The Long-term Impacts of Orphanhood on Education Attainment and Land Inheritance among Adults in Rural Kenya

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Abstract

The long-term economic impacts of the AIDS epidemic on orphans have been major concerns in countries hit by the epidemic. Responding to these concerns, previous studies have investigated the schooling of orphans. Yet, few studies have investigated the impacts of orphan status into adulthood. Therefore, this paper examines the education attainment and land inheritance of former orphans, who have lost at least one parent before reaching 15, by using a survey of 889 households in Kenya in 2004. In the survey, we have asked the ages of household members when they lost their parents, if they have suffered such a loss, and identified former orphans. Among individuals who started schooling before the Free Education Program introduced in 1974, we find about a one year lower educational attainment among former maternal orphans compared with former non-orphans. We do not find a similar difference in education attainment among the younger cohorts, who started schooling after 1974. Even the Cost-Sharing Scheme introduced in 1988 does not seem to lower the educational attainment of former orphans. On inherited land, we find no significant difference between households headed by former orphans and non-orphans.

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1. Introduction

The ever increasing number of orphans due to the AIDS pandemic in Sub-Saharan Africa raises great concerns about the future welfare of orphans (UNAIDS/UNICEF/ USAID, 2004). Responding to these concerns, there have been a growing number of studies on orphans' schooling and the impacts of adult mortality on child schooling (Case, Paxson, and Ableidinger, 2004; Evans and Miguel, 2004; Ainsworth, Beegle, and Koda, 2005; Yamano and Jayne, 2005). Besides education, passing land to their children is another important way for parents to assure their future welfare in rural areas (Quisumbing, Estudillo, and Otsuka, 2004). Because land is increasingly becoming a scarce resource as well as a source of conflicts in many African countries that are suffering from the AIDS epidemic (Jayne et al., 2004; Deininger and Castagnini, 2005), studying the land inheritance of orphans is equally as important as studying the schooling of orphans.

No studies, however, have yet quantified the impacts of orphan status on land inheritance. The lack of studies on the land inheritance of orphans is partly due to the lack of former orphan status information of adults. Because orphan status is only measured among children, the welfare status of former orphans in their adulthood is virtually unknown. One exception is Beegle, De Weerdt, and Decron (2005). They use panel data that cover surveys in 1991-94 and 2004 in the Kagera region of Tanzania. They follow

sampled children aged 0 to 15 in the 1990-94 surveys into the 2004 survey. Among the 681 sampled children who had reached adulthood by the 2004 survey, they find significantly lower education attainment between orphans, especially maternal orphans, and non-orphans. However, their study only follows orphans into early adulthood and does not cover the land inheritance of orphans. Thus, our knowledge about orphans' education attainment in their adulthood is still scarce, and our knowledge about orphans' land inheritance is absent.

To fill these gaps, we estimate the education attainment and land inheritance of adults, including former orphans, in rural Kenya. We use a household survey of 889 rural households interviewed in 2004. In the survey, we asked about the timing of losing the mother and father of household members, if they have experienced such a loss. If a member had already lost one or both parents, we asked the age of the member when the parent(s) died. By using such information, we identify household members who have lost at least one parent before reaching age 15 and classify them as former orphans (if aged 16 or older). To the best of our knowledge, no studies have identified the former orphan status of adults systematically in a household survey. By using the former orphan status information, we estimate the differences in the attained grades between former orphans and non-orphans aged 18 to 60. Then, we estimate the differences in the inherited land size between households who are headed by former orphans and non-orphans. The findings in this paper are based on information from former orphans in rural Kenya who had lost their parents when they were still children. Because most of them lost their parents before the

spread of the AIDS epidemic, their experiences could be different from the growing numbers of AIDS orphans. However, there is still much to be learned from them.

In the next section, we discuss the conceptual framework on education and land inheritance. Section 3 describes the data used in the study and provides some descriptive analyses. The estimation models and results are presented in Section 4, followed by the conclusions in Section 5.

2. Schooling and the Land Inheritance of Orphans

Schooling of Orphans

Based on the wealth model of transfers developed by Becker and Tomes (1979), previous studies have provided a theoretical framework on the impacts of parental deaths on child schooling (Gartler, Levine, and Ames, 2004; Case, Paxson, and Aleidinger, 2004). There are several pathways through in which parental deaths have negative impacts on child schooling: (i) financial losses caused by medical and funeral payments after parental deaths, (ii) increased opportunity costs of children because of time required for taking care of sick parents and replacing labor of the sick parents, (iii) changes in parental preference after the loss of one parent, and (iv) changes in living arrangements.

First, previous studies find financial losses among households who experience working-age adult deaths (Lundberg, Over, and Mujinja, 2000; Yamano and Jayne, 2004).

Especially, when a male household head dies, the size of the financial loss is found to be large. This is because men tend to have greater income earning power and require higher medical expenditure than women. Financial losses will have negative impacts on child schooling especially when schooling fees are high. Yamano, Shimamura, and Sserunkuuma (2005), for instance, found a lower enrollment rate for orphans than non-orphans among young adolescents aged 15 to 18 but not among children aged 6 to 14 in Uganda. This could be because of the elimination of school fees in public primary schools, which children aged 6 to 14 are likely to attend, and high school fees in secondary schools, which adolescents aged 15 to 18 are likely to attend

Second, AIDS-related adult mortality is likely to negatively affect child schooling by increasing the opportunity costs of children's time. As one family member becomes chronically ill, another household member (usually a female member and often an older girl) must devote more time to care giving and replacing the lost labor previously supplied by the sick member. Both Yamano and Jayne (2005) and Evans and Miguel (2004) find a decline in enrollment rates among children, especially girls, in periods before they experience working-age adult deaths in their households. The authors of both papers speculate that this is because of the increased demand for children's labor.

Third, there is evidence that mothers tend to invest more of the income they control in children than do fathers (Haddad and Hoddinott, 1994; Thomas, 1997). Thus, the loss of a father may shift the preference of parents to a favorable direction for the surviving children. In one of the most recent studies on orphans' schooling, Beegle, De Weerdt, and

Dercon (2005) find that maternal orphans, but not paternal orphans, suffer from lower educational and health (i.e., height) attainment than non-orphans. Because paternal orphans are expected to suffer from larger financial losses than maternal orphans, the financial loss does not explain their finding. Another possibility is that maternal orphans suffer from a shift in the parental preference from a favorable to unfavorable preference toward investments in children after the loss of mothers.

Fourth, the living arrangements of orphans may change after parental deaths. Although some orphans remain in their households after the death of one or both parents, caretakers adopt many of them. In many other African countries, earlier studies have found that orphans are cared for by relatives, especially grandmothers, if not by the remaining parent (Ntozi and Nakayiwa 1999). In Uganda, for instance, Yamano, Shimamura, and Sserunkuuma (2006) show that the education of the female members, the number of female elders, and the value of assets increase the household's probability of living with orphans who are not the biological children of any of the current household members. Existing studies on orphans, however, do not control for the characteristics of the original residential households when orphans are living in different households after becoming orphans. Thus, even if we find lower enrollment rates among orphans in adopted households, it is not clear if their enrollment rates became lower or higher than their enrollment rates before they were adopted.[1]

1 Among foster children in Burkina Faso, Akresh (2004), for instance, uses a unique data set that contains information about both sending and receiving households. He finds that foster children are 3.6 percent more likely to be enrolled in school than their biological siblings who stay in their original

Except for Beegle, De Weerdt, and Decron (2005), all of the previous studies on orphans' schooling are conducted among children and adolescents who are of school-going ages. This is primarily because orphan status is only measured among children. Beegle, De Weerdt, and Decron (2005) use panel data that cover surveys in 1991-94 and 2004 in the Kagera region of Tanzania. They follow sampled children aged 0 to 15 in the 1990-94 surveys into the 2004 survey. Among the 681 sampled children who had reached adulthood by the 2004 survey, they find significantly lower education attainment between orphans, especially maternal orphans, and non-orphans.

In addition to Beegle, De Weerdt, and Decron (2005), there are several other panel data studies that identify the causal effects of orphanhood on schooling. Case and Ardington (2005), for instance, use panel data from South Africa. They follow non-orphans in the first survey and measure the difference in schooling in the following surveys between children who remain non-orphans and those who become orphans. They find causal effects of maternal orphanhood on schooling, consistent with Beegle, De Weerdt, and Decron (2005).

The results for these studies imply that the loss of schooling among orphans in childhood will result in lower educational attainment, which will result in poorer ability to generate income among former orphans than non-orphans in adulthood. However, few previous studies actually measure the educational attainment of former orphans in their adulthood, except for the young adults studied in Beegle, De Weerdt, and Decron (2005).

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households.

Therefore, in the following sections of this paper, we identify former orphans among all adults and estimate the associations between the final educational attainment and former orphan status. Note that we do not identify the causal effects of orphanhood on education attainment as done in previous studies discussed above. Instead, we only estimate the associations.

Land Inheritance of Orphans

The pathways through which parental deaths affect land inheritance may differ from the above. Although there are some previous studies on the gender differences of schooling and land inheritance (e.g., Quisumbing, 1994; Quisumbing, Estudillo, and Otsuka, 2004), no studies have discussed a theoretical framework on orphans' land inheritance. To start a discussion, let us consider the simplest case where the parents simply divide their land, Z, equally among N children. In patrilineal societies, such as in Kenya, the number of children that matter is the number of sons. A simple question about the land inheritance of orphans is whether the parental deaths affect Z or N.

Let us start a discussion about how parental deaths affect the land size for inheritance, Z. The prevailing practice after the death of a father (or husband) in Kenya is for the wife of the deceased husband to hold land in trust for her male children (Drimie, 2002). In this case, the amount of land left by the deceased father, Z, is intact. Thus, male paternal orphans would inherit as much land as they would even if their fathers had

survived. In fact, the transfer process of inheritance to them could be faster than usual because they do not need to share the land with their father any longer. Thus, as soon as male paternal orphans become old enough to inherit land, they inherit as much land as they would in their life. In their early adulthood, therefore, male parental orphan may own more land than former non-orphans who need to wait to inherit land as long as their fathers are alive. For maternal orphans, the situation is similar to non-orphans, since their fathers maintain the land even after the death of their wives. Thus, male maternal orphans also would receive as much land in this case as long as their father remains unmarried.

Exceptions occur when widows are dispossessed of their land by their husbands' relatives after the deaths of their husbands. Because women's land rights are weak in many African countries where the HIV/AIDS epidemic is prevalent, some anecdotal evidence suggests the dispossession of land among widows (Wanyeki, 2003). In Kenya, Yamano and Deininger (2006) show that widows are about 13 percent more likely to experience pending land conflicts when their land is registered under their deceased husbands' name than when their land is registered under their own name. However, we do not know if such conflicts actually lead to the dispossession of land. In fact, the frequency of land dispossession in general is unknown. Thus, we need more systematic evidence to generalize implications on the dispossession of widows' land.

Another case is when a household decides to sell its land to compensate for financial losses due to medical and funeral fees. In rural areas, however, land is one of the most important household assets, and selling land is the last resort. An earlier study in

Kenya does not find any significant declines in total cultivated land after working-age adult mortality (Yamano and Jayne, 2004), although it finds significant losses in the number of small animals and other assets.

Next, let us consider how parental deaths affect the number of siblings, N, to share the inheritance. If one partner dies in an early stage of marriage and the remaining partner remains unmarried, the number of siblings who share the inheritance would be fewer than expected. As a result, former orphans would inherit more land than they would if both of their parents had survived and produced more children. Because land is a critical asset in rural areas, they may earn higher income than non-orphans in their adulthood.

The situation considered above has similarities to situations studied in Young (2005). In his study, he simulates the impact of the AIDS epidemic on future living standards in South Africa. He finds the positive impacts of lowered fertility, because of widespread community infections, on per capita income are larger than the negative effects of reduced educational levels of orphans. He also refers to historical studies of the Black Death in Britain in the late fourteenth century, where real wages rose rapidly during the plague years with a declining labor force, and remained high throughout the fifteenth century.

The number of siblings who share the inheritance may increase, however, if the surviving parent remarries and produces half-siblings. In Kenya, especially in Luo society in western Kenya where the HIV prevalence rate is high, a widow might be forced to leave her land if she refuses to marry with one of her deceased husband's relatives. Because of

the HIV epidemic, however, the practice has been discouraged because of the fear of HIV infections from widows to new husbands. In general, if people fear HIV infections from widows and widowers, they may remain unmarried and would have fewer children than they would have if their partners had remained alive.

In sum, without occasional incidences of the dispossession or sales of land after a loss of a father, former paternal orphans inherit land quickly after the loss of their fathers and have more land than former non-orphans of the same age, especially in their early adulthood, while former maternal orphans inherit land as former non-orphans do. The number of siblings who share the inheritance could be fewer than non-orphans if one or both of their parents die young. Thus, the expected impact of orphanhood on land inheritance is positive, especially for paternal orphans.

3. Data and Current and Former Orphan Status

The data used in this paper come from 899 households interviewed in a survey conducted in 2004. This survey was conducted as part of the Research on Poverty and Environment and Agricultural Technology (REPEAT) Project[2] and was financed by the 21st Century Center of Excellency Grant, which was provided by National Graduate Institute for Policy Studies. The survey randomly took samples from three surveys conducted by the International Livestock Research Institute (ILRI) in 1996, 1998, and

[2] The REPEAT Project is a collaborative research project of National Graduate Research Institute for

2000. The three ILRI surveys used a similar sampling method and covered about 3,300 households who resided in central and western regions of Kenya. From the sub-locations that the ILRI samples located, we selected 100 sub-locations randomly and 10 households from each of the 100 chosen sub-locations. Two waves of surveys were conducted in 2004 over a period of six months on the selected sample households. The first wave was conducted in February 2004, asking respondents about the previous six months, that is from August 2003 to January 2004. In October 2004, the second wave took place to cover the following six months, starting from February 2004.

The basic characteristics of the sampled households are presented in Table 1. The overall average total land size is 4.6 acres. About 3 acres of the 4.6 acres are inherited by the sample households, suggesting the importance of inheritance in land acquisition. As we mentioned earlier, we asked about the timing of losing the mother and father of each of the household members, if they have experienced such a loss. By using the information, we identify household members who have lost at least one parent before reaching age 15 and classify them as current orphans if they are 15 years old or younger and as former orphans if they are 16 years old or older. In Table 1, we find that about 9.6 percent of children aged 15 and below are orphans. Among adults, we find that about 12.7 percent of them are former orphans who lost at least one parent before reaching 15.

Because the AIDS epidemic has emerged in the last two decades, we expect that the proportion of orphans has increased in recent years. Thus, to see the changes in the

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Policy Studies, the World Agro-forest Center, and Tegemeo Institute in Kenya.

proportion of orphans across generations, we stratify the samples by age cohorts in Table 2. Among the youngest cohort, which includes children aged 0 to 5, we find that about seven percent of them are orphans who had lost at least one parent by the survey period. Among the second youngest cohort, it is 14.3 percent. Note that the percentages of orphans in these youngest two cohorts are likely to increase as some of them may still suffer from parental losses by the time they reach 15.

Among the next age cohort, we find that about 14 percent of them are former orphans who had lost at least one parent before reaching 15. This group and the younger age cohorts are likely to have suffered from AIDS-related parental deaths because the number of AIDS patients has increased in the past 20 years. The proportion of orphans is lower in the next three age cohorts, aged 26 to 55, and it is highest in the age cohort of individuals aged 56 to 65. This could indicate that the proportion of orphans was decreasing as the living conditions in Kenya improved in the older age cohorts. As the AIDS epidemic spread in the last two decades, however, the proportion of orphans increased in the youngest two age cohorts.

In the following analyses on land inheritance and income, we estimate models at the household level. In these analyses, the former orphan status of household heads is used as an indicator. Thus, at the bottom of Table 2, we present the proportions of former orphans among household heads. We find that about 10 percent of the household heads are former orphans. We discuss the estimation methods next.

4. Estimation Models and Results

4.1. Estimation Models and Variables

First, we estimate the attained grade model of adults aged 18 to 60. Because their schooling was completed in the distant past in some cases, the current household characteristics are not relevant to their education attainment. Instead, ideally, we should have the characteristics of households when they completed their schooling. Unfortunately, however, we do not have such characteristics. Thus, we only control for fixed individual and regional characteristics, in addition to their former orphan status variables. Although some adults never attended school, the proportion is not large (less than ten percent). Thus, we estimate the following model with the community fixed effects model:

$$Y_i = f(\boldsymbol{O}_i, \boldsymbol{X}_i) \qquad (1)$$

where Y_i is the attained highest grade of individual i; $\boldsymbol{O_i}$ is a set of the former orphan status dummies; and $\boldsymbol{X}_i$ is a set of fixed individual and regional characteristics. The former orphan status dummies include dummies for maternal and paternal orphans. We do not separate double orphans because the number of double orphans is small. The sum of the estimated coefficients for paternal and maternal orphans should be considered as a combined impact on double orphans.

Next, we estimate the land inheritance model. Ideally, we need to have information about how much land was owned by their parents and how many siblings competed for the inheritance. What we have, however, is how much of the current land holdings is acquired

though inheritance. Of the inherited land, we do not know who has inherited land from whom. Although this could be a serious problem in societies where both men and women inherit land, this is not a serious problem for the present paper because mostly men inherit land in rural societies in Kenya. Thus, we assume that male household heads have inherited land and use the former orphan status dummies of male household heads to measure the differences in inherited land between orphans and non-orphans. When male household heads have deceased by the time of the survey, we include a dummy for widow heads. Therefore, we estimate the following model by using almost the same variables included in equation (1):

$$ln\,(Z_i) = g\,(\boldsymbol{O}_i, \boldsymbol{X}_i), \qquad (2)$$

where Z_i is the amount of inherited land; $\boldsymbol{O_i}$ is a set of the former orphan status dummies of the household head; and $\boldsymbol{X}_i$ is a set of fixed individual and regional characteristics.

4.2.Variables

We have already discussed how we constructed the former orphan status dummies and dependent variables (i.e., the attained highest grade and the amounts of inherited land) in the previous sections. In the attained grade model, the set of fixed individual characteristics includes age, age squared, and a female dummy. In addition, it includes two religious dummies for Catholic and other minor religions. The dropped base group is Protestant, which is the largest religious group in central and western Kenya.

In the land inheritance model, we also have the same variables of the household heads. In addition, we include two dummies for the availability of the parents of the household heads. If the parents of the household heads are still alive, the process of the land inheritance may not be completed. Thus, we expect that the size of the land inheritance will be small when the parents are still alive.

In both models, the six ethnic dummies are included to capture different coping mechanisms against parental deaths and different customs in the land inheritance across ethnic groups. We chose ethnic dummies over regional dummies because we think that the ethnicity captures such differences better than regional dummies. To capture geographic characteristics, we include the altitude of the community and the distance to the nearest town from the community. These community variables are obtained from the community level surveys.

5. Descriptive and Regression Results

Orphans' Schooling and Education Systems in Kenya

Since independence, the Kenyan education system has witnessed several changes. Even in the pre-independence period, the enrollment rate in Kenya was high compared with other African countries. But after independence, the Kenyan government devoted a significant portion of its budget and increased the number of schools and teachers. As a result, the gross enrollment rate (GER) reached 62 percent in 1970. In 1974, free education

for grades one to four was introduced, and the GER exceeded 100 percent until 1987. In 1988, however, a cost-sharing scheme was introduced to reduce the government budget on education as part of the structural adjustment programs, and the GER started declining to below 90 percent in the late 1990s until the newly elected President Kibaki re-introduced Free Primary Education in 2003.

To see if such changes in the educational system have any impacts on the educational attainment of sampled members, especially of former orphans, we stratify the samples into three: before 1974 (Pre- and Post-Independence System), from 1974 to 1988 (Free Primary Education System), and from 1988 to 2003 (Cost-Sharing System). In Figure 1 and Table 3, we find that former orphans have about a half a year lower educational attainment than former non-orphans in general. The difference is the largest among the oldest cohort, aged 38 to 60, who attended schools before free education was introduced in 1974. Among them, we find about a one year lower educational attainment among former orphans than non-orphans. Among the second oldest cohort, aged 24 to 37, who attended primary schools under the free education system, we do not find any differences in the educational attainment between former orphans and non-orphans. Among the youngest age cohort, aged 18 to 23, we find the gap between orphans and non-orphans widened slightly more than the second oldest cohort. This could be because of the cost-sharing scheme introduced in 1988. However, the differences between non-orphans and the different types of orphans are not statistically different. Thus, it seems that the free education system introduced in 1974 helped former orphans to gain

education, while the cost sharing system lowered slightly the education attainment of former orphans. We examine this further by estimating the grade attainment models.

In Table 4, we present the results from the community level fixed effects models. The dependent variable is the highest grade attained. The results indicate that former maternal orphans have a lower attained grade, about 0.75 years, than former non-orphans. This result is consistent with what Beegle, De Weerdt, and Dercon (2005) find in Tanzania. However, when we stratify the sample into three periods by the educational systems in Kenya, we find such a negative and significant coefficient on the former maternal orphan dummy among adults aged 38 to 60 in column B but not in the other age cohorts in columns C and D. This indicates that, in recent years, orphans are not suffering from permanent losses in educational attainment.

The results also indicate that the gender gap in education attainment between male and female adults has shrunk in recent years. Among the oldest age cohort, the difference in the educational attainment is more than three years (column B), but it becomes 0.8 years among the second oldest age cohort (column C). Among the youngest age cohort, aged 18 to 23, female adults actually have a higher educational attainment than male adults, although the difference is not statistically significant.

Land Inheritance

Next, we examine the land inheritance of former orphans. In Table 5, we present the descriptive statistics of inherited land sizes of former orphans and non-orphans. We find that former non-orphans have inherited about 2.72 acres of land on average, while former orphans inherited about 2.3 acres of land. Among orphans, we find that paternal orphans inherited more land, about 2.6 acres, than maternal orphans, who inherited 2.0 acres. This could be because paternal orphans do not need to share land with their fathers any more and inherit land much earlier than others. Yet, paternal orphans do not inherit as much as non-orphans. However, the numbers in Table 5 are not statistically different from others. Thus, we cannot draw any conclusions from the table.

Even if there were significant differences in inherited land sizes between orphans and non-orphans, orphans can obtain land in land markets. Thus, in Table 5, we also present the purchased, rented-in, and total land sizes. We find that, although maternal orphans inherit less land than non-orphans and paternal orphans, they purchase more than others. As a result, the total land size of maternal orphans is 4.3 acres, which is very close to the land sizes of non-orphans and paternal orphans, whose land size is 4.4 and 4.3 acres, respectively.

To investigate further, we estimate the regression models on inherited land (Tobit) and total land access (Community Fixed Effects). Because men inherit land for the most cases in Kenya, we use the former orphan status of male heads in Table 5. When we do not have the information of the deceased male heads, we include a widow dummy in columns A and C or exclude such cases in columns B and D. In all models, the results indicate that

there are no differences in inherited land sizes and total land access between orphans and non-orphans.

Household Income

Finally, we compare income between households headed by former orphans and non-orphans. Before we compare income, we present the attained grades of male household heads. In Table 7, we find that the attained grade is significantly lower if the household heads are double orphans. However, between households headed by non-orphans and single orphans (paternal and maternal orphans), we do not find any differences in attained grades. Because we do not find statistically significant differences in total land size either in the previous analysis, it is probably not surprising to find no significant differences in income, both household level and per capita, Table 7. To confirm the results, we have estimated the household income models with the community fixed effects models (Table 8). As we expect, the results do not show any significant differences in household income between households headed by former non-orphans and orphans. We have estimated the same models for per capita income, but the results are similar to the ones presented in Table 8.

6. Conclusion

Concerned with the long-term implications of the AIDS epidemic, many researchers have examined the schooling of orphans. However, only a few studies have quantified the impacts of orphan status on educational attainment into adulthood, and no studies have yet quantified the impacts of orphan status on land inheritance. In rural areas of developing countries, education and land are the two most important assets that parents pass to their children for their future welfare. First, we estimate the educational attainment model and find that former maternal orphans have about a one year lower educational attainment than former non-orphans when we select individuals who started schooling before the Free Education Policy was introduced in 1974. We do not, however, find a similar difference in education attainment among younger cohorts, who started schooling after 1974. This suggests that the Free Education Program might have helped orphans to obtain education. Among the younger cohort who started schooling after the cost-sharing scheme was introduced in 1988, we find descriptive evidence that the difference in educational attainment between former orphans and non-orphans has worsened, but the regression results do not support the descriptive results. Even the cost-sharing system introduced in 1988 does not seem to lower the educational attainment of former orphans significantly.

On inherited land, there is a possibility for paternal orphans to inherit land quicker than non-orphans because paternal orphans do not need to share the land with their fathers. Both paternal and maternal orphans may receive larger large plots of land than

non-orphans if they become orphans when their parents are still in the reproducing stage and have left fewer siblings to share inheritance than they would if their parents had survived. The empirical evidence, however, suggests no significant differences in inherited land between former non-orphans and orphans. Although inherited land sizes are lower for maternal orphans than non-orphans and paternal orphans, the differences are not statistically significant. Maternal orphans also purchased more land than others in the past. As a result, the total land size the maternal orphans is virtually the same as the total land sizes of non-orphans and paternal orphans. The final analysis on income also suggests that there is no different in income between households headed by former orphans and non-orphans.

The results in this paper on educational attainment, however, may not be generalized to countries where schooling is expensive and education level is low. In Kenya, the Free Education Program was introduced much earlier than other African countries, and the education level is much higher in Kenya than others. Thus, if the Free Education Program has helped former orphans to obtain education, as suggested in this paper, we might find larger differences in educational attainment between former orphans and non-orphans in other countries where the free education was introduced later than 1974 or was never introduced. Further studies are required in other countries.

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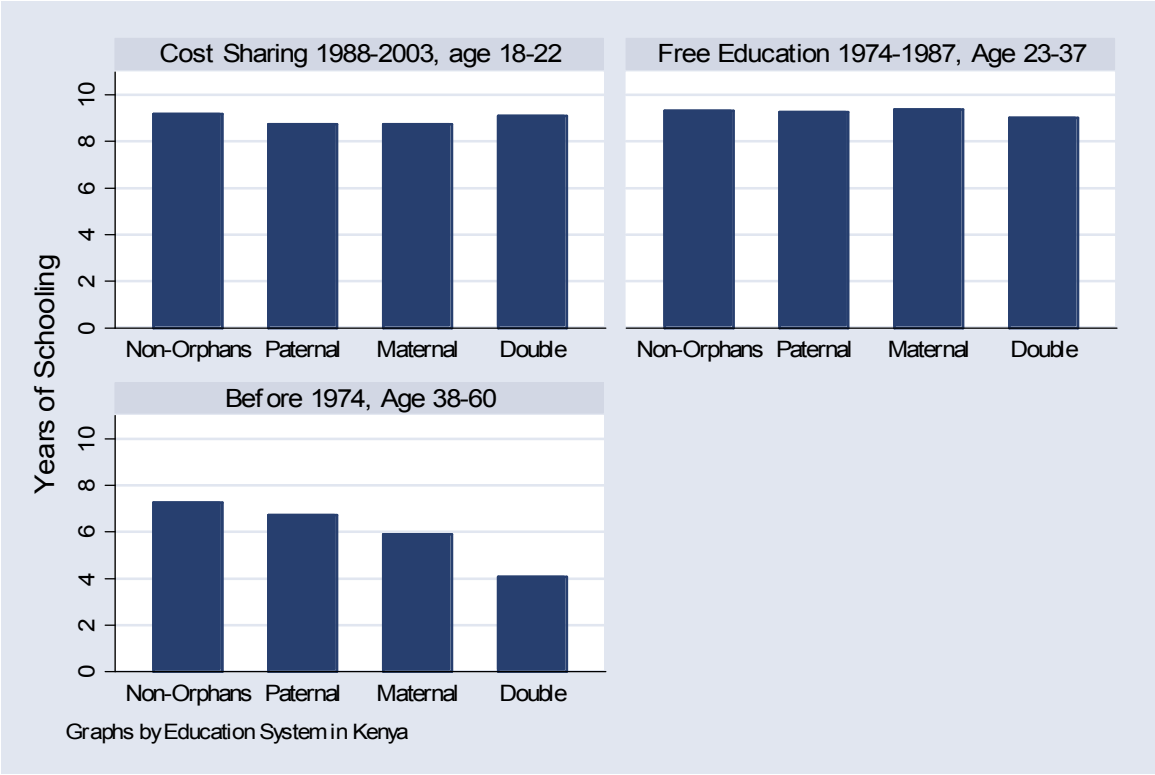

Figure 1. Years of Schooling by Former Orphan Status and Education System in Kenya

Only the difference between former maternal orphans and non-orphans and the difference between former double orphans and non-orphans are statistically significantly different in the bottom-left panel. Please see Table 3 for corresponding statistics.

Table 1. Sources of Land and Former Orphans Status of Household Heads in Kenya

Province	Number of Households	Per capita income	Total Land Size	Current and Former Orphan Status	
				Orphans aged 0-15	Former Orphans aged 16 and older
	(A)	(B)	(C)	(D)	(E)
	Number	US$	Acres	%	%
Eastern	71	575	4.5	9.5	11.9
Central	318	519	3.9	14.2	11.5
Rift Valley	223	500	7.1	6.7	14.6
Western	112	214	2.9	7.0	10.3
Nyanza	175	271	3.9	10.7	14.6
Total	899	431	4.6	9.6	12.7

Note:

Table 2. Current and Former Orphan Status of Sample Individuals

Age Category	Number of sampled individuals	Current or Former Orphans of Any Type	Current and Former Orphans		
			Paternal Orphans	Maternal Orphans	Double Orphans
	(A)	(B)	(C)	(D)	(E)
	- Number-	- % -	- % -	- % -	- % -
0 – 5 years	624	6.9	4.3	1.4	1.1
6 – 15 years	1,629	14.3	6.9	5.0	2.5
16 – 25 years	1,641	14.0	10.2	2.6	1.2
26 – 35 years	692	10.1	7.7	1.9	0.6
36 – 45 years	484	9.7	6.8	2.9	0
46 – 55 years	460	13.7	9.6	3.5	0.7
56 – 65 years	328	17.4	8.8	5.5	3.0
66 and older	382	10.7	5.8	3.4	1.6
All	6,240	12.6	7.8	3.3	1.4
Household Heads	899	10.5	6.0	3.1	1.4

Table 3. Highest Grade Attained by Former Orphan Status

	Former non-orphans	Former orphans of any type	Former Orphan Status		
			Paternal Orphans	Maternal Orphans	Double Orphans
	(A)	(B)	(C)	(D)	(E)
	mean (sd)	mean (sd)	mean (sd)	mean (sd)	mean (sd)
All Adults 18-60	8.58	8.01**	8.27	7.59**	6.83**
	(3.99)	(4.04)	(3.87)	(4.41)	(4.24)
Number of adults	2,777	375	266	80	29
Education Systems in Kenya					
Pre- and Post-Independent System before 1974					
Adults aged 38 to 60	7.25	6.26**	6.73	5.89*	4.08**
	(4.66)	(4.60)	(4.44)	(5.15)	(3.50)
Number of adults	933	139	89	37	13
Free Education System in 1974-1987					
Adults aged 24 to 37	9.30	9.27	9.26	9.38	9.00
	(3.59)	(3.55)	(3.52)	(3.58)	(4.65)
Number of adults	1,030	132	105	21	6
Cost-sharing System in 1988-2003					
Adults aged 18 to 23	9.19	8.77	8.74	8.73	9.10
	(3.18)	(2.83)	(2.97)	(2.43)	(2.81)
Number of adults	814	104	72	22	10

Note: * and ** indicate results from t-test between former non-orphans (column A) and each type of former orphans. ** indicates 5% significance level; * indicates 10% significance level

Table 4. Attained Grades of Adults Aged 18 to 60 by Former Orphan Status Community Fixed Effects Model

		Education Systems		
	All Adults	Pre- and Post-Independence in 1950-1973 Adults 38-60	Free Primary Education in 1974-1987 Adults 24-37	Cost-sharing System in 1988-2004 Adults 18-23
	(A)	(B)	(C)	(D)
Former Orphan Status				
Maternal Orphan (=1)	-0.754	-1.173	-0.553	0.122
	(2.06)**	(1.88)*	(0.78)	(0.37)
Paternal Orphan (=1)	0.105	0.097	0.095	-0.009
	(0.46)	(0.21)	(0.26)	(0.04)
Fixed Individual Characteristics				
Age	0.180	-0.107	-0.463	2.936
	(4.91)**	(0.34)	(1.19)	(5.32)**
Age squared	-0.004	-0.001	0.006	-0.071
	(7.37)**	(0.28)	(0.97)	(4.76)**
Female (=1)	-1.316	-3.213	-0.807	0.226
	(10.05)**	(12.54)**	(3.88)**	(1.58)
Catholic (=1)	0.040	-0.037	0.160	0.152
	(0.24)	(0.12)	(0.59)	(0.83)
Other religion (=1)	0.337	0.214	0.707	0.272
	(1.19)	(0.38)	(1.60)	(0.90)
Constant	7.747	16.323	17.454	-21.117
	(12.68)**	(2.15)**	(3.10)**	(4.19)**
R-squared	0.13	0.19	0.03	0.09
Number of Sub-locations	97	97	97	97
Number of total obs.	3151	1073	1163	1455

Note: Sub-location fixed effects for 97 sub-locations are controlled for. ** indicates 5% significance level; * indicates 10% significance level.

Table 5. Inherited Land Size by Former Orphan Status of Male Household Heads [a]

	Former non-orphans	Former orphans of any type	Former Orphan Status		
			Paternal Orphans	Maternal Orphans	Double Orphans
	(A)	(B)	(C)	(D)	(E)
	mean (sd)	mean (sd)	mean (sd)	mean (sd)	mean (sd)
Inherited Land	2.72 (4.70)	2.30 (2.48)	2.57 (2.47)	1.96 (2.71)	1.90 (1.98)
Purchased Land	1.36 (3.09)	1.61 (3.51)	1.44 (3.44)	2.08 (3.95)	1.33 (2.84)
Rented-in Land	0.26 (0.75)	0.18 (0.71)	0.26 (0.92)	0.10 (0.28)	0.02 (0.07)
Total Land Access	4.40 (5.17)	4.30 (3.96)	4.32 (4.30)	4.34 (3.72)	4.08 (3.14)
Number of Observations	637	90	51	27	12

Note: (*a*) The total number of male headed households is 727, and the number of widow headed households is 170. Female headed households in which their husbands are alive are included in the male headed households because we have their husbands' schooling information. Because men inherit land for the most cased in Kenya and because we assume that men's former orphan status affects inherited land sizes, we have excluded 170 widow-headed households because we do not have information about former orphan status of their deceased husbands.

* and ** indicate results from t-test between former non-orphans (column A) and each type of former orphans. ** indicates 5% significance level; * indicates 10% significance level.

Table 6. Determinants of Inherited Land Size by Former Orphan Status of Household Heads

	ln (Inherited Land in acres)		*ln* (Total Land Access in acres)	
	Full Sample	Female Headed Households Excluded	Full Sample	Female Headed Households Excluded
	Tobit	Tobit	Community FE	Community FE
	(A)	(B)	(C)	(D)
Head's Former Orphan Status				
Maternal Orphan (=1)	-0.184	-0.150	0.013	0.020
	(1.11)	(0.90)	(0.13)	(0.20)
Paternal Orphan (=1)	0.135	0.147	0.011	0.031
	(1.06)	(1.15)	(0.14)	(0.38)
Head is Widow (=1)	-0.064		-0.054	
	(0.68)		(0.93)	
Availability of Head's Parents				
Father alive (=1)	0.030	0.015	-0.002	-0.012
	(0.28)	(0.15)	(0.03)	(0.17)
Mother alive (=1)	0.116	0.091	-0.037	-0.063
	(1.34)	(1.04)	(0.68)	(1.10)
Head Characteristics				
Head's age	0.006	0.006	0.014	0.016
	(0.39)	(0.39)	(1.61)	(1.62)
Age squared	-0.000	-0.000	-0.000	-0.000
	(0.81)	(0.96)	(0.71)	(0.90)
Community Characteristics				
Altitude	0.137	0.257		
	(0.38)	(0.64)		
ln (Distance to town)	-0.111	-0.098		
	(1.72)*	(1.37)		
Six Ethnic Group Dummies	Included	Included		
14 District Dummies	Included	Included		
Constant	-0.610	0.210	0.826	0.834
	(0.22)	(0.07)	(3.22)**	(3.02)**
(Pseudo-) R-squared	0.105	0.097	0.018	0.011
Number of censored obs.	183	183	0	0
Number of total obs.	885	717	885	717

Note: Sub-location fixed effects models for 97 sub-locations are estimated in columns C and D.
** indicates 5% significance level; * indicates 10% significance level

Table 7. Household and Per Capita Income by Former Orphan Status of Male Household Heads [a]

	Former non-orphans	Former orphans of any type	Former Orphan Status		
			Paternal Orphans	Maternal Orphans	Double Orphans
	(A)	(B)	(C)	(D)	(E)
	mean (sd)	mean (sd)	mean (sd)	mean (sd)	mean (sd)
Attained Grades of Heads	7.57 (4.65)	7.13 (4.41)	7.50 (4.11)	7.74 (4.65)	4.17** (4.28)
Household Income	2,278 (2,635)	2,012 (1,782)	1,908 (1,556)	2,263 (2,043)	1,887 (2,193)
Per Capita Income	455 (671)	382 (368)	394 (341)	360 (355)	376 (532)
Number of Observations	637	90	51	27	12

Note: (*a*) The total number of male headed households is 727, and the number of widow headed households is 170. Female headed households in which their husbands are alive are included in the male headed households because we have their husbands' schooling information. Because men inherit land for the most cased in Kenya and because we assume that men's former orphan status affects inherited land sizes, we have excluded 170 widow-headed households because we do not have information about former orphan status of their deceased husbands.

* and ** indicate results from t-test between former non-orphans (column A) and each type of former orphans. ** indicates 5% significance level; * indicates 10% significance level.

Table 8. Determinants of Household Income by Former Orphan Status of Household Heads – Community Fixed Effects Model

	Basic	Add head's schooling and inherited land	Add current household characteristics
	(A)	(B)	(C)
Head's Former Orphan Status			
Maternal Orphan (=1)	-0.075	-0.039	-0.036
	(0.45)	(0.25)	(0.26)
Paternal Orphan (=1)	-0.081	-0.085	-0.019
	(0.61)	(0.68)	(0.17)
Head is Widow (=1)	-0.485	-0.261	-0.164
	(4.98)**	(2.69)**	(1.52)
Schooling and Inherited land			
Head's Schooling Years		0.040	0.021
		(4.68)**	(2.76)**
Inherited Land Size in Acres		0.061	0.016
		(7.41)**	(1.96)+
Availability of Head's Parents			
Father alive (=1)	0.137	0.074	0.022
	(1.21)	(0.68)	(0.23)
Mother alive (=1)	-0.053	-0.096	-0.069
	(0.59)	(1.11)	(0.90)
Head Characteristics			
Head's age	0.006	0.006	0.014
	(0.39)	(0.39)	(1.61)
Age squared	-0.000	-0.000	-0.000
	(0.81)	(0.96)	(0.71)
Current HH Characteristics			
Number of Male Adults			0.118
			(4.61)**
Number of Female Adults			0.057
			(2.23)*
ln (Asset Value)			0.326
			(12.32)**
Spouse Schooling Years			0.026
			(2.66)**
Spouse Schooling Missing (=1)			0.085
			(0.83)
Constant	10.47	9.783	7.565
	(24.1)**	(23.3)**	(17.9)**

Number of communities	96	96	96
Number of total obs.	881	881	881

Note: Sub-location fixed effects models for 97 sub-locations are estimated. ** indicates 5% significance level; * indicates 10% significance level