Customary Norms, Inheritance, and Human Capital: Evidence from a Reform of the Matrilineal System in Ghana*

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Abstract

This paper studies the effects of descent rules on human capital accumulation. We exploit a policy experiment in Ghana that introduced minimum quotas for the land that parents should devolve on their children. This policy differentially affected ethnic groups depending on their descent rules: the matrilineal Akan saw a reduction in the share of land going to the matriclan and an increase in the land going to male children (who could not inherit from their own fathers before the reform). Patrilineal groups were instead less affected because sons could already inherit from fathers before the reform. Using a difference-in-differences strategy, across cohorts and ethnic groups, we estimate the impact of the reform on educational attainment. We find that Akan boys exposed to the reform received on average 0.9 less years of education, a 10 percent reduction. The effect is driven by landed households, for whom the reform did effectively bind, while no effect is found for non-landed households. This evidence is consistent with the fact that before the reform matrilineal groups in Ghana "over-invested" in education to substitute for land inheritance. Our findings suggest that in the presence of customary norms, land reform and the individualization of land rights may have implications that go beyond the agricultural sector and affect human capital accumulation in the long run.

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1 Introduction

Recent years have seen important steps towards reforming land tenure and inheritance systems across Africa as well as in other regions of the developing world. These reforms have pushed towards the individualization of land rights, giving individuals greater control over the possibility of alienating and bequeathing land, and in some instances targeting greater gender equality in land allocation. In most cases the new laws were passed in contexts where traditional land allocation patterns were still prevalent. Indeed, out of forty-three African countries for which information is available, in twenty-seven customary law is granted statutory recognition as a source of law.[1] What are the effects of land and inheritance reform in the presence of customary norms that act as a constraint on individual decision-making? Do these effects spread beyond land markets and the agricultural sector? These are some of the questions to which we try to provide an answer.

We study Ghana, a country that is particularly interesting for our purposes because different ethnic groups follow different customary norms regarding land inheritance. In particular, the largest ethnic group -the Akan- is traditionally matrilineal, which implies that a man does not inherit land from his father but from his maternal uncle. We take advantage of a policy change introduced by the Government of Ghana in 1985, the Intestate Succession Law, which mandated that for all groups a significant fraction of a man's property should be inherited by his own children. This drastically changed the choice set available to Akan households compared to other (patrilineal) groups for which the Intestate Law had less consequences. Specifically, we are interested in understanding if and how human capital investment was affected by this reform which essentially changed the constraints on the inter-generational transmission of physical capital.

To frame our empirical exercise, we propose a simple model where a parent allocates his income between own consumption and investment in education of the child, and where education and land enter the child's income-generating function. The matrilineal norm before the reform is represented by an exogenous cap on the amount of land that the child can inherit. The Intestate Succession Law can be formalized as a relaxation of the "matrilineal constraint", leading to a higher amount of land devolved on children. In our model this leads to an equilibrium with lower investment in the child's education. We also provide an extension of the model and consider a case in which the parent has two children, a son and a daughter. Under assumptions that reflect the prevalent practice in Ghana, where land inheritance is gender-linked (i.e., sons inherit from fathers and daughters from mothers) and where matrilineal custom does not limit the transmission of land from mother to daughter, our model predicts that the reform should lead to a decrease in education investment for sons, and have an ambiguous effect on daughters' education.

[1] Source: Women's Legal and Economic Empowerment Database for Africa (LEED), The World Bank (2013). Available at: `http://go.worldbank.org/SIUXEO07R0`

In the context of Ghana, this simple theoretical framework implies that after the passage of the Law we should expect relatively lower levels of investment in education for groups that were previously subject to the matrilineal constraint (i.e., the Akan), but not for other groups. Furthermore, because the customary matrilineal norm implied restrictions on inheritance that were most binding for boys, we expect the reform to affect boys' human capital more than girls'. Finally, the predictions of our model should apply to landed households, whose budget set was affected by the reform, but not to landless ones.

We test the above predictions using five rounds of data from the Ghana Living Standards Survey (GLSS). We compare the educational outcomes of individuals who were exposed to the reform in the sense of being still in school when the Intestate Law was passed, to the outcomes of individuals whose education should not have been affected by the Law because they were past school age in 1985. Our empirical strategy is thus a difference-in-differences strategy akin to that used by Duflo (2001) and by Lavy and Zablotsky (2011). Specifically, we exploit differences across cohorts and ethnic groups separately for males and females, as well as for landed and non-landed households (the latter being unaffected by the Intestate Law).

Our results can be summarized as follows. Akan males exposed to the reform experienced a reduction of 0.9 years of education compared to non-Akan males in the same cohort. Considering that the average years of education of Akan males pre-reform were 8.6, this represents a 10 percent reduction in education for this group compared to non-Akan males. We show in figure 2 that there was a parallel trend in education for Akan and non-Akan men before the passage of the Law, and that a trend break occurred for cohorts of Akan men born after 1974, i.e. who were in the last year of primary school or younger at the time of the reform. The same does not hold for Akan women: the (positive) difference between their education levels and those of non-Akan women is constant before and after the reform. Importantly, the effect on males is driven by landed households, i.e. households where the father could substitute between physical and human capital investment: no effect is found for Akan men from non-landed households. We also find that Akan men affected by the reform have a 9.7 (11.4) percentage points lower probability of completing at least primary (secondary) school, while the change in the probability of completion for women is null.

Furthermore, we find a negative effect on attendance for children in later survey rounds, i.e. when the reform has been fully internalized by the parents. Interestingly, the negative effect on attendance is attenuated for boys who have more siblings, specifically boys who have older brothers. Although we should be cautious in giving a causal interpretation to this result, it is consistent with the fact that when paternal land needs to be shared among more heirs, leading to lower land per child, parents disinvest less in education.

We conduct a number of tests to assess the plausibility of our identification strategy and the robustness of our results. First, we consider an alternative control group constituted by the Ewe,

a Ghanaian patrilineal group whose average education pre-reform was much more similar to that of the Akan compared to other patrilineal groups. Our estimates are unaffected, which helps us rule out that our results are driven by mean reversion. Second, we conduct a falsification test using the Akan from Côte d'Ivoire, a neighboring state where the Intestate Succession Law had no jurisdiction, and find that the educational attainment of Ivorian Akans was unaffected by the reform. We also show that our results are robust to excluding from the sample northern regions where Akans are in very low numbers, to controlling for cocoa-growing villages where Akans are highly represented, and to controlling for differential trends based on parental occupations. This allows us to show that our results are not driven by omitted time-varying factors that are specific to the regions where the Akan are spatially concentrated, or to changes in returns to education due to fluctuations in cocoa production or to shocks to specific sectors. Finally, we also find evidence that the Law affected occupational choice. In particular, compared to non-Akan males, Akan males in later rounds show a higher probability of being farmers, while this is not the case for females. This is consistent with the fact that the possibility of inheriting the father's land may have affected the choice of becoming farmers (an occupation in which the returns to education are lower than in other sectors).

To sum up, we uncover significant and sizable effects of customary norms on the accumulation of human capital. While our policy experiment is from Ghana, the policy implications of our findings go beyond the Ghanaian context. Parental investment in human capital has been shown to have important consequences for children's well being and is a crucial input into their social mobility prospects. Available evidence mostly comes from industrialized countries, where parents are generally free to pass their wealth on to their offspring according to their will. However, in many developing countries, just as in Ghana, bequests respond not only to parental decisions, but to a series of claims by extended family and lineages that are enforced through customary norms. The presence of these norms is a potential source of distortions in parents' allocation decisions, the extent of which is not yet fully understood (Platteau, 2000; Platteau et al., 2010). Our paper suggests that policy changes targeting the agricultural sector, such as the individualization of land rights and inheritance reform, interact with customary norms in such a way to generate significant implications for other dimensions of economic and social development, among which the accumulation of human capital in the long run.

This paper is related to several strands of the literature. A first body of literature looks at the economic consequences of social norms and kinship systems, modeling household behavior as a rational response to traditional customs (e.g., La Ferrara, 2003 and 2007; Goetghebuer and Platteau, 2010; Mobarak et al., 2013; Quisumbing et al., 2001; Quisumbing and Otsuka, 2001). Gneezy, Leonard and List (2009) show that differences between societies with distinct kinship systems and customary rules –the matrilineal Khasi and patriarchal Maasai– correlate with economically rele-

vant behaviors such as the inclination toward competitiveness. Compared to this literature, our paper exploits a policy change that constitutes an exogenous shock to the strength of the customary norm. This allows us to make some progress toward establishing a causal link going from social constraints to economic choices.[2]

A recent set of studies has focused on inheritance reforms favorable to women and studied their impact on women's outcomes, e.g. education, dowry payments and marriage in India (Goyal et al., 2013; Roy, 2013), or fertility and son preference in Indonesia (Carranza, 2012). While we share an interest in the effect of inheritance reforms, our focus is not on gender but rather on the constraints generated by traditional kinship systems and faced by parents when choosing the combination of human and physical capital of their children.

In this respect, our paper also relates to the literature on the constraints generated by extended families ties. In particular, this literature suggests that family networks, mainly in the African context, limit the possibility of undertaking profitable economic opportunities and create incentives for hiding income due to informal risk-sharing arrangements (Baland, Guirkinger and Mali, 2011; Jakiela and Ozier, 2012).

Finally, our paper also speaks to the literature on land rights security and investment in agriculture (e.g., Besley, 1995; Goldstein and Udry, 2008; Hornbeck, 2010). By showing that control over the inter-generational transmission of land affects parental investment in human capital, we show that policies for the individualization of land rights have far reaching consequences that go well beyond changes in agricultural investment and productivity.

The remainder of the paper is organized as follows. Section 2 briefly reviews basic notions on matrilineal and patrilineal descent principles taken from the anthropological literature and gives some background on the Intestate Succession Law. In section 3 we present a simple model that serves as a guide for our empirical analysis. Section 4 introduces our empirical strategy and section 5 provides a descriptive analysis of the data. Section 6 contains our main econometric results and robustness checks and section 7 concludes.

2 Matrilineal inheritance and the Intestate Succession Law

Kinship systems form the basis for social organization in many developing countries. Kinship is usually built around a unilineal descent group in which kin membership is transmitted from one generation to the next only through ancestors of one gender. In patrilineal societies only males can

[2]A different approach treats social customs as endogenous and explains differences in the norms regarding inter-generational transmission of property as a rational response to different economic environments (e.g., Botticini and Siow, 2003; Platteau and Baland, 2001). We take the existence of matrilineal customs as given and study the effects of an exogenous shift in these customs operated through legislation.

pass kin membership on to their offspring and children are considered to be part of their father's kin group. In matrilineal societies instead, only females can pass kin membership on to their offspring and children are part of their mother's kin group.

The principle of matrilineal descent is illustrated in figure 1. Following the notation in social anthropology, triangles indicate males, circles females, vertical links indicate a descent bond, horizontal ones a codescent bond, and the sign "=" stands for a marriage relationship. The shaded symbols indicate members of the same matrikin. The top part of the diagram indicates a couple and is the first of three generations represented in the diagram. Following the descent bonds (vertical lines), it is easy to see how descent is traced only through females from a founding female ancestor. In particular, if we consider the eldest man in the diagram, indicated as "$head_0$", we see that his children belong to his wife's kin group, not his own. When we look at figure 1 from the point of view of the male symbol referred to as "$head_1$", we see again that his children do not belong to his kin group, and that the members of his maternal kin are the children of his sisters.

The relationship between father and child in matrilineal societies is thus somewhat weaker than in patrilineal ones, and some of the responsibilities generally assigned to fathers are instead taken on by the mother's brother. Importantly for our study, though, among the matrilineal Akan of Ghana the father remains responsible for food and education expenditures of his children.[3]

The matrilineal and patrilineal systems involve important differences not only in terms of social organization, but also for the intergenerational transmission of property. A general principle common to both is that rights to inheritance are usually gender-linked: males-to-males and females-to-females. In patrilineal systems a man's property is transmitted to his children (typically the sons), while in matrilineal systems the man's children do not belong to his kin group and are not entitled to inherit his property. The man's property is instead transferred to male members of his matrikin, the preferred order of inheritance being: the man's uterine brother, the son of a uterine sister, and the son of the deceased's mother's sister.[4] The woman's property instead is typically passed on to the daughters in both matrilineal and patrilineal societies.

Among the matrilineal Akan of Ghana, children have the customary obligation to work on the father's land. This can generate tensions between members of the nuclear family and the matriclan over the rights to inherit the father's land. On the other hand, "fathers are expected to set up their male children in life (...) Today, setting up a child in life includes providing a western type of education and/or apprenticeship" (Awusabo-Asare (1990), p. 7). Duncan (2010) reports qualitative evidence of the growing importance of a mutual understanding between husband and

[3]For extensive studies on matrilineal traditions in Ghana, see among others Fortes (1950) and Okali (1983).

[4]The matrilineal inheritance principle applies to inherited property, which belongs to the matrikin, and to self-acquired property in case of a man's death intestate. According to Akan customary norms, a man could dispose of his self-acquired property through inter-vivos gifts, sales or by writing a will before death, but this practice could only entail a limited portion of land and required formal approval by the matrikin.

wife in favor of educating children as an acceptable substitute for land. This evidence corroborates our theoretical prediction that Akan fathers traditionally considered education as a substitute for land inheritance for their sons.

On June 14, 1985 the Intestate Succession Law (PNDCL 111) was promulgated by the Government of Ghana. The main innovation brought by the Law was the specific protection granted to members of the nuclear family (as opposed to the extended family) in the distribution of a man's self-acquired property. The Law states that, after the house and household chattels are devolved entirely to the spouse and children, the residue of a man's intestate property has to be distributed as follows: nine-sixteenth to children, three-sixteenth to surviving spouse, one-eighth to surviving parents and the remaining one-eighth, in the case of the matrilineal Akan, to the matrikin.[5] The Law applies to all property which a deceased could have but did not dispose of through will, but it should be noticed that wills have traditionally been rare among Ghanaians as "many view drafting a will as inviting death"(Fenrich and Higgins, 2001, p. 293). Prior to the passage of the Law, intestate property was automatically devolved to the kin group and allocated to individual members following customary rules. After the Law, the nuclear family –and children in particular– became the main claimants of a man's property.

What led to the passage of the Intestate Succession Law? Several factors may have contributed to the reform. The first was the awareness of tensions between the nuclear family and the matriclan over the rights to inheritance. Duncan (2010) documents that the growing role of cocoa farming in the rural economy, together with the customary obligation placed on women to assist their husbands in their economic pursuits, intensified the use of conjugal labor giving rise to the "conjugal unit" as the major unit of production and consumption. The Law was introduced by the government to reflect changes in society and give more importance to the nuclear family. A second possible motive relates to the process of economic reforms that the country was undergoing. The Intestate Succession Law was introduced two years after Ghana launched the Economic Recovery Program in 1983. The set of rights created for the nuclear family under the new Law was more consistent with the market-oriented reforms launched as part of the adjustment program. Both our reading of the debates around the reform and the empirical evidence we provide below suggest that

[5]At the time of the passage of the Law, there was some debate regarding the application of the Law to any type of marriage, including marriages celebrated under customary law (which are the most common form of marriage in Ghana). The Customary Marriage and Divorce Law, 1985 (PNDCL 112) states that the 1985 Law on intestate succession applies also to all customary marriages, as long as they have been registered. Woodman (1985) states that following the PNDCL 112 Law "all customary marriages are required to be registered, but it seems likely that unregistered marriages will continue to be valid for the purpose of the Intestate Succession Law" (p. 123). Indeed, PNDCL 112 was amended in 1991 to state that the Intestate Succession Law applies also in cases "where a court or tribunal is satisfied by oral or documentary evidence before it that a customary law marriage had been validly contracted between a deceased and surviving spouse."(Fenrich and Higgings, 2001, p. 293).

the introduction of the Intestate Succession Law did not follow pre-existing trends in education investments, which is crucial for our identification strategy.

One final consideration should be made on women's versus men's land rights. According to customary principles, women could already pass their land on to daughters before the Intestate Succession Law. Obviously, in a context where women do not own land or have weak rights over it, this may translate into few bequests. But to the extent that intergenerational transmission of land from mothers to daughters was already allowed in matrilineal households, the impact of the Law on girls should have been smaller. Furthermore, qualitative evidence from Ghana suggests that often "male kin play the land-allocating role in both matrilineal and patrilineal societies: secure access rights for women therefore depend on the nature of their relationships with male relatives" (Duncan, 2010, p. 302). Therefore, while in principle the Law allowed fathers' property to be transmitted both to sons and to daughters, in practice inheritance rights remained gender-linked, with male property (the bulk of land property) being passed on to male heirs. For these reasons, empirically we expect to see most of the effects of the reform to be on male children, and to a lesser extent on female children.

3 Theoretical framework

In this section we propose a simple theoretical framework to highlight the effects of the reform of matrilineal inheritance on human capital investment. The model is very stylized and serves as a motivation for our empirical strategy.

3.1 Allocation with and without matrilineal norms

Consider an environment where an altruistic parent has one child, and allocates resources between own consumption and investment in education of the child (E). We assume that there is no saving technology, so income is either consumed or invested in children's human capital. The parent is endowed with an exogenous amount of land L. The amount of land that the child inherits is denoted by $L^c \leq L$. Importantly, the share of parental land that can be transferred to the child depends on the prevailing social norm.

First, we derive the optimal allocation in the absence of claims by the matrikin, i.e. the unconstrained optimum. In this case, land is entirely devolved to the child, e.g. $L^c = L$. Second, we model the matrilineal constraint as an upper bound on the amount of land the parent can transfer to the child, e.g. $L^c = \overline{L^c} < L$. Third, we model the Intestate Succession Law as an increase in the upper bound of the land the parent can transfer to the child and show that the equilibrium allocation is closer to the one he would have chosen in absence of the matrilineal constraint. We

then conduct some comparative statics to determine how the optimal allocation changes by varying the exogenous amount of land for the child (consistent with the change in the matrilineal rule).

The child's preferences are represented by the utility function $U^c = u(C^c)$, with $u'(\cdot) > 0$, $u''(\cdot) < 0$. The variable C^c denotes the child's consumption, which is equal to the child's income due to the absence of savings. Income, in turn, depends on the child's endowment of physical and human capital, i.e. $C^c = Y^c(E, L^c)$. We assume that the child's income depends positively on each of its arguments, $Y^c_E(\cdot) > 0$, $Y^c_L(\cdot) > 0$, $Y^c_{LL}(\cdot) \leq 0$ and $Y^c_{EE}(\cdot) \leq 0$.

The parent's utility depends on own and child's consumption (or income): $V^p = v\left(C^p; Y^c(E, L^c)\right)$, with partial derivatives $v_{C^p}(\cdot) > 0$, $v_{Y^c}(\cdot) > 0$, $v_{C^p,C^p}(\cdot) \leq 0$, and $v_{Y^c,Y^c} \leq 0$. Moreover, we assume that $v_{C^p,Y^c}(\cdot) = 0$, which is a common separability assumption between parental consumption and child's income in models of intrahousehold allocation with parental altruism (e.g., Behrman, 1997). The parent's income, Y^p, is taken as exogenous. This income has to be allocated between the parent's own consumption C^p, and expenditure on child's education, pE, where p is the price of education.

We start by considering an equilibrium in which no matrilineal constraint exists, where the parent's exogenous land endowment $L > 0$ is automatically passed to the child upon the parent's death. The amount of land inherited by the child is thus $L^c = L$. The parent's optimization problem can thus be written as:

$$\max_{C^p,E} v\left(C^p; C^c\right)$$

$$\begin{aligned} \text{s.t.} \quad C^c &= Y^c(E, L^c) \\ Y^p &= C^p + pE \\ L^c &\leq L \end{aligned}$$

After substituting the budget constraint into the parent's utility, we derive the following first order condition:

$$-pv_{C^p}\left(C^p; Y^c(E, L^c)\right) + v_{Y^c}\left(C^p; Y^c(E, L^c)\right)\frac{\partial Y^c(E, L^c)}{\partial E} = 0 \tag{1}$$

We assume that the conditions for the existence of an interior solution are satisfied and refer to the solution of (1) as the 'unconstrained' optimum. We denote the corresponding equilibrium values as $C^{p*} > 0$, $E^* > 0$, $L^c = L$.

We next move to the pre-reform case, where the parent is constrained by custom in his bequest choices. As discussed above, according to traditional matrilineal principles there is no systematic

transfer of land rights from a man to his child upon the man's death. Inter-vivos gifts from parent to child are allowed provided that the matriclan approves, and in any case can entail only a limited portion of the man's land. We thus represent the matrilineal constraint as an upper bound on the amount of land that the parent can pass on to his child:[6]

$$L^c = \overline{L_1^c} < L$$

The Intestate Succession Law included a provision that a given fraction of the property should go to the man's children and substantially decreased the share going to the matriclan. In our framework this reform can be modeled as an increase in the upper bound of the land that can be allocated to the child, e.g. to $\overline{L_2^c} \in (\overline{L_1^c}, L)$.

We now derive the sign of the change in the optimal amount of E^* implied by an exogenous change of L^c applying the implicit function theorem to expression (1). The sign of $\frac{\partial E^*}{\partial L^c}$ is unambiguously negative if the following sufficient (not necessary) condition holds: $\frac{\partial^2 Y^c}{\partial E \partial L^c} \leq 0$, which indicates that the returns to education are non-increasing in the amount of land.[7]

Under the assumptions made on the child's production function and the parent's utility function, the equilibrium allocation with the matrilineal constraint implies a higher amount of education for the child compared to the unconstrained case: $E_1^* > E^*$, (with $L^c = \overline{L_1^c}$). This equilibrium represents a situation in which parents 'overinvest' in their children's education compared to the unconstrained equilibrium with $L^{c*} = L$, because they are restrained in the amount of physical capital they can devolve on them. It is now easy to see that the reform of matrilineal inheritance would lead to a decrease in schooling investment for the child (compared to the pre-reform situation). The corresponding equilibrium allocation will involve a lower level of education, $E_2^* < E_1^*$ (with $L^c = \overline{L_2^c} > \overline{L_1^c}$). In other words, the effect of the reform is to bring the parent closer to his unconstrained optimal allocation.

Testable predictions

Despite its simplicity, our basic theoretical framework has some interesting implications. To frame these implications in the context of the empirical analysis that we conduct for Ghana, we refer to a group that follows matrilineal descent principles (Akan) and a group that does not (non-Akan).

Prediction 1: Ceteris paribus, after the reform Akan parents should invest relatively less in their children's education compared to non-Akan parents (for whom L^c is unchanged).

Prediction 1 is the key prediction for our analysis and will be tested using a difference-in-differences estimation strategy.

[6] We assume that the parent derives no utility from land going to other kin members upon his death.

[7] The analytical expression of the derivative is reported in appendix A.1. We are not aware of any evidence testing assumption $\frac{\partial^2 Y^c}{\partial E \partial L^c} \leq 0$ in our setting, although Kingdon and Soderbom (2008) show that returns to education in the agricultural sector in Ghana are very low.

Prediction 2: Prediction 1 should apply to landed households, for which the reform actually changes the budget set, and not to landless ones.

3.2 Extension: sons vs. daughters

We can extend this simple model and consider a case where the parent has two children –a son and a daughter– and allocates resources between own consumption and investment in education of the son (E^s) and of the daughter (E^d). Consistent with the evidence described in section 2, we assume that land inheritance is gender-linked, i.e. land is controlled by the male parent who can pass it on to his son (or to other male kin, depending on the inheritance rule). Daughters, on the other hand, do not inherit from their father but use the land controlled by their husband or other male relatives. We denote the (exogenous) amount of land that can be used by the daughter as L^d.

While in appendix A.2 we report the details of this version of the model, here we only sketch the main ingredients and the solution. The parent is altruistic towards both the son and the daughter, and maximizes the utility function $v\left(C^p; Y^s(E^s, L^s); Y^d(E^d, L^d)\right)$ subject to the budget constraint $Y^p = C^p + p_d E^d + p_s E^s$, where the price of education p is allowed to differ across genders.

In an interior equilibrium the following condition must hold:

$$\frac{v_{Y^s}(\cdot)}{v_{Y^d}(\cdot)} = \frac{p_s}{p_d} \frac{\partial Y^d(E^d, L^d)/\partial E^d}{\partial Y^s(E^s, L^s)/\partial E^s}$$

This condition states that the ratio of resources invested in son and daughter's education reflects differences in returns to education and relative prices of education across genders.

As before, the matrilineal constraint is defined as an upper bound to the land that the son can inherit, $L^s = \overline{L_1^s} < L$, and the Intestate Succession Law is represented as a relaxation of this constraint, i.e. $L^s = \overline{L_2^s} \in (\overline{L_1^s}, L)$. In appendix A.2, we derive the conditions for $\frac{\partial E^{*s}}{\partial L^s} < 0$. In the particular case where $v_{Y^s,Y^d}(\cdot) = 0$ (i.e. there are no complementarities between son's and daughter's consumption), a sufficient (not necessary) condition for $\frac{\partial E^{*s}}{\partial L^s} < 0$ is that $\frac{\partial^2 Y^s}{\partial E^s \partial L^s} \leq 0$, which indicates that the returns to education are non-increasing in the amount of land. Therefore, Prediction 1 above is confirmed in this extended model with respect to sons' education.

On the other hand, the effect of the reform on daughters' education ($\frac{\partial E^{d*}}{\partial L^s}$) is ambiguous: it may be positive due to a relaxation in the household's budget constraint, but this depends on the shape of the utility function. Whether the effect of the reform on girls is zero or not is ultimately an empirical question, but under realistic assumptions the main effect of the reform should be seen on boys, as before and after the reform males were the main recipients of land bequests. We can thus state another prediction of our framework.

Prediction 3: Ceteris paribus, after the reform Akan parents should invest relatively less in their sons' education compared to non-Akan parents, but the same should not necessarily apply to daughters' education.

Finally, notice that our stylized model also has implications related to the levels of human capital investments in the pre-reform equilibrium allocations. In particular, there should be differences in the pre-reform education levels across ethnic groups, with the Akan being on average more educated than the non-Akan. While this gap is something that we do uncover in our empirical analysis, we recognize that unobserved characteristics other than the matrilineal inheritance norm may be driving initial gaps among ethnic groups. Our key identification strategy relies on changes in allocations before and after the reform across different groups, as highlighted in predictions 1-3.

3.3 Discussion

The above framework is extremely stylized and involves a number of simplifying assumptions. However, it has the advantage of capturing the essential workings of the reform in the most parsimonious way. In this section we briefly discuss alternative modeling assumptions and the effects they may have on our results. While our simple model is static, one could extend it to a dynamic setting using an overlapping generations framework in which each individual lives for two periods. In such a setting, an individual's income (and consumption) would depend on his/her stock of human and physical capital, and each generation of parents would choose optimal amounts of investment in education for the next generation.[8] This problem would have a recursive structure, and the equilibrium without matrilineal constraint would entail a lower level of education compared to the 'constrained' equilibrium, similar to the static model.

A simplifying assumption of our setting is that children can only inherit land from their parents. We know that in real matrilineal systems males inherit lineage land from their maternal uncles, and this may be cause of concern because the reform of matrilineal inheritance should affect uncles' behavior as well as parents'. We can explore the implications of a richer model, one in which each generation can inherit both from the father and from the uncle, in a qualitative way. Consider first a setting where each young individual has exactly one parent and one uncle, and where the uncle has one child of his own. Assume also that the amount of land owned by the parent and the uncle is the same. In this setting the matrilineal reform would have no effect on equilibrium allocations, because the increase in the land that a parent can pass on to his child after the reform would perfectly compensate the decrease in the land received by the uncle (who, in turn, is devolving more land to his own child).

[8] In the static model, we have assumed that the parent's income does not depend on human capital, as this is equivalent to assuming that it depends on an exogenous (pre-determined) level of human capital.

In a realistic model of the matrilineal system, however, it may be preferable for children to inherit their own father's land rather than their uncle's for several reasons. First, this may be due to land-specific investments made by the children while working for their father: to the extent that Akan males spend considerably more time working their father's land than their uncle –as is empirically the case– it is efficient for them to have a long-term stake in the productivity of the land, as in Botticini and Siow (2003). Second, inheriting from one's father may also strengthen the security of property rights: Bruce and Migot-Adholla (1994), for example, argue that rights are better enforceable when the land is inherited from the father than when it is allocated by the matrikin. Third, while every child has a father, not every child has a maternal uncle, as this depends on the realized sibling composition of the child's mother. Indeed, the fact that the customary matrilineal norm would lead to impoverishment of those children who had no maternal uncles was one of the motivations for the Ghanaian legal reform that we examine. Finally, even when the child has a maternal uncle, in a matrilineal system fathers do not have full control over the land that the child will inherit. This may lead the father to invest more in his son's education to compensate for the uncertain amount of physical capital the child will be endowed with in the future. A way to capture this in the model would be to assume that there is uncertainty about the probability to inherit the uncle's land. In this case the reform would still have a negative impact on education investment, which is what we test in the data.[9]

4 Empirical strategy

To study the impact of the Intestate Succession Law on education, we consider two sets of outcomes. First, and most importantly, we analyze impacts on attainment by estimating regressions for years of completed schooling and completion rates. Second, we also estimate how attendance rates varied in response to the reform, with an emphasis on heterogeneous effects depending on siblings' composition.

4.1 Years of schooling and completion rates

In the first part of the analysis we compare educational attainment for two age groups: those who were 0 to 17 years old in 1985, when the Law on intestate succession was passed (i.e., who were most exposed to the reform) and those who were older than 18 and whose education should not have been affected by the Law. We restrict the sample to individuals 20 to 50 in each survey round.[10]

[9]Ideally, we would like to have data on the composition of the entire extended family (notably, the existence of a maternal uncle) and on land owned by each member. This information is not available in the GLSS, nor in the DHS surveys. Hence we cannot control for inheritance received by the uncle, nor assess the extent of substitutability between father's and uncle's land.

[10]Results are similar if we consider the age range 25-50 (available upon request).

The group of individuals aged 0–17 in 1985 includes children who were in primary school or would subsequently enroll in primary, children in junior secondary/middle school, and those who were completing senior secondary school.[11]

Our basic estimation strategy exploits differences across cohorts and ethnic groups. We analyze the impact of the Law separately for males and females. The basic difference-in-differences specification is:

$$y_{itr} = \beta_1(Akan_i * Post_{it}) + \beta_2 Akan_i + \beta_3 X_{itr} + \beta_4(X_{itr} * Post_{it}) + \\ + \beta_5 age_i + \beta_6 age_i^2 + \nu_t + \alpha_r + \gamma_r \cdot t + \epsilon_{itr} \quad (2)$$

where y_{itr} is number of years of schooling or the highest level of education completed by an individual i, born in year t and living in region r. $Akan_i$ is a dummy equal to one if an individual belongs to the Akan ethnic group. The variable $Post_{it}$ indicates the post-reform period, and is constructed based on the individual's age when the Law was passed in 1985. In most of our analysis $Post_{it}$ is a dummy equal to one if the individual was born in 1974 or later years. Children born in 1974 were completing the last year of primary school in 1985, hence we define this cutoff as "treated by the end of primary". For these children, the Law not only affected the decision to complete primary education, but also to enroll in secondary school. We will also experiment with a different cutoff for the birth year, defining $Post_{it}$ as equal to one if the individual was born in 1968 or after. Since those born in 1968 belong the first cohort being affected for the completion of secondary school, we define this cutoff as "treated by the end of secondary". We expect that educational outcomes should be most affected for children who were at an earlier stage of education when the Law was passed (i.e., that the impact of the reform should be bigger when using the 1974 cutoff).

The other controls that we include in specification (2) are as follows. X_{itr} is a set of covariates observed at the time of each survey including: household size, a principal component index of durable goods owned by the household, a dummy for female headed household, mother's and father's education, age of the household head, religion of the household head, and a set of nine dummies for

[11] In Ghana children should enroll in primary school when they are 6 and complete it when they are 11. However, late enrollment is not uncommon as there are many children starting primary at 7 or 8 (White, 2005). In terms of our empirical strategy, this would lead to an underestimation of the effect on education because also individuals in the 18–30 age bracket would be partly treated. Because of this choice, our estimates can be considered conservative. Note also that Ghana embarked on a reform of its education system in 1987. Before 1987 the school system was structured as 6-year primary, 4-year middle, 5-year secondary. The reform replaced this system with 6-year primary, 3-year junior secondary and 3-year senior secondary.

the major crops grown in the village where the individual lives.[12] We also include the interactions between the controls X_{itr} and $Post_{it}$ to take into account the possibility that these variables had a differential impact on education in the post-reform period. Note that the interactions between major community crops and the post-reform dummy account for the possibility that our results may be confounded by movements in returns to education for the Akan compared to the non-Akan due to changes in the production of a specific crop differentially grown by Akans in the post-reform period. In addition, we include among the controls in (2) the age of the individual and its square, survey wave fixed effects, birth year fixed effects ν_t, a vector of region dummies α_r, and region specific linear time trends $\gamma_r \cdot t$. These fixed effects and trends capture region and cohort-specific effects that may be correlated with the error term, e.g. variation across regions and over time in the supply of education.

In regression (2), our coefficient of interest is β_1, the coefficient of the interaction term between $Akan_i$ and $Post_{it}$. In line with our theoretical predictions we expect $\beta_1 < 0$: compared to non-Akan males of the same age, Akan males exposed to the reform should have fewer years of schooling. The same should not hold (or should hold to a lesser extent) for females.

The regressions for years of education are estimated with OLS using survey weights and clustering the standard errors at the village (survey cluster) level. To estimate the impact on highest grade completed we instead use a probit model for the probability of completing at least primary or secondary school. We also estimate an ordered logit model for the highest grade completed, which is a categorical dependent variable for the different educational levels completed.

Our identification strategy assumes that, conditional on the controls we include in specification (2), changes in education outcomes for Akan and non-Akan males would have been the same in the absence of the reform. Below we discuss the plausibility of this assumption examining pre-trends and conducting some falsification tests.

While specification (2) divides individuals into two broad categories –affected and not affected by the reform– we also estimate a fully interacted model that yields a different estimated coefficient for each birth cohort. This way we can see for which Akan cohorts –if any– the decrease in educational attainment started to materialize. Specifically, we estimate the following variant of (2):[13]

[12]The durable goods that enter our principal component index are: radio, tape-player, television, sewing machine, refrigerator, air conditioner, bicycle, motor cycle, and car. The religion of the household head include Catholic, Protestant, other Christians, Animist, and Muslim. The major crops are cocoa, cassava, maize, yam, tomato, plantains, nuts, pepper, beans/peas.

[13]In this model we include all the controls as in 2, except for the interactions between the controls in X_{itr} and the post-reform dummy.

$$y_{itr} = \sum_{l=1960}^{1985} \beta_{1,l}(Akan_i \ ^* \ I_{il}) + \beta_2 Akan_i + \beta_3 X_{itr} + \beta_4 age_i + \beta_5 age_i^2 + \nu_t + \alpha_r + \gamma_r \cdot t + \epsilon_{itr} \quad (3)$$

where I_{il} is a vector of birth-year dummies equal to one if individual i was born in year l, and all the other variables are defined as in (2). Our coefficients of interest are the $\beta_{1,l}$'s that estimate the year to year difference in education across ethnicities compared to the control group of those born before 1960.[14] We expect the coefficients $\beta_{1,l}$ to be zero for cohorts that were too old to be affected by the reform, e.g. $l < 1968$ or $l < 1974$, and become negative for younger cohorts.

4.2 Attendance rates

After having estimated the impact of the reform on our measures of "accumulated human capital", we turn to the analysis of the effects on school attendance rates. In order to do this, we select individuals aged 6 to 17 from each of the five rounds of the GLSS, and compare attendance rates for those observed if the first two waves (GLSS 1987/88 and 1988/89) to those observed in later rounds of the survey (GLSS 1991/92, 1998/99 and 2005/2006).[15] Ideally we would like to have information on attendance rates before 1985, but this data is not available in the GLSS. However, it is likely that it took some time before the reform was fully operative, so we hypothesize that parents internalized the effects of the reform more in rounds 3 to 5 of the GLSS. If the reform led to a sudden reduction in attendance levels in 1985, which is somewhat unlikely, our results would underestimate the true effect.

We use a probit model to estimate the probability of being currently in school in the post-reform period for individuals belonging to the Akan versus non-Akan ethnic group. We run a regression similar to (2), where edu_{itr} is an indicator variable taking value one if the individual is currently attending school and zero otherwise. $Post_{it}$ is equal to one if the individual was observed in GLSS wave 3, 4 or 5, and zero otherwise.[16]

We also run a regression with a triple interaction between *Akan*Post*age12–17* to understand if the effect on attendance is different for primary and secondary school age children, i.e. children aged 6–11 and 12-17, respectively.

[14] The average bin size for the years 1960-1985 is 476 individuals (for the sample of both males and females).

[15] For the analysis of attendance rates, we restrict the sample to children of the household head. We follow White (2005) and define the attendance rate as the fraction of children who are supposed to be enrolled in a particular school level for their age who are currently in school. For example, for primary school age children, it is the fraction of children aged 6–11 currently in school.

[16] Control variables are the same as in (2), except that we include wave fixed effects but not birth year fixed effects, due to the smaller sample size.

5 The data: a descriptive analysis

The theoretical predictions illustrated in the previous sections will be tested using individual-level data from all five rounds of the Ghana Living Standard Survey: GLSS1 (1987/88), GLSS2 (1988/89), GLSS3 (1991/92), GLSS4 (1998/99), and GLSS5 (2005/06). Because matrilineal inheritance norms mostly apply to the allocation of land, we restrict our attention to the rural subsample of the GLSS.

As discussed above, we analyze the effects of the Intestate Succession Law on educational attainment and on attendance rates. For the analysis of attainment we focus on individuals aged 20 to 50, and test the theoretical predictions first using the full sample and then splitting the sample based on whether an individual's father is/was a farmer. Having a father farmer is a proxy for whether the father owned land at the time when his children (who are the individuals included in our sample) were of school age. This variable is preferred to the one that can be derived from the question "Does any member of the household own any land?" for two reasons. First, since this information refers to land owned by the household at the time of the survey, we do not know whether this land was already owned at the time when the individual was in school. Second, if the father of the individual is not a household member, there is no question asked about land ownership of the father. However, while having a father who was a farmer is a 'lagged' proxy for land ownership (which is what we need for our analysis), it is an imperfect one: being a farmer does not necessarily mean owing land. Nonetheless, as we show in section 6.3, our results are very similar if we use father's farmer status or current land ownership.

In the second part of the empirical analysis, when we consider current attendance rates of younger cohorts (aged 6 to 17), we present evidence for the full sample and for the subsample of landed households, defined as households who answer in the affirmative to the question "Does any member of the household own any land?". In this case the contemporaneous land ownership status of the household is the appropriate measure because the population under study is that of individuals younger than 18, most of whom are still living with their father in the household being interviewed. We also run the attendance regressions on the subsamples of individuals with and without a father farmer to provide support to the validity of our proxy for land ownership and obtain consistent results.

For the first part of the analysis on accumulated human capital, we use all five rounds of the GLSS and restrict the sample to individuals aged 20–50 in rural areas. The restricted sample includes 18622 individuals. Summary statistics for the main variables of interest are shown in Table 1. Summary statistics for the other variables used in the regressions as well as a breakdown by ethnicity and gender are shown in appendix table A.1.

The Akan constitute 41 percent of our sample. The remaining groups, all patrilineal and that

for brevity we denote as the "non-Akan", are the Ewe, Mole Dagbani, Ga-Dangme and others. Individuals in our sample have on average 4.75 years of education, but this estimate varies significantly across ethnicities and genders. The average Akan male in our sample has 8.61 years of education, compared to 4.84 for non-Akan males. For females, the corresponding figures for Akans and non-Akans are 5.02 and 2.26, respectively. Consistently, a higher fraction of Akans have attained primary or higher levels of education.[17]

Turning to our proxy for land ownership, table 1 shows that 81 percent of the individuals in our sample have a father who is/was a farmer: this percentage is higher among the non-Akan (85 and 87 percent for males and females, respectively) than among the Akan (74 percent).

The remaining part of Table 1 shows the summary statistics for the sample of younger cohorts used in the second part of the analysis. Panel B refer to the sample of individuals aged 6–17. Descriptive statistics for the subsample of those aged 12 to 17 are shown in appendix table A.2. Attendance rates for Akan and non-Akan boys of primary and secondary school age are 86 and 64 percent, respectively (panel B). The percentage of girls going to school is lower than that of boys by about 5 percentage points in both ethnic groups. Finally, we see that 68 percent of Akan and 59 percent of non-Akan men live in a household in which at least one member owns land.

6 Econometric results

6.1 Effect of the reform on years of education

6.1.1 Main results

We start by testing Prediction 1 of our theoretical framework: ceteris paribus, after the reform Akan parents should have invested relatively less in their children's education compared to non-Akan parents. Table 2 shows the simple difference-in-differences (DiD) estimates of the effect of the Intestate Law on years of schooling using a 2×2 structure.

[Insert table 2]

We consider mean years of education for four different age groups: 0–11, 12–17, 18–25 and 26–30 at the time of the reform. We expect that the 1985 Law should have affected education decisions for children of primary or secondary school-age, but not for those older than 18, who

[17] One may speculate that this difference in educational attainment may reflect differences in age at marriage, but this does not seem to be the case. In the rural sample of the 2003 Demographic and Health Survey for Ghana, for example, the age at first marriage is similar across ethnic groups: the median age at which women first got married is 18, while it is 23 for males, both for Akans and not. Also, inter-ethnic marriages among Akans and non-Akans tend to be rare: only 5.7 of unions in the same dataset involve a head and spouse belonging to different ethnic groups.

should have already completed secondary school in 1985. Each panel in the table reports estimates separately for Akans and non-Akans (columns), who were in different age brackets when the reform was implemented (rows). We report results separately by gender. Panel A shows that Akan males aged 0 to 11 in 1985 completed on average 8.6 years of education, while non-Akan males in the same cohort completed 5.6. On the other hand, for the older cohort who was 18 to 25 years old when the reform was passed, completed on average 8.9 years of education for Akan males and 5 for non Akan males. Our DiD estimate of the effect of the reform is thus -0.8 with a standard error of 0.35, indicating that the reform induced Akan parents to give on average 0.8 less years of education to their male children compared non-Akan children in the same age group. It is interesting to notice that the margin of adjustment to the reform for Akans is a reduction in educational investment for younger cohorts –and not simply slower growth. This is in fact what our model predicts. When we repeat a similar exercise for females (rightmost part of the table), we find no statistically significant effect of the reform: if anything, the effect is in the opposite direction.

In panel B of table 2 we estimate the effect of the reform on a group of children who would have been in secondary school when the reform was implemented, i.e., who were 12 to 17 years old in 1985, and we keep as control group cohorts who were 18 to 25 in the same year. We find no significant effect of the reform on Akan males nor females. Thus, the effect of the reform seems to be mainly concentrated on those who were at an earlier stage of their education and had to decide whether to enroll in secondary.

Finally, in panel C of table 2 we conduct a falsification test, comparing individuals aged 18 to 25 in 1985 to individuals aged 26 to 30. Neither group should be affected by the reform according to our theory, hence if we found a significant difference in the same direction when comparing these two groups this would suggest that our effects may be spurious. As can be seen from the table, the DiD estimate for this placebo test is a precisely estimated zero, which increases our confidence in our identification strategy.

[Insert table 3]

In table 3 we turn to multivariate regression and estimate equation (2). We show results separately for males (columns 1 and 2) and females (columns 3 and 4) using the full sample and the two birth year cutoffs: "post 1968" and "post 1974". Recall that "post 1968" is an indicator variable taking value one if the individual was born in or after 1968, meaning that when the reform was passed in 1985, the individual was in the last year of secondary school or younger. Similarly, "post 1974" takes value one if the individual was born in or after 1974, i.e. he/she was in the last year of primary school or younger at the time of reform. We expect to find a negative and significant coefficient on the interaction term *Akan*post* for males, but no effect (or a smaller effect) for females. Also, we expect the negative effect to be stronger for individuals born in 1974 or after,

because their decision to enroll in (not just to complete) secondary school was affected. Thus, we expect the coefficient of *Akan*post 1974* to be larger in absolute value than that of *Akan*post 1968*. This is indeed what we find: in column 1 the coefficient of *Akan*post 1968* is equal to -0.66 and is significant at the five percent level. This means that, compared to non-Akan males, ceteris paribus, Akan males exposed to the reform experienced a 0.66 year reduction in the number of years of completed education. The coefficient of *Akan*post 1974* is larger at -0.92, as predicted, and significant at the 1 percent level.

Columns 3 and 4 of table 3 show the estimates for females. After the reform there is no significant change in years of education for Akan females with respect to non-Akan females in the same cohorts. If anything, the change is positive: the coefficients on *Akan*post* are 0.076 and 0.129, none of them significant. The lack of a significant effect is consistent with Prediction 3 of our model and with the institutional background discussed in section 2. Because the intergenerational transmission of land continued to remain gender-linked, the Intestate Law effectively relaxed the transmission of property from father to son, while girls kept inheriting their mothers' land which was either nonexistent or "unconstrained" to start with.

Another interesting fact that emerges looking at the coefficient on the Akan dummy in table 3 is that Akans have an initial education advantage: this advantage is about 1.6 additional years of schooling for males and one year for females. This level effect for Akan males is something that our model predicts, though we refrain from giving a causal interpretation to this estimate as it may reflect unobservable differences (e.g., in preferences or endowments) other than customary inheritance. Among the other regressors, we see that both mother's and father's education are strong predictors of educational outcomes of their children.

[Insert figure 2]

To better understand the difference between the two cutoffs used in table 3 and get a disaggregated picture of the effects for different cohorts, in figure 2 we show the estimates of a fully interacted model, where the Akan dummy is interacted with a set of dummies for the year of birth of the individual (regression equation 3).[18] Figure 2 plots the estimated coefficients on the interaction terms $Akan_i^* I_{il}$ for the male subsample, with 95 percent confidence bands. Two results emerge from this analysis. First, for cohorts born until 1974, none of the estimated interactions is statistically different from zero: this suggests that Akan and non-Akan males shared a parallel trend before the reform, which is important to support our identification strategy. Second, after 1974 the graph shows a sharp decline and the coefficients remain significantly negative for all younger cohorts. This pattern suggests that the reduction in educational investment was mostly driven by

[18] As previously indicated in the description of the empirical strategy, this model includes all the controls as in table 3, except for the interactions between the controls in X_{itr} and the post-reform dummy.

Akan households whose children were not so old as to have started secondary education at the time of the reform. In light of this result, in the remaining tables we use 1974 as a cutoff for our definition of *Post*.

[Insert table 4]

Another prediction of our framework (Prediction 2) is that the reduction in educational investment should be observed only among landed households, for which the reform actually changed the budget set, and not for landless ones. In table 4 we estimate the effect of the Law separately for individuals whose father was a farmer and individuals whose father was not. The negative effect on education for Akan males should be found for men with a father farmer, to the extent that this proxies for land ownership of fathers at the time when the individuals in our sample were in school, and no effect should be found for individuals whose father was not a farmer. As before, the coefficient of interest is that on the interaction term $Akan^{*}Post$, where *Post* is defined using the 1974 cutoff. In column (1) we see that the coefficient of interest for men with father farmer is -1.12 and significant at the one percent level. This indicates that, ceteris paribus, Akan men affected by the reform with fathers who were farmers achieved 1.1 less years of education compared to non-Akans belonging to the same cohorts and whose fathers were also farmers. Column (2) shows that for individuals whose father was not a farmer the coefficient of the interaction term is zero, which is consistent with our theoretical prediction. Again, we do not find any significant effect for females.

[Insert figure 3]

When we estimate the effects separately for each cohort using a fully interacted model, we find results strongly consistent with our interpretation. In the left panel of figure 3, which refers to males with a father farmer, the estimated effects are precisely zero for all cohorts born until 1974, and become negative and significant starting in 1975. The pattern for individuals whose father was not a farmer (right panel) is instead flat throughout the period.[19]

We also find consistent results with the rest of the analysis when estimating the fully interacted model for females. As can be seen in appendix figure A.1, contrary to what happens for males no trend break emerges for Akan females affected and not affected by the reform.

6.1.2 Alternative control groups

The above analysis rests on a comparison between Akans and non-Akans, plus some further differences depending on father farmer status and on gender. It is therefore useful to discuss to what extent ethnic groups other than the Akan in Ghana constitute a valid counterfactual for what would have happened to Akans.

[19] Some estimates are less precise due to smaller sample size in these subsamples.

As we noted when we presented descriptive statistics, compared to non-Akans, Akans have a higher initial level of education. This generates a concern that our results may be driven by mean reversion. It is first worth noting that, as shown in figure 2, there is no differential trend in education between Akan and non-Akan males in the pre-reform period. This supports the idea that there was no convergence in education for cohorts born before 1968 who were too old to be affected by the reform. Moreover, we have shown that there is no decrease in years of education for Akan females (rather, a slight increase) even though Akan females also start with a higher education level compared to non-Akans – about one more year of education. Both these facts suggest that mean reversion is likely not responsible for our findings.

[Insert table 5]

To further check the extent to which our results may be affected by mean reversion, we conduct an additional test in which our control group is composed only by the Ewe, a sub-group of the non-Akan characterized by a higher level of education. In our sample the Ewe constitute about 25 percent of all the non-Akan and are mainly concentrated in the Eastern and Volta regions of Ghana. Their average number of years of education is much higher than that of other non-Akans (Ewe males have on average 7.6 years of education compared to 4 for the rest of non-Akan males) which is closer to the Akan level (8.6). If our results were driven by mean reversion, we would fail to find an effect of the reform when comparing the Akan to the Ewe. Columns 1 and 2 of table 5 show the results for males and females, respectively. Compared to the Ewe, Akan males affected by the reform experience a reduction of 0.77 years in their educational attainment. The size of this effect is comparable to that of our benchmark regression in table 3, where the coefficient on $Akan^{*}Post$ was 0.9. This corroborates our interpretation that our results are not driven by mean reversion.

Aside from mean reversion, one may be concerned that shocks specific to the Akan ethnicity might be driving our results. To address this concern, we exploit the fact that the Akan are also present in the neighboring Côte d'Ivoire, but Akans living there were not affected by the Intestate Law introduced in Ghana in 1985. Akans represent about the 33 percent of the Ivorian population and are geographically concentrated in the Southern and Eastern regions, the regions closest to Ghana. As in the context of Ghana, all ethnic groups other than the Akan are patrilineal. Importantly for our purposes, in Côte d'Ivoire the 1964 Family Code regulated inheritance and designated the nuclear family (spouse and children) as the sole inheritors. Therefore, the "shock" to the matrilineal customary system in Côte d'Ivoire had occurred two decades before the Ghanaian reform. Our reasoning is as follows. If the reduction in educational attainment of Akan males is driven by shocks to this ethnic group that occurred after 1985, to the extent that Akans in bordering regions of Côte d'Ivoire also experienced such shocks we should see a reduction in their educational

attainment compared to Ivorian patrilineal groups. If on the other hand the reduction in education is due to households' responses to the Intestate Succession Law, then we should not find any effect when estimating our model on data from Côte d'Ivoire because the 1985 Law did not apply beyond Ghanaian borders.

We use the Côte d'Ivoire Demographic and Health Survey (DHS) for 1994, 2005, and 2011 and, consistent with our analysis for Ghana, we consider individuals age 20-50 in rural areas.[20] We focus on individuals living in the North-East, Center-East, and South of Côte d'Ivoire, regions that are bordering Ghana. In these regions the average number of years of education for Akan males is 6.42, and 2.67 for non-Akan males (for females, it is 3.09 for Akans and 1.08 for non-Akans).

We estimate a specification similar to (2), defining $Post_{it}$ based on the Ghana post-reform period, i.e. as an indicator variable for individuals born after 1974. The results are reported in columns 3 and 4 of table 5. In neither sample we detect any effect on education for individuals born after 1974. This evidence supports our interpretation that the reduction in education for Akan males in Ghana is not due to shocks specific to the Akan ethnicity.

6.1.3 Alternative interpretations and robustness

We next discuss further alternative interpretations of our results and run more robustness checks to assess whether the mechanism that we suggest for linking the passage of the reform to educational outcomes is plausible and finds support in the data.

[Insert Table 6]

Region-specific shocks

Our first robustness check addresses the fact that the Akan are concentrated in the Southern and Western regions of Ghana. Although all our regressions include region fixed effects and region-specific linear trends, one may conjecture that shocks affecting Southern and Western Ghana after 1974 may have generated the effects we find. In panel A of Table 6 we estimate our regression excluding from the sample Northern regions. We find that for males the coefficient on the interaction term of interest is very similar in magnitude to the benchmark estimate in table 3 (-0.886 compared to -0.919), and is significant at the 1 percent level. As before, we find no significant effect on the subsample of females. This evidence suggests that our results are not driven by omitted time-varying factors that are specific to the regions where the Akan are spatially concentrated.

Returns to education

Second, we check whether our results may be due to differential changes in the returns to education for Akan compared to non-Akan males in the post-reform period. Such changes may

[20] We cannot use the 1998 DHS survey because the information on the region of residence is not available.

have originated, for example, from technological changes in the occupational sectors where Akans are concentrated. Here we discuss a major sector, cocoa production, and other types of occupations.

As we mentioned above, the Akan are spatially concentrated in regions where certain types of crops are grown (see the summary statistics for the major crops grown at the village level reported in appendix table A.1). It should be noted that in all our regressions we already control for dummies indicating the nine main crops grown in the community and for interactions between these crop dummies and the post-reform dummy. This accounts for crop-specific shocks occurring in the post-reform period, although it treats ethnic groups symmetrically in terms of the effects of these shocks. We next consider the possibility that there may have been crop-specific shocks that impacted Akans differentially from other groups. In particular, we know that one characteristic of Akans is that they are highly represented among cocoa producers. In fact, cocoa is mainly grown in the Southern and Western parts of Ghana, the regions where the Akan are concentrated. If returns to education in cocoa farming for Akans specifically changed over this period, or if Akans switched into or out of cocoa farming differentially from other groups (and this changed their returns to education), this may generate a pattern of results like the one we find. We thus define an indicator variable 'cocoa major crop' taking value one for villages where cocoa is listed as being one of the nine major crops, and zero otherwise. In panel B of table 6 we re-estimate our main regression introducing a triple interaction term *Akan*Post*cocoa major crop*. If our results were driven by changes in the returns to education associated with cocoa farming for Akans, we would expect a negative and significant coefficient on this triple interaction, and an insignificant coefficient on *Akan*Post*. Instead we find that for the male sample (column 1) the coefficient on *Akan*Post* is negative and significant, and close to our benchmark estimates. On the other hand the coefficient on *Akan*post*cocoa major crop*, is insignificant. No significant effect is found for females (column 2). Overall, we interpret these findings as evidence that our results are not driven by changes in returns to education for Akan cocoa farmers or by reallocation of Akans in or out of the cocoa sector in the post-reform period.

Another robustness check relates to changes in returns to education due to shocks to specific sectors in which Akans and non-Akans are differentially employed. We construct dummies for the type of mother's and father's occupation including: farmer, sales, clerical job, and professional. We also interact these dummies with the post-reform dummy and augment our benchmark specification to include these terms. The results are reported in panel C of table 6 and show that the inclusion of these variables does not affect our coefficients of interest, confirming our interpretation. When we analyze attendance rates below, we conduct a different version of this robustness check focusing on shocks to public employment.

Finally, to corroborate our interpretation of the results, we analyze whether the reform affected occupational choice. After the introduction of the 1985 Intestate Law, more Akan men may have chosen to work the paternal land as farmers (an activity in which the returns to education are lower than in other sectors). We test whether the probability of being a farmer differs between Akan and non-Akan males in the post-reform period and find that Akan males in the most recent survey rounds are 6.3 percentage points more likely to be farmers. Consistent with our results for education, there is no significant change for females. These results are reported in appendix table A.3.

6.2 Completion rates

We next estimate the impact of the reform on the probability of completing different levels of schooling.

[Insert Table 7]

Table 7 shows marginal probit coefficients from regressions where the dependent variable is an indicator for whether the respondent completed at least primary (Panel A) or at least secondary school (Panel B).[21] Results are reported for the full sample and for the subsamples of individuals with father farmer and not, by gender. Column (1) in panel A shows that, compared to the non-Akan, Akan males born after 1974 are 9.8 percentage points less likely to complete at least primary school. Since we are using the 1974 cutoff, we are considering individuals who were younger than 12 in 1985 and most likely to be affected for the completion of primary school. Column (1) in panel B shows that Akan males from the same cohorts are 11.4 percentage points less likely to complete secondary school or higher level. Column (4) shows the results for females. Consistent with the results obtained for years of education, we do not find any significant effect on female completion rates.

Columns 2-3 and 5-6 of table 7 show results for the subsample of individuals with a father farmer and not for males and females, respectively. By comparing columns (2) and (3), we see that only males with a father farmer experienced a significant reduction in the probability of completing at least primary or secondary school, while there is no effect on those whose father is not a farmer. This is consistent with our theoretical prediction. Columns 5 and 6 show corresponding results for females: again, we cannot detect any significant impact of the reform.

We also estimated an ordered logit model where the dependent variable is the highest level of education completed, which has four categories: no education, incomplete primary, completed

[21] Completion of at least secondary school is defined as a dummy equal to one if the individual has completed middle school or higher level (in the old education system) or junior secondary or higher (in the new education system), and zero otherwise.

primary, and secondary or higher. The estimates are reported in the appendix table A.4 and confirm our probit results in table 7.

Finally, we conducted all the robustness checks done for the regressions for years of education also for the completion regressions. The estimates are reported in appendix table A.5 and confirm our main results.

6.3 Effect of the reform on school attendance

We now analyze the effects of changes in matrilineal inheritance rules on current attendance rates for individuals of primary and secondary school age, i.e. individuals who are 6 to 17 year old in any given survey round. While ideally we would want to observe attendance before 1985 (the year of the reform), the first available survey is in 1987. We then compare attendance rates of individuals observed in waves 1 and 2 of the GLSS (1987/88 and 1988/89) to those surveyed in waves 3, 4, and 5 (1991/92 onwards). The idea is that households in the first two rounds may have had limited time to internalize the changes brought about by the reform, hence they may have reacted to a lesser extent than households interviewed in later rounds. Consistent with the attainment analysis, we should expect to find a reduction in attendance rates for Akan males surveyed in the last three rounds of GLSS (i.e., "treated" in the sense of being most affected by the reform), compared to non-Akan males in the same rounds. Moreover, the effect should be stronger for individuals in landed households.

[Insert Table 8]

Table 8 panel A shows the results on attendance rates for individuals aged 6 to 17, by gender. The dummy "post" takes value one for individuals interviewed in rounds 3 to 5 of the GLSS, and zero for those interviewed in earlier rounds. In column (1) we see that the coefficient of *Akan*post* is negative and significant at the 1 percent level. The estimated coefficient is -0.118, which means that the probability of being in school for those between 6 and 17 decreased for Akan males in the post-reform period by 11.8 percentage points. To see whether this reduction was stronger for Akan males of primary or secondary school-age (age 6–11 or 12–17, respectively), in column (2) we estimate a regression with a triple interaction term between *Akan*post*age12-17*. The results suggest that, while there is weak evidence of lower attendance for children in primary school, the reduction in attendance occurred mostly for Akan males aged 12–17. Column (3) shows that there was a significant reduction in attendance also for Akan females, though this is no longer statistically significant when we disaggregate by age group.[22]

[22]This evidence is not necessarily inconsistent with our previous finding that the female primary completion rate was not affected: Akan girls might be attending less in the post-reform period but still completing primary school.

Panel B of table 8 shows the results separately for households currently owning land or not. This is a good proxy for the fact that children in that household may in the future inherit paternal land. In Panel C of table 8, instead, we split the sample according to whether the father of the child is a farmer or not. While this seems a coarser proxy for potential inheritance, we want to compare results using this proxy to those obtained using current land ownership for the purpose of assessing how reliable our analysis was in the attainment regressions (where the only proxy for land ownership of adult men's original households was their fathers' farmer status). We focus on the subsample of individuals aged 12–17, for whom the effect on attendance for Akan males was stronger.

First of all, the coefficients on the Akan dummy in Panels B and C of table 8 show that Akan males have a strong initial advantage in attendance compared to non-Akan males that is limited to landed households (Panel B) or individuals with a father farmer (Panel C). More importantly, the reform decreased the probability of being in school but only for individuals in households with land. For males, this reduction is equal to 16 percentage points (coefficient of *Akan*post* in column 1 of Panel B) when land ownership status is directly measured, and to 14.8 percentage points when father's farmer status is used as a proxy (column 1 of Panel C). The closeness in the estimates increases our confidence that "father farmer" is a good proxy for land ownership. The coefficient on *Akan*post* for non-landed households is never significant regardless of the definition used.

Also, we conducted all the robustness checks that we performed for the attainment analysis also for the attendance regressions. Results are shown in appendix table A.6 and support our main findings.[23]

[Insert Table 9]

[23]There are two differences in the set of robustness checks reported in appendix table A.6 compared to the earlier analysis. The first is that we cannot perform the falsification test using Côte d'Ivoire because the first survey was done in 1994 hence we would not have any observations with $post = 0$. The second difference is that we can perform one additional test –reported in panel D of appendix table A.6– to deal specifically to shocks to public employment. Between 1987 and 1990 many civil servants were laid off as part of the redeployment program. Since Akans were relatively more employed in the public sector, one may conjecture that the redeployment program could have lowered investment in secondary education due to reduced access to public sector jobs. We use as a proxy for the expected lower returns to education the dummy '*any member in government*', which takes value one if at least one member of the household works for the government. Since we have information on the type of employer *only for resident members*, we can do this check only for the attendance regressions where we use the sample of younger cohorts, and not for the attainment regressions. Panel D of appendix table A.6, shows that the coefficient of *Akan*post* is −12.4 and significant at the 1 percent level, while that of (*Akan*post*any member in government*) is zero. This indicates that the reduction in school attendance is not driven by households in which someone works in the public sector.

We next test whether the effects of the reform on attendance rates vary with the number of siblings within the household.[24] If bequests are to be divided among all children of the head, the higher the number of children, the smaller the fraction of land going to each of them. In the framework of our model, the relaxation of the matrilineal constraint induced by the reform would then imply smaller gains (in terms of land) for children with more siblings. Hence we expect that, after the reform, disinvestment in education should be lower for boys who have more siblings.[25] Table 9 tests this hypothesis. In column (1) we see that the reduction in attendance for the cohorts most affected by the reform is 33.9 percentage points for Akan males with no siblings (coefficient on Akan*post). On the other hand, the coefficient on the triple interaction term ($Akan^{*}post^{*}\#siblings$) is positive and significant at the 1 percent level, indicating that the negative effect on attendance is attenuated by 5.4 percentage points for each additional sibling.

In columns (2) and (3) of table 9 we explore whether this "attenuation effect" varies according to the age and gender composition of the siblings. We expect that the attenuation effect should be mainly driven by those who have older siblings. In fact, the order of inheritance according to traditional matrilineal rules is such that 'if more than one person qualifies to inherit the property of the deceased, age and achievement become other important criteria' (Awusabo-Asare, 1990, p. 7). Moreover, since land is typically controlled (and consequently, inherited) by males, we expect that the number of older male siblings should have a positive mitigating effect on attendance for Akan boys.

Column (2) of Table 9 shows that the coefficient on ($Akan^{*}post^{*}\#$ *older siblings*) is positive and significant, while that on ($Akan^{*}post^{*}\#$ *younger siblings*) is zero. This is consistent with our hypothesis. We also find evidence that it is the number of older brothers that matters, and not the number of older sisters (column 3), again confirming our prediction. Finally, no similar effects are found on female attendance (columns 4 to 6).

Some caution should be exerted in interpreting the above results in a causal way, because the number of siblings may be endogenous. However, the fact that not just siblings but older siblings -and in particular older brothers- drive the differential effect on attendance, restricts the set of alternative explanations that one may provide. In summary, although we do not make any causal claim, the above evidence is consistent with the fact that when paternal land should be shared among more heirs, leading to lower land per child, parents disinvest less in education.

[24] The number of siblings is calculated taking into account all biological children of the household head. Note that we only have information about siblings currently *residing* in the household, and not about those who are living elsewhere. Therefore, we are underestimating the total number of siblings.

[25] Note that we could not test this prediction in the education attainment regressions because the GLSS does not contain information on the number of siblings of the (adult) individuals used in those regressions, unless they are co-residing. On the other hand, for the sample of younger individuals used in the attendance regressions it is plausible that a large number of their siblings is still living in the household.

7 Concluding remarks

A number of countries, in Africa and in the rest of the developing world, have embarked on land tenure and inheritance reforms in recent years. The rationale for such reforms is typically to increase productivity in the agricultural sector and, in some instances, to achieve redistributive goals. This paper studies the interplay between land inheritance reform and customary norms, showing that this interplay generates important implications for human capital investment.

We exploit the introduction of the 1985 Intestate Succession Law that radically changed traditional inheritance practices among matrilineal groups (the Akan) in Ghana. While before 1985 Akan fathers could not bequeath land to their own children, the Intestate Law mandated that a substantial fraction of a man's property should go to their children. Using a difference-in-differences strategy, we show that Akan men who had not yet completed primary school at the time of reform ended up having 0.9 less years of education. This effect is confined to landed households (who were in practice affected by the reform) and is specific to men, for whom traditional matrilineal principles were binding before the reform. We interpret this effect as a response by parents who had previously "over-invested" in human capital (compared to the unconstrained optimum) to compensate their sons for the limited ability to intergenerationally transmit physical capital.

Our results speak to a growing literature on the economic effects of traditional norms in developing countries and have policy implications that go beyond the Ghanaian experience. In particular, our paper suggests that the individualization of land rights may have far reaching implications that go beyond agricultural investment and productivity, and affect human capital accumulation in the long run.

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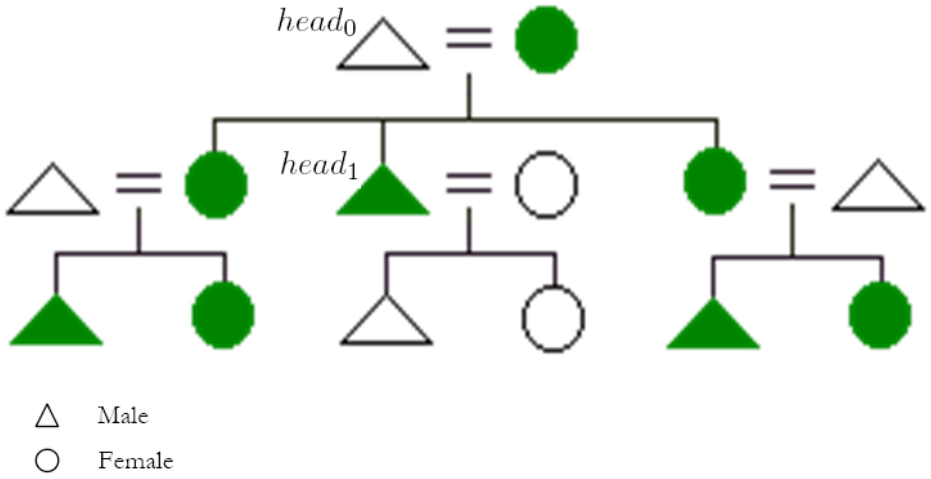
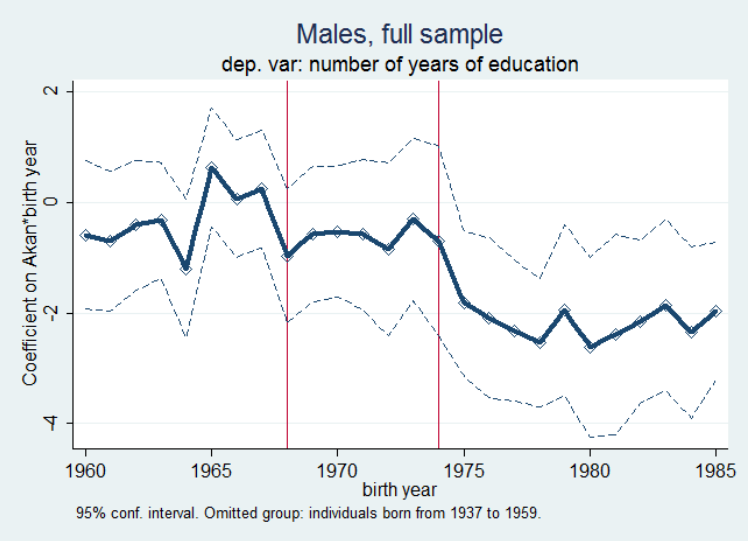
Figures

Figure 1: Matrilineal descent



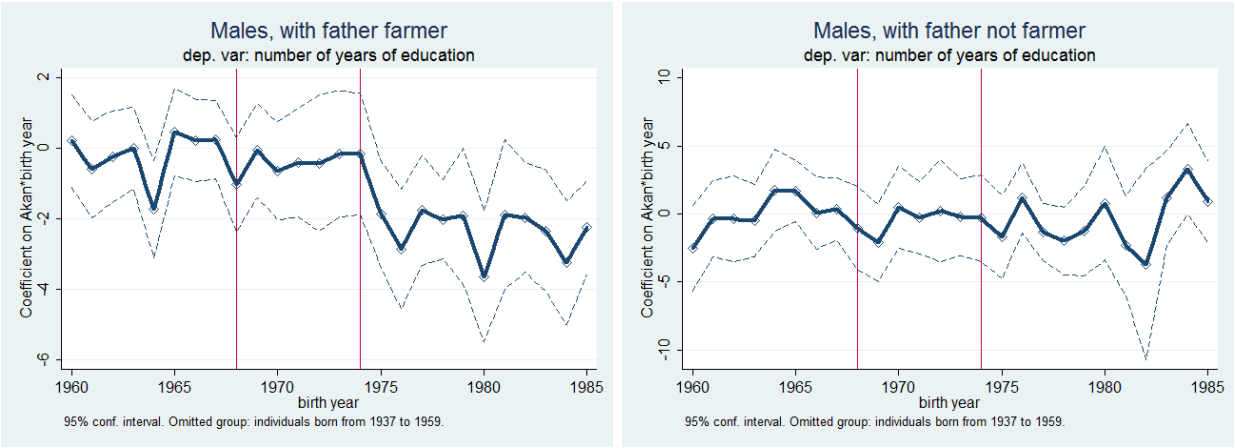
Note: Shaded symbols identify members of the same matrikin.

Figure 2: Cohort-specific effects, males



Note: Figure reports the estimated coefficients on the interaction of Akan and birth year dummies with 95% confidence bands. The dependent variable in the regression is the number of years of education and the controls include: birth year, region and survey round fixed effects, region-specific time trends, age (and its square), dummies for the 9 main crops grown in the community, a durables index, household size, female headed household, mother's and father's education, age of the household head, dummies for religion of the household head.

Figure 3: Cohort-specific effects by father farmer status, males



Note: Figure reports the estimated coefficients on the interaction of Akan and birth year dummies with 95% confidence bands. The dependent variable in the regression is the number of years of education and the controls are those listed in the footnote to figure 2. The leftmost panel uses the subsample of individuals whose father is/was a farmer; the rightmost panel uses the subsample of individuals whose father is/was not a farmer.

Tables

Table 1: Summary statistics

Panel A. Sample of individuals aged 20 to 50

	Full sample		Males				Females			
			Akan		non-Akan		Akan		non-Akan	
	mean	s.dev.	mean	s.dev.	mean	s.dev.	mean	s.dev.	mean	s.dev.
Akan	0.41	(0.49)	-	-	-	-	-	-	-	-
Education years	4.75	(4.96)	8.61	(4.15)	4.84	(5.17)	5.02	(4.49)	2.26	(3.93)
Primary or higher	0.47	(0.50)	0.83	(0.37)	0.46	(0.50)	0.52	(0.50)	0.22	(0.42)
Junior sec./middle or higher	0.33	(0.47)	0.67	(0.47)	0.34	(0.48)	0.32	(0.47)	0.14	(0.34)
Senior sec./sec or higher	0.05	(0.22)	0.11	(0.31)	0.07	(0.26)	0.02	(0.15)	0.02	(0.13)
Father farmer	0.81	(0.39)	0.74	(0.44)	0.85	(0.36)	0.74	(0.44)	0.87	(0.34)
Panel B. Sample of individuals aged 6 to 17										
Akan	0.42	(0.49)	-	-	-	-	-	-	-	-
Currently in school	0.71	(0.45)	0.86	(0.34)	0.64	(0.48)	0.82	(0.39)	0.59	(0.49)
Education years	2.14	(2.85)	2.87	(3.09)	1.78	(2.64)	2.71	(3.03)	1.55	(2.49)
Own land (at hh level)	0.62	(0.48)	0.68	(0.46)	0.59	(0.49)	0.67	(0.47)	0.57	(0.49)

Note: Authors' calculations on GLSS1-5.

Table 2: Impact of the Intestate Succession Law on educational attainment, difference-in-differences

Dependent variable: Years of education						
	Males			Females		
	Akan	non-Akan	diff	Akan	non-Akan	diff
Panel A. Pre-school and primary school age versus control						
0 to 11 years in 1985	8.57	5.55	3.02	6.38	3.32	3.07
se	(0.148)	(0.152)	(0.204)	(0.175)	(0.198)	(0.131)
18 to 25 years in 1985	8.87	5.04	3.82	5.12	2.23	2.88
se	(0.178)	(0.246)	(0.300)	(0.161)	(0.157)	(0.227)
difference	-0.30	0.50	-0.80	1.27	0.83	0.44
se	(0.206)	(0.279)	(0.345)	(0.215)	(0.232)	(0.314)
Panel B. Secondary school age versus control						
12 to 17 years in 1985	8.84	5.16	3.67	5.93	2.77	3.16
se	(0.219)	(0.214)	(0.283)	(0.260)	(0.151)	(0.247)
18 to 25 years in 1985	8.87	5.04	3.82	5.12	2.23	2.88
se	(0.178)	(0.246)	(0.300)	(0.161)	(0.157)	(0.227)
difference	-0.03	0.12	-0.15	0.82	0.54	0.28
se	(0.252)	(0.305)	(0.396)	(0.278)	(0.207)	(0.339)
Panel C. Placebo						
18 to 25 years in 1985	8.87	5.04	3.82	5.12	2.23	2.88
se	(0.178)	(0.166)	(0.225)	(0.161)	(0.107)	(0.173)
26 to 30 years in 1985	8.76	4.91	3.86	4.80	1.85	2.95
se	(0.271)	(0.269)	(0.362)	(0.209)	(0.161)	(0.264)
difference	0.11	0.14	-0.03	0.31	0.38	-0.07
se	(0.304)	(0.275)	(0.434)	(0.230)	(0.170)	(0.295)

Note: OLS estimates. Standard errors in parentheses adjusted for clustering at the village level.

Table 3: Impact of the Intestate Succession Law on educational attainment, by gender

Dependent variable: Years of education				
	Males		Females	
	(1)	(2)	(3)	(4)
Akan*post68	-0.660**		0.076	
	(0.290)		(0.250)	
Akan*post74		-0.919***		0.129
		(0.320)		(0.295)
Akan	1.667***	1.607***	0.960***	0.964***
	(0.194)	(0.183)	(0.168)	(0.157)
durables index	0.908***	0.937***	0.734***	0.745***
	(0.085)	(0.081)	(0.073)	(0.066)
hh size	-0.056**	-0.078***	-0.039***	-0.050***
	(0.022)	(0.020)	(0.014)	(0.014)
female hd hh	0.192	0.209	1.120***	0.987***
	(0.353)	(0.313)	(0.163)	(0.138)
mother eduyrs	0.103**	0.109***	0.221***	0.189***
	(0.045)	(0.033)	(0.030)	(0.024)
father eduyrs	0.176***	0.165***	0.197***	0.184***
	(0.024)	(0.020)	(0.020)	(0.015)
age head	0.023***	0.019***	-0.010**	-0.008*
	(0.008)	(0.006)	(0.004)	(0.004)
age	-0.033	-0.029	-0.069	-0.084*
	(0.067)	(0.067)	(0.049)	(0.049)
age squared	-0.001	-0.001	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	8337	8337	10285	10285
R-squared	0.390	0.393	0.369	0.372

Note: OLS estimates. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post 1968" is a dummy equal to one if the individual was born in 1968 or after. "post 1974" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the following controls: birth year, region and survey round fixed effects, region-specific time trends, dummies for the 9 main crops grown in the community, dummies for religion of the household head, interactions of the individual controls (a durables index, female headed household, household size, mother's and father's education, age of the head, dummies for religion of the household head) with "post 1968" (or "post 1974"), interactions of community crop dummies with "post 1968" (or "post 1974").

Table 4: Impact by father farmer status

Dependent variable: Years of education				
	Males		Females	
	father farmer	father not farmer	father farmer	father not farmer
	(1)	(2)	(3)	(4)
Akan*post	-1.117***	0.040	0.211	-0.325
	(0.343)	(0.664)	(0.335)	(0.697)
Akan	1.790***	0.730*	1.042***	0.580*
	(0.198)	(0.393)	(0.171)	(0.297)
Observations	6700	1460	8481	1726
R-squared	0.387	0.326	0.337	0.337

Note: OLS estimates. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the following controls: birth year, region and survey round fixed effects, region-specific time trends, age (and its square), dummies for the 9 main crops grown in the community, other individual controls (a durables index, female headed household, household size, mother's and father's education, age of the head, dummies for religion of the household head), interactions of other individual controls with "post", interactions of community crop dummies with "post".

Table 5: Alternative control groups

Dependent variable: Years of education				
	Akan vs Ewe		Côte d'Ivoire	
	Males	Females	Males	Females
	(1)	(2)	(3)	(4)
Akan*post	-0.770*	-0.354	1.141	-0.200
	(0.399)	(0.432)	(0.811)	(0.346)
Akan	0.790***	0.956***	1.433**	0.803***
	(0.235)	(0.232)	(0.590)	(0.233)
Observations	4410	5433	1468	2748
R-squared	0.199	0.274	0.405	0.333

Note: OLS estimates. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Columns 1-2 use rounds 1-5 of the GLSS and regressions also include the controls listed in the footnote to Table 4; columns 3-4 use the 1994, 2005, and 2011 DHS for Cote d'Ivoire and regressions also include the following controls: birth year and region fixed effects, a survey round dummy, region-specific time trends, age (and its square), other individual controls (a durables index, female headed household, household size, age of the head, and religion of the woman or the man interviewed), and interactions between other individual controls with "post".

Table 6: Robustness checks.

Dependent variable: Years of education		
	Males	Females
	(1)	(2)
Panel A. No northern regions		
Akan*post	-0.886***	0.203
	(0.317)	(0.298)
Akan	1.656***	0.941***
	(0.184)	(0.159)
Observations	5914	7151
R2	0.240	0.284
Panel B. Cocoa villages		
Akan*post	-0.776*	0.346
	(0.412)	(0.429)
Akan	2.007***	1.194***
	(0.259)	(0.212)
Akan*cocoa major crop*post	-0.292	-0.403
	(0.571)	(0.517)
Akan*cocoa major crop	-0.730**	-0.426
	(0.332)	(0.297)
cocoa major crop*post	0.369	0.064
	(0.488)	(0.458)
cocoa major crop	0.146	0.269
	(0.298)	(0.265)
Observations	8337	10285
R2	0.394	0.373
Panel C. Parental occupations		
Akan*post	-0.928***	0.210
	(0.313)	(0.296)
Akan	1.677***	0.989***
	(0.186)	(0.158)
Observations	7893	10061
R2	0.394	0.379

Note: OLS estimates. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the controls listed in the footnote to Table 4. Panel C in addition includes dummies for the type of mother's and father's occupation (i.e., farmer, sales, clerical job, and professional) and interactions of these dummies with the post-reform dummy. Panel A excludes from the sample Northern regions (i.e., Northern, Upper East, and Upper West).

Table 7: Completion rates

	Males			Females		
	full sample	father farmer	father not farmer	full sample	father farmer	father not farmer
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. *Dependent variable =1 if completed primary school or higher*						
Akan*post74	-0.098*	-0.116**	-0.014	0.042	0.035	0.032
	(0.051)	(0.054)	(0.061)	(0.036)	(0.038)	(0.089)
Akan	0.214***	0.235***	0.087***	0.110***	0.109***	0.050
	(0.022)	(0.025)	(0.030)	(0.019)	(0.019)	(0.039)
Observations	8323	6690	1455	10283	8411	1714
Pseudo R2	0.326	0.328	0.274	0.296	0.288	0.235
Panel B. *Dependent variable =1 if completed secondary school or higher*						
Akan*post	-0.114***	-0.104**	-0.065	0.011	0.016	-0.040
	(0.043)	(0.044)	(0.096)	(0.025)	(0.024)	(0.084)
Akan	0.168***	0.178***	0.055	0.056***	0.044***	0.105**
	(0.022)	(0.025)	(0.043)	(0.013)	(0.012)	(0.044)
Observations	8323	6690	1443	10192	8330	1709
Pseudo R2	0.243	0.245	0.208	0.249	0.231	0.217

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the controls listed in the footnote to Table 4.

Table 8: School attendance

Dependent variable =1 if currently enrolled in school				
	Male		Female	
	(1)	(2)	(3)	(4)
Panel A. Full sample				
Akan*post	-0.118***	-0.060	-0.106**	-0.060
	(0.045)	(0.050)	(0.050)	(0.057)
Akan*post*age12–17		-0.109*		-0.098
		(0.062)		(0.074)
Akan*age12–17		0.051		0.039
		(0.043)		(0.057)
post*age12–17		-0.025		0.071
		(0.034)		(0.043)
age12–17		0.028		-0.047
		(0.033)		(0.046)
Akan	0.108***	0.080**	0.148***	0.131***
	(0.036)	(0.040)	(0.041)	(0.046)
Observations	8063	8063	6799	6799
Pseudo R2	0.242	0.243	0.264	0.265
Panel B. By land ownership				
	w/ land	w/o land	w/ land	w/o land
Akan*post	-0.160*	0.148	-0.177*	0.060
	(0.087)	(0.116)	(0.106)	(0.236)
Akan	0.213***	-0.214	0.156*	0.004
	(0.068)	(0.166)	(0.089)	(0.238)
Observations	2316	1149	1761	988
Pseudo R2	0.273	0.222	0.302	0.277
Panel C. By father farmer status				
	father farmer	father not farmer	father farmer	father not farmer
	(1)	(2)	(3)	(4)
Akan*post	-0.148*	0.031	-0.124	0.093
	(0.083)	(0.090)	(0.104)	(0.120)
Akan	0.210***	-0.060	0.141	0.035
	(0.062)	(0.080)	(0.088)	(0.116)
Observations	2653	775	2027	681
Pseudo R2	0.249	0.261	0.277	0.295

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. Panel A includes individuals aged 6-17, Panels B and C individuals aged 12-17. "post" is a dummy equal to one for respondents from rounds 3 to 5 of the GLSS. Each regression also includes the following controls: region and survey round fixed effects, region-specific time trends, log of distances to primary, junior and senior secondary school, age (and its square), dummies for the 9 main crops grown in the community, other individual controls (a durables index, female headed household, household size, mother's and father's education, age of the head, dummies for religion of the household head), interactions of other individual controls with "post", interactions of community crop dummies with "post".

Table 9: School attendance and sibling composition

Dependent variable =1 if currently enrolled in school						
	Males			Females		
	(1)	(2)	(3)	(4)	(5)	(6)
Akan*post	-0.339***	-0.347***	-0.335***	0.121	0.130	0.128
	(0.095)	(0.095)	(0.093)	(0.114)	(0.115)	(0.115)
Akan*post*# siblings	0.054***			-0.040*		
	(0.018)			(0.023)		
Akan*post*# younger siblings		0.024			-0.047*	
		(0.020)			(0.028)	
Akan*post*# older siblings		0.134***			-0.041	
		(0.034)			(0.042)	
Akan*post*# younger sisters			0.047			-0.054
			(0.035)			(0.047)
Akan*post*# younger brothers			-0.002			-0.039
			(0.031)			(0.044)
Akan*post*# older sisters			0.078			-0.042
			(0.066)			(0.067)
Akan*post*# older brothers			0.168***			-0.039
			(0.044)			(0.064)
Akan	0.269***	0.268***	0.257***	-0.104	-0.113	-0.110
	(0.068)	(0.067)	(0.066)	(0.111)	(0.112)	(0.113)
Observations	3590	3590	3590	2839	2839	2839
Pseudo R2	0.229	0.233	0.237	0.262	0.264	0.264

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one for respondents from rounds 3 to 5 of the GLSS. Each regression also includes the controls listed in the footnote to Table 8. Partial interaction terms (not shown) are included in all specifications.

A Appendix

A.1 Derivation of $\frac{\partial E^*}{\partial L^c}$

Substitute the budget constraint $C^p = Y^p - pE$ into the first order condition (1) and define the left-hand side of the resulting expression as $F(E, L^c, p)$. Applying the implicit function theorem we can derive the sign of the change in E^* implied by an exogenous change of L^c:

$$\frac{\partial E^*}{\partial L^c} = -\frac{\frac{\partial F(\cdot)}{\partial L^c}}{\frac{\partial F(\cdot)}{\partial E^*}}$$

where:

$$\frac{\partial F(\cdot)}{\partial L^c} = (-p)v_{C^p,Y^c}(\cdot)\frac{\partial Y^c(\cdot)}{\partial L^c} + v_{Y^c,Y^c}(\cdot)\frac{\partial Y^c(\cdot)}{\partial L^c}\frac{\partial Y^c(\cdot)}{\partial E} + v_{Y^c}(\cdot)\frac{\partial^2 Y^c(\cdot)}{\partial E \partial L^c}$$

$$\begin{aligned}\frac{\partial F(\cdot)}{\partial E^*} = (-p)&\left(v_{C^p,C^p}(\cdot)(-p) + v_{C^p,Y^c}(\cdot)\frac{\partial Y^c(\cdot)}{\partial E}\right) + \\ &+ \left(v_{Y^c,C^p}(\cdot)(-p) + v_{Y^c,Y^c}(\cdot)\frac{\partial Y^c(\cdot)}{\partial E}\right)\frac{\partial Y^c(\cdot)}{\partial E} + v_{Y^c}(\cdot)\frac{\partial^2 Y^c(\cdot)}{\partial E^2}\end{aligned}$$

Given the assumptions on the shape of the parent's and child's utility functions indicated in section 3.1, $\frac{\partial E^*}{\partial L^c}$ is unambiguously negative if: $\frac{\partial^2 Y^c(\cdot)}{\partial E \partial L^c} \leq 0$, which is a sufficient –not necessary– condition.

A.2 Model with one son and one daughter

We extend the simple model of section 3 considering a case where the parent has two children –a son and a daughter– and allocates resources between own consumption and investment in education of the son (E^s) and of the daughter (E^d). Throughout the analysis, we use superscripts p, s and d to denote parent, son and daughter, respectively.

As in the general case, the parent is endowed with an exogenous amount of land L. Consistent with the evidence described in the previous section, we assume that land inheritance is gender-linked, i.e. land is controlled by the male parent who can pass it on to his son upon his death (or to other male kin members depending on the specific inheritance rule). The amount of land that the son inherits is denoted by $L^s \leq L$, that depends on the prevailing social norm. In the setting we study, a woman's rights are very weak and limited to the use of the land controlled by the husband or other male relatives. The amount of land available to the daughter, therefore, is not chosen by the father but is exogenous. We denote this amount as L^d.

The child's preferences are defined as before, $U^i = u(C^i)$, where $C^i = Y^i(E^i, L^i)$, and $u'(\cdot) > 0$, $u''(\cdot) < 0$, $Y^i_E(\cdot) > 0$, $Y^i_L(\cdot) > 0$, $Y^i_{EE}(\cdot) \leq 0$ and $Y^i_{LL}(\cdot) \leq 0$, with $i \in \{s, d\}$. We discuss the sign of the cross derivative below.

The parent's utility now depends on own, son and daughter's consumption (or income): $V^p = v\left(C^p; Y^s(E^s, L^s); Y^d(E^d, L^d)\right)$, with partial derivatives $v_{C^p}(\cdot) > 0$, $v_{Y^s}(\cdot) > 0$, $v_{Y^d}(\cdot) > 0$, $v_{C^p,C^p}(\cdot) \leq 0$, $v_{Y^s,Y^s}(\cdot) \leq 0$, and $v_{Y^d,Y^d}(\cdot) \leq 0$. Moreover, we assume that $v_{C^p,Y^s}(\cdot) = v_{C^p,Y^d}(\cdot) = 0$. This separability assumption between parental consumption and child's income is commonly used in models of intrahousehold allocation with parental altruism (e.g., Behrman, 1997).

The exogenous parent's income Y^p has to be allocated between the parent's own consumption C^p, and expenditure on son's and daughter's education, $p_s E^s$ and $p_d E^d$, respectively. The price of education is allowed to differ across genders.

The parent's optimization problem can be written as:

$$\max_{C^p, E^s, E^d} v\left(C^p; Y^s(E^s, L^s); Y^d(E^d, L^d)\right)$$

$$\text{s.t.} \quad Y^p = C^p + p_d E^d + p_s E^s$$
$$L^s \leq L$$

In the case with no matrilineal constraints, $L^s = L$. After substituting the budget constraint into the parent's utility, we derive the following first order conditions:

$$E^s: \quad v_{Y^s}\left(C^p; Y^s(\cdot); Y^d(\cdot)\right) \frac{\partial Y^s(\cdot)}{\partial E^s} - p_s v_{C^p}\left(C^p; Y^s(\cdot); Y^d(\cdot)\right) = 0 \tag{4}$$

$$E^d: \quad v_{Y^d}\left(C^p; Y^s(\cdot); Y^d(\cdot)\right) \frac{\partial Y^d(\cdot)}{\partial E^d} - p_d v_{C^p}\left(C^p; Y^s(\cdot); Y^d(\cdot)\right) = 0 \tag{5}$$

Taking the ratio of 4 and 5, we obtain the following equilibrium condition:

$$\frac{v_{Y^s}(\cdot)}{v_{Y^d}(\cdot)} = \frac{p_s}{p_d} \frac{\partial Y^d(E^d, L^d)/\partial E^d}{\partial Y^s(E^s, L^s)/\partial E^s} \tag{6}$$

This condition states that the ratio of resources invested in son and daughter's education reflects differences in returns to education and relative prices of education across genders. We assume that the conditions for the existence of an interior solution are satisfied and derive the 'unconstrained' solution. The equilibrium values of the above problem can be denoted as C^{p*}, $E^{s*} > 0$, $E^{d*} > 0$ (with $L^s = L$).

As in the case with only one child, the matrilineal constraint is defined as an upper bound to the transferable land, $L^s = \overline{L_1^s} < L$, and the Law is represented as a relaxation of this constraint, i.e., $\overline{L_2^s} \in (\overline{L_1^s}, L)$.

We now derive the sign of the change in the optimal amount of education received by the son, E^{s*}, implied by an exogenous change in the availability of land to be inherited, L^s. Substitute the budget constraint $C^p = Y^p - p_d E^d - p_s E^s$ into (4) and (5). Denote the left hand side of the resulting expression for (4) as $F(\cdot)$, and the left hand side of the resulting expression for (5) as $G(\cdot)$.

By the implicit function theorem:

$$\frac{\partial E^{s*}}{\partial L^s} = (-)\frac{\begin{vmatrix} \frac{\partial F(\cdot)}{\partial L^s} & \frac{\partial F(\cdot)}{\partial E^d} \\ \frac{\partial G(\cdot)}{\partial L^s} & \frac{\partial G(\cdot)}{\partial E^d} \end{vmatrix}}{\begin{vmatrix} \frac{\partial F(\cdot)}{\partial E^s} & \frac{\partial F(\cdot)}{\partial E^d} \\ \frac{\partial G(\cdot)}{\partial E^s} & \frac{\partial G(\cdot)}{\partial E^d} \end{vmatrix}} \tag{7}$$

where:

$$\frac{\delta F(\cdot)}{\partial L^s} = v_{Y^s,Y^s}\frac{\partial Y^s}{\partial L^s}\frac{\partial Y^s}{\partial E^s} + v_{Y^s}\frac{\partial^2 Y^s}{\partial E^s \partial L^s} - p_s v_{C^p,Y^s}\frac{\partial Y^s}{\partial L^s}$$

$$\frac{\delta F(\cdot)}{\partial E^d} = \left(v_{Y^s,C^p}(-p_d) + v_{Y^s,Y^d}\frac{\partial Y^d}{\partial E^d}\right)\frac{\partial Y^s}{\partial E^s} - p_s\left(v_{C^p,C^p}(-p_d) + v_{C^p,Y^d}\frac{\partial Y^d}{\partial E^d}\right)$$

$$\frac{\delta F(\cdot)}{\partial E^s} = \left(v_{Y^s,C^p}(-p_s) + v_{Y^s,Y^s}\frac{\partial Y^s}{\partial E^s}\right)\frac{\partial Y^s}{\partial E^s} + v_{Y^s}\frac{\partial^2 Y^s}{\partial E^{s2}} - p_s\left(v_{C^p,C^p}(-p_s) + v_{C^p,Y^s}\frac{\partial Y^s}{\partial E^s}\right)$$

$$\frac{\delta G(\cdot)}{\partial L^s} = v_{Y^d,Y^s}\frac{\partial Y^s}{\partial L^s}\frac{\partial Y^d}{\partial E^d} - p_d\left(v_{C^p,Y^s}\frac{\partial Y^s}{\partial L^s}\right)$$

$$\frac{\delta G(\cdot)}{\partial E^d} = \left(v_{Y^d,C^p}(-p_d) + v_{Y^d,Y^d}\frac{\partial Y^d}{\partial E^d}\right)\frac{\partial Y^d}{\partial E^d} + v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}} - p_d\left(v_{C^p,C^p}(-p_d) + v_{C^p,Y^d}\frac{\partial Y^d}{\partial E^d}\right)$$

$$\frac{\delta G(\cdot)}{\partial E^s} = \left(v_{Y^d,C^p}(-p_s) + v_{Y^d,Y^s}\frac{\partial Y^s}{\partial E^s}\right)\frac{\partial Y^d}{\partial E^d} - p_d\left(v_{C^p,C^p}(-p_s) + v_{C^p,Y^s}\frac{\partial Y^s}{\partial E^s}\right)$$

The numerator of (7) is given by:

$$\frac{\partial Y^s}{\partial L^s}\frac{\partial Y^d}{\partial E^d}\left\{\frac{\partial Y^s}{\partial E^s}\frac{\partial Y^d}{\partial E^d}\left[v_{Y^s,Y^s}v_{Y^d,Y^d} - (v_{Y^d,Y^s})^2\right] - v_{Y^d,Y^s}v_{C^p,C^p}p_s p_d\right\} +$$
$$+ v_{Y^s,Y^s}\frac{\partial Y^s}{\partial L^s}\frac{\partial Y^s}{\partial E^s}\left[v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}} + (p_d)^2 v_{C^p,C^p}\right] + v_{Y^s}\frac{\partial^2 Y^s}{\partial E^s \partial L^s}\left[v_{Y^d,Y^d}\left(\frac{\partial Y^d}{\partial E^d}\right)^2 + v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}} + (p_d)^2 v_{C^p,C^p}\right] \tag{8}$$

while the denominator is:

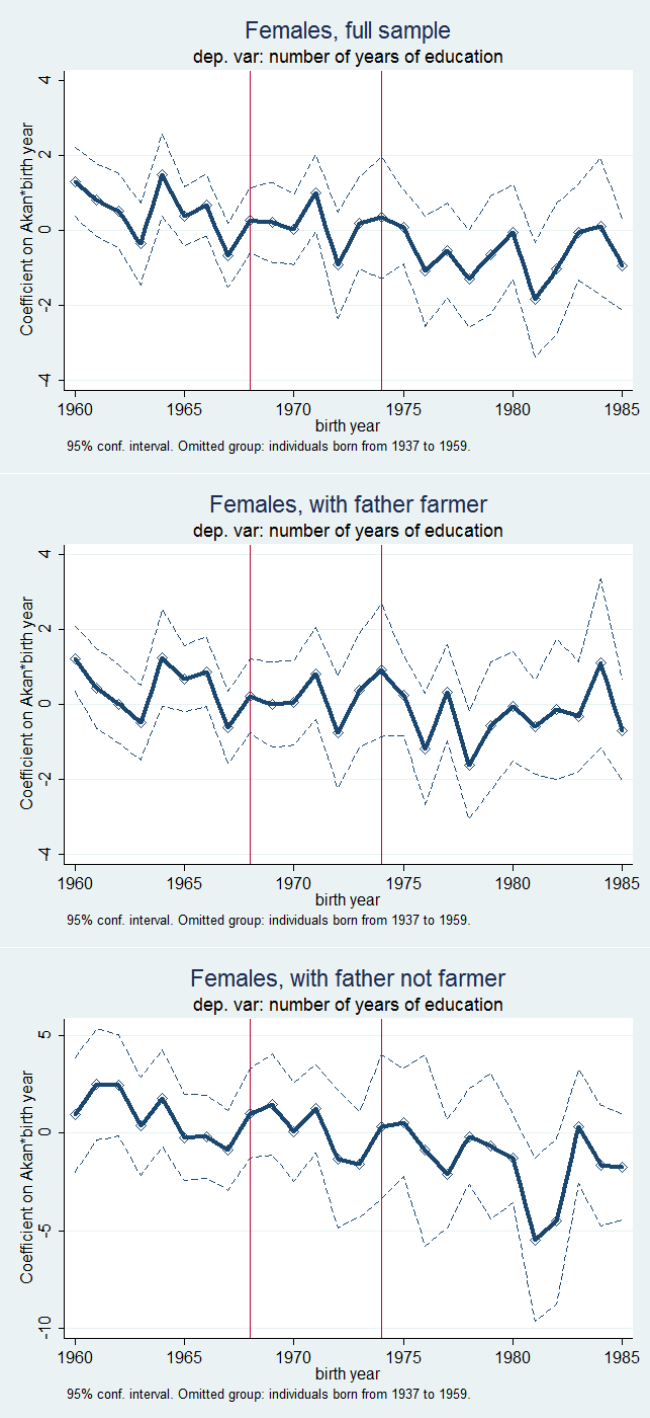
$$\frac{\partial Y^s}{\partial E^s}\frac{\partial Y^d}{\partial E^d}\left\{\frac{\partial Y^s}{\partial E^s}\frac{\partial Y^d}{\partial E^d}\left[v_{Y^s,Y^s}v_{Y^d,Y^d}-(v_{Y^d,Y^s})^2\right]-v_{Y^d,Y^s}v_{C^p,C^p}p_sp_d\right\}+$$
$$+v_{Y^s,Y^s}\left(\frac{\partial Y^s}{\partial E^s}\right)^2\left[v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}}+(p_d)^2v_{C^p,C^p}\right]+v_{Y^s}\frac{\partial^2 Y^s}{\partial E^{s2}}\left[v_{Y^d,Y^d}\left(\frac{\partial Y^d}{\partial E^d}\right)^2+v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}}+(p_d)^2v_{C^p,C^p}\right]+$$
$$+v_{C^p,C^p}\left[(p_s)^2v_{Y^d,Y^d}\left(\frac{\partial Y^d}{\partial E^d}\right)^2+(p_s)^2v_{Y^d}\frac{\partial^2 Y^d}{\partial E^{d2}}-p_sp_dv_{Y^d,Y^s}\frac{\partial Y^s}{\partial E^s}\frac{\partial Y^d}{\partial E^d}\right] \tag{9}$$

Therefore $\frac{\partial E^{s*}}{\partial L^s}$ is unambiguously negative when (8) and (9) are either both positive or both negative.

Given the assumptions on the shape of the parent's and child's utility functions, from conditions (8) and (9) it follows that if $v_{Y^s,Y^d}=0$ (i.e. there are no complementarities between son's and daughter's consumption), a sufficient condition for $\frac{\partial E^{s*}}{\partial L^s}<0$ is that $\frac{\partial^2 Y^s}{\partial E^s\partial L^s}\leq 0$, which indicates that the returns to education are non-increasing in the amount of land. Of course, $\frac{\partial E^{s*}}{\partial L^s}$ could still be negative even if $v_{Y^s,Y^d}\neq 0$, depending on the magnitude of expressions (8) and (9).

When $\frac{\partial E^{s*}}{\partial L^s}<0$ the equilibrium allocation with the matrilineal constraint implies a higher amount of education for the son compared to the unconstrained case: $E_1^{s*}>E^{s*}$ (with $L^s=\overline{L_1^s}$), while the allocation after the Law implies a lower level of education, $E_2^{s*}<E_1^{s*}$ (with $L^s=\overline{L_2^s}>\overline{L_1^s}$).

Figure A.1: Cohort-specific effects, females



Note: Figure reports the estimated coefficients on the interaction of Akan and birth year dummies with 95% confidence bands. The dependent variable in the regression is the number of years of education and the controls are those listed in the footnote to figure 2. The upper panel uses the full females sample, the middle panel uses the subsample of individuals whose father is/was a farmer, and the bottom panel uses the subsample of individuals whose father is/was not a farmer.

Table A.1: Summary statistics, sample of individuals aged 20–50

	All			Male						Female					
				Akan			non-Akan			Akan			non-Akan		
	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n
Akan	0.41	0.49	18622	1.00	0.00	3225	0.00	0.00	5112	1.00	0.00	4125	0.00	0.00	6160
eduyrs	4.75	4.96	18622	8.61	4.15	3225	4.84	5.17	5112	5.02	4.49	4125	2.26	3.93	6160
no education	0.44	0.50	18606	0.10	0.29	3216	0.45	0.50	5107	0.34	0.48	4125	0.69	0.46	6158
incompl primary	0.10	0.29	18606	0.07	0.26	3216	0.09	0.28	5107	0.14	0.34	4125	0.09	0.28	6158
primary or higher	0.47	0.50	18606	0.83	0.37	3216	0.46	0.50	5107	0.52	0.50	4125	0.22	0.42	6158
jun sec/middle or higher	0.33	0.47	18606	0.67	0.47	3216	0.34	0.48	5107	0.32	0.47	4125	0.14	0.34	6158
senior sec/sec or higher	0.05	0.22	18622	0.11	0.31	3225	0.07	0.26	5112	0.02	0.15	4125	0.02	0.13	6160
female	0.55	0.50	18622	0.00	0.00	3225	0.00	0.00	5112	1.00	0.00	4125	1.00	0.00	6160
age	33.24	8.93	18622	33.22	8.98	3225	33.11	9.01	5112	33.46	9.00	4125	33.21	8.77	6160
own land (hh)	0.60	0.49	17865	0.62	0.49	3083	0.56	0.50	4942	0.64	0.48	3926	0.58	0.49	5914
hh size	6.03	3.46	18622	5.16	3.00	3225	6.04	3.62	5112	5.51	2.73	4125	6.89	3.84	6160
female headed hh	0.15	0.36	18622	0.10	0.30	3225	0.05	0.22	5112	0.33	0.47	4125	0.14	0.34	6160
age head	42.86	13.07	18622	40.48	12.04	3225	41.82	13.20	5112	43.16	12.87	4125	44.88	13.35	6160
durables	-0.40	0.96	18622	-0.16	1.11	3225	-0.53	0.84	5112	-0.22	1.05	4125	-0.55	0.84	6160
catholic (head)	0.16	0.36	18622	0.17	0.37	3225	0.16	0.37	5112	0.16	0.37	4125	0.15	0.35	6160
protestant (head)	0.15	0.36	18622	0.20	0.40	3225	0.12	0.32	5112	0.22	0.41	4125	0.11	0.31	6160
other christian (head)	0.28	0.45	18622	0.42	0.49	3225	0.19	0.39	5112	0.42	0.49	4125	0.18	0.38	6160
muslim (head)	0.15	0.36	18622	0.06	0.24	3225	0.21	0.41	5112	0.06	0.24	4125	0.22	0.41	6160
animist (head)	0.18	0.39	18622	0.05	0.22	3225	0.25	0.43	5112	0.06	0.24	4125	0.29	0.45	6160
mother eduyrs	0.85	2.73	18622	1.38	3.26	3225	0.55	2.24	5112	1.29	3.30	4125	0.49	2.15	6160
father eduyrs	2.36	4.58	18622	3.90	5.33	3225	1.49	3.78	5112	3.47	5.20	4125	1.39	3.73	6160
father farmer	0.81	0.39	18367	0.74	0.44	3210	0.85	0.36	4950	0.74	0.44	4100	0.87	0.34	6107
cocoa major crop	0.37	0.48	18622	0.63	0.48	3225	0.19	0.39	5112	0.62	0.49	4125	0.18	0.38	6160
cassava major crop	0.79	0.41	18622	0.95	0.22	3225	0.69	0.46	5112	0.95	0.21	4125	0.67	0.47	6160
maize major crop	0.89	0.32	18622	0.89	0.31	3225	0.88	0.33	5112	0.89	0.31	4125	0.88	0.32	6160
yam major crop	0.43	0.50	18622	0.34	0.47	3225	0.51	0.50	5112	0.33	0.47	4125	0.50	0.50	6160
tomato major crop	0.36	0.48	18622	0.42	0.49	3225	0.31	0.46	5112	0.42	0.49	4125	0.32	0.46	6160
plantains major crop	0.44	0.50	18622	0.73	0.44	3225	0.24	0.43	5112	0.72	0.45	4125	0.22	0.42	6160
nuts major crop	0.41	0.49	18622	0.12	0.32	3225	0.60	0.49	5112	0.12	0.32	4125	0.62	0.49	6160
pepper major crop	0.40	0.49	18622	0.43	0.49	3225	0.38	0.49	5112	0.43	0.49	4125	0.37	0.48	6160
beanspeas major crop	0.38	0.49	18622	0.13	0.33	3225	0.56	0.50	5112	0.12	0.33	4125	0.58	0.49	6160

Note: Authors' calculations on GLSS1-5. Rural sample of individuals aged 20–50. Using survey weights.

Table A.2: Summary statistics, sample of individuals aged 12–17

	All			Male						Female					
				Akan			non-Akan			Akan			non-Akan		
	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n	mean	s.dev.	n
Akan	0.44	0.50	6429	1.00	0.00	1457	0.00	0.00	2133	1.00	0.00	1233	0.00	0.00	1606
eduyrs	3.94	3.28	6428	5.13	3.03	1457	3.24	3.22	2132	4.87	3.09	1233	2.96	3.16	1606
in school	0.68	0.46	6429	0.83	0.37	1457	0.61	0.49	2133	0.76	0.43	1233	0.57	0.50	1606
no education	0.23	0.42	6420	0.06	0.24	1451	0.32	0.47	2130	0.08	0.28	1233	0.38	0.49	1606
incompl primary	0.39	0.49	6420	0.43	0.49	1451	0.38	0.48	2130	0.41	0.49	1233	0.33	0.47	1606
primary or higher	0.39	0.49	6420	0.51	0.50	1451	0.30	0.46	2130	0.50	0.50	1233	0.29	0.45	1606
jun sec/middle or higher	0.08	0.27	6420	0.12	0.32	1451	0.06	0.24	2130	0.11	0.31	1233	0.05	0.21	1606
female	0.44	0.50	6429	0.00	0.00	1457	0.00	0.00	2133	1.00	0.00	1233	1.00	0.00	1606
age	14.21	1.68	6429	14.26	1.71	1457	14.28	1.68	2133	14.20	1.70	1233	14.09	1.64	1606
own land (hh)	0.65	0.48	6214	0.71	0.45	1417	0.62	0.49	2048	0.68	0.47	1195	0.59	0.49	1554
hh size	7.55	3.44	6429	6.60	2.56	1457	8.14	3.75	2133	6.88	2.63	1233	8.24	3.98	1606
female hd hh	0.20	0.40	6429	0.28	0.45	1457	0.13	0.33	2133	0.30	0.46	1233	0.13	0.34	1606
age head	50.03	10.89	6429	48.77	10.24	1457	51.61	11.39	2133	48.22	10.29	1233	50.66	10.95	1606
durables	-0.40	1.00	6429	-0.24	1.07	1457	-0.59	0.84	2133	-0.13	1.17	1233	-0.55	0.88	1606
mother eduyrs	2.45	4.02	6429	3.54	4.41	1457	1.43	3.24	2133	3.91	4.55	1233	1.55	3.40	1606
father eduyrs	4.78	5.48	6429	6.70	5.29	1457	2.96	4.90	2133	7.15	5.45	1233	3.36	5.09	1606
catholic (head)	0.16	0.36	6429	0.18	0.38	1457	0.14	0.35	2133	0.17	0.38	1233	0.14	0.35	1606
protestant (head)	0.16	0.37	6429	0.21	0.41	1457	0.11	0.32	2133	0.22	0.41	1233	0.12	0.33	1606
other christian (head)	0.27	0.44	6429	0.41	0.49	1457	0.14	0.34	2133	0.41	0.49	1233	0.20	0.40	1606
muslim (head)	0.14	0.35	6429	0.07	0.25	1457	0.21	0.41	2133	0.07	0.26	1233	0.19	0.40	1606
animist (head)	0.21	0.40	6429	0.07	0.26	1457	0.34	0.47	2133	0.05	0.21	1233	0.29	0.45	1606
any member in govmt	0.08	0.27	6304	0.08	0.28	1448	0.07	0.25	2069	0.10	0.30	1225	0.07	0.26	1562
# older siblings	1.22	1.38	6429	1.03	1.15	1457	1.29	1.46	2133	1.10	1.16	1233	1.42	1.57	1606
# younger siblings	2.70	2.15	6429	2.28	1.85	1457	3.02	2.28	2133	2.34	1.87	1233	2.98	2.34	1606
# older sisters	0.47	0.76	6429	0.41	0.66	1457	0.45	0.77	2133	0.47	0.72	1233	0.54	0.85	1606
# younger sisters	1.27	1.30	6429	1.06	1.16	1457	1.38	1.36	2133	1.19	1.26	1233	1.38	1.37	1606
# older brothers	0.75	1.02	6429	0.61	0.86	1457	0.84	1.10	2133	0.63	0.85	1233	0.88	1.14	1606
# younger brothers	1.43	1.43	6429	1.21	1.27	1457	1.65	1.53	2133	1.15	1.20	1233	1.60	1.54	1606
father farmer	0.75	0.43	6136	0.70	0.46	1427	0.81	0.39	2001	0.67	0.47	1216	0.80	0.40	1492
mother farmer	0.75	0.43	6114	0.75	0.43	1424	0.77	0.42	1985	0.74	0.44	1208	0.75	0.43	1497
cocoa major crop	0.39	0.49	6429	0.66	0.47	1457	0.18	0.38	2133	0.64	0.48	1233	0.20	0.40	1606
cassava major crop	0.81	0.39	6429	0.96	0.19	1457	0.68	0.47	2133	0.96	0.20	1233	0.70	0.46	1606
maize major crop	0.88	0.32	6429	0.87	0.34	1457	0.89	0.31	2133	0.89	0.32	1233	0.88	0.32	1606
yam major crop	0.42	0.49	6429	0.32	0.47	1457	0.51	0.50	2133	0.34	0.47	1233	0.48	0.50	1606
tomato major crop	0.36	0.48	6429	0.41	0.49	1457	0.32	0.47	2133	0.41	0.49	1233	0.33	0.47	1606
plantains major crop	0.45	0.50	6429	0.73	0.45	1457	0.22	0.42	2133	0.73	0.45	1233	0.23	0.42	1606
nuts major crop	0.40	0.49	6429	0.13	0.33	1457	0.63	0.48	2133	0.12	0.32	1233	0.59	0.49	1606
pepper major crop	0.41	0.49	6429	0.41	0.49	1457	0.39	0.49	2133	0.42	0.49	1233	0.41	0.49	1606
beanspeas major crop	0.37	0.48	6429	0.11	0.32	1457	0.58	0.49	2133	0.12	0.33	1233	0.56	0.50	1606

Note: Authors' calculations on GLSS1-5. Rural sample of individuals aged 12–17. Using survey weights.

Table A.3: Occupational choice

Dependent variable =1 if individual is a farmer		
	Males	Females
	(1)	(2)
Akan*post	0.063*	0.039
	(0.034)	(0.036)
Akan	-0.049	-0.031
	(0.033)	(0.034)
Observations	7588	9327
Pseudo R2	0.155	0.161

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one for respondents from rounds 3 to 5 of the GLSS, i.e. after the reform had been internalized to a large extent. Each regression also includes the controls listed in the footnote to Table 4.

Table A.4: Completion rates, ordered logit

Dependent variable is highest level completed: *0=no education; 1=incompl. primary;* *2=compl. primary; 3= compl. sec. or higher*		
	Males	Females
	(1)	(2)
Akan*post	-0.586***	0.044
	(0.172)	(0.149)
Akan	0.837***	0.489***
	(0.091)	(0.081)
Observations	8323	10283
Pseudo R2	0.211	0.207

Note: Ordered logit estimates. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the controls listed in the footnote to Table 4.

Table A.5: Robustness checks, completion rates

	Akan vs Ewe		No northern regions		Cocoa villages		Parental occupations	
	Male	Female	Male	Female	Male	Female	Male	Female
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. *Dependent variable =1 if completed primary school or higher*								
Akan*post74	-0.083*	0.012	-0.071*	0.048	-0.048	0.076	-0.118**	0.046
	(0.050)	(0.059)	(0.041)	(0.041)	(0.077)	(0.057)	(0.052)	(0.037)
Akan	0.083***	0.122***	0.176***	0.130***	0.272***	0.123***	0.219***	0.114***
	(0.023)	(0.031)	(0.019)	(0.021)	(0.030)	(0.027)	(0.023)	(0.019)
Akan*cocoa majcr					-0.087	-0.054		
*post74					(0.099)	(0.058)		
cocoa majcr*post74					0.026	0.017		
					(0.065)	(0.056)		
Akan*cocoa majcr					-0.113**	-0.022		
					(0.045)	(0.034)		
cocoa majcr					0.040	0.014		
					(0.036)	(0.031)		
Observations	4394	5432	5901	7149	8323	10283	7872	10059
Pseudo R-squared	0.137	0.182	0.180	0.199	0.327	0.297	0.326	0.304
Panel B. *Dependent variable =1 if completed primary school or higher*								
Akan*post74	-0.105*	0.005	-0.112**	0.014	-0.115*	0.040	-0.132***	0.014
	(0.057)	(0.049)	(0.047)	(0.034)	(0.059)	(0.039)	(0.044)	(0.026)
Akan	0.100***	0.085***	0.168***	0.077***	0.236***	0.077***	0.174***	0.058***
	(0.029)	(0.025)	(0.022)	(0.017)	(0.030)	(0.018)	(0.023)	(0.013)
Akan*cocoa majcr					-0.001	-0.045		
*post74					(0.083)	(0.034)		
cocoa majcr*post74					0.053	0.014		
					(0.066)	(0.042)		
Akan*cocoa majcr					-0.123***	-0.034*		
					(0.039)	(0.020)		
cocoa majcr					0.046	0.037*		
					(0.035)	(0.021)		
Observations	4397	5380	5901	7086	8323	10192	7872	9971
Pseudo R-squared	0.112	0.170	0.132	0.179	0.245	0.250	0.240	0.256

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one if the individual was born in 1974 or after. Each regression also includes the controls listed in the footnote to Table 4. Columns 7-8 in addition include dummies for the type of mother's and father's occupation (i.e., farmer, sales, clerical job, and professional) and interactions of these dummies with the post-reform dummy. Columns 3-4 exclude from the sample Northern regions (i.e., Northern, Upper East, and Upper West).

Table A.6: Robustness checks, school attendance

Dependent variable =1 if currently enrolled in school				
	Males	Females	Males	Females
	(1)	(2)	(3)	(4)
	A) Akan vs Ewe		**B) No northern regions**	
Akan*post	-0.069*	-0.026	-0.083***	-0.075*
	(0.042)	(0.051)	(0.032)	(0.038)
Akan	0.072	0.074	0.091***	0.121***
	(0.052)	(0.056)	(0.030)	(0.036)
Observations	4210	3673	5531	4839
Pseudo R2	0.166	0.218	0.167	0.224
	C) Parental occupation		**D) any member in the govmt**	
Akan*post	-0.125***	-0.110**	-0.124***	-0.101*
	(0.045)	(0.050)	(0.048)	(0.052)
Akan	0.121***	0.156***	0.123***	0.146***
	(0.035)	(0.041)	(0.037)	(0.042)
Akan*post*any member in govmt			0.020	-0.033
			(0.098)	(0.138)
Akan*any member in govmt			-0.139	0.020
			(0.098)	(0.103)
post*any member in govmt			-0.015	0.076
			(0.078)	(0.089)
any member in govmt			0.138***	0.003
			(0.032)	(0.089)
Observations	7476	6296	7925	6685
Pseudo R2	0.246	0.265	0.246	0.265

	E) Cocoa villages	
	Male	Female
Akan*post	-0.158**	-0.046
	(0.072)	(0.071)
Akan	0.130**	0.106*
	(0.057)	(0.062)
Akan*cocoa major crop*post	0.066	-0.109
	(0.072)	(0.099)
Akan*cocoa major crop	-0.043	0.075
	(0.077)	(0.074)
cocoa major crop*post	-0.051	0.120*
	(0.068)	(0.071)
cocoa major crop	0.064	-0.091
	(0.055)	(0.071)
Observations	8063	6799
Pseudo R2	0.242	0.264

Note: Probit estimates, marginal effects reported. Standard errors in parentheses adjusted for clustering at the village level. ***, ** and * indicate significance at 1%, 5% and 10% level, respectively. "post" is a dummy equal to one for respondents from rounds 3 to 5 of the GLSS. Each regression also includes the controls listed in the footnote to Table 8. Panel C in addition includes dummies for the type of mothers and fathers occupation (i.e., farmer, sales, clerical job, and professional) and interactions of these dummies with the post-reform dummy. Panel B excludes from the sample Northern regions (i.e., Northern, Upper East, and Upper West).