Can Policy Change Culture? Government Pension Plans and Traditional Kinship Practices

By NATALIE BAU*

Policies may change the incentives that allow cultural practices to persist. To test this, I study matrilocality and patrilocality, kinship traditions that determine daughters' and sons' post-marriage residences and thus, which gender lives with and supports parents in their old age. Two separate policy experiments in Ghana and Indonesia show that pension policies reduce the practice of these traditions. I also show that these traditions incentivize parents to invest in the education of children who traditionally co-reside with them. Consequently, when pension plans change cultural practices, they also reduce educational investment. This finding further demonstrates that policy can change culture.
Keywords: cultural transmission, cultural change, kinship traditions, intergenerational transfers.

Cultural traditions evolve in response to the conditions in which humans live[1] (Boyd and Richerson, 1988) and can facilitate better outcomes by alleviating market incompleteness and substituting for laws or policies (Greif, 1993). As modernizing countries adopt new policies, culture may change. This paper provides new evidence on whether policies lead to cultural change by studying traditional, ethnicity-level practices that determine whether daughters (matrilocal), sons (patrilocal), or neither gender (neolocal) live with their parents after marriage. In so doing, it also adds to a nascent literature in economics that builds on anthropologists' recognition of the importance of kinship traditions for economic outcomes, particularly in low-income countries.

I hypothesize that matrilocal and patrilocal practices have two important effects. First, they ensure old age support for parents in the absence of pension plans and savings mechanisms by designating which children will care for parents in their old age, providing a form of informal insurance.[2] Second, they provide parents with an additional incentive to invest in the human capital of these children since they are more likely to share in the labor and marriage market returns of their human capital investments. This second effect is consistent with a growing literature that

* UCLA, NBER, and CEPR, Bunche Hall, 315 Portola Plaza, Los Angeles, CA, nbau@ucla.edu. I acknowledge the support of the CIFAR Azrieli Global Scholars Program. Comments from the editor and two anonymous referees greatly improved the paper. I am grateful to Nava Ashraf, David Baqaee, Alberto Bisin, Tim Besley, Pamela Campa, Raquel Fernández, Paola Guiliano, Asim Khwaja, Eliana LaFerrara, Adriana Lleras-Muney, Nathan Nunn, Manisha Shah, Aloysius Siow, and Alessandra Voena, as well as seminar and conference participants at Harvard-MIT, Dartmouth, UCLA, CIFAR, NYU, LSE, UCL, Simon Fraser, PSE, Namur, H2D2, SIOE, the Galatina Meetings, and UToronto for their helpful comments. Matias Giaccobasso, Eva Ng, Palermo Penano, Maria Sauval, and William Stukas provided exceptional research assistance.

[1] As anthropologists Boyd and Richerson (1988) write, "humans adjust their [cultural] phenotypes in response to their environments through learning and rational calculation" (p. 9).

[2] Jayachandran (2015) reviews the literature on patrilocality and its link to old age support by sons, Banerjee et al. (2014) show that parents perceive children as an important source of old age support in China, and Jensen and Miller (2017) show that living together is important for children providing parents with old age support in India.

suggests that imperfectly altruistic parents may invest less than is optimal in their children since their children cannot credibly commit to repaying that investment in the future (Becker, Murphy and Spenkuch, 2016; Banerjee, 2004; Ashraf et al., 2020). Under this hypothesis, large-scale social programs like pension plans weaken the incentives to practice matrilocality and patrilocality, crowding out a form of informal insurance. This also undermines parents' incentives to invest in the human capital of matrilocal (patrilocal) daughters (sons). Thus, observing changes in educational investment related to changes in the practices of matrilocality and patrilocality provides an additional measure of cultural change beyond directly observing changes in cultural practices.

In an environment where parents strategically transmit cultural traditions or preferences to their children (as in Bisin and Verdier (2001) and Guttman (2001)), the above hypothesis generates several testable predictions. First, if matrilocality mitigates incomplete contracting problems in educational investment for daughters, education rates should be higher for daughters in traditionally matrilocal ethnic groups relative to sons as compared to other ethnic groups (and vice versa for traditionally patrilocal sons). Second, the introduction of a pension plan, which reduces the need for old age support, should reduce the transmission of matrilocal and patrilocal traditions to children, and therefore, the practices of matrilocality and patrilocality among children who were exposed to the pension plan. As this will exacerbate incomplete contracting problems, educational outcomes for daughters from traditionally matrilocal ethnic groups who were exposed as children should also differentially decline, as should the educational outcomes of traditionally patrilocal sons. Third, because social stigma and the cultural traits of an individual's spouse both play a role in whether an individual practices a cultural tradition, the behavior of those who are directly affected by the pension plan may also affect the behavior of co-ethnics who do not themselves receive the plan. A cultural externality can therefore amplify the pension program's effects and cause the effects of the share of the population exposed to the program on education and the practice of matrilocality/patrilocality to be non-linear.

I test these predictions in Indonesia and Ghana.[3] While the primary analyses are in Indonesia, where there is more detailed data on the rollout of the pension program, the analyses from Ghana provide evidence that these results are externally valid. As predicted, in Indonesia, females in traditionally matrilocal groups are more likely to be enrolled in school relative to their brothers when compared to females from non-matrilocal groups. In Ghana, the same is true for males from traditionally patrilocal ethnic groups.

Turning to the Indonesian pension program, I provide – to my knowledge – the first estimates of the effects of the 1977 introduction of a pension system, Astek, on education and cultural practices.[4] The primary triple-differences analyses exploit ethnicity-level variation in traditional customs, variation in pension plan exposure based on birth year, and geographic variation in the intensity of the rollout. They show that the pension program differentially reduced educational investments in females from traditionally matrilocal ethnic groups. These women were also less likely to practice matrilocality as adults. In contrast, the plan had no differential effects on traditionally matrilocal males' education. In line with the existence of cultural externalities, the effects

[3]Unlike most potential settings, Indonesia and Ghana have within-country variation in matrilocality/patrilocality across ethnic groups. Both have also introduced pension plans in the recent past.

[4]Sudomo (1985), Muliati (2013), and Perusahan Umum Asuransi Sosial Tenaga Kerja (1985) discuss this policy in more detail.

of the intensity of the pension's rollout on both the practice of matrilocality and education are non-linear, with discontinuously large effects in the top tercile of treated provinces.

In Ghana, I exploit the timing of the introduction of a 1972 pension policy to provide estimates of this policy's effect on education and cultural practices. Males from traditionally patrilocal ethnic groups who were exposed to the program for longer received less education than non-traditionally patrilocal males and were less likely to practice patrilocality as adults. Thus, the results from Indonesia replicate in a very different setting.

Beyond examining whether policies can lead to cultural change, this paper provides evidence on the role of cultural traditions in the provision of old age support and how they interact with formal old age support policies. Declines in fertility and increases in longevity have led to rapidly aging populations throughout the world (Lee, Mason and Cotlear, 2010). In over half of the world's countries, the increase in the population in the 60+ category dominates increases in younger groups, and by 2050, the percent of the population that is 65+ is expected to exceed 15 percent in 42 countries with GDP per-capita below 10,000 USD in 2005 (Lee, Mason and Cotlear, 2010). The World Bank (2020) writes, "The most dramatic aging worldwide is projected to take place in low and middle-income countries." To address this challenge, the World Bank has been involved in pension reforms in over 90 countries (World Bank, 2020). A better understanding of how old age support is informally provided and of the consequences of formal old age support policies is therefore crucial for the design of these policies throughout the world.

This paper contributes to several literatures. It builds on the literature on the evolution of cultural practices and attitudes (Giuliano and Nunn, 2016; Lowes et al., 2017; Bidner and Francois, 2011; Anderson and Bidner, 2015). Most empirical papers in this literature study the effects of large shocks that likely affected culture along many dimensions. For example, Campa and Serafinelli (2019) and Alesina and Fuchs-Schündeln (2007) study the effects of state socialism on attitudes. Other papers study the effect of different historical empires (Peisakhin, 2010; Becker et al., 2015; Grosfeld and Zhuravskaya, 2015; Wysokinskya, 2015). In contrast, this paper studies relatively small policy changes[5] that come with modernization and shows that these policies can lead to cultural change.

Additionally, this paper contributes to a growing literature on the importance of family ties and kinship practices for economic outcomes (Alesina and Giuliano, 2013; Alesina et al., 2015; Alesina and Giuliano, 2011; Enke, 2019; La Ferrara, 2007; Lowes, 2016; Schulz, 2018; Akbari, Bahrami-Rad and Kimbrough, 2018; Moscona, Nunn and Robinson, 2017). While anthropologists have long believed that these kinship traditions are an important driver of outcomes in low-income countries, this understanding is relatively new in economics. I contribute to this literature by showing how a specific set of kinship practices – matrilocality and patrilocality – affect human capital investment.[6]

[5]Several other papers document that policies can affect culture and/or attitudes. Gruber and Hungerman (2007) show that the New Deal's "modernization" policies crowded out the informal social safety net of church-based charitable spending. Bastian (2020) shows that the introduction of the EITC contributed to a rise in working mothers in the United States, and Beaman et al. (2009) provide evidence that female leadership quotas change voter attitudes in India.

[6]Two related papers study the relationship between kinship traditions and human capital investment in Indonesia. Levine and Kavane (2003) use the Indonesia Family Life Survey data set to study the relationship between patrilocality (as determined by an expert respondent at the village-level) and gender biased investment in Indonesia and do not find a strong relationship. Rammohan and Robertson (2012) find a strong negative relationship between ex post migration and female education in the IFLS. The analysis on the link between kinship traditions and human capital in this paper differs from these papers both by using a different, larger data set and a

This paper also adds to an emerging literature on the importance of culture for determining the effects of different policies (Ashraf et al., 2020; World Bank, 2015; Ebenstein, 2014; La Ferrara and Milazzo, 2017, Schoellman and Tertilt, 2006; Tertilt, 2005), as well as the growing literature that examines the effects of gender-related cultural traditions (Fernández, 2007; Fernández, 2011; Fernández and Fogli, 2009; Tertilt, 2006; Alesina, Giuliano and Nunn, 2013; Giuliano, 2014; Alesina, Brioschi and La Ferrara, 2015; Corno, Hildebrandt and Voena, 2020; Corno and Voena, 2015; Gneezy, Leonard and List, 2009; Becker, 2018; Jayachandran and Pande, 2017).

Finally, this paper contributes to a large literature on informal insurance networks (examples include Munshi and Rosenzweig (2016) and Mazzocco and Saini (2012) on the role of caste networks, Caldwell, Reddy and Caldwell (1986) on the role of fertility, and Rosenzweig and Stark (1989) on exogamy) and how they interact with modernizing environments (e.g. Meghir et al. (2019) on the interaction between village risk-sharing and migration and Munshi and Rosenzweig (2006) on the interaction of caste networks with increasing returns to English language education). I contribute to this rich literature by providing evidence on how cultural traditions can play a role in facilitating transfers between children and parents and documenting how informal arrangements respond to the growth of formal social insurance.

The paper is organized as follows. Section 2 provides an overview of patrilocal and matrilocal traditions. Section 3 outlines a brief conceptual framework to guide the empirical analysis. Section 4 reports estimates of the effect of traditional matrilocality and patrilocality on the gender gap in education in Indonesia and Ghana. Section 5 turns to the primary analysis of the paper, testing whether the introduction of the pension plan differentially reduced female education and the transmission of matrilocality among traditionally matrilocal groups in Indonesia. Section 6 replicates the key findings for patrilocality in Ghana. Section 7 reports additional findings, and Section 8 concludes.

I. Patrilocal and Matrilocal Customs

In this section, I first document how I classify ethnic groups as matrilocal and patrilocal and describe the variation in these measures. Then, to provide context for the analyses in this paper and identify potential sources of bias, I discuss theories on the origins of matrilocality and patrilocality from the anthropological literature. Finally, to validate the anthropological data, I show that, even in recent data sets, the assignment of these ethnicity-level traditions predicts matrilocal and patrilocal practices.

A. Variation in Matrilocality and Patrilocality

My analysis requires the measurement of the traditional post-marriage residency practices of different ethnic groups. To do so, I use data from the *Ethnographic Atlas* (Murdock, 1967), which codes ethnic groups' traditional, pre-modernization cultural practices.[7] To arrive at ethnicity-level measures of traditional matrilocality and patrilocality in the Indonesian and Ghanian censuses, I

different definition of matrilocality drawn from the anthropological literature, and also by providing symmetric results on patrilocality in Ghana. By exploiting exogeneous variation from pension plan introductions to show that reducing the practice of matrilocality and patrilocality reduces the education of the targeted gender, this paper also provides more evidence that the link between these kinship traditions and education is causal.

[7] Of the 1,235 ethnic groups for whom data on ethnicity-level practices are available in the *Ethnographic Atlas*, 880 are traditionally patrilocal (71 percent), 155 are traditionally neolocal (13 percent), and 200 are traditionally matrilocal (16 percent).

follow methods developed by Ashraf et al. (2020) and Alesina, Giuliano and Nunn (2013). I use the *Ethnologue* (Gordon, 2009) to match the ethnicity or language data collected by the censuses with the ethnicity-level data on cultural practices available in the *Ethnographic Atlas*. Because there are more disaggregated ethnic groups in the censuses than the *Ethnographic Atlas*, multiple ethnic groups in a census may be matched to 1 ethnic group in the *Ethnographic Atlas*.

In Indonesia, I match 812 of the 827 languages in the 2010 census to 45 groups in the *Ethnographic Atlas* with information on post-marriage residence (matrilocality, neolocality, or patrilocality). I focus on variation between traditional matrilocality and patrilocality/neolocality, since groups that primarily practice patrilocality or neolocality in Indonesia often practice the other as a secondary practice (Lebar, 1972).[8] In Ghana, I successfully match 53 of the 57 ethnic groups in the 2000 census to 24 groups with information on post-marriage residence in the *Ethnographic Atlas*. In an alternative match using Gil (1964) and Asante and Mazama (2009), the majority of the groups coded as matrilocal in this match are neolocal. Therefore, I focus on the margin between patrilocality and neolocality/matrilocality.[9]

Using this assignment of matrilocality and patrilocality, I map the geographic variation in these practices. Figure 1 reports the district-level percent of individuals in the census who belong to traditionally matrilocal (in Indonesia) and patrilocal (in Ghana) ethnic groups. While these traditions are not uniformly distributed in either country, there is still a great deal of geographic variation in matrilocal and patrilocal traditions.

B. Origins of Matrilocality and Patrilocality

Theories in anthropology on the origins of matrilocality and patrilocality shed light on other cultural traits that could be correlated with these traditions. One theory argues that early hunter gatherer societies were typically matrilineal (lineage and inheritance pass through the mother's line, and a son usually inherits from his maternal uncle) because sexual promiscuity made it difficult to identify a child's father (Engels, 1942). Matrilocality and matrilineality may in turn be correlated since matrilocality allows children to grow up with their mother's family, which is their lineage group under matrilineality.[10]

An alternative theory is that matrilineality tends to occur in horticultural societies where women often have a more dominant role in agriculture (Jones, 2011). Relatedly, Holden and Mace (2003) argue that patrilineality (and therefore, patrilocality) may be more likely to evolve in pastoral societies with access to cattle, where men play a larger role in agricultural production.

[8]This choice follows from two additional pieces of information. The first piece of information come from the *Ethnographic Atlas*, which reports both the primary post-marriage residential practice, which is what is used for the coding in this paper, and the alternative practice. According to the *Ethnographic Atlas*, less than 1 percent of individuals who report matrilocality as their primary practice have an alternative practice. In contrast, among those who report patriocality as their primary form, 82 percent report neolocality as an alternative. The second piece of information comes from a secondary match that I created of large ethnic groups in the 2010 Indonesia census to ethnic traditions using Lebar (1972) and Strouthes (1993). In this match, less than half of the individuals who were coded as patrilocal according to the *Ethnographic Atlas* are still coded as patrilocal. However, the coding of matrilocality was very stable across concordances. 99 percent of individuals coded as matrilocal according to the *Ethnographic Atlas* are also coded as matrilocal according to the alternative concordance.

[9]If a group is primarily patrilocal according to the *Ethnographic Atlas*, the second match agrees 76 percent of the time. This second match, however, never codes groups as matrilocal. The majority of the groups that are matrilocal in the match from the *Ethnographic Atlas* (92 percent) are coded as neolocal in this match.

[10]Matrilineality doesn't typically imply women inherit. In *Status of Women in Pre-Industrial Societies*, Whyte (1978) notes that in matrilineal societies, "It is perfectly possible for the position of women to be as low as the greatest misogynist would desire" (p. 7).

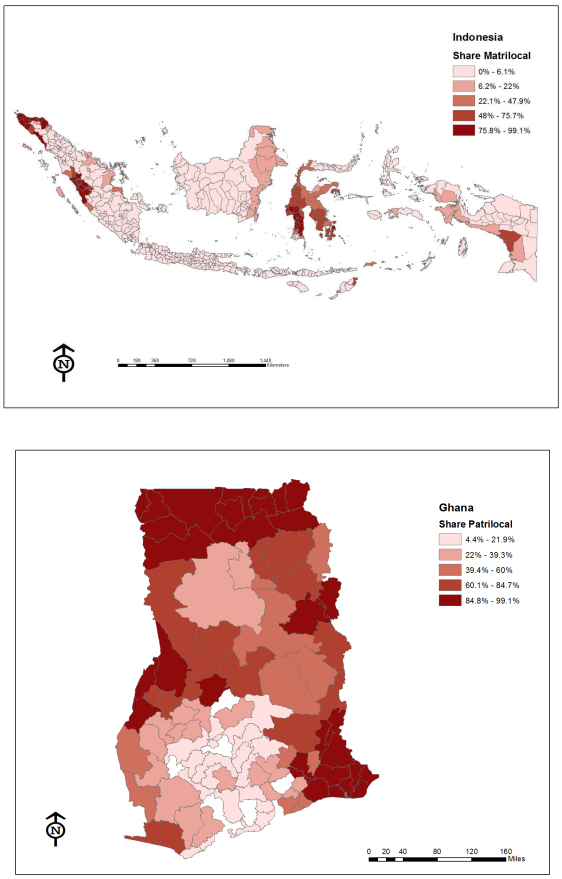

Figure 1. : Distribution of Matrilocal Groups in Indonesia and Patrilocal Groups in Ghana

Note: The figure reports the percent of the population in a district that traditionally practices matrilocality in Indonesia (top) and traditionally practices patrilocality in the Ghana (bottom).
Source: Population shares were constructed by matching the Indonesia 2010 census and the Ghana 2000 census (data provided by Minnesota Population Center (2011)) to data on ethnicity-level traditions from Murdock (1967).

Finally, some anthropologists have also linked matrilineality to dowry and patrilineality to bride price. For example, Vroklage (1952) suggests that bride price, a payment from the family of the husband to the family of the bride at the time of marriage, compensates the family of the bride for taking the daughter from their lineage group.

Using data from the *Ethnographic Atlas*, I examine whether across- and within-country correlations in traditional practices are consistent with these theories. I also test whether matrilocality and patrilocality are correlated with other characteristics believed to be related to gender-biased behavior. Appendix Table A1 estimates the global correlation between ethnicity-level matrilocality and patrilocality and aboriginal plow use, polygamy, bride price, male-dominated agriculture,

and matrilineality. Consistent with the anthropological literature, patrilocality and matrilocality are strongly correlated with bride price and matrilineality across ethnic groups.

However, the correlations between these traditions and matrilocality and patrilocality may be weaker within countries, where the traditional practices of the populations are more homogeneous. Appendix Table A2 reports the correlations between matrilocality and other traditions within Indonesia and between patrilocality and other traditions within Ghana.[11] I run these regressions at the individual instead of the ethnic group level to allow larger ethnic groups to have more weight, as they do in my main analysis, and cluster the standard errors at the *Ethnographic Atlas* ethnicity-level. As the table shows, there is no variation in Ghana in polygamy (all groups are historically polygamous), male-dominated agriculture (no ethnic groups have exclusively male agriculture), and aboriginal plow use (no groups had the plow). Additionally, in Ghana, bride price and matrilineality do not correlate with patrilocality. In Indonesia, bride price and male-dominated agriculture are not correlated with matrilocality, while aboriginal plow use, polygamy, and matrilineality are. Altogether, though patrilocality and matrilocality are correlated with other cultural traditions in Indonesia, these relationships are not systematic across both countries.[12] Nonetheless, throughout this paper, I control for a set of cultural traditions that have been linked with gender-biased behavior consisting of aboriginal plow use, bride price, male-dominated agriculture, and polygamy.

C. Modern Practice of Matrilocality and Patrilocality

I now validate my ethnicity-level measures of matrilocality and patrilocality from the *Ethnographic Atlas* by testing whether they predict modern behavior. I use the 2000 Ghana census, the 2010 Indonesia census,[13] and the 2000 and 2007 rounds of the Indonesia Family Life Survey or IFLS (Strauss et al., 2004, 2009), which provides more detailed data on matrilocal practices. In the censuses, I code a household as practicing matrilocality (patrilocality) if a married daughter (son) lives in the same household as her parents. This is a lower-bound measure of the prevalence of these traditions. It does not capture cases where a child lives in the same compound or the same village as a parent but does not live in the same census household.[14] Nor does it capture cases where matrilocality and patrilocality are not possible because there are no living parents or married children.

Columns 1–3 and 6–8 of Table 1 report the coefficients from regressions of the practice of matrilocality and patrilocality in the censuses on indicator variables for whether the household head belongs to a traditionally matrilocal or patrilocal ethnicity. In the case of Indonesia, I further include province fixed effects to account for important geographic variation across islands in traditional practices. In addition to the baseline specifications (columns 1 and 6), columns 2 and 7 control for other cultural traits, and columns 3 and 8 restrict the sample to individuals who live outside their ethnic homelands.[15] This restriction follows from the "epidemiological approach"

[11] To account for the fact that much of the variation in cultural traditions in Indoensia is across islands, I further control for province fixed effects in Indonesia.

[12] Matrilocality and patrilocality may still be associated with unobserved gender biased attitudes. While research in this area is limited, Alesina, Brioschi and La Ferrara (2015) provide evidence that there is no correlation between patrilocality and domestic violence or attitudes toward violence against women in 18 Sub-Saharan African countries.

[13] Both censuses are provided by the Minnesota Population Center (2011).

[14] Beaman and Dillon (2012) show that determining the exact boundaries of a household in low-income countries is difficult, and the choice of boundaries may affect the results of economic analysis.

[15] To determine if an individual lives outside his or her ethnic homeland, I match the ethnic groups in the data to ethnicity-level

(Fernández and Fogli, 2006), which analyzes the effect of the cultural background of different migrants to the same destination on their behavior. By comparing migrants in the same destination from different cultural backgrounds, this approach separates the effect of culture from other confounders and shows that culture has persistent effects.

In Indonesia, the baseline specification indicates that belonging to a matrilocal ethnicity increases the likelihood a household practices matrilocality by 3.2 percentage points (39 percent). In Ghana, belonging to a patrilocal ethnicity increases the likelihood a household practices patrilocality by 3.2 percentage points (44 percent). Columns 3 and 8 of Table 1 also indicate that historical traditions are predictive of modern-day practices, even among individuals who no longer live in their ethnic homeland.

Table 1—: Association Between Cultural Traditions and Current Practices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Indonesia 2010 Census			**Indonesia Family Life Survey**		**Ghana 2000 Census**		
	Household Practices Matrilocality			Respondent Practices Matrilocality		Household Practices Patrilocality		
Matrilocal Ethnicity	0.032	0.023	0.020	0.061	0.064			
	(0.006)	(0.006)	(0.003)	(0.019)	(0.029)			
				[0.020]	[0.292]			
Patrilocal Ethnicity						0.032	0.033	0.020
						(0.011)	(0.016)	(0.009)
Non-Homeland Sample	N	N	Y	N	N	N	N	Y
Province FE	Y	Y	Y	Y	Y	N	N	N
Ethnicity Tradition Controls	N	Y	N	N	Y	N	Y	N
Muslim Control	N	Y	N	N	Y	N	Y	N
Age FE	N	N	N	Y	Y	N	N	N
Mean Dep. Var.	0.082	0.082	0.065	0.200	0.200	0.071	0.071	0.066
Number of observations	6,067,884	6,063,227	1,485,992	8,776	8,772	298,245	298,245	154,292
Clusters	45	45	45	13	13	24	24	24
Adjusted R^2	0.009	0.010	0.009	0.027	0.027	0.004	0.005	0.002

Note: For the census data sets, this table regresses an indicator variable for whether a household practices matrilocality (a married daughter lives in the same household as her parents) or patrilocality (a married son lives in the same household as his parents) on indicator variables for whether the household head belongs to a traditionally matrilocal or patrilocal ethnicity. An observation is then a household. For the Indonesia Family Life Survey (rounds 3 and 4), this table regresses an indicator variable equal to 1 if a female, married respondent between the ages of 25 and 45 with at least one living parent reports one or both of her biological parents live with her or her sister on an indicator variable for whether the respondent belongs to a matrilocal ethnic group. Ethnicity controls consist of indicator variables for polygamy, aboriginal plow use, male-dominated agriculture, and bride price customs, and indicator variables for cases where information on these customs is missing. Standard errors are clustered at the *Ethnographic Atlas* ethnicity level. Due to the small number of clusters in the IFLS, wild bootstrapped p-values appear in the brackets for these regressions.
Source: Data sources consist of the Indonesia 2010 census and the Ghana 2000 census (Minnesota Population Center, 2011), rounds 3 and 4 of the Indonesia Family Life Survey (Strauss et al., 2004, 2009), and information on ethnicity-level traditions and homelands from Murdock (1967); Gordon (2009).

I next replicate these tests of the predictive power of matrilocal traditions using the IFLS data. Unlike the censuses, the IFLS asks respondents whether each of their biological parents is alive, lives with them, or lives with a sister. I restrict my sample to daughters who are married, have a

GIS shape files of the boundaries of ethnic/linguistic homelands from the 16th edition of the Ethnologue (Gordon, 2009) for Indonesia and the Murdock map for Africa in Ghana (Murdock, 1967). Ethnicities whose homelands in Ghana could not be identified with the Murdock map were matched to homelands based on the Ethnologue 16. In the non-homeland sample, any individual living in a district that is identified as being part of his or her ethnic homeland is dropped from the sample. I am grateful to Nathan Nunn for sharing this data with me.

living parent, and are aged 25–45. These restrictions ensure that I examine an adult sample that *can* practice matrilocality and is unlikely to be affected by differential mortality. The respondent is coded as practicing matrilocality if at least one parent lives with either the respondent or her sister. Because an observation is now an individual instead of a household, I further control for age fixed effects. The results from the IFLS suggest that the census measure of the pervasiveness of matrilocality is a lower bound. Compared to the 8 percent of households in the census, 20 percent of married females in the IFLS are coded as practicing matrilocality. Columns 3 and 4 show that belonging to a matrilocal ethnicity is associated with a 6 percentage point increase in practicing matrilocality (30 percent).[16]

II. Conceptual Framework

This section provides a brief conceptual framework guided by the theoretical work of Banerjee (2004) and Bisin and Verdier (2001) to generate predictions for the empirical analysis. Appendix A shows that these predictions can be produced by an equilibrium model of cultural transmission and human capital investment. An imperfectly altruistic parent can be thought of as choosing whether to attempt to transmit her ethnic group's cultural tradition (matrilocality or patrilocality) to her child in line with Bisin and Verdier (2001). If a parent transmits the cultural tradition, the child will have a positive probability of practicing that tradition as adult.[17] However, that positive probability will also depend on how widespread the tradition is among co-ethnics, both because the practice of the tradition is enforced if deviating leads to social stigma and because the child's spouse must also agree to practice the tradition.[18] Transmitting cultural traditions may be costly because it leads children to forgo profitable migration opportunities, because the parent must practice matrilocality or patrilocality to model the behavior, or because it has actual financial costs. However, there are also benefits to transmitting a cultural tradition. If a parent transmits the tradition, it increases the likelihood that a child of the targeted gender stays with the parent and provides her with old age support, allowing the parent to informally save in a context with little access to formal savings technologies. Additionally, as the child will be able to provide more old age support if she is more educated due to marriage market[19] or labor market returns,[20]

[16]Given that I will show that the introduction of a pension plan reduces these practices, cultural traditions likely had an even stronger differential effect on the practices of matrilocality and patrilocality before the pension plan was introduced. My estimates – which I will discuss in detail in Section 5 – indicate that the pension plan differentially reduced the likelihood of practicing matrilocality among traditionally matrilocal females by 7 percentage points. Taking the 6 percentage point difference from the IFLS as the modern effect of traditional matrilocality, this indicates that prior to the plan, traditionally matrilocal females were at least 13 percentage points more likely to practice matrilocality.

[17]Appendix Table A3 provides evidence from the panel IFLS that matrilocal practices are indeed transmitted across generations. Female descendants of households that practiced matrilocality in the first round of the IFLS in 1993 (but themselves were not observed practicing matrilocality in 1993) with at least one living parent were almost 50 percentage points more likely to be observed practicing matrilocality in 2000 and 25 percentage points more likely to be observed practicing it in 2007.

[18]As noted by anthropologists, co-residence traditions require "interlocking and coordinated social exchange" (Jordan and Mace, 2009). This reasoning assumes that individuals marry within their own ethnic group, and the data is consistent with this assumption. In the Indonesia 2010 census, less than 1 percent of household heads have a spouse from an ethnicity with a different post-marriage residency practice. In the Ghana 2010 census, only 13.8 percent of married household heads have a spouse from an ethnicity with a different post-marriage residency practice.

[19]Ashraf et al. (2020) show that marriage market matching in Indonesia is highly assortative in education. Thus, parents of more educated matrilocal daughters in Indonesia benefit from both the labor market returns to education and the increased quality/income of the daughter's spouse.

[20]More than 50 percent of women aged 25–45 in the 2010 Indonesian census are employed, and Mincerian regressions reported in Appendix Table A21 show that greater female education is associated with a greater chance of employment, higher wages, and greater

transmitting the tradition allows the parent to partake in the returns to the child's education. As Banerjee (2004) shows, cultural traditions or social norms that increase a parent's ability to capture the returns to education mitigate incomplete contracting problems that would otherwise lead to inefficiently low educational investment when parents are imperfectly altruistic. Thus, matrilocality incentivizes educational investment in daughters and patrilocality incentivizes it in sons, producing the conceptual framework's first testable prediction.

PREDICTION 1: *Education will be higher for daughters relative to sons for traditionally matrilocal ethnic groups relative to other ethnic groups. Education will be higher for sons relative to daughters for traditionally patrilocal ethnic groups relative to other ethnic groups.*

Consider what happens when the government introduces a pension account that a parent pays into when she is young and receives as a lump-sum when she is old. This formal savings technology makes old age support from a child less valuable, and as a result, the parent is less likely to transmit her ethnic group's cultural tradition to her child. Thus, a child who is exposed to the pension program becomes less likely to practice matrilocality/patrilocality as an adult. As in Banerjee (2004), the removal of the cultural tradition exacerbates incomplete contracting problems between the parent and children whose genders would otherwise be targeted by the prevalent cultural tradition.

PREDICTION 2: *Daughters from traditionally matrilocal ethnic groups who were exposed to the pension plan will have less education and be less likely to practice matrilocality as adults. Sons from traditionally patrilocal ethnic groups who were exposed to the pension plan will have less education and be less likely to practice patrilocality as adults.*

An important caveat to Predictions 1 and 2 is that they rely on the assumption that educating a child does not increase the probability that she migrates (and reneges on the tradition) by enough to eliminate parents' old age support motive to educate the child. In Section 7, I provide descriptive evidence that this is the case for traditionally matrilocal females in Indonesia and traditionally patrilocal males in Ghana. Consistent with the idea that a parent is more likely to educate a child to whom they also transmit the cultural tradition, education (for secondary and university education in Indonesia and for primary schooling in Ghana) is positively associated with co-residing with parents as an adult for these samples. However, in other contexts, like the Indian context studied by Jensen and Miller (2017), where education strongly increases the likelihood of migration, cultural traditions of co-residence and old age support may lead parents to strategically *decrease* the education of children they expect to care for them in their old age. Thus, in some cases, by reducing the need for old age support, pension programs could have positive rather than negative effects on education.

The existence of pension programs may even affect parents and children in households without access to a pension through a cultural externality. If enough adults stop transmitting matrilocality/patrilocality to their children due to the program, failing to follow the practice will be less stigmatized, and following the practice will be more likely to create conflicts between spouses. Even a child whose parents transmit the tradition will be less likely to practice it as an adult, and parents who do not receive the plan themselves may rationally cease to transmit the practice.

household wealth.

PREDICTION 3: *The effect of the share of the traditionally matrilocal or patrilocal population exposed to the pension plan on education and the practice of the cultural tradition may be non-linear if there are cultural spillovers onto households that do not receive the plan.*

III. Matrilocality, Patrilocality, and the Gender Gap

In this section, I test the first prediction from the conceptual framework – that female education rates will be higher relative to male education rates for traditionally matrilocal ethnic groups and vice versa for patrilocal ethnic groups. I start by evaluating how the gender gap in enrollment between siblings varies with cultural traditions. To estimate the association between patrilocality and matrilocality and within-household differences in school enrollment in Indonesia and Ghana, I use the 2010 census data in Indonesia and the 2000 census data in Ghana to estimate:

$$enroll_{ije} = \beta_1 I_i^{Gender} + \beta_2 I_i^{Gender} \times I_e^{Tradition} + \mathbf{\Gamma X}_{ie} + HH_j + \varepsilon_{ije}, \quad (1)$$

where i denotes a child of the household head between the ages of 5 and 22, e denotes an ethnic group, j denotes a household, and $enroll_{ije}$ is an indicator variable equal to 1 if a child is enrolled in school and 0 otherwise. I_i^{Gender} is an indicator variable for the relevant gender (female in Indonesia and male in Ghana), $I_e^{Tradition}$ is an ethnicity-specific indicator variable for an ethnic group's traditional practice (matrilocality in Indonesia and patrilocality in Ghana), and HH_j is a household fixed effect. I focus on the sample aged 5–22 since this group is school-aged, including college. $\mathbf{X_{ie}}$ contains child-specific controls and age fixed effects, and depending on the specification, includes controls for Muslim, parental educational and socioeconomic status,[21] controls for geographic region (province indicator variables in Indonesia and district indicator variables in Ghana), a control for whether the household head is male, and indicators for aboriginal plow use, bride price customs, male-dominated agriculture, and polygamy traditions, all interacted with child gender. β_2, the relative effect on enrollment of being a traditionally matrilocal female or patrilocal male, is the coefficient of interest, and the conceptual framework predicts that $\beta_2 > 0$.

By examining the gender gap between siblings, I use household fixed effects to control for differences in access to schooling or household wealth that could be associated with ethnicity-level traditions and affect enrollment. Including rich socioeconomic and geographic controls interacted with gender accounts for socioeconomic and geographic variables that could be correlated with cultural traditions and could affect the gender gap in education.

To inform potential sources of bias in regression equation (1), the top panels of Appendix Tables A4 and A5 document summary statistics and balance by traditional practice for the Indonesia and Ghana census data used in these regressions. Along most dimensions, matrilocal and non-matrilocal groups in Indonesia are similar. While matrilocal groups are more likely to be Muslim and are slightly more likely to have a female household head, my more stringent specifications control for both these variables. In Ghana, Appendix Table A5 shows that there are strong differences between patrilocal and non-patrilocal groups, indicating that patrilocal groups are poorer and less educated than non-patrilocal groups.

[21] These consist of indicator variables for whether the father has completed primary school, whether the father's spouse has completed primary school, whether the father works in a high skill sector, whether the father's spouse works in a high skill sector, whether the father works in agriculture, and whether the father's spouse works in agriculture.

The estimates from regression equation (1) are in Table 2. As the upper-half of the table shows, females in matrilocal households are 1-2 percentage points more likely to be enrolled in school relative to their brothers when compared to females in non-matrilocal households in Indonesia. Neither the gender interactions with household socioeconomic status (column 2), alternative ethnic traditions (column 3), nor geographic location (column 4) fully explain this result. While the yearly differences in the likelihood of enrollment appear small, they accumulate. Adding up the 18 years a child could have been enrolled in school between the ages of 5 and 22, this indicates that there will be a gap in educational attainment of 0.14–0.38 years of schooling between matrilocal and non-matrilocal females (relative to their brothers). For comparison, Duflo (2001) finds that an additional school per 1,000 children increases male years of schooling in Indonesia by 0.12-0.19 years. Thus, for a female, belonging to a matrilocal ethnic group increases years of schooling by about the same amount as 1-2 extra primary schools per 1,000 children.

Table 2—: Cultural Traditions and the Within-Household Gender Gap in Enrollment

	(1) **Baseline**	(2) **+Socioeconomic Controls**	(3) **+Custom Controls**	(4) **+Geography Controls**
		Indonesia		
$I_e^{Matrilocal} \times I_i^{Female}$	0.021	0.019	0.018	0.008
	(0.002)	(0.003)	(0.003)	(0.003)
Mean Dep. Var.	0.694	0.702	0.702	0.702
Number of observations	4,657,941	4,239,051	4,239,051	4,239,051
Clusters	44	44	44	44
Adjusted R^2	0.516	0.512	0.512	0.512
		Ghana		
$I_e^{Patrilocal} \times I_i^{Male}$	0.011	0.006	0.009	0.011
	(0.007)	(0.006)	(0.004)	(0.004)
Mean Dep. Var.	0.601	0.595	0.595	0.595
Number of observations	347,918	236,111	236,111	236,111
Clusters	24	24	24	24
Adjusted R^2	0.505	0.517	0.517	0.517

Note: This table reports difference-in-difference estimates of the association of the interaction between traditional matrilocality and female (Indonesia) and traditional patrilocality and male (Ghana) with enrollment for children of the household head aged 5-22 in Indonesia and Ghana. All regressions include household and age fixed effects. Column 2 adds indicator variables for whether the father has completed primary school, whether the father's spouse has completed primary school, whether the father works in a high skill sector, whether the father's spouse works in a high skill sector, whether the father works in agriculture, whether the father's spouse works in agriculture, whether the household head is male, and whether the individual is Muslim interacted with child gender. Column 3 adds indicator variables for whether a child belongs to an ethnicity with a bride price custom, male-dominated agriculture, polygamy, or aboriginal plow use interacted with child gender. Column 4 adds province-gender fixed effects (Indonesia) or district-gender fixed effects (Ghana). Standard errors are clustered at the *Ethnographic Atlas* ethnicity level.
Source: Data are drawn from the Indonesia 2010 and Ghana 2000 censuses (Minnesota Population Center, 2011), and the *Ethnographic Atlas* (Murdock, 1967).

The estimates are similar in Ghana. Patrilocal males are approximately 1 percentage point more likely to be enrolled in school relative to their sisters when compared to non-patrilocal males,

implying a difference of 0.18 years of education. While the estimates are not significant in the first two columns, the inclusion of the gender interactions with ethnicity level traditional practices and the district-gender fixed effects increases their precision.[22]

Following the epidemiological approach, Appendix Table A7 reports estimates from the same regressions for children who live outside their ethnic homelands. The same relationships are observed in these samples, again suggesting that cultural traditions are persistent. In Appendix Table A8, I examine whether the differences in enrollment rates observed in Table 2 are reflected in adults' education levels with the caveat that, for adults, I cannot control for unobserved socioeconomic status with household fixed effects and cannot observe and control for parental characteristics. The regressions in this table report the effect of the interaction between cultural traditions and gender on primary, secondary, and college completion, and in the case of Ghana, years of education[23] for adults aged 25-45,[24] controlling for ethnicity fixed effects, age fixed effects, gender by geographic area fixed effects, and ethnic traits interacted with gender. The results for Indonesia indicate that, relative to traditionally matrilocal males, traditionally matrilocal females are 8.6, 13.5, and 2.6 percentage points more like to have completed primary school, secondary school, and university, respectively, when compared to non-matrilocal females' outcomes relative to non-matrilocal males. In Ghana, the results are imprecise, but for primary schooling (the most likely level of schooling to be affected given the rarity of secondary and university completion), the estimates indicate that patrilocal males are 2 percentage points more likely to have completed primary school. For years of schooling, though insignificant, the estimate indicates that patrilocal males receive 0.16 more years of schooling, which is very close to the 0.18 years predicted by the enrollment estimates.

Finally, I examine whether these findings apply more broadly outside of Indonesia and Ghana in Appendix B. Appendix Table A9 shows that the percent of a country's population that has each cultural tradition affects the country-level gender gap in the expected direction. Together, traditional patrilocality and matrilocality explain 4 percent of the global education gender gap.

IV. Indonesian Pension Program

In this section, I test whether the introduction of a pension program in Indonesia differentially reduced female education and the practice of matrilocality among traditionally matrilocal groups. I first describe the details of the program. I then discuss the different empirical strategies used to identify the plan's effects – all of which exploit geographic variation in the location of pension offices – their results, and robustness checks. In Appendix C, I report results from an alternative identification strategy that exploits geographic variation in manufacturing employment.

A. Astek

Astek was founded in Indonesia in 1977 and developed accident, health care, death, and provident fund schemes for employees of medium and large firms (greater than 100 employees). At the beginning program, employees were required to save 1 percent of their earnings and employers

[22]The results for Indonesia and Ghana are not driven by the differential selection of a sample of children aged 5-22 who still live with parents across ethnic groups. Appendix Table A6 re-estimates equation (1) for a sample of children aged 5-18 and shows that the results are similar if somewhat less precise in this smaller sample.

[23]Respondents do not report the number of years of schooling in the Indonesia 2010 census.

[24]I focus on this group since adults over the age of 25 are likely to have completed their educational investment, and differential mortality is less likely to affect the results in this younger population

provided a matching contribution of 1.5 percent. Most funds were initially allocated to bank time deposits with annual interest rates of 9 percent, and retirees received their benefits in lump-sum form when they retired, as long as they were 55 or older.[25] By the end of 1983, 8,602 employers and 1,960,109 employees were covered by Astek. Coverage expanded rapidly, and in 1985, the government estimated that 5.5 million employees would be covered by 1988 (Perusahan Umum Asuransi Sosial Tenaga Kerja, 1985).[26] While a minority of workers were employed at large firms in the formal sector, the percent of affected individuals (due to having an affected worker in their household) is much greater than the percent of affected workers. Though I cannot directly observe what share of children are affected by the pension plan, I can provide a benchmark for this number using the government's estimate that 5.5 million employees would be covered by 1988. Using the 1971 weighted census, I randomly assign 5.5 million individuals aged 25-55 to be recipients. Since the IFLS 2007 indicates that 22 percent of retired pension recipients are female, I randomly assign 22 percent to be females and the rest to be males. Under this assignment, 13 percent of adults 25-55 are affected by the pension program, and 23 percent of children under 18 have a pension recipient in their household.[27]

B. Triple-Differences Estimates for Females

Province-Level Empirical Strategy. My main empirical strategy is a triple-differences exploiting the locations of the pension plan offices in Indonesia. In this strategy, there are two pieces of variation that determine the degree to which a female in the 2010 Indonesia census was affected by the introduction of Astek. First, if a daughter was sufficiently old when the pension plan was introduced, it will be too late for the program to affect parents' educational investments and transmission of the cultural tradition. These investments will have already been made. Second, when the program was introduced, some geographic areas were more intensively treated by the pension plan than others. The cohort variation can be combined with this geographic variation to create a difference-in-differences estimator of the effect of the pension program in Indonesia.[28] Additonally, since I am interested in the *differential* effect of the pension plan on traditionally matrilocal groups, I also exploit variation in whether a female belongs to a traditionally matrilocal ethnic group. Combining the geographic, cohort, and ethnicity-level variation results in the final triple-differences strategy.

Geographic variation in Astek's rollout comes from the fact that, though it was national, Astek expanded its coverage over time and initial compliance was imperfect. From 1978 to 1979, the number of enrollees grew by 24 percent, and from 1979 to 1980, it grew by 12 percent. By 1983, only 40 percent of eligible individuals were enrolled (Sudomo, 1985). Thus, I exploit the fact

[25]The implementation of the pension program means that it is unlikely that it would have immediately changed family composition, and therefore affected education due to changes in family structure, unlike the South African OAP program studied by Hamoudi and Thomas (2014), since pay-outs from the plan would not have taken place until current workers retired.

[26]Purwoko (1997) reports that 6.3 million workers were enrolled in 1993, and 14.6 million were enrolled by 1997.

[27]If I instead use the official count from 1993 of 6.3 million enrollees (Purwoko, 1997) in this simulation, 15 percent of adults 25-55 are affected, and 26 percent of children under the age of 18 are in a household with a recipient. I can also use the 1980 census as a base year instead of the 1971 census to evaluate whether population growth has important implications for these numbers. The percents of the population affected using the 1980 census are reasonably similar to those using the 1971 census (11 percent of adults 25-55 and 20 percent of children under 18).

[28]This identification strategy is similar to the one used by Duflo (2001) to estimate the effect of the INPRES school construction on education outcomes in Indonesia.

that areas with more Astek branch offices, liaisons, and representatives likely had higher initial enrollment. The second volume of a two-part series entitled *Readings in Social Security: The Indonesian Case*, published by the Astek Research and Development Board (Perusahan Umum Asuransi Sosial Tenaga Kerja, 1985), reports the locations of these offices at the district-level in 1985, and Figure 2 plots their locations, assigning each office to the district centroid. Supporting the idea that the pension offices created geographic variation in exposure to the plan, Appendix Table A10 confirms that living in a province with more pension offices per 1,000 sq. miles is positively associated with receiving a public pension in round 4 of the IFLS (2007).[29,30]

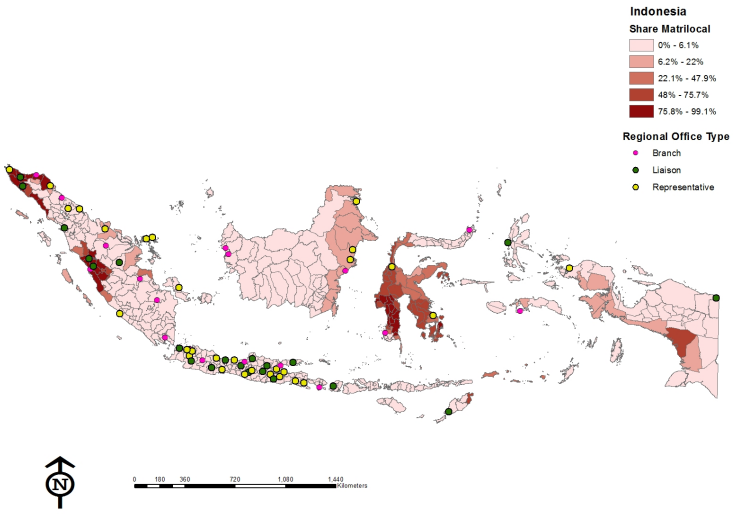

Figure 2. : Locations of Astek Offices in Indonesia

Note: The figure documents the locations of the Astek pension plan offices in Indonesia in 1985.

Source: Population shares are constructed using the Indonesia 2010 census (Minnesota Population Center, 2011) and Murdock (1967). Data on pension office locations are drawn from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985).

Using the cohort, geographic, and ethnicity-level variation and a sample of females born between

[29] I focus on the 2007 round rather than combining the 2007 and 2000 rounds because the 2007 round has more detailed questions on pension plan receipt. The regressions control for age fixed effects and ethnicity fixed effects to account for variation in pension policy access over time and across ethnic groups.

[30] While office locations in 1985 are positively associated with pension receipt in 2007, the point estimates in this table cannot be interpreted as estimating differences in pension plan enrollment in the 1980s due to office locations for two reasons. First, enrollment in the plan expanded over time, attenuating the importance of office locations for enrollment in later years. Second, the IFLS sample covers relatively more urban and developed areas and provinces. Thus, it may not fully capture differences in enrollment between the most and least intensively treated provinces.

1959 and 1985, my first triple-differences specification is

$$
\begin{aligned}
y_{icpe} =& \beta_1 I_e^{Matrilocal} \times I_c^{Full\_Treat} \times Intensity_p + \beta_2 I_e^{Matrilocal} \times I_c^{Part\_Treat} \times Intensity_p \\
&+ \alpha_{cp} + \alpha_e + \sum_p \gamma_p I_e^{Matrilocal} + \sum_c \lambda_c I_e^{Matrilocal} + \mathbf{\Gamma} \boldsymbol{X}_{icpe} + \varepsilon_{icpe}, \qquad (2)
\end{aligned}
$$

where i denotes an individual, c denotes the individual's birth year, p denotes the province of an individual's birth, and e denotes an ethnic group. The outcomes of interest, y_{icpe}, consist of indicator variables for completing primary and secondary schooling, university, and an indicator variable for practicing matrilocality (a married woman living in the same household as at least one of her parents). $I_e^{Matrilocal}$ is an indicator variable equal to 1 if an individual belongs to a traditionally matrilocal ethnic group, and $I_c^{Part\_Treat}$ and $I_c^{Full\_Treat}$ indicate the individual's exposure to the plan based on her birth year. $I_c^{Part\_Treat}$ is equal to 1 if a woman was between 6 and 12 when the plan was instituted, and $I_c^{Full\_Treat}$ is an indicator variable equal to 1 if she was 6 or younger. A woman who was younger when the pension plan was instituted is likely to be more affected both because parents would have had more time to change their educational investments and because offices and compliance expanded in the early years, increasing the likelihood her parents were enrolled in the plan during her childhood. α_{cp} is a birth province-birth year fixed effect, α_e is an ethnic group fixed effect, and $\sum_p \gamma_p I_e^{Matrilocal}$ and $\sum_c \lambda_c I_e^{Matrilocal}$ allow the birth province and cohort fixed effects to depend on whether a woman belongs to a matrilocal ethnic group or not.

$\boldsymbol{X}_{icpe}$ is a vector of controls. To control for differential time trends, it always includes a linear trend in birth year whose coefficient is allowed to vary at the birth province-matrilocal level. To control for the fact that matrilocality may be correlated with other traditions, it also includes triple interactions between $I_e^{Intensity}$ and $I_c^{Full\_Treat}$ and $I_e^{Part\_Treat}$ and other ethnic traditions.[31] Importantly, it includes Muslim by birth province fixed effects interacted with indicator variables for treatment group (partial treatment, full treatment, or none). To control for other programs that were on-going during the same period in Indonesia, I also interact province-level controls for the INPRES school construction and water sanitation programs described by Duflo (2001) with matrilocal-birth year fixed effects and include these controls. To account for the fact that pension offices were placed in more urban or dense areas, I use the Indonesia 1971 census to calculate the population density and percent of the population that lived in urban areas for each province. Since I will ultimately use three different geographic measures of pension plan exposure, and the functional form of population density's relationship with these measures is likely to be different across measures, I include controls for matrilocal-birth year fixed effects interacted with both the birth province's population density and log population density. This ensures a consistent set of population density controls across specifications. In addition, I control for matrilocal-birth year fixed effects interacted with share that lived in urban areas in the 1971 census. In robustness tests, I will also use a lasso procedure to select the functional form of the population density controls rather than specifying it ex ante. Finally, I two-way cluster the standard errors by birth province and ethnicity in the *Ethnographic Atlas*.

[31] These consist of traditional polygamy, aboriginal plow use, male-dominated agriculture, and bride price. To avoid losing a significant fraction of the sample, missing values were set to 0, and indicator variables for missing information were also included in the triple and double interactions.

The coefficients of interest are β_1 and β_2. The conceptual framework predicts that $\beta_1 < 0$ and $\beta_2 < 0$. As fully treated females are more intensively treated than partially treated females, we also expect that the magnitude of β_1 is greater than β_2. β_1 and β_2 are differential effects. As education levels in Indonesia were increasing during this period, the estimates should be interpreted not as a reduction in education levels but rather as indicating how much higher education levels would have been among matrilocal females in the absence of the pension program.

I include females born between 1959 and 1985 so that the oldest females were 18 at the time the pension plan was instituted and were wholly untreated during their childhood. The youngest females were -8 and were fully treated. I do not include women born later than 1985 so that women are at least 25 when they are observed. Those who will go to university have already done so, and most are married, allowing me to test for the practice of matrilocality. When I estimate the effects of the pension plan on the practice of matrilocality, I restrict the sample to married women, since unmarried women cannot be observed practicing matrilocality. The bottom panel of Appendix Table A4 reports summary statistics for this sample.

The triple-differences approach allows me to address several potential sources of bias in the estimates. One natural concern is that pension plans were established in response to concerns about lack of old age support driven by declines in the practice of matrilocality. Since I exploit geographic variation in the program's intensity, I control for traditionally matrilocal-birth year fixed effects, absorbing any generalized declines in the practice of matrilocality. Along with ethnicity fixed effects, this also absorbs any level differences between matrilocal and non-matrilocal ethnic groups. Therefore, my key coefficients of interest, β_1 and β_2, will only be biased if matrilocality was declining faster in areas that then received more pension offices. This is unlikely to be the case since pension plan offices were not initially targeted to areas with more matrilocal ethnic groups (Figure 2). However, I further address this concern by controlling for matrilocal-birth province linear time trends so that the effects of the plan are identified from the discontinuous effect of being exposed to the plan during childhood.

Another concern is that there are differential educational trends between matrilocal and non-matrilocal groups. The triple-differences identification strategy also accounts for this by including matrilocal-birth year fixed effects. Similarly, while more heavily traditionally matrilocal areas may have different time trends, different returns to education, or have received different policies that affect the practice of matrilocality or female education, the inclusion of birth province-birth year fixed effects absorbs this variation. Analogously, while $Intensity_p$ is not randomly distributed across provinces, birth province-matrilocal fixed effects absorb these level differences across space. The identifying variation for β_1 and β_2 comes from comparing traditionally matrilocal and non-matrilocal females of the same age in the same geographic regions who face similar labor markets.

To further address identification concerns, I also estimate equation (2) for educational outcomes for the population of males. Males serve as a natural comparison group, since the conceptual framework indicates that the introduction of the pension plan should not have as large a negative effect on males' education as females'. However, males also are not a true placebo group. If the pension program affects females' education, males may be affected through sibling spillovers or marriage market incentives.

I do not estimate effects on the practice of matrilocality for males since a male's likelihood of

living with his wife's parents is likely to be highly related to whether the wife herself practices matrilocality. Unlike the educational outcomes, it is not clear we should expect a null or quantitatively smaller effect on living in a household that is practicing matrilocality for males.

Building-Up to the Triple-Differences: Difference-in-Differences by Sub-Group. Before reporting the triple-differences results, I build up to equation (2) by reporting the results from each of the component difference-in-differences regressions in the triple-differences specification. For each of four subgroups – matrilocal females, matrilocal males, non-matrilocal females, and non-matrilocal males – I estimate

$$\begin{aligned} y_{icpe} =& \beta_1 I_c^{Full\_Treat} \times Intensity_p + \beta_2 I_c^{Part\_Treat} \times Intensity_p + \alpha_c + \alpha_p + \alpha_e \\ & + \mathbf{\Gamma} \boldsymbol{X}_{icp} + \varepsilon_{icpe}, \end{aligned} \tag{3}$$

where $\boldsymbol{X}_{icp}$ consists of an indicator variable for Muslim, linear time trends that are allowed to vary at the birth province-level, and the population density and urbanization controls interacted with birth year. Appendix Table A11 reports the results for each subgroup.

The results for matrilocal females are consistent with the conceptual framework: fully treated females in more exposed districts experience reductions in primary, secondary, and university completion, and the practice of matrilocality. Column 5 further controls for current province, in addition to birth province, and shows that controlling for conditions in an individual's current province does not eliminate the effect of the pension plan on the practice of matrilocality. Since the average matrilocal female was born in a province where $Intensity_p = 0.144$, the effects indicate that the average fully treated traditionally matrilocal female is 2.7 percentage points less likely to complete primary school, 3.6 percentage points less likely to complete secondary school, 1.9 percentage points less likely to attend university, and 2.1 percentage points less likely to practice matrilocality. For matrilocal males, there is some evidence of significant negative effects, particularly for primary schooling, pointing to the possibility that differential time trends across provinces may be biasing the difference-in-differences estimates. This highlights the potential value of the triple-differences strategy, which controls for birth province-birth year fixed effects. However, the point estimates for fully treated males' secondary and university outcomes are insignificant and one-tenth to one-third as large as the estimates for females. They are statistically significantly different from those for fully treated, matrilocal females at the 1 percent level. Turning to non-matrilocal ethnic groups, there are no significant negative effects on education for either males or females, nor are there significant negative effects on the practice of matrilocality.

Provincial Triple-Differences for Females. Panel A of Table 3 reports the triple-differences estimates for females using the $Intensity_p$ measure. Consistent with the idea that the primary schooling effects observed for both matrilocal males and females in the difference-in-differences estimates may have been driven by provincial time trends, these effects are no longer significant. However, for fully treated, traditionally matrilocal females, there are significant and economically meaningful effects on secondary (-5 percentage points at the average value of $Intensity_p$ for matrilocal females) and university completion (-1.4 ppts), as well as the practice of matrilocality (-7 ppts). While these effects are large, recalling that an estimated 23 percent of children are directly affected by the program, large spillover effects are not necessary to explain these effect sizes. Panel B of

Table 3 reports the triple-differences results with an alternative specification: $Intensity_p$ is replaced by the log number of offices in a province, and the specification controls for the log area of the province and its triple interactions with $I_c^{Part\_Treat}$, $I_c^{Full\_Treat}$, and $I_e^{Matrilocal}$. While this specification drops 2 provinces that have 0 offices, the pattern of the results is very similar. Greater pension plan exposure reduces secondary and university completion, as well as the practice of matrilocality.

Appendix Table A12 reports the results of a robustness check that helps ensure that the estimates in Table 3 are not driven by the inclusion of both the log and linear population density controls. I run a lasso regression of each of the geographic pension intensity measures on population density and log population density. I then control for the interactions of the selected control(s) with matrilocal-birth year fixed effects instead of automatically including the interactions of both measures with matrilocal-birth year fixed effects as controls. The estimates are very similar to those in Table 3.

District-Level Distance Variation. I next assess whether using an alternative, district-level distance measure of pension exposure based on office locations delivers similar results. This measure $distance_d$ is the sum of an intra-district distance measure and a cross-district distance measure and is given by

$$distance_d = cross\,distance_d + intra\,distance_d, \tag{4}$$

where d denotes a district, $cross\,distance_d$ is the distance from district d's centroid to the centroid of the closest district with a pension office, and $intra\,distance_d$ is the average distance in district d to d's centroid.[32] The inclusion of the intra-district distance measure accounts for the effects of distance within districts that have pension offices. As the geographic variation is now at the district-level, the new triple-differences estimating equation is

$$\begin{aligned} y_{icpde} =& \beta_1 I_e^{Matrilocal} \times I_c^{Full\_Treat} \times (-log(distance_d)) \\ &+ \beta_2 I_e^{Matrilocal} \times I_c^{Part\_Treat} \times (-log(distance_d)) \\ &+ \alpha_{cp} + \alpha_e + \sum_p \gamma_p I_e^{Matrilocal} + \sum_c \lambda_c I_e^{Matrilocal} + \mathbf{\Gamma X}_{ipde} + \varepsilon_{icpde}, \end{aligned} \tag{5}$$

where I multiply $log(distance_d)$ by -1 so that, consistent with Table 3, the conceptual framework would predict that all the coefficients for females are negative, and $\mathbf{X}_{ipde}$ now includes Muslim-treated cohort-birth district fixed effects, the double interaction between $I_e^{Matrilocal}$ and $log(distance_d)$, and relevant triple- and double-interactions of the cultural traditions controls with $log(distance_d)$. Since the geographic variation is now at the birth district-level, I calculate my geographic controls at the district-level instead of the province-level, and I two-way cluster my standard errors at the *Ethnographic Atlas* ethnicity and birth district-levels. I focus on $log(distance_d)$ as my distance measure rather than a linear distance variable since it is likely that distance matters less at very great distances.

Panel C of Table 3 reports the results. We again see that traditionally matrilocal women who

[32] For the counts of offices, I focused on provincial variation rather than district-level variation because 93% of districts do not have offices. Thus, I expect the effects of offices to extend beyond district borders and wanted to exploit variation from the existence of offices in neighboring districts.

are more exposed to the pension plan are less educated and less likely to practice matrilocality as adults.[33] There is one interesting difference, however, between the province-level estimates and the district-level, distance estimates. In Panel C, the educational effects are largest for primary schooling, although the point estimate for secondary schooling is also negative. This may reflect the fact that these different strategies capture households who are on different margins of educational investment. For example, the distance strategy may exploit more variation from households in less dense, less developed provinces with lower baseline education rates (that received few pension offices), who are still relatively close to pension offices in other provinces.

Triple-Differences Estimates for Males. Using the same specifications as in Table 3, Table 4 reports the educational estimates for males. For all three panels, there are no statistically significant negative effects on education for fully treated males. In cases where the effects for males are negative, the magnitude of the effect for females is always greater, often on the order of 2-4 times. This further suggests that the results in Table 3 are not driven by a confounding variable or time trends that differentially affect traditionally matrilocal individuals' education. Rather, consistent with the conceptual framework, the pension plan appears to more strongly affect *females'* educational outcomes.

C. Non-linear Effects

Equation (2) assumes the effect of $Intensity_p$ is linear. However, the conceptual framework predicts that the effect of the pension plan on matrilocal females may be nonlinear due to the cultural externality. I directly test whether this is the case by estimating treatment effects by a birth province's tercile for $Intensity_p$. The resulting regression equation is

$$\begin{aligned} y_{icpe} =& \beta_1 I_e^{Matrilocal} \times I_c^{Full\_Treat} \times I_p^{Q2} + \beta_2 I_e^{Matrilocal} \times I_c^{Part\_Treat} \times I_p^{Q2} \\ & \beta_3 I_e^{Matrilocal} \times I_c^{Full\_Treat} \times I_p^{Q3} + \beta_4 I_e^{Matrilocal} \times I_c^{Part\_Treat} \times I_p^{Q3} \\ & + \alpha_{cp} + \alpha_e + \sum_p \gamma_p I_e^{Matrilocal} + \sum_c \lambda_c I_e^{Matrilocal} + \mathbf{\Gamma} \boldsymbol{X}_{icpe} + \varepsilon_{icpe}, \end{aligned} \tag{6}$$

where I_p^{Q2} is an indicator variable equal to 1 if the province is in the middle tercile, I_p^{Q3} is an indicator variable equal to 1 if it is in the top tercile, and $\boldsymbol{X}_{icpe}$ now includes triple and double interactions between the cultural trait controls and the tercile indicator variables. Table 5 reports the estimates from equation (6). I again find that pension exposure reduces secondary and university completion, as well as the practice of matrilocality. Furthermore, there is some evidence that the effects are non-linear and concentrated in the top-tercile of provinces.

D. Event Study Graphs

Though the triple-differences procedure accounts for many potential identification concerns, the estimates will still be biased if traditionally matrilocal groups in more intensively treated areas experience non-linear differential time trends. To establish if trends are parallel prior to the treatment, and if the timing of the effects I measure coincides with the pension plan, I plot event study graph

[33] The results in Appendix Table A12, which uses lasso to determine whether to include a linear or log population density control (or both) interacted with matrilocal-birth year fixed effects are very similar to the results reported in Panel C of Table 3.

Table 3—: Triple-Differences Estimates of the Differential Effect of Pension Plan Exposure for Indonesian Females

	(1) **Primary**	(2) **Secondary**	(3) **University**	(4) **Practice Matrilocality**	(5) **Practice Matrilocality**
			Panel A: $Intensity_p$ Measure		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times Intensity_p$	-0.059	-0.228	-0.078	-0.171	-0.178
	(0.103)	(0.075)	(0.030)	(0.047)	(0.046)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times Intensity_p$	-0.007	-0.357	-0.100	-0.466	-0.497
	(0.168)	(0.152)	(0.042)	(0.125)	(0.116)
Current Province FE	N	N	N	N	Y
Mean Dep. Var.	0.876	0.320	0.056	0.079	0.079
N	4,780,573	4,780,573	4,780,573	4,461,289	4,461,289
Adjusted R^2	0.837	0.823	0.513	0.675	0.733
			Panel B: Log Number of Offices Measure		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times log(num.\ offices_p)$	0.002	-0.033	-0.010	-0.014	-0.015
	(0.014)	(0.016)	(0.006)	(0.008)	(0.008)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times log(num.\ offices_p)$	0.031	-0.044	-0.014	-0.031	-0.033
	(0.029)	(0.019)	(0.006)	(0.018)	(0.018)
Current Province FE	N	N	N	N	Y
Mean Dep. Var.	0.877	0.320	0.056	0.079	0.079
N	4,677,531	4,677,531	4,677,531	4,364,884	4,364,884
Adjusted R^2	0.840	0.827	0.519	0.689	0.741
			Panel C: Distance to a Pension Office		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times log(distance_d)$	-0.022	0.000	0.007	-0.005	-0.005
	(0.008)	(0.012)	(0.006)	(0.004)	(0.004)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times log(distance_d)$	-0.038	-0.016	0.008	-0.019	-0.021
	(0.011)	(0.015)	(0.004)	(0.009)	(0.008)
Current District FE	N	N	N	N	Y
Mean Dep. Var.	0.880	0.318	0.055	0.080	0.080
N	4,618,188	4,618,188	4,618,188	4,313,952	4,313,949
Adjusted R^2	0.648	0.609	0.212	0.429	0.483

Note: This table reports triple-differences estimates of the effect of the 1977 institution of the Astek pension plan on women, exploiting the interaction between years exposed to the plan (partial treatment indicates a woman was 6-12 when the pension plan was initiated, and full treatment indicates that she was younger than 6), a geographic area-level measure of treatment intensity, and whether an individual belongs to a matrilocal ethnic group. The sample consists of women born between 1959 and 1985. All panels include birth province-matrilocal fixed effects, ethnicity fixed effects, birth province-birth year fixed effects, and linear time trends in birth year interacted with birth province-matrilocal fixed effects. All panels also include cultural trait interactions (ethnicity-level controls for the interaction between traditional plow use, male-dominated agriculture, polygamy, and bride price with the geographic area-level measure of pension plan affectedness, indicator variables for partial and full treatment, and the relevant double interactions), population density controls (geographic area linear and log population density and percent urban from the 1971 census interacted with matrilocal-birth year fixed effects), and controls for the INPRES program and a water and sanitation program (at the geographic level of the treatment) interacted with matrilocal-birth year fixed effects. Panels A and B include muslim-birth province-treatment cohort (partial, full, or none) fixed effects. Panel C includes muslim-birth district-treatment cohort fixed effects and the relevant double interactions for the treatment variables that are not subsumed by the fixed effects. Standard errors are two-way clustered at the *Ethnographic Atlas* ethnic group-level and the birth geographic area-level (province in Panels A and B and district in Panel C). There are 45 ethnic groups, 26 provinces, and 464 districts.

Source: Individual-level data are drawn from the Indonesia 2010 census (Minnesota Population Center, 2011). Data on pension office locations come from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985), and data on ethnic traditions are from Murdock (1967).

Table 4—: Triple-Differences Estimates of the Differential Effect of Pension Plan Exposure for Indonesian Males

	(1) **Primary**	(2) **Secondary**	(3) **University**
	Panel A: $Intensity_p$ Measure		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times Intensity_p$	-0.037	-0.132	-0.027
	(0.064)	(0.072)	(0.031)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times Intensity_p$	0.000	-0.245	-0.038
	(0.116)	(0.160)	(0.062)
Mean Dep. Var.	0.912	0.388	0.066
N	4,789,858	4,789,858	4,789,858
Adjusted R^2	0.794	0.801	0.509
	Panel B: Log Number of Offices Measure		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times log(num.\ offices_p)$	0.013	-0.012	0.005
	(0.010)	(0.013)	(0.006)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times log(num.\ offices_p)$	0.032	-0.009	0.012
	(0.020)	(0.021)	(0.011)
Mean Dep. Var.	0.912	0.389	0.066
N	4,687,691	4,687,691	4,687,691
Adjusted R^2	0.799	0.803	0.515
	Panel C: Distance to a Pension Office		
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times log(distance_d)$	-0.003	0.001	-0.007
	(0.006)	(0.009)	(0.006)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times log(distance_d)$	-0.011	0.003	-0.007
	(0.008)	(0.010)	(0.010)
Mean Dep. Var.	0.915	0.386	0.065
N	4,623,739	4,623,739	4,623,739
Adjusted R^2	0.754	0.853	0.605

Note: This table reports triple-differences estimates of the effect of the 1977 institution of the Astek pension plan on men, exploiting the interaction between years exposed to the plan (partial treatment indicates a man was 6-12 when the pension plan was initiated, and full treatment indicates that he was younger than 6), a geographic area-level measure of treatment intensity, and whether an individual belongs to a matrilocal ethnic group. The sample consists of men born between 1959 and 1985 in the 2010 Indonesia census. All panels include birth province-matrilocal fixed effects, ethnicity fixed effects, birth province-birth year fixed effects, and linear time trends in birth year interacted with birth province-matrilocal fixed effects. All panels also include cultural trait interactions (ethnicity-level controls for the interaction between traditional plow use, male-dominated agriculture, polygamy, and bride price with the geographic area-level measure of pension plan affectedness, indicator variables for partial and full treatment, and the relevant double interactions), population density controls (geographic area linear and log population density and percent urban from the 1971 census interacted with matrilocal-birth year fixed effects), and controls for the INPRES program and a water and sanitation program (at the geographic level of the treatment) interacted with matrilocal-birth year fixed effects. Panels A and B include muslim-birth province-treatment cohort (partial, full, or none) fixed effects. Panel C includes muslim-birth district-treatment cohort fixed effects and the relevant double interactions for the treatment variables that are not subsumed by the fixed effects. Standard errors are two-way clustered at the *Ethnographic Atlas* ethnic group-level and the birth geographic area-level (province in Panels A and B, and district in Panel C). There are 45 ethnic groups, 26 provinces, and 464 districts.
Source: Individual-level data are drawn from the Indonesia 2010 census (Minnesota Population Center, 2011). Data on pension office locations come from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985), and data on ethnic traditions are from Murdock (1967).

Table 5—: Non-Linear Effects of Pension Plan Exposure

	(1) **Primary**	(2) **Secondary**	(3) **University**	(4) **Practice Matrilocality**	(5) **Practice Matrilocality**
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times I_p^{Q3}$	-0.001	-0.073	-0.020	-0.031	-0.033
	(0.018)	(0.020)	(0.007)	(0.009)	(0.009)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times I_p^{Q3}$	0.034	-0.107	-0.035	-0.084	-0.088
	(0.040)	(0.041)	(0.012)	(0.026)	(0.024)
$I_e^{Matrilocal} \times I_c^{Part\_Treat} \times I_p^{Q2}$	-0.012	-0.028	0.007	0.003	0.001
	(0.024)	(0.049)	(0.015)	(0.007)	(0.007)
$I_e^{Matrilocal} \times I_c^{Full\_Treat} \times I_p^{Q2}$	0.016	-0.048	-0.017	0.011	0.008
	(0.046)	(0.058)	(0.020)	(0.018)	(0.017)
Current Province FE	N	N	N	N	Y
Mean Dep. Var.	0.876	0.320	0.056	0.079	0.079
N	4,780,573	4,780,573	4,780,573	4,461,289	4,461,289
Adjusted R^2	0.837	0.823	0.512	0.688	0.737

Note: This table reports non-linear triple-differences estimates of the effect of the 1977 institution of the Astek pension plan on women, exploiting the interaction between years exposed to the plan (partial treatment indicates a woman was 6-12 when the pension plan was initiated, and full treatment indicates that she was younger than 6), tercile of $Intensity_p$, and whether an individual belongs to a matrilocal ethnic group. The sample consists of women born between 1959 and 1985 in the 2010 Indonesia census. All regressions include the same controls as Panel A of Table 3 except that the cultural trait interactions are now interacted with the treatment tercile indicator variables. Standard errors are two-way clustered at the *Ethnographic Atlas* ethnic group-level and the birth province-level. There are 45 ethnic groups and 26 provinces.

Source: Individual-level data are drawn from the Indonesia 2010 census (Minnesota Population Center, 2011). Data on pension office locations come from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985), and data on ethnic traditions are from Murdock (1967).

versions of equations (2) and (6). These graphs plot the differential effect on matrilocal females of being born in a province with a higher intensity of treatment by cohort. To allow for more pre-treatment periods, I also include women born between 1945 and 1965 in the 1990 census in the data used for estimation.[34]

To plot these graphs I follow a two-step procedure. If I include both the interactions between birth group indicator variables and $Intensity_p \times I_e^{Matrilocal}$ and controls for linear differential time trends at the matrilocal-birth province level in the same regression, these two sets of explanatory variables will be almost collinear.[35] So, I first estimate a regression similar to equation (2), except that all the terms besides the main treatment effects are now interacted with survey fixed effects to account for differences between the 1990 and 2010 census, and subtract out the estimated effects of the differential, linear time trends. Then, I estimate the event study regression using the residual variation in the outcome variable as the new outcome. In the second step, the event study analogue of equation (2) is

$$\begin{aligned}\tilde{y}_{icpes} = &\sum_g \tau_g I_e^{Matrilocal} \times I_c^{c\in g} \times Intensity_p + \alpha_{cps} + \alpha_{es} + \sum_{ps} \gamma_{ps} I_e^{Matrilocal} + \sum_{cs} \lambda_{cs} I_e^{Matrilocal} \\ &+ \mathbf{\Gamma} \boldsymbol{X}_{ipes} + \varepsilon_{icpes}, \end{aligned} \tag{7}$$

where $\tilde{y}_{icpe}$ is the outcome variable, which has been residualized for time trends, s denotes the survey, $\sum_g$ sums over three-year birth cohort bins, and $I_c^{c\in g}$ is an indicator variable equal to 1 if a birth year c is in bin g. $\boldsymbol{X}_{ipes}$ includes all the same controls as before, now interacted with survey fixed effects. The graph plots the coefficients τ_g. I expect that τ_g will be indistinguishable from 0 for cohorts who were too old to be affected by the pension plan, indicating that pre-trends are parallel. For cohorts who are young enough to be treated, I expect $\tau_g < 0$.

The procedure for constructing the non-linear event study graph is analogous, except that for that graph, I plot the coefficient on the interaction between the matrilocal-birth cohort indicator variables and being born in a top-tercile province. Therefore, the coefficients in the two graphs are not comparable, since one reports the effect of an additional office per 1,000 miles, while the other reports the average effect of being born in a top-tercile province.

Figure 3 plots the event study graph for the linear specification, and Figure 4 plots it for the non-linear specification. Plotting the results in this way is particularly informative for secondary schooling, since we should not expect individuals who were older than 18 (and no longer in secondary school if they progressed through school on-track) to be affected by the institution of the program.[36] In contrast, it less clear at what age the program would cease to affect the transmission of matrilocality. The secondary education figure indeed indicates that the treatment effects

[34] Since the two censuses have different sampling procedures, I use the provided sampling weights to make them comparable.

[35] A typical event study graph might report the coefficients on matrilocal-birth year fixed effects interacted with $Intensity_p$. These variables would be fully collinear with the time trends controls in my main regression specifications. In practice, I group cohorts into 3-year birth groups to increase statistical power. These birth group-traditional matrilocal fixed effects interacted with $Intensity_p$ are not fully collinear with the time trends controls, but they are highly correlated. If both sets of variables were included in the same regression, the time trend controls would only be identified from variation in outcomes within 3-year birth groups, which may be sensitive age-heaping. This is likely to lead to very different time trend estimates than my main triple-differences regressions. The two-step procedure described below allows me to estimate the time trend controls' coefficients using the same variation as in the triple differences specification in Table 3.

[36] That is, we should not see an effect on secondary schooling for cohorts born before the 1960-1962 cohort.

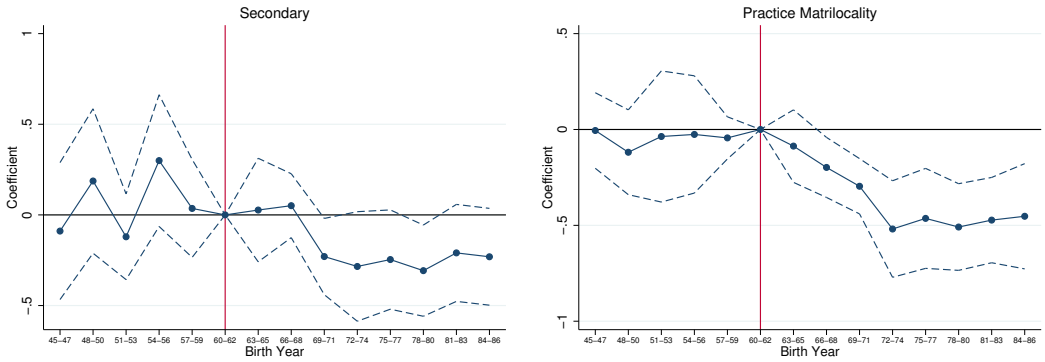

Figure 3. : Event Study Graphs for the Institution of Pension Plans in Indonesia (Assuming Intensity of Pension Exposure has a Linear Effect)

Note: These figures graph the coefficients for the interaction between belonging to a traditionally matrilocal ethnic group, being born in a 3 year cohort-group, and the intensity of treatment by the Astek pension plan (as measured by the number of pension plan offices in the birth province per square mile) for completing secondary school (left) and practicing matrilocality (right). Graphs were created following a two-step process where linear time trends were estimated in the first step and then the coefficients of interest were estimated using the residual variation. Confidence intervals are at the 95 percent level.
Source: Individual-level data are drawn from the Indonesia 1990 and 2010 censuses (Minnesota Population Center, 2011). Data on pension office locations come from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985), and data on ethnic traditions are from Murdock (1967).

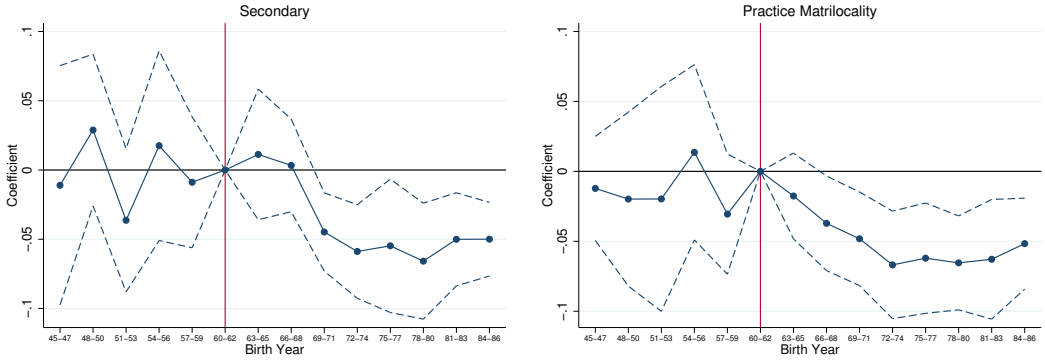

Figure 4. : Event Study Graphs for the Institution of Pension Plans in Indonesia for Top-Tercile Provinces

Note: These figures graph the estimated treatment effect for matrilocal females born in a province in the top-tercile for the number of pension offices per 1,000 square miles. The outcomes are completing secondary school (left) and practicing matrilocality (right). Graphs were created following a two-step process where linear time trends were estimated in the first step, and then the coefficients of interest were estimated using the residual variation. Confidence intervals are at the 95 percent level.
Source: Individual-level data are drawn from the Indonesia 1990 and 2010 censuses (Minnesota Population Center, 2011). Data on pension office locations come from Perusahan Umum Asuransi Sosial Tenaga Kerja (1985), and data on ethnic traditions are from Murdock (1967).

are not driven by pre-trends, with no significant effect of the program on the outcomes of students who were already too old to attend secondary school. The lack of pre-trends also suggests that the regression results are not picking up "reverse causality," where the decline in matrilocality causes the government to institute pension plans. Secondary school effects begin to appear strongly for females born between 1969 and 1971, who were 6-8 when the pension plan was instituted. This lag in the effects may be because the pension plan coverage (and offices) expanded over time after establishment in 1977 and may also reflect the fact that females who were already in secondary school at the beginning of the policy were less likely to have their secondary education disrupted.

E. Robustness.

In this subsection, I provide additional evidence on the robustness of the Indonesia results.

Robustness to Flexible Time Trends Controls. The triple-differences approach in the baseline specifications non-parametrically controls for differential time trends between matrilocal and non-matrilocal females that are the same across provinces. While it also includes controls for birth province-matrilocal linear time trends, the estimates could still be biased by non-linear birth province-matrilocal time trends. This could be the case if, for example, the government strategically rolled out the pension plan earlier in places where traditional matrilocality was declining faster. To account for this potential bias, in Appendix Table A13, I include controls for second and third degree polynomial time trends, which are allowed to vary at the birth province by matrilocal level. Though this conservative specification includes an additional 104 time trend controls, the pattern of the results is similar to the more parsimonious regressions.

Additional Population Density and Socioeconomic Controls. To further account for the potentially confounding effects of different time trends across more or less dense areas, I adapt the double-lasso methodology suggested by Urminsky, Hansen and Chernozhukov (2016). Conditional on the other controls, I use lasso regressions to select the provincial density and development controls that are most predictive of both the two key triple-differences explanatory variables and the outcome variable in each regression. I select from the following potential controls, all interacted with matrilocal-birth year fixed effects: up to third degree polynomials of population density and log population density in 1971, 1980, and 1990, as well as share urban, share working in agriculture, share with electricity, and share with running water (measured in the 1971 census). While population density in 1980 and 1990 is potentially endogenous to the policy, I include these additional population density controls to more fully account for any confounding effects of increasing urbanization. Appendix Table A14 reports the results, which are very similar to the main estimates.

Robustness to Baseline Education Controls. Since matrilocal ethnic groups may have different baseline educational levels relative to non-matrilocal groups, I next verify that the results are not driven by the fact that matrilocal mothers are more educated than non-matrilocal mothers. For matrilocal and non-matrilocal females, I use the 2010 census to calculate the percent of women aged 55-65 (who were too old to be treated) who finished primary and secondary school and university. Cautioning that these are endogenous controls and may account for part of the treatment effect, I triple-interact these three variables with $Intensity_p$ and either $I_c^{Full\_Treat}$ or $I_c^{Part\_Treat}$. I include these as controls in equations (2), along with their double interactions with birth year and birth province fixed effects. Appendix Table A15 reports the results from this robustness test. The pattern of results is consistent with pension plans differentially reducing both education and the practice of

matrilocality for females from traditionally matrilocal ethnic groups.

Robustness to Provincial Composition. A final concern is that though the pension plan appears to have non-linear effects, this is because the pension plan had larger effects on traditionally matrilocal females in areas where traditional matrilocality is less common. Since $Intensity_p$ is typically lower in areas with more traditionally matrilocal individuals, this could give the appearance of a non-linear pension plan effect. To account for this, I calculate the share of individuals 55–65 (the group too old to be in the sample) who are traditionally matrilocal by birth province. I then include the interactions between this variable, $I_e^{Matrilocal}$, and $I_c^{Full\_Treat}$ and $I_c^{Part\_Treat}$ as controls in equation (6). Appendix Table A16 shows that the pattern of results is again similar.

V. External Validity: The Introduction of Social Security in Ghana

Having provided evidence that the introduction of Astek reduced both education and the practice of matrilocality for traditionally matrilocal females, I now test whether pension plans also reduced education and the transmission of patrilocality for patrilocal males in Ghana. These analyses provide evidence that the results in Indonesia are externally valid. Additionally, Ghana and Indonesia are substantially different contexts, and matrilocality and patrilocality are correlated with very different things within these countries. It is unlikely that the same omitted factor would drive the results in both settings. In this section, I briefly describe the details of the Ghana pension plan (NRCD 127), my empirical strategy, results, and robustness checks.

A. NRCD 127

In 1972, the passage of NRCD 127 established the Social Security and National Insurance Trust (SSNIT), which administered a provident scheme that paid lump sum benefits to beneficiaries. The bill mandated compulsory coverage for establishments that employed at least 5 workers and was optional for smaller establishments (Kumado and Gockel, 2003). Employees affected by the program paid 5 percent of their salaries, while employers made a matching contribution of 12.5 percent, and these contributions were held in government bonds. Employees then received the benefits at retirement age (55 for men and 50 for women).

B. Empirical Strategy & Results

Difference-in-Differences. Unlike in Indonesia, I do not observe geographic variation in exposure to the Ghana pension plan. Instead, in my first set of specifications, I exploit ethnicity-level variation in traditional patrilocality and cohort variation in the degree to which males were affected by the passage of the plan. This difference-in-differences regression is given by

$$y_{icde} = \beta_1 I_e^{Patrilocal} \times I_c^{Part\_Treat} + \alpha_e + \alpha_{dc} + \mathbf{\Gamma} \mathbf{X}_{ie} + \varepsilon_{icde}, \tag{8}$$

where the subscripts are defined as before, and $\mathbf{X}_{ie}$ includes Muslim by birth year fixed effects, a linear trend in birth year interacted with $I_e^{Patrilocal}$, and the ethnicity-level tradition controls interacted with $I_c^{Part\_Treat}$. The sample consists of males born between 1954 and 1975.[37] β_1 captures the

[37] The choice of 1954 allows for the inclusion of the birth years from 18 years prior to the institution of the pension plan, analogous to starting the sample in 1959 for the Astek sample. As with Astek, I only include individuals who are at least 25 at the time of the survey to ensure most of the group has completed their education and married. Since the Ghana census took place in 2000, this includes individuals born before 1975.

differential effect of greater exposure to the pension plan on traditionally patrilocal males, and we expect $\beta_1 < 0$ for education and the transmission of patrilocality. The bottom panel of Appendix Table A5 reports summary statistics for this sample.

One of the main differences between this estimating equation and the equation for Astek is that $I_c^{Part\_Treat}$ now includes all individuals who were 12 or under when the pension plan was instituted, including those younger than 6. Separating the fully treated and the partially treated would lead to a much smaller fully treated group relative to Indonesia, where the census is from 2010 instead of 2000. The composition of a fully-treated group consisting of those 6 or under when the plan was adopted would be meaningfully different, with only 3 cohorts born after the institution of the plan instead of 8.

The inclusion of district-birth year fixed effects (α_{pc}) accounts for geographic variation in the labor market returns to schooling or access to schooling over time. Then, β_1 in equation (8) is identified by variation among individuals from different ethnic groups living in the same district and born in the same year. The inclusion of a control for differential linear time trends for patrilocal individuals helps account for any differential underlying trends in education (e.g. changes in access to education or the returns to education) or the practice of patrilocality that are not associated with the pension plan. Controlling for ethnicity fixed effects (α_e) accounts for any level differences between traditionally patrilocal and non-patrilocal ethnic groups.

The odd columns of Table 6 report the results of regression equation (8). Exposure to the pension program is differentially associated with a 3 percentage point reduction in primary completion for patrilocal males and a 1.7 percentage point reduction in the likelihood of practicing patrilocality. The concentration of the educational effects in primary schooling is consistent with the fact that secondary and university completion are relatively rare (17 percent and 2 percent of the sample have completed secondary school and attended university respectively).

Triple-Differences. Since I do not observe geographic variation in the program's rollout, for educational outcomes, I also exploit differences in gender as an additional source of variation. The conceptual framework implies that the pension plan will affect male education more than female education among traditionally patrilocal groups. Thus, using both males and females, I estimate the triple-differences regression

$$(9) \quad y_{icdeg} = \beta_1 I_e^{Patrilocal} \times I_c^{Part\_Treat} \times I_i^{Male} + \alpha_{eg} + \alpha_{dcg} + \sum_j \phi_j I_e^{Patrilocal} \times I_c^{c=j} + \mathbf{\Gamma} \mathbf{X}_{ieg} + \varepsilon_{icdeg},$$

where g denotes gender, so α_{dcg} is a gender-district-birth year fixed effect. $\sum_j \phi_j I_e^{Patrilocal} \times I_c^{c=j}$ controls for birth year by patrilocal fixed effects. $\boldsymbol{X}_{ieg}$ consists of the same set of controls as before except that the linear time trend is now allowed to vary at the male by patrilocal ethnic group level, as are the ethnicity-level controls. The same strategy cannot be used to study the practice of patrilocality since patrilocal men are likely to marry patrilocal women, so women's practices are not independent of men's. β_1, the differential effect of the pension plan on patrilocal males, is then the coefficient of interest, and we expect $\beta_1 < 0$.

The triple-differences strategy accounts for the same potential sources of bias as does the difference-in-differences strategy in equation (8). In addition, the inclusion of patrilocal by birth cohort fixed effects also accounts for differential time trends, economic conditions, or alternative policies be-

tween traditionally patrilocal and non-patrilocal ethnic groups. Importantly, these fixed effects will account for any differential effects across ethnic groups of Ghana's economic crisis in the early 1980s, as long as the effects are similar across genders within a group. The results could still be biased if non-pension events or time trends differentially affect patrilocal men but not patrilocal women.

The even columns of Table 6 report the results of regression equation (9). The triple-differences effects for the educational outcomes are similar, though larger than in the difference-in-differences regressions. Relative primary schooling falls by 3-3.5 percentage points across strategies, and secondary schooling and university are also negatively affected in the triple-difference strategy.[38]

Table 6—: The Differential Effects of Social Security in Ghana

	(1) **Primary**	(2) **Primary**	(3) **Secondary**	(4) **Secondary**	(5) **University**	(6) **University**	(7) **Practices Patrilocality**
	Difference-in-Differences	Triple-Differences	Difference-in-Differences	Triple-Differences	Difference-in-Differences	Triple-Differences	Difference-in-Differences
$I_e^{Patrilocal} \times I_c^{Part\_Treat}$	-0.033		0.004		-0.003		-0.015
	(0.012)		(0.004)		(0.002)		(0.006)
$I_e^{Patrilocal} \times I_c^{Part\_Treat} \times I_g^{Male}$		-0.035		-0.008		-0.006	
		(0.014)		(0.005)		(0.002)	
Ethnicity FE	Y	Y	Y	Y	Y	Y	Y
District by Birth Year FE	Y	Y	Y	Y	Y	Y	Y
Muslim by Birth Year FE	Y	Y	Y	Y	Y	Y	Y
Cultural Trait Interactions	Y	Y	Y	Y	Y	Y	Y
Differential Time Trends	Y	Y	Y	Y	Y	Y	Y
District by Birth Year by Gender FE	N	Y	N	Y	N	Y	N
Muslim by Gender	N	Y	N	Y	N	Y	N
Patrilocal by Gender	N	Y	N	Y	N	Y	N
Sample	Males	All	Males	All	Males	All	Males
Mean Dep. Var.	0.623	0.523	0.165	0.127	0.022	0.016	0.116
Number of observations	195,629	419,570	195,629	419,570	195,629	419,570	147,343
Clusters	24	24	24	24	24	24	24
Adjusted R^2	0.241	0.260	0.050	0.058	0.010	0.009	0.074

Note: This table reports difference-in-differences and triple-differences estimates of the effect of the 1972 institution of a social security program in Ghana. Difference-in-differences exploit the interaction between exposure to the plan in childhood ($I_c^{Part\_Treat}$ indicates an individual was younger than 12 when the plan was instituted) and whether an individual belongs to a patrilocal ethnic group. *e* denotes an ethnic group, *c* denotes a birth year, and *g* denotes a gender. The sample consists of individuals born between 1954 and 1975 in the Ghana 2000 census. The difference-in-differences only include males, and the triple-differences include both males and females. In the DD specification, the cultural trait interactions are between $I_c^{Part\_Treat}$ and the cultural trait variables. In the triple-D, they include ethnicity-level controls for the cultural trait variables interacted with $I_c^{Part\_Treat}$ and gender, as well as the relevant double interactions. Time trend controls are a linear trend in birth year (normalized to 1954) interacted with an indicator variable for traditional patrilocality (and with gender indicator variable in the triple-D). Standard errors are clustered at the *Ethnographic* ethnic group level.
Source: Individual-level data are drawn from the Ghana 2000 census (Minnesota Population Center, 2011), and data on ethnic traditions are from Murdock (1967).

Event Study Graphs. As for Indonesia, I plot event study graph analogues for the difference-in-differences regression equation (8). I again use the two-step procedure to first estimate linear time trends and subtract them from the outcome variable. I then re-estimate the difference-in-

[38]The larger triple-differences effects are consistent with the possibility that the decline in human capital investment in males due to old age support motives had positive spillovers on females. This would occur if declining male education loosened households' budget constraints.

differences regression but allow being traditionally patrilocal to have different effects by three-year cohort bins. To allow for more pre-treatment years, since no earlier Ghana census includes ethnicity data, I extend the sample back to individuals born after 1945.

As before, this exercise provides evidence on whether the regression results are driven by differential time trends. If β_1 estimates the pension plan's differential effect on traditionally patrilocal males, we expect that being traditionally patrilocal will not have a differential effect on cohorts who were too old to be affected by the pension plan. This also helps rule out the possibility that the results are driven by reverse causality, where the government adopted pension plans in response to the decline of traditional patrilocality.

Figure 5 plots the event study graphs for equation (8) for primary completion and the practice of patrilocality. The event study graphs indicate that differential time trends are unlikely to be driving the results. Figure 5 shows that being born in later cohort had no significant effect on education or the transmission of patrilocality prior to the introduction of the pension plan. As in Indonesia, the timing of when the treatment effect appears in the event study graph also coincides with the timing of the pension plan.

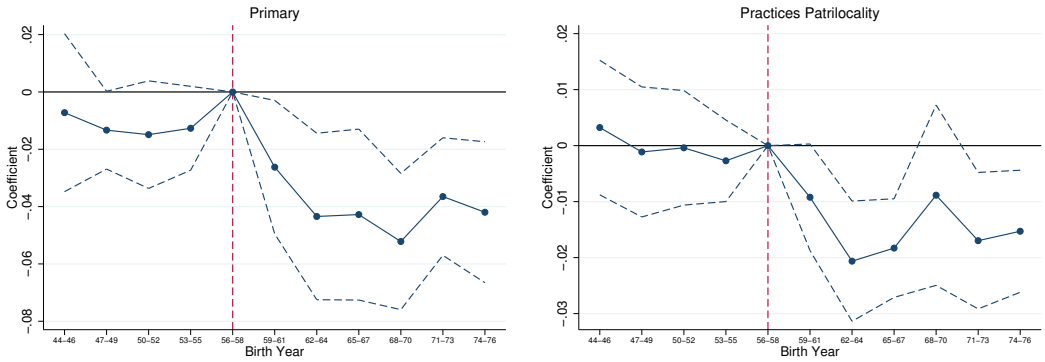

Figure 5. : Event Study Graphs for the Institution of Social Security in Ghana

Note: These figures graph the coefficients for the interaction between belonging to a traditionally patrilocal ethnic group and being born in a 3 year cohort-group for completing primary school (left) and practicing patrilocality (right). Graphs were created following a two-step process where linear time trends were estimated first with equation (8) and then the coefficients of interest were estimated using the residual variation. Confidence intervals are at the 95 percent level.
Source: Data comes from the 2000 Ghana census (Minnesota Population Center, 2011).

C. Robustness

In this section, I evaluate the robustness of the Ghana results.

Robustness to Flexible Time Trend Controls. To further verify whether the main treatment effects in the difference-in-differences and triple-differences regressions are driven by differential time trends for patrilocal males, I now control more flexibly for time trends. In the difference-in-differences regressions, I control for the interaction between third-degree polynomials in birth year and $I_e^{Patrilocal}$. In the triple-differences regressions, I control for male-patrilocal fixed effects

interacted with third degree polynomials in birth year. The first panel of Appendix Table A17 reports these estimates, which are similar to those in Table 6.

Robustness to Baseline Education Controls. Patrilocality may lead to different baseline education levels between patrilocal and non-patrilocal males, which could itself lead individuals to respond differently to the pension plan. To account for this, I allow the pension plan to have different effects for more educated ethnic groups. I calculate the percent of males aged 55–65 who have completed primary school, secondary school, and attended university by whether or not an individual belongs to a traditionally patrilocal group.[39] With the caveat that these are endogenous controls, I then include interactions between these controls and $I_c^{Part\_Treat}$ in equation (8). Similarly, I include double and triple interactions between these controls and $I_c^{Part\_Treat}$ and I_i^{Male} in equation (9). As the second panel of Appendix Table A17 shows, in both cases, including these controls has little effect on the point estimates.

VI. Additional Results

In this section, I descriptively explore whether matrilocal daughters and patrilocal sons who are more educated are more likely to practice matrilocality/patrilocality. This is counter-intuitive, as we typically expect more educated individuals to be more likely to migrate. But it is consistent with the conceptual framework, where parents want to transmit matrilocality/patrilocality to the same children they educate. In the census data, using a sample of married women from traditionally matrilocal ethnic groups aged 25-45 in Indonesia[40] and married men from traditionally patrilocal ethnic groups aged 25-45 in Ghana, I estimate

$$y_{icp} = \tau_0 + \tau_1 I_i^{Primary} + \tau_2 I_i^{Secondary} + \tau_3 I_i^{University} + \alpha_c + \alpha_p + \varepsilon_{icp}, \tag{10}$$

where i denotes an individual, c denotes the individual's birth year, and p denotes a province in Indonesia and a district in Ghana. Then, y_{icp} is an indicator variable equal to 1 if an Indonesian woman lives in the same household as her parents or a Ghanian man lives in the same household as his parents, and $I_i^{Primary}$ is an indicator variable equal to 1 if an individual has completed primary school, $I_i^{Secondary}$ is an indicator variable equal to 1 if an individual has completed secondary school, and $I_i^{University}$ is an indicator variable equal to 1 if an individual has attended university, α_c denote birth year fixed effects, and α_p denote province or district fixed effects.

Since the census data does not allow me to observe parental socioeconomic status for non-coresident parents, I also run these regressions in the IFLS for traditionally matrilocal females. Since the IFLS includes the education status of all household members *and* asks members about the education of non-coresident parents, this allows me to control for whether a respondents' father and mother have any education, attended secondary school, or attended university.

With the important caveat that the regression estimates are descriptive rather than causal, Appendix Table A18 reports the results of these regressions. Even though the data sets post-date the policy change, there is a positive association between education and practicing the cultural tradi-

[39] Males aged 55–65 are too old to be included in the sample for whom I estimate the pension plan's effects.

[40] I choose this age group so that the results will not be affected by selective mortality or by individuals who have not yet completed their education.

tion. The levels of education that are positively associated with the practice of the cultural customs (primary schooling in Ghana and secondary schooling and university attendance in Indonesia) correspond to the education levels for which individuals are most likely to be marginal in these two countries. In the 2000 Ghana census, only 62 percent of males between 25 and 45 have completed primary school (16 percent have completed secondary school). In the 2010 Indonesia census, 90 percent of women have completed primary school, and only 34 percent have completed secondary school. The results from the IFLS, which include parental education controls, are similar to those without, providing some evidence that the relationships in the data are not explained by differences in family socioeconomic status.

I report several other additional results in Appendix D. There, I provide evidence that the pension program does not detectably differentially affect fertility for the parents of the matrilocal women/patrilocal men in the main regressions and that differential returns to education or gender bias are not driving the main results. Additionally, I provide evidence that the reduced practice of matrilocality does reduce old age support, as traditionally matrilocal daughters who live apart from their parents are *not* more likely to send remittances. Finally, in back of the envelope calculations, I make two comparisons. I compare the old age support provided by practicing matrilocality to the support provided by the pension plan, and I compare the returns to investing in a daughter's secondary schooling from additional old age support to the cost of secondary schooling. These calculations suggest that the pension plan provides similarly-sized support to the consumption benefits of practicing matrilocality and that conditional on living with a daughter, investing in her secondary education more than pays for itself.

VII. Conclusion

This paper provides novel evidence that cultural traditions evolve in response to new laws and policies. To establish whether policies can change cultural traditions, I study matrilocality and patrilocality, customs that determine which child lives with his or her parents after marriage. I show that pension plans reduce the practice of these customs. Moreover, since these customs incentivize educational investments in the targeted genders, pension plans also reduce these educational investments.

These results have several implications. First, they establish that policies can indeed change cultural traditions. While it may seem surprising that policies could cause cultural traditions that have persisted for centuries to change, modern pension plans and access to savings change the economic environment in new and important ways. Until modern times, there is little precedent for these changes to how individuals save for retirement or acquire old age support.

Second, these results speak to the importance of kinship traditions for determining economic outcomes, particularly in low-income countries. This paper helps bring kinship traditions into the economics literature by establishing the important role post-marriage residence traditions play in determining human capital investments.

Finally, this paper shows that pension plans can have the unintended consequence of reducing human capital investments because they help decouple old age support from parental investment in children. This finding highlights the importance of taking culture into account when considering the effects of policies.

REFERENCES

Akbari, Mahsa, Duman Bahrami-Rad, and Erik O Kimbrough. 2018. "Kinship, fractionalization and corruption." *Working Paper*.

Alesina, Alberto, and Nicola Fuchs-Schündeln. 2007. "Good-Bye Lenin (or Not?): The Effect of Communism on People's Preferences." *American Economic Review*, 97(4): 1507–1528.

Alesina, Alberto, and Paola Giuliano. 2011. "Family ties and political participation." *Journal of the European Economic Association*, 9(5): 817–839.

Alesina, Alberto, and Paola Giuliano. 2013. "Family Ties." *Handbook of Economic Growth*, 2: 177.

Alesina, Alberto, Benedetta Brioschi, and Eliana La Ferrara. 2015. "Violence Against Women: A Cross-cultural Analysis for Africa." *Working Paper*.

Alesina, Alberto, Paola Giuliano, and Nathan Nunn. 2013. "On the origins of gender roles: Women and the plough." *The Quarterly Journal of Economics*, 128(2): 469–530.

Alesina, Alberto, Yann Algan, Pierre Cahuc, and Paola Giuliano. 2015. "Family values and the regulation of labor." *Journal of the European Economic Association*, 13(4): 599–630.

Anderson, Siwan, and Chris Bidner. 2015. "Property rights over marital transfers." *The Quarterly Journal of Economics*, 130(3): 1421–1484.

Asante, Molefi Kete, and Ama Mazama, ed. 2009. *Encyclopedia of African Religion.* Vol. 1, SAGE Publications, Inc.

Ashraf, Nava, Natalie Bau, Nathan Nunn, and Alessandra Voena. 2020. "Bride price and female education." *Journal of Political Economy*, 128(2): 591–641.

Banerjee, Abhijit. 2004. "Educational Policy and Economics of the Family." *Journal of Development Economics*, 74(1): 3–32.

Banerjee, Abhijit, Xin Meng, Tommaso Porzio, and Nancy Qian. 2014. "Aggregate fertility and household savings: A general equilibrium analysis using micro data." *NBER Working Paper #20050*.

Bastian, Jacob. 2020. "The rise of working mothers and the 1975 earned income tax credit." *American Economic Journal: Economic Policy*, 12(3): 44–75.

Beaman, Lori, and Andrew Dillon. 2012. "Do Household Definitions Matter in Survey Design? Results From a Randomized Survey Experiment in Mali." *Journal of Development Economics*, 98(1): 124–135.

Beaman, Lori, Raghabendra Chattopadhyay, Esther Duflo, Rohini Pande, and Petia Topalova. 2009. "Powerful women: does exposure reduce bias?" *The Quarterly journal of economics*, 124(4): 1497–1540.

Becker, Anke. 2018. "On the Origins of Son Preference and Female Genital Cutting." *Working Paper*.

Becker, Gary S, Kevin M Murphy, and Jörg L Spenkuch. 2016. "The manipulation of children's preferences, old-age support, and investment in children's human capital." *Journal of Labor Economics*, 34(2): 3–30.

Becker, Sascha O, Katrin Boeckh, Christa Hainz, and Ludger Woessmann. 2015. "The Empire Is Dead, Long Live the Empire! Long-Run Persistence of Trust and Corruption in the Bureaucracy." *The Economic Journal*, 126(590): 40–74.

Bidner, Chris, and Patrick Francois. 2011. "Cultivating trust: Norms, institutions and the implications of scale." *The Economic Journal*, 121(555): 1097–1129.

Bisin, Alberto, and Thierry Verdier. 2001. "The economics of cultural transmission and the dynamics of preferences." *Journal of Economic Theory*, 97(2): 298–319.

Boyd, Robert, and Peter J Richerson. 1988. *Culture and the evolutionary process.* University of Chicago Press.

Caldwell, John C, PH Reddy, and Pat Caldwell. 1986. "Periodic high risk as a cause of fertility decline in a changing rural environment: Survival strategies in the 1980-1983 South Indian drought." *Economic Development and Cultural Change*, 34(4): 677–701.

Campa, Pamela, and Michel Serafinelli. 2019. "Politico-economic regimes and attitudes: Female workers under state socialism." *Review of Economics and Statistics*, 101(2): 233–248.

Corno, Lucia, and Alessandra Voena. 2015. "Selling daughters: Age of marriage, income shocks and bride price tradition." *Working Paper*.

Corno, Lucia, Nicole Hildebrandt, and Alessandra Voena. 2020. "Weather Shocks, Age of Marriage and the Direction of Marriage Payments." *Econometrica*, 88(3): 879–915.

Duflo, Esther. 2001. "Schooling and labor market consequences of school construction in Indonesia: Evidence from an unusual policy experiment." *American Economic Review*, 91(4): 795–813.

Ebenstein, Avraham. 2014. "Patrilocality and missing women." *Working Paper*.

Engels, Friedrich. 1942. *The Origin of the Family, Private Property, and the State.* International Publishers Co.

Enke, Benjamin. 2019. "Kinship Systems, Cooperation and the Evolution of Culture." *Quarterly Journal of Economics*.

Fernández, Raquel. 2007. "Alfred Marshall Lecture: Women, Work, and Culture." *Journal of the European Economic Association*, 305–332.

Fernández, Raquel. 2011. "Does Culture Matter?" In *Handbook of Social Economics, Vol. 1A.* , ed. Jess Benhabib, Matthew O. Jackson and Alberto Bisin, 481–510. Amsterdam:North-Holland.

Fernández, Raquel, and Alessandra Fogli. 2006. "Fertility: The role of culture and family experience." *Journal of the European economic association*, 4(2-3): 552–561.

Fernández, Raquel, and Alessandra Fogli. 2009. "Culture: An Empirical Investigation of Beliefs, Work, and Fertility." *American Economic Journal: Macroeconomics*, 1(1): 146–177.

Gil, Benjamin Zvi. 1964. *Tribes in Ghana.* Ghana Census Office.

Giuliano, Paola. 2014. "The Role of Women in Society: From Preindustrial to Modern Times." *CESifo Economic Studies*.

Giuliano, Paola, and Nathan Nunn. 2016. "Understanding cultural persistence and change." *Working Paper*.

Gneezy, Uri, Kenneth L Leonard, and John A List. 2009. "Gender differences in competition: Evidence from a matrilineal and a patriarchal society." *Econometrica*, 77(5): 1637–1664.

Gordon, Raymond G. 2009. *Ethnologue: Languages of the World, 16th Edition.* SIL International.

Greif, Avner. 1993. "Contract enforceability and economic institutions in early trade: The Maghribi traders' coalition." *American Economic Review*, 525–548.

Grosfeld, Irena, and Ekaterina Zhuravskaya. 2015. "Cultural vs. economic legacies of empires: Evidence from the partition of Poland." *Journal of Comparative Economics*, 43(1): 55–75.

Gruber, Jonathan, and Daniel M Hungerman. 2007. "Faith-based charity and crowd-out during the great depression." *Journal of Public Economics*, 91(5): 1043–1069.

Guttman, Joel M. 2001. "Self-enforcing reciprocity norms and intergenerational transfers: Theory and evidence." *Journal of Public Economics*, 81(1): 117–151.

Hamoudi, Amar, and Duncan Thomas. 2014. "Endogenous coresidence and program incidence: South Africa's old age pension." *Journal of development economics*, 109: 30–37.

Holden, Clare, and Ruth Mace. 2003. "Spread of Cattle Led to the Loss of Matrilinear Descent in Africa: A Co-Evolutionary Analysis." *Proceedings of the Royal Society*, 270: 2425–2433.

Jayachandran, Seema. 2015. "The roots of gender inequality in developing countries." *Annual Review of Economics*, 7(1): 63–88.

Jayachandran, Seema, and Rohini Pande. 2017. "Why are Indian children so short? The Role of Birth Order and Son Preference." 107(9): 2600–2629.

Jensen, Robert, and Nolan Miller. 2017. "Keepin' 'em Down on the Farm: Old Age Security and Strategic Underinvestment in Children." *NBER Working Paper #23122*.

Jones, Doug. 2011. "The Matrilocal Tribe: An Organization of Demic Expansion." *Human Nature*, 22: 177–200.

Jordan, Fiona, Russell Gray Greenhill Simon, and Ruth Mace. 2009. "Matrilocal Residence is Ancestral in Austronesian Societies." *Proceedings of the Royal Society*, 276: 1957–1964.

Kumado, Kofi, and Augustine Fritz Gockel. 2003. *A study on social security in Ghana.* University of Ghana.

La Ferrara, Eliana. 2007. "Descent rules and strategic transfers. Evidence from matrilineal groups in Ghana." *Journal of Development Economics*, 83(2): 280–301.

La Ferrara, Eliana, and Annamaria Milazzo. 2017. "Customary norms, inheritance, and human capital: Evidence from a reform of the matrilineal system in Ghana." *American Economic Journal: Applied Economics*, 9(4): 166–85.

Lebar, Frank, ed. 1972. *Ethnic Groups of Insular Southeast Asia.* Vol. 1, Human Relations Area Files Press.

Lee, Ronald, Andrew Mason, and Daniel Cotlear. 2010. "Some economic consequences of global aging." *Health, Nutrition and Population Discussion Paper. Washington, DC: The World Bank*.

Levine, David, and Michael Kavane. 2003. "Are Investments in Daughters Lower When Daughters Move Away?" *World Development*, 31(6): 1065–1084.

Lowes, Sara. 2016. "Kinship systems, gender norms, and household bargaining: Evidence from the matrilineal belt." *Working paper*.

Lowes, Sara, Nathan Nunn, James A Robinson, and Jonathan L Weigel. 2017. "The evolution of culture and institutions: Evidence from the Kuba Kingdom." *Econometrica*, 85(4): 1065–1091.

Mazzocco, Maurizio, and Shiv Saini. 2012. "Testing efficient risk sharing with heterogeneous risk preferences." *American Economic Review*, 102(1): 428–68.

Meghir, Costas, Ahmed Mushfiq Mobarak, Corina D Mommaerts, and Melanie Morten. 2019. "Migration and informal insurance." *NBER Working Paper*.

Minnesota Population Center. 2011. "Integrated Public Use Microdata Series, International: Ver-

sion 6.1."

Moscona, Jacob, Nathan Nunn, and James A Robinson. 2017. "Keeping it in the family: Lineage organization and the scope of trust in Sub-Saharan Africa." *American Economic Review P&P*, 107(5): 565–71.

Muliati, Iene. 2013. "Pension reform experience in Indonesia." *Prepared for IMF conference "Designing Sustainable and Equitable Pension Systems in Asia in the Post Crisis World"*.

Munshi, Kaivan, and Mark Rosenzweig. 2006. "Traditional institutions meet the modern world: Caste, gender, and schooling choice in a globalizing economy." *American Economic Review*, 96(4): 1225–1252.

Munshi, Kaivan, and Mark Rosenzweig. 2016. "Networks and misallocation: Insurance, migration, and the rural-urban wage gap." *American Economic Review*, 106(1): 46–98.

Murdock, George Peter. 1967. *Ethnographic Atlas.* Pittsburgh:University of Pittsburgh Press.

Peisakhin, Leonid V. 2010. "Living Historical Legacies: The 'Why' and 'How' of Institutional Persistence – The Case of Ukraine." *Working Paper*.

Perusahan Umum Asuransi Sosial Tenaga Kerja. 1985. *Readings in Social Security: The Indonesian Case.* Vol. 2, ASTEK.

Purwoko, Bambang. 1997. "The Social Security System in Indonesia: Current Investment Issues and Future Prospects."

Rammohan, Anu, and Peter Robertson. 2012. "Do Kinship Norms Influence Female Education? Evidence From Indonesia." *Oxford Development Studies*, 40(3): 283–304.

Rosenzweig, Mark R, and Oded Stark. 1989. "Consumption smoothing, migration, and marriage: Evidence from rural India." *Journal of political Economy*, 97(4): 905–926.

Schoellman, Todd, and Michele Tertilt. 2006. "Marriage laws and growth in Sub-Saharan Africa." *American Economic Review*, 96(2): 295–298.

Schulz, Jonathan. 2018. "The Catholic Church, Kin Networks, and Institutional Development." *Working Paper*.

Strauss, J., F. Witoelar, B. Sikoki, and A.M. Wattie. 2009. "The Fourth Wave of the Indonesian Family Life Survey (IFLS4): Overview and Field Report."

Strauss, J., K. Beegle, B. Sikoki, A. Dwiyanto, Y. Herawati, and F. Witoelar. 2004. "The Third Wave of the Indonesian Family Life Survey (IFLS): Overview and Field Report."

Strouthes, D. 1993. *Encyclopedia of World Cultures: East and Southeast Asia.* Vol. 5, GK Hall and Co.

Sudomo, R. 1985. "The development of the ASTEK social insurance system in Indonesia." *International Social Security Review*, 38(1): 55–61.

Tertilt, Michele. 2005. "Polygyny, fertility, and savings." *Journal of Political Economy*, 113(6): 1341–1371.

Tertilt, Michele. 2006. "Polygyny, women's rights, and development." *Journal of the European Economic Association*, 4(2-3): 523–530.

Urminsky, Oleg, Christian Hansen, and Victor Chernozhukov. 2016. "Using double-lasso regression for principled variable selection." *Working Paper*.

Vroklage, Bernh. 1952. "Bride Price or Dower." *Anthropos*, Bd. 47, H. 1./2.: 133–146.

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

Press.
World Bank. 2015. "World Development Report 2015: Mind, Society, and Behavior." *Washington, DC: World Bank.*
World Bank. 2020. "Pensions." *https://www.worldbank.org/en/topic/pensions#3*, Accessed: 2020-03-25.
Wysokinskya, Agnieszka. 2015. "Invisible Wall: How History Matters for Economic Development." *Working Paper*.