NBER WORKING PAPER SERIES

KINSHIP STRUCTURE AND THE FAMILY: EVIDENCE FROM THE MATRILINEAL BELT

Sara Lowes

Working Paper 30509
http://www.nber.org/papers/w30509

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
September 2022

I thank Martin Abel, Alberto Alesina, Robert Bates, Natalie Bau, Anke Becker, Iris Bohnet, Michael Callen, Jeffrey Carpenter, Alessandra Cassar, Benjamin Enke, Raissa Fabregas, Ed Glaeser, Claudia Goldin, Pauline Grosjean, Joseph Henrich, Seema Jayachandran, Matt Lowe, Sendhil Mullainathan, Nathan Nunn, Rohini Pande, Gautam Rao, Amanda Robinson, James A. Robinson, Pauline Rossi, Heather Sarsons, Jonathan Schulz, Tom Vogl, Jack Willis and Roberta Ziparo for their feedback. Cammie Curtin, Riccardo Di Cato, Anne DeGrave, Andre Gray, and Adam Xu provided excellent research assistance. I am grateful for financial support from: the NSF Graduate Research Fellowship Program, Harvard IQSS, and the Harvard Center for African Studies. This project has IRB approval from the Harvard CUHS (IRB15-1787). This paper was previously circulated as "Matrilineal Kinship and Spousal Cooperation: Evidence from the Matrilineal Belt". The first draft of the paper is from March 2016. The views expressed herein are those of the author and do not necessarily reflect the views of the National Bureau of Economic Research.

Kinship Structure and the Family: Evidence from the Matrilineal Belt
Sara Lowes
NBER Working Paper No. 30509
September 2022
JEL No. D13,J16,N47,P5,Z13

ABSTRACT

Kinship structure – how extended families are organized – varies across societies and may have implications for outcomes within the household. A key source of variation in kinship structure is whether lineage and inheritance are traced through women, as in matrilineal kinship systems, or men, as in patrilineal kinship systems. Anthropologists hypothesized that matrilineal kinship systems benefit women because they have greater support from their kin and husbands have less authority over their wives. However, they believed these same factors may also reduce spousal cooperation. I test these hypotheses using OLS and a geographic regression discontinuity design along the matrilineal belt in Africa. Using over 50 DHS survey-waves, I find that matrilineal women experience less domestic violence and have greater autonomy in decision making. Additionally, matrilineal kinship closes the education gap between male and female children, and matrilineal children experience health benefits. To better understand the specific mechanisms behind these effects, I collect original survey and experimental data from along the matrilineal belt. Men and women from matrilineal ethnic groups cooperate less with their spouses in a lab experiment. This is particularly the case for matrilineal women when they have the opportunity to hide income from their spouse. The results highlight how broader social structures shape key outcomes within the domestic sphere.

Sara Lowes
Department of Economics
University of California at San Diego
9500 Gilman Drive
La Jolla, CA 92093
and NBER
slowes@ucsd.edu

1. Introduction

Kinship systems and marriage are fundamental social institutions for many societies. They are key for organizing production, allocating resources, determining obligations to family members, and determining the scope and extent of cooperation. A growing literature in economics has begun to explore how social structures such as kinship systems affect development outcomes (e.g. Alesina and Giuliano, 2014; Rossi, 2019; Tur-Prats, 2019; Moscona, Nunn and Robinson, 2020; Bau, 2021; Becker, 2021; Bahrami-Rad, Beauchamp, Henrich and Schulz, 2022). However, the relationship between kinship systems and outcomes within the family is relatively under-explored (Bau and Fernández, 2022). Economists tend to focus on the nuclear household as an integral unit of production in isolation from broader social structures. In this paper I provide evidence that kinship structure affects key outcomes within the family, such as the well-being of women and children and cooperation within the household.

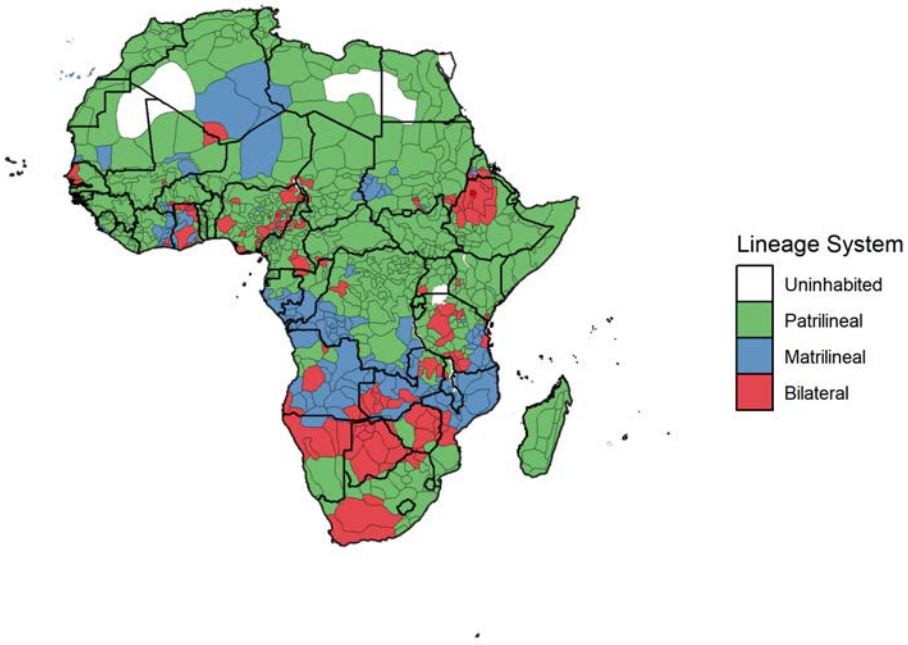
Kinship systems determine the set of people to whom an individual is considered related and their social obligations to this group (Radcliffe-Brown, 1950). Kinship systems are believed to sustain cooperation within a group (e.g. Schulz, Bahrami-Rad, Beauchamp and Henrich, 2019; Enke, 2019; Schulz, forthcoming). Thus, an important element of a kinship system is the determination of group membership. One of the primary sources of variation in kinship structure is whether group membership is determined through men or women. In *matrilineal* kinship systems, group membership and inheritance are traced through female members. Individuals are part of their mother's kinship group and inheritance is restricted to the children of the female group members. In contrast, in *patrilineal* systems individuals are part of their father's kinship group, and inheritance can only be passed on to children of male group members.[1] The greatest density of matrilineal kinship systems is in central Africa in the so-called "matrilineal belt", which is shown in Figure 1.[2]

This paper tests the long standing hypothesis from anthropology that matrilineal kinship relative to patrilineal kinship has important implications for the nuclear family. First, anthropologists have argued that matrilineal systems decrease the authority of husbands over wives (Whyte,

[1] Matrilineal and patrilineal kinship systems are examples of *unilineal descent*, in which kin are defined using only one of the two parents (Fox, 1967). Most Western societies practice *cognatic* descent, in which kinship ties are traced through both parents. An individual considers people related through their mother and through their father to be kin.

[2] See Figure A1 for the global distribution of matrilineal societies. Most matrilineal societies are located in sub-Saharan Africa. However, there are also many matrilineal groups in North America and in the Pacific, as well as in parts of South Asia.

Figure 1: Kinship Structure in sub-Saharan Africa



1978; Schlegel, 1972). This is because in matrilineal systems, authority is dispersed between the husband and the wife's kin group. A woman's children are part of her lineage and her children inherit from her brothers. Thus, her brothers maintain an active role in her life. Relatedly, if a husband mistreats his wife, it is relatively easier for her to leave her spouse (Richards, 1950). Her extended family are invested in her and her children. Thus, matrilineal systems may allow women greater autonomy in decision making and may improve their outside option in the case of spousal abuse. Matrilineal women may also be better able to invest in their children, as they retain greater autonomy and get greater support from their extended kin who are invested in the welfare of their children.

Second, anthropologists note that matrilineal systems create "conflicting allegiances" within the household (Fox, 1967), as men have strong ties to their sisters and women have strong ties to their brothers. This is contrast with patrilineal systems, where women are subsumed into the kin group of their husbands. Because matrilineal kinship creates conflicting allegiances and because husbands have less authority over their wives, a large literature in anthropology suggests that matrilineal systems may also reduce cooperation within the nuclear household (Radcliffe-Brown, 1950; Gluckman, 1963; Richards, 1950; Douglas, 1969). Note, this perspective considers "cooperation" to be partly a product of coercion; once men do not have as much authority over

their wives, women are no longer as cooperative. I test the hypotheses that matrilineal kinship benefits women but that it undermines spousal cooperation using survey data from across sub-Saharan Africa and original lab-in-the-field data from couples residing along the matrilineal belt.

To examine how matrilineal kinship affects outcomes for women and children, I combine data from over 50 Demographic and Health Surveys (DHS) across 14 sub-Saharan African countries that have geo-located cluster information and variation in kinship structure. The DHS have data on attitudes toward domestic violence, exposure to domestic violence, and autonomy in decision making, as well as data on the education and health of children. I match data from the Ethnographic Atlas (Murdock, 1967) with the Murdock ethnic group boundary map (Murdock, 1959), so that for each ethnic group boundary, I can assign a type of kinship system: matrilineal, patrilineal, or bilateral. Using the geo-located cluster information, I am able to ask how matrilineal kinship relative to patrilineal kinship affects women's views on domestic violence, women's exposure to domestic violence, and investment in children's education and health.

The empirical analysis consists of two estimation strategies. The first is to estimate the cross-ethnicity relationship between matrilineal kinship and the outcomes of interest in the DHS. For this analysis, I ask how matrilineal relative to patrilineal kinship affects the outcomes of interest, conditional on country and year fixed effects and accounting for a wide variety of geographic and cultural variables that may confound the relationship of interest.

As with any study examining the effects of culture, reverse causality and omitted variable bias are a concern. Specifically, the omitted variable bias concern is that some unobserved variable both determines the adoption of matrilineal kinship and outcomes within the family. The reverse causality concern is that in societies where women had more autonomy, they were more likely to adopt matrilineal kinship systems. I use the borders between matrilineal and patrilineal groups and a geographic regression discontinuity design to help mitigate these concerns. I identify ethnic pairs – e.g. contiguous ethnic groups that differ in the practice of matrilineal or patrilineal kinship. Across all of these ethnic pair boundaries I estimate a geographic regression discontinuity design and include an ethnicity pair fixed effect.

The benefit of the RD estimates over the OLS estimates is that the RD helps account for any omitted factors that vary smoothly over space. Specifically, it alleviates concerns about any spatially continuous variable either affecting the adoption of matrilineal kinship or affecting the outcomes of interest. For example, the RD helps account for any spatially continuous historical,

geographic, or climatic variables. However, the RD strategy is ineffective if there are omitted factors that vary discontinuously at the border – e.g. if there are systematic differences between neighboring ethnic groups other than the practice of matrilineal kinship. I present evidence that the RD assumptions are reasonable by showing balance for ethnic pairs for a wide variety of geographic and cultural characteristics. Nevertheless, I include the geographic controls as part of my baseline specification, and control for any unbalanced cultural characteristics.

I find the following set of results. First, in the OLS and RD specifications, matrilineal women are less likely to view domestic violence as justified, are less likely to have experienced domestic violence, and are less likely to have experienced physical harm as a result of domestic violence. I then turn to examining autonomy in decision making. The DHS asks women whether they are able to decide by themselves, with another person, or another person decides on: visits to the family, healthcare, large household purchases, and how their earnings are used. I construct an index with these variables. In the RD specification, I find that matrilineal women have greater autonomy in decision making. I then examine each question individually. In both the OLS and RD specifications, matrilineal women have greater say in whether to visit their family and greater ability to seek healthcare.

In the event of a separation between husband and wife, a woman and her children return to her kin group. Investments in the children may therefore improve a wife's outside option since her kin group values these investments more than a patrilineal woman's kin group. Additionally, if women tend to prefer to invest in children and women retain greater control over their earnings, this may confer benefits on children. Therefore, I examine two sets of outcomes to proxy for children's well-being. First, I examine years of education for all school-aged children. I find that matrilineal children have fewer years of education. However, this masks important heterogeneity. Once I examine effects by the gender of the child, I find that matrilineal kinship closes the education gap between male and female children, though on average matrilineal children are less educated. This is important given that many societies favor educational investments in boys.

Second, I also examine several proxies for the health of children. I examine whether a child has been sick in the last month with cough or fever. I find that children of matrilineal women are less likely to have been sick; this benefit is present for both male and female children. I leverage the anthropometric data in the DHS, which includes height-for-age z-scores for children under five. I construct a measure of stunting – when an individual is two standard deviations below

the median height-for-age – which is an indicator of chronic malnutrition. I find that matrilineal girls in particular are less likely to be stunted. The DHS results are robust to alternative RD specifications and bandwidths. Overall, the DHS results suggest that the structure of the kin network has important implications for the well-being of women and children.

I then turn to my lab-in-the-field data to ask if, as anthropologists hypothesized, matrilineal kinship affects cooperation within the household. Matrilineal kinship, by improving women's autonomy and empowerment, may actually decrease cooperation between spouses. Matrilineal women in particular may be able to choose to be less cooperative with spouses because their husbands have less control. I collected original survey and experimental data in the Democratic Republic of the Congo (DRC) to test this mechanism. The survey and experimental data are from 320 matrilineal and patrilineal couples in the DRC. The DRC is an ideal place to examine the effects of matrilineal kinship because it is intersected by the "matrilineal belt," which describes the distribution of matrilineal ethnic groups across the center of Africa (see Figure 1). The data were collected in a major city in the south of the DRC, where there are many matrilineal and patrilineal ethnic groups. The 640 individuals in the sample represent 28 ethnic groups and come from villages along the border of the matrilineal belt, but they share a common institutional setting presently.

I use laboratory experiments to measure cooperation in the household. I find that matrilineal individuals – both men and women – cooperate less with their spouses in a household public goods game. To overcome the challenge posed by a non-anonymous public goods game, the experiment is designed so that there is variation in how easy it is to hide income from the other player. Differential matrilineal cooperation is driven by these opportunities to hide income. Matrilineal women are particularly responsive to these opportunities to hide income. As a form of a falsification exercise, participants also complete a public goods game with a stranger of the opposite sex. When partnered with a stranger of the opposite sex, matrilineal women no longer differentially respond to opportunities to hide income, suggesting that the differential cooperation of matrilineal women is behavior specific to being paired with a spouse and not more general to cooperation with a stranger of the opposite sex. The experimental results are robust to an RD specification, to the inclusion of geographic and cultural controls, and to the inclusion of other potential confounding variables such as altruism towards the spouse, time and risk preferences, and education controls. In an environment where husbands do not have as much

control over their spouses nor do women face the same threat of domestic violence, women can choose not to cooperate with their spouse and to simultaneously retain control over the money in the experiment.

This paper is related to several literatures in economics. First, there is a growing literature on understanding the importance of social structures for economic development (Greif, 1994, 2006; Alesina and Giuliano, 2014; Bahrami-Rad et al., 2022). There is evidence that kinship systems affect the scope and extent of cooperation and have an important evolutionary role of sustaining cooperation at the group level (Richerson et al., 2003; Henrich, 2015; McNamara and Henrich, 2017; Greif and Tabellini, 2017; Enke, 2019). Despite the mounting evidence on how kin networks and other social structures have important implications for cooperation, we have little evidence on how kinship systems affect outcomes within the household, an integral unit for cooperation and the unit that is generally the focus for economists. For example, Bau (2021) demonstrates that traditional residence practices (e.g. matrilocal relative to patrilocal residence) affect investment in children and response to policies in Indonesia and Ghana.

I contribute to this literature by showing that broader kinship structure, e.g. matrilineal relative to patrilineal kinship, affects incentives for cooperation within the household. This paper is the first to implement a geographic regression discontinuity design along the matrilineal belt – which has the highest density of matrilineal kinship – and to present causal evidence that matrilineal women have greater autonomy, experience less domestic violence, and are better able to invest in their children. Building on recent efforts to expand cultural data and combining lab-in-the-field methods with work in historical economics (Henrich, 2020; Lowes, 2023), I collect novel experimental data on cooperation; I find that matrilineal women in particular are less cooperative with their spouses.

The paper is also related to a large literature on the cultural determinants of the status of women (see e.g. Giuliano (2017) for a review). Large gaps in outcomes between men and women exist in many developing countries. Women often have less education, poorer health, limited autonomy (Bertrand, 2010; Jayachandran, 2015; Anderson, 2018), and are subjected to physical and emotional violence (Bloch and Rao, 2002; Bobonis et al., 2013). There is a literature that examines the effects of cultural practices, such as bride price or endogamy, for women's well-being (Alesina, Giuliano and Nunn, 2013; Ashraf, Bau, Nunn and Voena, 2020; La Ferrara, 2006; La Ferrara and Milazzo, 2017; Rossi, 2019) and the origins of these practices (BenYishay et al.,

2017; Becker, 2021). For example, Alesina et al. (2020) examine the correlation between cultural traits, such as women's participation in agriculture and residence after marriage, and violence against women.

In this paper I focus on the effects of kinship structure – and examine one of key sources of variation in kinship structure – whether lineage is traced through women and men. Anthropologists have long studied the variation in kinship systems and the implications of these systems for societal outcomes, but economists are just beginning to understand how kinship structure affects outcomes for women (Gneezy et al., 2009; Lowes, 2021; Gottlieb and Robinson, 2021) and children (Jayachandran and Pande, 2017). In work from India, Jayachandran and Pande (2017) find that the height differential between first sons and other children is mitigated in India's matrilineal societies. My paper builds on these literatures by providing causal evidence that matrilineal kinship – by altering women's support and limiting a husband's authority over them – improves outcomes for women and children.

Finally, the paper also speaks to a growing literature on the evolution of cultural systems (e.g. Cavalli-Sforza and Feldman (1981); Boyd and Richerson (1985); Giuliano and Nunn (2021); Bisin and Verdier (2017); Nunn (2021)). Anthropologists have long puzzled over the stability of matrilineal systems. From an evolutionary perspective, the "matrilineal puzzle" is to understand how matrilineal systems continue to persist relative to alternative systems (i.e. patrilineal kinship) if they undermine cooperation in the household, an integral unit of cooperation. However, given that matrilineal systems confer benefits to women and children, this may help resolve the so-called "puzzle" of matrilineal kinship.

2. Matrilineal Kinship

In matrilineal kinship systems, individuals trace lineage and descent through women. Biologically, an individual is related to family on both the mother's side and the father's side; however, in matrilineal systems individuals are considered kin only if they share a common female ancestor. Figure 2a illustrates the structure of matrilineal kinship systems. In the diagram, men are represented by triangles and women are represented by circles. Membership in the same matrilineal group is denoted with red. Children are in the same matrilineal group as their mothers. Likewise, a mother is in the same matrilineal group as her male and female siblings. In many matrilineal societies, the mother's brother has an important role relative to his sister's

children. His inheritance and lineage will be traced through his sister's children, and he has obligations to financially support her children. Importantly, husband and wife do not share the same lineage – for all married couples one spouse is red and the other spouse is blue.

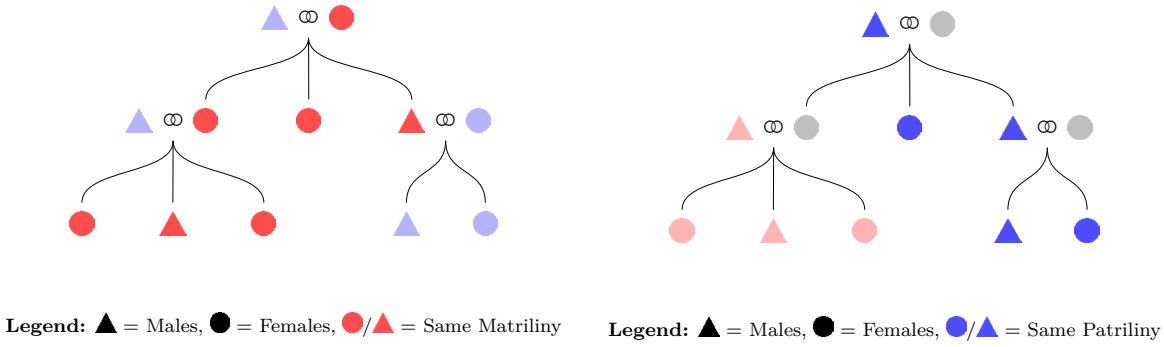
Figure 2b presents the structure of patrilineal kinship. Children are in the same group as their father, as denoted in blue. In a patrilineal society, rather than maintaining strong ties with her own lineage, a woman is effectively incorporated into the lineage of her husband upon marriage. This is because once she is married, she is not relevant for determining descent and inheritance for her lineage. This is illustrated in the patrilineal kinship diagram by the married daughter denoted in grey, while the unmarried daughter shares the same color as her father.

Matrilineal systems are not symmetric with patrilineal systems. First, in both matrilineal and patrilineal kinship systems, men often retain positions of power and authority within the kin group. This is commonly known as patriarchy. Thus, in a patrilineal society, there is concordance between who determines group membership and who holds political authority, while in a matrilineal society there is not.[3] Second, in matrilineal systems, husbands and wives maintain strong allegiances with their own kin group. In patrilineal systems, a wife is effectively incorporated into the lineage of her husband because she is not relevant to her kin group for determination of lineage or inheritance, reducing her ability to rely on her own kin group in the case of separation or conflict.

The asymmetries between matrilineal and patrilineal kinship systems highlight how men and women in matrilineal groups have different roles and obligations to their spouses and to their broader kin group relative to patrilineal societies. Specifically, the role of women is altered in matrilineal societies. Although matrilineal societies are not matriarchal, women are key for determining descent and have greater support from their kin network relative to patrilineal women. Therefore, they may have an improved outside option relative to patrilineal women. Additionally, the obligations men and women have to their extended kin network differ across matrilineal and patrilineal societies. A husband in a matrilineal society has allegiances to his sisters, whose children he must support because they are his heirs; likewise, a wife has allegiances to her brother, who provides her and her children with support. These relative differences in roles and obligations may have important implications for spousal cooperation and the well-being of women (Radcliffe-Brown, 1950; Gluckman, 1963; Richards, 1950; Douglas, 1969).

[3]Matrilineal kinship is not synonymous with *matriarchy*, in which women have political authority.

Figure 2: Diagram of Kinship Systems



(a) Matrilineal Kinship

(b) Patrilineal Kinship

The kinship groups defined by matrilineal or patrilineal systems are often important in sub-Saharan Africa. They form a basic political unit in which members recognize each other as kin and often have certain obligations toward each other (Fox, 1967). For example, members of the same matrilineal group may share land and may contribute to bride price payments for lineage members. They may also provide financial support in the form of school fees or burial payments. Thus, membership in a matrilineal or patrilineal society determines your obligations and privileges relative to your kin group.

Work in anthropology has highlighted that matrilineal systems create "conflicting allegiances" within the household (Fox, 1967). This is because a husband in a matrilineal society supports his sisters, and a wife receives support from her brothers. Additionally, matrilineal systems reduce men's authority over their spouses because a woman's children belong to her lineage, and it is therefore easier to leave a husband that is mistreating them. Children in a matrilineal society may increase a woman's outside option and increase her relative bargaining power. A large literature on the "matrilineal puzzle" argues that it is puzzling that matrilineal systems continue to exist because they undermine cooperation within the nuclear household (Radcliffe-Brown, 1950; Gluckman, 1963; Richards, 1950; Douglas, 1969).

The Ethnographic Atlas is a data set compiled by George Murdock that documents the practices and customs of various societies across the world (Murdock, 1967). Of the 1267 societies in the Ethnographic Atlas, 12 percent are matrilineal (while 46 percent are patrilineal). Within sub-Saharan Africa, 15 percent of the 527 societies in the Ethnographic Atlas are matrilineal and 70 percent are patrilineal. The vast majority of these matrilineal societies are distributed across

the center of Africa in the so called "matrilineal belt" (Richards, 1950, p.207). The matrilineal belt intersects present day Angola, Republic of Congo, DRC, Gabon, Malawi, Mozambique, Namibia, Tanzania and Zambia. Figure 1 illustrates the matrilineal belt across Africa, with matrilineal groups denoted in blue, patrilineal groups denoted in green, and bilateral groups in red. For more information on the historical development and spread of matrilineal kinship systems in sub-Saharan Africa and for a discussion of the work in anthropology on the effects of matrilineal kinship, see Appendix A.

Historically, matrilineal kinship systems are correlated with other cultural traits. Table 1 shows some of the traits that are correlated with matrilineal kinship within Africa in the Ethnographic Atlas. The table presents geographic traits and cultural traits that other work in economics has shown to be important for development and for women, including: Tsetse fly suitability, malaria suitability, bride price, residence after marriage, polygyny, female participation in agriculture, reliance on animal husbandry, use of the plough, and jurisdictional hierarchy (Alsan, 2015; Ashraf et al., 2020; Bau, 2021; Rossi, 2019; Becker, 2021; Michalopoulos et al., 2019; Alesina et al., 2013; Michalopoulos and Papaioannou, 2013). The first three columns present the results for all groups in the Ethnographic Atlas. The last three columns present the results for the ethnic groups represented in the geographic regression discontinuity sample – e.g for those adjacent groups that differ in whether they practice matrilineal or patrilineal kinship.

Matrilineal relative to patrilineal groups are fairly balanced on geographic characteristics in the full EA sample. One exception is Tsetse fly suitability; in the full EA sample matrilineal areas are more Tsetse fly suitable. However, once the analysis restricts to the ethnicity pair sample – i.e. contiguous ethnic groups that differ in their kinship structure, matrilineal areas are no longer differentially more suitable for the Tsetse fly. However, all analyses will control for geographic covariates.

Matrilineal kinship is also correlated with different cultural characteristics. For example, it is correlated with *matrilocal* residence patterns, which is when a couple lives in the same village as the bride's mother's kin group.[4] While some matrilineal groups practice matrilocality (see Appendix Figure A2), many practice a form of residence in which the couple lives with the

[4]There are many potential living arrangements after marriage. In *matrilocal* (or *uxorilocal*) groups, couples live in the same village as the bride's mother's group. In *avunculocal* residence, the couple lives in the village of the husband's maternal uncle. In *patrilocal* (or *virilocal*) groups, couples live in the same village as the groom's father's group. In *natolocal* groups couples stay in their natal homes on marriage, and in *neolocal* groups they establish a new residence upon marriage (Fox, 1967).

husband's family (e.g. with the household of the husband's maternal uncle or with his family more generally). In the full set of EA groups, matrilineal groups are less likely to be polygynous; have more complex settlements; are more likely to have women participate in agriculture; are less likely to depend on animal husbandry; and have greater exposure to the slave trade. While matrilineal and patrilineal groups are more balanced on these traits in the ethnicity pair sample, there remain significant differences in matrilocal residence, polygyny, and dependence on animal husbandry. Given that these three cultural variables remain unbalanced in the ethnicity pair sample, I will control for them in the empirical analysis.

Table 1: Geographic and Cultural Characteristics By Kinship Structure

	All Ethnic Groups in EA			*Ethnicity Pair Sample*		
	Matrilineal	Patrilineal	SE	Matrilineal	Patrilineal	SE
	(1)	(2)	(3)	(4)	(5)	(6)
Geographic Variables:						
Average Temperature	24.304	24.295	0.320	24.087	24.623	0.490
Average Precipitation	93.137	88.086	5.348	95.909	95.248	7.583
Soil Suitability	0.310	0.330	0.025	0.360	0.342	0.043
Malaria Suitability	14.398	15.715	0.910	14.613	15.820	1.753
Tsetse Fly Suitability	0.481	0.430	0.015 ***	0.457	0.451	0.027
Cultural Variables:						
Bride Price	0.846	0.913	0.032	0.864	0.933	0.055
Matrilocal	0.128	0.000	0.013 ***	0.114	0.000	0.037 ***
Polygynous	0.684	0.810	0.042 **	0.591	0.933	0.069 ***
Level of Jurisdictional Hierarchy, 1-5	1.949	2.061	0.116	1.955	1.773	0.198
Settlement Complexity, 1-8	6.115	5.543	0.208 ***	5.976	6.354	0.304
Dependence on Agriculture, 1-9	5.795	5.534	0.185	6.000	6.067	0.277
Women's Participation in Agriculture, 1-6	4.281	3.854	0.179 ***	4.286	3.738	0.332
Dependence on Animal Husbandry, 1-9	1.675	2.672	0.185 ***	1.591	2.053	0.278 *
Presence of Plough, 0/1	0.019	0.120	0.031 ***	0.000	0.000	0.000
Slave Trade (ln(1+Atlantic and Indian))	3.915	2.296	0.374 ***	4.447	3.761	0.813
Moral High God, 0/1	0.302	0.416	0.078	0.150	0.267	0.121
Groups	117	584		44	75	

Notes: This table compares mean values of geographic and cultural variables at the ethnic group level. The first three columns use the full sample of groups in the Ethnographic Atlas, while the last three use the ethnic groups included in the ethnic-pair regression discontinuity sample. Columns 3 and 6 show the standard error and significance level from t-test comparisons of the mean values. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

3. Data

3.1. Demographic and Health Surveys Data

To examine outcomes for women and children, I use data from the Demographic and Health Surveys (DHS) for sub-Saharan Africa harmonized by IPUMS (Boyle et al., 2022). I combine DHS data from all DHS survey waves for which there are geo-located cluster data and variation in kinship structure. The analysis data set represents 14 sub-Saharan African countries and over 50 survey-waves. For more information on the countries and survey waves included in the analysis, see Appendix Table B1.

From the DHS surveys, I use several variables that proxy for women's well-being and autonomy. First, I examine domestic violence outcomes. These data are collected from a random sub-sample of women interviewed in the DHS. I use survey questions on whether a woman views domestic violence as acceptable in different scenarios, whether a woman has experienced domestic violence, and whether domestic violence has resulted in physical harm. Second, I also use questions on autonomy in decision making. These questions are administered to random sub-sample of women. They ask women who has the final say in decisions like seeking health care or visiting family members. Finally, I also examine questions related to child well-being, including years of education, if the child has been sick recently, and stunting. See Appendix B.1 for variable definitions.

3.2. Cultural Variables

I match data from the Ethnographic Atlas (Murdock, 1967) with the Murdock ethnic group boundary map (Murdock, 1959). The Ethnographic Atlas has a wide variety of cultural data on ethnic groups, including kinship structure, residence after marriage, types of payments made at marriage, reliance on animal husbandry, and levels of jurisdictional hierarchy. Note, the EA does not map one-to-one to the Murdock map. I therefore construct a new and easily replicable matching strategy that takes advantage of the Murdock cultural groups outlined in the index of (Murdock, 1967). This allows me to match Murdock map groups with culturally proximate EA groups when there is not an exact match between the EA and the Murdock Map.[5]

3.3. Fieldwork

I also collect original experimental and survey data from married couples who reside along the matrilineal belt to explore implications for cooperation in the household. Data for the project were collected in 2015 in Kananga, the capital of Kasai Central province in the DRC. Kananga is an ideal setting for this study for several reasons. The DRC is intersected by the matrilineal belt. Within the country, there are many matrilineal and patrilineal ethnic groups. Kananga lies on the boundary between matrilineal and patrilineal groups. By collecting data in a city, rather than

[5]Groups are matched between the EA and Murdock map as follows. First, I search for an exact name match if possible. Second, if there is no exact name match, I assign EA data for group that shares same cultural index code. If there is still no match, I assign EA data for an ethnic group in same cultural cluster. Finally, if there are no matches from the three previous steps, I assign the EA data from the most physically proximate group.

in smaller villages, I can ensure that couples are in a similar institutional environment today (as suggested in Fernández (2011) and Fernández and Fogli (2010) and as implemented in e.g. Lowes et al. (2017)). It also means I have access to many matrilineal and patrilineal groups, rather than just a single group from each. The final sample includes 320 married couples (640 individuals) from 28 different ethnic groups. The surveys and experiments are described in detail in Section 6.

4. Empirical Strategy

I examine the effects of matrilineal kinship using OLS and a geographic regression discontinuity design. To examine the effect of matrilineal kinship on the outcomes of interest, I first estimate the following OLS specification:

$$y_{ive} = \gamma Matrilineal_{e(v)} + \mathbf{X_i'}\boldsymbol{\beta} + \mathbf{X_v'}\boldsymbol{\Lambda} + \mathbf{X_e'}\boldsymbol{\Gamma} + \alpha_{c(v)} + \mu_t + \varepsilon_{ive} \tag{1}$$

where y_{ive} is the outcome of interest for individual i residing in DHS cluster v within the homeland of ethnic group e; $Matrilineal_{e(v)}$ is an indicator equal to 1 if a village v is within the homeland of an ethnic group e that practices matrilineal descent. $\mathbf{X_i}$ is a vector of covariates for individual i including age, age squared, and an urban indicator variable; $\mathbf{X_v}$ is a vector of geographic covariates for DHS cluster v; and $\mathbf{X_e}$ is a vector of ethnicity-level cultural covariates for ethnic group e. I also include country fixed effects, $\alpha_{c(v)}$, and fixed effects for the DHS survey year, μ_t. ε_{ive} is the error term. I present two sets of standard errors, clustered at the ethnic group level and clustered at the DHS cluster level. The coefficient of interest is γ, the effect of residing in a DHS cluster in an ethnic group that practices matrilineal kinship relative to patrilineal kinship.

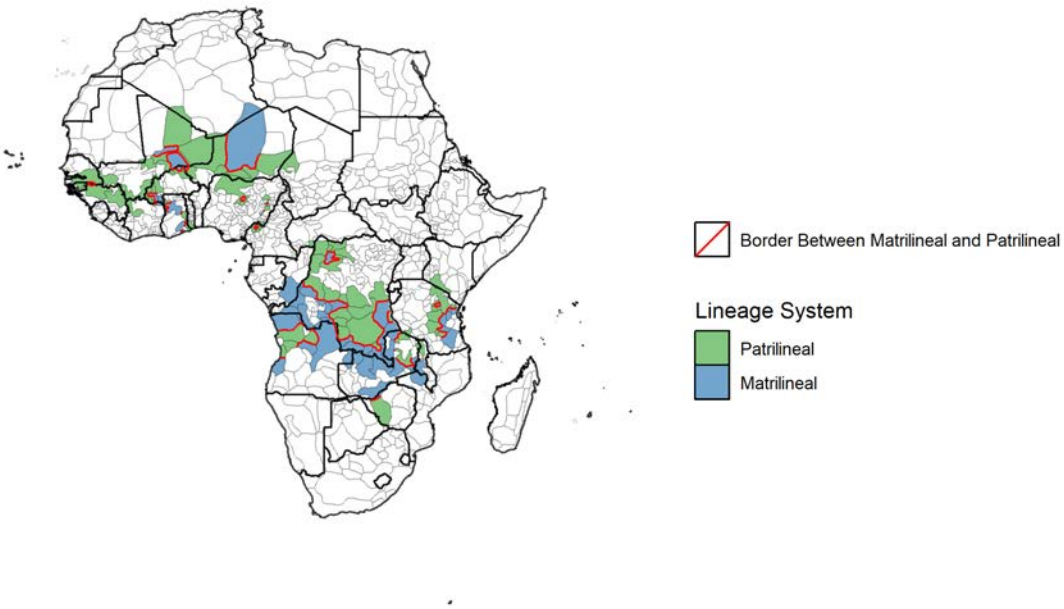
Geographic controls at the DHS cluster level include mean annual temperature, mean annual precipitation, soil suitability, malaria suitability, and Tsetse fly suitability. Cultural variables are from the Ethnographic Atlas and vary at the ethnic group level. These include controls for those cultural characteristics that are unbalanced in the ethnicity pair sample (see Table 1) and which may affect the outcomes of interest, e.g. matrilocal residence, polygyny, and reliance on animal husbandry (see e.g., Bau, 2021; Rossi, 2019; Becker, 2021). Additionally, I control for whether there is an exact match between the EA and the Murdock map and the log of years since an ethnic group was observed in the EA to account for any differences between groups that were directly observed in the EA and differences due to timing of the observation.

One concern with specification (1) is that the matrilineal indicator variable is capturing the effect of something other than the practice of matrilineal kinship. First, omitted variable bias may be an issue. Matrilineal kinship may be correlated both historically and currently with many traits. For example, matrilineal systems may be more likely in certain ecological environments. Second, reverse causality may also be an issue if groups where women had more autonomy were more likely to adopt matrilineal kinship systems. In that case, a matrilineal indicator is capturing the effect of having this initially more favorable view toward women. To help mitigate these concerns, the OLS specification adds the geographic and cultural controls described above. I additionally include a specification with LASSO-selected controls from the full set of possible control variables (Belloni et al., 2014).

To further address identification concerns, I estimate a geographic regression discontinuity specification, taking advantage of ethnic groups that border one another but differ in their practice of matrilineal or patrilineal kinship. See Figure 3 for a map of ethnic groups, kinship practices, and borders between groups that differ in their kinship practice. Thus, I identify all ethnic pairs for which a matrilineal group borders a patrilineal group and for which there are DHS data, and estimate a geographic RD using this ethnic pair sample.

The intuition behind the geographic RD specification is that the matrilineal belt borders are

Figure 3: Map of Ethnic Pairs in Regression Discontinuity Sample



determined by the borders of multiple matrilineal and patrilineal ethnic groups. The boundaries between these multiple ethnic groups are arbitrary, and along the border these areas are quite similar: they share similar geography, history, and culture. By identifying ethnic pairs, I am able to include an ethnicity pair fixed effect in my geographic RD specification. A similar strategy is followed in Moscona et al. (2020). The geographic RD specification is:

$$y_{ivp} = \omega_p + \gamma Matrilineal_{e(v)} + f(location_{ivp}) + \mathbf{X_i'}\boldsymbol{\beta} + \mathbf{X_v'}\boldsymbol{\Lambda} + \mathbf{X_e'}\boldsymbol{\Gamma} + \mu_t + \epsilon_{ivp} \tag{2}$$

where y_{ivp} is the outcome of interest for individual i from DHS cluster v in ethnic pair p. ω_p is an ethnicity pair fixed effect; ethnic pairs are adjacent ethnic groups in which one group practices matrilineal kinship and the other group practices patrilineal kinship. $Matrilineal_{e(v)}$ is an indicator equal to 1 if the individual is in a DHS cluster v on the matrilineal side of the ethnic pair and equal to 0 otherwise. $f(location_{ivp})$ is the RD polynomial, which controls for a smooth function of the geographic location of DHS cluster v for ethnic pair p. $\mathbf{X_i}$, $\mathbf{X_v}$, $\mathbf{X_e}$, and μ_t are as defined above. ϵ_{ivp} is the error term.

In my baseline specification, I use latitude and longitude as the running variables and a local linear specification following the RD specifications in Dell (2010); Dell et al. (2018); Dell and Querubin (2018). As in the OLS analysis, I present standard errors clustered at the ethnic group level and the DHS cluster level. For the RD analysis, I restrict my sample to observations within 100 km of the ethnic pair border for a given ethnic pair, as this restricts the range in which unobservable parameters can vary at the border. The coefficient of interest is γ: the effect of originating from a village just inside a matrilineal ethnic group on the outcome of interest. Robustness to alternative RD specifications and bandwidths is presented in Appendix C.

The RD approach presented in equation (2) requires two identifying assumptions. The first assumption is that all relevant factors vary smoothly at the matrilineal belt border except treatment. This assumption is needed to ensure that individuals located on one side of the matrilineal belt are a reasonable counterfactual for those located on the other side of the matrilineal belt. The second important assumption for this regression discontinuity approach is that there was no selective sorting across the RD threshold. The assumption would be violated if, for example, particular types of individuals sorted from the matrilineal side of the border to the patrilineal side of the border. See Appendix Table C1 for balance on the geographic variables at the DHS cluster level, as well as the associated RD coefficient for the geographic variables. The benefit of

the ethnic pair strategy is that it estimates the effect of matrilineal kinship among two contiguous groups. This makes balance on geographic and cultural variables more likely. Nevertheless, to address any imbalances, I control for all of the geographic variables at the DHS cluster level and control for unbalanced cultural variables at the ethnic group level. Note, cultural variables may not be good controls, as other cultural traits likely co-evolve alongside kinship structure.

5. Implications of Matrilineal Kinship for the Well-Being of Women and Children

In matrilineal kinship systems, husbands may have less authority over their wives and women may receive more support from their extended family. This may affect the cost of domestic violence, a woman's outside option, or a woman's incentives and ability to invest in her children. It is therefore natural to examine whether matrilineal women and children fare better. I examine several sets of outcomes, including: views on if domestic violence is appropriate, actual domestic violence, autonomy in decision making, and education and health outcomes for children. Robustness to alternative RD specifications and bandwidths is presented in Appendix C.

5.1. Outcomes for Women

Table 2 presents the OLS and RD specifications examining domestic violence outcomes. The first three columns present the OLS estimates; the last three columns present the RD estimates. Columns 1 and 4 present the results with the baseline controls and geographic controls. Columns 2 and 5 add the cultural controls, and columns 3 and 6 use LASSO methods to select from the full set of possible controls.

In Panel A, I examine the relationship between matrilineal kinship and whether the respondent views domestic violence as justified. I construct an index with all of the questions related to whether domestic violence is justified; larger values indicate domestic violence is justified in more scenarios. The scenarios include when a woman argues with her husband, burns the food, goes out without permission, refuses sex, or neglects the children. Respondents tend to report that domestic violence is justified in about a third of the situations. Matrilineal women are significantly less likely to report that domestic violence is justified in both the OLS and RD specifications.

Panel B presents the results for experienced domestic violence, which is the mean of whether a woman has experienced less severe and more severe forms of domestic violence. Matrilineal women are also less likely to have experienced domestic violence. Finally, in Panel C, matrilineal

women are also less likely to experience physical harm as a result of the domestic violence, such as bruising or an injury. These results paint a consistent picture: matrilineal women are less accepting of and less subjected to domestic violence.

Table 3 presents the results examining the relationship between matrilineal kinship and women's autonomy in decision making. The DHS asks various questions on the extent to which women have the final say on visits to family or relatives, healthcare, making large household purchases, and spending a woman's earnings. I harmonize these variables so that lower values indicate less autonomy (i.e., a value of 1 means a woman's husband alone decides or another person decides), intermediate values indicate some autonomy (i.e., a value of 2 means a woman and her husband decide together) and higher values indicate full autonomy (i.e., a value of 3 means a woman alone decides).

Panel A presents the results with an index that averages the values to these four questions. For the OLS results (columns 1 to 3), the results are insignificant and close to zero. However, for the RD specification, matrilineal women report greater autonomy in decision making. Panels B through E present the results separately for each of the questions in the index. The positive and significant index results seem to be primarily driven by matrilineal women's ability to visit their families and to make healthcare decisions, which are positive and significant in the RD specification (Panels B and C). However, there is some indication in the RD specification that matrilineal women are also more likely to have a say in household purchases and a say in how their earnings are used (Panels D and E). Appendix C.2 presents the robustness to alternative RD bandwidths. The index results are significant for smaller bandwidths, but are insignificant and close to zero for wider bandwidths, which may explain why the OLS results, which include all observations for an ethnic pair, are insignificant. However, for the decision to visit family members, the results are positive and significant for the full range of bandwidths from 50 kilometers to 300 kilometers. This suggests that matrilineal women have more autonomy in the ability to visit family members.

5.2. Outcomes for Children

Matrilineal kinship may affect a woman's ability to invest in her children. This may be because she has greater support from her family, who provide financial support, or because she has control over resources to invest in her children. I therefore examine education and health outcomes

Table 2: Matrilineal Kinship and Domestic Violence

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Domestic Violence Justified Index, [0-1]					
Matrilineal	−0.043	−0.025	−0.024	−0.025	−0.027	−0.024
	[0.014]***	[0.017]	[0.016]	[0.009]***	[0.011]**	[0.011]**
	(0.005)***	(0.006)***	(0.006)***	(0.009)***	(0.012)**	(0.012)**
Observations	413,554	413,554	413,554	85,146	85,146	85,146
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,626	14,626	14,626	2,653	2,653	2,653
Mean Dep. Var.	0.325	0.325	0.325	0.346	0.346	0.346
	Panel B: Experienced Domestic Violence Index, [0-1]					
Matrilineal	−0.037	−0.039	−0.036	−0.022	−0.040	−0.034
	[0.011]***	[0.013]***	[0.012]***	[0.008]***	[0.010]***	[0.011]***
	(0.005)***	(0.006)***	(0.006)***	(0.008)***	(0.012)***	(0.012)***
Observations	123,755	123,755	123,755	27,447	27,447	27,447
Ethnic Groups	328	328	328	105	105	105
DHS Clusters	10,142	10,142	10,142	1,766	1,766	1,766
Mean Dep. Var.	0.165	0.165	0.165	0.190	0.190	0.190
	Panel C: Experienced Physical Harm, [0/1]					
Matrilineal	−0.038	−0.046	−0.054	−0.021	−0.026	−0.020
	[0.015]**	[0.013]***	[0.014]***	[0.009]**	[0.009]***	[0.009]**
	(0.005)***	(0.006)***	(0.006)***	(0.009)**	(0.014)*	(0.013)*
Observations	121,200	121,200	121,200	26,524	26,524	26,524
Ethnic Groups	325	325	325	105	105	105
DHS Clusters	9,874	9,874	9,874	1,701	1,701	1,701
Mean Dep. Var.	0.097	0.097	0.097	0.116	0.116	0.116
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include age, age squared, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Domestic Violence Justified Index* is a an average of yes or no questions that ask if domestic violence is justified in different scenarios. The scenarios are: a woman argues with her husband, a woman burns the food, a woman goes out without her husband's permission, a woman refuses sex, or a woman neglects the children. *Experienced Domestic Violence Index* is a mean of two indicators of whether the woman has ever experienced less severe or severe domestic violence. *Experienced Physical Harm* is an indicator for whether domestic violence resulted in physical injury. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3: Matrilineal Kinship and Women's Decision Making

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Autonomy in Decision Making Index, [1-3]					
Matrilineal	0.005	−0.003	−0.005	0.036	0.077	0.071
	[0.021]	[0.017]	[0.016]	[0.014]**	[0.013]***	[0.013]***
	(0.007)	(0.009)	(0.009)	(0.014)**	(0.018)***	(0.018)***
Observations	328,081	328,081	328,081	68,930	68,930	68,930
Ethnic Groups	355	355	355	112	112	112
DHS Clusters	15,351	15,351	15,351	2,888	2,888	2,888
Mean Dep. Var.	1.674	1.674	1.674	1.690	1.690	1.690
	Panel B: Final Say on Visit Family, [1-3]					
Matrilineal	0.046	0.023	0.035	0.075	0.112	0.126
	[0.023]**	[0.022]	[0.020]*	[0.017]***	[0.021]***	[0.027]***
	(0.010)***	(0.012)*	(0.012)*	(0.023)***	(0.029)***	(0.033)***
Observations	318,188	318,188	318,188	66,068	66,068	66,068
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,626	14,626	14,626	2,653	2,653	2,653
Mean Dep. Var.	1.665	1.665	1.665	1.711	1.711	1.711
	Panel C: Final Say on Healthcare, [1-3]					
Matrilineal	−0.010	−0.011	0.003	0.036	0.102	0.103
	[0.029]	[0.022]	[0.021]	[0.021]*	[0.019]***	[0.025]***
	(0.009)	(0.011)	(0.011)	(0.014)**	(0.019)***	(0.018)***
Observations	319,027	319,027	319,027	66,169	66,169	66,169
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,626	14,626	14,626	2,653	2,653	2,653
Mean Dep. Var.	1.529	1.529	1.529	1.541	1.541	1.541
	Panel D: Final Say on Large Household Purchases, [1-3]					
Matrilineal	0.006	0.004	0.009	0.021	0.045	0.044
	[0.017]	[0.019]	[0.019]	[0.018]	[0.017]***	[0.016]***
	(0.008)	(0.010)	(0.010)	(0.015)	(0.019)**	(0.018)**
Observations	318,013	318,013	318,013	66,013	66,013	66,013
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,626	14,626	14,626	2,653	2,653	2,653
Mean Dep. Var.	1.460	1.460	1.460	1.469	1.469	1.469
	Panel E: Final Say on Woman's Earnings, [1-3]					
Matrilineal	−0.005	−0.025	−0.041	0.013	0.083	0.068
	[0.036]	[0.026]	[0.027]	[0.018]	[0.015]***	[0.017]***
	(0.013)	(0.015)*	(0.015)*	(0.021)	(0.025)***	(0.025)***
Observations	150,397	150,397	150,397	30,885	30,885	30,885
Ethnic Groups	353	353	353	112	112	112
DHS Clusters	14,656	14,656	14,656	2,749	2,749	2,749
Mean Dep. Var.	2.516	2.516	2.516	2.423	2.423	2.423
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include age, age squared, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Autonomy in Decision Making Index* varies from 1 to 3 and is increasing in the woman's control in the choice. It averages the responses to questions on whether a woman has the final say in: big household purchases, spending her earnings, deciding to visit family, and deciding on health care. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

for children of matrilineal women. I further estimate the effects by gender of the child. The only difference between the specification for women and the analysis of child outcomes is that I include child age fixed effects, rather than controlling for age and age squared.

Table 4 presents the results examining years of education. The data are for all school-aged children (between the ages of 7 and 18). First, Panel A presents the effect of matrilineal kinship for both girl and boy children. Matrilineal children have fewer years of education; this is consistent with the fact that matrilineal individuals are also less wealthy (see Panel A of Appendix Table C2). However, Panel B includes a female and a matrilineal by female interaction term. The results suggest that while matrilineal children on average fare worse relative to patrilineal children in terms of educational attainment, matrilineal kinship closes the education gap between male and female children. This is important because while many societies have a gap between male and female educational attainment, female children receive equal investment in matrilineal societies.

Table 5 presents results for various indicators of child health. These data are collected for children under five. First, Panel A asks if a child has been sick recently with a cough or a fever. Matrilineal children are significantly less likely to have been sick. I also examine how matrilineal kinship affects the incidence of moderate or severe stunting. Stunting is considered an indicator of chronic malnutrition, and thus, it is a good proxy for a child's health. A height-for-age z-score (HAZ) score of less than -2 is considered to represent moderate chronic malnutrition, and a HAZ score of less than -3 is considered to represent severe chronic malnutrition. In the analysis, stunting is an indicator variable equal to one if the child has a HAZ score of less than -2. For the full sample, 38% of children are stunted, and thus suffer from some chronic malnutrition. Panel B presents the results examining all children under five. On average, there is no difference in stunting rates across matrilineal and patrilineal children. Panel C presents the results by the gender of the child. Female children tend to exhibit less stunting. Matrilineal female children are even less likely to be stunted, though there is some indication that matrilineal male children are slightly more likely to be stunted.

Taken together, the results in Tables 4 and 5 suggest that matrilineal kinship may confer benefits on children, particularly female children. Though matrilineal individuals tend to be less educated, matrilineal kinship closes the gap between male and female children. Additionally, matrilineal children are less likely to have been sick and female children benefit from decreased stunting rates.

Table 4: Matrilineal Kinship and Child Education

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Years of Education (Children 7 to 18)					
Matrilineal	−0.098	−0.122	−0.141	−0.134	−0.127	−0.169
	[0.131]	[0.098]	[0.102]	[0.054]**	[0.064]**	[0.064]***
	(0.034)***	(0.041)***	(0.041)***	(0.060)**	(0.070)*	(0.070)*
Observations	933,471	933,471	933,471	189,585	189,585	189,585
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,015	17,015	17,015	3,254	3,254	3,254
Mean Dep. Var.	2.973	2.973	2.973	2.743	2.743	2.743
	Panel B: Years of Education (Children 7 to 18)					
Matrilineal	−0.306	−0.328	−0.347	−0.248	−0.243	−0.284
	[0.130]**	[0.102]***	[0.106]***	[0.087]***	[0.094]**	[0.086]***
	(0.034)***	(0.041)***	(0.041)***	(0.064)***	(0.072)***	(0.073)***
Female	−0.254	−0.254	−0.252	−0.280	−0.280	−0.280
	[0.054]***	[0.053]***	[0.053]***	[0.048]***	[0.048]***	[0.048]***
	(0.011)***	(0.011)***	(0.011)***	(0.025)***	(0.025)***	(0.025)***
Matrilineal × Female	0.398	0.397	0.396	0.222	0.224	0.223
	[0.071]***	[0.070]***	[0.071]***	[0.126]*	[0.126]*	[0.125]*
	(0.017)***	(0.017)***	(0.017)***	(0.046)***	(0.046)***	(0.046)***
Observations	933,471	933,471	933,471	189,585	189,585	189,585
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,015	17,015	17,015	3,254	3,254	3,254
Mean Dep. Var.	2.973	2.973	2.973	2.743	2.743	2.743
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include child age fixed effects, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Years of Education* is the number of years of education a child has completed. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

6. Testing Spousal Cooperation with Lab-in-the-Field Data

6.1. Conceptual Framework

Anthropologists had hypothesized that matrilineal kinship increases women's support from their kin and decreases a husband's control over his wife. Consistent with these hypotheses, I find that matrilineal women are less likely to believe domestic violence is justified and are less likely to experience domestic violence. Additionally, they exhibit greater autonomy in decision making – particularly around being able to visit their family.

Anthropologists had also hypothesized that precisely because matrilineal kinship decreases a husband's authority over his wife and creates stronger ties with a spouse's own kin group, that it

Table 5: Matrilineal Kinship and Child Health

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Child Sick Index (Children Under 5), [0-1]					
Matrilineal	−0.018	−0.011	−0.017	−0.007	−0.026	−0.021
	[0.009]**	[0.010]	[0.007]**	[0.005]	[0.007]***	[0.006]***
	(0.004)***	(0.005)**	(0.005)**	(0.007)	(0.010)***	(0.010)**
Observations	488,463	488,463	488,463	124,886	124,886	124,886
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,003	17,003	17,003	3,244	3,244	3,244
Mean Dep. Var.	0.228	0.228	0.228	0.244	0.244	0.244
	Panel B: Moderate or Severe Stunting (Children under 5), [0/1]					
Matrilineal	0.008	0.001	0.002	0.010	0.010	0.006
	[0.014]	[0.012]	[0.014]	[0.007]	[0.011]	[0.011]
	(0.006)	(0.007)	(0.007)	(0.010)	(0.014)	(0.014)
Observations	300,562	300,562	300,562	62,676	62,676	62,676
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,555	14,555	14,555	2,634	2,634	2,634
Mean Dep. Var.	0.381	0.381	0.381	0.415	0.415	0.415
	Panel C: Moderate or Severe Stunting (Children under 5), [0/1]					
Matrilineal	0.011	0.004	0.005	0.023	0.023	0.019
	[0.013]	[0.013]	[0.014]	[0.010]**	[0.013]*	[0.012]
	(0.007)*	(0.008)	(0.008)	(0.012)**	(0.015)	(0.015)
Female	−0.044	−0.045	−0.044	−0.030	−0.030	−0.030
	[0.003]***	[0.003]***	[0.003]***	[0.008]***	[0.008]***	[0.008]***
	(0.003)***	(0.003)***	(0.003)***	(0.007)***	(0.007)***	(0.007)***
Matrilineal × Female	−0.006	−0.005	−0.006	−0.027	−0.027	−0.026
	[0.006]	[0.006]	[0.006]	[0.015]*	[0.015]*	[0.015]*
	(0.005)	(0.005)	(0.005)	(0.013)**	(0.013)**	(0.013)**
Observations	300,562	300,562	300,562	62,676	62,676	62,676
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,555	14,555	14,555	2,634	2,634	2,634
Mean Dep. Var.	0.381	0.381	0.381	0.415	0.415	0.415
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include child age fixed effects, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Child Sick Index* is the average of two questions asking whether the child has had a cough or fever recently. *Moderate or Severe Stunting* is an indicator equal to 1 if the child has a height-for-age z-score of less than -2. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

may also lead to differences in spousal cooperation. Put differently, matrilineal kinship changes the relevant group with which an individual cooperates, de-emphasizing the nuclear household. Husband's have less authority over their wives, and thus are less able to enforce "cooperation". I turn to original experimental data to test the hypothesis that matrilineal kinship undermines spousal cooperation. I expect that matrilineal women in particular will be less likely to cooperate with their husbands.

6.2. Fieldwork Data

To test if matrilineal kinship affects cooperation within the household, I collect survey and experimental data from individuals who reside along the matrilineal belt. Individuals were selected for participation in the study using random sampling methods within the city of Kananga. Individuals that were randomly selected to participate in the study after an initial screening survey were revisited at their homes by a team consisting of one male and one female enumerator. The enumerators asked the husband and wife if they would like to participate in the study. Ultimately, 320 individuals from the screening survey were able to participate in the study, yielding a sample of 640 individuals.[6] For a summary of visits, see Appendix Table D1.

The final sample consists of 28 ethnic groups, 13 of which are matrilineal. The largest patrilineal groups represented in the sample are the Luluwa, Luntu, Luba, Tetela, Songe, Bindi and Dekese. The largest matrilineal groups represented in the sample are the Kuba, Sala, Mbala, Kete, Lele, Chokwe and Kongo. Thirty nine percent of the sample reported being from an ethnic group identified as matrilineal in the anthropological literature. The remaining individuals are from patrilineal groups. In 47 percent of the sample, patrilineal individuals were married to other patrilineal individuals. Twenty-five percent of the sample was in a fully matrilineal marriage (where both partners are from a matrilineal society) and 28 percent were in a mixed marriage, where one partner was of matrilineal descent and the other of patrilineal descent. See Appendix Table D2 for a list of ethnic groups in the sample.

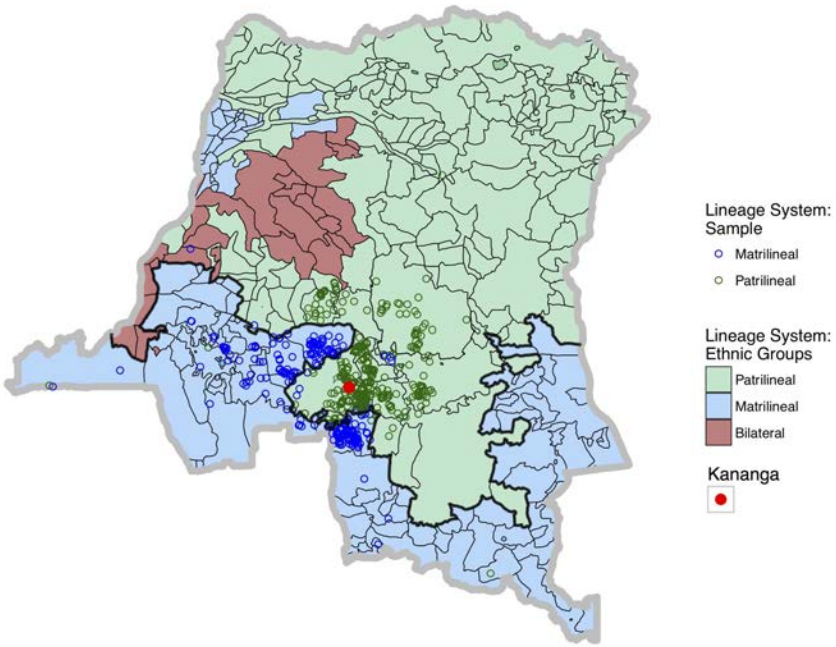
Figure 4 presents a map of the locations of the villages of origin (i.e. ancestral village) for the sample and the location of the field site, Kananga. The villages of origin are in blue for those who identify as from a matrilineal ethnic group and in green for those who identify as from a patrilineal ethnic group. The map also includes the delineation of the matrilineal belt, a border that separates matrilineal groups, which are in blue, from patrilineal groups, which are in green, as well as ethnic group boundaries digitized from Vansina (1966), who provides granular ethnic group boundaries and ethnographic data for the DRC. Note, I construct the matrilineal belt border by tracing the boundary between matrilineal and patrilineal ethnic groups, but this is

[6]The screening survey yielded a sampling frame from which a random subsample of patrilineal individuals and all eligible matrilineal individuals were invited to participate. Individuals were unable or ineligible to participate for a variety of reasons. The primary reason for not participating is that one spouse was traveling for an extended duration. Other reasons for not participating include: illness, death, a spouse who lives outside of Kananga, divorce, or inability to locate. Very few individuals refused to participate at all, and there was no differential refusal to participate based on matrilineal status.

not an actual physical boundary.

Individuals from matrilineal and patrilineal ethnic groups may vary on important dimensions. Therefore, Appendix Table D3 presents basic summary statistics on the sample respondents broken down by matrilineal and patrilineal and by sex. On average, the patrilineal sample is slightly older than the matrilineal sample. Patrilineal individuals have been married slightly more times, though there is no difference in the number of current wives across matrilineal and patrilineal individuals. Virtually everyone in the sample reports having paid a bride price upon marriage. One of the primary differences between matrilineal and patrilineal individuals in the sample is years of education. Matrilineal individuals have on average 11 years of education relative to 9 years of education for patrilineal individuals. There are no significant differences in age at which they married their spouse, current employment status, or weekly income. Matrilineal women are more likely to report having access to some form of savings.

Figure 4: Matrilineal Belt, Ethnic Group Boundaries, and Villages of Origin for Kananga Sample



6.3. Validating Outcomes in Kananga Sample

To validate that we observe similar patterns in the Kananga sample as in the DHS sample, I present the OLS and RD results using analogous outcomes from survey data from the Kananga sample and the same set of geographic, cultural, and LASSO selected controls as in the full DHS sample. I examine whether domestic violence is considered justified, women's autonomy in decision making, children's education outcomes, and whether a child has been sick in the last month. Note, the IRB did not permit me to ask questions related to actual domestic violence. The results from the OLS and RD specifications for the Kananga sample are presented in Appendix Table D4. Reassuringly, I observe similar patterns in the Kananga sample as I do in the broader sample, though the results are less precisely estimated in this smaller sample. See Appendix Section D.2 for additional details on the estimating equations for the Kananga sample.

6.4. Experimental Design

Couples were visited at their homes three different times by a team of enumerators. In the first visit, participants completed a survey with demographic questions and family history. During the second visit, individuals played two versions of the dictator game (DG), three versions of a household public goods game (PG), and completed a second shorter survey. During the third visit respondents completed a short survey which included incentivized time and risk questions.

The wife and husband completed the second visit simultaneously, with a female enumerator meeting with the wife and a male enumerator meeting with the husband. This helped ensure the privacy of the respondent and prevent coordination in game play. The order of DG and PG game play was randomized across participants, as was the order of the versions of each game. The randomization of game order was stratified on gender and on matrilineal status. All questions pertaining to views on marriage and gender were asked in the second survey after participants had completed the experiments to avoid priming game play with the survey questions. The surveys and activities were administered in either French or Tshiluba, the languages spoken in this area of DRC. In the final visit, individuals completed a short survey.

Respondents participated in two types of experiments: a dictator game (DG) and a public goods game (PG). The dictator game is a proxy for altruism, and allows me to show robustness to different levels of altruism towards the spouse. The public goods game is meant to be a

measure of respondent's intuition or heuristic about the "right way" to behave in an interaction with their spouse. Given that this a non-anonymous setting, behavior in the lab experiment will almost certainly be part of a broader "game" that an individual has with a spouse. For example, if women are not cooperative in the experiment, this could lead to retaliation by the husband outside of the experiment. In a setting with domestic violence, it is nearly impossible to have a lab experiment that reflects the incentives faced in reality. Thus, we should consider the decisions made in this public goods game as measuring an individual's sense of how to act with a spouse.

The PG is similar to a standard public goods game, but with some modifications meant to reflect the cooperation problem that couples face on a daily basis. In the most basic variation of the PG, couples met with an enumerator of the same sex and were separated from each other physically. The enumerator then explained the rules of the game in either French or Tshiluba and asked a series of test questions to ensure that the respondent understood the game. Respondents were given an initial endowment of 1,000 CF, which is equivalent to approximately one US dollar.

Unlike a standard public goods game, the other player is not anonymous. Thus, I modify the structure of the public goods game to decrease the ease with which exact game play can be inferred. This was also important for compliance with IRB concerns. Participants were given the opportunity to roll a die with three black sides and three white sides. They were told if they rolled the die and saw the black side, they would receive a "bonus" of 500 CF. Thus, those who rolled the die and saw a black side received a total endowment of 1,500 CF to use in the game. The rest received the standard endowment of 1,000 CF. The outcome of the die roll was private knowledge, i.e. the respondent's spouse would not know whether the respondent received an initial endowment of 1,000 CF or 1,500 CF. The spouses did know that their partners were given the opportunity to roll the die however, and so they know that with 50% probability their partner received 1,500 CF. The endowment was given in increments of 100 CF bills (so either 10 bills or 15 bills depending on the outcome of the die roll).

The respondent was then told to allocate their endowment across two envelopes: an envelope for themselves and a "shared" envelope. They were told that the amount they contribute to the shared envelope would be combined with the amount their spouse contributed to the shared envelope. This amount would then be increased by 1.5 by the researchers and divided evenly between the couple. The total amount of money each respondent received would thus be the sum of what they put in the envelope for themselves plus half of the increased amount in the shared

envelope. To assist with understanding the payoffs associated with various allocation decisions, respondents were given a table that showed them how much money they would make for various allocations. The respondent made their allocation to the two envelopes in the privacy of a tent using actual money. The enumerator then collected the two envelopes and brought them back to the study office. The money allocated to the envelopes was counted in the office, and the total amount of money each respondent earned was calculated and returned to the respondent within one week.

Respondents also played an additional version of the game in which the amount contributed to the shared envelope was increased by 2, rather than by 1.5. This means that regardless of what the respondent's partner contributes to the shared envelope, the respondent will at least receive as much as they put in. This treatment makes it more costly to not cooperate with the other player.

Finally, the respondents also complete a version of the DG and PG games paired with an anonymous stranger of the opposite sex. By pairing individuals with a stranger of the opposite sex in addition to their spouse for the various lab experiments, I can test whether any differential cooperation or altruism are due to a general orientation toward individuals of the opposite sex, or are instead specific to being paired with spouse. The logic is similar to a placebo test.

The public goods game combines several key features of interactions between couples. First, there is some chance of getting additional income that is unobserved by the spouse. Individuals must then decide how much of their money to keep for themselves and how much to contribute to the household. Contributions made to the household have a positive return, but there is some chance your partner may free ride and not make contributions. To maximize household income, each partner would need to contribute their entire endowment to the shared envelope. Any deviations from this strategy results in an income loss at the household level.

Qualitative evidence collected after game play suggests that the respondents understood the key tradeoffs in the game. For example, one woman said "I put money in the common pot because it is increased," while another woman said, "the husband has a monopoly on the common pot, and he can take decisions without asking me, therefore I also need to have money in my own pot". Another woman said, "I put a lot in the [shared pot] because women shouldn't have their own money". A man said, "Despite that the money in the common pot is increased, I kept a lot of money in my own pot because you never know...". These quotes highlight that the set up

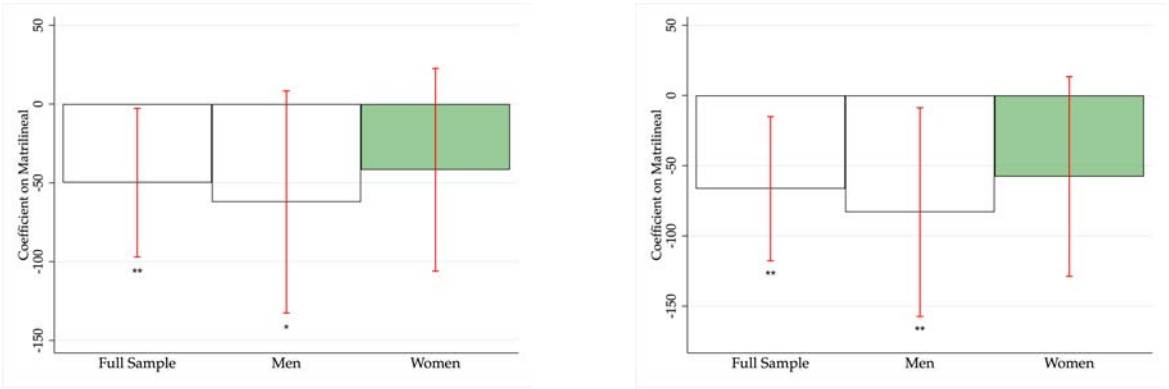
captures a choice the individuals are familiar with, that individuals understood the key trade offs, and that they face real tensions organizing household expenses. For additional examples of quotes from respondents, see Appendix E.1.

6.5. Experimental Results

The experimental data allow us to ask if matrilineal individuals are less cooperative with their spouses in a public goods game. The outcome of interest is the amount allocated to the shared pool for an individual. Figure 5a plots the coefficient on matrilineal for the full sample and then by male and female respondents. On average, matrilineal individuals allocate less to the shared pool. When examining just men, the result is significant, but is not significant for just women. Figure 5b presents the results where the respondents were paired with a stranger of the opposite sex. We find that, again, matrilineal individuals are less cooperative, and that this is particularly the case for matrilineal men.

Given that matrilineal individuals are less cooperative with both their spouses and a stranger of the opposite sex, this naturally raises the question of whether the behavior we observe is about interactions with the spouse, or about a general propensity to be less cooperative. To overcome the difficulty of a non-anonymous setting when paired with a spouse, I can also take advantage of the variation from winning a bonus. Thus, I am able to ask how the behavior of matrilineal individuals varies based on whether they win the bonus, and thus can more easily

Figure 5: Effect of Matrilineal Kinship on Cooperation in Public Goods Game



(a) With Spouse

(b) With Stranger

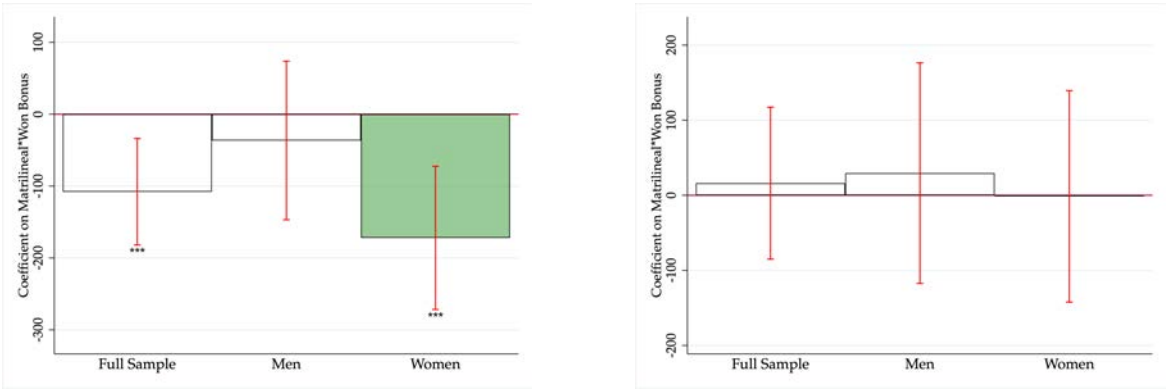
Note: These figures plot the coefficient β from the following estimating equation: $y_i = \beta_1 \mathbb{1}_i^{Matrilineal} + X_i'\omega + \epsilon_i$. The estimating equation is run on the full sample, men only, and women only. Controls include age and age squared.

hide money from a spouse. I expect that if matrilineal kinship affects cooperation with a spouse, it is particularly likely to matter when the respondent wins the bonus and can more easily hide money from the spouse.

Figure 6a presents the coefficient on a matrilineal times won bonus interaction term, controlling for a matrilineal indicator and a won bonus indicator; the coefficient is estimated for the full sample and for each gender separately. The results suggest that when paired with a spouse, matrilineal women in particular are less likely to contribute to a public good. For matrilineal men, there is no differential effect of winning the bonus when paired with a spouse. Figure 6b presents the results on matrilineal times won bonus when the partner is a stranger of the opposite sex. There is no evidence that matrilineal men or women behave differently when paired with a stranger and they win a bonus. The ability to conceal income does not matter differentially for matrilineal individuals when the partner is a stranger. The results are evidence that matrilineal kinship alters cooperation within the household. Matrilineal women can choose to be less cooperative with their spouses, particularly when they have some ability to conceal their actions. This allows them to retain greater control over their earnings. In a setting where domestic violence is common, choosing not to cooperate may actually be a signal of greater empowerment.

Appendix Table E5 presents the OLS and RD analyses for the public goods game by respondent gender and by whether the partner is a spouse or a stranger. The specifications include baseline, geographic, cultural, and LASSO selected controls, and present standard errors clustered

Figure 6: Effect of Matrilineal Kinship and Won Bonus on Cooperation in Public Goods Game



(a) With Spouse

(b) With Stranger

Note: These figures plot the coefficient β from the following estimating equation: $y_i = \gamma_1 \mathbb{1}_i^{Matrilineal} + \gamma_2 \mathbb{1}_i^{Bonus} + \beta(\mathbb{1}_i^{Bonus} * \mathbb{1}_i^{Matrilineal}) + X_i'\omega + \epsilon_i$. The estimating equation is run on the full sample, men only, and women only. Controls include age and age squared.

at the ethnic group level, village of origin level, and respondent level. The results in Appendix Table E5 are consistent with the figures: matrilineal women are less cooperative with their spouses when they win the bonus, but not less cooperative with a stranger of the opposite sex when they win the bonus.

Additionally, Appendix Figure E6 presents the results with a spouse separately for the version where the shared pot is increased by 1.5 and by 2. The benefit of this additional version of the game is that it removes confounders from expectations of spousal play: regardless of what the other player does in the times 2 version, a player will receive at least as much as they contribute. It also becomes more costly not to cooperate. In both versions, matrilineal women are less cooperative with their spouses when they win the bonus.

These results are robust to the inclusion of additional control variables, including controls for years of education, share of test questions correct, amount sent in a dictator game to the spouse, trust in foreigners, trust in people just met, an indicator for having a polygynous union, and time and risk preferences (see Appendix Table E6 for the public goods game results with additional control variables; see Appendix Figure E7 for the DG results).

7. Conclusion

Kinship systems and marriage are integral social structures for society. A growing literature in economics and other fields suggest that kinship systems have important effects for the scope of cooperation and economic growth. This paper tests the hypothesis from anthropology that how broader kinship systems are organized affect outcomes within the nuclear household.

Using over 50 DHS survey-waves, I examine outcomes for matrilineal women and children. I find that matrilineal women are less likely to believe domestic violence is justified and to experience domestic violence. They also report greater autonomy in decision making – particularly in the ability to visit family and seek health care. Additionally, matrilineal kinship closes the gender gap in educational attainment and has health benefits for children.

I then examine original survey and experimental data to ask if, consistent with hypotheses from anthropology, matrilineal kinship undermines spousal cooperation. Matrilineal couples participate in a public goods experiment with a spouse and with a stranger of the opposite sex. Given that spouses are not an anonymous partner, the games are designed to give respondents some plausible deniability over their initial endowment. I find that matrilineal women are less

cooperative with their spouses but not with strangers, when they win the bonus and can more easily hide income from the spouse. These results highlight how altering the structure of the broader kin group has both empowered women and changed incentives for cooperation within the household.

Finally, despite that I find evidence of less cooperation between matrilineal spouses, I also find that there may be particular benefits of kinship systems that result in greater autonomy for women. This speaks to the matrilineal puzzle, which suggested that the existence of matrilineal kinship systems is puzzling if they undermine an integral unit of cooperation. A resolution to this puzzle is that matrilineal kinship confers benefits on women and children. The results highlight how kinship systems may both affect the provision of public goods, but also the extent to which children are considered public goods.

The results of my analysis have broader implications. First, they highlight that greater "co-operation" is not necessarily synonymous with greater women's empowerment, particularly in settings with domestic violence. Additionally, they suggest a need to account for broader social structures such as kinship systems when understanding outcomes within the household.

References

Aberle, David F., "Matrilineal Descent in Cross-cultural Perspective," in David M. Schneider and Kathleen Gough, eds., *Matrilineal Kinship*, University of California Press, 1961.

Alesina, Alberto and Paola Giuliano, "Family Ties," in Philippe Aghion and Steven N. Durlauf, eds., *Handbook of Economic Growth*, Vol. 2A, The Netherlands: North Holland, 2014, pp. 177–215.

_ , Benedetta Brioschi, and Eliana La Ferrara, "Violence Against Women: A Cross-cultural Analysis for Africa," *Economia*, January 2020.

_ , Paola Giuliano, and Nathan Nunn, "On the Origin of Gender Roles: Women and the Plough," *Quarterly Journal of Economics*, May 2013, *128* (2), 469–530.

Alsan, Marcella, "The Effect of the TseTse Fly on African Development," *American Economic Review*, 2015, *105* (1), 382–410.

Anderson, Siwan, "Legal Origins and Female HIV," *American Economic Review*, 2018, *108* (6), 1407–1439.

Ashraf, Nava, Natalie Bau, Nathan Nunn, and Alessandra Voena, "Bride Price and Female Education," *Journal of Political Economy*, 2020, *128* (2), 591–641.

Bahrami-Rad, Duman, Jonathan Beauchamp, Joseph Henrich, and Jonathan Schulz, "Kin-based institutions and economic development," September 2022.

Bau, Natalie, "Can Policy Change Culture? Government Pension Plans and Traditional Kinship Practices," *American Economic Review*, June 2021, *111* (6), 1880–1917.

_ and Raquel Fernández, "Culture and the Family," 2022.

Becker, Anke, "On the Economic Origins of Restricting Women's Promiscuity," October 2021.

Belloni, Alexandre, Victor Chernozhukov, and Christian Hansen, "High-Dimensional Methods and Inference on Structural and Treatment Effects," *Journal of Economic Perspectives*, 2014, *28* (2), 29–50.

BenYishay, Ariel, Pauline Grosjean, and Joe Vecci, "The Fish is the Friend of Matriliny: Reef Density and Matrilineal Inheritance," *Journal of Development Economics*, July 2017, *127*, 234–249.

Bertrand, Marianne, "New Perspectives on Gender," in Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 4B, Elsevier, 2010, chapter 17, pp. 1543–1590.

Bisin, Alberto and Thierry Verdier, "On the Joint Evolution of Culture and Institutions," 2017. NBER Working Paper No. 23375.

Bloch, Francis and Vijayendra Rao, "Terror as a Bargaining Instrument: A Case Study of Dowry Violence in Rural India," *American Economic Review*, September 2002, *92* (4), 1029–2043.

Bobonis, Gustavo J., Melissa Gonzalez-Brenes, and Roberto Castro, "Public Transfers and Domestic Violence: The Roles of Private Information and Spousal Control," *American Economic Journal: Economic Policy*, 2013, *5* (1), 179–205.

Boyd, Robert and Peter J. Richerson, *Culture and the Evolutionary Process*, Chicago: Chicago University Press, 1985.

Boyle, Elizabeth Heger, Miriam King, and Matthew Sobek, "IPUMS-Demographic and Health Surveys: Version 9 [dataset].," IPUMS and ICF 2022.

Cavalli-Sforza, Luigi Luca and Marcus W. Feldman, *Cultural Transmission and Evolution: A Quantitative Approach*, Princeton, NJ: Princeton University Press, 1981.

Dell, Melissa, "The Persistent Effects of Peru's Mining Mita," *Econometrica*, 2010, *78* (6), 1863–1903.

_ and Pablo Querubin, "National Building Through Foreign Intervention: Evidence from Discontinuities in Military Strategies," *The Quarterly Journal of Economics*, 2018, *133* (2), 701–764.

_ , _ , and Nathan Lane, "State Capacity, Local Governance and Economic Development in Vietnam," *Econometrica*, November 2018, *86* (6), 2083–2121. Working Paper.

Destro-Bisol, Giovanni, Francesco Donati, Valentia Coia, Ilaria Boschi, Fabio Verginelli, Alessandra Caglia, Sergio Tofanelli, Gabriella Spedini, and Cristian Capelli, "Variation of Female and Male Lineages in Sub-Saharan Population: the Importance of Sociocultural Factors," *Molecular Biology and Evolution*, 2004, *21* (9), 1673–1682.

Douglas, Mary, "Is Matriliny Doomed in Africa?," in Mary Douglas and Phyllis M. Kaberry, eds., *Man in Africa*, London: Tavistock Publications, 1969, pp. 123–137.

Enke, Benjamin, "Kinship, Cooperation, and the Evolution of Moral Systems," *Quaterly Journal of Economics*, 2019, *134* (2), 953–1019.

Fernández, Raquel, "Does Culture Matter?," in Matthew O. Jackson Jess Benhabib and Alberto Bisin, eds., *Handbook of Social Economics*, Vol. 1A, Elsevier, 2011, chapter 11, pp. 481–510.

_ and Alessandra Fogli, "Culture: An Empirical Investigation of Beliefs, Work and Fertility," *American Economic Journal: Macroeconomics*, 2010, *1* (1), 472–500.

Fortunato, Laura, "The Evolution of Matrilineal Kinship Organization," *Proceedings of the Royal Society London*, 2012.

Fox, Robin, *Kinship and Marriage: An Anthropological Perspective*, Cambridge: Cambridge University Press, 1967.

Giuliano, Paola, "Gender: An Historical Perspective," in Susan L. Averett, Laura M. Argys, and Saul D. Hoffman, eds., *The Oxford Handbook of Women and the Economy*, Oxford University Press, 2017.

_ and Nathan Nunn, "Ancestral Characteristics of Modern Populations," *Economic History of Developing Regions*, 2018, *33* (1), 1–17.

_ and _ , "Understanding Cultural Persistence and Change," *Review of Economic Studies*, July 2021, *88* (4), 1541–1581.

Gluckman, Max, *Custom and Conflict in Africa*, Basil Blackwell, 1963.

Gneezy, Uri, Kenneth L. Leonard, and John A. List, "Gender Differences in Competition: Evidence from a Matrilineal and a Patriarchal Society," *Econometrica*, 2009, *77* (5).

Gottlieb, Jessica and Amanda Lea Robinson, "How to Close the Gender Gap in Political Participation: Lessons from Matrilineal Societies in Africa," *British Journal of Political Science*, 2021, *51* (1), 68–92.

Greif, Avner, "Cultural Beliefs and the Organization of Society: A Historical and Theoretical Reflection on Collectivist and Individualist Societies," *Journal of Political Economy*, 1994, *102* (5), 912–950.

_ , "Family Structure, Institutions, and Growth: The Origins and Implications of Western Corporations," *American Economic Review*, 2006, *96*, 308–312.

_ **and Guido Tabellini**, "The Clan and the Corporation: Sustaining Cooperation in China and Europe," *Journal of Comparative Economics*, 2017, *4*, 1–35.

Hammer, M. F., T. A. Karafet, A. J. Redd, H. Jarjanazi, S. Santachiara-Benerecetti, A. Langaney, and L. Excoffier, "Hierarchical Patterns of Global Human Y-chromosome Disversity," *Molecular Biology and Evolution*, 2001, *18*, 1189–1203.

Henrich, Joseph, *The Secret of Our Success: How learning from others drove human evolution, domesticated our species and made us smart*, Princeton, NJ: Princeton University Press, 2015.

_ , *The WEIRDest People in the World: How the West Became Psychologically Peculiar and Particularly Prosperous*, Farrar, Straus and Giroux, 2020.

Hijmans, R.J., S.E. Cameron, J.L. Parra, P.G. Jones, and A. Jarvis, "Very High Resolution Interpolated Climate Surfaces for Global Land Areas," *International Journal of Climatology*, 2005, *25*, 1965–1978.

Holden, Clare Janaki and Ruth Mace, "Spread of Cattle Led to the Loss of Matrilineal Descent in Africa: a Coevolutionary Analysis," *Proceedings of the Royal Society London*, 2003.

_ **, Rebecca Sear, and Ruth Mace**, "Matriliny as daughter-biased investment," *Evolution and Human Behavior*, 2003, *24*, 99–112.

Jayachandran, Seema, "The Roots of Gender Inequality in Developing Countries," *Annual Review of Economics*, 2015, *7*, 63–88.

_ **and Rohini Pande**, "Why Are Indian Children So Short? The Role of Birth Order and Son Preference," *American Economic Reveiw*, September 2017, *107* (9), 2600–2629.

Kiszewski, Anthony, Andrew Mellinger, Andrew Spielman, Pia Malaney, Sonia Ehrlich Sachs, and Jeffrey Sachs, "A Global Index Representing the Stability of Malaria Transmission," *The American Journal of Tropical Medicine and Hygiene*, 2004, *70* (5), 486–498.

Knight, C., "Early Human Kinship was Matrilineal," in N. J. Allen, H. Callan, R. Dunbar, and W. James, eds., *Early Human Kinship*, Blackwell, 2008, pp. 61–82.

La Ferrara, Eliana, "Descent Rules and Strategic Transfers. Evidence from Matrilineal Groups in Ghana," *Journal of Development Economics*, 2006, *63*, 280–301.

_ **and Annamaria Milazzo**, "Customary Norms, Inheritance, and Human Capital: Evidence from a Reform of the Matrilineal System in Ghana," *American Economic Journal: Applied Economics*, 2017, *9* (4), 166–185.

Lowes, Sara, "Kinship Strucutre, Stress, and the Gender Gap in Competition," *Journal of Economic Behavior and Organization*, December 2021, *192*, 36–57.

_ , "Culture in Historical Political Economy," 2023. Chapter for Handbook on Historical Political Economy.

_ , **Nathan Nunn, James Robinson, and Jonathan Weigel**, "The Evolution of Culture and Institutions: Evidence from the Kuba Kingdom," *Econometrica*, 2017, *85* (4), 1065–1091.

McNamara, Rita Anne and Joseph Henrich, "Kin and Kinship Psychology Both Influence Cooperative Coordination in Yasawa, Fiji," *Evolution and Human Behavior*, 2017, *38* (2), 197–207.

Michalopoulos, Stelios, "The Origins of Ethnolinguistic Diversity," *American Economic Review*, 2012, *102* (4), 1508–39.

_ **and Elias Papaioannou**, "Pre-Colonial Ethnic Institutions and Contemporary African Development," *Econometrica*, January 2013, *81* (1), 113–152.

_ , **Louis Putterman, and David Weil**, "The Influence of Ancestral Lifeways on Individual Economic Outcomes in Sub-Saharan Africa," *Journal of the European Economic Association*, 2019, *17* (4), 1186–1231.

Morgan, Lewis, *Ancient Society*, London: MacMillan, 1907.

Moscona, Jacob, Nathan Nunn, and James Robinson, "Segementary Lineage Organization and Conflict in Sub-Saharan Africa," *Econometrica*, 2020, *88* (5), 1541–1581.

Murdock, George Peter, *Africa: Its Peoples and Their Cultural History*, New York: McGraw-Hill Book Company, 1959.

_ , *Ethnographic Atlas*, Pittsburgh: University of Pittsburgh Press, 1967.

Nunn, Nathan, "History as Evolution," in Alberto Bisin and Giovanni Federico, eds., *Handbook of Historical Economics*, Elsevier, 2021, pp. 41–91.

_ **and Leonard Wantchekon**, "The Slave Trade and the Origins of Mistrust in Africa," *American Economic Review*, 2011, *101* (7), 3221–3252.

Opie, Christopher, Susanne Shultz, Quentin D. Atkinson, Thomas Curie, and Ruth Mace, "Phylogenetic reconstruction of Bantu kinship challenges Main Sequence Theory of human social evolution," *PNAS*, December 2014, *111* (49), 17414–17419.

Radcliffe-Brown, A.R., "Introduction," in A.R. Radcliffe-Brown and Daryll Forde, eds., *African Systems of Kinship and Marriage*, Oxford University Press, 1950.

Ramankutty, Navin, Jonathan A. Foley, John Norman, and Kevin McSweeney, "The Global Distribution of Cultivable Lands: Current Patterns and Sensitivity to Possible Climate Change," *Global Ecology and Biogeography*, 2002, *11*, 377–392.

Richards, Audrey, "Some Types of Family Structure Amongst the Central Bantu," in A.R. Radcliffe-Brown and Daryll Forde, eds., *African Systems of Kinship and Marriage*, Oxford University Press, 1950.

Richerson, Peter J., Robert T. Boyd, and Joseph Henrich, "Cultural Evolution of Human Cooperation," in Peter Hammerstein, ed., *Genetic and Cultural Evolution of Cooperation*, MIT Press, 2003.

Rossi, Pauline, "Strategic Choices in Polygamous Households: Theory and Evidence from Senegal," *Review of Economic Studies*, 2019, *86* (3), 1332–1370.

Schlegel, Alice, *Male Dominance and Female Autonomy: Domestic Authority in Matrilineal Societies*, New Haven, CT: Human Relations Area Files Press, 1972.

Schulz, Jonathan, Duman Bahrami-Rad, Jonathan Beauchamp, and Joseph Henrich, "The Church, intensive kinship, and global psychological variation," *Science*, November 2019, *366* (6466).

Schulz, Jonathan F., "Kin-Networks and Institutional Development," *Economic Journal*, forthcoming.

Seielstad, M. T., E. Minch, and L. L. Cavalli-Sforza, "Genetic Evidence for a Higher Female Migration Rate in Humans," *Nature Genetics*, 1998, *20*, 278–280.

Tur-Prats, Ana, "Family Types and Intimate-Partner Violence: A Historical Perspective," *Review of Economics and Statistics*, 2019, *101* (5), 878–891.

Vansina, Jan, *Introduction a l'Ethnographie du Congo*, Centre de Recherche et d'Information Socio-Politiques, 1966.

_ , *Paths in the Rainforests*, The University of Wisconsin Press, 1990.

Whyte, Martin King, *The Status of Women in Preindustrial Societies*, Princeton University Press, 1978.

Web Appendix for

Kinship Structure and the Family: Evidence from the Matrilineal Belt

Sara Lowes

UC San Diego, NBER, and BREAD

28 September 2022

Contents

Appendix A. Background on Matrilineal Kinship Systems

A.1. Origins of Matrilineal Kinship Systems

There are many views on the origins of the matrilineal kinship system. Early work in anthropology posited that matrilineal kinship was the most archaic of kinship systems. Lewis Morgan popularized this hypothesis with his work on the Iroquois and other Native Americans who practice matrilineal kinship (Morgan, 1907; Knight, 2008). His work on kinship was motivated by an evolutionary perspective that all societies went through certain identifiable stages of kinship structures, of which, one of the earliest was matrilineal kinship. Morgan argued that the advent of alienable property lead to the demise of matrilineal kinship and to the adoption of patrilineal kinship. This hypothesis that matrilineal systems represent the earliest of the evolution of human kinship systems still has support today, for example the work by Knight (2008).

Recent work in genetics offers mixed evidence on whether early kinship systems were matrilineal or patrilineal. A paper by Seielstad et al. (1998) is one of the initial studies that examines the relationship between social structure and genetic variation of unilinearly transmitted polymorphisms. The paper leverages the fact that Mitochondrial DNA (mtDNA) is transmitted exclusively by females and the Y chromosome is passed only by males. They infer that differences in the relative genetic diversity of the Y chromosomes and mtDNA can be explained by differential migration rates of men and women. They find that Y chromosome variants tend to be more localized geographically than those of mtDNA and conclude that this suggests a higher female to male migration rate. This is consistent with patrilocal systems because women would relocate more than men under this system. A subsequent study by Hammer et al. (2001) also uses genetic data from sub-Saharan Africa, but finds evidence of greater mobility of males, rather than females (as would be consistent with matrilocal systems). Interestingly, the genetic data used in the Seielstad et al. (1998) study is from groups that are primarily food producing populations (e.g. engaged in agriculture) while the Hammer et al. (2001) study obtains samples from hunter gatherer populations. A third paper by Destro-Bisol et al. (2004) attempts to rectify these findings. They find that the relative diversity of mtDNA and Y chromosomes is greater among food producers than for hunter gathers. The authors argue that their results are consistent with more matrilocal arrangements among hunter gather populations (as suggested in the Hammer et al. (2001) paper) and with more patrilocal arrangements for food producing groups in East and Central Africa (as is suggested by the Seielstad et al. (1998) paper). These papers suggest that social structure is linked to the relative genetic diversity of mtDNA and Y chromosomes, but does not necessarily address whether early kinship systems were matrilineal or patrilineal.

Anthropologist Jan Vansina argues that matrilineal kinship is not a vestige of "antiquity", but rather that it was invented (perhaps more than once) and spread across central Africa. Proposed centers of invention include in southern Angola by the Kongo of Mayombe, in western Cameroon, and in Northern Congo (by the Doko) (Vansina, 1990, p.152). He links the invention and spread of matrilineal kinship to the adoption of agriculture and sedentary villages. In this environment, there arose a need for institutions that spanned across villages. Unilineal descent systems allowed for linkages across villages and also limited the number of claimants in succession and inheritance issues. Unlike patrilineal systems, matrilineal systems could incorporate unaffiliated men into the matrilineal group, which is more difficult in patrilineal societies where male membership is established through birth (Vansina, 1990). Douglas makes a similar observation: "If there is any advantage in a descent system which overrides exclusive, local loyalties, matriliny has it. Furthermore, matrilineality, by its ambiguities, gives scope to the enterprising individual to override ascribed roles" (1969).

Evolutionary anthropologists explain the existence of matrilineal societies as the result of an

evolutionary process that created institutions suitable for the ecological and social environment. They identify several factors that contribute to the adoption of matrilineal kinship. Matrilineal societies are argued to be more beneficial with certain types of production, such as hoe agriculture. In contrast, hunting, which requires skill development and male cooperation, is argued to be more compatible with patrilineal kinship (Aberle, 1961). Additionally, matrilineal kinship may be advantageous in environments with low paternal certainty. While it is difficult to confirm paternity, maternity is easily observable. Thus, an inheritance system in which property passes from the mother's brother to her sons may be optimal since the brother knows he is related to his sister, but cannot verify that he is related to his children (Fortunato, 2012). However, this model alone would require that paternity certainty be below .268, a value that is unrealistically low even for matrilineal societies. A more sophisticated model argues that daughter-biased investment may be adaptive when the marginal benefit of investing in sons (relative to daughters) is not sufficient to offset by the risk of non-paternity of the son's children (Holden et al., 2003). These authors argue that with the rise of moveable heritable wealth, such as cows, the marginal benefits of investing in sons increases, leading to the demise of matrilineal societies. The authors thus posit that "cows are the enemy of matriliny" (Holden and Mace, 2003). In more recent work, BenYishay et al. (2017) present evidence that reef density predicts the adoption of matrilineal inheritance in the Soloman islands.

Recent work in anthropology uses methods from evolutionary biology to determine the history of Bantu kinship patterns. The Bantu migrated from their ancestral homeland in Eastern Nigeria between 3,000-5,000 BP. Though the exact route is contested, they likely migrated through the Cameroon rainforest. Note that it is in Cameroon where Vansina suggests matrilineal kinship was once invented. During the neolithic period they undertook the adoption of farming. Opie et al. (2014) use linguistic data from 542 Bantu languages to construct a Bantu phylogenetic tree, which represents how these societies are related to each other historically. They combine this data on current kinship patterns across these groups. Using Bayesian models, it is possible to assign probabilistic assessments of the historical residence and inheritance patterns of these groups. They find strong evidence that the initial descent system at the root of the phylogeny was patrilineal and that the form of residence was patrilocal. Furthermore, they find evidence of various switches from patriliny to matriliny as the Bantu expanded across Africa, but that unilineal systems were retained through the expansion of the Bantu. Finally, their results suggest that when groups adopt matrilineal systems, they then subsequently adopt matrilocal practices (rather than first becoming matrilocal and then adopting matrilineal inheritance). Conversely, as groups move away from matrifocal practices to patrifocal practices, they first adopt patrilocal residence patterns and then adopt patrilineal inheritance. In sum, while the origins of matrilineal kinship systems is contested, the most recent work does not lend support for the hypothesis that initial kinship systems, at least in Sub-Saharan Africa, were matrilineal (and matrilocal). The work by Opie et al. (2014) and Vansina (1990) suggest that the Bantu expansion across Africa was associated with the spread and adoption of matrilineal systems.

A.2. Matrilineality and Women's Empowerment

Matrilineal societies may empower women because of structural elements of the society or because they intrinsically value women more. Examples of structural elements of matrilineal kinship include matrilocality, which is the practice of living close to the wife's relatives, and women's inheritance of land. Living closer to relatives may enable women to better implement their preferences and ownership of land may increase their outside option in a bargaining framework. However, neither of these features is universally present in all matrilineal systems, nor will they be relevant in the present context.

Fox (1967, p. 113) presents three types of matrilineal kinship systems, with varying levels of women's empowerment. The first type of matrilineal society is based on mother-daughter-sister roles and has matrilocal residence. In this case, women control the continuity of the matrilineage and resources, and thus tend to have relatively higher status. In the second type of matrilineal society, the emphasis is on the brother-sister-nephew roles. They often practice avunculocal residence and political power is generally monopolized by men. This results in relatively lower status of women. Finally, a third type emphasizes all of the above relationships. In this type men remain in control, but the status of women is not as low as in the second type. In the DRC, the matrilineal groups are primarily of the second type, where men retain much of the authority and control of resources, and the emphasis is on the brother-sister-nephew roles.

A.3. The Matrilineal Puzzle

Much of the early anthropological scholarship on matrilineal kinship focused on the so called "matrilineal puzzle". The matrilineal puzzle is the hypothesis that matrilineal kinship systems decrease spousal cooperation, and therefore it is puzzling to observe them as a kinship system. Anthropologists note that matrilineal systems (1) split an individual's allegiance between their spouse and their lineage and (2) undermine male authority. First, in patrilineal systems, women effectively relinquish membership in their own lineage to be *de facto* members of their husband's lineage. However, in matrilineal systems both partners retain strong ties with their own lineages. This leads to split allegiances within a matrilineal household. Second, given requirements of *exogamy*, or marrying outside of the kinship group, a woman produces children with a man outside of her group, but these children are to belong to her lineage, rather than her husband's lineage. Thus, a husband in a matrilineal society does not have the same authority and control over his wife or children as a husband in a patrilineal society, in which the children are members of the husband's group. As Richard's writes in her work on matrilineal kinship among the Central Bantu, "the matrilineal system makes for certain elements of conflict for which some kind of solution has to be found. The problem...is the difficulty of combining recognition of descent through the woman with the rule of exogamous marriage" (1950).

The notion that a system that undermines a man's authority over his wife is puzzling requires both the assumption of male dominance and the assumption that the nuclear family is the elementary unit of the household. Richards writes:

> "There is the further difficulty that in most societies, authority over a household...is usually in the hands of men, not women, as are also the most important political offices. Thus any form of [marriage in which the husband lives with wife's family] means that an individual of the dominant sex is...in a position of subjugation in his spouse's village, and this is a situation which he tends to find irksome and tries to escape from." (Richards, 1950, p.246)

In this example, the husband, the presumed dominant partner in the household, would find it distasteful to live with the wife's extended family and therefore would not want to do it. Without the assumption of male dominance, matrilineal kinship systems are no more puzzling than patrilineal kinship systems, where women generally live with the family of their husband and are effectively incorporated into their husband's lineage. Additionally, Mary Douglas writes,

> "Underlying [analyses of matrilineality] is the implicit assumption that the elementary family is the basic, universal unit of society. If matriliny divides the elementary family, and if the latter is taken to be the most viable unit of kinship in the modern world, the outlook for matriliny may indeed by dim." (1969, p. 125)

challenging the assumption that the integral unit of the family is a husband, a wife and their children. This argument highlights that in matrilineal systems, the roles of brother, uncle, sister, and aunt may be relatively more important than in patrilineal societies.

The matrilineal puzzle captures several important features of matrilineality. First, the allegiances of both husband and wife are split between the marriage and natal kin. Though a wife and husband share a bond and children, they must rely on their natal kin for their lineage and inheritance. These conflicting allegiances can lead to tensions within the marriage. Gluckman writes:

> "Hence in matrilineal societies where [a wife] bears children mainly for her own blood-kin, her wifely bond is weak. Divorce is frequent; women are liable to side with their brothers against their husbands. A man trusts his sister, and not his wife: Your sister is always your sister; tomorrow your wife may be another man's wife." (Gluckman, 1963, p.74)

According to this argument, matrilineal systems may lead to weaker bonds between husband and wife than in patrilineal systems, but to stronger bonds between brother and sister.

Second, matrilineality undermines a man's authority over his wife and children relative to patrilineality. As Gluckman writes,

> "what happens in a matrilineal society is that [the rights to a woman as a wife and the rights to a woman as a child-bearer] are held by different sets of men. The woman's kin transfer to the husband, often in return for gifts, rights in her as a wife...they also retain in her rights a child-bearer" (1963, p.73).

A man's children do not belong to him, but to his wife's lineage. He therefore faces competition from his wife's brothers and parents for control over the wife and the children. Relative to a patrilineal man, he has less control over his wife and children. The anthropological literature on the matrilineal puzzle highlights that particular structural features of matrilineal kinship systems undermine cooperation between spouses.

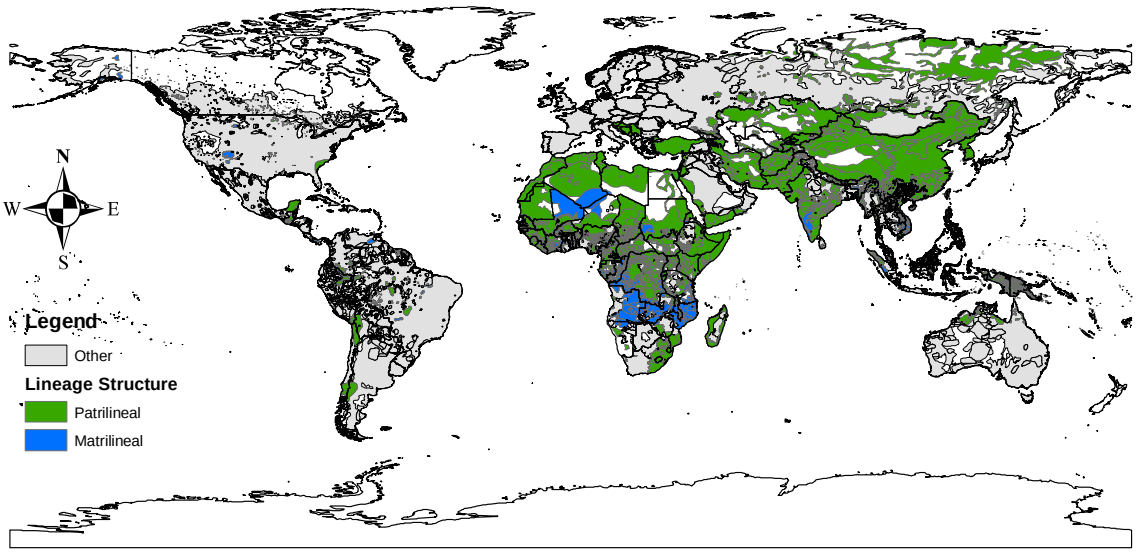
Appendix B. Data Sources and Variable Definitions

B.1. DHS Survey Data and Variables

The survey data and detailed information on the sampling procedure and variable definitions are available at http://dhsprogram.com/data/Data-Variables-and-Definitions.cfm. The survey provides GPS coordinates for each village (i.e. *clusters* in the survey); these coordinates are displaced by up to 5km for all urban clusters, and 99% of rural clusters and up to 10 km for 1% of rural clusters. Importantly, this displacement is random, and simply induces classical measurement error. Below I explain the variable definitions for the variables used in this paper from the DHS survey.

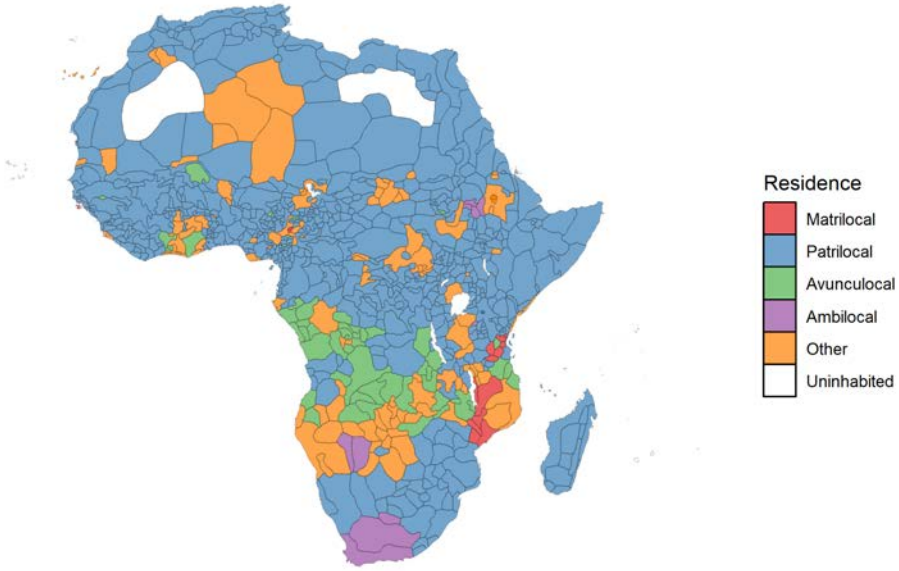
- **Domestic Violence Justified Index, [0-1]:** For women who were randomly selected and interviewed for the domestic violence module, the index is the average of all non-missing responses to Yes or No questions regarding whether domestic violence is justified in various scenarios. The scenarios are: a woman argues with her husband, a woman burns the food, a woman goes out without her husband's permission, a woman refuses sex, or a woman neglects the children.

Figure A1: Global Distribution of Matrilineal Kinship Groups



Notes: Data are from Giuliano and Nunn (2018).

Figure A2: Matrilineal Kinship and Residence After Marriage



- **Experienced Domestic Violence Index, [0-1]:** For women who were randomly selected and interviewed for the domestic violence module, the index is the average of all non-missing responses to Yes or No questions regarding whether the woman had experienced less severe or more severe domestic violence from her husband/partner.
- **Experienced Physical Harm, [0/1]**: For women who were randomly selected and inter-

Table B1: Surveys Included in DHS Analysis Sample

	All IPUMS DHS Data	*Analysis Sample*
	(1)	(2)
Country	Interview Year	Interview Year
Angola	2015	2015
Benin	2017-18, 2011, 2001, 1996	
Burundi	2016, 2010	
Burkina Faso	2010, 2003, 1998, 1993	2010, 2003, 1998, 1993
Cameroon	2011, 2004, 1991	2011, 2004, 1991
DRC	2013-14, 2007	2013-14, 2007
Ethiopia	2016, 2011, 2005, 2000	
Ghana	2014, 2008, 2003, 1998, 1993	2014, 2008, 2003, 1998, 1993
Guinea	2018, 2012, 2005, 1999	2018, 2012, 2005, 1999
Kenya	2014, 2008-9, 2003	
Lesotho	2014, 2009, 2004	
Liberia	2013, 2007, 1986	
Malawi	2016, 2010, 2004, 2000	2016, 2010, 2004, 2000
Mali	2018, 2012, 2006, 2011, 1995-6	2018, 2012, 2006, 2011, 1995-6
Mozambique	2011	
Namibia	2013, 2006, 2000	
Niger	2012, 1998, 1992	2012, 1998, 1992
Nigeria	2018, 2013, 2008, 2003, 1990	2018, 2013, 2008, 2003, 1990
Rwanda	2014, 2010, 2008, 2005	
Senegal	2017, 2016, 2015, 2012-13, 2010-11, 2005, 1997, 1992-93	2017, 2016, 2015, 2012-13, 2010-11, 2005, 1997, 1992-93
Tanzania	2015, 2010, 1999	2015, 2010, 1999
Uganda	2016, 2011, 2006, 2001	
Zambia	2018, 2013, 2007	2018, 2013, 2007
Zimbabwe	2015, 2010-11, 2005-6, 1999	2015, 2010-11, 2005-6, 1999

Notes: This table lists all IPUMS DHS survey samples (Boyle et al., 2022) and lists which samples are included in the OLS and RD analysis for sub-Saharan Africa.

viewed for the domestic violence module, this is an indicator variable for whether woman ever had any physical results of her husband/partner's actions.

- **Who makes decisions regarding..., [1-3]:** Women are asked who usually decides on (1) visiting family, (2) healthcare, (3) large household purchases, (4) how a woman's earning are used. I rescale the response options so that it is a 1 to 3 categorical variable where 1 is Partner/Other Person decides, 2 is Respondent and Partner together decide, and 3 is Respondent alone decides. Thus, a higher value indicates greater autonomy in decision making.

- **Autonomy in Decision Making Index, [1-3]:** Women are asked who usually decides on (1) visiting family, (2) healthcare, (3) large household purchases, (4) how a woman's earning are used. I rescale the response options so that it is a 1 to 3 categorical variable where 1 is Partner/Other Person, 2 is Respondent and Partner together, and 3 is Respondent where a higher value indicates greater autonomy in decision making. The index is the average of non-missing values for these four questions.

- **Years of Education:** For each individual in the household, the DHS survey asks the individual the total number of years of education in single years.

- **Child Sick Index, [0-1]** For children under five, the DHS asks whether the child has had a cough recently or has had a fever recently. This variable is the average of these two questions.

- **Moderate or Severe Stunting, [0/1]:** For children under 5, the DHS calculates the height-for-age z-score. Moderate or severe stunting is an indicator equal to 1 if the height-for-age z-score is less than -2.

B.2. Geographic Data and Variables

- **Precipitation:** Precipitation data are provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. This data provides monthly average rainfall in millimeters. I calculate the average rainfall for each month in each region of interest and average this over the twelve months to obtain our yearly precipitation measure in millimeters of rainfall per year.

- **Temperature:** Temperature data are provided by the Global Climate Database created by Hijmans et al. (2005) and available at http://www.worldclim.org/. I use the average yearly temperature in degrees Celsius.

- **Soil Suitability:** Soil suitability is the soil component of the land quality index created by the Atlas of the Biosphere available at http://www.sage.wisc.edu/iamdata/ used in Michalopoulos (2012) and Ramankutty et al. (2002). This data uses soil characteristics (namely soil carbon density and the acidity or alkalinity of soil) and combines them using the best functional form to match known actual cropland area and interpolates this measure to be available for most of the world at the 0.5 degree in latitude by longitude level. (The online appendix in Michalopoulos (2012) provides a detailed description of the functional forms used to create this dataset.) This measure is normalized to be between 0 and 1, where higher values indicate higher soil suitability for agriculture.

- **Malaria Suitability:** Malaria data uses the Malaria Ecology index created by Kiszewski et al. (2004). The index was created by Kiszewski et al. (2004) to approximate the prevalence of severe forms of malaria. It is created from equations relating the human-feeding tendency of the Anopheles mosquito to the malaria mortality rate using parameters from various field studies and adjusts for the mosquito type that is most prevalent in a region.

- **Tsetse Fly Suitability:** The tsetse suitability index (TSI) is from Alsan (2015). The TSI is constructed by Alsan (2015) using global climate data and parameters from laboratory experiments on the relationship between tsetse fly population birth and death rates and climate variables. The TSI is measured as the Z-score of the potential steady-state tsetse fly population.

B.3. Cultural and Historical Data and Variables

Cultural data are primarily from the Ethnographic Atlas (Murdock, 1967). I match the EA to groups in the Murdock ethnic group map (Murdock, 1959). Because the EA does not map one-to-one to the Murdock map, I construct a new and easily replicable matching strategy that takes advantage of the Murdock cultural groups outlined in the index of (Murdock, 1967). This allows me to match Murdock groups with culturally proximate EA groups when there is not an exact match between the EA and the Murdock Map. Groups are matched between the EA and Murdock map as follows. First, I search for an exact name match if possible. Second, if there is no exact name match, I assign EA data for group that shares same cultural index code. If there is still no match, I assign EA data for an ethnic group in same cultural cluster. Finally, if there are no matches from the three previous steps, I assign the EA data from the most physically proximate group.

- **Matrilineal:** Matrilineal is an indicator variable equal to one if the ethnic group practiced matrilineal kinship (variable v43 equal to 3).

- **Matrilocal:** Matrilocal is an indicator variable equal to one if the ethnic group practiced matrilocal residence (variable v12 equal to 5 or 9).

- **Polygynous:** Polygynous is an indicator variable for different forms of polygyny (variable v9 equal to 3,4,5,6, or 7).
- **Level of Jurisdictional Hierarchy:** This is a variable that ranges from 1 to 5 and reflects level of centralization beyond the local group (variable v33).
- **Settlement Complexity:** This is variable that ranges from 1 to 8 and reflects settlement complexity (variable v30).
- **Dependence on Agriculture:** This variable reflects level of dependence on agriculture and ranges from 1 to 9 (variable v5).
- **Women's Participation in Agriculture:** This variable is increasing in women's relative participation in agriculture and ranges from 1 to 6 (variable v54)
- **Dependence on Animal Husbandry:** This variable varies from 1 to 9 and is increasing in reliance on animal husbandry (variable v4).
- **Presence of Plough:** This is an indicator variable for whether the plough was present indigenously or well-established use of the plough upon contact (variable v39 equals 2 or 3).
- **Moral High God:** This is an indicator variable equal to one if the group had a moral high God involved in human morality (variable v34 equal to 4).
- **Log of Years Since Observed in EA:** This variable is the log of the years since a group was observed in the EA (variable v102).
- **Exact Match:** This variable indicates whether there is an exact match between the EA and the Murdock Map.
- **Slave Trade (ln(1+Atlantic and Indian Ocean)):** These data are from Nunn and Wantchekon (2011). I take the natural log of the sum of individuals exported during the Atlantic and Indian Ocean slave trades.

I also use Vansina (1966) to digitize granular geographic boundaries for ethnic groups in the Democratic Republic of the Congo and to delineate the matrilineal belt for the Kananga Sample.

Appendix C. DHS Sample: Additional Tables and Figures

Table C1: Balance on Geographic Characteristics at DHS Cluster Level

	All DHS Clusters in Sample				*Ethnicity Pair Sample*			
	Matrilineal	Patrilineal	SE	RD Coef.	Matrilineal	Patrilineal	SE	RD Coef.
Geographic Variables:								
Average Temperature	22.856	25.982	0.040 ***	0.539	23.619	25.802	0.092 ***	-0.001
	4691	12583			1234	2064		
Average Precipitation	90.446	98.984	0.836 ***	-2.627	89.548	83.288	1.226 ***	4.950
	4691	12583			1234	2064		
Soil Suitability	0.415	0.376	0.003 ***	-0.058 ***	0.351	0.379	0.007 ***	-0.032
	4686	12522			1230	2045		
Malaria Suitability	10.081	21.304	0.143 ***	1.675	13.314	20.585	0.326 ***	0.082
	4662	12546			1232	2063		
Tsetse Fly Suitability	0.445	0.439	0.002 ***	0.029	0.427	0.452	0.005 ***	-0.012
	4691	12583			1234	2064		

Notes: This table compares mean values of the geographic variables at the DHS cluster level. The first three columns use the full sample, while the last three restricts to DHS clusters within 100km of any ethnic pair boundary. Columns 3 and 7 show the standard error and significance level from t-test comparisons of the mean values. Columns 4 and 8 show p-values from a regression discontinuity estimation of the matrilineal indicator on the geographic variable, clustered at the ethnicity level. The specification used is identical to the specification in the main analysis for the ethnic pair sample. For each variable, the second row shows the total number of DHS clusters in the sample. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

C.1. Other Outcomes

Table C2: Matrilineal Kinship and Other Outcomes

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Wealth Index					
Matrilineal	−0.147	−0.157	−0.163	−0.145	−0.152	−0.163
	[0.099]	[0.096]	[0.088]*	[0.040]***	[0.058]***	[0.061]***
	(0.025)***	(0.029)***	(0.029)***	(0.035)***	(0.043)***	(0.042)***
Observations	411,785	411,785	411,785	90,706	90,706	90,706
Ethnic Groups	354	354	354	111	111	111
DHS Clusters	14,722	14,722	14,722	2,947	2,947	2,947
Mean Dep. Var.	3.045	3.045	3.045	2.931	2.931	2.931
	Panel B: Women's Years of Education					
Matrilineal	−0.211	−0.225	−0.046	−0.176	−0.134	−0.128
	[0.358]	[0.243]	[0.252]	[0.100]*	[0.153]	[0.123]
	(0.065)***	(0.074)***	(0.074)***	(0.097)*	(0.125)	(0.126)
Observations	481,422	481,422	481,422	101,801	101,801	101,801
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,142	17,142	17,142	3,272	3,272	3,272
Mean Dep. Var.	4.269	4.269	4.269	3.928	3.928	3.928
	Panel C: Women's Literacy					
Matrilineal	0.012	0.017	0.005	0.016	0.010	0.013
	[0.025]	[0.022]	[0.022]	[0.010]*	[0.015]	[0.012]
	(0.006)*	(0.007)**	(0.007)**	(0.010)*	(0.013)	(0.013)
Observations	478,552	478,552	478,552	101,381	101,381	101,381
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,142	17,142	17,142	3,272	3,272	3,272
Mean Dep. Var.	0.592	0.592	0.592	0.627	0.627	0.627
	Panel D: Share of Children Died					
Matrilineal	0.006	0.001	−0.001	−0.004	−0.008	−0.010
	[0.005]	[0.005]	[0.005]	[0.003]	[0.004]*	[0.004]***
	(0.002)***	(0.002)	(0.002)	(0.004)	(0.004)*	(0.004)**
Observations	355,359	355,359	355,359	76,110	76,110	76,110
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	16,806	16,806	16,806	3,173	3,173	3,173
Mean Dep. Var.	0.138	0.138	0.138	0.144	0.144	0.144
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include age, age squared, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.2. Alternative RD Bandwidths

Figure C3: Alternative RD Bandwidths: Outcomes for Women

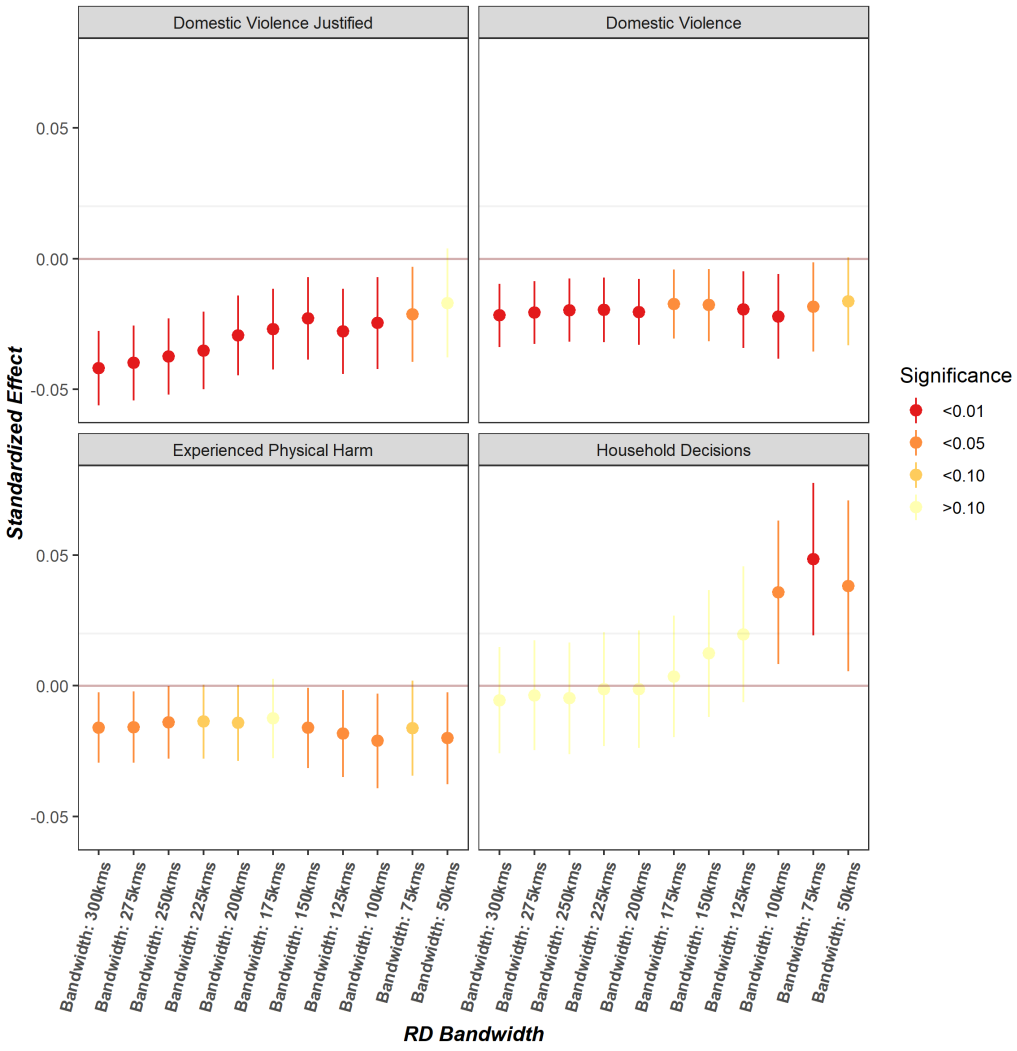


Figure C4: Alternative RD Bandwidths: Decision Making

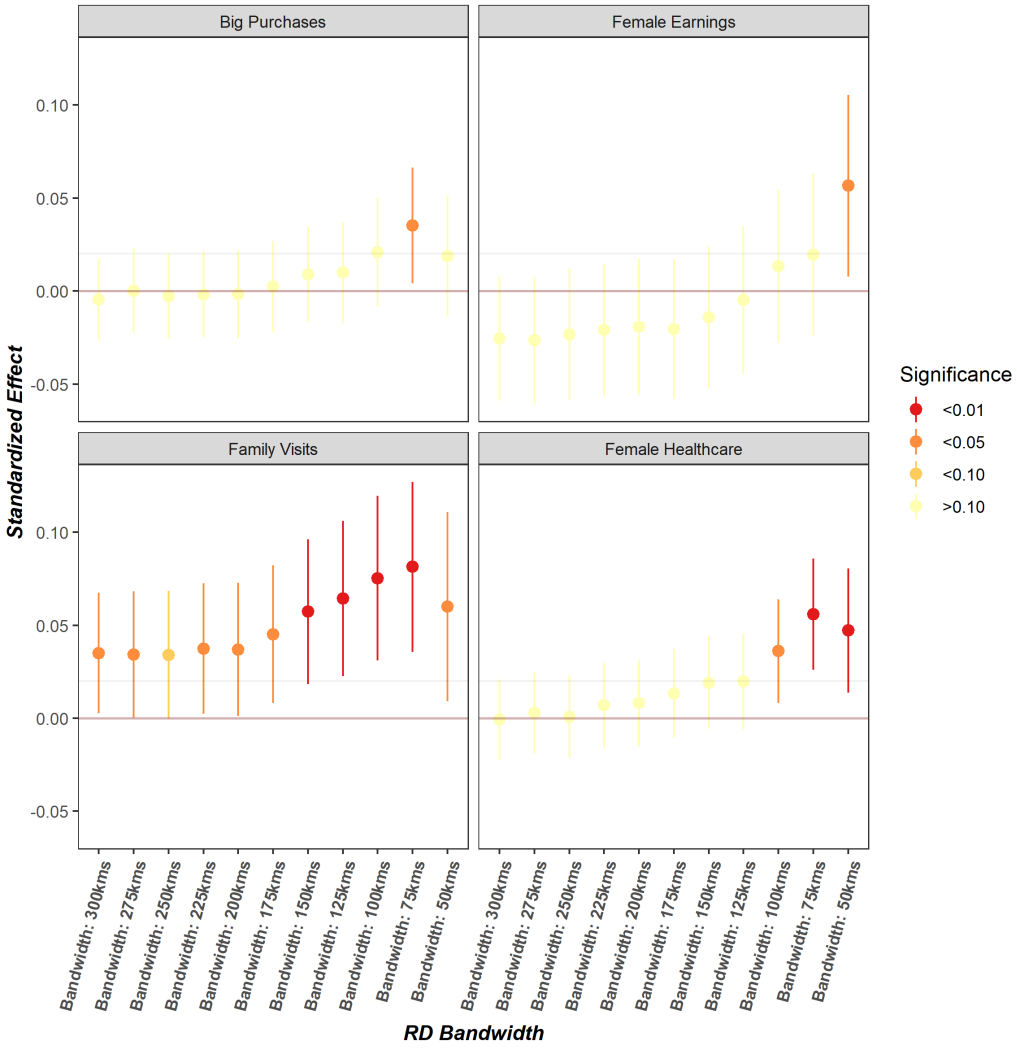
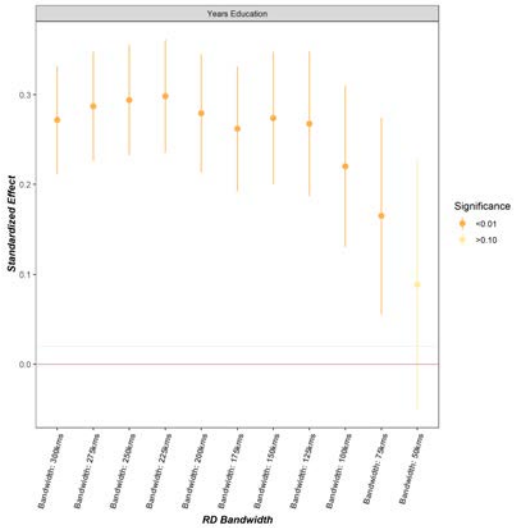
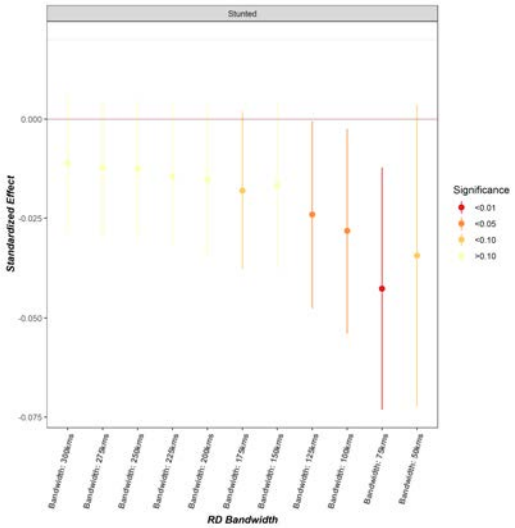


Figure C5: Alternative RD Bandwidths: Child Outcomes

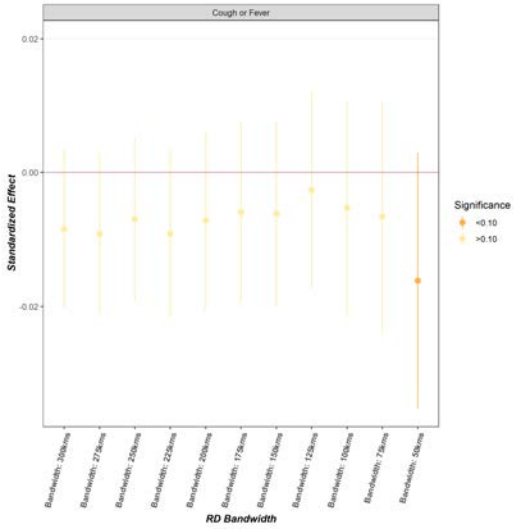
(a) Years of Education, Matrilineal×Female



(b) Stunting Matrilineal×Female



(c) Child Sick Index, Matrilineal



C.3. Alternative RD Specifications

Table C3: Matrilineal Kinship and Women's Outcomes: Linear Polynomial in Distance RD Specification

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Domestic Violence Justified Index, [0-1]					
Matrilineal	−0.043	−0.025	−0.024	−0.029	−0.030	−0.024
	[0.014]***	[0.017]	[0.016]	[0.010]***	[0.011]**	[0.011]**
	(0.005)***	(0.006)***	(0.006)***	(0.009)***	(0.012)**	(0.012)**
Observations	413,554	413,554	413,554	85,146	85,146	85,146
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,626	14,626	14,626	2,653	2,653	2,653
Mean Dep. Var.	0.325	0.325	0.325	0.346	0.346	0.346
	Panel B: Experienced Domestic Violence Index, [0-1]					
Matrilineal	−0.037	−0.039	−0.036	−0.021	−0.040	−0.036
	[0.011]***	[0.013]***	[0.012]***	[0.008]***	[0.010]***	[0.010]***
	(0.005)***	(0.006)***	(0.006)***	(0.008)***	(0.012)***	(0.012)***
Observations	123,755	123,755	123,755	27,447	27,447	27,447
Ethnic Groups	328	328	328	105	105	105
DHS Clusters	10,142	10,142	10,142	1,766	1,766	1,766
Mean Dep. Var.	0.165	0.165	0.165	0.190	0.190	0.190
	Panel C: Experienced Physical Harm, (0/1)					
Matrilineal	−0.038	−0.046	−0.054	−0.021	−0.026	−0.023
	[0.015]**	[0.013]***	[0.014]***	[0.008]**	[0.009]***	[0.010]**
	(0.005)***	(0.006)***	(0.006)***	(0.009)**	(0.014)*	(0.013)*
Observations	121,200	121,200	121,200	26,524	26,524	26,524
Ethnic Groups	325	325	325	105	105	105
DHS Clusters	9,874	9,874	9,874	1,701	1,701	1,701
Mean Dep. Var.	0.097	0.097	0.097	0.116	0.116	0.116
	Panel D: Autonomy in Decision Making Index, [1-3]					
Matrilineal	0.005	−0.003	−0.005	0.038	0.079	0.071
	[0.021]	[0.017]	[0.016]	[0.015]**	[0.013]***	[0.013]***
	(0.007)	(0.009)	(0.009)	(0.014)***	(0.018)***	(0.018)***
Observations	328,081	328,081	328,081	68,930	68,930	68,930
Ethnic Groups	355	355	355	112	112	112
DHS Clusters	15,351	15,351	15,351	2,888	2,888	2,888
Mean Dep. Var.	1.674	1.674	1.674	1.690	1.690	1.690
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in distance to the ethnic-pair border and includes an ethnicity pair fixed effect. *Baseline Controls* include age, age squared, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Domestic Violence Justified Index* is a an average of yes or no questions that ask if domestic violence is justified in different scenarios. The scenarios are: a woman argues with her husband, a woman burns the food, a woman goes out without her husband's permission, a woman refuses sex, or a woman neglects the children. *Experienced*

Table C4: Matrilineal Kinship and Child Outcomes: Linear Polynomial in Distance RD Specification

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Years of Education (Children 7 to 18)					
Matrilineal	−0.098	−0.122	−0.141	−0.236	−0.232	−0.246
	[0.131]	[0.098]	[0.102]	[0.110]**	[0.103]**	[0.120]**
	(0.034)***	(0.041)***	(0.041)***	(0.083)***	(0.088)***	(0.087)***
Observations	933,471	933,471	933,471	189,585	189,585	189,585
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,015	17,015	17,015	3,254	3,254	3,254
Mean Dep. Var.	2.973	2.973	2.973	2.743	2.743	2.743
	Panel B: Years of Education (Children 7 to 18)					
Matrilineal	−0.306	−0.328	−0.347	−0.352	−0.349	−0.361
	[0.130]**	[0.102]***	[0.106]***	[0.127]***	[0.123]***	[0.133]***
	(0.034)***	(0.041)***	(0.041)***	(0.086)***	(0.089)***	(0.089)***
Female	−0.254	−0.254	−0.252	−0.280	−0.281	−0.280
	[0.054]***	[0.053]***	[0.053]***	[0.049]***	[0.049]***	[0.048]***
	(0.011)***	(0.011)***	(0.011)***	(0.025)***	(0.025)***	(0.025)***
Matrilineal × Female	0.398	0.397	0.396	0.223	0.225	0.222
	[0.071]***	[0.070]***	[0.071]***	[0.126]*	[0.126]*	[0.125]*
	(0.017)***	(0.017)***	(0.017)***	(0.046)***	(0.046)***	(0.046)***
Observations	933,471	933,471	933,471	189,585	189,585	189,585
Ethnic Groups	357	357	357	112	112	112
DHS Clusters	17,015	17,015	17,015	3,254	3,254	3,254
Mean Dep. Var.	2.973	2.973	2.973	2.743	2.743	2.743
	Panel C: Moderate or Severe Stunting (Children under 5), (0/1)					
Matrilineal	0.008	0.001	0.002	0.019	0.022	0.020
	[0.014]	[0.012]	[0.014]	[0.013]	[0.015]	[0.015]
	(0.006)	(0.007)	(0.007)	(0.015)	(0.017)	(0.017)
Observations	300,562	300,562	300,562	62,676	62,676	62,676
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,555	14,555	14,555	2,634	2,634	2,634
Mean Dep. Var.	0.381	0.381	0.381	0.415	0.415	0.415
	Panel D: Moderate or Severe Stunting (Children under 5), (0/1)					
Matrilineal	0.011	0.004	0.005	0.032	0.035	0.033
	[0.013]	[0.013]	[0.014]	[0.015]**	[0.017]**	[0.016]**
	(0.007)*	(0.008)	(0.008)	(0.016)**	(0.018)*	(0.018)*
Female	−0.044	−0.045	−0.044	−0.030	−0.030	−0.030
	[0.003]***	[0.003]***	[0.003]***	[0.008]***	[0.008]***	[0.008]***
	(0.003)***	(0.003)***	(0.003)***	(0.007)***	(0.007)***	(0.007)***
Matrilineal × Female	−0.006	−0.005	−0.006	−0.027	−0.027	−0.027
	[0.006]	[0.006]	[0.006]	[0.015]*	[0.015]*	[0.015]*
	(0.005)	(0.005)	(0.005)	(0.013)**	(0.013)**	(0.013)**
Observations	300,562	300,562	300,562	62,676	62,676	62,676
Ethnic Groups	354	354	354	112	112	112
DHS Clusters	14,555	14,555	14,555	2,634	2,634	2,634
Mean Dep. Var.	0.381	0.381	0.381	0.415	0.415	0.415
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the DHS cluster level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The OLS sample are those country-waves represented in the RD sample; the RD analysis is restricted to a 100km boundary within ethnic pairs. The OLS specification includes country fixed effects. The RD polynomial is linear in latitude and longitude and includes an ethnicity pair fixed effect. *Baseline Controls* include child age fixed effects, urban-rural status, a survey-year fixed effect, log of the years an ethnic group has been in the EA, and an indicator for whether the ethnic group was an exact match from the Murdock sample to the EA. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include matrilocality, polygyny, and animal husbandry. *Matrilineal* is an indicator for whether a DHS cluster is located in the homeland of an ethnic group that traditionally practiced matrilineal kinship. *Years of Education* is the number of years of education a child has completed. *Moderate or Severe Stunting* is an indicator equal to 1 if the child has a height-for-age z-score of less than -2. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix D. Kananga Sample: Additional Tables and Figures

D.1. Kananga Data

Surveys and experiments were conducted in Kananga, DRC, a provincial capital on the border of the matrilineal belt. Screening surveys were conducted in 2013, 2014, and 2015 for multiple on-going projects. These screening surveys were organized by randomly sampling polygons and households within the city of Kananga to establish a sampling frame from which eligible couples were asked to participate. The screening surveys collected basic demographic information on the household head. From these screening surveys, 442 individuals and their spouses were asked to participate; 320 of them agreed and were eligible (i.e. both spouses would be present for next several months), yielding a total sample of 640 individuals. The sample represents many different matrilineal and patrilineal groups. See Table D1 for a timeline of the activities, payouts and notes. Refer to Table D2 for information on the groups included in the sample and the number of individuals per ethnic group.

Incentivized Time and Risk Questions: To measure risk and time preferences, individuals were asked five incentivized questions. In three of the questions, the individuals had to choose between gambles, where one of the two options is more risky. For example, one of the questions asks respondents if they would rather play Game 1, where they can win 1500 CF with 50% probability or 1000 CF with 50% probability or Game 2, where they can win 2500 CF with 50% probability or 0 CF with 50% probability. To ensure that the respondent understood the probability of each outcome, the gambles were contextualized using a local game that has a 50% probability of winning and losing. An additional two questions asked respondents to choose between a small amount of money now or a larger amount of money in the future. The respondents were incentivized to answer truthfully because one of these questions was randomly selected to be implemented at the end of the survey.

Additional Control Variables for Public Goods Game Analysis:

- **Share of test questions correct, [0-1]:** This is the share of test questions the respondent answered correctly prior to completing the public goods game.
- **Years of education:** This is the number of years of education the respondent has completed.
- **Trust in Foreigners, [1-4]:** This is how much the respondent reports trusting foreigners, between (1) not at all and (4) completely.
- **Trust in New People, [1-4]:** This is how much the respondent reports trusting people they have just met, between (1) not at all and (4) completely.
- **Polygynous Union, (0/1):** This is an indicator variable equal to one if the husband has multiple wives.
- **Amount Given to Spouse in the Dictator Game, [0-1000]**: This is the amount between 0 CF and 1000 CF given to the spouse in a dictator game.
- **Risk Index, [0-1]:** This is the share of three incentivized gambles for which the respondent chose the riskier option.
- **Patient Index, [0-1]:** This is the share of two incentivized time questions for which the respondent chose the delayed option.

Table D1: Timeline of Surveys and Experiments

	Date	*Activities*	*Notes*
Visit 0	June 2015	Screening Survey	
Visit 1	July 2015	Main Survey	N=640
Visit 2	August 2015	DG with spouse DG with stranger PG with spouse PG with stranger Short survey 2	N=640 Payments received after 1 week. Spouses interviewed at same time.
Visit 3		Short survey 3 Risk and time preference questions	N=614 Payments received after 1 week.

Table D2: Ethnic Groups in Kananga Sample

	Matrilineal Groups		***Patrilineal Groups***	
	Name	Number	Name	Number
1.	Bunde	5	Bindi	37
2.	Chokwe	18	Dekese	29
3.	Kete	32	Kuchu	3
4.	Kongo	18	Kusu	1
5.	Kuba	52	Luba	44
6.	Lele	28	Luba Katanga	1
7.	Lualua	10	Luluwa	135
8.	Lunda/Rund	3	Luntu	51
9.	Mbala	35	Mfuya	4
10.	Pende	6	Nyoka	2
11.	Sala	38	Songe	37
12.	Yansi	4	Tetela	40
13.	Suku	1	Other	6
	Total:	250	**Total:**	390

Notes: The "Other" patrilineal tribes not listed in the table are: Angola, Mongo, Nyambi, Nyoka, and Orendo.

Table D3: Sample Summary Statistics

Panel A: All of Sample

	Matrilineal	Patrilineal	SE	(p-value)
Age	39.5	41.6	1.192	0.088
Age Married	23.2	22.9	0.566	0.606
Age Lived with Spouse	23.3	22.9	0.545	0.517
Number of Marriages	1.11	1.18	0.036	0.044
Number of Wives	1.016	1.041	0.016	0.118
Matrilocal	0.060	0.051	0.018	0.651
Left Spouse	0.289	0.337	0.038	0.216
Years Education	11.1	9.4	0.334	0.000
Employed	0.705	0.686	0.037	0.615
Weekly Income	30.7	26.3	3.083	0.151
Savings	0.414	0.341	0.039	0.061
Obs.	640			

Panel B: Men Only

	Matrilineal	Patrilineal	SE	(p-value)
Age	42.7	45.9	1.63	0.054
Age Married	26.9	26.8	0.781	0.845
Age Lived with Spouse	26.9	26.7	0.752	0.717
Number of Marriages	1.18	1.29	0.065	0.085
Number of Wives	1.03	1.08	0.032	0.101
Matrilocal	0.039	0.047	0.023	0.739
Paid Bride Price	0.992	1.00	0.006	0.218
Left Spouse	0.352	0.356	0.055	0.935
Years Education	13.2	10.7	0.444	0.000
Employed	0.922	0.891	0.034	0.356
Weekly Income	37.2	31.9	5.32	0.327
Savings	0.375	0.351	0.055	0.660
Obs.	320			

Panel C: Women Only

	Matrilineal	Patrilineal	SE	(p-value)
Age	36.2	37.4	1.63	0.474
Age Married	19.3	19.1	0.541	0.736
Age Lived with Spouse	19.4	19.2	0.506	0.711
Number of Marriages	1.03	1.07	0.026	0.146
Matrilocal	0.081	0.056	0.029	0.372
Left Spouse	0.219	0.317	0.054	0.070
Years Education	8.98	8.13	0.420	0.044
Employed	0.480	0.487	0.058	0.895
Weekly Income	24.1	20.8	2.97	0.275
Savings	0.455	0.332	0.056	0.027
Obs.	320			

Notes: *Age* is the individuals current age. *Age Married* is the individual's age at marriage. *Age Lived with Spouse* is age at which the individual first began living with their spouse. *Number of Marriages* is the number of times the individual has been married. *Number of Wives* is the number of wives a man has currently (if polygamous). *Matrilocal* is whether the individual reports having lived with the wife's family after marriage. *Bride Price Paid* is whether the individual reports a bride price was paid at the time of marriage. *Left Spouse* is whether the individual reports having ever left their spouse for an extended period of time. *Years Education* is the number of years of education the individual has completed. *Employed* is a indicator variable equal to 1 if the individual is currently employed. *Weekly Income* is the individual's personal weekly income in dollars. *Savings* is an indicator variable equal to 1 if the individual has a savings account of some sort (formal or informal).

D.2. OLS and RD specifications for the Kananga Sample

I estimate the effect of matrilineal kinship on outcomes for women and children in the Kananga sample. I follow the RD and OLS specifications used for the analysis of the DHS data for all of Africa with a few minor modifications. The OLS specification is as follows:

$$y_{ive} = \gamma Matrilineal_e + \mathbf{X_i'}\boldsymbol{\beta} + \mathbf{X_v'}\boldsymbol{\Lambda} + \mathbf{X_e'}\boldsymbol{\Gamma} + \varepsilon_{ive} \tag{A1}$$

where y_{ive} is the outcome of interest for individual i from village of origin v and ethnic group e; $Matrilineal_e$ is an indicator equal to 1 if an individual is from an ethnic group that practices matrilineal kinship; $\mathbf{X_i}$ is a vector of covariates for individual i including age and age squared; $\mathbf{X_v}$ is a vector of geographic covariates for village of origin v; and $\mathbf{X_e}$ is a vector of ethnicity level cultural covariates for ethnic group e. Geographic controls at the village of origin level include precipitation, soil suitability, temperature, malaria suitability, and Tsetse fly suitability. Cultural controls are for reliance on animal husbandry and polygyny. I do not control for matrilocal residence because no group in the sample practices matrilocality. I present two sets of standard errors, clustered at the ethnic group level and at the DHS cluster level. The coefficient of interest is γ, the effect of residing within a DHS cluster within an ethnic group that practices matrilineal kinship.

The RD specification is as follows:

$$y_{ive} = \alpha + \gamma Matrilineal_{iv} + f(location_{iv}) + \mathbf{X_i'}\boldsymbol{\beta} + \mathbf{X_v'}\boldsymbol{\Lambda} + \mathbf{X_e'}\boldsymbol{\Gamma} + \epsilon_{ive} \tag{A2}$$

where y_{iv} is the outcome of interest for individual i from village of origin v and ethnic group e; $Matrilineal_{iv}$ is an indicator equal to 1 if the village of origin v on the matrilineal side of the matrilineal belt and equal to 0 otherwise. $f(location_{iv})$ is the RD polynomial, which controls for a smooth function of the geographic location of the village of origin v. $\mathbf{X_v}$ and $\mathbf{X_e}$ are as defined above for equation A1. The key difference is that I do not include an ethnicity pair fixed effect, since all of the villages are along a contiguous matrilineal/patrilineal border. I use a linear polynomial in latitude and longitude as the running variables. I present standard errors clustered at the ethnic group level and the village of origin level. I restrict my sample to observations within 200km of the matrilineal belt, as this restricts the range in which unobservable parameters can vary at the border. The coefficient of interest is γ: the effect of originating from a village just inside the matrilineal belt on the outcome of interest.

Table D4: Matrilineal Kinship and Outcomes in Kananga Sample

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Domestic Violence Justified Index, [1-5]					
Matrilineal	−0.167	−0.168	−0.121	−0.156	−0.108	−0.087
	[0.066]**	[0.074]**	[0.056]**	[0.074]**	[0.115]	[0.086]
	(0.075)**	(0.124)	(0.116)	(0.102)	(0.138)	(0.135)
Observations	317	317	317	305	305	305
Ethnic Groups	25	25	25	24	24	24
Villages	278	278	278	266	266	266
Mean Dep. Var.	2.570	2.570	2.570	2.562	2.562	2.562
	Panel B: Autonomy in Decision Making Index, [0-1]					
Matrilineal	−0.004	−0.105	−0.068	0.101	0.101	0.085
	[0.040]	[0.045]**	[0.039]*	[0.047]**	[0.058]*	[0.056]
	(0.039)	(0.066)	(0.058)	(0.054)*	(0.063)	(0.062)*
Observations	305	305	305	305	305	305
Ethnic Groups	24	24	24	24	24	24
Villages	266	266	266	266	266	266
Mean Dep. Var.	1.540	1.540	1.540	1.540	1.540	1.540
	Panel C: Years of Education (Children 6 to 18)					
Matrilineal	0.152	0.132	0.170	0.338	0.466	0.422
	[0.098]	[0.147]	[0.135]	[0.105]***	[0.136]***	[0.114]***
	(0.103)	(0.133)	(0.151)	(0.126)***	(0.154)***	(0.165)*
Observations	1,034	1,023	1,023	1,000	989	989
Ethnic Groups	23	23	23	22	22	22
DHS Clusters	247	244	244	236	233	233
Mean Dep. Var.	2.886	2.878	2.878	2.885	2.877	2.877
	Panel D: Child Sick in Last Month (Children 6 to 18), (0/1)					
Matrilineal	−0.117	−0.075	−0.050	−0.150	−0.142	−0.120
	[0.024]***	[0.060]	[0.058]	[0.023]***	[0.075]*	[0.064]*
	(0.039)***	(0.097)	(0.100)	(0.053)***	(0.119)	(0.108)
Observations	1,033	1,022	1,022	999	988	988
Ethnic Groups	23	23	23	22	22	22
DHS Clusters	247	244	244	236	233	233
Mean Dep. Var.	0.283	0.284	0.284	0.285	0.286	0.286
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the village of origin level in (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The RD analysis is restricted to a 200km boundary from the matrilineal belt border. The RD polynomial is linear in latitude and longitude. *Baseline Controls* include age and age squared. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include polygyny and animal husbandry. In the OLS, *Matrilineal* is an indicator for whether an individual's ethnic group practices matrilineal kinship; in the RD *Matrilineal* is an indicator for whether an individual's village of origin is on the matrilineal side of the matrilineal belt. *Domestic Violence Justified Index* is XXX. *Domestic Violence Justified Index* is the average of survey questions that ask if domestic violence is justified in various scenarios, where response options vary from "Never" to "Always". The scenarios are: a woman argues with her husband, a woman burns the food, a woman goes out without her husband's permission, a woman refuses sex, or a woman neglects the children. *Autonomy in Decision Making Index* varies from 1 to 3 and averages the responses to questions related to whether a woman has the final say in: big household purchases, spending her earnings, deciding to visit family, and deciding on health care. *Years of Education* is the number of years of education a child has completed. *Child Sick* is an indicator variable equal to 1 if the child has been sick in the last month. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Appendix E. Experimental Results: Additional Tables and Figures

E.1. Qualitative Evidence

One approach to examining how participants understood the experiment is through their responses to exit questions that asked participants why they made the particular allocation that they made and what this game reminded them of in their real life.

What motivated you to make your decision in this game?

- "I put money in the common pot because it is increased" (patrilineal woman)
- "I put money in the common pot to invest and to gain money soon" (patrilineal man)
- "My decision depended on my husband's choice but also on the opportunity to make some money" (patrilineal woman)
- "I can share some, but I also should have money in my own pot." (patrilineal man)
- "Despite that the money in the common pot is increased, I kept a lot of money in my own pot because you never know." (matrilineal man)

Do you think you should divide the money in the same way for each version? If yes, why? If no, why?

- "I divided the money intelligently because women spend money without control therefore it is necessary to give them only a small amount and to keep the rest." (patrilineal man)
- "No, because the husband has a monopoly on the common pot, and he can take decisions without asking me, therefore I also need to have money in my own pot." (matrilineal woman)
- "I put a lot in the common pot because a wife should not have her own money." (matrilineal woman)
- "I should put a lot of money in my own account because I may work to make money in the common fund but the husband can spend it all without asking me" (patrilineal woman)
- "My wife is always complaining, so I should keep money in my own account so I can I can help her when she needs it." (matrilineal man)
- "Despite everything, I put very little in the common pot and a lot in my own because money in a common pot always has consequences." (patrilineal man)
- "The husband should have all of the money because he is the boss of the wife." (patrilineal man)

What does this game remind you of in your life?

- "It reminds me of saving, a household with two savings accounts is a bad household and it runs the risk of divorce." (matrilineal woman)
- "It is important to always have savings in the house separate from the husband because sometimes he will make decisions without consulting the wife. Therefore, I always have my own savings." (patrilineal woman)
- "In the life of a couple, there are times when the wife knows something and the husband doesn't, likewise the husband can have a secret that the wife doesn't know." (patrilineal woman)

E.2. Experimental Results

Table E5: Matrilineal Kinship and Contribution in Public Goods Game

	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Women Only					
	Panel A: Amount Contributed in PG with Spouse					
Matrilineal × Won Bonus	−176.548	−175.993	−169.963	−162.824	−162.354	−164.639
	[49.561]***	[49.386]***	[47.567]***	[40.138]***	[40.336]***	[39.232]***
	(50.260)***	(50.306)***	(50.386)***	(52.625)***	(52.760)***	(52.209)***
	(50.423)***	(50.527)***	(50.459)***	(52.831)***	(52.942)***	(52.620)***
Observations	636	636	636	612	612	612
Ethnic Groups	25	25	25	24	24	24
Villages	279	279	279	267	267	267
Indviduals	318	318	318	306	306	306
Mean Dep. Var.	509.119	509.119	509.119	511.601	511.601	511.601
	Panel B: Amount Contributed in PG with Stranger					
Matrilineal × Won Bonus	−19.556	−9.061	3.908	−14.347	2.784	5.850
	[88.638]	[91.719]	[90.417]	[86.728]	[87.902]	[90.685]
	(73.248)	(72.938)	(70.641)	(75.189)	(74.607)	(71.662)
	(73.885)	(73.317)	(70.993)	(75.989)	(75.293)	(74.384)
Observations	318	318	318	306	306	306
Ethnic Groups	25	25	25	24	24	24
Villages	279	279	279	267	267	267
Indviduals	318	318	318	306	306	306
Mean Dep. Var.	461.321	461.321	461.321	460.784	460.784	460.784
	Men Only					
	Panel A: Amount Contributed in PG with Spouse					
Matrilineal × Won Bonus	−49.101	−55.640	−51.920	−76.206	−80.814	−81.102
	[78.329]	[78.387]	[74.925]	[65.439]	[65.520]	[62.037]
	(55.675)	(55.460)	(55.507)	(55.725)	(55.659)	(54.713)
	(56.550)	(56.224)	(55.818)	(56.788)	(56.701)	(55.362)
Observations	640	640	640	616	616	616
Ethnic Groups	23	23	23	22	22	22
Villages	286	286	286	274	274	274
Indviduals	320	320	320	308	308	308
Mean Dep. Var.	542.031	542.031	542.031	541.883	541.883	541.883
	Panel B: Amount Contributed in PG with Stranger					
Matrilineal × Won Bonus	30.077	0.906	6.986	67.645	48.835	47.350
	[64.356]	[61.788]	[58.043]	[66.054]	[67.769]	[64.597]
	(74.319)	(77.285)	(74.539)	(75.017)	(77.899)	(75.923)
	(76.095)	(79.301)	(76.534)	(77.048)	(79.976)	(77.210)
Observations	320	320	320	308	308	308
Ethnic Groups	23	23	23	22	22	22
Villages	286	286	286	274	274	274
Indviduals	320	320	320	308	308	308
Mean Dep. Var.	434.688	434.688	434.688	434.416	434.416	434.416
Baseline Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

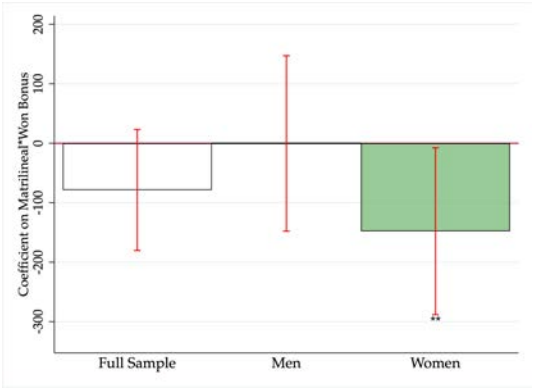
Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the village of origin level in (); standard errors clustered at the individual level in the last set of (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The RD analysis is restricted to a 200km boundary from the matrilineal belt border. The RD polynomial is linear in latitude and longitude. *Baseline Controls* include age and age squared. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include polygyny and animal husbandry. In the OLS, *Matrilineal* is an indicator for whether an individual's ethnic group practices matrilineal kinship; in the RD *Matrilineal* is an indicator for whether an individual's village of origin is on the matrilineal side of the matrilineal belt. *Matrilineal × Won Bonus* is an indicator for a matrilineal individual who won the bonus. The regression includes indicators for matrilineal and won bonus, but only the interaction term is reported. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table E6: Matrilineal Kinship and Contribution in Public Goods Game: With Additional Controls for Education, Understanding of Game, Trust, Altruism, and Time and Risk Preferences

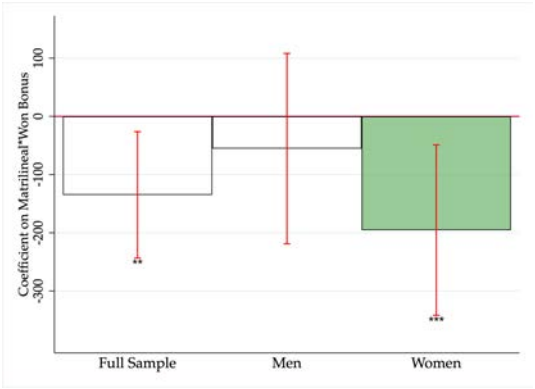
	OLS			*RD*		
	(1)	(2)	(3)	(4)	(5)	(6)
	Women Only					
	Panel A: Amount Contributed in PG with Spouse					
Matrilineal × Won Bonus	−173.058	−174.869	−162.095	−186.369	−186.628	−171.699
	[51.053]**	[51.287]***	[47.033]***	[39.632]***	[40.588]***	[37.833]***
	(51.183)**	(51.109)**	(51.343)**	(52.235)***	(51.961)***	(51.677)***
	(50.492)**	(50.557)**	(50.939)**	(52.203)***	(51.988)***	(51.963)***
Observations	610	610	610	588	588	588
Ethnic Groups	25	25	25	24	24	24
Villages	267	267	267	256	256	256
Indviduals	305	305	305	294	294	294
Mean Dep. Var.	514.918	514.918	514.918	516.667	516.667	516.667
	Panel B: Amount Contributed in PG with Stranger					
Matrilineal × Won Bonus	14.565	22.193	13.060	40.568	52.306	31.137
	[84.699]	[89.030]	[94.267]	[84.461]	[86.583]	[97.357]
	(74.227)	(73.033)	(70.682)	(75.819)	(74.819)	(72.367)
	(74.847)	(73.662)	(71.154)	(76.688)	(75.883)	(74.921)
Observations	305	305	305	294	294	294
Ethnic Groups	25	25	25	24	24	24
Villages	267	267	267	256	256	256
Indviduals	305	305	305	294	294	294
Mean Dep. Var.	468.525	468.525	468.525	469.048	469.048	469.048
	Men Only					
	Panel A: Amount Contributed in PG with Spouse					
Matrilineal × Won Bonus	−17.632	−21.907	−9.330	−42.689	−47.933	−49.768
	[67.499]	[68.225]	[68.041]	[60.515]	[61.575]	[61.992]
	(53.187)	(53.058)	(53.280)	(54.097)	(54.276)	(52.744)
	(53.878)	(53.622)	(53.815)	(54.726)	(54.779)	(53.585)
Observations	614	614	614	594	594	594
Ethnic Groups	23	23	23	22	22	22
Villages	275	275	275	265	265	265
Indviduals	307	307	307	297	297	297
Mean Dep. Var.	542.182	542.182	542.182	541.246	541.246	541.246
	Panel B: Amount Contributed in PG with Stranger					
Matrilineal × Won Bonus	41.819	14.404	24.268	85.269	64.250	79.554
	[72.534]	[71.671]	[63.590]	[73.920]	[78.460]	[72.168]
	(74.774)	(77.837)	(77.260)	(75.886)	(79.926)	(79.669)
	(75.994)	(79.082)	(78.999)	(77.263)	(81.239)	(81.625)
Observations	307	307	307	297	297	297
Ethnic Groups	23	23	23	22	22	22
Villages	275	275	275	265	265	265
Indviduals	307	307	307	297	297	297
Mean Dep. Var.	433.550	433.550	433.550	435.017	435.017	435.017
Baseline Controls	Y	Y	Y	Y	Y	Y
Additional Controls	Y	Y	Y	Y	Y	Y
Geographic Controls	Y	Y	Y	Y	Y	Y
Cultural Controls	N	Y	Y	N	Y	Y
LASSO Controls	N	N	Y	N	N	Y

Notes: Standard errors clustered at the ethnic group level in []; standard errors clustered at the village of origin level in (); standard errors clustered at the individual level in the last set of (). The first 3 columns present coefficients from OLS regressions; the last 3 columns present coefficients from a geographic regression discontinuity design. The RD analysis is restricted to a 200km boundary from the matrilineal belt border. The RD polynomial is linear in latitude and longitude. *Baseline Controls* include age and age squared. *Additional Controls* include controls for: share of test questions correct, years of education, trust in foreigners, trust in new people, a polygynous union, years of education, incentivized time and risk questions, and amount given to the spouse in the dictator game. *Geographic Controls* include mean annual temperature, mean annual precipitation, soil quality, Tsetse fly suitability, and malaria suitability. *Cultural Controls* include polygyny and animal husbandry. In the OLS, *Matrilineal* is an indicator for whether an individual's ethnic group practices matrilineal kinship; in the RD *Matrilineal* is an indicator for whether an individual's village of origin is on the matrilineal side of the matrilineal belt. *Matrilineal × Won Bonus* is an indicator for a matrilineal individual who won the bonus. The regression includes indicators for matrilineal and won bonus, but only the interaction term is reported. *LASSO Controls* use LASSO methods from Belloni et al. (2014) to select controls from the full set of controls. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure E6: Public Goods Game Results: By Game Version



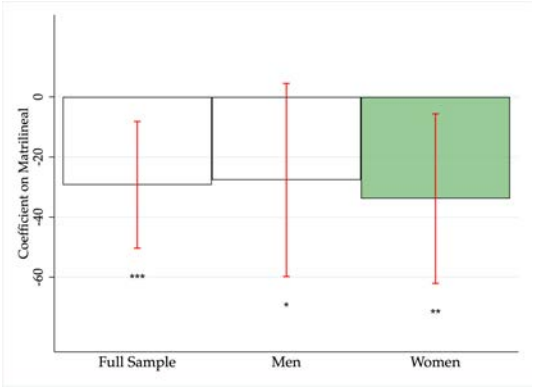
(a) Public Goods Game, $\times$ 1.5 Version



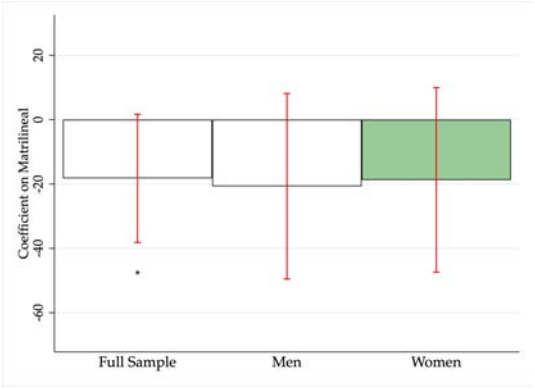
(b) Public Goods Game, $\times$ 2 Version

Note: These figures show coefficient β plots of the estimating equation: $y_i = \gamma_1 \mathbb{1}_i^{Matrilineal} + \gamma_2 \mathbb{1}_i^{Bonus} + \beta(\mathbb{1}_i^{Bonus} * \mathbb{1}_i^{Matrilineal}) + X_i'\omega + \epsilon_i$. This estimating equation is run on the full sample, only males and only females for each outcome.

Figure E7: Dictator Game Results: Effect of Matrilineal by Gender



(a) Dictator Game, With Spouse



(b) Dictator Game, With Stranger

Note:These figures show coefficient β plots of the estimating equation: $y_i = \beta_1 \mathbb{1}_i^{Matrilineal} + X_i'\omega + \epsilon_i$. This estimating equation is run on the full sample, only males and only females for each outcome.