary rights as the ultimate ownership rights rest with the community (Lloyd 1970). Once labour has been applied to clearing and cultivating a plot of land, it creates usufruct rights (Meek 1970*a*). Inheritance within the lineage, in particular in the patrilineage, is widespread across Nigeria's ethnic groups (Meek 1970*b*).

While all individuals who are members of the community or family have a right to a portion of the land, this does not apply to women as they are often considered as temporary household members and therefore without the rights to acquire or inherit land in case of a deceased husband (Achinewhu-Nworgu et al. 2019, van Staveren & Ode bode 2007). Upon a man's death, land may be divided among his male heirs or passed down solely to the eldest son, depending on community practice. Under customary tenure, women rarely inherit and mostly obtain use rights through their husbands or children. While women may not hold a right to the land "on the death of her husband a woman may continue to have a life interest in her husband's land and to hold it on behalf of his children" (Meek 1970*b*, p. 294). The inheritance system under Islamic law provides more protection to woman's inheritance rights: widows inherit their husbands' properties together with their children; however, women have the right to inherit a small share only which is decreasing in the number of wives. Still, women without a son are extremely vulnerable facing possible eviction if a son or another member of the family fails to ensure her access to land (Lambert & Rossi 2016, Milazzo & van de Walle 2021).

To summarize, the existence of gender-biased inheritance norms in combination with absent old-age support systems often turn children into irreversible investments that determine wives' outside options in polygamous households, making co-wives primarily concerned with their nucleus family's rather than the overall household's welfare.

3 A Polygamous Household Model

Consider a household whose utility function is a linear combination of partners' individual utility functions weighted by their bargaining power (Browning et al. 2014). Our adaptation of the collective model focuses on the child labour/schooling trade-off in a setting where children face different inheritance rights (Bhalotra et al. 2019, La Ferrara & Milazzo 2017) and where bargaining power varies among the wives within a polygamous household.

3.1 Set Up

Each polygamous household consists of one husband (male), m, and i wives (female), f_i, where $i = 2$. Without loss of generality the set up can be extended to $i = n$. For

[1] For a more detailed description of land tenure in Nigeria, see Emery (2006) or Lloyd (1970).

simplicity, we assume that each wife has one child from the same husband and her utility function is affected by elements that concern her biological child only.

The household decides the optimal amount of working hours that each child spends in domestic agricultural production on the farm and, residually, those invested in education. Children receive a fraction of inheritance represented by the share of land each child is entitled to according to social norms, π_i. In Nigeria, wives are considered temporary members of the household, hence we assume they have access to inheritance via their child (see section on 2.3). We assume for now π_i to be exogenous. This is consistent with a well established rule of law that regulates inheritance norms for the household's members and is not affected by wives' bargaining power; we relax this assumption in Section 3.3.

The utility of each wife, V_i, depends on the expected value of the future inheritance, the stock of family's land A multiplied by π_i, and on the time their biological child spends in school, E_i. As is standard in the literature, E_i is expected to increase the welfare of both biological parents, for example, because of the expected improvement in the social standing of their children. This can be thought as a *pride effect* driven by the hope of realizing a better future for their children.

Therefore, we assume the utility functions of the wives to be increasing in the education of their children and in the future value of inheritance and decreasing in labor supply (Browning et al. 2014, Reggio 2011). These functions are concave, continuous, twice differentiable and separable in the sub-components:

$$V_i = V\Big(\pi_i A, (1 - L_i)\Big) \tag{1}$$

The child of each wife i has a total amount of time available, normalized to 1, and it can be allocated to either attending school or working on the farm, so that $L_i \geq 0$ and $E_i \geq 0$. We assume the children work only on the family farm, i.e. there is no child labour market. The time constraint can be written as:

$$1 = L_i + E_i$$

The time children contribute to agricultural production, L_i, affects the quality of the land A that children inherit in the future. The type of activities we consider as child labour are age-appropriate farm activities. While they do not present hazards for the children, such as clearing the land, preparing the soil and providing irrigation, those tasks not only help them to learn valuable skills but contribute to household income. The stock of land available depends on an exogenous land endowment normalized to 1 and the work done by the household's children:

$$A = 1 + \gamma \sum_{i=1}^{2} L_i \tag{2}$$

where γ, being strictly positive, represents the productivity parameter of child labour, i.e. it measures the ability/efficiency of children in completing their tasks. Our specification implies that land quality improvements are independent of the particular child who works on the land ($\gamma_1 = \gamma_2 = \gamma$).

Since the benefits of the future inheritance, represented by the share of land inherited by both children, are gained by the heirs of a deceased husband only (wives and children) we assume the husband only derives utility of his children's education. For now, children are assumed to be of the same sex. We relax this assumption to analyse the effects of a gender-biased inheritance system in section 3.2.1.1. The husband's utility function increases in the education of his children, is concave and twice continuously differentiable:

$$U = U\Big((1-\beta)(1-L_1), \beta(1-L_2)\Big) \tag{3}$$

where $\beta \leq 1$ represents the weight the husband assigns to the education of child 2. By combining equations (1) and (3), we construct a collective household model following Browning & Chiappori (1998)'s approach. The household welfare function, H, is defined as a weighted average of both husband and spouses individual welfare functions:

$$H = (1 - \sum_{i=1}^{2} \mu_i)U + \sum_{i=1}^{2} \mu_i V_i \tag{4}$$

The weight μ_i represents the bargaining power of each wife with $\mu_i \in [0, 1]$ and $\sum_{i=1}^{2} \mu_i \leq 1$. Moreover, μ_i identifies the marriage order of wives with $\mu_i \geq \mu_j$, $\forall$ $i < j$. This set up allows to analyze how the bargaining power dynamics between the husband and each wife individually, but also those among co-wives, affect each child's labour supply.

Total household production, Y, represents the farm production obtained with the household's factor inputs: land, A, and child labour L_i. The quasi-linear specification emphasizes that: 1) both inputs have separate and additive effects on the final output; 2) land contributes in a linear way (constant) to the final output highlighting the key role played in this context, whereas labour inputs are complementary; 3) corner solutions are avoided, such as, when one of the children invests all their time in education, guaranteeing a subsistence consumption level to the household.

Domestic farm production is summarized by the following function:

$$Y = (1 + \gamma \sum_{i=1}^{2} L_i) + \prod_{i=1}^{2} L_i \tag{5}$$

where A, normalized to 1, represents the stock of land and L_i is child i's labour input. Equation (5) distinguishes between an inheritable component of the output (land related) and a non-inheritable component (labour related). The production function satisfies standard properties, being strictly increasing and twice differentiable.

The only costs the household faces are those associated with education, C_e (measured in-kind, so non-pecuniary), which are equal across children. The budget constraint is then given by:

$$Y = C_e \tag{6}$$

Combining (5) with (6), we obtain the household's budget constraint:

$$1 + \gamma \sum_{i=1}^{2} Li + \prod_{i=1}^{2} Li = C_e \tag{7}$$

3.2 Mother status and human capital investment

To study the effects of a variation in the wives' bargaining power on children's labour supply, we start by maximizing equation (4) subject to (7) with respect to L_i. A full derivation can be found in the Appendix A.

3.2.1 Mother i and child i

Defining $\tilde{\pi} = \pi(\beta, \gamma)$, we can state:

Result 1 *If $\pi_i > \tilde{\pi}$, then $\partial L_i / \partial \mu_i > 0$ regardless of μ_j.*

When the bargaining power of wife i, μ_i, increases, the labour supply of her own child increases if the inheritance share child i is entitled to is greater than $\tilde{\pi}$. We can define $\tilde{\pi}$ as the threshold level of inheritance share that mother i would like guaranteed to make the time invested in working the land worth for her child (See Appendix for derivation). Mother i, knowing her child inherits a share higher than $\tilde{\pi}$ of the household land wants therefore to increase this child's working hours so that ultimately he (and her via him) inherits an asset with a higher value and so her utility is higher when her child works on the land than when he invests time in education.

When instead ($\pi_i < \tilde{\pi}$), then $\partial L_i / \partial \mu_i < 0$, the inheritance share is not sufficiently high and mother i wishes her child to work less on the farm (and as a consequence) to receive more education. Also, the higher the children's labour productivity, the more wife i is willing to increase child i working hours. Since the land's quality is improved in equal measure by the work of both children, she would like her child to work more on the land so that he (and she ultimately) inherits a more valuable asset. Child i's labour supply increases when the husband does not value sufficiently the education of child i (i.e., $(1-\beta)$ is small): in this case, both parents' preferences are aligned towards working on the farm and the labour supply of child i increases. In Result 1, the bargaining power of mother j, μ_j, does not play any role. Even when $\mu_j \neq 0$, this is not sufficient to counter balance the bargaining power of both mother i and the husband which ultimately decide child i's working hours.

3.2.1.1 Gender-biased inheritance:

So far we have assumed that local norms assign to both children a positive inheritance share. Inheritance rights, like most rights in Nigeria, are tilted towards men. When it comes to devolution of land, wives and daughters typically get little or nothing in comparison to the male counterparts.

Assume, therefore, child i is the sole heir (male) and so $\pi_i = 1$, because of the gender-biased inheritance system, whilst child j (female) is formally excluded from inheritance (i.e., $\pi_j = 0$).

Corollary 1.1 *If* $\pi_i = 1$, $\partial L_i/\partial \mu_i > 0$ *when* $\gamma > \tilde{\gamma}$.

Inheritance norms that favors sons over daughters by assigning them the highest shares increase the mother's marginal utility from the inheritance even more when her child i is a son. Also, child i's productivity γ must be greater than $\tilde{\gamma}$, which can be interpreted as the threshold productivity level for the mother to increase her child's working hours following an increase in her bargaining power. When $\pi_i = 1$, wife i knows that her son is receiving all of the inheritance, therefore, in a system that assigns such rights, she wants her child to work more on the farm to increase the value of the asset of which he (and she, ultimately) inherits the higher share. As across ethnic groups and religions, a higher share of inheritance is usually granted to boys, Corollary 1.1 shows that mothers want their children to work more on the farm when they are boys.

3.2.2 Mother i and child j

We now focus on the effects of an increase in the bargaining power of mother i on the labour supply of child j.

$$\textbf{Result 2}\ \exists\, \mu_j \geq 0 \textit{ such that } \partial L_j/\partial \mu_i = \begin{cases} > 0 & \textit{if} \quad \mu_j = 0 \quad \textit{and} \quad \beta < 1/2; \\ > 0 & \textit{if} \quad \mu_j > 0 \quad \textit{and} \quad \beta < 1/2; \pi_i > 1/2 \\ < 0 & \textit{if} \quad \mu_j > 0 \quad \textit{and} \quad \beta > 1/2; \pi_i < 1/2 \end{cases}$$

The effect that an increase of wife i's bargaining power has on the labour supply of child j depends on the relative bargaining power of the other mother, μ_j, and on the preferences of the husband towards the education of child j, β. If $\mu_j = 0$, mother j does not have enough power to contain mother i's bargaining power in deciding on her biological child's labour supply. Since the land quality increases by the work of both children, wife i wants child j to work on the farm to improve the asset's value that her child, i, inherits. This result holds under the assumption that child i has a strictly positive inheritance share, i.e. $\pi_i > 0$ and for $\beta < 1/2$ which implies that the father's interest for child j's education is also low.

When instead $\mu_j > 0$, the final effect on child j's labour supply depends crucially on the husband's preferences for child j's education. Specifically, if $\beta < 1/2$, despite the fact that his biological mother has some bargaining power, the joint effect of mother i's power and the husband's preferences produce in the end an increase in child j's labour supply. The same final effect on child j's labour supply occurs when $\pi_i > 1/2$; that is, child i (and mother i through him) is inheriting a higher share of the household's land, whose final value is improved by the work of child j too. When, instead, the husband cares substantially for child j's education, mother i's bargaining power is not strong enough to counterbalance the one of the other adults and therefore, the final effect on child's j labour supply is negative.

To summarize, whenever one wife is not all powerful and child i is not the sole heir, mother i is not unambiguously able to command over child j's time if the father cares for his education, resulting in differences in labour supply across siblings.

3.3 π_i as an endogenous function of bargaining power

Several types of administrations and rule of law co-exist in Nigeria since the beginning of the nineteenth century. A common trait shared by many ethnic groups, such as the Yoruba, for example, is that all the children inherit a share of the father's assets, but for the widows there is much less agreement on what they are entitled to. In the Southern Nigerian ethnic group Efik, for example, "[...] widows have no right of succession to their deceased husbands' estates. At best the widow can be allowed to stay in the family house, if she had children for her deceased husband as well as remains of good behavior. She has no maintenance allowance from the family, but is taken care of by her children" (Otu & Nabiebu 2021, p.52). Islamic law allows women to inherit up to one eighth of the husband's total wealth. The lack of a uniform system of norms that regulates women's inheritance rights opens up a void in the legislation that we now assume bargaining power can fill.

Assume π_i is a function of the wives' relative position within the household ($\pi_i(\mu_i, \mu_j) = \frac{\mu_i}{\mu_i+\mu_j}$).[2]

To study how child i's labour supply, L_i, varies with respect to an increase in μ_i, we compute again $\frac{dL_i}{d\mu_i}$ (full derivation can be found in the Online Appendix A).

Result 3 *Child i's labour supply is increasing in the bargaining power of the most powerful wife if* $\beta > 1/2$.

When the inheritance share a child is entitled to depends on the relative bargaining power of his biological mother, the labour supply of child i increases in the bargaining power of the most powerful wife. Because both children contribute to increase the family asset's value, the first wife wants both to work on the land, even though only her biological child inherits the asset. For this to happen, the husband's preference for education, i.e. the parameter $(1-\beta)$, must be small so that the husband's preferences for education do not conflict with those of the most powerful wife. As a result, child i ends up working more on the farm and receiving less education.

Under this assumption, inheritance rights rely exclusively on the relative bargaining power of the first wife. When the other wives have a considerably smaller bargaining power than the first wife, they cannot avoid their children working more on the farm even when they do not inherit. When multiple rules of law co-exist generating uncertainty on how inheritance rights are assigned, relative bargaining power of each wife becomes key in determining the share of assets heirs are entitled to because having more bargaining power translates into a higher inheritance share for the biological child.

3.4 Testable predictions

Our theoretical results suggest that parents' investments in their children's education/labor supply are the byproduct of the interaction between inheritance shares of the household members (children and/or mothers) and the relative bargaining

[2]This functional form is chosen to enhance tractability but results are robust to other specifications that are available upon request.

power of their mothers. Rather than *owning* the land, as in the *Wealth Paradox* by Bhalotra & Heady (2003), it is the possibility of *inheriting* the land in the future that exacerbates the parental trade-off between labour supply and education within the polygamous environment we designed.

Result 1 suggests that, within the polygamous household, the mother with the higher rank (i.e., with the higher bargaining power) increases her children's labour supply to inherit a higher quality stock of land. This occurs regardless of the other wife's relative bargaining power and holds true as long as the husband's preferences do not favour education over working the land. Given that Nigerian inheritance norms tend to favor boys over girls, Corollary 1.1 establishes that differences in children's labour supply can be explained by gender-biased inheritance systems. When $\pi_i = 1$, i.e. the existing inheritance norms favour one child over the other, for example because of their gender, this child tends to work longer hours.

Prediction 1 *Children of the first wife provide more labour supply than children of other mothers, especially when they are boys.*

Since our theoretical framework assumes only one child per mother, our results look at differences in labour supply of boys versus girls across different mothers; however, our data allows to test prediction 1 exploring differences in labour supply of boys versus girls also within children of the same mother. Being the more powerful wife and having a child with sufficient inheritance would not only translate into her child working more but also into an increased labor supply of children of other mothers unless i) the father cares about their education and ii) other wives have enough bargaining power, together with the husband's, to counteract the first wife's power and decrease the child's labour supply (Result 2).

Wives not always have inheritance of their own and even when they do, their shares tend to be smaller than those of their children, often limiting access to resources to their children's inheritance. For this reason, in the model we interpret π_i as the inheritance share the children are entitled to, which implies mothers access inheritance only via their children (*indirect access*). However, π_i can also be interpreted as the mother's direct inheritance share (*direct access*). Results 1 and Corollary 1.1 would still hold and can be extended to include changes in children's labour supply when their mothers have direct access to inheritance.

Prediction 2 *Children of the first wife provide more labour supply than children of other mothers when their mothers inherit.*

Result 3 focuses on the role of bargaining power when inheritance rights of the mothers are not clearly established. More specifically, our model predicts that the higher the uncertainty on the rule of law regarding how inheritance rights are assigned to wives, the more important the role of relative bargaining power becomes for the allocation of resources. To test this prediction, we empirically proceed by analysing children's labour supply in different settings: one where polygamous marriages are not officially recognised leading to wives' inheritance not being uniformly defined and one where polygamous marriages are recognised and inheritance shares are determined by the law.

Prediction 3 *Without established inheritance rights, children of the first wife work longer hours than the children of other wives.*

4 Empirical framework

To test Prediction 1, we specify an empirical baseline model as:

$$y_{iht} = \delta w_{ih} + \boldsymbol{\gamma x}_{iht} + \eta_{ht} + \varepsilon_{iht} \tag{8}$$

where y_{iht} is labour supply of child i in household h in wave t. w_{ih} takes on the value of one if child i is the child of the first wife, and $\boldsymbol{x}$ is a vector of child and mother characteristics (discussed in detail below). η_{ht} is a household-wave fixed effect that captures child-invariant father/household characteristics, such as, genetic characteristics or cultural factors affecting all children in a given household and wave equally. While providing an overall effect of wives' relative position on child labour supply, this model does not allow to disentangle the effect of bargaining power from inheritance norms. We therefore add an interaction term between w_{ih} and an indicator taking the value of one if the child is a girl and zero otherwise, g_{ih}. This specification is based on the assumption that mothers only *indirectly* access inheritance via their children and in particular via their sons. To disentangle bargaining power from possible inheritance effects more *directly*, we test Prediction 2 by adding an interaction term between I_{ht}, an inheritance indicator (discussed in detail in Section 5.3), and w_{ih}. To analyse gender differences within this setting, we estimate:

$$\begin{aligned} y_{iht} =& \beta_1 w_{ih} + \beta_2 I_{ht} + \beta_3 g_{ih} + \delta_1 (I_{ht} \times w_{ih}) \\ &+ \delta_2 (g_{ih} \times w_{ih}) + \delta_3 (I_{ht} \times w_{ih} \times g_{ih}) + \boldsymbol{\gamma x}_{iht} + \eta_{ht} + \varepsilon_{iht} \end{aligned} \tag{9}$$

Given that I_{ht} and η_{ht} are perfectly collinear, the inheritance difference of sons of mothers other than the first wife cannot be identified. If there are no gender differences in labor supply across mother and inheritance status the gender interactions will be equal to zero.

Table 1: Expected effects of inheritance across gender and wife status

	Wife 1	Other wives	Difference
Boys			
Inheritance = 1	$\beta_1 + \delta_1$		$\beta_1 + \delta_1$
Inheritance = 0	β_1		β_1
Difference	δ_1		δ_1
Girls			
Inheritance = 1	$\beta_1 + \beta_3 + \delta_1 + \delta_2 + \delta_3$	β_3	$\beta_1 + \delta_1 + \delta_2 + \delta_3$
Inheritance = 0	$\beta_1 + \beta_3 + \delta_2$	β_3	$\beta_1 + \delta_2$
Difference	$\delta_1 + \delta_3$	0	$\delta_1 + \delta_3$

The parameter estimate of $\beta_1 + \delta_1$ is the difference in sons' labour supply across mothers' status when the inheritance indicator is equal to one, such as for ethnic

groups in which the mother has access to inheritance (Table 1 summarizes the expected differences in labour supply across mother status, inheritance regime and gender). β_1 measures the difference in human capital investments between first wives' sons and those of other mothers when the inheritance indicator is equal to zero. δ_1 is the inheritance difference in labor supply for sons of the first wife.

To test Prediction 3, we analyse heterogeneity in inheritance and bargaining power using the fact that the Sharia states in Northern Nigeria provide a setting in which π can be regarded as exogenously determined (inheritance across mothers is explicitly written into the law (Lambert & Rossi 2016)) while in non-Sharia states there is arguably much more ambiguity on inheritance rules.

5 Data sources and sample characteristics

The main data we use is drawn from the Nigeria General Household Panel Survey (GHS) collected by the Nigerian Bureau of Statistics.[3]

5.1 Data sources

The GHS is part of a larger cross-sectional survey that covers 22,000 households following an initial 5,000 households interviewed in 2010-11 (wave 1), re-interviewed in 2012-13 (wave 2), 2015-16 (wave 3) and 2018-19 (wave 4).

A unique feature of the GHS is that it contains a community questionnaire which collects information about access to and acquisition of land.[4] The questionnaire is answered by a group of a minimum of five knowledgable, representative individuals of the community and asks if villagers can "inherit land and/or bequeath land when they die" and if women can do so (*direct access*).[5] To analyse the intra-household labor allocation and inheritance more explicitly and to corroborate the results (*indirect access*), we also draw upon the agricultural questionnaires of the GHS which collect individual labor supply and inheritance information at the land plot level.[6] We also link our data to the information on inheritance provided by the *Ethnographic Atlas*, added to Murdock's *Ethnographic Map* and digitalized by Blier and Nunn.[7] To increase the sample size and incorporate recent inheritance norms, we

[3]Nigeria National Bureau of Statistics. General Household Survey, Panel (GHS-Panel) 2010-2011; 2012-13; 2015-15; and 2018-19. Ref.NGA_2010_GHSP_v02_M, Ref.NGA_2012_LSMS_v03_M, Ref.NGA_2015_GHSP-W3_v02_M, and Ref.NGA_2018_GHSP-W4_v01_M downloaded from www.microdata.worldbank.org [first accessed 31 Oct 2014, last accessed 16 Oct 2020].

[4]The community questionnaire is conducted at the enumeration area level (primary sampling unit) and there are approximately 400 to 500 enumeration areas per wave.

[5]Given that the first wave of the data does not contain the information on inheritance in the community questionnaire and the short time interval between the first and second waves, we impute the inheritance information of the first wave with the second wave data.

[6]Wave 1 does not contain plot-level inheritance information, so we exclude it from the plot-level analysis.

[7]Available on: https://worldmap.harvard.edu/data/geonode:Murdock_EA_2011_vkZ [last accessed 04/12/20]. We update missing information using the *Atlas of Pre-Colonial Societies* for Nigeria, an extended *Atlas* version based on Müller (1999) that has been used in recent studies (Corno et al. 2020), which is available on: https://www.worlddevelopment.uzh.ch/en/atlas/

draw upon ethnicity data from the *Atlas Narodov Mira*/GREG (Geo-referencing of ethnic groups) data (Weidmann et al. 2010), and add inheritance information for each matched ethnic group.[8]

We use the 2018 Demographic and Health Survey from Nigeria (NDHS) to ascertain the validity of our data and analyse correlates of wife rank, power and observable characteristics further.

5.2 Sample

We classify a household as being polygamous if it contains a household head who co-resides with multiple spouses.[9]

Our unit of analysis is children aged 5 to 17 for whom information of human capital outcomes is collected. Across the waves, there are 10,665 households with children of the head of the household and his spouses in this age group, constituting 2,737 households, or 56 percent, of the initial sample households (Table 2 and Online Appendix Table B.3). Of all households who have children of this age, about 28 percent are polygamous with about 50 percent of these having children of different mothers. This amounts to 37 and 24 percent of all children, respectively (Table 2). In general, polygamous households are more heavily concentrated in Northern and Northeastern Nigeria than in Southern Nigeria (see Online Appendix Figure B.1).

The plot-level data consists of 2,522 plots on which child labor is supplied with about 60 percent of these from multiple children.

5.3 Variable construction

The household head explicitly identifies the first wife among his spouses and the way the data is entered allows construction of an unambiguous wife ranking in the GHS. Based on this, we create an indicator variable if child i's mother is the first wife (w_{ih}). As the great majority of households only co-resides with two wives (only 19.5 percent of households have more than 2 wives in our data), we cannot explore the role of wife's rank beyond the first wife.

Information about working hours during the past seven days for the primary and secondary jobs is collected for all individual household members aged 5 and above. The GHS questionnaires are generally consistent across the waves, but there are some differences. While wave 1 and 2 collect information on water and firewood collection in minutes/hours using a one day recall, wave 3 collects this information in

`Data.html` [last accessed 04/12/20]. As the names of the ethnic groups in the *Atlas* do not always correspond to the names on the *Map*, we use alternative spellings, names and subgroup affiliations (Fenske 2013), and draw upon online sources, such as the Joshua Project, to increase the matching of ethnic groups across the two data sources. A list of the ethnic groups matched across the *Map* and the *Atlas* can be found in the Online Appendix Table B.1.

[8] A detailed list of the sources of information and the ethnic/inheritance grouping can be found in the Online Appendix Table B.2.

[9] While co-residence may be a restrictive assumption, Reynoso (2017) finds that cohabitation of wives could amount to 86 percent in Nigeria. Using data from the NDHS, we find that about 30 percent of all women aged 15 to 49 who are in a union report their husbands have multiple wives. Only 7.5 percent of these do not reside with their partner and co-residence among wives amounts to 68.7 percent.

minute interval format and wave 4 contains a full time-use module that collects hours spent during the last 7 days. We convert this information into weekly totals and add it to create a more comprehensive measure of hours of work. η_{ht} in (8) absorbs any differences in questionnaire design across the waves.[10] We use the total hours worked including zero hours of work, as a measure of labour supply at the extensive margin, and the working hours conditional on supplying labour, as a measure of labour supply at the intensive margin, as outcome variables (y_{iht}). In addition to hours of work, we classify a child as supplying 'substantial' child labour if she is younger than 12 and worked at least an hour during the past week; she is aged between 12 and 14 and works for more than 13 hours per week or if she is between 15 and 17 years of age and works more than 43 hours per week (Edmonds 2008).[11] Plot-level labor supply is collected in hours for up to four household members and two agricultural seasons per wave, which we aggregate at the individual-plot-level. We use three analogue measures of labor supply in the plot-level data: the total hours worked, the logarithm of the total hours worked and the share of labor in plot-level family labor. While we focus our analysis on labour supply, in the Online Appendix we report analogous results for educational outcomes.[12]

To measure I_{ht}, we create an indicator variable whether women in the village in which the child resides can inherit land as an indication of mothers' access to inheritance. To distinguish inheritance settings further we draw upon plot-level inheritance and ethnographic information. Plot-level inheritance information is collected for multiple household members and allows constructing an indicator of whether a child inherits a particular plot of land. Using the GREG data, we classify settings in which 'Children can inherit with daughters receiving less' as in some customary traditions (such as Yoruba and Nupe) and 'Patrilineal systems (first sons)' as in most customary traditions (such as the Igbo, Jukun and Idoma, Bini, Bura); systems in which only sons are entitled to inherit; and systems in which 'Spouses and children are entitled to inherit with daughters receiving less' (such as for the Fulbe, Hausa, Kanuri and Bade). When using the *Atlas*, we use analogue codings for I_{ht} except for inheritance systems that include spouses as this is not available in the *Atlas* data. While the data allows to measure access to inheritance, it does not provide information on inheritance shares.

We control for several child characteristics, such as a full set of age fixed effects, gender, and the number of biological brothers and sisters. Given the importance

[10]The interviewer manual explicitly asks to collect labor and education information of individuals directly, unless the person is below the age of 12.

[11]This measure is based on the ILO allowable age of employment and has been used in various instances to measure child labour supply (e.g. NORC 2020). It is associated with a decline in child labor over the age groups with 27.62 supplying substantial labor among the 12 to 14 year old children while only 4.4 percent do so among the ones aged above 15 in our data.

[12]These include measures of whether the child was attending school during the current school year, whether she ever attended school, whether she is literate and a years of schooling measure. We use the highest level of education completed for those not currently attending school to construct a years of schooling measure and we use the level of enrollment and subtract the current year for those currently enrolled. Given Nigerian educational categories that are difficult to relate to exact years of schooling (for instance, 'completed koranic' and 'adult education'), our 'years of schooling variable' is likely to be measured with error so we only report the results for this outcome for completeness.

of seniority rankings among children for inheritance, we also account for the 'birth rank' by ranking all the biological children of the household head by their age rather than using a birth order measure constructed at the parental sub-unit level.[13]

We iteratively include a set of mother characteristics such as her age; the net value of her assets in '000 Naira (for bargaining-effects); her work status in the past week and her education to alleviate possible endogeneity concerns of w_{ih}.

5.4 Descriptive statistics

Table 2 contains descriptive statistics for the pooled data of all children of the household head aged 5 to 17, children in polygamous households, and children in polygamous households with different mothers (our sample). Online Appendix Table B.3 presents additional summary statistics by wave.

[Table 2]

Polygamous households with children aged 5 to 17 are more likely to be located in the Sharia region, in a rural area and the head of the household to be Muslim compared to the full children sample (see Table 2, column (2) compared to (3) and (4)). Polygamous households have, on average, 2.8 additional members (column (2) and (3)), and households with multiple children add about 1.4 members to this (column (3) and (4)). Contrary to common perception that women are generally not entitled to land inheritance in Nigeria, 52 percent of households live in a community in which women are reported to be able to inherit or bequest land.[14] Given that our measure does not differentiate the amount of inheritance received, we cannot rule out that this includes communities in which women may be entitled to inherit but only a diminutive share or nothing in practice. Notably, girls work relatively less than boys in settings in which mothers are entitled to inheritance compared to those in which they are not (Figure 1).

[Figure 1]

Despite the reduction in sample size when restricting the sample to polygamous households with 'multiple children from different mothers' (column (4)), the child and mother characteristics are very similar compared with the 'full' polygamous sample (column (3)).

[13]Unlike the DHS, the GHS does not contain detailed birth records of mothers, but the data allows us to match children to their biological parents within the household. As we cannot unambiguously rank children in the case of twins we allocate them the same birth rank.

[14]There is a notable increase in the access to inheritance of women in wave 4 compared to the earlier waves of the data (Online Appendix Table B.3). While Nigeria passed a Violence against Persons Prohibition Act in the end of 2015, which also contains a small provision for the rights of widows, only few states adopted the act and we do not find these states to have a greater fraction of communities in which women inherit. The increase could be in parts due to a partial refreshment of the sample in wave 4 in which 1,425 of the original households were tracked, and 3,551 new households were added.

6 Results

The theoretical findings highlight the joint impact of both mothers' bargaining power and inheritance norms on children's labour supply. To disentangle the role of these factors, our empirical strategy proceeds in three steps. First, we focus on bargaining power overall, then we differentiate by child gender to proxy possible indirect inheritance effects which we finally model explicitly.

6.1 Do children of the first wife work longer hours than children of other mothers, especially when they are boys?

Across the specifications, we find that children of the first wife work longer hours than children of other mothers (Table 3, Panel A upper part). They are also 2 to 5 percentage points more likely to supply substantial labour, and this holds true accounting for various child and mother characteristics.

[Table 3]

To investigate what drives the higher labour supply provided by the children of the first wife, we proceed by focusing on the gender dimension to identify the role of an *indirect access* to inheritance for the mothers and adding $g_{ih} \times w_{ih}$ to Equation (8) to test Prediction 1. In this specification, the estimate attached to w_{ih} measures the first wife difference in child labor supply for sons, while the coefficient on the interaction term measures how far first wife labor supply differences vary across child gender. We find that sons of first wives work more than sons of other mothers; daughters of wives other than the first work less than their sons; daughters of first wives work substantially less than their sons, but not much more than daughters of other mothers (see Table 3, Panel A, lower part). This is consistent with our theoretical prediction 1: being the wife with the higher rank, which implies more bargaining power, allows to choose the labour supply of her children according to her preferences, regardless of the other adults in the household.

It could be that the first born children in our sample are disproportionately from the first wife and, as a result, that our estimates are picking up birth order rather than mother status effects. To analyse first born effects beyond our 'birth rank' variable, we create a dummy variable for the first born based on our 'birth ranking' of children of the household head, and interact it with the first wife indicator and add it to Equation (8). The first born dummy variable and the interaction effect are both insignificant and the parameter estimate of the first mother status is not affected by their inclusion (Online Appendix Table B.4).

6.2 Women's inheritance rights and children's labour supply

We continue to study the role of inheritance norms in explaining the differences in children's labour supply by focusing on settings where women have a *direct access* to inheritance. To do so, we add an interaction between I_{ht} and w_{ih} to Equation (8).

I_{ht} is equal to 1 when women can inherit and/or bequest land in the community in which the child resides (see Section 5.3). This allows to compare prediction 1 where mothers have *indirect access* to inheritance (i.e. only via their children) with prediction 2, where instead there is a *direct access*. In section 6.5.1, we further distinguish inheritance settings drawing upon alternative data sources (discussed in Section 5.1).

The results suggest there are no inheritance differences across wives on average and conditional on child gender but when first wives inherit directly, their children are more likely to supply substantial labor than when not (Table 3, Panel B, upper part). Differentiating by child gender (Table 3, Panel B, lower part), we find that in settings where women are not entitled to inheritance, sons of first wives do not work more than sons of second wives (β_1), but that first wives' sons work much more when women inherit than when they do not (δ_1). Given that $\delta_1 + \beta_1$ is significant (Table 4) and large, in settings where women can inherit, first wives' sons work more than second wives sons which is most likely due to the fact that first wives are more privileged and get a higher inheritance share. When women do not have access to inheritance, second wives' daughters work less than their sons (β_3). In this setting there are no gender differences for first wives (δ_2). Table 4 contains the point estimates summarized in Table 1 confirming that first wives' sons work longer hours when they inherit, but that there is no such difference for daughters. If anything, first wives' daughters work less in settings where they inherit compared to when they do not.

These results support the transmission channel outlined in Result 1: facing the prospect of increasing the returns to mothers' future land, first wives' sons work longer hours. No similar effect is found for settings in which women do not have direct access to inheritance (when mothers are not entitled to inherit, labor supply differences across mother status do not vary by child gender i.e. δ_2 is not significant). If it is the case that first wife mothers encourage their children to work longer hours when they are more likely to inherit the key family asset, our results should only be true for households who own some land. In line with this argument, we indeed find that the increased labour supply of children of the first wife is driven by households that own land (see Online Appendix Table B.5). As in Bhalotra & Heady (2003), our results confirm the idea that working on the farm can be considered a long-term first best option for landowner households.

6.3 Is bargaining power less relevant for child labour supply when female rights are written in law?

Prediction 3 suggests that when inheritance shares depend on the wife's rank, bargaining power becomes the key determinant of labour supply, since future inheritance shares are influenced by the wives' status. When the rule of law does not provide security of future wealth, social norms (i.e., wife's status) fill the gap shaping parental incentives. Given that polygamous marriages are recognised by Sharia law and inheritance across mothers is explicitly written into the law (Lambert & Rossi 2016), the Sharia states in Northern Nigeria provide a setting in which π_i can be regarded as exogenously determined, while in non-Sharia states there is arguably

much more ambiguity on inheritance rules. In fact, in Non-Sharia states, 63.80 percent of households live in communities in which women cannot inherit which compares to 29.33 percent of households in Sharia states in our sample. While the great majority of households in Sharia states is headed by a Muslim, in Non-Sharia states 46.11 percent of households are headed by a Christian and 48.83 percent by a Muslim. Table 5 summarizes the results when we split the sample into Sharia versus Non-Sharia states.

[Table 5]

Our results suggest that when inheritance is exogenously determined, sons of the first wife work longer hours conditionally on their mother being entitled to inheritance (δ_1 is driving the result). With more ambiguous inheritance norms, the effect of mother's bargaining power is not channeled via the existing inheritance rules (as β_1 is driving the result). As second marriages are generally not recognised by law in Non-Sharia states, and the majority of mothers do not have access to inheritance in many customary traditions, the only way to increase the returns to land is by having the child work longer hours and this is independent of the existing inheritance norms. If anything, increasing female bargaining power reduces sons' labor supply in societies with pro-female inheritance norms relative to those without (δ_1 is negative but it is not significant).

6.4 Endogenous wife status

Children of the first wife may work longer hours because first wives differ in many observable characteristics from their co-wives, reflecting and affecting their relative position within the household (Matz 2016). In line with the literature (Section 2.1) and using the NHDS, we find that first wives report a greater relative degree of autonomy in decision-making than other wives. Husbands are less likely to be reported to be the sole decision-makers regarding wife's health, large purchases, social visits and his own earnings (Online Appendix Table B.7). This is however explained by the seniority of first wives in the Nigerian setting in which the order of marriage mostly defines wife rank: when differences in age of wives are taken into account, the difference vanishes except for decisions regarding social activities (see Online Appendix Table B.7).

Second wives may come from less privileged backgrounds and, as a result, marry at a younger age or have less education than first wives (see Section 2.1). If this is the case, our results may reflect pre-marital inequality in characteristics across wives rather than bargaining power. Table 6 summarizes differences in characteristics across wives.

[Table 6]

We find that first wives are older than their co-wives by about 7 years (Table 6, Panel A, column (2)) and are, reflecting their rank and age, married for a longer time (Table 6, Panel A, column (12)), but if anything we find that first wives marry at a younger age than second wives by about half a year (Online Appendix Table B.8).

We find that only 7% of first wives report being previously married or having lived with a man more than once, while 27% of second wives report to have done so (Online Appendix Table B.8). First wives are also about 5 percentage points more likely to have attended or completed primary education and 3 percentage points less likely to have attended or completed secondary education relative to their co-wife counterparts (Table 6 Panel A). The difference in educational outcomes across wives is, however, explained by differences in age: once age and cohort effects are taken into account, there are no significant differences in educational outcomes across wives (Table 6 Panel B and C, and Online Appendix Table B.9). This suggests that rather than selection into second wife status, differences in education across wives may reflect educational policies (discussed in more detail below).

As mentioned in Section 2.1, fertility differences across wives are believed responsible for affecting selection into polygamy and wife composition (Munro et al. 2019). Somewhat unexpectedly, we find that first wives have, on average, more children than other wives. They have about 1.6 more children (1 son and 0.6 daughters) and are 16 percentage points less likely to be childless (Table 6). This holds true when accounting for age and cohort effects (Table 6 Panel B and C and Figure B.2). These fertility differences across wives are consistent with the latest NDHS in which first wives have, on average, 1.8 children more than their co-wive(s) (Online Appendix Table B.9). We do not find any differences in the likelihood of child death or miscarriage across wives once differences in age have been accounted for (Online Appendix Table B.9, Panel B). This suggests that selection into (co-residence) polygamy is not primary due to the low number of children of the first wife in the setting from which our data is drawn, which is in contrast to previous findings (Milazzo 2014) but we cannot rule out that fertility differences do affect residence status. Controlling further for fertility does not alter our key results (Online Appendix Table B.10).

Specialization across tasks and wives has been linked to the wife composition within the marriage market (Reynoso 2017). In line with previous studies (Matz 2016), our data suggests that first wives are indeed more productive than their co-wives: they are 5.4 percentage points more likely to have worked in the past seven days on their own account or in a business enterprise belonging to herself or to another household member. First wives work, on average, 3.7 hours more per week and, when working for a wage, they tend to earn 11.3 percent more compared to their co-wives (Table 6, Panel A). However, it could be that these productivity differences reflect an age-driven division of labour between wives rather than wife selection into marriage, with younger wives specializing in home production and older wives pursuing tasks outside the household consistent with their children's age. While differences in labour productivity are not entirely explained by age in the LSMS data (Table 6, Panel B), they are in the DHS data (Online Appendix Table B.9, Panel B). Using the panel element of the data, we can identify households who increase the number of wives across the waves and can analyse first wives' characteristics prior to the addition of a new wife to identify if first wives share similar or oppositive characteristics to other wives, which could, for example, explain whether husbands' wife choice is driven by specialization across tasks within the household.

[Table 7 and Table 8]

Contrary to a selection according to comparative advantages in production, our results suggest there is strong positive assortative mating across characteristics of wives (Table 7). More strikingly, the previously identified differences in characteristics across wives (Table 6) are confirmed when comparing first wives with pre-wife-addition characteristics (Table 8).[15]

A shortcoming analysing these 'switching households' is that the sample becomes very small, so that these results can be treated as indicative at most. To further alleviate endogeneity concerns, we draw upon two sources of information to find an instrument that varies across wives within the household. First, we use the observation that adverse income shocks affect marriage patterns (Rexer 2022) and rainfall at the time of marriage affects bride price payments parents can command and with this their daughters' relative position within the household (Corno et al. 2020). We use precipitation data (0.5×0.5 degree grid) since 1900 from University of Delaware (Dell et al. 2012, Corno et al. 2020), aggregated at an annual level and link it to wives' year of marriage. To measure variation in power due to the weather, we compute the (rolling) deviation in average rainfall in the 5 years prior to marriage from a long-run (30 year) preceding average. Arguably, rainfall at the time of the mothers' marriage should not affect current child labour supply once unobservable, child-invariant household characteristics (i.e. current rainfall) as well as mother characteristics have been taken into account.

Second, Nigeria implemented an universal primary education (UPE) program during 1976 to 1981 to boost educational outcomes which included several policies, such as, free primary education (see Akresh et al. (2023) for a detailed discussion). We use the years of the UPE implementation in combination with the year of birth/age of wives to identify mothers that were likely affected by the UPE program i.e. between 5 to 12 years old in 1976 to 1981. We use an indicator whether a mother was eligible to benefit from the UPE program, together with the rainfall deviation and its square, to instrument for wife status. Fixed effects instrumental variable (IV) estimates are summarized in Table 9.

[Table 9]

The IV results are generally in line with our previous findings, but – by construction – our IVs do not add much extra variation in explaining mother status once mothers' age is accounted for (Table 9, Panel B). This fosters our argument that mothers' age is crucially correlated with marriage order, which defines wife rank in the setting from which our data is drawn.

Finally, to test whether our results may be driven by chance, we randomly assign first wife status across mothers within the household and re-estimate Equation (8) in a falsification exercise. There is no evidence to suggest that our results are driven by chance (Online Appendix Table B.11).

[15] While first wives do significantly less housework prior to the addition of wives, there are no differences in time spent on domestic tasks post addition.

6.5 Robustness and specification checks

6.5.1 Alternative Inheritance Measures

Plot-level labor supply and inheritance norms.

While the community data allows identifying if women have access to inheritance, it does not allow identifying who has access to inheritance within the household. To analyse the variation in labor supply across siblings due to inheritance systems, mother status and child gender within the household, we draw upon the plot-level data. We account for mother and child characteristics and for household-plot-wave-fixed-effects to control for any plot-specific child-invariant characteristics, such as the plot's soil quality or whether there are multiple heirs to the same plot.

[Table 10]

Table 10 summarizes the plot-level estimates confirming that – also at this level of disaggregation – children of the first wife work longer hours than children of other mothers and that this is driven by sons (Table 10). Children entitled to inherit a plot of land supply relatively more labor on it than children who do not, but it is children of the first wife, and in particular her sons, that work more on a piece of land when they are not entitled to inherit it (Table 10). This may be so because first wives' sons are on average 8.6 percentage points more likely to report inheriting a plot of land than sons of other mothers. If first wives use their son's labor to establish ownership/access to land, we would expect this result to be driven by inheritance systems in which the family has no right to bequeath the land of a plot or bequeathing the land requires community approval. Given the richness of the agricultural questionnaire, we use information of whether a plot can be bequeathed and on whether inheritance rests outside the household accounting for household-wave-fixed effect and a range of plot characteristics. We do not find evidence that the first wife difference in child labor can be explained by community inheritance norms (village headman, traditional authority or political leader inherits), whether community approval is needed to bequeath a plot or whether the family has the right to bequeath the plot at all (results available upon request).

Property rights vs inheritance norms.

Rather than laying future rights to the land by the means of child labour, our results may be driven by households in which women have generally more rights to farming the land and may as such immediately benefit from labour supply. To analyse if this is the case, we use information on property rights from the community questionnaire and, instead of I_{ht}, we use an indicator variable if women have access to property rights of land in Equation (9). We do not find that the effect of mothers' bargaining power varies by property rights rules (δ_1 is insignificant in Online Appendix Table B.13). If anything, it is in settings without a provision to property rights that sons of the first wife work more. This is in line with our theoretical predictions and the qualitative literature on the use of child labor to gain access to markets in some parts of Nigeria (Schildkrout 1982), in that once women's access to land is restricted

to the returns to their offspring's labor, mothers' limited economic options incentives them to draw upon their children as a source of income. The contrasting findings of property and inheritance rights could reflect differences in enforceability of these rights; for example, due to differences in the husbands' presence affecting external parties' influences in determining these rights.

Ethnographic inheritance information.

While the community data allows identifying if women have access to inheritance, it does not allow distinguishing inheritance settings further. To do so and to corroborate our findings, we link our data to the information on inheritance provided by the *Ethnographic Atlas* and ethnicity data from the *Atlas Narodov Mira*/GREG.

[Table 11]

The GREG results generally align with our findings: in a setting in which the mother has access to a diminutive share of inheritance, it is her sons that work longer hours (Table 12). In contrast, when the mother is entirely excluded from the inheritance such as in patrilineal inheritance settings (Table 12), δ_1 is negative and the entire first wife difference in labour supply is driven by β_1. This finding is in line with our results based on plot-level data and can be aligned with our theoretical framework: once the more powerful mother faces the prospect of increasing her returns by applying labor, it will be the child yielding the highest return that will work more. Using the *Ethnographic Atlas*, we find that it is sons of first wives who work longer hours when children are entitled to inherit compared to sons of other mothers which is now principally due to β_1, the first wife difference in labour supply in settings in which children are not entitled to inherit. This may be explained by the fact that the *Atlas* data does not contain information on whether spouses have access to inheritance and is in line with the GREG and plot-level results.

[Table 12]

Ethnicity vs. Inheritance.

It could be that rather than inheritance *per se*, it is particular ethnic groups driving our results. Online Appendix Table B.14 uses the GREG data to split the sample into different ethnic groups to see if the difference in child labour across mother status relates to a particular ethnic group. The ethnic groups driving our results are the Hausa, Yoruba, Tiv, Jukun and Idoma, and Nupe. Ranging from practicing 'no individual property' (Tiv) to following 'Islamic law' (as many Hausa), no clear pattern emerges across these groups. This could be due to several sociopolitical changes affecting existing inheritance norms even *within* ethnic groups, such as British colonial rule or the establishment of Sharia law in the North of the country.

While patrilinear inheritance practices are widespread across the Nigerian society, there is a considerable heterogeneity due to the co-existence of multiple overlapping (legal) inheritance norms within the various ethnic groups which may explain the lack of pattern of results by ethnicity.

6.5.2 Alternative human capital outcomes

Overall, we do not find a consistent pattern for educational outcomes (Online Appendix Table B.15, Panel A). If anything, the results suggest that children of the first wife fare better than children of other mothers as they are more likely to currently attend school, to have ever attended school, to be literate and have more years of education. While these results are consistent with the theoretical model in that the first wife can choose according to her preferences, the results are not robust to the inclusion of covariates.

In terms of inheritance, there seems to be a first wife advantage for currently attending education in settings in which mothers are entitled to inherit compared to when they are not (Online Appendix Table B.15, column (3) Panel B), which is entirely driven by their sons (Online Appendix Table B.15, column (3) Panel C) and Sharia states (Online Appendix Table B.6). In settings in which mothers are not entitled to inheritance, first wives' sons are less likely to attend schooling compared to sons of other mothers, but no similar result is found for literacy, years of schooling or whether the child ever attended school.

6.5.3 Specification issues

Information on hours of work tends to be measured with error especially for children. To analyse the extent to which outlier values are driving our results, we transform the dependent variable in several ways. First, we log transform hours of work after adding a positive constant. Second, we take the inverse hyperbolic sine of hours of work. Third, we winzorise hours of work values that exceed the 95th percentile value at the geopolitical zone-level with the 95th percentile value, and finally we exclude observations for which hours of work exceed the 95th percentile value within each wave. Table B.16 in the Online Appendix summarizes the results, which are consistent with our previous findings.

Hours of work are zero for a great fraction of children in our sample. In order to account for the truncated nature of the data, we also estimate a range of non-linear models. The addition of the fixed effects leads to the 'incidental parameter problem' that contaminates all parameter estimates in the Maximum Likelihood setting, which is particularly severe given the number of parameters to be estimated increases as $N \to \infty$ but T is fixed. First differencing or demeaning the data does not eliminate η_h in this setting (Hsiao 2003). As a result, we estimate a fixed effects poisson model, a Mundlak/Chamberlain type of random effects Tobit models and Honoré's (1992) trimmed least squares model. The results are consistent and get more pronounced once the truncation of the data has been taken into account (Online Appendix Table B.17).

As children of the same mother are likely to exhibit unobserved common characteristics and first wives tend to have more children than other wives, we repeat the estimation of the key specifications adjusting the standard errors for the intra-mother correlation of error terms across siblings by cluster-bootstrapping the standard errors (reported in Online Appendix Table B.18), which yields consistent results.

Our sample is restricted to children aged 5 to 17. As compulsory schooling covers 9 years in many countries, including in Nigeria, the age bracket to define child labour

usually consists of children who are 5 to 14 years old. Restricting the sample further to children who are 5 to 14 year old yields results that are similar in magnitude and significance (reported in Online Appendix Table B.19).

7 Conclusion

This paper documents the importance of inheritance norms and female bargaining power for investments in children's human capital in settings where formal institutions and markets operate only with limited force. We develop a polygamous household model in which child labour improves the quality of land, the main inheritable asset. We show that inheritance norms that prioritize a particular child incentivize mothers to prefer child labour over educational investments, and particularly so for mothers who are relatively more powerful with a child who is the principal heir.

Using data from Nigeria, we find that children of the more powerful mother work more than children of other mothers within the polygamous household. The result is driven by boys, can be explained by landed households and is more likely to emerge when mothers have *direct access* to a diminutive share of inheritance. This is in line with our theoretical framework: when the returns to child outcomes vary across wives but the distribution of power within the household limits the control wives can place on the labor supply of children of other mothers, the husband joins the least powerful wife to mediate the resource allocation across wife-child-nuclear-units to guarantee optimal household welfare. Rather than access to the land, our results suggest it is possibly the insecurity of inheritance rights that incentivizes mothers to use their bargaining power to increase child labor supply. The contrasting findings of property and inheritance rights support this argument and may reflect differences in enforceability of rights that exist when the husband is present as opposed to deceased; but more nuanced data would be needed to provide evidence that allows drawing this conclusion, which presents an interesting avenue for future research.

In addition to improving our understanding of the relationship between bargaining power, household structures and child outcomes, our findings highlight the importance of inheritance norms for designing development policies aimed at female empowerment. The UN Convention on the Elimination of All Forms of Discrimination against Women condemns gender-based discrimination in inheritance practices and states that polygamy breaches the convention as it "severely undermines equality in marriage and family relations" (UN 2016, p.9). Studying the case of Nigeria, a country in which polygamy is widespread, land is one of the most valuable asset and multiple legal practices coexist, this paper shows the importance of taking power struggles within the household into account when designing policies to promote human capital investments in settings with complex family structures and gender-biased inheritance norms.

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Table 2: Summary Statistics of Children 5 to 17 years old, pooled data

	All children	Polygamous households	Polygamous different mothers
Child characteristics			
Age (years)	10.34	10.27	10.29
Girl (=1)	0.47	0.46	0.46
Emp. outside (=1)	0.00	0.00	0.00
Emp. home (=1)	0.16	0.19	0.21
Emp. own (=1)	0.03	0.04	0.05
H'rs. worked	6.83	8.05	8.45
H'rs. lab.	24.83	26.09	26.01
H'rs. domestic	4.09	4.43	4.41
Emp. (=1)	0.33	0.35	0.36
Attends edu.	0.72	0.65	0.65
Ever att. edu.	0.83	0.77	0.77
Literate (=1)	0.58	0.50	0.50
Birth rank	3.36	4.20	4.67
# Biological brothers	2.08	2.11	1.94
# Biological sisters	1.74	1.64	1.53
# Child-wave obs.	31,842	11,746	7,724
Mother characteristics			
Mother age (years)	37.54	36.97	36.83
Mother att. edu.	0.60	0.45	0.46
Mother emp. outside	0.06	0.03	0.03
Mother emp. home	0.33	0.25	0.26
Mother emp. own	0.47	0.48	0.49
Asset val. ('000)	9.38	8.90	7.64
UPE eligible	0.18	0.17	0.16
Rainfall deviation	-19.70	-12.99	-12.05
Household characteristics			
Sharia (=1)	0.43	0.66	0.65
Head islam (=1)	0.52	0.79	0.80
Women inherit (=1)	0.52	0.59	0.59
Rural (=1)	0.72	0.85	0.85
North (=1)	0.63	0.87	0.87
# wives	1.33	2.22	2.32
Household size	7.67	10.46	11.84
Total land area (m^2)	83.47	98.93	103.29
Polygamous (=1)	0.28		
# Household-wave obs.	10,665	2,934	1,481

Source: Pooled GHPS Wave 1 (2010/11), Wave 2 (2011/12), Wave 3 (2015/16) and Wave 4 (2018/19).

Notes: The second column refers to all children aged 5 to 15 of the household head and his spouse(s).

Column (3) restricts the sample to children in polygamous households.

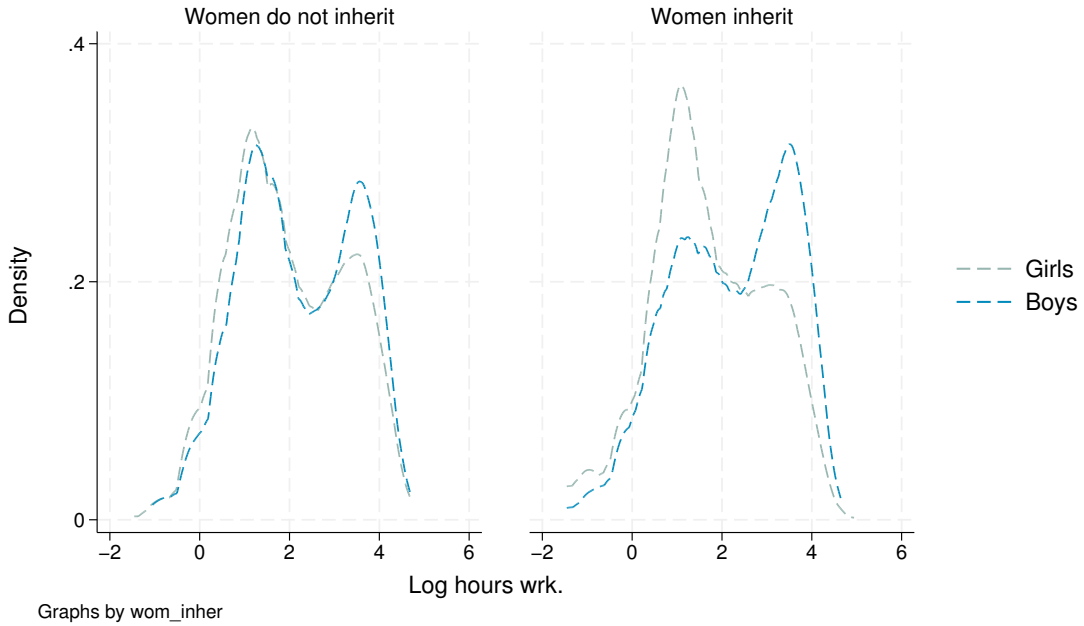
Columns (4) restricts the sample to polygamous households with children of different mothers.

Hours worked are hours worked in the primary and secondary job during the last 7 days.

Hours spent in domestic activities only include the time spent on water and firewood collection.

The birth rank is based on ranking all the biological children of the household head by their age.

Figure 1: Labour supply by gender and inheritance



Notes: The figure illustrates the distribution of the logarithm of the hours worked during the last week by child gender and land inheritance arrangement in the community in which the child resides. The data is pooled across the GHS waves.

Table 3: Estimates of mother status on child labor supply in polygamous households

Panel A: Wife Status and Gender (Prediction 1)										
	H'rs (OLS)	H'rs (extensive)			H'rs (intensive)			Any labour		
Wife 1	2.4372***	3.2180***	1.4923***	1.5392***	2.3163***	0.9829**	0.9035*	0.0172*	0.0547***	0.0506***
	(0.3782)	(0.3034)	(0.3088)	(0.3856)	(0.4051)	(0.4176)	(0.5449)	(0.0103)	(0.0099)	(0.0124)
Wife 1				2.3394***			1.6183**			0.0636***
				(0.4647)			(0.6575)			(0.0156)
Wife 1 × Daughter				-1.7509***			-1.5835**			-0.0285
				(0.5233)			(0.7531)			(0.0195)
Daughter				-1.4359***			-2.2066***			-0.0098
				(0.4088)			(0.6095)			(0.0144)
N	7,401	7,401	7,401	7,401	4,030	4,030	4,030	7,401	7,401	7,401
# fixed effects	793	1,468	1,468	1,468	1,187	1,187	1,187	1,468	1,468	1,468
Panel B: Wife Status and Inheritance (Prediction 2)										
Wife 1				1.0030*			0.6388			0.0135
				(0.5690)			(0.7568)			(0.0181)
Wife 1 × Women inherit				0.7866			0.3157			0.0585***
				(0.5908)			(0.8147)			(0.0190)
Wife 1 ($\boldsymbol{\beta_1}$)				0.9309			0.4346			0.0078
				(0.6949)			(0.9197)			(0.0221)
Wife 1 × Women inherit ($\boldsymbol{\delta_1}$)				2.0818***			1.6088			0.0870***
				(0.7653)			(1.0171)			(0.0238)
Wife 1 × Daughter (δ_2)				0.1880			0.4503			0.0130
				(0.7664)			(1.0638)			(0.0270)
Wife 1 × Women inherit × Daughter (δ_3)				-2.8865***			-2.9197**			-0.0632**
				(0.9386)			(1.3148)			(0.0299)
Daughter (β_3)				-1.4764***			-2.2734***			-0.0097
				(0.4109)			(0.6114)			(0.0145)
Child controls			✓	✓		✓	✓		✓	✓
Mother controls				✓			✓			✓
N				7,324			3,987			7,324
#fixed effects				1,451			1,174			1,451

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates reported of Equation 8.

Standard errors in parentheses are adjusted for clustering at the household-level. OLS estimates control for wave and zone fixed effects.

The inheritance variable is an indicator whether women in the village in which the child resides can inherit land as an indication of mothers' access to inheritance.

Child characteristics include age fixed effects, birth rankings, gender indicator, # bio. brothers and sisters.

Mother covariates include age, education, labor market status and assets (see Section 5.3).

Table 4: Summary of inheritance across gender and wife status

	Wife 1	Other wives	Difference
Sons			
Inheritance = 1	$\beta_1 + \delta_1$		$\beta_1 + \delta_1$
Point estimate	3.0127***		3.0127***
	(0.5272)		(0.5272)
Inheritance = 0	β_1		β_1
Point estimate	0.9309		0.9309
	(0.6949)		(0.6949)
Difference	δ_1		δ_1
Point estimate	2.0818** (0.7653)		2.0818** (0.7653)
Daughters			
Inheritance = 1	$\beta_1 + \beta_3 + \delta_1 + \delta_2 + \delta_3$	β_3	$\beta_1 + \delta_1 + \delta_2 + \delta_3$
Point estimate	-1.1622	-1.4764***	0.3142
	(0.6078)	(0.4109)	(0.5324)
Inheritance = 0	$\beta_1 + \beta_3 + \delta_2$	β_3	$\beta_1 + \delta_2$
Point estimate	-0.3575	-1.4764***	1.1189
Point estimate	(0.7323)	(0.4109)	(0.6705)
Difference	$\delta_1 + \delta_3$	0	$\delta_1 + \delta_3$
Point estimate	-0.8047 (0.7315)		-0.8047 (0.7315)

Point estimates of expected hour of work (extensive margin) differences by inheritance, gender and wife status (see Table 1). Based on estimates in Table 3.
Standard errors in brackets.

Table 5: Fixed effects estimates of first wife difference by sharia

	H'rs (extensive)		H'rs (intensive)		Any labour	
	Sharia	Non-sharia	Sharia	Non-sharia	Sharia	Non-sharia
Wife 1 ($\boldsymbol{\beta_1}$)	0.4806	1.9500**	-0.4900	1.4781	-0.0366	0.0601*
	(0.9289)	(0.9518)	(1.1363)	(1.3863)	(0.0309)	(0.0317)
Wife 1 × Women inherit ($\boldsymbol{\delta_1}$)	2.7336***	-1.2740	2.6009**	-1.6298	0.1231***	0.0254
	(0.9539)	(1.0451)	(1.2012)	(1.5350)	(0.0310)	(0.0399)
Wife 1 × Daughter (δ_2)	0.6276	-0.9756	1.1039	-0.3430	0.0601*	-0.0446
	(1.1169)	(1.0149)	(1.4580)	(1.5200)	(0.0359)	(0.0410)
Wife 1 × Women inherit × Daughter (δ_3)	-3.9303***	2.3544	-4.5037***	2.2914	-0.1214***	0.0621
	(1.2306)	(1.4456)	(1.6678)	(2.0983)	(0.0375)	(0.0537)
Daughter (β_3)	-2.1273***	-0.0736	-2.6165***	-1.3831	-0.0207	0.0096
	(0.5593)	(0.5805)	(0.8473)	(0.8703)	(0.0186)	(0.0232)
$\boldsymbol{\beta_1 + \delta_1}$	3.214	0.676	2.111	-0.152	0.087	0.085
SE($\beta_1 + \delta_1$)	0.647	0.748	0.908	1.152	0.022	0.031
$\boldsymbol{\beta_1 + \delta_2}$	1.108	0.974	0.614	1.135	0.024	0.015
SE($\beta_1 + \delta_2$)	0.975	0.878	1.329	1.251	0.035	0.032
$\boldsymbol{\beta_1 + \delta_1 + \delta_2 + \delta_3}$	-0.089	2.055	-1.289	1.797	0.025	0.103
SE($\beta_1 + \delta_1 + \delta_2 + \delta_3$)	0.623	1.127	0.940	1.396	0.021	0.035
N	4,874	2,450	2,651	1,336	4,874	2,450
#fixed effects	954	497	770	404	954	497
within-R squared	0.165	0.106	0.171	0.093	0.232	0.241

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates of Equation 9 reported. Standard errors in parentheses are adjusted for clustering at the household-level.

The inheritance variable is an indicator whether women in the village in which the child resides can inherit land.

Child characteristics include age fixed effects, birth rankings, gender indicator, # bio. brothers and sisters.

Mother covariates include age, education, labor market status and assets (see Section 5.3).

Child and mother characteristics are controlled for but estimates are not reported.

Sharia states are Sokoto, Zamfara, Katsina, Kano, Jigawa, Yobe, Borno, Kebbi, Niger, Kaduna, Bauchi and Gombe.

Table 6: Wife characteristics and Wife Status

	Age	# Boys	# Girls	No child	Ever school	Literate	No edu.	Primary[a]	Secondary[a]	Higher edu	Y'rs edu.	Y'rs marr.	Emp. out[b]	Emp. farm[b]	Emp. Own.[b]	H'rs W'kd.	Log wage
Panel A: Observable differences in characteristics																	
Wife 1	7.474***	0.982***	0.610***	-0.155***	-0.026***	-0.022***	-0.002	0.049***	-0.031**	-0.012*	-0.200**	9.846***	-0.001	0.013***	0.054***	3.754***	0.107**
	(0.169)	(0.054)	(0.045)	(0.012)	(0.008)	(0.008)	(0.005)	(0.014)	(0.014)	(0.007)	(0.090)	(0.188)	(0.004)	(0.004)	(0.008)	(0.339)	(0.041)
Constant	33.366***	1.077***	0.920***	0.272***	0.438***	0.392***	0.019***	0.707***	0.218***	0.047***	7.154***	14.790***	0.030***	0.246***	0.408***	23.274***	9.028***
	(0.077)	(0.024)	(0.020)	(0.005)	(0.003)	(0.003)	(0.002)	(0.006)	(0.006)	(0.003)	(0.040)	(0.085)	(0.002)	(0.002)	(0.003)	(0.150)	(0.020)
N	7,389	7,642	7,642	7,642	7,517	7,535	3,985	3,985	3,985	3,985	3,985	6,782	7,138	7,131	7,133	7,642	941
#fixed effects	3,467	3,477	3,477	3,477	3,425	3,430	2,146	2,146	2,146	2,146	2,146	3,127	3,442	3,440	3,442	3,477	540
within-R squared	0.430	0.171	0.097	0.070	0.004	0.003	0.000	0.012	0.005	0.002	0.005	0.514	0.000	0.003	0.017	0.034	0.017
Panel B: Observable differences in characteristics controlling for age																	
Wife 1		0.803***	0.505***	-0.142***	-0.003	-0.007	-0.000	0.020	-0.003	-0.016*	-0.113	5.578***	-0.003	0.014**	0.030***	2.717***	0.060
		(0.065)	(0.054)	(0.015)	(0.010)	(0.010)	(0.007)	(0.017)	(0.017)	(0.009)	(0.110)	(0.261)	(0.006)	(0.006)	(0.010)	(0.443)	(0.063)
Constant		-2.636***	-1.997***	0.939***	0.497***	0.451***	0.015	0.611***	0.221**	0.110	7.348***	-2.974**	-0.037	0.249***	0.125**	12.114***	8.326***
		(0.293)	(0.272)	(0.082)	(0.059)	(0.057)	(0.060)	(0.112)	(0.107)	(0.073)	(0.972)	(1.387)	(0.031)	(0.040)	(0.063)	(2.545)	(0.477)
N		7,389	7,389	7,389	7,269	7,285	3,839	3,839	3,839	3,839	3,839	6,772	7,137	7,130	7,132	7,389	941
#fixed effects		3,467	3,467	3,467	3,414	3,419	2,120	2,120	2,120	2,120	2,120	3,125	3,442	3,440	3,442	3,467	540
within-R squared		0.236	0.156	0.115	0.014	0.010	0.002	0.024	0.015	0.007	0.006	0.639	0.003	0.003	0.025	0.037	0.027
Panel C: Observable differences in characteristics controlling for age and cohort effects																	
Wife 1		0.789***	0.492***	-0.136***	0.001	-0.006	-0.002	0.025	-0.004	-0.019*	-0.143	5.519***	-0.002	0.019***	0.025**	2.424***	0.088
		(0.069)	(0.056)	(0.016)	(0.010)	(0.011)	(0.007)	(0.017)	(0.017)	(0.010)	(0.116)	(0.266)	(0.006)	(0.006)	(0.010)	(0.451)	(0.060)
Constant		-0.502	-1.152*	0.638***	0.650***	0.511***	-0.143	0.809***	0.052	0.269	8.399***	11.379***	-0.029	0.062	0.379**	11.399*	9.095***
		(0.626)	(0.614)	(0.182)	(0.158)	(0.145)	(0.139)	(0.261)	(0.283)	(0.184)	(2.256)	(3.392)	(0.081)	(0.084)	(0.149)	(6.075)	(0.807)
N		7,099	7,099	7,099	7,000	7,015	3,714	3,714	3,714	3,714	3,714	6,552	6,917	6,911	6,912	7,099	918
#fixed effects		3,391	3,391	3,391	3,347	3,352	2,073	2,073	2,073	2,073	2,073	3,060	3,361	3,359	3,361	3,391	529
within-R squared		0.246	0.171	0.122	0.018	0.013	0.013	0.038	0.030	0.011	0.017	0.648	0.008	0.006	0.030	0.033	0.047

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates report. Standard errors in parentheses are adjusted for clustering at the household-level.

[a] The educational categories include some up to competed primary and secondary education.

[b] The employment categories are based on a set of screening questions referring to the activity undertaken in the past 7 days. In particular, they comprise whether an individual aged 5 or above has worked for someone who is not a member of your household, whether any work was undertaken on a farm owned or rented by a member of the household or whether the person worked on their own account or in a business belonging to the person or someone in the household.

Table 7: Correlation of additional wife characteristics with first wives characteristics pre-addition, switching households

	Age	# Boys	# Girls	No child	Ever school	Literate	No edu.	Primary[a]	Secondary[a]	Higher edu	Y'rs edu.	Y'rs marr.	Emp. out	Emp. farm	Emp. Own.	H'rs domestic	H'rs W'kd.
Age	0.427***																
	(0.031)																
# Boys		0.226***															
		(0.040)															
# Girls			0.116***														
			(0.030)														
No child				0.054													
				(0.045)													
Ever school					0.330***												
					(0.034)												
Literate						0.334***											
						(0.036)											
No edu.							0.186***										
							(0.059)										
Primary								0.306***									
								(0.049)									
Secondary									0.303***								
									(0.058)								
Higher edu										0.512***							
										(0.064)							
Y'rs edu.											0.182***						
											(0.036)						
Y'rs marr.												0.403***					
												(0.069)					
Emp. out													0.254***				
													(0.049)				
Emp. farm														0.440***			
														(0.048)			
Emp. Own.															0.229***		
															(0.053)		
H'rs domestic																0.319***	
																(0.072)	
H'rs W'kd.																	0.175***
																	(0.034)
Constant	13.114***	0.343***	0.332***	0.475***	0.322***	0.273***	0.014	0.413***	0.197***	0.033**	6.153***	7.925***	0.019*	0.097***	0.207***	4.763***	9.688***
	(1.302)	(0.090)	(0.063)	(0.029)	(0.031)	(0.031)	(0.009)	(0.044)	(0.032)	(0.014)	(0.338)	(0.601)	(0.010)	(0.024)	(0.034)	(0.631)	(1.522)
N	317	393	393	393	380	380	221	221	221	221	221	252	277	277	277	125	393

Sample is restricted to households who increase the number of wives from one wave to the next.

Only switching waves are included. First wife characteristics are measured in the wave before an additional wife joins the household.

Table 8: Differences in characteristics of additional wives and first wives (prior to addition)

	First wife	Other wives	Difference	Standard error	# first wives	# other wives
Age	33.744	30.449	-3.295	0.992	301	336
# Boys	1.475	0.652	-0.823	0.101	303	345
# Girls	1.274	0.467	-0.807	0.088	303	345
No child	0.211	0.493	0.282	0.036	303	345
Ever school	0.526	0.507	-0.019	0.040	302	335
Literate	0.490	0.448	-0.042	0.040	302	335
No edu.	0.026	0.021	-0.005	0.015	195	190
Primary	0.677	0.600	-0.077	0.049	195	190
Secondary	0.262	0.289	0.028	0.046	195	190
Higher edu	0.036	0.058	0.022	0.022	195	190
Y'rs edu.	7.328	7.605	0.277	0.327	195	190
Y'rs marr.	18.409	8.752	-9.657	1.018	203	230
Emp. out	0.034	0.039	0.005	0.015	296	308
Emp. farm	0.226	0.214	-0.012	0.034	296	308
Emp. Own.	0.365	0.269	-0.095	0.038	296	308
H'rs domestic	4.699	6.241	1.542	0.626	220	159
H'rs W'kd.	26.430	19.911	-6.519	2.044	303	345

Sample is restricted to households who increase the number of wives from one wave to the next.

Only switching waves are included. First wife characteristics are measured in the wave before an additional wife joins the household.

Table 9: IV estimates of mother status on child labour supply in polygamous households

Panel A: IV estimates

	H'rs (extensive)			H'rs (intensive)			Any labour		
Wife 1	4.2984***	3.1609***	16.4447	2.6097**	2.3803*	12.0442	0.0468	0.1165***	0.3287
	(0.8630)	(0.9973)	(11.1534)	(1.1552)	(1.3246)	(9.3173)	(0.0293)	(0.0322)	(0.2759)
Panel B: First stage estimates									
UPE (1976-1981)	0.4495***	0.3370***	0.0184	0.4567***	0.3881***	0.0133	0.4495***	0.3370***	0.0184
	(0.0515)	(0.0515)	(0.0412)	(0.0629)	(0.0616)	(0.0478)	(0.0515)	(0.0515)	(0.0412)
Rainfall deviation at marriage	-0.0019***	-0.0017***	-0.0004	-0.0020***	-0.0018***	-0.0005*	-0.0019***	-0.0017***	-0.0004
	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0004)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
Rainfall deviation squared	-0.0000	-0.0000**	-0.0000	-0.0000*	-0.0000*	-0.0000	-0.0000	-0.0000**	-0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Child controls		✓	✓		✓	✓		✓	✓
Mother controls			✓			✓			✓
N	7,154	7,154	7,154	3,731	3,731	3,731	7,154	7,154	7,154
# fixed effects	1,394	1,394	1,394	966	966	966	1,394	1,394	1,394
First stage F	69.184	38.874	1.098	39.227	29.470	1.287	69.184	38.874	1.098
Kleibergen-Paap LM	79.548	57.766	2.945	60.292	53.307	3.545	79.548	57.766	2.945
Hansen's J	2.992	2.246	0.104	5.303	2.461	0.517	0.199	0.468	2.050

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates report. Standard errors in parentheses are adjusted for clustering at the household-level.

Table 10: Household-Plot-wave fixed effects estimates of plot-level labor supply (children 5 to 17)

	Log h'rs	H'rs	Share h'rs
Wife 1	0.1572***	37.0596***	0.0155***
	(0.0459)	(11.9456)	(0.0044)
Wife 1	0.1775***	50.7421***	0.0199***
	(0.0512)	(13.5745)	(0.0051)
Wife 1 × Daughter	-0.0678	-45.8976***	-0.0145**
	(0.0727)	(15.9537)	(0.0066)
Daughter	-0.5063***	-10.6595	-0.0351***
	(0.0704)	(13.0687)	(0.0058)
Child inherits	0.0383	32.8179***	0.0093*
	(0.0487)	(12.4890)	(0.0053)
Child inherits	0.0839*	27.7316**	0.0141***
	(0.0498)	(13.1966)	(0.0054)
Child inherits × Daughter	-0.2687***	29.9727**	-0.0285***
	(0.0937)	(15.2257)	(0.0087)
Daughter	-0.4561***	-45.2155***	-0.0338***
	(0.0627)	(14.8930)	(0.0054)
Child inherits	0.0397	32.7155**	0.0030
	(0.0686)	(14.9826)	(0.0067)
Wife 1	0.1613***	36.0777**	0.0123**
	(0.0556)	(14.6182)	(0.0054)
Wife 1 × Child inherits	-0.0158	-3.0012	0.0071
	(0.0641)	(12.4956)	(0.0060)
Child inherits	0.0313	35.5976**	0.0021
	(0.0691)	(14.9343)	(0.0068)
Wife 1	0.1663***	54.8650***	0.0147**
	(0.0636)	(16.8407)	(0.0063)
Wife 1 × Child inherits	0.0151	-15.1285	0.0103
	(0.0695)	(13.7925)	(0.0069)
Wife 1 × Daughter	-0.0186	-56.8843***	-0.0078
	(0.0854)	(19.7802)	(0.0077)
Wife 1 × Child inherits × Daughter	-0.1425	37.4194**	-0.0166*
	(0.0994)	(18.0630)	(0.0099)
Daughter	-0.5057***	-7.3318	-0.0350***
	(0.0709)	(13.2873)	(0.0058)
N	5,228	5,228	5,228
# fixed effects	2,412	2,412	2,412

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors in parentheses are adjusted for clustering at the household-level.

The Inheritanceance indicator equals one if a child is entitled to the Inheritanceance on a plot of land.

Child characteristics include age fixed effects, birth rankings, gender indicator, # bio. brothers and sisters.

Mother covariates include age, education, labor market status and assets (see Section 5.3).

Child and mother characteristics are controlled for but estimates are not reported.

Table 11: Fixed effects estimates of first wife difference by inheritance system, GREG data

	Mother inherits			Children inherit			Patrilineal		
	H'rs (extensive)	H'rs (intensive)	Any labour	H'rs (extensive)	H'rs (intensive)	Any labour	H'rs (extensive)	H'rs (intensive)	Any labour
Wife 1 ($\boldsymbol{\beta_1}$)	0.7454	0.4016	0.0490***	3.0875***	2.0160***	0.0694***	2.7790***	2.0089***	0.0637***
	(0.5742)	(0.7843)	(0.0188)	(0.5531)	(0.7525)	(0.0184)	(0.4922)	(0.6873)	(0.0168)
Wife 1 × Inheritance × Daughter (δ_3)	-3.8298***	-3.6434***	-0.0345	3.3035***	3.0661**	0.0122	3.1723***	3.5545***	-0.0007
	(0.8920)	(1.2679)	(0.0289)	(0.9120)	(1.3137)	(0.0298)	(0.9732)	(1.2859)	(0.0340)
Wife 1 × Inheritance ($\boldsymbol{\delta_1}$)	2.9149***	2.0697**	0.0267	-2.0225***	-1.2370	-0.0149	-1.8465**	-1.8961*	-0.0002
	(0.7300)	(0.9425)	(0.0233)	(0.7379)	(0.9851)	(0.0235)	(0.8315)	(1.1408)	(0.0262)
Wife 1 × Daughter (δ_2)	0.4525	0.5682	-0.0087	-2.9143***	-2.6265***	-0.0328	-2.4904***	-2.3847***	-0.0284
	(0.6669)	(0.9820)	(0.0247)	(0.6397)	(0.8891)	(0.0225)	(0.5857)	(0.8520)	(0.0208)
Daughter (β_3)	-1.4504***	-2.2401***	-0.0100	-1.4646***	-2.2497***	-0.0099	-1.4453***	-2.2195***	-0.0099
	(0.4081)	(0.6108)	(0.0144)	(0.4084)	(0.6115)	(0.0144)	(0.4089)	(0.6097)	(0.0144)
$\boldsymbol{\beta_1 + \delta_1}$	3.660	2.471	0.076	1.065	0.779	0.054	0.932	0.113	0.063
SE($\beta_1 + \delta_1$)	0.607	0.829	0.020	0.640	0.904	0.021	0.815	1.143	0.025
$\boldsymbol{\beta_1 + \delta_2}$	1.198	0.970	0.040	0.173	-0.610	0.037	0.289	-0.376	0.035
SE($\beta_1 + \delta_2$)	0.586	0.823	0.020	0.512	0.772	0.018	0.477	0.737	0.017
$\boldsymbol{\beta_1 + \delta_1 + \delta_2 + \delta_3}$	0.283	-0.604	0.033	1.454	1.219	0.034	1.614	1.283	0.034
SE($\beta_1 + \delta_1 + \delta_2 + \delta_3$)	0.559	0.854	0.019	0.667	0.941	0.022	0.831	1.025	0.025
N	7,401	4,030	7,401	7,401	4,030	7,401	7,401	4,030	7,401
#fixed effects	1,468	1,187	1,468	1,468	1,187	1,468	1,468	1,187	1,468
within-R squared	0.142	0.138	0.228	0.140	0.136	0.228	0.139	0.136	0.228

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates report. Standard errors in parentheses are adjusted for clustering at the household-level.

In the columns classified as Mother inherits, the binary variable `Inheritance` is equal to one if the inheritance system is Spouses and children with daughters receiving less.

In the columns classified as Children inherit, the binary variable `Inheritance` is equal to one if the inheritance system is either Children with daughters receiving less or Patrilineal.

In the columns classified as Patrilineal, the binary variable `Inheritance` is equal to one if the inheritance system is Patrilineal.

Child characteristics include age fixed effects, birth rankings, gender indicator, # bio. brothers and sisters.

Mother covariates include age, education, labor market status and assets (see Section 5.3). Child and mother characteristics are controlled for but estimates are not reported.

Table 12: Fixed effects estimates of first wife difference by inheritance, ATLAS data

	Children inherit			Patrilineal		
	H'rs (extensive)	H'rs (intensive)	Any labour	H'rs (extensive)	H'rs (intensive)	Any labour
Wife 1 ($\boldsymbol{\beta_1}$)	2.0445***	0.9689	0.0536***	1.9219***	0.6259	0.0465**
	(0.6016)	(0.7844)	(0.0195)	(0.5897)	(0.7667)	(0.0191)
Wife 1 × Inheritance × Daughter (δ_3)	-0.3179	0.1390	-0.0196	-0.9038	-1.3862	-0.0265
	(0.9334)	(1.3277)	(0.0292)	(0.9366)	(1.3360)	(0.0291)
Wife 1 × Inheritance ($\boldsymbol{\delta_1}$)	0.5912	1.2815	0.0196	0.9158	2.1291**	0.0378
	(0.7675)	(0.9649)	(0.0238)	(0.7685)	(0.9723)	(0.0235)
Wife 1 × Daughter (δ_2)	-1.5820**	-1.6364*	-0.0181	-1.3085*	-0.8736	-0.0157
	(0.7147)	(0.9634)	(0.0250)	(0.7057)	(0.9480)	(0.0244)
Daughter (β_3)	-1.4372***	-2.2194***	-0.0100	-1.4440***	-2.2454***	-0.0101
	(0.4091)	(0.6107)	(0.0144)	(0.4087)	(0.6095)	(0.0144)
$\boldsymbol{\beta_1 + \delta_1}$	2.636	2.250	0.073	2.838	2.755	0.084
SE($\beta_1 + \delta_1$)	0.600	0.844	0.020	0.613	0.870	0.020
$\boldsymbol{\beta_1 + \delta_2}$	0.463	-0.667	0.036	0.613	-0.248	0.031
SE($\beta_1 + \delta_2$)	0.591	0.897	0.020	0.573	0.892	0.019
$\boldsymbol{\beta_1 + \delta_1 + \delta_2 + \delta_3}$	0.736	0.753	0.036	0.625	0.495	0.042
SE($\beta_1 + \delta_1 + \delta_2 + \delta_3$)	0.574	0.807	0.020	0.590	0.806	0.020
N	7,401	4,030	7,401	7,401	4,030	7,401
#fixed effects	1,468	1,187	1,468	1,468	1,187	1,468
within-R squared	0.137	0.135	0.228	0.138	0.135	0.229

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Household-wave fixed-effects estimates report. Standard errors in parentheses are adjusted for clustering at the household-level.

In the columns classified as Children, the binary variable `Inheritance` is equal to one if the inheritance system is either Children with daughters receiving less or Patrilineal.

In the columns classified as Patrilineal, the binary variable `Inheritance` is equal to one if the inheritance system is Patrilineal.

Child characteristics include age fixed effects, birth rankings, gender indicator, # bio. brothers and sisters.

Mother covariates include age, education, labor market status and assets (see Section 5.3). Child and mother characteristics are controlled for but estimates are not reported.