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

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Abstract

We study the role of traditional norms in land allocation and human capital investment. We exploit a policy experiment in Ghana that increased the land that children from matrilineal groups could inherit from their fathers. Boys exposed to the reform received 0.9 less years of education –an effect driven by landed households, for whom the reform was binding. We find no effect for girls, whose inheritance was *de facto* unaffected. These patterns suggest that before the reform matrilineal groups invested more in education than they would if unconstrained, to substitute for land inheritance, underscoring the importance of cultural norms.

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I Introduction

According to the most standard household model (Barro and Becker, 1989), parental investment in the education of their children should only depend on the marginal return to education. However, if households are constrained in their ability to bequeath wealth to their children (e.g., because of the lack of savings opportunities or due to specific social norms), education will play a dual role. On the one hand, it is a productive investment; on the other, it is a way of transferring resources across generations. In this case, changes in the ability to leave bequests may affect education investments.

We study a setting where this mechanism is at play due to customary norms that restrict parents' ability to bequeath land to their children. The coexistence of modern and traditional land allocation systems is still pervasive in contemporary Africa: 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] This has important implications for the effectiveness of land tenure and inheritance reforms, which are increasingly undertaken by governments in these countries.

We focus on 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 (from now on ISL), 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 ISL 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.

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 law was passed, to the outcomes of individuals whose education should not have been affected by the ISL because they were past school age in 1985. We employ a difference-in-differences strategy and exploit differences across cohorts and ethnic groups separately for males and females, as well as for landed and non-landed households (the latter should be unaffected by the ISL).

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 cohorts. Considering that the average years of education of Akan males pre-reform were 8.6, this represents a 10 percent

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

reduction in education for this group over the baseline. We show in Figure 1 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 7.5 (9) percentage points lower probability of completing at least primary (secondary) school, while the change in the probability of completion for women is null.

We interpret these results as consistent with a model where there is imperfect contracting within the family and the increase in land inherited from fathers after the reform is not completely offset by a reduction in land from maternal uncles. Parents respond to the net increase in their children's expected physical capital by decreasing investment in their human capital.

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 similar to that of the Akan. 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 ISL 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.

Next, we empirically investigate the mechanisms underlying our interpretation of the results. We find that the ISL led to changes in land ownership both at the extensive and at the intensive margin. Akan men affected by the reform have a 17 percent higher probability of owning land, and they also own more acres. Using a different data source we show that after the reform the increase in land inherited from fathers was not completely offset by a decrease in inheritance from maternal uncles. Finally, we investigate the use of land inputs and find that Akans after the reform are more reliant on family (male) labor.

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 kinship systems correlate with economically relevant

behaviors such as the inclination toward competitiveness. Compared to this literature, our paper exploits 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. We share with Munshi and Rosenzweig (2006) and with Ashraf et al. (2016) the interest in how traditional institutions and culture affect human capital investment, although our focus here is not on traditional occupational networks or customary marriage payments, but on customary inheritance practices.

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, 2015), 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 equality but on the constraints generated by traditional kinship systems. In addition to showing that parents substitute across different forms of intergenerational investment (a point made by Becker and Tomes, 1986, among others), the contribution of our paper is to analyze how this substitution is brought about by changes in inheritance systems and shaped by the prevailing customary norms in developing countries.[2]

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 intergenerational 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 II briefly reviews basic notions on matrilineal and patrilineal descent principles and gives some background on the ISL. Section III introduces our empirical strategy and section IV provides a descriptive analysis of the data. Section V contains our main econometric results and robustness checks and section VI discusses possible mechanisms consistent with our results. Finally, section VII concludes.

II 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 through ancestors of one gender. In patrilineal societies only males can 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.

[2] In this respect, our paper also relates to the literature on the constraints generated by extended families ties (Baland, Guirkinger and Mali, 2011; Jakiela and Ozier, 2016).

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 taken on by the mother's brother. Importantly, among the matrilineal Akan of Ghana the father remains responsible for food and education expenditures of his children.[3]

Matrilineal and patrilineal systems involve important differences 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 brother, the son of a 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. Therefore even in matrilineal societies, to the extent that land is mostly in the hands of men, it will be passed on to male heirs, only along the lines of female kinship.

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 matrikin 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 wife in favor of educating children as an acceptable substitute for land. This evidence corroborates the notion that Akan fathers traditionally considered education as a substitute for land inheritance for their sons.[5]

While important differences exist between the Akan and other ethnic groups in Ghana in terms of descent and inheritance practices, the various groups seem broadly comparable on a number of characteristics that can be derived from Murdock's Ethnographic Atlas. Appendix Table A1 shows that both Akans and non-Akans practice bride price and have similar class stratification and similar patterns in terms of animal husbandry, intensity of agriculture and age or occupational specialization. They differ to some extent in the type of crops cultivated, and for this reason in our specification we

[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.

[5] Acquiring land for one's children through the market was not a viable alternative, as land sales in the period under study were quite scarce (e.g., Bruce and Mighot-Adholla, 1994). Across the five rounds of the GLSS the fraction of household heads who report having bought land in the twelve months before the survey is on average 3.2 for Akans (minimum 0.8, maximum 6.6) and 2.4 for non-Akans (minimum 1, maximum 3.7).

control for crop dummies and the interaction of these dummies with a post-reform indicator.

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 in the distribution of a man's self-acquired property. The ISL 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. 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 ISL, 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 ISL? Several factors may have contributed to the reform. The first was the awareness of tensions between the nuclear family and the matrikin 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. A second motive relates to the process of economic reforms that the country was undergoing. The ISL 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 the introduction of the ISL 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 ISL. 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 ISL 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.

III Empirical strategy

Given the above institutional context, one can foresee two scenarios. The first is a scenario where the ISL is neutral in terms of children's landholdings because any increase in the amount of land inherited from the father is compensated by an equivalent decrease in the land inherited from the maternal uncle. Under this scenario, the reform should have no effect on educational investment. The second scenario is one where, for different possible reasons, the increase in land inherited from the father after the reform more than compensates for the reduction in uncle's land. Under this scenario children affected by the ISL see a net increase in their landholdings and parents may adjust their investment in children's education in response to the reform. We discuss in detail these two scenarios and the different possible reasons for non-neutrality in Section VI. For the time being, we note two empirical predictions that should be found in the data if the second scenario is the relevant one.

First, *ceteris paribus*, after the reform Akan parents should invest differentially in their children's education compared to non-Akans. In fact the ISL did not affect the options available to patrilineal groups (which could already bequeath land to their children), while it affected matrilineal ones.

Second, the response to the ISL should be different for landed households, whose budget set was affected by the reform, compared to landless ones.

An additional element of heterogeneity may be gender: because the matrilineal norm implied restrictions on inheritance that were most binding for boys, we should expect the reform to affect boys' human capital more than girls'. However, given that any adjustment in boys' educational investment would have implications for the household's budget constraint, we cannot rule out effects on girls' education as well, although this would depend on the household's utility function. Whether the effect of the reform on girls is zero or not is therefore ultimately an empirical question.

To study the impact of the ISL on education, we employ a difference-in-differences strategy akin to that used by Duflo (2001) and by Lavy and Zablotsky (2015), i.e., we exploit differences across cohorts and ethnic groups affected or not by the reform. We compare educational attainment for two age groups: those who were in primary school or younger when the ISL was passed in 1985, and those who were older than 11.[6] We restrict the sample to individuals aged 20 to 50 in each survey round. We estimate the following specification:

[6] 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 (White, 2005), which may lead us to underestimate the effect on education because also individuals in the 12–30 age bracket may be partly treated. Our estimates can thus 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

$$y_{itr} = \beta_1(Akan_i * Post_{it}) + \beta_2 Akan_i + \beta_3 X_{itr} + \beta_4(X_{itr} * Post_{it}) +$$
$$+ \beta_5 age_i + \beta_6 age_i^2 + \nu_t + \alpha_r + \gamma_r \cdot t + \epsilon_{itr} \quad (1)$$

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; $Post_{it}$ is a dummy equal to one if the individual was born in 1974 or later years, i.e., had not yet completed primary school in 1985. Our coefficient of interest is β_1, the coefficient of the interaction term between $Akan_i$ and $Post_{it}$. 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 the major crops grown in the village where the individual lives.[7] 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 (1) 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.

We estimate (1) with OLS using survey weights and clustering standard errors by (ethnic group $\times$ birth year). Our results are very similar if we don't use weights (see Appendix Table A2). To estimate the impact on highest grade completed we use a linear probability model for the probability of completing at least primary or secondary school.[8] Results are similar if we estimate a Probit model.

Our identification strategy assumes that, conditional on the controls we include in specification (1), changes in education outcomes for Akan and non-Akan males would have been the same in the

secondary and 3-year senior secondary.

[7] 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.

[8] 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.

absence of the reform. Below we discuss the plausibility of this assumption examining pre-trends and conducting some falsification tests.

While specification (1) 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:[9]

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

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 (1). 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. We expect the coefficients $\beta_{1,l}$ to be zero for cohorts that were too old to be affected by the reform, i.e., $l < 1974$, and to become negative for younger cohorts.

IV The data: a descriptive analysis

For our analysis we use 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. We focus on individuals aged 20 to 50 and estimate the impact of the reform 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.[10]

Our sample includes 18622 individuals aged 20–50 living in rural areas. 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 A3.

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

[9] In this model we include all the controls as in (1), except for the interactions between the controls in X_{itr} and the post-reform dummy.

[10] This variable is preferred to 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 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. As we show in Appendix Table A9, our results are very similar if we use father's farmer status or current land ownership.

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.

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).

V Results

A Effect of the reform on years of education

Table 2 reports our main results, i.e., the estimates of specification (1). The table reports OLS coefficients and, in parenthesis, standard errors clustered at the (ethnic group $\times$ year of birth) level. Results are very similar if we cluster by ethnic group only and correct for the small number of clusters using wild bootstrap.[11] Our main coefficient of interest, that on $Akan * Post$, is negative and significant for males (column 1), and positive but insignificant for females (column 4). The estimates in column 1 imply that, compared to non-Akan males, *ceteris paribus* Akan males exposed to the reform experienced a reduction of 0.92 years of completed education. The lack of a significant effect for females is consistent with the institutional background discussed in section II: because the intergenerational transmission of land continued to remain gender-linked, the ISL 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.

Table 2 also shows that the Akan have an initial education advantage of about 1.6 years of schooling for males and one year for females. This level effect for Akan males is consistent with the fact that for generations the lower ability to pass on physical capital to their biological children may have led Akan fathers to invest in education more than other groups. At the same time, we cannot give a causal interpretation to this coefficient 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.

In the remainder of Table 2 we estimate the effect of the Law separately for individuals whose father was a farmer and individuals whose father was not, where father's farmer status is used as a proxy for land ownership of the father at the time when the respondents in our sample were in school. In column 2 we see that the coefficient of interest for men with father farmer is -1.12 and is significant

[11] In this case, we use the the wild bootstrap procedure proposed by Webb (2014), which is an adaptation of Cameron et al. (2008) for cases where the number of clusters is particularly small, as in our setting where we only have five ethnic groups. Results available from the authors.

at 1 percent level, while the effect is zero for the individuals whose fathers were not farmers (column 3). For females, no significant effect is found for either subsample. These results are consistent with our interpretation that the reform actually changed the budget set only for fathers who had land to bequeath, while it did not affect landless ones.

To validate our identification strategy and get a disaggregated picture of the effects for different cohorts, in Figure 1 we show the estimates of equation (2), where the variable *Akan* is interacted with a set of dummies for the year of birth of the individual. Panel A of Figure 1 plots the estimated coefficients on the interaction terms $Akan_i^* I_{il}$ for the male sample, 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. 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 Akan households whose children were not so old as to have started secondary education at the time of the reform and validates our choice of 1974 as a cutoff for the difference-in-differences analysis.

In Panel B of Figure 1 we estimate the effects separately according to father's farmer status. We find results strongly consistent with our interpretation. In the leftmost graph, 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 (rightmost graph) is instead flat throughout the period.[12]

A.1 Alternative control groups and robustness

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.

Our descriptive statistics showed that, 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 1, 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 1974 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

[12] Appendix Figure A1 shows that, contrary to what happens for males, no trend break emerges for Akan females affected and not affected by the reform.

one more year of education. Both these facts suggest that mean reversion is likely not responsible for our findings.

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. Ewe males have on average 7.6 years of education compared to 4 for the rest of non-Akan males, so they are closer to the education level of Akans (8.6 years). 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 3 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, an effect significant at the 5 percent level. The size of this effect is comparable to our benchmark estimate in Table 2 (-0.9). This corroborates our interpretation that our results are not driven by mean reversion.

One may also be concerned that shocks specific to the Akan ethnicity might drive 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 ISL introduced in Ghana in 1985. Akans represent about 33 percent of the Ivorian population and are geographically concentrated in the Southern and Eastern regions, the regions closest to Ghana. In Côte d'Ivoire, as in 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 ISL, 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.[13] 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 and non-Akan males is 6.42 and 2.67, respectively (for females, it is 3.09 and 1.08).

We estimate a specification similar to (1), defining $Post_{it}$ based on the Ghana post-reform period,

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

i.e. as an indicator variable for individuals born after 1974.[14] The results are reported in columns 3 and 4 of Table 3. 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.

In Appendix A.1 we discuss alternative interpretations of our results and run further robustness checks. In particular, Appendix Table A4 shows that our results are robust to excluding from the sample Northern regions (where the Akan are a minority) and are not driven by differential shocks to the cocoa sector for Akans or to other occupations where the Akan may be concentrated.[15]

In Appendix A.2 we analyze the effects of the reform on school attendance of children in primary and secondary school. 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. Appendix Table A5 shows a negative effect on school attendance for children in later survey rounds, which is attenuated for boys who have more siblings. Although we should be cautious in giving a causal interpretation, this result 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.

B Completion rates

We next estimate the impact of the reform on the probability of completing different levels of schooling. Table 4 shows OLS 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).[16] Results are reported for the full sample and for the subsamples of individuals with father farmer and not, by gender. Column (1) shows that, compared to the non-Akan, Akan males born after 1974 are 7.5 percentage points less likely to complete at least primary school (Panel A) and 9 percentage points less likely to complete secondary school (Panel B). In columns (2) and (3) we see that only males with a father farmer experienced a significant reduction, while there is no effect on those whose father was not a farmer.

[14] Compared to specification (1), we do not include crop fixed effects (and their interaction with Post), nor mother's and father's education, because these variables are not available in the Côte d'Ivoire DHS.

[15] We also tested for whether Akans had differential migration rates before and after the reform, which would affect the composition of our "treatment" and "control" groups, and we found that they did not (results available from the authors).

[16] Results using Probit are very similar (available from the authors).

Regarding female completion rates, we find a borderline significant positive effect on primary completion rates in the full sample (column 4), consistent with the fact that the reduced investment in boys may have freed up resources for girls. However, this effect is insignificant when we split the sample by landed status (columns 5-6) and when we estimate the probability of completing secondary school (Panel B).

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 A6 and confirm our main results.

VI Discussion

A Possible mechanisms

We next discuss how our results can be rationalized in light of different possible mechanisms. Modeling households' decisions on human capital investment is a nontrivial task (e.g., Banerjee, 2004). A simple way to rationalize our findings would be to consider a setting where parents allocate their income between own consumption and investment in children's education, and where education and land enter the child's income-generating function.[17] Before the reform fathers decide on education and uncles on the amount of land to bequeath, while after the reform fathers decide on both dimensions. If we assume that parents and uncles own on average the same amount of land, that they do not have differential altruism towards their biological children and their nephews, and that they can perfectly contract, then we should not expect a change in educational investment in response to the ISL. This is because the increase in land inherited from one's father is perfectly compensated by a decrease in the land inherited from one's uncle (who, in turn, is devolving more land to his own child).

However, one could foresee many reasons why this perfect contracting model would not apply in practice and why the reform may not be neutral. One reason has to do with the timing of the decision: since investment in schooling typically takes place before uncle's bequests are received, in the presence of imperfect commitment risk averse fathers may want to insure against the possibility that uncles will not bequeath the optimal amount of land, and they will invest more in education early on. After the reform, fathers gain control of both decisions hence they can decrease educational investment.

A second possibility is that the strength of land rights depends on the source of the inheritance. For example, land inherited from the uncle may be less secure than land inherited from one's father (e.g., because other members of the extended family may claim the land when it's inherited from the uncle). Indeed, Bruce and Migot-Adholla (1994) argue that rights are better enforceable when the

[17] Note that Kingdon and Soderbom (2008) show that returns to education in the agricultural sector in Ghana are very low.

land is inherited from the father than when it is allocated by the matrikin. In this case, risk averse fathers would again want to invest more in education under the matrilineal system to compensate for the risk of expropriation.

A third reason why inheriting from one's father may not be the same as inheriting from one's uncle is specific experience (Rosenzweig and Wolpin, 1985). Akan boys spend considerably more time working their father's land than their uncle's, which makes them more productive on their father's land. Under the matrilineal system, fathers who anticipate that their sons will be less productive on the land they will inherit in the future may invest more in education to compensate for this lower productivity.

Fourth, fathers and uncles have a different stake in a child's future income when it comes to old age support. It is customary in Ghana for biological children to take care of their parents in old age.[18] Under the matrilineal system, parents anticipate that the person who will inherit their land (the nephew) will not be their main caretaker in old age, hence they invest more in their own children's education to ensure that they will have enough resources to support them in the future. After the reform, because parents are passing on land to their children, the need to invest in education is reduced.

Finally, 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.

B Supporting evidence

The above explanations are not mutually exclusive, and data limitations prevent us from taking on one particular interpretation against the others. In what follows we try to shed light on the plausibility of some of the hypothesized mechanisms, using the available data.

Land holdings. A common tenet of the above stories is that the possibility of inheriting from one's father, as opposed to one's uncle, should have translated into more land inherited by the children after the reform. Appendix A.3 discusses how we use available data from the GLSS1-5 to test if patterns in land ownership changed in a direction consistent with this interpretation. Appendix Table A7 shows that after the reform the probability of owning land as well as the amount of land owned did increase for Akan households compared to non-Akan ones, consistent with our discussion above.

Maternal uncles. While the above evidence suggests that the change in inheritance from uncles

[18] This is reflected in several proverbs, e.g., "When someone has looked after you while you cut your teeth, you should look after them while they are losing theirs", or "An elder who has grown old depends on his children" (Van der Geest, 2002; Aboderin, 2004). These authors also stress the role of reciprocity, especially linked to resources that parents may have devoted to children's education in young age.

to fathers was not neutral, i.e., that on average Akan males saw a net increase in their landholdings, the GLSS does not distinguish between different sources of inheritance, hence it does not allow us to directly look at land inherited from maternal uncles. To bring suggestive evidence on this point, we rely on a different dataset, that is, a survey collected by Markus Goldstein and Chris Udry in the Central region of Ghana.[19] The "family history" module of the survey asks respondents whether they have inherited, or anticipate inheriting, land from different sources, including the father and the maternal uncle: 246 Akan males and 494 non-Akan males answered this question. Table 5 reports some summary statistics.

About 43 percent of Akans and 47 percent of non-Akans report that they inherited or will inherit land from their fathers. This suggests that twenty-six years after the passage of the ISL, the likelihood of inheriting from one's father for Akan men is virtually the same as that of patrilineal groups. Interestingly, though, the matrilineal custom has not disappeared completely as Akan men are more than twice as likely to inherit from their maternal uncles (the fractions for Akans and non-Akans are 8.4 and 3.6 percent, respectively, and the difference is statistically significant with a p-value of .013).

When we turn to the amount of land inherited or to be inherited, on average Akans and non-Akans inherited from their fathers 6 and 4.2 acres, respectively. Again, a significant difference emerges for land inherited from maternal uncles (0.6 versus 0.2 acres).[20]

We interpret the evidence in Table 5 as suggestive of the fact that, while the ISL allowed Akan men to inherit from their fathers with the same probability as non-Akan men, it did not completely crowd out inheritance from maternal uncles, as Akans remained more likely to inherit from their uncles compared to patrilineal groups.

Land inputs. A final test we perform relates to the effects of the ISL on land inputs and on the incentives of Akans to work on their father's land. If Akan parents know that the land is going to their children and if children anticipate inheriting the land, we may expect to see more land-related investment and increased use of inputs such as family labor. In Appendix Table A8 we find a positive effect on the use of manure and on the probability of employing unpaid family labor.

While the types of tests that we can perform are limited by data constraints and by issues of comparability across survey rounds and datasets, the overall picture that emerges from the above

[19] Goldstein, Markus and Christopher Udry,. *The Social and Economic Effects of Improved Property Rights and Financial Literacy Training in Ghana, 2011 Survey,* World Bank and ISSER (selected files). These data cover 21 communities located very close to two urban centres, Accra and Kasoa, and as such it is not quite comparable to the rural sample in our main analysis, but it is the only data source we could find for Ghana that explicitly identifies land inherited from maternal uncles. Also, because the data was collected in 2011, every respondent was affected by the reform when it comes to the possibility of inheriting (or having inherited) from their father.

[20] While these averages include zeroes for those who did not inherit at all, when we condition on receiving a positive inheritance the pattern remains qualitatively similar, but the differences are no longer statistically significant.

analysis is consistent with our interpretation that matrilineal families (partially) substituted physical and human capital in response to the inheritance reform.

VII 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 ISL 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 ISL 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 with 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 relied on human capital investment to compensate their sons for the limited ability to intergenerationally transmit land, and who can now adjust on both margins (physical and human capital).

Parental investment in human capital has 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). Our paper suggests that the individualization of land rights may have far reaching implications that go beyond agricultural investment and productivity, affecting human capital accumulation in the long run.

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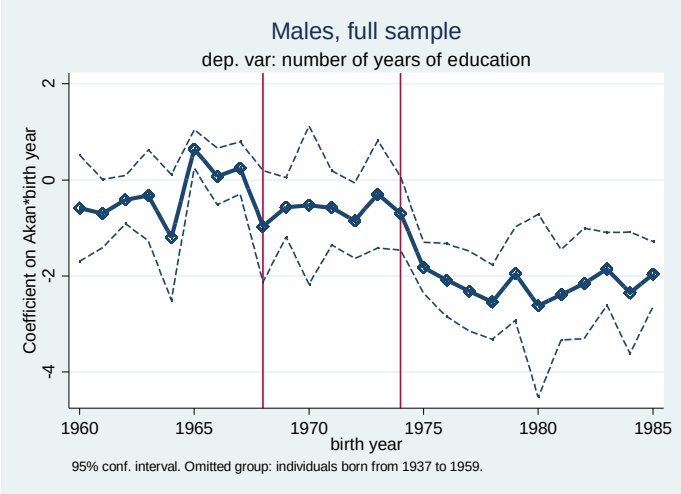
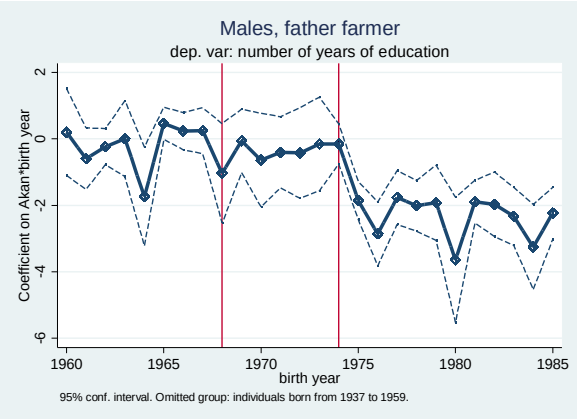
Figures

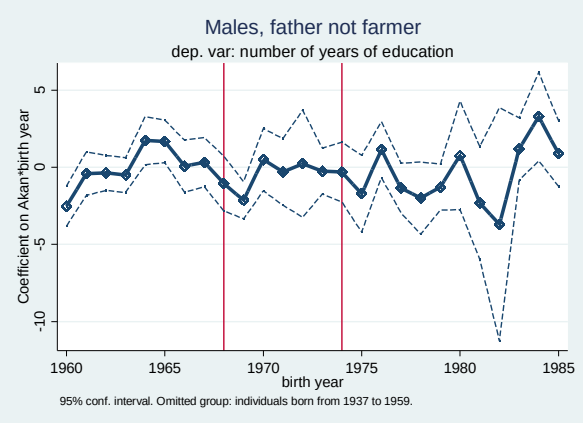
Figure 1: Cohort-specific effects, males

Panel A: Full sample



Panel B: By father's farmer status





Note: Estimated coefficients on the interaction of Akan and birth year dummies with 95% confidence bands (standard errors clustered at the ethnic group*birth year level). The dependent variable is the number of years of education. Controls include: birth year fixed effects, region and survey round fixed effects, region-specific time trends, age (and its square), crop dummies, a durables index, household size, female head, mother's and father's education, age of the head, religion dummies. Panel A reports estimates for the full sample, Panel B separately for the subsample with father farmer (leftmost graph) and not farmer (rightmost graph).

Tables

Table 1: Summary statistics

	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)

Note: Authors' calculations on GLSS1-5.

Table 2: Impact of the ISL on educational attainment

Dependent variable: Years of education						
		Males			Females	
	Full sample	Father farmer	Father not farmer	Full sample	Father farmer	Father not farmer
	(1)	(2)	(3)	(4)	(5)	(6)
Akan*Post	-0.919	-1.117	0.040	0.129	0.211	-0.325
	(0.325)	(0.345)	(0.598)	(0.323)	(0.369)	(0.681)
Akan	1.607	1.79	0.73	0.964	1.042	0.58
	(0.151)	(0.174)	(0.378)	(0.139)	(0.148)	(0.309)
Durables index	0.937	0.905	0.861	0.745	0.665	0.912
	(0.072)	(0.092)	(0.122)	(0.069)	(0.080)	(0.116)
Household size	-0.078	-0.072	-0.047	-0.05	-0.048	-0.031
	(0.019)	(0.020)	(0.063)	(0.013)	(0.013)	(0.053)
Female head	0.209	0.699	-0.260	0.987	0.864	1.23
	(0.268)	(0.293)	(0.623)	(0.135)	(0.147)	(0.351)
Mother's education	0.109	0.076	0.173	0.189	0.207	0.184
	(0.028)	(0.047)	(0.036)	(0.025)	(0.033)	(0.042)
Father's education	0.165	0.123	0.181	0.184	0.186	0.133
	(0.018)	(0.025)	(0.026)	(0.019)	(0.027)	(0.027)
Age of head	0.019	0.023	-0.005	-0.008	-0.008	-0.017
	(0.006)	(0.006)	(0.017)	(0.004)	(0.004)	(0.013)
Age	-0.029	-0.084	0.190	-0.084	-0.077	-0.174
	(0.069)	(0.077)	(0.164)	(0.062)	(0.064)	(0.142)
Age squared	-0.001	-0.000	-0.003	-0.000	-0.000	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Observations	8337	6700	1460	10285	8481	1726
R-squared	0.393	0.387	0.326	0.372	0.337	0.337

Notes: OLS estimates. Standard errors in parentheses adjusted for clustering at the "ethnic group X birth year" level (245 clusters). *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, 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*, interactions of community crop dummies with *Post*.

Table 3: Alternative control groups

Dependent variable: Years of education				
	Akan vs Ewe		Cote d'Ivoire	
	Males	Females	Males	Females
	(1)	(2)	(3)	(4)
Akan*Post	-0.770	-0.354	1.141	-0.200
	(0.347)	(0.486)	(0.735)	(0.320)
Akan	0.790	0.956	1.433	0.803
	(0.225)	(0.191)	(0.556)	(0.187)
Observations	4410	5433	1468	2748
R-squared	0.199	0.274	0.405	0.333

Notes: OLS estimates. Standard errors in parentheses adjusted for clustering at the (ethnic group X birth year) level. Columns 1-2 use rounds 1-5 of the GLSS and include the controls listed in the note to Table 2. Columns 3-4 use the 1994, 2005 and 2011 DHS for Cote d'Ivoire and include the following controls: birth year, region and survey round fixed effects, region-specific time trends, age (and its square), durables, female headed, household size, age of the head, religion, and interactions of individual controls with *Post*.

Table 4: 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*Post	-0.075	-0.098	0.004	0.056	0.055	0.045
	(0.033)	(0.039)	(0.054)	(0.032)	(0.040)	(0.069)
Akan	0.176	0.192	0.095	0.109	0.122	0.042
	(0.016)	(0.018)	(0.029)	(0.015)	(0.017)	(0.035)
Observations	8323	6690	1456	10283	8479	1726
R-squared	0.375	0.384	0.249	0.326	0.304	0.275
Panel B. *Dependent variable =1 if completed secondary school or higher*						
Akan*Post	-0.09	-0.093	-0.024	0.036	0.055	-0.004
	(0.036)	(0.041)	(0.070)	(0.031)	(0.036)	(0.078)
Akan	0.153	0.169	0.051	0.062	0.057	0.080
	(0.016)	(0.017)	(0.035)	(0.014)	(0.014)	(0.036)
Observations	8323	6690	1456	10283	8479	1726
R-squared	0.287	0.285	0.242	0.244	0.200	0.258

Notes: OLS estimates. Standard errors in parentheses adjusted for clustering at the (ethnic group X birth year) level. *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 note to Table 2.

Table 5: Inheritance from father and maternal uncle, summary statistics

	Akan N=246 (1)	non-Akan N=494 (2)	p-value (3)
Fraction who inherited/will inherit			
from father	0.435	0.466	0.431
from maternal uncle	0.084	0.036	0.013
Land inherited/to be inherited (acres)			
from father	6.015	4.217	0.212
from maternal uncle	0.583	0.171	0.027
Land inherited/to be inherited, conditional on >0 (acres)			
from father	13.98	9.122	0.117
from maternal uncle	7.326	5.077	0.435

Notes: Male sample