ABSTRACT

Title of Document:	ESSAYS ON FEMALE EMPOWERMENT AND ITS HEALTH CONSEQUENCES IN WEST AFRICA
	Alessandro Emilio Orfei, Doctor of Philosophy, 2012
Directed By:	Professor Maureen L. Cropper Assistant Professor Jeanne Lafortune Department of Economics

Part 1: The Impact of Female Empowerment on Men's Extramarital Sexual Behavior: Evidence from West Africa

Improving women's bargaining power to negotiate safer sex with their partner is widely seen as fundamental to reducing women's vulnerability to HIV infection, although little causal evidence has been provided. This paper uses exogenous variation in a determinant of female bargaining power, women's kin support, to identify the causal effect of women's empowerment on men's extramarital sexual behavior. I establish the relevance of kin support shocks for measures of bargaining power such as women's reported decision-making authority over major and daily household purchases, women's healthcare, and household cooking decisions. Reduced form estimates indicate that having one more adult male sibling alive leads to a decrease of 1.3 percent in the probability of her husband's extramarital behavior. However, the number of living adult female siblings does not influence her husband's behavior. A measure of shocks to kin support, captured by the death of a woman's young siblings, is shown to increase her husband's extramarital behavior. The kin support measures are balanced across observables and results are robust to excluding households in which women's relatives reside, as well as alternate definitions of the kin support measures. This suggests that a woman's bargaining power within the household does influence the likelihood of her husband's extramarital sexual behavior, and thus her risk of contracting a sexually transmitted disease.

Part 2: Kin Support, Female Bargaining Power, and Fertility

Do decreases in a woman's bargaining power relative to her husband lead to higher fertility? This paper attempts to answer this question in the context of West Africa using shocks over time to a determinant of a woman's bargaining power, her kin support, to identify the causal effect. Kin support shocks are captured by deaths of a woman's young siblings, which are argued to be an indication that the woman's natal family has suffered a negative shock. The shocks are shown to be relevant across couples for women's reported household decision-making authority. I exploit differences in the timing of the shocks across couples over time to estimate how changes in a woman's bargaining power impact a couple's fertility. A couple is on average 2.5 percentage points more likely to have a child in any given year after the woman has experienced an additional post-marriage young sibling death. The effect is robust to removing village-year and country-cohort-year effects among other controls. Analysis of the dynamics of fertility changes relative to the timing of the shocks support the validity of the findings.

ESSAYS ON FEMALE EMPOWERMENT AND ITS HEALTH CONSEQUENCES
IN WEST AFRICA

by

Alessandro Emilio Orfei

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Advisory Committee:
Professor Maureen L. Cropper, Co-Chair
Professor Jeanne Lafortune, Co-Chair
Professor Anna Alberini
Professor Jessica A. Goldberg
Professor Raymond P. Guiteras

Dedication

To Belén and Valentina

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Chapter 1

Introduction

In his seminal work *Development as Freedom*, Amartya Sen argues for a conception of development based on the expansion of individual freedoms and the realization of human capabilities. Such freedoms include the opportunity to live a long life; to obtain an education, seek and find employment, own property, and have a say in household decisions; the freedom from violence or coercion; and to choose one's spouse and family size. While some freedoms have expanded as average income has grown, Sen argues many freedoms are governed by political forces, or social arrangements such as the division of resources and responsibilities within the household. As a result, progress in development must ultimately be evaluated on the basis of achieving these freedoms for everyone, rather than on a more narrow focus on the growth of average income.

The current state of women's well-being and freedom along several dimensions underscores the importance of being mindful of this broader conception of development. Improvements in average household income obscure persistent inequities in the welfare of men and women in the household. While women's education and labor force participation have increased in tandem with income growth in many countries, aspects of women's well-being have not improved with average

income growth (WDR, 2012). For example, excess female mortality[1] for women and girls has been invariant to average income growth in low and middle income countries over the period 1990 to 2008 (Figure 1.1) and remains orders of magnitude higher in these countries relative to high-income countries (Table 1.1) (WDR, 2012; Anderson and Ray, 2010). Most starkly, excess female mortality has increased ten-fold over this period in the high HIV-prevalence countries of sub-Saharan Africa.

In addition to disadvantages in health outcomes, women continue to face violence and limited decision-making authority in the household. A World Health Organization study of intimate partner violence in ten countries found that between 10 and 69 percent of women report being physically abused at least once in their lifetime, with comparable proportions reporting attempted forced sex by an intimate partner in their lifetime (Harvey et al., 2007). These rates vary widely across countries and often not significantly with household wealth or income (Hindin et al., 2008; WDR, 2012). Large proportions of women also continue to have no say in how their own income is spent (Figure 1.2) or in household decisions (Kishor and Subaiya, 2008). These indicators of women's decision-making authority appear also not to improve with household wealth once controlling for other characteristics (Kishor and Subaiya, 2008).

Building on the notion of development as freedom, Sen went on to argue that freedom represents not only the ends of development, but also its means. That is, the further expansion of individual freedom and human capability is itself a function of the free agency of people (Sen, 1999). In this view, the deprivations women face in

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[1] Excess female deaths are defined as the number of women who would not have died had they had the same likelihood of dying relative to men as women in high-income countries do relative to men (WDR, 2012; Anderson and Ray, 2010).

the areas discussed above not only represent a failure of development in and of themselves, but also foregone opportunities for further development in these and other areas. This view is shared by the international development community as embodied in the Millennium Development Goals (MDGs) in which promoting gender equality and the empowerment of women represents one of the eight goals, which is in turn widely seen as instrumental in achieving the goals of universal primary education (MDG 2), reduction of under-five mortality (MDG 4), improvement in maternal health (MDG 5), and a reduction in the likelihood of contracting HIV/AIDS (MDG 6) (UNDP, 2006).

The extent to which women's empowerment serves as a catalyst for their own development, that of their children, and other development goals is an empirical question. Support for the instrumental nature of women's empowerment reflected in Sen (1999) and the MDGs is based in part on a body of empirical work arguing for a link between various proposed measures of women's agency and various household outcomes. Examples include Thomas (1990), who finds that unearned income in women's control leads to substantial improvements in child survival probabilities and the nutritional status of daughters in Brazil. In a study of Indonesia, Beegle et al. (2001) find that a woman with a larger share of household assets in her control, or a higher level of education than her husband, is more likely to obtain prenatal care and other modern reproductive health services. Duflo (2003) studies the gender of the recipient of a cash transfer due to the expansion of an old-age pension program in South Africa. Duflo finds that pensions received by grandmothers had large improvements on the anthropometric status of girls in the household, with little effect

on boys, and no effect due to pensions received by men. Lundberg et al. (1997) find similarly that a policy change in the United Kingdom in which a child allowance was transferred to wives resulted in greater expenditure on children's clothing.

While the findings of these and similar studies overall are suggestive of a causal relationship between women's empowerment and development outcomes, the difficulty of finding exogenous variation in women's empowerment renders drawing inferences challenging and subject to omitted variable bias, perhaps less so in those studies able to utilize experimental or quasi-experimental evidence (e.g. Ashraf et al., 2010; Duflo, 2003; and Lundberg et al., 1997).

Observed measures of women's bargaining power in the household such as differences in a husband and wife's education or share of asset ownership may be endogenous as couples may pair on the marriage market on the basis of these factors in a manner correlated with outcomes. Other unobserved differences across couples such as social norms governing women's status and household behavior may frustrate causal interpretation as well. Yet despite these econometric challenges, estimating the causal relationship of women's empowerment on development outcomes has important implications for how development challenges are approached. That is, if improvement in women's empowerment, while a worthwhile objective per se, does not contribute to reducing high rates of unwanted fertility, intimate partner violence, malnutrition, or the excess mortality of women and girls, then efforts must be directed toward solutions which address these deprivations by other means.

This dissertation seeks to contribute to this body of literature by estimating the causal effect of a woman's empowerment on two determinants of her welfare

intimately linked to her freedom over her body, her health, her labor, and quality of life. Specifically, in Chapter 2, I explore whether a change in a woman's bargaining power during her marriage influences her husband's extramarital sexual behavior using data on couples in West Africa. Many development practitioners and researchers believe that women are unable to protect themselves from their husband's risky sexual behavior and resulting sexually transmitted diseases (STD), because they lack bargaining power in their relationship. Such a possibility is particularly serious in the context of the high HIV rates of sub-Saharan Africa. While HIV rates in West Africa are relatively low, rates have been rising in recent years rendering such a vulnerability for women precarious. In Chapter 3, I study the effects of women's empowerment on a couple's fertility. West Africa has among the highest rates of births per women and rates of maternal mortality in the world. Understanding whether changes in women's empowerment affect fertility has implications for strategies designed to reduce maternal mortality in the region. Estimation in both chapters uses data on couples in eight West African countries pooled from households surveyed in the Demographic and Health Surveys.

In Chapter 2, the causal effect of women's empowerment on men's extramarital behavior is identified using shocks to a determinant of a woman's bargaining power, her kin support. Traditional sources of social support such as kinship have been argued to affect bargaining strength in the household and to be especially important for women. Kin support is argued to be particularly relevant in the context of sub-Saharan Africa due to the importance of kin relations relative to conjugal relations. Shocks to kin support are argued to serve as valid shifters of

bargaining power in this context due in part to anthropological evidence indicating the separate nature of husbands' and wives' kin relations.

Specifically, variation in a woman's bargaining power induced by shocks to her kin support is captured by the deaths of a woman's siblings during her marriage. I present two measures of shocks to kin support based on the surviving number of living adult male siblings a woman has, and the deaths of a woman's younger siblings. The generally patriarchal societies of West Africa render adult male family member's support most critical. Deaths of a woman's young siblings during her marriage serve as indication her natal family has suffered a negative shock.

I demonstrate the negative effect of these shocks to kin support for measures of a woman's decision-making authority over major and daily household purchases, her healthcare, and household cooking decisions. Reduced form results indicate that having one more adult male sibling alive leads to a decrease of about 1 percent in the probability of her husband's extramarital behavior. This effect represents 10 percent of the sample mean for men's extramarital behavior. Results are similar using the deaths of young siblings as shocks to kin support. Both kin support measures are shown to be balanced across observables and robust to excluding households in which women's relatives reside, along with alternative definitions of the kin support measures. Finally, a falsification exercise demonstrates that the deaths of a woman's adult female siblings do not affect her husband's behavior. An instrumental variable estimation is eschewed in favor of reduced form estimates due to the likely violation of the exclusion restriction due to the noisy measurement of bargaining power in the data. Overall, the results in this chapter suggest that a woman's bargaining power

does influence the likelihood of her husband's extramarital behavior, and therefore her risk of contracting an STD.

In Chapter 3, I explore whether decreases in a woman's bargaining power relative to her husband over the course of her marriage affect the couple's fertility. I utilize a richer dimension of the data set in Chapter 2 to address this question by constructing a panel based on a time series of a woman's births and sibling deaths constructed from her retrospective fertility and sibling histories. Such an approach serves as a contribution to the empirical literature on the topic by restricting identification to shifts in bargaining power within couples over time, as opposed to across couples. This strategy allows for the inclusion of couple fixed effects to control for unobserved time-invariant differences across couples which have risked confounding inference in previous studies in the literature. Exploiting differences in the timing of kin support shocks for women over time, I estimate that a couple is 2.5 percentage points more likely to have a child in any given year after the woman has experienced an additional sibling death. The effect is shown to be robust to removing village-year and country-cohort-year effects among other controls. Examining the dynamics of fertility changes before and after the timing of the kin support shocks supports the validity of the findings.

Figure 1.1: Changes in Excess Female Mortality vs. Income Growth in Low and Middle Income Countries 1990 - 2008

change in excess female deaths per 100,000 female population

income growth, log

— excess female mortality, ages 0–4

— excess female mortality, ages 15–49
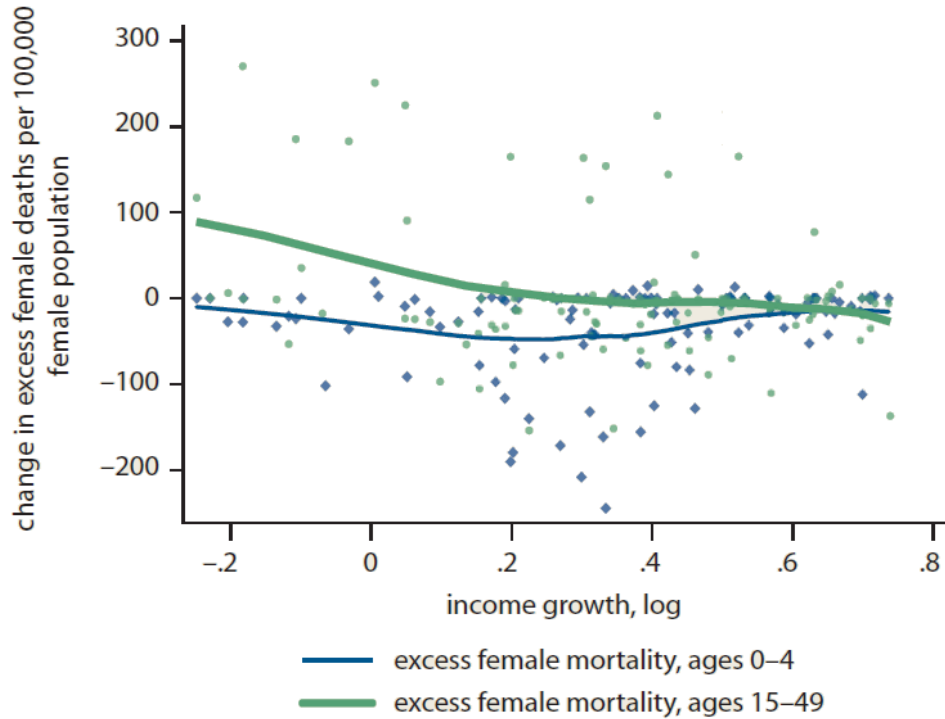
Source: World Bank (2012)

Table 1.1: Global Estimates of Excess Female Mortality for 1990 and 2008

	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008	1990	2008
China	890	1,092	259	71	21	5	208	56	92	30	1,470	1,254
India	265	257	428	251	94	45	388	228	81	75	1,255	856
Sub-Saharan Africa	42	53	183	203	61	77	302	751	50	99	639	1,182
High HIV-prevalence countries	0	0	6	39	5	18	38	328	4	31	53	416
Low HIV-prevalence countries	42	53	177	163	57	59	264	423	46	68	586	766
South Asia (excluding India)	0	1	99	72	32	20	176	161	37	51	346	305
East Asia and Pacific (excluding China)	3	4	14	7	14	9	137	113	48	46	216	179
Middle East and North Africa	5	6	13	7	4	1	43	24	15	15	80	52
Europe and Central Asia	7	14	3	1	0	0	12	4	4	3	27	23
Latin America and the Caribbean	0	0	11	5	3	1	20	10	17	17	51	33
Total	1,212	1,427	1,010	617	230	158	1,286	1,347	343	334	4,082	3,882

Source: World Bank (2012)

Figure 1.2: Women's control over own income
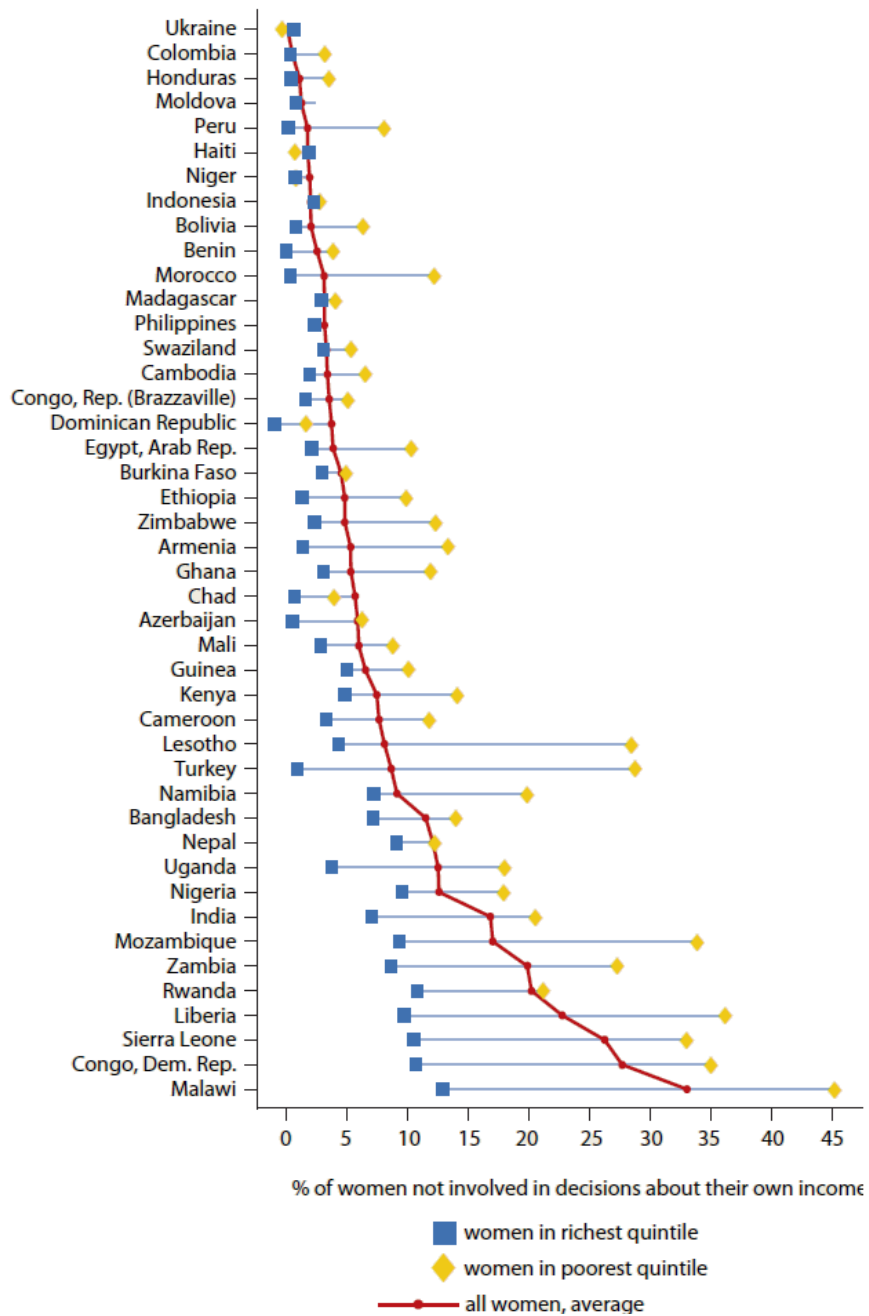
Source: World Bank (2012)

Chapter 2

The Impact of Female Empowerment on Male Extramarital Sexual Behavior: Evidence from West Africa

2.1   Introduction

In 2004, *The Economist* claimed "Men tend to contract HIV because of things they have done; women are more likely to contract it because of things that have been done to them."[2]   It is widely believed that a significant factor leading to a high infection rate for women in sub-Saharan Africa is their husband's high-risk sexual behavior.[3]   Men become infected through sexual encounters with someone other than their spouse or live-in partner and in turn infect their partner at home.   Many development practitioners and researchers believe that women are unable to protect themselves from their partner's behavior in part due to their poor bargaining position within the household (Carpenter et. al., 1999; Tlou, 2002; Varga, 1999).   A woman may be unable to condition her relationship on her partner's safe sexual practices, because she risks violence, financial hardship, or social sanction.   As a result, the empowerment of women has become an important component of the response to combat HIV in sub-Saharan Africa in addition to being an important development objective in and of itself (UNAIDS, UNFPA, and UNIFEM, 2004).   Yet, there has

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[2]The Economist, 11/27/2004, Vol. 373 Issue 8403, p82-83

[3]Physiological factors may also serve to explain the high rate of female infection.   The transmission of HIV from men to women has been argued to be more efficient than women to men (Kristensen et. al., 2002).   Though Gray et.al. (2001) do not find statistically significant differences in transmission rates.

For discussion of male extramarital behavior as a source of infection for women see UNAIDS, UNFPA and UNIFEM (2004).

been little empirical work attempting to establish a causal relationship between female bargaining power and men's high-risk sexual behavior and to estimate the size of the effect. This study attempts to fill this gap by studying the relationship between bargaining power, as proxied by shocks to a woman's kin network, and her husband's extramarital relations.

Previous studies have reported associations between measures of low female bargaining power and high-risk male sexual behavior within relationships in various sub-Saharan African countries.[4] While these associations are robust to the inclusion of controls for various couple characteristics, these studies are unlikely to establish a causal relationship because they cannot adequately account for omitted variable bias and simultaneity bias. Omitted variable bias could confound analysis if, for example, unobserved social norms govern both women's status in the household and acceptable male sexual behavior. Individual unobserved characteristics may also confound causal interpretation if certain types of men and women match together in the marriage market. Simultaneity bias may result if the husband's sexual behavior and the woman's power in the household are jointly determined through an implicit negotiation. For example, a man may cede control over household decisions to his wife in an implicit exchange for less scrutiny of his extramarital relations. This paper will attempt to circumvent these identification problems by exploiting post-marriage shocks to a determinant of female bargaining power, kin support, which provides

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[4]For example, Langen (2005) find that dependent women are less likely to suggest condom use and their male partners are more likely to refuse condom use. Dunkle et. al. (2004) find that South African women in relationships with a high degree of male control are more likely to be HIV positive. The authors hypothesize that the men in such relationships are more likely to be HIV positive and impose risky sexual practices on the women.

variation which is unlikely to be correlated with factors driving male sexual behavior except through women's bargaining power.

Traditional sources of social support such as kinship have been argued to impact bargaining strength within the household and to be especially important for women (Agarwal, 1997). Kinship support has been shown to serve as a source of implicit insurance perhaps due to the greater trust among kin (Rosenzweig, 1988; Rosenzweig and Stark, 1989). In a study of households in Cote d'Ivoire, Grimard (1997) finds evidence of partial insurance among households of the same ethnic group which he argues may be a proxy for lineage or kinship group. Jacoby and Mansuri (2008) note the role of a woman's brother in protecting her from mistreatment via a bride exchange custom between families in rural Pakistan. Kin support is also especially relevant for female bargaining power in sub-Saharan Africa as several anthropological studies have highlighted the importance of kinship relations relative to conjugal relations (Potash, 1995; Abu, 1983; Caldwell and Caldwell, 1987). As Potash (1995) noted, "African families are based on the enduring, separate kinship ties of husbands and wives." Spouses often maintain separate budgets and women and their children may be even regarded as a separate economic unit from the husband (Caldwell and Caldwell, 1987).[5] For men, financial responsibilities to kin may supersede those to the marital unit.

The separate nature of kin support in sub-Saharan Africa and its importance suggests that intrahousehold bargaining power is affected by kin support in two ways.

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[5] Lesthaeghe (1989) documents that child fosterage is a common form of kin support in West Africa allowing the costs child rearing to be spread within a kin group. Given the burden of caring for children on the mother's income, the practice of child fosterage can be especially important for women.

First, a decrease in a woman's kin support can worsen her outside option by damaging her fall-back source of support should the marriage dissolve or become uncooperative. With a worsened outside option, a woman may be less able to demand better outcomes within the relationship. Secondly, given that kinship ties may involve financial transfers, shocks to this network directly affect the income within her control and hence her bargaining power vis-a-vis her husband.[6]

The implied model of the couple's behavior is a cooperative bargaining model where surplus within marriage can be thought to be divided according to a Nash bargaining solution in which the threat point may be divorce as in the seminal work of McElroy and Horney (1981) or an uncooperative outcome within marriage as in the separate-spheres model of Lundberg and Pollack (1993). Shocks to a woman's kin support affect her utility at the relevant threat point and affect outcomes within marriage as a result.

Two measures of kin support are presented. First, the current number of living adult male siblings at least 20 years old, will serve as a measure of a woman's current level of kin support. The generally patriarchal societies of West Africa render male family member's support most critical.[7] Secondly, the post-marriage deaths of a woman's young siblings under age 20 are used to capture negative shocks to a woman's natal family. While HIV prevalence is low across West Africa, deaths are

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[6] In addition to the loss of an future income sharing due to a deceased sibling, the direct costs of deaths associated with funeral expenses have been shown to be significant in many countries and particularly onerous in sub-Saharan Africa. For example, Case et al. (2008) and Case and Menendez (2009) document that funeral expenses in South Africa can cost on average the equivalent of one year of median income.

[7] The vast majority of couples in this study belong to ethnic groups characterized as patrilineal such as the Ewe, Hausa, Fulani, Igbo, and Yoruba (Murdock, 1967). A sizeable ethnic group with matrilineal orientation in West Africa is the Akan which generally live in Ghana and Cote d'Ivoire. Couples from these countries, however, are not in the sample.

restricted to siblings under the age of 20 in this measure in order to ensure that the deaths are not due to sexually transmitted HIV, which might then be correlated with the husband's sexual behavior.[8] Only sibling deaths after the woman's marriage are included in the measure in order to avoid the possibility that the outcomes of these shocks were a consideration in marriage decisions. Likewise, fixed effects for the number of siblings eligible to become living adult male siblings after the woman's marriage are included so that the variation in the current number of living adult male siblings is due to deaths. Controlling for the number of siblings also serves to account for socioeconomic characteristics that may be associated with sibship size.

I measure kin support and shocks to a woman's natal family using the birth and death history of a woman's siblings in the Demographic and Health Surveys (DHS). The sample used in the analysis consists of couples pooled from DHS surveys in the West African countries of Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali, Niger, and Senegal. West Africa is chosen due to the relatively low HIV prevalence of the region, which avoids that sibling mortality is correlated with HIV prevalence and in turn male sexual behavior. A focus on West Africa is also of independent interest as prevalence rates have been rising in some countries such as Cameroon and Gabon (UNAIDS, 2008). Understanding the dynamics of HIV transmission and barriers to change in sexual behavior in this region may inform policy prior to any further increase in HIV prevalence.

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[8]One may still be concerned that the deaths of siblings under the age of 20 may be correlated with sexually transmitted HIV prevalence due to mother-to-child transmission of the virus. Child mortality due to HIV in West Africa, however, is uncommon representing only 2.8 percent of the deaths of children under 5 for the countries in this study (WHO, 2007).

I show that the kin support measures are balanced across observables which are fixed at the time of the couple's marriage. I also find no effect of the measures on the likelihood the husband or woman knows someone who has died of AIDS. Nor is the husband's knowledge of HIV and prevention methods predicted by the kin support measures. These results suggest the kin support measures are not affecting the husband through HIV-related channels. I also verify that the results are robust to excluding households from the sample which can be identified as containing the woman's relatives, where this concern would be very important.

Next I demonstrate the relevance of the kin support measures for a measure of female bargaining power. An indicator variable for female bargaining power is constructed from a woman's response in the DHS survey regarding whether she has some say over major household purchases. The literature on the determinants of female bargaining power has highlighted control over economic resources as a critical factor (Anderson and Eswaran, 2009; Kantor, 2003; Friedberg and Webb, 2006). This paper benefits from a survey question which directly measures a woman's control over important economic decisions of the household. The regression of the female bargaining power measure on the kin support measure confirms a negative relationship with young sibling deaths and a positive relationship with the number of living adult male siblings. This relationship is robust to the inclusion of several controls including village-level fixed effects, number of sibling fixed effects, couple and household characteristics, and characteristics of the woman's natal family. I also demonstrate the expected relationship between the kin support measures and alternate measures of female bargaining power.

The validity of the kin support measures as a bargaining power shifter is explored further. If unobserved socioeconomic characteristics of the couple accounted for the correlation between sibling mortality and female bargaining power, then the correlation should exist for both adult female sibling and adult male sibling mortality. Tests indicate that there is no statistically significant relationship between the number of living adult female siblings and the female bargaining power measure unlike for living adult male siblings. Furthermore, if the young sibling mortality measure is to have the interpretation of a negative shock to the woman's natal family then we should observe that the deaths of siblings of both genders have an impact.[9] For example, infant siblings of both genders would be at risk from income shocks to the natal family. I verify that indeed both male and female young sibling deaths have a statistically significant relationship with the female bargaining power measure. These results lend credence to my hypothesis.

Finally, I test for the causal relationship of interest and assess whether a woman with lower bargaining power is more likely to have a husband who engages in high-risk sexual behavior. A measure of men's high-risk sexual behavior is constructed from men's survey responses regarding whether they have had extramarital partners in the last 12 months. Extramarital behavior is studied given evidence that multiple concurrent partnerships increase the speed of transmission, prevalence, and persistence of HIV in a population (Mah and Halperin, 2010).

An instrumental variable approach would have been preferred, but given the

[9]Male and female infant mortality rates are similar in West Africa with mortality slightly higher among male infants. Gender is not predictive of mortality after infancy (Balk et. al., 2004).

limits of the bargaining power variable I had at hand, the exclusion restriction was unlikely to be satisfied. A causal relationship between female bargaining power and male extramarital sexual behavior is thus assessed by examining the reduced form effects of the kin support measures on the male extramarital partner indicator. Given evidence that the kin support measures affect female bargaining power and are unlikely to be correlated with male sexual behavior through other channels, causality can be inferred from these reduced form estimates. The results indicate that an increase in female bargaining power results in a decrease in the likelihood a woman's husband takes an extramarital partner. In terms of the kin support measures, a young sibling death results in a 1.3 percent increase in the likelihood the husband has taken an extramarital partner. On the other hand, another living adult male sibling results in a 1.3 percent decrease in the likelihood of an extramarital partner. In terms of the standard deviation of the kin support measures within villages, a one standard deviation increase in young sibling deaths or living adult male siblings results in a 0.4 percent increase and decrease respectively in the likelihood of extramarital behavior. Living adult female siblings do not display any statistically significant relationship with extramarital behavior.

As a final robustness check, I restrict my attention to only recent sibling deaths which allows the exclusion of a potentially endogenous variable as a needed control (marriage duration).

The paper is organized as follows. In Section 2, I describe the empirical strategy that will be used to identify the causal effect of female bargaining power on male extramarital behavior. Section 3 discusses the data and measures used in this

study. Results are presented in Section 4 along with tests of the exogeneity of the kin support measures. Section 5 provides further robustness checks followed by concluding remarks.

2.2 Empirical Strategy

The causal relationship of interest is represented in equation (1):

$$extramarital_i = \beta_0 + \beta_1 BP_i + \beta_2 Z_i + \varepsilon_i \tag{1}$$

A binary variable indicating whether the husband in couple i has extramarital partners, $extramarital_i$, is a function of the wife's bargaining power, BP_i, and a vector of covariates, Z_i. This structural equation indicates how a change in the bargaining power of the female, once the union has been formed, would influence her partner's sexual behavior.

Straightforward estimation of equation (1) is unlikely to lead to the estimation of the desired structural parameter for two reasons: first, bargaining power is likely to be endogenously determined and second, "bargaining power" is not directly observed. Whether or not BP is precisely measured or simply proxied, OLS estimation of equation (1) would be unlikely to produce a causal estimate of the effect of female bargaining power on the husband's extramarital sexual behavior due to the presence of omitted variable and simultaneity bias. For example, it could be that norms governing acceptable roles for women may also determine appropriate male sexual behavior. Introducing village fixed effects may mitigate the concern as long as norms are shared within a geographic entity. To the extent that such norms would vary within villages at the household level, however, they would remain a concern.

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Individual unobserved characteristics comprise the other class of important potential omitted variables. Such characteristics may work through the marriage market to pair certain types of males and females. For example, men with a preference for multiple partners may marry "submissive" women willing to tolerate lower levels of decision-making power. Such matching may produce the spurious appearance that lower female bargaining power causes men's high-risk sexual behavior. Additionally, simultaneity bias may result if the man's sexual behavior and the woman's say in household financial decisions are jointly determined through an implicit bargaining process. For example, the husband may cede household decisions to the wife in exchange for autonomy in his sexual decisions. In this instance, greater female bargaining power would falsely appear to cause an increase in the likelihood the husband has extramarital partners.[10]

2.2.1   Kin Support

Given these possible sources of bias, the use of exogenous variation in bargaining power would appear to be warranted. An exogenous proxy for bargaining power is constructed from shocks to a determinant of female bargaining power, kin support. As discussed above, kin support is particularly suited as a bargaining power shifter given both the importance of traditional sources of social support for women, and also the separate nature of spouses' kinship ties in sub-Saharan Africa.

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[10] Table A.1 shows OLS regressions of an indicator for male extramarital behavior on women's say over major household purchases. The simple regressions are in the same direction as the reduced form and IV estimates, but smaller in size and not significantly different from zero unlike the reduced form estimates. This suggests that OLS may be underestimating the effect of bargaining power on male extramarital behavior.

This paper will utilize the birth and death history of a woman's siblings in the DHS to create two measures of a woman's kin support to serve as measures for female bargaining power. First, the current number of living adult male siblings of the woman at least 20 years old, *adultmales*, will capture her current level of kin support. The generally patriarchal societies of West Africa render adult male sibling's support more critical than adult female siblings. Fixed effects for the number of male siblings who were born at least 20 years earlier, and had not died before the couple's marriage, will be included as controls in regressions. This set of siblings represents those who were eligible after the woman's marriage to become one of the woman's current living adult male siblings. By controlling for these eligible male siblings, only variation in *adultmales* for women with the same number of eligible siblings is used for identification. Variation within such groups in the current number of living adult male siblings is determined only by post-marriage deaths. Restricting variation in the level of kin support to this source limits correlation with characteristics of the woman's natal family such as its fertility which may confound analysis.

Second, the number of post-marriage deaths of a woman's young siblings under the age of 20, *youngdeaths*, will measure negative shocks to a woman's natal family and hence shocks to her kin support. As discussed above, measuring kin support shocks with young sibling deaths avoids that the deaths are due to HIV and thus avoids any potential that results are due to invalid correlation with the HIV-related determinants of male sexual behavior. As with the variation in *adultmales*, only deaths after the woman's marriage are used to construct the young sibling deaths measure in order to avoid the possibility that the outcome of the shock was a

consideration in marriage decisions. For example, negative kin support shocks may affect the dowry or bride price offered and the type of men and women who marry. The measure would then be invalid due to its potential correlation with unobserved characteristics of the man which may determine his likelihood of having extramarital partners. Fixed effects for the number of young siblings at the time of the woman's marriage or born thereafter are included to restrict identification to variation within groups of women with the same number of eligible young siblings.

Unlike adult male siblings, young siblings themselves are not conceived of here as sources of support but rather their deaths as proxies for negative shocks to kin support.[11] Hence, *adultmales* is measured as the number of living siblings to capture a level of support and *youngdeaths* measured as the number of deaths to capture shocks. In the case of both measures, however, the inclusion of fixed effects for the number of eligible siblings after marriage restricts the variation used for identification to post-marriage deaths.

2.2.2 Kin Support and Bargaining Power

In order to assess whether these kin support measures function as bargaining power shifters, I estimate their effect on proxies for bargaining power drawn from women's reported decision-making authority in the DHS. Following the literature on

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[11] The argument can be made that while adult sibling deaths may cost the family money (e.g. due to funeral expenses), the death of child siblings may free up resources. Therefore, in addition to serving as a proxy for a negative shocks on the natal families resources, the death of the child sibling may have a direct positive effect on the other siblings by freeing up resources. The presence of such an effect would attenuate a negative effect of child sibling deaths on a woman's bargaining power. The balance of these effects and the value of child sibling deaths as negative bargaining power shifters is testable and will be assessed in the results below.

the effects of female bargaining power, this paper will focus on a measure of women's control over the household's important economic decisions to establish the relevance of the kin support measures for female bargaining power. The DHS survey allows for a direct measure of this control which avoids having to rely on more remote determinants of this control. Women are asked who has final say over major household purchases. A binary variable is created from this question indicating whether the woman has some say in major household purchases. Other survey responses indicating a woman's decision-making authority over her own health care, daily household purchases, and which food to be cooked each day will also be used as proxies for bargaining power to evaluate the relevance of the kin support measures for bargaining power.

If the kin support measures affect female bargaining power, then a negative effect of $youngdeaths$ and a positive effect of $adultmales$ should be observed on the woman's reported authority over important household decisions. Specifically, in the case of young sibling deaths, I estimate equation (2) which displays the regression of the decision-making authority for the woman in couple i in village v with s eligible siblings, say_{isv} on the number of young sibling deaths, $youngdeaths_{isv}$, where X_{isv} is a vector of controls; γ_v village fixed effects; and γ_s, fixed effects for the number, s, of young siblings alive at the time of the woman's marriage or born subsequently.

$$say_{isv} = \alpha_0 + \alpha_1 youngdeaths_{isv} + \alpha_2 X_{isv} + \omega_{isv} \tag{2}$$

The specification using $adultmales_{isv}$ as the measure of kin support is equivalent except for the use of the number of siblings eligible to become a living adult male

sibling.

Finally, while kinship ties have been shown to be important sources of support in the developing country context, these benefits also come with obligations to reciprocate (Cox and Fafchamps, 2007; La Ferrara, 2007). Moreover, the ability to derive benefits, and the obligation to bear costs from one's social network varies across individuals. For example, Goldstein et al. (2002) find that an individual's inclusion in mutual insurance in Ghana was related to factors such as gender, wealth of household members, and anticipated land inheritance. As a result, it is conceivable that for some women the death of kin may have an ambiguous effect on command over resources and bargaining power with her husband. To the extent that sibling deaths have a *positive* effect on women's bargaining power, the relevance of the kin support measures as negative shocks to bargaining power will be attenuated. Ultimately, this is an empirical question which can be tested as discussed below.

2.2.3   Kin Support and Male Sexual Behavior

While the kin support measures would appear to be an instrument for the structural equation (1) above, the fact that bargaining power is noisily captured in the data prevents the implementation of an instrumental variable strategy. The DHS survey questions regarding women's decision-making power in the household are likely to capture only aspects of bargaining power. The measurement error will contain other aspects of true bargaining power and will therefore be correlated with the true regressor as in non-classical measurement error (Hausmann, 2001). Given that the kin support measures likely affect bargaining power beyond just the aspect

captured by the proxy, the necessary exclusion restriction required for an instrumental

variable strategy is unlikely to hold as the kin support measures will be correlated

with the measurement error., Instrumental variables estimates in these circumstances

will be inconsistent (Angrist and Imbens, 1991). [12] Nevertheless, for completeness, I

include instrumental variable estimates in the appendix and discuss them in the results

below.[13]

The causal effect of bargaining power on extramarital behavior is suggested

by the reduced form effect of the kin support measures on $extramarital_{isv}$ as

displayed in equation (3) for $youngdeaths_{isv}$ with independent variables equivalent

to equation (2) above.

$$extramarital_{isv} = \lambda_0 + \lambda_1 youngdeaths_{isv} + \lambda_2 X_{isv} + \gamma_v + \gamma_s + \omega_{isv} \qquad (3)$$

Establishing that the kin shocks represented by $youngdeaths_{isv}$ are negatively

correlated with bargaining power and uncorrelated with other determinants of male

extramarital behavior implies that a positive effect of $youngdeaths_{isv}$ on male

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[12] In order to sign the bias from 2SLS estimates due to a violation of the exclusion restriction from the unobservability of true bargaining power, suppose that *BP* is only partially captured by *say* such that $BP = say + u$ and u is unobserved. Furthermore, suppose that the kin support shocks impact the factors captured by u such that $Cov(youngdeaths, u|X, say) < 0$, but that otherwise the instrument is valid such that $Cov(youngdeaths, \varepsilon) = 0$ and relevant for *say* in the expected direction such that $\alpha_1 < 0$. Inserting the expression for *BP* into Equation 1 yields $extramarital = \beta_0 + \beta_1 say + \beta_2 Z + \beta_1 u + \varepsilon$ where the new error term is $\beta_1 u + \varepsilon_i$. Adapting Equation 3.1 in Hahn and Hausman (2005), the sign of the large sample bias of 2SLS for the estimate of the effect of *BP* on *extramarital*, β_1, is $sign\{plim[\hat{\beta}_1] - \beta_1\} = sign\{Cov(\alpha_0 + \alpha_1 youngdeaths + \alpha_2 X, \beta_1 u + \varepsilon)\}$.
Simplifying yields $sign\{plim[\hat{\beta}_1] - \beta_1\} = sign\{\alpha_1 \beta_1 Cov(youngdeaths, u)\} = sign\{\beta_1\}$. Therefore, 2SLS will tend to bias the estimate of β_1 away from zero as the bias will be of the same sign as the parameter of interest.
[13] Factor analysis has been used by some researchers to attempt to create an index measuring true bargaining power (Ashraf et al., 2010; Fafchamps et al., 2009; Mabsout et al., 2010; Pitt et al., 2006; Varanasi ,2009.) In this paper, I rely on reduced form estimates for causal inference instead of an instrumental variable approach using such an index derived from factor analysis out of a concern that the kin support shocks would still risk violation of the exclusion restriction.

extramarital behavior can be interpreted as evidence of a negative impact of bargaining power on male extramarital behavior. Likewise, a positive effect of living adult male siblings on bargaining power and a negative effect on male extramarital behavior would suggest a negative causal effect of bargaining power on extramarital behavior. The reduced form equation of the effect of $adultmales_{isv}$ on $extramarital_{isv}$ contains the same covariates as equation (3) with the exception of fixed effects for the number of eligible siblings for living adult male siblings.

2.2.4   Key Covariates

It is critical to identify and control for the sources of variation in the kin support measures to ensure that the measures impact male sexual behavior only through female bargaining power. By construction, both $youngdeaths$ and $adultmales$ vary with marital duration in the specifications above as the longer the couple has been married the more likely a post-marriage sibling death has occurred. Including marital duration as a control is necessary since marital duration may be correlated with the quality of the couple's marriage and hence the likelihood of extramarital behavior. Similarly, bargaining power, sexual behavior, and age of siblings vary with age requiring the inclusion of age controls for the couple.

Furthermore, $youngdeaths$ is correlated with a woman's low birth order and the long birth-spacing of the woman's siblings. Such women are more likely to have young siblings and therefore more likely to have young sibling deaths. As birth order and birth spacing may have also impacted the woman's marriage market outcomes or may be related to socioeconomic status, I include them as controls. The measure for

adultmales will vary oppositely with birth order as a woman with higher birth order is more likely to have adult siblings. The proportion of the woman's siblings who are male will of course be positively correlated with *adultmales* and, as the gender distribution of the sibship may have affected marriage market outcomes, I include it as a control as well.

Additionally, *youngdeaths* will be related to the correlates of infant and child mortality in West Africa. Infant and child mortality of the woman's natal family may be related to the couple's socioeconomic status. Some of the correlates of infant and child mortality in West Africa are short birth-spacing, age of mother, male gender of infant, parental education, poverty, access to health services, and geographic factors (Balk et. al., 2004). While the birth-spacing and gender of the woman's siblings are observed in the DHS, the woman's parents' education, cultural factors, and the woman's natal family's access to health services and socioeconomic status are not observed. I proxy for these unobserved characteristics by controlling for young sibling mortality prior to the couple's marriage. Similarly to *youngdeaths*, I construct a variable for the number of young sibling deaths before marriage conditional on the number of siblings born before marriage. To more directly measure child mortality, I also control for the proportion of the woman's siblings born before the couple's marriage who died before the age of 5. Village fixed effects will capture geographic factors which correlate with the kin support measures and potentially male sexual behavior.

Equations (2) and (3) above will be estimated in both sparse and more comprehensive specifications including the controls discussed above as well as

others. In particular, I will also test whether results are robust to the inclusion of controls for household characteristics such as a household's wealth index derived from asset possession, as well as indicators for possession of electricity, television, and radio. Characteristics of the woman and husband are included such as their relationship to the head of household, an indicator for a polygamous union, whether the woman has remarried, whether the woman and husband each designate the couple as married or living together and the interaction of the responses, and indicators for Muslim and Catholic for both the woman and husband. Additionally, the couples' years of education are included. Finally, factors likely to be determinants of male extramarital behavior are included such as the husband's age at first intercourse, indicators for the husband's occupation, and indicators for the husband's knowledge that monogamy and condoms are preventative against HIV. Many characteristics of the couple and the household may be endogenous, however, due to marriage market matching. For this reason, a sparse specification of equations (2) and (3) with only marital duration and age variables will be preferred. The more comprehensive specifications will be used to demonstrate the robustness of the results.

2.3 Data

2.3.1 Sample Construction

The sample is constructed from couples pooled from households surveyed in the DHS from the countries Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali,

Niger, and Senegal.[14]   These countries vary by income level from the lowest income countries of Liberia and Niger to lower middle income countries of Cameroon and Senegal. In terms of religious affiliation, Guinea, Mali, Niger, and Senegal are predominantly Muslim countries, Liberia and Cameroon are largely Christian, and Benin and Burkina Faso have large shares of both Christians and Muslims.

These particular countries in West Africa were selected because they included questions regarding male sexual behavior, women's decision-making authority, and included women's sibling mortality history. In addition to traditional topics such as education, nutrition, and fertility, these surveys ask couples questions regarding sexual behavior and women are asked questions about their say over household decision-making. Women are also asked to report the birth and death history of their siblings.

The sample used in this analysis consists of couples in which at least one of the spouses is in their first marriage. The DHS does not ask directly for the date of respondent's current marriage, but rather the date of the respondent's first marriage. If either spouse or both are in their first marriage, then the couple's marital duration can be obtained from their responses for the date of first marriage. The date of marriage is used critically to define which sibling deaths occurred post-marriage. In total, 15,363 couples have data for marital duration, sibling history, women's decision-making, and men's sexual behavior.

The sample is restricted to couples who have been in a union for at least one

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[14]The survey years used are Benin (2006), Burkina Faso (2003), Cameroon (2004), Guinea (2005), Liberia (2006/2007), Mali (2006), Niger (2006), and Senegal (2005).

year in order for the male sexual behavior measure in which the man is asked whether he has had sexual partners other than his wife (or wives) in the last year to accurately measure extramarital relations. This restriction reduces the sample to 14,723 couples. Additionally, 60 women who identify as daughters of the head of household are excluded from the sample as the woman's natal household would be equivalent to the couple's household rendering use of the kin support measures for these households inappropriate. If the woman's natal household is also the couple's household, then the shocks to the natal household would also be experienced by the woman's husband which overtly risks that the measures are correlated with the determinants of the man's sexual behavior decisions. This leaves a final sample of 14,663 couples.

2.3.2   Descriptive Statistics

Table 2.1 displays general descriptive statistics of the sample. Women are on average nine years younger than their husbands with slightly more than half the years of education. Average marital duration is 12.2 years and 33 percent of couples are in a polygamous union.

Most women in the sample do not have say over major household purchases with only 36 percent reporting having some say. The measure of female bargaining power is constructed from the response to the question "Who usually makes decisions about making major purchases for the household?". The woman is coded as having some say in this decision if she responds that she makes the decision or makes it jointly with her husband or someone else. If the woman responds that the husband or someone else make the decision exclusively then she is coded as not having say. In

the sample, 62 percent of women report their husband or partner have exclusive say, 25 percent report sharing say with their husband or partner, 11 percent of women report having exclusive say, and 1 percent respond that someone else has say. Less than 1 percent of women report having some say along with someone other than their husband or partner. Table 2.1 displays the means for women's authority over other decisions -- 30 percent of women report having some say over their own healthcare, 49 percent have say over daily household needs, and 72 percent have say over the food to be prepared each day.

The dependent variable is constructed from the man's response on the DHS survey regarding the number of people he has had sex with in the last 12 months other than his wife (or wives) or live-in partner. Such behavior is generally defined as high-risk sex (UNDG, 2003). Extramarital sex in particular merits study as research on the spread of HIV has highlighted multiple concurrent partnerships as an important factor in increasing the speed of transmission, prevalence, and persistence of HIV in a population (Mah and Halperin, 2010). A binary dependent variable is created from the man's response which indicates he has had an extramarital partner in the last 12 months. Table 2.1 displays that 13 percent of men in the sample have had an extramarital partner in the last 12 months.

Importantly, Table 2.1 displays 95% and 96% of men and women respectively believe that men should only have sex with their wives, whereas 29% and 31% respond that men actually do only have sex with their wives. These reported attitudes indicate that men are aware that extramarital sex is disapproved of and that women have an awareness that men are engaging in extramarital sex.

Table 2.1 also displays summary statistics for the kin support measures. The mean number of living adult male siblings is 1.63. As discussed above, fixed effects for the number of eligible male siblings alive at any point post-marriage are included in the specifications using adult male siblings as the kin support measure. The mean number of eligible siblings in the sample is 1.74 siblings. In total, 9 percent of the sample have fewer living adult male siblings than siblings who were eligible to become such due to deaths. The mean number of deaths resulting in fewer adult male siblings than were eligible is 0.10. The median age of these deaths is 28.

The mean number of post-marriage young sibling deaths in the sample is 0.12 with a range from 0 to 7. In total, 9 percent of the sample has at least one post-marriage young sibling death. The median age at death for the young sibling deaths is 8 years old.

2.3.3 Data Quality: Male Sexual Behavior

The use of self-reported sexual behavior raises concerns of misreporting given the sensitive nature of the questions. The respondent may over-report or underreport his behavior based on the social desirability of the response. The reported levels of extramarital sexual behavior in the DHS are similar to those obtained in another study by Ferry et. al. (2001). They survey the sexual behavior of men and women in four cities in sub-Saharan Africa, two of which are in Benin and Cameroon, countries included in this study and obtain a similar percentage of men reporting extramarital partners.

I test the reliability of the male sexual behavior responses by checking for

correlations with sexual behavior variables less subject to misreporting. Table 2.2 displays that the men's responses regarding extramarital behavior are correlated in the expected direction with the following variables:

- *Husband's HIV Status*: A blood sample was collected from male respondents to independently test their HIV status. A man's extramarital partner response was found to be positively correlated with his HIV status with controls for the man's age and country, region, and village fixed-effects. While the point estimate is positive it is not statistically significant when using region and village fixed effects perhaps due to the low HIV prevalence in the sample. 1.8 percent of men in the sample tested HIV positive.

- *Recent Sexual Activity*: Men and women are asked whether they have been sexually active in the last month. Men are arguably less likely to underreport their recent sexual activity than extramarital sex since they are not asked to indicate whether their partner was extramarital. I construct a variable indicating that the woman's husband has been sexually active in the last month and the woman has not been. For men with one wife, this variable should be an indication of extramarital sex. Column (4) of Table 2.2 displays that the variable is positively correlated with extramarital sex and statistically significant.

- *Men's Extramarital Behavior in General*: The DHS survey asks both men and women whether men generally in the community have sex with women other than their wives. Arguably individuals face less of an incentive to misreport the extramarital sexual behavior of other men as opposed to their own. If the

reports of men's own sexual behavior are reasonably accurate then there should be a positive correlation between the village-average of the response about the group behavior and the village-average reported sexual behavior. Table 2.2 illustrates that the village-average of men's sexual behavior is significantly positively correlated with the village average of both men and women's responses regarding the sexual behavior of men in general. The correlations are robust to region fixed effects. A man's individual response is also correlated with the village average of men's responses regarding general sexual behavior. The man's individual response is correlated with the village average of women's responses in the expected direction, but is not statistically significant.

- *Husband's Total Lifetime Number of Partners*: Men reporting extramarital partners in the last year should be expected to also report a higher number of lifetime partners on average. Column (7) of Table 2.2 indicates that lifetime partners is positively correlated with a man reporting extramarital partners and statistically significant.

- *Husband Reports Having STD in the Last Year*: Men's responses regarding extramarital partners are positively correlated with their reports of having an STD in the last year and statistically significant. As men are unlikely to over-report having an STD, a positive correlation with extramarital sex would suggest that there has not been rampant over-reporting of having extramarital partners.

These reliability tests increase confidence that men's responses regarding their

extramarital partners are informative and measure actual behavior.

2.4   Results

2.4.1   The Effect of Kin Support on Female Bargaining Power

The kin support measures for young sibling deaths and living adult male siblings impact women's reported say over major household purchases in the expected directions as shown in Table 2.3. An increase of one post-marriage young sibling death results in a 2.7 percent decrease in the likelihood a woman has say in major household purchases. This decline represents 7.7 percent of the sample mean for women's say in major household purchases and is statistically significant at the 1 percent level. An additional living adult male sibling results in a 2.4 percent increase in the likelihood the woman has some say in major household purchases. The estimate is significant at the 5 percent level. Standard errors are clustered at the village level and heteroskedasticity robust throughout the paper.

The estimates are robust to the inclusion of village fixed effects and fixed effects for the number of eligible siblings. Marital duration and age and age-squared for the woman and husband are included in all specifications. Additionally, Table 2.3 displays the robustness of the results to the sequential inclusion of controls for characteristics of the woman's natal family, household characteristics, and characteristics of the couple as described in Section 2. The effect size and the statistical significance of the kin support measures appear robust across specifications. Table 2.3 also displays the results of a fixed effects logit estimation

which produces similar results.[15]

The kin support measures also impact women's reported authority over other household decisions in the expected directions. Table 2.4 displays the results of the regression of women's say over daily household purchases, her own healthcare, and food to be cooked each day on the kin support measures. Woman's say over daily household purchases and say over the food to be cooked each day exhibit a statistically significant negative relationship with young sibling deaths. The point estimates for the effect of young sibling deaths on a woman's say in her own healthcare is negative but not statistically significant. Likewise, Panel B of Table 2.4 indicates a positive relationship between living adult male siblings and these alternate measures of female bargaining power. While say over healthcare and daily household purchases exhibit a statistically significant relationship with living adult male siblings, the say over food to be cooked each day is not statistically significant. Overall, the estimates suggest decision-making authority is affected by kin support in the expected directions with decision-making over major household purchases the most clearly affected.

2.4.2   Selection on Observables

To assess whether the kin support measures affect male sexual behavior through channels other than bargaining power, I check whether the kin support measures are balanced across observables which are fixed at the time of the couple's marriage. Statistically significant variation of the measures with these observables

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[15] Results were also robust to interactions of country fixed effects with polygamous couples and religion, as well as fixed effects for wife rank.

would raise concerns that the kin support measures may vary with important unobservables (Altonji et. al., 2005). Table 2.5 displays a regression of several of the husband's characteristics regressed on the kin support measures. The measures are shown to not be predictive of the husband's years of education, his age at first intercourse, whether he is Muslim, and the couple's age difference. These characteristics were chosen as they are correlated with whether the husband has extramarital partners and are also fixed characteristics. The kin support measures are shown to be uncorrelated with these observables in both sparse and more comprehensive specifications. The correlation of the measures with fixed characteristics of the woman is also assessed. Table 2.5 also contains the results of a regression of the following variables on the kin support measures: the woman's years of education, whether she is Muslim, and her height as a percent of the median. No statistically significant relationship is found in either specification for each variable. The woman's height is included as it is in large part determined by her nutrition as a child and so may proxy for the socioeconomic status of the woman's natal family. The lack of correlation with these observables is reassuring for the exogeneity of the kin support measures.

2.4.3 Reduced Form Effect of Kin Support on Male Sexual Behavior

Based on the relevance of the kin support measures for female bargaining power established in the previous section and evidence that these measures can be safely excluded from the structural equation, a causal relationship between female

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bargaining power and male extramarital behavior is suggested by the reduced form. Reduced form estimates of the effect of post-marriage young sibling deaths and living adult male siblings are presented in Panels A and B of Table 2.6. The estimates indicate that post-marriage young sibling deaths have a positive effect on the likelihood a woman's husband has extramarital partners. Each young sibling death results in a 1.3 percent increase in the likelihood of extramarital partners. By the same magnitude, an additional living adult male sibling is estimated to decrease the likelihood of extramarital behavior by 1.3 percent. These effect sizes represent 10 percent of the sample mean for the extramarital behavior indicator in the sample. In terms of the standard deviation of the kin support measures within villages, a one standard deviation increase in young sibling deaths or living adult male siblings results in a 0.4 percent increase and decrease respectively in the likelihood of extramarital behavior. Such an effect represents 3 percent of the sample mean or 2 percent of the within-village standard deviation in the likelihood of extramarital behavior.[16]

A positive impact of post-marriage young sibling deaths on extramarital behavior, along with evidence that the young sibling deaths are negatively related to female bargaining power, implies a negative causal effect of female bargaining power on the husband's extramarital sexual behavior. Inference utilizing young sibling mortality as the bargaining power shifter is robust to concerns that the measure is correlated with the husband's extramarital behavior merely due to a mutual

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[16]The instrumental variable estimates in Appendix Table A.3 reflect the conclusion from the reduced form that an increase in the female bargaining power measure results in a decrease in male extramarital behavior. Given the concerns that the exclusion restriction is unlikely to hold as discussed above, causal inference will rely on the reduced form.

correlation with sexually transmitted HIV. As discussed above, mortality due to HIV is low in West Africa, and especially so for the young. Likewise, the negative impact in the reduced form of living adult male siblings on the likelihood of an extramarital partner is also indicative of a negative causal relationship between female bargaining power and the husband's extramarital behavior. The effects are modest in size, but suggest that a woman's bargaining power within the household does influence the likelihood of her husband's extramarital sexual behavior, and thus her risk of contracting a sexually transmitted disease.

2.5   Robustness

2.5.1   Is the Husband Affected Through Other Channels?

The validity of the causal inference drawn from the reduced form estimates above rests on the kin support measures affecting the husband's extramarital behavior only through the woman's bargaining power. The validity of this assumption can be explored further by testing whether the kin support measures are predictive of factors associated with other potential channels. A concern may be that some of the deaths of the woman's siblings are related to HIV and thus affect the husband's knowledge of HIV and in turn his sexual behavior decisions. I verify that there is no relationship between the kin support measures and the husband's knowledge of HIV and HIV prevention methods. Specifically, I test for statistically significant relationships between the kin support measures and whether the husband or woman know someone who has died of AIDS, whether the husband has heard of AIDS, whether he believes that condoms and having only one sexual partner can reduce the chances of AIDS.

Table 2.7 displays the results of these regressions and confirms that indeed the kin support measures are not changing any of these variables.

An additional check which can be conducted to guard against the threat to validity posed by concerns that the husband is directly affected by the woman's sibling mortality shocks is to attempt to exclude households from the sample which can be identified as containing relatives of the woman. The DHS provides information on the relationship to the household head for each member of the household. I first restrict the sample to only couples in which either the husband or woman identifies as the head of household so that the relatives of the woman can be identified. I then exclude households in which any parent, brother, sister, or other relative of the woman were residing in the household. Households with adopted or foster children were also excluded as a precaution as they may be children of deceased siblings or siblings unable to care for their children. Excluding couples who reside in these households leaves 12,642 couples in the sample. Table 2.8 displays results of estimates of the effect of the kin support measures on women's say over major household purchases and the male extramarital sexual behavior indicator. The results are quantitatively and qualitatively similar to those in the larger sample and continue to imply increased female bargaining power decreases male extramarital sexual behavior.

2.5.2   Falsification Exercise

Another threat to the validity of the kin support measure as a bargaining power shifter is the potential for the correlation of the measures with unobserved

socioeconomic characteristics of the couple.   Such a correlation may persist and confound this analysis if controls do not adequately account for kin groups of low socioeconomic status who also experience higher mortality. These same kin groups may be more likely to have low levels of female bargaining power giving rise to the correlations observed in the regressions above.   Given that these unobserved socioeconomic characteristics are likely to be associated with male sexual behavior, causal inference using the kin support measures would be rendered invalid due to an effect on the dependent variable through channels other than female bargaining power. The robustness of the relationship between measures of female bargaining power and kin support to village fixed effects, several controls, and sibling mortality prior to the couple's marriage should mitigate concerns that unaccounted for socioeconomic characteristics of the couple continue to drive the correlation.

However, if these unobserved socioeconomic characteristics accounted for the correlation between sibling mortality and female bargaining power, then the correlation should exist for both adult male and adult female sibling mortality. Siblings of both genders should be susceptible to the effects of socioeconomic status on mortality. On the other hand, the kin support mechanism would predict that only adult male siblings would be relevant for female bargaining power given the cultural importance of male relatives. Columns (1) and (2) of Table 2.9, however, indicate that consistent with the kin support mechanism there is no statistically significant relationship between the number of living adult female siblings on women's say in major household purchases nor on the husband's extramarital behavior, unlike for living adult male siblings.

Furthermore, if the young sibling mortality measure is to have the interpretation of a negative shock to the woman's natal family, then we should observe that the deaths of siblings of both genders have an impact on the bargaining power measure and male extramarital behavior. The results in Panels B and C in Table 2.9 demonstrate that indeed a relationship exists between women's say and the number of young sibling deaths of both genders. Both genders of young sibling deaths have the expected positive effect on the likelihood the man has an extramarital partner. The young female sibling variable just loses statistical significance in the more comprehensive specification and the number of young male sibling deaths is statistically significant at the 10 percent level in the more comprehensive specification, but just loses statistical significance in the sparse specification.

2.5.3   Recent Sibling Deaths

The specifications in this study thus far include marital duration as a control variable. Controlling for marital duration was necessary due to the construction of the kin support measures. Even conditional on age, women in couples who have been married longer are more likely by construction to have post-marriage young sibling deaths and also more deaths of siblings eligible to have become living adult male siblings. Given that marital duration may also be correlated with the likelihood the man has taken extramarital partners, controlling for marital duration was required to ensure the exogeneity of the kin support measures. For example, if extramarital sex is a cause of divorce, then men in couples who have been married longer are less likely to have extramarital partners. Marital duration, however, is a choice variable for

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couples for whom divorce is feasible and may be jointly determined with male sexual behavior. Therefore, there is a risk that marital duration is endogenous and its inclusion in regressions may bias all coefficients in the regression.

I define a kin support measure to include only recent sibling deaths rather than post-marriage deaths in order to avoid the need to control for marital duration. Given the apparent importance of adult male siblings and young sibling mortality in the specifications above, I construct a measure for young sibling and adult male sibling deaths occurring in the last year or in the last five years. In Panels A and B in Table 2.10, I present estimates of the effect of the new measures on women's say in major household purchases as well as reduced form effects on male extramarital behavior. The new estimates are conducted for specifications including few controls and many controls. None of the specifications include marital duration as a control. Also, to ensure that the sibling deaths did not occur pre-marriage, I exclude couples with marital durations of less than five years from the sample in the specification using the sibling deaths in the last five years as the measure. The estimates displayed in Panels A and B in Table 2.10 are of the expected signs, but exhibit large standard errors likely due to the reduced variation caused by limiting the period over which the sibling deaths occurred. In order to increase precision, I combine the young and adult male sibling deaths for each time period and re-estimate their effect on female bargaining power and extramarital behavior in Panel C. The effects for this combined measure are statistically significant for the female bargaining power measure and just lose statistical significance in the reduced form effects on extramarital behavior in the sparse specifications. Overall, these alternate measures for kin support appear

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consistent with results from the main specifications suggesting that bias due to the inclusion of marital duration did not drive the results.

2.6   Conclusion

Overall, the results in this study suggest that a woman's bargaining power within the household and control over resources does influence the likelihood her husband has extramarital partners. Shocks to a determinant of women's bargaining power, kin support, are used to identify the causal effect. First, post-marriage deaths of a woman's male siblings induce variation in her current number of living adult male siblings. An additional living adult male sibling is shown to increase a woman's authority over key household decisions and to decrease her husband's extramarital relations. Consistent with a kin support mechanism and the cultural importance of male relatives, living adult female siblings are shown to have no relationship over a woman's decision-making authority and her husband's extramarital behavior.

Similarly, the post-marriage deaths of women's young siblings, capturing shocks to the woman's natal family, were found to negatively impact a woman's decision-making authority and to increase the likelihood of extramarital behavior. The kin support measures are balanced across observables and results are robust to changes in specification.

These results lend credence to efforts by development practitioners to reduce women's vulnerability to HIV by addressing gender inequality. In particular, efforts to reduce women's economic dependence on their partners may be most effective. In addition to marital relationships, future work should investigate the effect on women's

HIV vulnerability of lessening their dependent position within pre-marital cross-generational relationships, known to be an important source of HIV transmission in sub-Saharan Africa. Finally, regarding women's own sexual behavior, it will be important to assess whether reductions in HIV transmission due to improvements in gender equality are at all mitigated by increases in women's own high-risk behavior due to an improved bargaining position.

Table 2.1: Summary Statistics

	Mean	Std. Dev.	N
Key Variables			
Husband Has Extramarital Partner (0/1)	0.13	0.33	14,663
Woman Has Say in Large Household Purchases (0/1)	0.36	0.48	14,613
Other Bargaining Power Measures			
Woman Has Say in Own Healthcare (0/1)	0.30	0.46	12,651
Woman Has Say in Daily Household Purchases (0/1)	0.48	0.50	14,605
Woman Has Say in Food to be Cooked Each Day (0/1)	0.71	0.45	12,518
Couple Characteristics			
Woman's Age	30.1	8.06	14,663
Husband's Age	39.4	9.41	14,663
Woman's Years of Education	1.73	3.81	14,652
Husband's Years of Education	3.32	5.27	14,644
Polygamous Union (0/1)	0.33	0.47	14,663
Marital Duration	12.3	8.08	14,663
Muslim Husband (0/1)	0.58	0.49	14,638
Christian Husband (0/1)	0.31	0.46	14,638
Sexual Behavior Attitudes and Knowledge			
Woman: Men should only have sex with their wives (0/1)	0.95	0.22	6,193
Husband: Men should only have sex with their wives (0/1)	0.96	0.20	6,210
Woman: Men do only have sex with wives (0/1)	0.31	0.46	6,458
Husband: Men do only have sex with wives (0/1)	0.29	0.46	6,458
Woman: Sex with one partner who has no other partners reduces chance of AIDS (0/1)	0.70	0.46	14,643
Husband: Sex with one partner who has no other partners reduces chance of AIDS (0/1)	0.85	0.36	14,645
Sibling Mortality Instruments			
Number of Post-Marriage Young Sibling Deaths	0.12	0.43	14,663
Number of Eligible Post-Marriage Young Siblings	3.01	2.36	14,663
Median Age of Post-Marriage Young Sibling Deaths	7.99	6.30	1,224
Number of Living Adult Male Siblings	1.63	1.41	14,663
Number of Eligible Living Adult Male Siblings	1.74	1.48	14,663
Median Age of Adult Male Sibling Deaths in Eligible Group	28.0	14.40	1,295
Number of Siblings Ever Born	5.65	2.53	14,129

Notes: This table consists of summary statistics for the sample of couples pooled from the Demographic and Health Surveys. The countries included are Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali, Niger, and Senegal.

Table 2.2: Husband Sexual Behavior Correlations

	Husband HIV Positive (0/1)			Village Average: Women Say Most Men have Sex with Women Other Than Wives		Village Average: Men Say Most Men have Sex with Women Other Than Wives		Husband: Sex in Last Month & Woman: No Sex in Last Month (0/1)	Husband's Age at First Intercourse	Husband: Reports STD in the Last Year (0/1)	Husband: Total Lifetime Number of Partners
	(1a)	(1b)	(1c)	(2a)	(2b)	(3a)	(3b)	(4)	(5)	(6)	(7)
Husband Has Extramarital Partner (0/1)	0.010**	0.007	0.006	0.011		0.115***		0.131***	-0.684***	0.040***	3.59***
	(0.005)	(0.005)	(0.006)	(0.016)		(0.016)		(0.014)	(0.114)	(0.008)	(0.409)
Village Average: Husband Has Extramarital Partner (0/1)					0.084*		0.268***				
					(0.045)		(0.046)				
Fixed Effects	Country	Region	Village	Village	Region	Village	Region	Village	Village	Village	Village
Mean of Dep. Variable	0.017	0.017	0.017	0.426	0.474	0.514	0.556	0.108	20.2	0.028	5.65
N	11,137	11,137	11,137	6,463	1,434	6,349	1,434	9,727	14,515	14,599	7,689

Standard errors clustered at the village level in parentheses. All regressions except 2b and 3b include controls for husband and woman's age and age-squared. Sample in column (4) includes only husband's with one wife.   * significant at 10%; ** significant at 5%; *** significant at 1%

Table 2.3: The Effect of the Kin Support Measures on Female Bargaining Power

	Woman Has Say in Major Household Purchases (0/1)						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	OLS					FE Logit	
Panel A: Post-Marriage Young Sibling Deaths							
Number of Young Sibling Deaths	-0.027***	-0.028***	-0.025***	-0.026***	-0.027***	-0.038***	-0.042**
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)	(0.013)	(0.017)
Panel B: Living Adult Male Siblings							
Number of Living Adult Male Siblings	0.024**	0.028***	0.028***	0.030***	0.027**	0.036**	0.045**
	(0.010)	(0.010)	(0.010)	(0.010)	(0.011)	(0.015)	(0.018)
Additional Covariates For All Panels							
Woman's Natal Family Characteristics: Eligible Sibling Determinants		✓	✓	✓	✓		✓
Woman's Natal Family Characteristics: Child Mortality Determinants			✓	✓	✓		✓
Household Characteristics				✓	✓		✓
Couple Characteristics					✓		✓
N	14,613	14,012	13,641	13,557	13,097	8,677	7,546

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table 2.4: The Effect of the Kin Support Measures on Other Measures of Female Bargaining Power

	Woman Has Say Over Her Own Healthcare (0/1)		Woman Has Say in Daily Household Purchases (0/1)		Woman Has Say Over Food to be Cooked Each Day (0/1)	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Post-Marriage Young Sibling Deaths						
Number of Young Sibling Deaths	-0.009	-0.009	-0.019**	-0.017*	-0.028***	-0.020*
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)
Panel B: Living Adult Male Siblings						
Number of Living Adult Male Siblings	0.019*	0.021*	0.015	0.019*	0.014	0.009
	(0.011)	(0.011)	(0.011)	(0.012)	(0.011)	(0.012)
Additional Covariates For All Panels						
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓
N	12,651	11,423	14,605	13,092	12,518	11,309

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table 2.5: Selection on Observables

	Husband's Years of Education		Husband's Age at First Intercourse		Husband and Woman's Age Difference		Husband is Muslim (0/1)		Woman's Years of Education		Woman is Muslim (0/1)		Woman's Height as Percent of Median	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Panel A: Post-Marriage Young Sibling Deaths														
Number of Young Sibling Deaths	0.025	0.061	-0.041	-0.041	0.143	0.189	-0.004	0.007	0.025	0.061	0.003	0.005	-0.077	-0.041
	(0.043)	(0.047)	(0.086)	(0.091)	(0.131)	(0.132)	(0.005)	(0.005)	(0.043)	(0.047)	(0.006)	(0.006)	(0.084)	(0.088)
Panel B: Living Adult Male Siblings														
Number of Living Adult Male Siblings	-0.092	-0.042	-0.128	-0.131	0.024	0.082	-0.002	-0.005	-0.092	-0.042	-0.001	-0.003	-0.094	-0.098
	(0.060)	(0.057)	(0.096)	(0.099)	(0.154)	(0.155)	(0.006)	(0.006)	(0.060)	(0.057)	(0.006)	(0.006)	(0.098)	(0.101)
Additional Covariates for All Panels														
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓		✓		✓		✓		✓
Mean of Dependent Variable	1.68	1.65	20.2	20.2	9.26	9.26	0.580	0.581	1.68	1.65	0.568	0.571	97.7	97.8
N	14,597	13,121	14,465	13,097	14,613	13,097	14,588	13,244	14,597	13,121	14,595	13,252	14,238	13,097

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband.

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman. *Selected Covariates Removed*: years of education removed from independent variables in Column (1), (2), (9), and (10); husband's age at first intercourse removed from Column (3) and (4); age variables removed in Columns (5) and (6); religion variables removed in Columns (7), (8), (11), (12); woman's height as percent of median removed in Columns (13) and (14).

Table 2.6: Reduced Form Effect of Kin Support Measures on Male Extramarital Sexual Behavior

	Husband Has Extramarital Partner (0/1)				
	(1)	(2)	(3)	(4)	(5)
	Panel A: Post-Marriage Young Sibling Deaths				
Number of Young Sibling Deaths	0.013**	0.012**	0.013*	0.012*	0.014**
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)
	Panel B: Living Adult Male Siblings				
Number of Living Adult Male Siblings	-0.013*	-0.013*	-0.014*	-0.014*	-0.013
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
	Additional Covariates For All Panels				
Woman's Natal Family Characteristics: Eligible Sibling Determinants		✓	✓	✓	✓
Woman's Natal Family Characteristics: Child Mortality Determinants			✓	✓	✓
Household Characteristics				✓	✓
Couple Characteristics					✓
N	14,663	14,056	13,684	13,599	13,138

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table 2.7: The Effect of Kin Support Measures on Husband's HIV Knowledge

	Husband Knows Someone Who Died of AIDS (0/1)		Woman Knows Someone Who Died of AIDS (0/1)		Husband Has Heard of AIDS (0/1)		Husband Believes Condoms Reduce Chance of AIDS (0/1)		Husband Believes Monogamy Reduces Chance of AIDS (0/1)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Panel A: Post-Marriage Young Sibling Deaths										
Number of Young Sibling Deaths	-0.005	0.004	0.006	0.015	0.000	0.001	-0.008	-0.010	-0.009	-0.009
	(0.010)	(0.010)	(0.014)	(0.015)	(0.003)	(0.003)	(0.010)	(0.010)	(0.008)	(0.008)
Panel B: Living Adult Male Siblings										
Number of Living Adult Male Siblings	-0.012	-0.019	-0.007	0.003	-0.003	-0.003	-0.003	0.001	-0.001	0.001
	(0.012)	(0.013)	(0.016)	(0.017)	(0.004)	(0.004)	(0.011)	(0.011)	(0.009)	(0.009)
Additional Covariates For All Panels										
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓		✓		✓
Mean of Dependent Variable	0.285	0.290	0.267	0.271	0.973	0.974	0.717	0.720	0.849	0.853
N	9,244	8,399	7,700	7,014	14,661	13,179	14,628	13,148	14,645	13,163

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband.

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for relationship to head of household each for husband and woman.

Table 2.8: Excluding Households with Women's Relatives

	Woman Has Say in Major Household Purchases (0/1)		Husband Has Extramarital Partner (0/1)	
	(1)	(2)	(3)	(4)
Panel A: Post-Marriage Young Sibling Deaths				
Number of Young Sibling Deaths	-0.023***	-0.026***	0.012*	0.014*
	(0.009)	(0.010)	(0.007)	(0.007)
Panel B: Living Adult Male Siblings				
Number of Living Adult Male Siblings	0.028**	0.031***	-0.016*	-0.017*
	(0.011)	(0.012)	(0.008)	(0.009)
Additional Covariates For All Panels				
Woman's Natal Family, Household, and Couple Characteristics		✓		✓
N	12,481	11,214	12,481	11,214

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table 2.9: Falsification Exercise

	Woman Has Say in Major Household Purchases (0/1)		Husband Has Extramarital Partner (0/1)	
	(1)	(2)	(3)	(4)
	Panel A: Living Adult Female Siblings			
Number of Living Adult Female Siblings	0.009	0.009	-0.003	0.002
	(0.012)	(0.013)	(0.009)	(0.009)
	Panel B: Post-Marriage Young Female Sibling Deaths			
Number of Young Female Sibling Deaths	-0.028**	-0.028*	0.017*	0.015
	(0.013)	(0.014)	(0.010)	(0.011)
	Panel C: Post-Marriage Young Male Sibling Deaths			
Number of Young Male Sibling Deaths	-0.028**	-0.026*	0.014	0.019*
	(0.013)	(0.015)	(0.009)	(0.010)
	Additional Covariates For All Panels			
Woman's Natal Family, Household, and Couple Characteristics		✓		✓
N	14,613	13,097	14,663	13,138

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%

Notes: Eligible siblings in the regressions in Panel A consist of the adult female siblings alive at the woman's marriage, or younger female siblings who could have come of age afterwards. Eligible siblings in Panels B and C are siblings of each respective gender under age 20 at the time of the woman's marriage, or born subsequently. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table 2.10: Recent Sibling Deaths as Kin Support Measures

	Woman Has Say in Major Household Purchases (0/1)				Husband Has Extramarital Partner (0/1)			
	Deaths in Last Year		Deaths in Last 5 Years		Deaths in Last Year		Deaths in Last 5 Years	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Young Sibling Deaths								
Number of Young Sibling Deaths	-0.054	-0.060	-0.039**	-0.035*	0.018	0.020	0.019	0.022
	(0.037)	(0.038)	(0.017)	(0.018)	(0.034)	(0.036)	(0.017)	(0.018)
Panel B: Adult Male Sibling Deaths								
Number of Adult Male Sibling Deaths	-0.043	-0.065	-0.040**	-0.047**	0.064*	0.057	0.022	0.016
	(0.038)	(0.040)	(0.018)	(0.019)	(0.034)	(0.037)	(0.015)	(0.016)
Panel C: Young Sibling or Adult Male Sibling Deaths								
Number of Young Sibling or Adult Male Sibling Deaths	-0.046*	-0.060**	-0.042***	-0.043***	0.040	0.038	0.017	0.015
	(0.027)	(0.028)	(-0.012)	(-0.013)	(0.025)	(0.026)	(0.011)	(0.012)
Additional Covariates For All Panels								
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓		✓
N	14,613	13,107	11,783	10,571	14,663	13,148	11,822	10,606

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%; *** significant at 1%

Notes: *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table A.1: OLS Estimates of the Effect of Female Bargaining Power on Male Extramarital Behavior

	Husband Has Extramarital Partner (0/1)				
	(1)	(2)	(3)	(4)	(5)
Woman Has Say in Major Household Purchases (0/1)	-0.013	-0.011	-0.012	-0.011	-0.011
	(0.008)	(0.008)	(0.009)	(0.009)	(0.009)
Woman's Natal Family Characteristics: Eligible Sibling Determinants		✓	✓	✓	✓
Woman's Natal Family Characteristics: Child Mortality Determinants			✓	✓	✓
Household Characteristics				✓	✓
Couple Characteristics					✓
N	14,613	14,012	13, 641	13,557	13,097

Standard errors clustered at the village level in parentheses. Column(1) is a regression with village fixed effects and age and age-squared of the couple as the only controls. Columns (1) - (5) include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings for post-marriage young sibling deaths are siblings under age 20 at the time of the woman's marriage, or born subsequently. Siblings eligible to be living adult male siblings consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards.

Women's Natal Family Characteristics: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table A.2: First-Stage Estimates of the Effect of the Kin Support Measures on Female Bargaining Power

	Woman Has Say in Major Household Purchases (0/1)					
	(1)	(2)	(3)	(4)	(5)	(6)
Number of Post-Marriage Young Sibling Deaths	-0.027***	-0.027***			-0.022**	-0.021**
	(0.008)	(0.009)			(0.009)	(0.010)
Number of Living Adult Male Siblings			0.025**	0.027**	0.018*	0.021*
			(0.010)	(0.011)	(0.011)	(0.011)
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓
Partial F-Statistic	10.27	8.54	5.84	6.36	6.53	5.73
N	14,613	13,097	14,613	13,097	14,613	13,097

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings for post-marriage young sibling deaths are siblings under age 20 at the time of the woman's marriage, or born subsequently. Siblings eligible to be living adult male siblings consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Table A.3: 2SLS Estimates of the Effect of Female Bargaining Power on Male Extramarital Behavior

	Husband Has Extramarital Partner (0/1)	
	(1)	(2)
Panel A: IV with Post-Marriage Young Sibling Deaths		
Woman Has Say in Major Household Purchases (0/1)	-0.440*	-0.479
	(0.263)	(0.296)
Panel B: IV with Living Adult Male Siblings		
Woman Has Say in Major Household Purchases (0/1)	-0.547	-0.483
	(0.368)	(0.339)
Panel C: Overidentified IV		
Woman Has Say in Major Household Purchases (0/1)	-0.475**	-0.480*
	(0.240)	(0.256)
Hansen J-Statistic (p-value)	0.83	0.94
Additional Covariates for All Panels		
Woman's Natal Family, Household, and Couple Characteristics		✓
N	14,613	13,097

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. * significant at 10%; ** significant at 5%

Notes: Eligible siblings in the regressions in Panel A are siblings under age 20 at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B consist of the adult male siblings alive at the woman's marriage, or younger male siblings who could have come of age afterwards. Panel C uses both kin support measures as instruments and fixed-effects for eligible siblings for both measures. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, husband's age at first intercourse, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for husband's knowledge of HIV prevention through condom use and monogamy, indicators for relationship to head of household each for husband and woman.

Chapter 3

Kin Support, Female Bargaining Power, and Fertility

3.1 Introduction

Maternal mortality rates in West Africa are among the highest in the world (WHO et al., 2007). Estimates range as high as 1 in 7 women in Niger expected to die from a maternal cause during their lifetime. For every woman that dies, 20 more are estimated to suffer injuries, infection, and disability (WHO et al., 2010). In recognition of these facts, improving maternal health was adopted as one of eight of the Millennium Development Goals, with a key target being the reduction of the rate of maternal mortality by three-quarters from 1990 to 2015 (WHO et al., 2010). A key factor in achieving this goal will be reducing the high rates of fertility which persist in many developing countries, particularly those with high maternal mortality (Diamond-Smith and Potts, 2011). In West Africa, the average number of live births for a woman is more than five in the countries with the highest rates of maternal mortality, with nearly seven live births per woman in Niger (UN, 2012).

Evidence suggests a significant portion of fertility in West Africa is unwanted by women with an estimate of nearly nine percent of births unwanted (Westoff, 2001). Additionally, more than a quarter of women in the region report wanting to discontinue bearing children or to increase their birth spacing, yet are not using contraceptive methods (Westoff, 2001). Development practitioners and researchers have focused on the possible role of intrahousehold bargaining and disagreement between men and women over desired fertility and the use of contraception in

explaining high fertility and fertility beyond women's desired level (Ashraf et al., 2010; Klawon and Tiefenthaler, 2001; Varanasi, 2009; Field, 2003; Rasul, 2007; Schultz, 1990; Thomas, 1990; Seebens, 2005).[17] Men in the developing country context prefer larger family sizes on average than women (Bankole and Singh, 1998). Figures 3.1a and 3.1b depict this phenomenon for households drawn from surveys in eight West African countries. Men may prefer a greater number of children than women because the burden and risks of pregnancy, and the costs of child rearing fall mostly to women. Additionally, men may be the primary beneficiaries of the labor of more children (Caldwell, 1982; Seebens, 2005). Therefore, a bargaining theory of fertility would suggest that a reduction in a woman's bargaining power relative to her husband will result in her deferral to her husband's generally higher fertility preferences. As a result, improving women's status in the household may be an important route in reducing fertility and improving women's health, in addition to being a worthwhile policy objective per se.

Several previous empirical studies have generally claimed evidence in support of the theory, finding a negative effect of women's bargaining power on fertility. Klawon and Tiefenthaler (2001) and Thomas (1990) find that greater non-wage income in women's control led to fewer births for Brazilian households. Along the same lines, Seebens (2005) find that a woman who brings more assets to the marriage

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[17] Women surveyed in Benin did not report access to and knowledge of family planning methods as a predominant limitation in taking advantage of contraception (USAID, 2005). Given the retrospective fertility history studied in this paper, the access to family planning methods for couples throughout the years covered by the sample is also relevant. Modern planning family methods were largely unavailable until 1960 in West Africa, after which official government policies improving access emerged. The first year of marriage of couples studied in this paper occurred in 1966, with over 90 percent of couple-marriage years studied are after 1985. Therefore, access to family planning methods alone is unlikely to explain high fertility observed in the sample over time.

has fewer children and longer birth spacing in a survey of Ethiopian households. Contrary to these findings, Schultz (1990) finds that greater non-wage income leads to an increase in fertility in a Thai survey. Field (2003) uses variation in an urban land titling program in Peru which included women's names on land title registration for the first time, increasing the security of her property rights. Given that the effect of land titling may affect fertility through channels other than more secure property rights for women, Field tests for an effect of bargaining power on fertility using measures of a woman's decision-making authority and the couple's age difference as an instrument. Field finds that the instrumental variable estimation provides evidence that women's bargaining power at least partially causes the decline in fertility observed after titling. Varanasi (2009) also employs an instrumental variable strategy in a study of Indonesia, instrumenting for a measure of a woman's household decision-making authority with community level variables such as relative male-female wages and relative education, as well as the types of credit institutions available.

While the findings of these studies are overall suggestive of a causal relationship between bargaining power and fertility, the inferences remain vulnerable to omitted variable bias. In the case of the studies using non-labor income as a proxy for bargaining power, the risk is that non-labor income may be endogenous (Varanasi, 2009). Men and women may pair into marriages on the basis of their assets at the time of marriage. A similar concern arises for the use of identifying variation from differences in the spouses' ages and other factors likely affecting household formation. Finally, the use of community level variables as a source of variation in

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bargaining power across women, while not an outcome of the couple's actions, may nevertheless be correlated with unobserved factors, such as norms, varying at the community level which are also correlated with fertility and women's status. For example, a high ratio of male to female education may be the result of attitudes regarding the appropriate role of women in society and the household. Such unobserved factors are very likely also correlated with intrahousehold bargaining power and fertility, biasing estimates of the causal effect of bargaining power on fertility.

This study attempts to overcome these identification issues and contribute to the empirical literature on the causal effect of bargaining power on fertility by utilizing a source of variation in women's bargaining power which varies within couples over time -- shocks to a woman's kin support during her marriage. The use of a bargaining power shifter which varies within a couple over time allows for the inclusion of couple fixed effects, controlling for observed and unobserved time invariant differences across couples. Shocks to a woman's kin support during her marriage are captured by the deaths of women's young siblings over time. The deaths of young siblings serve as an indication that the woman's natal family has suffered an adverse shock. The woman's natal family serves as a fall-back source of support for the woman should her marriage dissolve or become uncooperative. With a weakened "threat point" in bargaining with her husband, a woman may be more likely to have to defer to her husband's preferences over fertility and other household decisions. As discussed in more detail in Chapter 2, while traditional sources of support such as kinship have been argued to impact women's bargaining strength in general, kin

support is especially relevant for bargaining power in the context of sub-Saharan Africa due to the importance of kin relations relative to conjugal relations. Anthropologist have noted that couples often maintain separate budgets and husband's may not offset drops in a woman's income (Doss 1996; Duflo and Udry, 2003; Seebens, 2005).

Shocks to kin support are measured via the woman's retrospective history of her siblings' births and deaths in the Demographic and Health Surveys (DHS). As in Chapter 2, the sample used in this analysis consists of a cross-section of couples pooled from DHS surveys in the West African countries of Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali, Niger, and Senegal. I demonstrate the relevance of the sibling deaths for measures of women's reported decision making authority in the household. I focus in particular on the say the woman has in major household purchases given the salience of control over economic decisions in the literature on the determinants of female bargaining power (Anderson and Eswaran, 2009; Kantor, 2003; Friedberg and Webb, 2006). A regression of this measure of women's bargaining power on the sibling deaths confirms a negative relationship, robust to the inclusion of controls for village fixed effects and variety of controls for couple and household characteristics, and characteristics of the woman's natal family. I also confirm that the sibling deaths affect the woman's say over other household decisions in the expected direction. Finally, I address a concern that a spurious negative correlation between bargaining power and sibling deaths may arise if fertility causes a decrease in bargaining power, and sibling deaths and fertility are positively correlated for reasons unrelated to bargaining power. To address this, I instrument for controls

for women's number of children in IV regressions of women's say over large household on sibling deaths and find the effect is unchanged and robust.

Finally, I test for the causal relationship of interest and assess whether a woman's fertility increases in response to a decrease in her bargaining power. Using a woman's retrospective fertility and sibling birth and death history, I construct a panel at the couple-marriage year level recording her births and sibling deaths over the marriage. Estimating a differences-in-differences model, I find that after removing mean couple fertility, common country-year effects, and the effects of time-varying couple characteristics, a couple is on average 2.5 percentage points more likely to have a child in any given year after the woman has experienced an additional young sibling death during her marriage. This effect represents about 8 percent of the sample mean for the probability of a live birth in a given year. The effect is robust to the inclusion of a variety of further controls and fixed effects. Moreover, I examine the timing of changes in fertility relative to the sibling death by including dummies for leads and lags of the death in the baseline differences-in-differences specification. I find that, consistent with a causal effect of the sibling death on fertility operating through the bargaining power channel, there is no statistically significant effect on fertility in the years before, the year of, and the year after the death. In the second year after the death, the effect on fertility jumps to about 6 percentage points and is maintained at an elevated, though declining level. This pattern is consistent with initial excess pregnancies in response to the shock occurring in the first year after the death, followed by births in the second year and a few years afterwards.

The paper is organized as follows. Section 2 describes the empirical strategy

used to identify the causal effect of women's bargaining power on fertility. Section 3 describes the cross-sectional data on couples and the construction of the panel data set. Section 4 presents results followed by concluding remarks.

3.2   Empirical Strategy

This paper attempts to test the hypothesis that changes in a woman's bargaining power relative to her husband during her marriage will cause a change in the couple's fertility behavior. Given that women on average prefer fewer children than men, the implication of the hypothesis is that a decrease in a woman's bargaining power will move the couple's fertility closer toward her husband's preferences. In a population such as West Africa in which men on average prefer more children (see Figure 3.1a and Figure 3.1b), a bargaining model of fertility predicts that a shift in bargaining power toward men will result in an increase in fertility. The structural relationship of interest can be represented by equation (1):

$$birth_{it} = \alpha + \beta BP_{it} + \delta Z_{it} + \varepsilon_{it} \qquad (1)$$

Where $birth_{it}$ indicates whether woman i gave birth in year t , and is a function of her bargaining power, BP_{it}, relative to her husband at the time of the fertility decision, and a vector of factors affecting fertility, Z_{it}. Parameter β captures how a change in a woman's bargaining power, after the union has formed, influences the probability the woman gives birth in a particular year.[18]

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[18] A couple is likely to bargain implicitly or explicitly over aspects of fertility other than the number of children, but factors such as the gender composition of their children and the spacing of births. This bargaining itself is taking place within a larger context of bargaining over other household decisions.   Fertility itself is focused on in this paper given the particularly important consequences of the number of children for household outcomes.

Straightforward estimation of equation (1) is unlikely to lead to estimation of the desired structural parameter due to the risk of omitted variable bias from several sources. First, estimates utilizing variation in the amount of bargaining power across women risk confounding due to unobserved factors that vary across groups such as unobserved social norms which govern both appropriate women's status, fertility preferences, and attitudes toward family planning among other factors.

Secondly, bargaining power may affect pairing on the marriage market leading to the appearance of a spurious relationship between bargaining power and the couple's observed behavior. For example, vulnerable women may be paired with controlling men who impose their preference for larger family sizes. Likewise, some men, inclined to share power with women, may also have preferences for smaller family sizes. Such phenomena would lead to a negative correlation between women's bargaining power and fertility, but the relationship would not be causal.

A further difficulty in recovering β is that true bargaining power is not directly observed, and must be inferred from observed proxies, such as reported decision-making authority or proximate determinants of bargaining power. The use of observed measures of bargaining power, however, risks the introduction of simultaneity bias in that fertility decisions and women's observed decision-making authority are likely to be jointly determined through an implicit bargaining process. For example, a woman may tacitly agree not to interfere with household financial decisions in an implicit exchange for control over fertility. Similarly, a husband may cede some control over household decisions if his fertility or sexual activity desires are accommodated. In both cases, fertility and women's decision-making authority

would be positively correlated, but the relationship would not be causal.

3.2.1   Kin Support Shocks

These potential sources of bias suggest the use of exogenous variation in bargaining power. As the examples above illustrate, inferring the effect of bargaining power on fertility can pose challenges when exploiting variation in the level of bargaining power across couples. This study attempts to circumvent these challenges by instead exploiting a source of variation in bargaining power varying *within* a couple over time. I match shocks to a determinant of a woman's bargaining power, her kin support, to a couple's year-by-year marital fertility history. Constructing a bargaining power shifter which varies at the couple-level allows for the use of couple fixed-effects which restricts identifying variation to variation within the same couple over time, rather than relying on variation across couples as has often been necessary in previous studies. Kin support is particularly suited as a bargaining power shifter in the context of West Africa given both the importance of traditional sources of social support for women, and also the separate nature of spouses' kinship ties.

This paper will use the birth and death history of a woman's siblings in the DHS to create a time-series of shocks to a woman's kin support as captured by the post-marriage deaths of a woman's younger siblings. The variable $deaths$ records the number of a woman's siblings, 10 years old or under, who have died since the beginning of the couple's marriage up to the previous year. The variable captures deaths up to the previous year in order to account for the pregnancy period of any

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birth.[19]

Deaths of the woman's young siblings function as an indication that the woman's natal family has suffered a negative shock. The measure is limited to post-marriage deaths in order to focus on shocks occurring after household formation. Shocks occurring before a couple's marriage may have impacted the types of men and women who marry along unobserved dimensions relevant for later fertility outcomes. The deaths of siblings older than 10 years are not included in the preferred specifications in order to avoid that these siblings directly affect fertility. Adolescent and adult siblings may directly affect the cost of child rearing by offering help and support for child care.

3.2.2   Validity

The validity of using a woman's sibling deaths as a shock to kin support to consistently estimate the causal effect of bargaining power on fertility, β, in the structural equation requires that, in addition to being relevant for bargaining power, the sibling deaths also be uncorrelated with other determinants of fertility. Also of interest and useful from a policy perspective, however, is to infer just the sign of β, as well as placing bounds on its magnitude. In order to estimate the sign of β, one needs to satisfy a weaker condition that the possible biases in the estimate of β be of the opposite sign. That is, in the case of the bargaining power theory of fertility which predicts a positive β, if the estimated parameter is found to be positive and potentially

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[19]La Ferrara et al. (2008) time the measure of their treatment variable, TV channel introduction, in a similar manner in their study of fertility in Brazil.

biased downward, then one can infer that the sign of β is positive and bounded below by the estimate. Next I discuss possible channels other than bargaining power through which sibling deaths might affect fertility and the implications of these possibilities for characterizing the causal effect of bargaining power on fertility.

First, a concern may be that the shock represented by the sibling death could cut support to the woman from her natal family to support further children. Therefore, rather than solely representing a shift in a woman's bargaining power relative to her husband, the sibling death captures a reduction in a woman's receipt of transfers from her natal family. Analogous to this channel would be if the woman experienced the same shock as her natal family and suffers a decrease in income as a result. Studies in the developing country context have found that households shift or reduce fertility in response to economic shocks (Bhalotra et al., 2009; McKenzie, 2003; Sabarwal et al., 2011). Should such an income shock channel be in effect, it would generate a zero or negative correlation between sibling deaths and fertility - in the opposite direction of the prediction of the bargaining power theory.[20] Therefore, a positive reduced form estimate of sibling deaths on fertility would be evidence in favor of the bargaining power channel, albeit with a point estimate potentially biased downward. Similar reasoning would apply to a decrease in fertility due to grief stemming from the loss of a sibling, or the loss of future assistance for child rearing due to the sibling death.

One may also argue that the death of a woman's sibling could make more

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[20]The relationship between $deaths$, the number of post-marriage sibling deaths to date, and fertility could be zero if the timing of fertility is merely shifted, but eventually completed. Such an effect could be the case for couples below natural fertility. For couples who would have otherwise been at natural fertility levels, a delay due to a shock would result in lower completed fertility and a negative effect of $deaths$ on fertility.

resources available to the woman. In such a scenario, a unitary model of the household in which children are regarded as normal or luxury goods would also predict an increase in fertility. Yet, a unitary model would not predict that changes in the source of income should alter decision-making authority in the household. Therefore, evidence of shifts in bargaining power in response to changes in a woman's family would not be consistent with the unitary model, and serves as an empirical test to distinguish between the bargaining and unitary models of the household. Likewise, a mechanism based on a woman's parents demanding children from the woman to replace the deceased sibling does not readily predict a decrease in her bargaining power.

Yet another channel to consider which may lead to a correlation between sibling deaths and fertility is through a sibling death's effect on couple's expectations of the likelihood of child mortality. Couples expecting a higher child mortality may increase their fertility in order to ensure the survival of a sufficient number of children. In order to address this possibility, I include in some specifications controls for the mortality of the couple's children, as well as a measure of the young sibling deaths of the other couples in the same village in order to control for the couple's expectations of mortality.

3.2.3   Kin Support Shocks and Bargaining Power

I next turn to establishing the relevance of the sibling deaths for bargaining power. I initially follow the same approach as in Chapter 2 to establish that the sibling deaths shift bargaining power by estimating their effect on proxies for bargaining

power based on a woman's reported decision-making authority over household decisions. Due to the emphasis on control over economic resources in the literature on the determinants of bargaining power, I focus in particular on a woman's reported say over major household purchases. A dummy is created indicating a woman reports having some say over major household purchases. Dummies are also created for responses regarding a woman's say over her own health care, daily household purchases, and which food to be cooked each day.

Unlike the sibling death and fertility history data, the bargaining power proxies capture decision-making authority only at the time of interview. Therefore, tests based on the effect of variation in sibling deaths on bargaining power for a couple over time are not possible. In light of such an analysis, I estimate the effect of young sibling deaths over the course of the marriage for couples on current measures of a woman's bargaining power. I also test whether recent sibling deaths have a stronger effect on women's current reported decision-making authority as would be expected if women's bargaining power over time responded to kin support shocks.

Specifically, I estimate equation (2a) and equation (2b) which display the regression of the decision-making authority for the woman in couple i in village v with s eligible siblings, say_{isv} on the number of young sibling deaths occurring since the beginning of the marriage, $deaths_{isv}$, where X_{isv} is a vector of controls; γ_v village fixed effects; and γ_s fixed effects for the number, s, of young siblings alive at the time of the woman's marriage or born subsequently in order to control for differences across women in the number of siblings who could have died. Equation (2b) tests the relative importance of deaths one year or less ago, two to five years ago,

and greater than five years ago.

$$say_{isv} = \alpha_0 + \alpha_1 deaths_{isv} + \alpha_2 X_{isv} + \gamma_v + \gamma_s + \omega_{isv} \qquad (2a)$$

$$say_{isv} = \pi_0 + \pi_1 deaths_{isv}^{0to1} + \pi_2 deaths_{isv}^{2to5} + \pi_3 deaths_{isv}^{>5} +$$

$$\pi_4 X_{isv} + \gamma_v + \gamma_s + \omega_{isv} \qquad (2b)$$

A concern in OLS estimation of equation (2a) or (2b) is that if sibling deaths are correlated with fertility, then the effect of $deaths$ on women's reported bargaining power at the time of interview will be biased if fertility enters on the right-hand side of equation (2a) or (2b). The number of a woman's children could affect women's bargaining power, for example, via child care preventing the woman's employment outside the home. As fertility and bargaining power are therefore likely jointly determined, variables measuring fertility cannot be entered as a control in an OLS estimation of equation (2a) or (2b). To address this issue, I estimate a two-stage least squares regression (2SLS) in which fertility is instrumented by the proportion of the woman's births which were twin births. Separately, I also instrument with a dummy for whether either of the woman's first two births were twin births.[21] Specifically, I estimate the following first-stage, equation (3a), and second-stage, equation (3b):

$$children_{isv} = \varphi_0 + \varphi_1 deaths_{isv} + \varphi_2 twin_{isv} + \varphi_3 X_{isv} + \gamma_v + \gamma_s + \epsilon_{isv} \qquad (3a)$$

$$say_{isv} = \theta_0 + \theta_1 deaths_{isv} + \theta_2 children_{isv} + \theta_3 X_{isv} + \gamma_v + \gamma_s + \tau_{isv} \qquad (3b)$$

Where $children_{isv}$ is the woman's current number of living children and alternatively the number of children under five years old in the household. Given that the occurrence of twins is an arguably exogenous event, and strongly correlated with the

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[21]The number of children under the age of 5 in the household is not instrumented with the dummy for whether either of the first two births was a twin birth as there was no first stage as would be expected since for many women the first two births are older than 5 years old.

number of children a woman has to-date, it serves as a useful instrument in order to consistently estimate the effect of young sibling deaths on a woman's reported bargaining power conditional on the number of children she has.

3.2.4   Kin Support Shocks and Fertility

3.2.4.1   Differences-in-Differences Specification

Having tested for the relevance of the kin support shocks for bargaining power, the next step is to exploit this variation to infer the causal effect of bargaining power on fertility. In the sample, the woman's reported bargaining power is observed only at the date of interview, whereas her births and sibling deaths are recorded over time. Therefore, in order to take advantage of the variation over time, a reduced form approach is taken here for causal identification rather than attempting an instrumental variable strategy. An instrumental variable strategy would not be advised in any event due to the fact that bargaining power is noisily captured in the data by women's decision-making power in the household. As a result, the exclusion restriction for an instrumental variables strategy is unlikely to hold as the kin support measures will remain correlated with aspects of bargaining power relevant for fertility which are not captured by the proxies for bargaining power.

In the first set of results, I infer the causal effect of bargaining power on fertility from the reduced form effect of young sibling deaths through the previous year on the probability a woman gives birth in a particular year. The full retrospective history of a woman's fertility is built from her responses in the DHS cross-sectional household surveys for eight countries in West Africa. An unbalanced panel is created

for married women based on each year of marriage. The following linear probability

model is estimated:

$$birth_{it} = X_{it}\Phi + \gamma deaths_{it} + \mu_i + \lambda_t + \varepsilon_{it} \tag{4}$$

where $birth_{it}$ is equal to 1 if woman i gives birth to a child in year t; $deaths_{it}$ is the

number of post-marriage young sibling deaths that have occurred through year $t - 1$;

μ_i are couple fixed effects and λ_t are country-year fixed effects. The variables in X_{it}

include the woman and her husband's age and age-squared, the stock of children the

woman had up to year t, a dummy variable for whether the woman gave birth in year

$t - 1$. A variable for birth in the previous year is included in order to account for

reduced fertility due to postpartum amenorrhea.[22] Additional specifications included

for robustness include controls for whether a child of the couple died in year $t - 1$,

the number of living young and adult siblings, the number of the couple's children

which have died to date, and fixed effects for mother age, year of marriage, country -

mother age - year, woman-decade of age, and village-year. Standard errors are

clustered at the couple level in all regressions.[23] [24]

In the ideal econometric case, shocks to kin support would be independent,

random events - resulting (or randomly resulting) in a young sibling death. In such a

case estimation of equation (4) will result in an unbiased estimate of γ, the reduced

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[22] See Field (2003) and La Ferrara et al. (2008) for examples of fertility specifications using birth in the previous year to account for infertility from postpartum amenorrhea.
[23] Wooldridge (1995) and Semykina and Wooldridge (2010) give conditions under which fixed effects estimation of an unbalanced panel is consistent. In particular, the selection process resulting in missing observations for some units must be strictly exogenous conditional on covariates and the unit fixed effect. In the model in this paper, couples have greater or fewer marriage years in part based on observable covariates such as their year of birth and age of marriage. To the extent that unobservable characteristics of the couple are driving the selection process, the couple fixed effect will capture any time invariant factors.
[24] Following Cameron and Trivedi (2005), sampling weights are not used as the paper takes an analytical approach as opposed to a data summary approach.

form effect of sibling deaths on the probability of birth in a given year. In practice, however, the occurrence of young sibling deaths has both an idiosyncratic and systematic component. Systematic components may include the socioeconomic status of the woman's natal family, geographically distributed shocks over time such as crop failure, as well as mechanically the size of a woman's sibship. Yet despite these systematic components, the timing and occurrence of shocks to the natal family likely continue to have a significant idiosyncratic component based on the random timing of fortunate and unfortunate events occurring to households and individuals.

The fixed effects model in equation (4) attempts to exploit the idiosyncratic component of the timing of shocks to the woman's natal family by purging the variation due to systematic components through couple and country-year fixed effects in the baseline specification, and a variety of other fixed effects and controls in other specifications. With the idiosyncratic component remaining, those women never experiencing deaths and those women with deaths later in the marital period serve as a counterfactual for those women experiencing deaths.

Establishing that post-marriage young sibling deaths negatively affect a woman's bargaining power, and do not affect fertility through other channels conditional on covariates, implies that a positive effect of $deaths_{it}$ on the likelihood a woman gives birth in a particular year can be interpreted as evidence of a negative effect of bargaining power on fertility. As discussed above, to the extent that concerns remain about correlation of $deaths_{it}$ with fertility through other channels, estimates of the magnitude of the negative effect of bargaining power on fertility are likely to be biased downward and therefore serve as useful lower bound.

To further explore the bargaining power mechanism, I also test whether the effect of young sibling deaths is increasing in the difference in the man and woman's respective reports of their ideal number of children.[25] A husband with a higher ideal number of children should be more motivated to exploit a woman's weaker bargaining position to shift the couple's fertility to his preference. Similarly, I interact the sibling deaths with the man's stock of sons in each year. A man with a greater number of sons may be less motivated to exploit bargaining power to increase fertility.[26]

Finally, to address concerns that the exact timing of the deaths is more safely random than whether a woman ever experienced a death, I also estimate the model for the sub-sample of couples with women who ever experienced a post-marriage young sibling death.

3.2.4.2   Inferring Causality from the Timing of Sibling Deaths

In order to further investigate the causal relationship between young sibling deaths and fertility, I consider the timing of the deaths relative to the fertility outcome. Consider the following equation (5) in which leads and lags of a dummy for the occurrence of a young sibling death in a particular year augment the specification in equation (4):

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[25] These reports are unfortunately ex-post and may not have represented the couple's feelings at the time of the fertility decision and therefore results must be interpreted with caution.
[26] Women express a slight preference for a greater proportion of sons to daughters in the sample, whereas men's preference is more pronounced. Women prefer on average 53 percent male children, whereas men prefer 59 percent in the sample.

$$birth_{it} = X_{it}\beta + \gamma_{+4}D_{i,+4} + \gamma_{+3}D_{i,+3} + \cdots + \gamma_0 D_{i,0} + \cdots + \gamma_{-5}D_{i,-5} + \gamma_{-6}D_{i,-6} +$$

$$\gamma_{-7}D_{i,-7\,forward} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (5)$$

Where $D_{i,0}$ is a dummy for a young sibling death in year t, $D_{i,+m}$ is a dummy for a young sibling death occurring m years into the future, $D_{i,+m}$ is a dummy for a young sibling deaths m years before. $D_{i,-7\,forward}$ is a dummy equal to 1 in every year beginning with the seventh year after a sibling death has occurred.

Estimation of equation (5) will allow for *i*) a test of reverse causality, *ii*) a test of whether the couple's fertility and the sibling death are both affected by a common shock, *iii*) a test of the effect of a "placebo" treatment to further test for causality, and *iv*) an assessment of the dynamics of the effect of sibling deaths on fertility - that is, does the impact accelerate, stabilize, or revert to the mean.[27]

The discrete specification in equation (4) could obscure reverse causality in which the couple's fertility outcome affects the mortality of the woman's young siblings if, for example, the woman allocates less time to assisting in the rearing of her younger siblings after the birth of her child. Positive coefficients on the treatment leads, γ_{+m}, would be an indication that the couple's fertility outcome may be affecting the mortality of the woman's siblings - contrary to an interpretation in which the sibling deaths indicate shocks to kin support which subsequently impact the couple's fertility. Negative coefficients on the treatment leads would suggest that the couple's fertility declines prior to the death of a woman's siblings. If the coefficients on the

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[27]This specification draws on the analysis conducted in Autor (2003) of the effect of changes employment contract law on firm's hiring of temporary employees. La Ferrara et al. (2008) employ a similar test at the regional level testing for the effect of the introduction of soap opera television programs in Brazil on subsequent fertility.

lags are in turn positive this would suggest that the couple is merely shifting fertility in time perhaps because the couple is experiencing the same shock as the woman's natal family or have temporarily ceased receiving direct support from the natal family. Treatment leads, particularly longer leads, can also be thought of as a falsification test using placebo treatments. Women who will experience a young sibling death in three, four, or five years should not presently alter their fertility if kin support shocks shift bargaining power which subsequently shifts fertility.

3.3   Data

3.3.1   Sample Construction

Using the same group of countries as in Chapter 2, couples are pooled from households surveyed in the DHS from the countries of Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali, Niger, and Senegal.[28] These countries in West Africa were selected because they included a detailed fertility history, questions regarding women's decision-making authority, and included women's sibling mortality history.

The sample used in this analysis consists of couples in which at least one of the spouses is in their first marriage. The DHS does not ask directly for the date of respondent's current marriage, but rather the date of the respondent's first marriage. If either spouse or both are in their first marriage, then the couple's marital duration can

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[28]The survey years used are Benin (2006), Burkina Faso (2003), Cameroon (2004), Guinea (2005), Liberia (2006/2007), Mali (2006), Niger (2006), and Senegal (2005).

be obtained from their responses for the date of first marriage. The date of marriage is used critically to define which sibling deaths occurred post-marriage. In total, 14,981 couples have data for marital duration, sibling and fertility history, and women's decision-making authority. Additionally, 80 women who identify as daughters of the head of household are excluded from the sample as the woman's natal household would be equivalent to the couple's household rendering use of the kin support measures for these households inappropriate. This leaves a final sample of 14,901 couples.

The cross-sectional data set for couples is used to investigate the relevance of sibling deaths for bargaining power measures. The retrospective histories of a woman's siblings and fertility allow for the construction of a panel data set for a richer study of the reduced form effect of sibling deaths on fertility as discussed above. A panel is constructed for each year of the couple's marriage given that the effect of changes in bargaining power during marriage on fertility is under study. This transformation results in an unbalanced panel with a total of 207,208 observations. Table 3.1 displays descriptive statistics for the key variables in the paper.

3.4 Econometric results

3.4.1 Sibling Deaths and Bargaining Power

Table 3.2a displays OLS estimates of the effect of post-marriage young sibling deaths on the likelihood a woman has say over major household purchases. An additional death of a sibling 10 years old or under results in about a 2 percent

decrease in the likelihood the woman reports having say over major household purchases. Given that 36 percent of the sample reports having some say over major household purchases, the effect represents 5 percent of the sample mean. The effect is significant at the 5 percent level and robust to the inclusion of village fixed effects as well as a variety of controls for couple and woman's natal family characteristics. Table 3.2b displays results of the effect of the timing of young sibling deaths on women's current reported decision making authority across couples. The table reveals that the average effect is driven in large part by sibling deaths less than two years ago. An additional young sibling death within the last two years results in about a 7 percent decline in the likelihood a woman has say over major household purchases. The effect size decreases with distance from the present and is only statistically significant for the most recent deaths.

Table 3.3 displays the effect of the sibling deaths on other measures of women's bargaining power such as say over her own health care, daily household purchases, and food to be cooked each day. The effects are in the expected direction, but roughly half the size of women's say over large household purchases, and not statistically significant. Nevertheless, overall the estimates suggest a woman's decision-making authority is affected by shocks to the woman's kin support. Estimates using the deaths of siblings under the age of 20 demonstrate a similar effect.

Estimates of the effect of sibling deaths on women's reported decision-making authority in Table 3.2 and Table 3.3 may be biased due to correlation between sibling deaths and fertility through other channels. That is, if sibling deaths affect fertility

through alternate channels unrelated to bargaining power and fertility outcomes subsequently affect bargaining power, the estimates in Table 3.2 and Table 3.3 may give the spurious appearance that shocks to kin support cause a decrease in bargaining power. As discussed above, I test for this possibility by conducting a 2SLS regression in which measures of a woman's fertility are included in regressions of woman's say on sibling deaths and instrument for the fertility outcomes by the woman's proportion of twin births and alternatively a dummy for either of the first two births being a twin birth. Results are presented in Table 3.4 for a woman's say over major household purchases. Controlling and instrumenting for either the woman's number of living children or children in the household under the age of 5 are very similar to and confirm the estimates in Table 3.2. Overall, these results suggest a robust effect of the sibling deaths on measures of a woman's bargaining power, particularly as measured by control over major household economic decisions.

3.4.2 Reduced Form Effect of Sibling Deaths on Fertility

Next I turn to estimates of the reduced form effect of sibling deaths on fertility. Column 1 of Table 3.5 displays baseline estimates of equation (4) on the panel of couple-marriage year observations. The model is estimated as a linear probability model with standard errors clustered by couple. The dependent variable in each regression, $birth_{it}$, is a dummy equal to 1 if woman i gave birth in year t, and otherwise 0. The variable of interest, $deaths_{it}$, records the number of post-marriage deaths of siblings age 10 and under the woman has experienced up through year $t-1$. The regression in column 1 includes controls for the man and woman's age and

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age-squared in year t; their respective stocks of children in year t,[29] and their square; and a dummy for whether the woman gave birth in the previous year. The results indicate that after removing the effects of these controls, mean couple fertility, and common country-year effects, a couple is on average 2.5 percentage points more likely to have a child in any given year after the woman has experienced an additional post-marriage young sibling death. The mean probability of birth in a year in the sample is 0.28. Therefore, the effect represents about 8 percent of the sample mean. The magnitude of the effect is sensitive to the inclusion of an indicator for birth in the previous year as displayed in Column 1 of Table 3.6. In this specification a couple is on average 1.4 percentage points more likely to have a child. The smaller effect remains, however, statistically and economically significant.

Panel A of Table 3.6 displays results based on variations in the baseline specification of equation (4). The results appear robust to the inclusion of a variety of controls including the previous child mortality experienced by the couple as well as the woman's number of young, adolescent, and adult siblings. Particularly noteworthy are columns (4), (7), and (8) in which the effect is robust to the inclusion of fixed effects for country by year by woman's age (equivalently country-cohort by year), village by year, and woman by decade of life (i.e. her 20s, 30s etc.). Panel B of Table 3.6 estimates the baseline specification using sibling deaths under 20 years old finding broadly similar effects. Panels C and D repeat the estimation on the sub-

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[29]The stock of children of the man may be different than the woman if the man has other wives or either member of the couple were previously married. Field (2003) discusses the particular importance of controlling for women's birth parity in fertility regressions due to differences in the marginal cost of child rearing based on the birth parity.

sample of couples in which the woman has experienced a young sibling death at some point in the marriage. Comparison with these estimates is useful as it is robust to concerns that despite the controls and fixed effects that have been included in the specifications, women who have never had a post-marriage young sibling death are not an appropriate counterfactual for women who have experienced the deaths. The results for these estimations are very similar to Panels A and B with the exception of column 8, which though significantly larger still indicates a positive reduced form effect of sibling deaths on the probability of birth.

Columns (3) of Table 3.5 explores the interaction of disagreement between the husband and wife in their reported ideal number of children with young sibling deaths. A bargaining power mechanism would suggest that the greater the husband's ideal point relative to the woman's, the more important shifts in bargaining should be for fertility outcomes. The interaction effect in Column (3) is positive in the expected direction, however not statistically significant. One must keep in mind that the reported ideal number of children is measured at the date of interview and may not correspond to the couple's sentiments at the time of the fertility decision.

Columns (4) and (5) of Table 3.5 test the bargaining mechanism further by interacting the sibling deaths with the man's stock of sons and daughters respectively. Results indicate that a man with a greater stock of sons reduces the effect of sibling deaths on fertility. Each additional son reduces the effect by 0.5 percentage points relative to an average effect of 2.5 percentage points and is statistically significant at the 5 percent level. The effect of the stock of daughters has a point estimate which also reduces the effect of the sibling deaths, but is not statistically significant. These

results are consistent with the bargaining mechanism in that a shift in bargaining power induced by kin support shocks is less acute the greater the number of sons he has.

The presence of a causal effect of kin support shocks on fertility can be further examined by considering the timing of changes in fertility in response to shocks. Figure 3.2 graphs the point estimates of the estimation of equation (5) with leads and lags of the sibling death shown in column 2 of Table 3.5. The coefficient on the effects in the years prior to the sibling death are not significantly different from zero suggesting the lack of reverse causality stemming from the couple's birth to higher sibling mortality. Likewise, in the year of death and the first year after, the probability of birth is very close to zero, followed by a spike significantly different from zero from the second year to the fifth year after the death, which subsequently dissipates. This pattern is consistent with a kin support shock which causes an increased likelihood of pregnancy, but not birth, in the first year after the sibling death, followed by a continuous period of higher likelihood of fertility. The estimated probability of birth does not turn negative after the spike following a young sibling death indicating that the effect is not a shift in timing, but a change in total fertility. Finally, Table 3.7 subjects the baseline specification to further testing through the addition of the same variety of controls and fixed effects as in Table 3.6. The pattern is broadly upheld, though point estimates lose statistical significance in some specifications perhaps due in part to the inclusion of so many fixed effects.

Overall, the reduced form estimates of the effect of young sibling deaths on fertility are consistent with a bargaining power channel and inconsistent with the

empirical implications of plausible alternatives. Alternative channels which negatively affect a couple's ability or willingness to have a child are inconsistent with a positive reduced form effect of sibling deaths on fertility. Examples of such mechanisms are a common shock which affects both the woman's natal family and the couple, or a reduction in labor or resources from the natal family to support the woman's fertility. Furthermore, the lack of a negative effect on fertility in the years surrounding the sibling death suggests the couple is not shifting the timing of fertility in response to an income shock, a reduction in direct support from the woman's natal family, or as a response to grief.[30] The empirical support for the bargaining power channel is consistent with several studies that have found evidence contrary to the unitary model of the household.

3.5   Conclusions

This paper has assessed the effect of a woman's bargaining power relative to her husband on a couple's fertility. Shocks to a determinant of bargaining power, women's kin support, varying within couples over time are used to identify the causal effect. Kin support shocks are captured by deaths of a woman's young siblings. Such deaths are argued to be an indication that the woman's natal family has suffered a negative shock. I exploit differences in the timing of these shocks across couples to estimate how changes in a woman's bargaining power impact a couple's fertility. I find that, after controlling for time invariant couple characteristics, common country-

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[30]Results in Chapter 2 also establish that the kin shocks are balanced across observables and do not appear to affect the man or woman's likelihood of working.

year effects, and time varying controls, shocks to a woman's kin support lead to significantly higher fertility. The effect is robust to removing village-year, and country-cohort-year effects among other controls. Moreover, exploring the dynamics of fertility changes relative to the timing of the shocks confirms that fertility changes occur after the shocks with no effect in the years prior to the event. These results are consistent with a mechanism in which kin support shocks worsen women's bargaining power leading to fertility outcomes closer to the generally higher fertility preferences of husbands. Furthermore, I argue that to the extent sibling deaths may affect fertility through channels other than bargaining power, the estimated effect is likely to be biased toward zero, maintaining the validity of inference on the direction of causation and providing a useful lower bound on the magnitude.

These findings validate efforts to promote gender equality and the empowerment of women as a means of improving maternal health. The findings also point to the equally important conclusion that efforts must be undertaken to understand how fertility and maternal health can be improved despite women's lower bargaining position relative to their spouse. Consistent with a bargaining model, recent experimental studies have found the importance of improving women's access to information and the particular importance of having the opportunity to choose concealable forms of contraception not subject to de facto spousal consent (Ashraf et al., 2010). Further research is warranted on how improved maternal health and fertility outcomes can be achieved by both improving women's bargaining power and achieving results despite women's lower bargaining position.

Figure 3.1a: Men and women ideal number of children (All couples)

Figure 3.1b: Men and women ideal number of children (Monogamous couples)
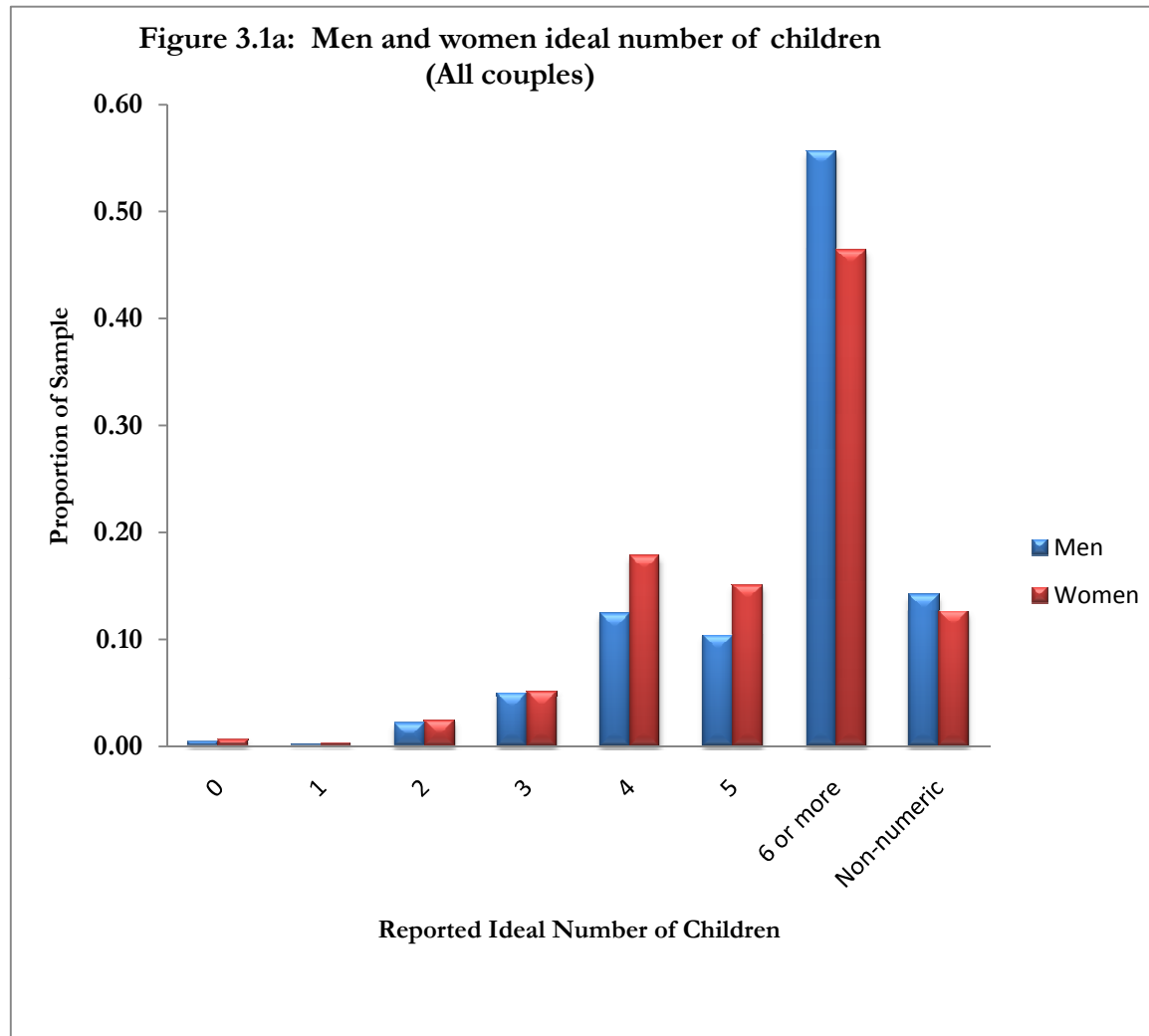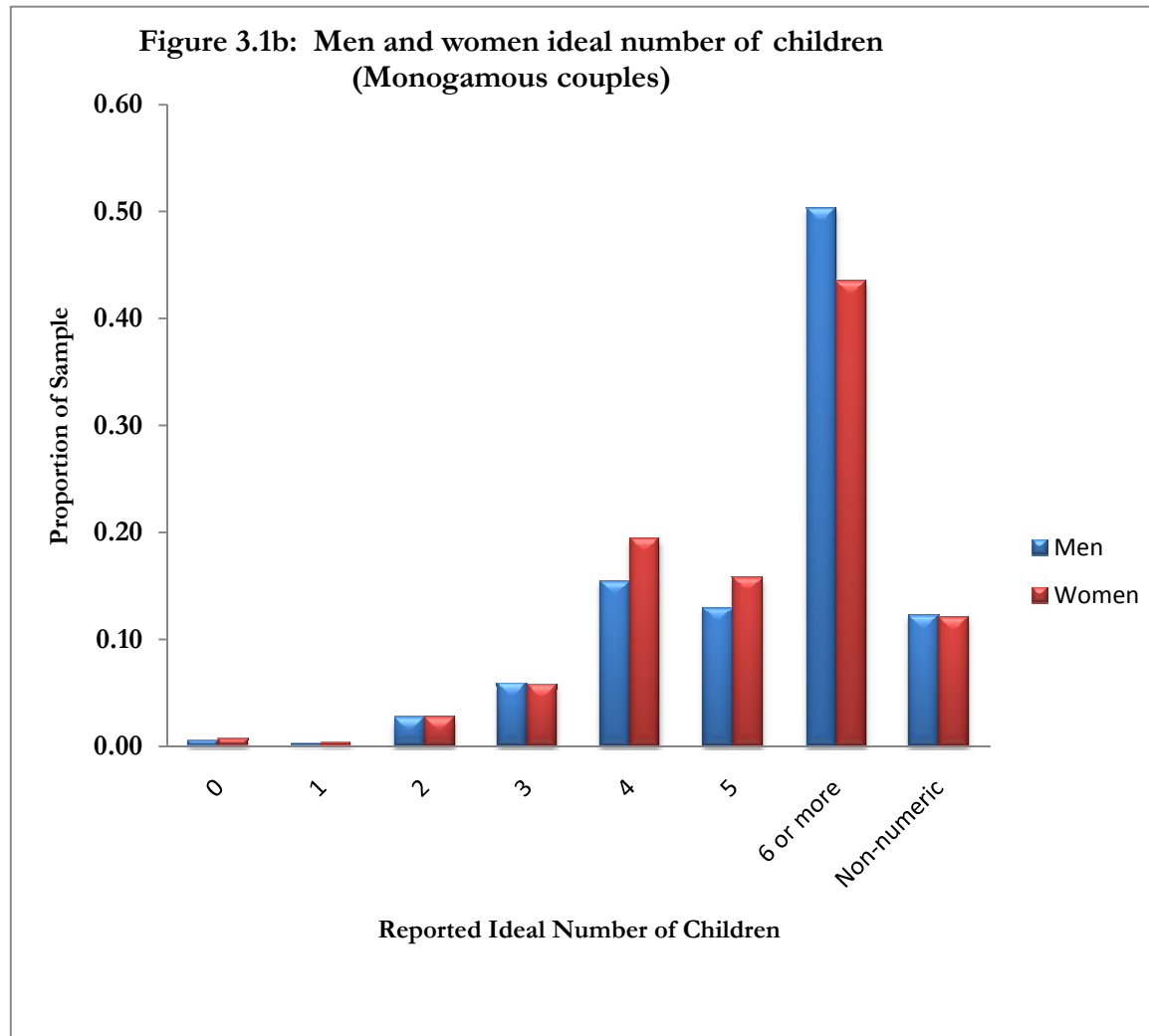
Figure 3.2: Estimated impact of leads and lags of young sibling death on the probability the

Years Before or After the Death of a Woman's Young
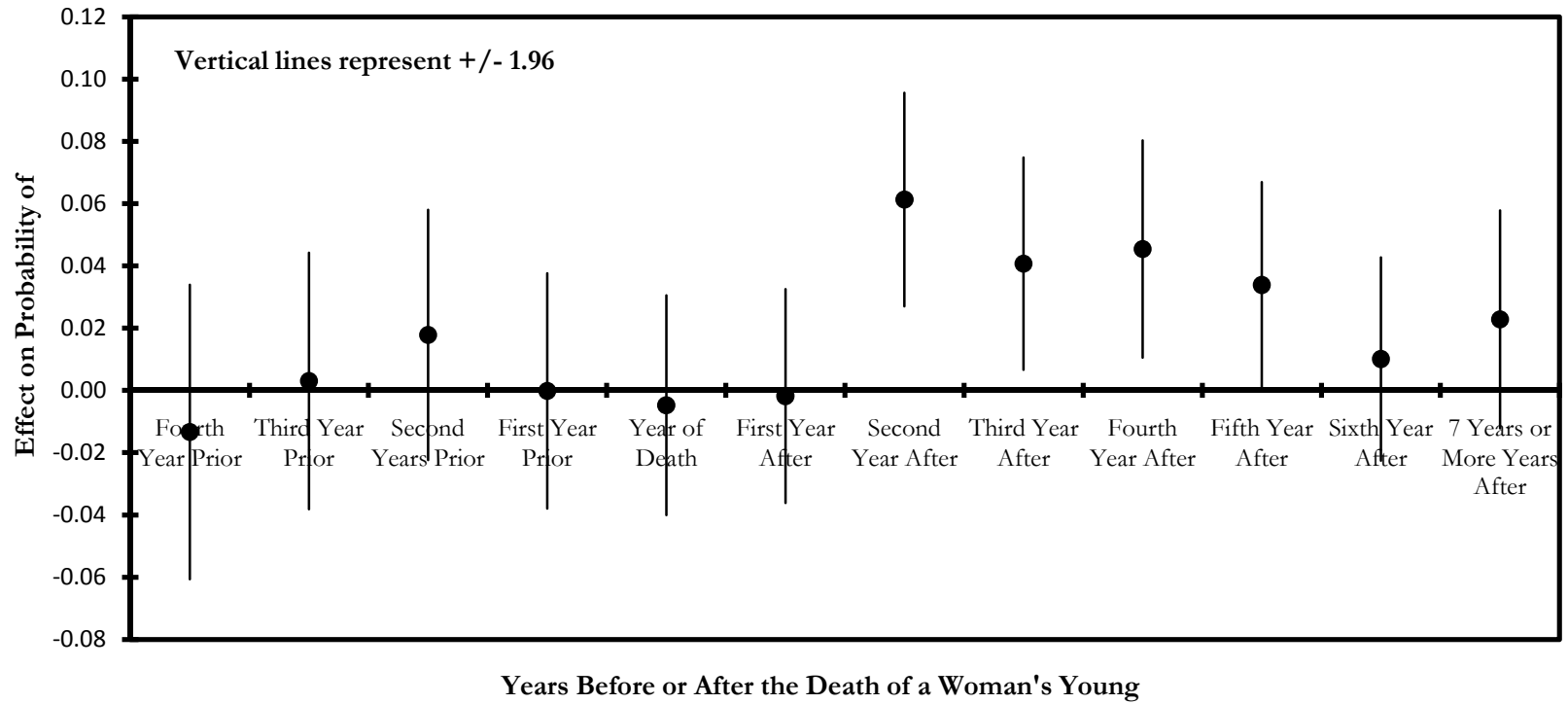
Table 3.1: Summary Statistics

Panel A: Couple Level			
	Mean	Std. Dev.	Number of Obs
Woman Has Say in Large Household Purchases (0/1)	0.36	0.48	14,901
Woman Has Say in Own Healthcare (0/1)	0.30	0.46	12,894
Woman Has Say in Daily Household Purchases (0/1)	0.48	0.50	14,879
Woman Has Say in Food to be Cooked Each Day (0/1)	0.71	0.45	12,774
Woman's Age	30.1	8.06	14,901
Husband's Age	39.4	9.41	14,901
Woman's Years of Education	1.67	3.25	14,885
Husband's Years of Education	3.23	4.56	14,870
Polygamous Union (0/1)	0.33	0.47	14,901
Marital Duration	12.3	8.08	14,901
Muslim Husband (0/1)	0.58	0.49	14,887
Christian Husband (0/1)	0.31	0.46	14,887
Number of Post-Marriage Young Sibling Deaths (10 and under)	0.10	0.43	14,901
Number of Post-Marriage Young Sibling Deaths (under 20)	0.14	0.47	14,901
Number of Eligible Post-Marriage Young Siblings (10 and under)	1.34	1.82	14,901
Number of Eligible Post-Marriage Young Siblings (under 20)	2.90	2.36	14,901
Number of Siblings Ever Born	5.65	2.53	14,901
Woman's Ideal Number of Children	6.16	2.67	13,702
Men's Ideal Number of Children	19.2	29.16	12,287
Woman's Ideal Number of Children (Median)	6		
Men's Ideal Number of Children (Median)	8		
Proportion of Births Twin-Births	0.017	0.07	14,141
First or Second Birth Twin-Birth	0.025	0.16	12,161
Panel B: Couple - Marriage Year Level			
Woman gives birth (0/1)	0.28	0.45	207,208
Young sibling death occurs (10 years old and under)	0.01	0.09	207,208
Young sibling death occurs (under 20 years old)	0.01	0.11	207,208
Stock of children (woman)	2.22	2.06	207,208
Stock of children (man)	2.69	2.65	207,208
Woman's stock of young siblings	0.64	1.24	207,208
Woman's stock of male adolescent or adult siblings	1.81	1.45	207,208
Woman's stock of female adolescent or adult siblings	1.80	1.45	207,208
Woman's Age	25.93	7.44	207,208
Man's Age	34.86	8.76	207,208
Number of Children died through t-2	0.50	0.99	207,208

Notes: This table consists of summary statistics for the sample of couples pooled from the Demographic and Health Surveys. The countries included are Benin, Burkina Faso, Cameroon, Guinea, Liberia, Mali, Niger, and Senegal.

Table 3.2a: The Effect of Young Sibling Deaths on Female Bargaining Power

	Woman Has Say in Major Household Purchases (0/1)				
	(1)	(2)	(3)	(4)	(5)
	Panel A: Post-Marriage Sibling Deaths (10 years old and under)				
Number of Sibling Deaths 10 Years Old and Under	-0.019**	-0.022***	-0.017*	-0.018*	-0.016*
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)
	Panel B: Post-Marriage Sibling Deaths (under 20 years old)				
Number of Sibling Deaths Under 20 Years Old	-0.022***	-0.024***	-0.023***	-0.024***	-0.023***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
	Additional Covariates For All Panels				
Woman's Natal Family Characteristics: Eligible Sibling Determinants	✓	✓	✓	✓	
Woman's Natal Family Characteristics: Child Mortality Determinants		✓	✓	✓	
Household Characteristics			✓	✓	
Couple Characteristics				✓	
N	14,901	14,289	13,869	13,792	13,524

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings 10 years old or under at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B are siblings under 20 years old at the time of the woman's marriage or born subsequently. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for relationship to head of household each for husband and woman.

Table 3.2b: The Effect of Timing of Young Sibling Deaths on Female Bargaining Power

	Woman Has Say in Major Household Purchases (0/1)				
	(1)	(2)	(3)	(4)	(5)
Number of Sibling Deaths 10 Years Old and Under					
Deaths - 1 year ago or less	-0.069**	-0.074**	-0.077**	-0.079**	-0.072**
	(0.032)	(0.032)	(0.033)	(0.033)	(0.033)
Deaths - 5 to 2 years ago	-0.027	-0.027	-0.020	-0.019	-0.022
	(0.020)	(0.021)	(0.022)	(0.022)	(0.023)
Deaths - More than 5 years ago	-0.013	-0.016	-0.010	-0.012	-0.010
	(0.011)	(0.011)	(0.013)	(0.011)	(0.011)
	Additional Covariates For All Panels				
Woman's Natal Family Characteristics: Eligible Sibling Determinants	✓	✓	✓	✓	
Woman's Natal Family Characteristics: Child Mortality Determinants		✓	✓	✓	
Household Characteristics			✓	✓	
Couple Characteristics				✓	
N	14,901	14,289	13,869	13,792	13,524

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings 10 years old or under at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B are siblings under 20 years old at the time of the woman's marriage or born subsequently. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for relationship to head of household each for husband and woman.

Table 3.3: The Effect of Young Sibling Deaths on Other Measures of Female Bargaining Power

	Woman Has Say Over Her Own Healthcare (0/1)		Woman Has Say in Daily Household Purchases (0/1)		Woman Has Say Over Food to be Cooked Each Day (0/1)	
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Post-Marriage Sibling Deaths (10 years old and under)						
Number of Sibling Deaths 10 Years Old and Under	-0.010	-0.010	-0.011	-0.009	-0.012	-0.004
	(0.009)	(0.010)	(0.010)	(0.011)	(0.012)	(0.012)
Panel B: Post-Marriage Sibling Deaths (under 20 years old)						
Number of Sibling Deaths Under 20 Years Old	-0.010	-0.009	-0.014	-0.013	-0.024**	-0.014
	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Additional Covariates For All Panels						
Woman's Natal Family, Household, and Couple Characteristics		✓		✓		✓
N	12,913	11,785	14,893	13,518	12,785	11,675

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings 10 years old or under at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B are siblings under 20 years old at the time of the woman's marriage or born subsequently. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for relationship to head of household each for husband and woman.

Table 3.4: The Effect of Young Sibling Deaths on Female Bargaining Power, Controlling and Instrumenting for Fertility

	Panel A: First Stage											
	Woman's No. of Living Children				Number of Children Living in the Household 5 Years Old and Under							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Proportion of Woman's Births that were Twin-Births	2.15***	2.05***	2.13***	2.03***	0.990***	0.883***	0.997***	0.891***				
	(0.211)	(.226)	(0.210)	(0.225)	(0.177)	(0.176)	(0.177)	(0.176)				
Either of First Two Births Twin-Births (0/1)									0.425***	0.414***	0.435***	0.422***
									(0.102)	(0.107)	(0.102)	(0.107)
Partial F-Statistic	104.30	82.67	102.18	81.65	31.33	25.14	31.82	25.63	17.39	14.94	18.31	15.53
	Panel B: 2SLS Second Stage											
	Woman Has Say in Major Household Purchases (0/1)											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Number of Sibling Deaths 10 Years Old and Under	-0.020**	-0.014			-0.020**	-0.014					-0.017	-0.014
	(0.010)	(0.010)			(0.010)	(0.010)					(0.012)	(0.013)
Number of Sibling Deaths Under 20 Years Old			-0.021***	-0.019**			-0.023***	-0.021**	-0.019**	-0.018*		
			(0.026)	-0.009			(0.009)	(0.009)	(0.010)	(0.010)		
Number of Living Children	-0.037	-0.034	-0.038	-0.033					-0.041	-0.065	-0.041	-0.066
	(0.026)	(0.029)	(0.026)	(0.029)					(0.066)	(0.072)	(0.064)	(0.071)
Number of Children Living in the Household 5 yrs old and under					-0.080	-0.078	-0.080	-0.075				
					(0.058)	(0.069)	(0.057)	(0.068)				
	Additional Covariates For All Panels											
Woman's Natal Family, Household, and Couple Vars.		✓		✓		✓		✓		✓		✓
N	13,798	12,417	13,798	12,417	13,798	12,417	13,798	12,417	11,713	10,514	11,713	10,514

Standard errors clustered at the village level in parentheses. All regressions include village fixed-effects, fixed-effects for the number of eligible siblings, and controls for marital duration, age and age-squared of the woman and her husband. ** significant at 5%; *** significant at 1%

Notes: Eligible siblings in the regressions in Panel A are siblings 10 years old or under at the time of the woman's marriage, or born subsequently. Eligible siblings in Panel B are siblings under 20 years old at the time of the woman's marriage or born subsequently. *Women's Natal Family Characteristics*: (1) Eligible Sibling Determinants: fraction of siblings born before woman, average birth spacing of woman's siblings, interaction of fraction born before and average birth spacing. (2) Child Mortality Determinants: number of sibling births in which the birth spacing was less than 24 months, proportion of siblings that are male, woman's height as percent of median, proportion of siblings born before woman's marriage who died before age 5, number of pre-marriage young sibling deaths, number of siblings born before woman's marriage. *Household Characteristics*: fixed effects for wealth index, and one indicator each for electricity, TV, and radio possession. *Couple Characteristics*: years of education each for woman and husband, Muslim and Christian indicator each for husband and woman, indicators for husband's occupation categories, indicator for woman has been in multiple unions, indicators each for husband and woman for whether they identify the relationship as married or just living together, indicator for couple is in a polygamous union, indicators for relationship to head of household each for husband and woman.

Table 3.5: Effect of Young Sibling Deaths on Probability of Giving Birth

| | Woman Gives Birth in Year t (0/1) | | | | |
	(1)	(2)	(3)	(4)	(5)
Number of Post-Marriage Siblings Deaths up to t-1: 10 Years Old and Under	0.025*** (0.008)		0.033*** (0.011)	0.038*** (0.008)	0.037*** (0.010)
Deaths * (Man Ideal Number of Children - Woman Ideal Number of Children)			0.0010 (0.0007)		
Deaths * Man's Stock of Sons in Year t				-0.005** (0.003)	
Man's Stock of Sons in Year t				0.000 (0.003)	
Deaths * Man's Stock of Daughters in Year t					-0.003 (0.002)
Man's Stock of Daughters in Year t					0.000 (0.003)
$Death_{t+5}$		-0.013 (0.024)			
$Death_{t+4}$		0.003 (0.021)			
$Death_{t+3}$		0.018 (0.020)			
$Death_{t+2}$		-0.000 (0.019)			
$Death_{t+1}$		-0.005 (0.018)			
$Death_{t0}$		-0.002 (0.017)			
$Death_{t-1}$		0.061*** (0.017)			
$Death_{t-2}$		0.041** (0.017)			
$Death_{t-3}$		0.045*** (0.018)			
$Death_{t-4}$		0.034** (0.017)			
$Death_{t-5}$		0.010 (0.017)			
$Death_{t-6\ forward}$		0.023 (0.018)			
Couple FE	Y	Y	Y	Y	Y
Country by Year FE	Y	Y	Y	Y	Y
N	207,208	207,208	207,208	207,208	207,208

Standard errors clustered at the couple level in parentheses. All regressions represent linear probability estimates. All regressions contain controls for the couple's ages and age-squared, an indicator for whether the woman gave birth in the last year, and the total stock of children and squared for the man and woman respectively. * significant at 10%; ** significant at 5%; *** significant at 1%

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Table 3.6: Effect of Young Sibling Deaths on Probability of Giving Birth

	Woman Gives Birth in Year t (0/1)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of Post-Marriage Siblings Deaths up to t-1:	**Panel A: Deaths of Siblings 10 Years Old and Under**							
10 Years Old and Under	0.014***	0.020***	0.022***	0.021***	0.014***	0.022***	0.023**	0.018*
	(0.005)	(0.008)	(0.008)	(0.008)	(0.005)	(0.008)	(0.010)	(0.010)
10 Yr Old or Under Sibling Deaths of Other Villagers					0.003	0.007		
					(0.006)	(0.005)		
	Panel B: Deaths of Siblings Under 20 Years Old							
Under 20 Years Old	0.010**	0.015**	0.017**	0.015**	0.010**	0.017**	0.012	0.011
	(0.004)	(0.006)	(0.007)	(0.007)	(0.004)	(0.007)	(0.009)	(0.009)
Under 20 Yrs Old Sibling Deaths of Other Villagers					0.003	0.006		
					(0.005)	(0.004)		
	Panel C: Only Women Ever Had Post-Marriage Deaths of Siblings 10 and Under							
10 Years Old and Under	0.016**	0.016	0.018*	0.017	0.019***	0.022**	0.014	0.071**
	(0.007)	(0.010)	(0.011)	(0.015)	(0.007)	(0.011)	(0.013)	(0.035)
10 Yr Old or Under Sibling Deaths of Other Villagers					0.014	0.020**		
					(0.010)	(0.010)		
	Panel D: Only Women Ever Had Post-Marriage Deaths of Siblings Under 20							
Under 20 Years Old	0.012**	0.012	0.016*	0.017	0.014**	0.018*	0.008	0.064**
	(0.006)	(0.008)	(0.009)	(0.011)	(0.006)	(0.010)	(0.011)	(0.025)
Under 20 Yrs Old Sibling Deaths of Other Villagers					0.011	0.014*		
					(0.008)	(0.008)		
	Covariates For All Panels							
Woman gave birth last year		Y	Y	Y		Y	Y	Y
Husband age, age^2 in year t		Y	Y	Y		Y		
Stock of children variables		Y	Y	Y		Y	Y	Y
Child mortality variables			Y	Y		Y		
Stock of siblings variables			Y	Y		Y		
Couple FE	Y	Y	Y	Y	Y	Y		Y
Woman's age FE	Y	Y	Y		Y	Y	Y	Y
Year of marriage FE		Y	Y	Y		Y	Y	Y
Country by year FE	Y	Y	Y		Y	Y	Y	
Ctry by yr by woman age FE				Y				
Village by year FE								Y
Woman by age-decade FE							Y	
N (Panel A and B)	207,208	207,208	207,208	207,208	207,208	207,208	207,208	207,208
N (Panel C)	17,738	17,738	17,738	17,738	17,738	17,738	17,738	17,738
N (Panel D)	26,492	26,492	26,492	26,492	26,492	26,492	26,492	26,492

Standard errors clustered at the couple level in parentheses. All regressions represent linear probability estimates.
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 3.7: Effect of Young Sibling Deaths on Probability of Giving Birth

Post-marriage 10 yr old or under young sibling deaths leads and lags:	Woman Gives Birth in Year t (0/1)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Death$_{t+4}$	-0.004	-0.014	-0.020	-0.018	-0.004	-0.020	-0.014	-0.007
	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)	(0.026)	(0.029)
Death$_{t+3}$	0.007	0.007	-0.004	0.003	0.007	-0.004	0.008	0.022
	(0.019)	(0.021)	(0.020)	(0.021)	(0.019)	(0.020)	(0.024)	(0.028)
Death$_{t+2}$	0.020	0.022	0.011	0.013	0.020	0.011	0.021	0.024
	(0.019)	(0.020)	(0.019)	(0.020)	(0.019)	(0.019)	(0.024)	(0.026)
Death$_{t+1}$	0.001	0.007	-0.006	-0.007	0.001	-0.006	0.017	0.023
	(0.016)	(0.019)	(0.018)	(0.018)	(0.016)	(0.018)	(0.023)	(0.023)
Death$_{t0}$	-0.001	-0.004	-0.017	-0.014	-0.001	-0.017	0.008	0.006
	(0.016)	(0.018)	(0.017)	(0.018)	(0.016)	(0.017)	(0.022)	(0.022)
Death$_{t-1}$	0.003	-0.003	-0.012	-0.009	0.002	-0.009	0.011	0.009
	(0.014)	(0.017)	(0.016)	(0.016)	(0.016)	(0.017)	(0.022)	(0.021)
Death$_{t-2}$	0.055***	0.025	0.016	0.019	0.055***	0.016	0.033	0.035*
	(0.015)	(0.017)	(0.016)	(0.016)	(0.015)	(0.016)	(0.022)	(0.021)
Death$_{t-3}$	0.012	0.015	0.005	0.007	0.012	0.005	0.026	0.032
	(0.015)	(0.017)	(0.017)	(0.017)	(0.015)	(0.017)	(0.022)	(0.020)
Death$_{t-4}$	0.031*	0.026	0.016	0.016	0.031*	0.016	0.036	0.045**
	(0.016)	(0.018)	(0.017)	(0.017)	(0.016)	(0.017)	(0.022)	(0.021)
Death$_{t-5}$	0.013	0.019	0.009	0.009	0.013	0.009	0.032	0.037*
	(0.015)	(0.017)	(0.016)	(0.016)	(0.015)	(0.016)	(0.021)	(0.020)
Death$_{t-6}$	-0.003	0.001	-0.008	-0.007	-0.003	-0.008	0.017	0.001
	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)	(0.016)	(0.021)	(0.019)
Death$_{t-7\ forward}$	0.021*	0.031*	0.023	0.024	0.021*	0.023	0.060**	0.046**
	(0.012)	(0.018)	(0.017)	(0.017)	(0.012)	(0.017)	(0.025)	(0.022)
Deaths of 10 yr old or under siblings of other villagers					-0.000	0.003		
					(0.007)	(0.006)		
Other Covariates:								
Woman gave birth last year		Y	Y	Y		Y	Y	Y
Husband age, age^2 in year t			Y	Y		Y		
Stock of children variables		Y	Y	Y		Y	Y	Y
Child mortality variables			Y	Y		Y		
Stock of siblings variables			Y	Y		Y		
Woman FE	Y	Y	Y	Y	Y	Y		Y
Woman's age FE	Y	Y	Y		Y	Y	Y	Y
Year of marriage FE		Y	Y	Y		Y	Y	Y
Country by year FE	Y	Y	Y		Y	Y	Y	
Ctry by yr by woman age FE				Y				
Village by year FE								Y
Woman by age-decade FE							Y	
N	207,208	207,208	207,208	207,208	207,208	207,208	207,208	207,208

Standard errors clustered at the couple level in parentheses. All regressions represent linear probability estimates. * significant at 10%; ** significant at 5%; *** significant at 1%

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