UNIVERSITY OF CALIFORNIA SAN DIEGO

Consanguinity and Intimate Partner Violence

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy

in

Political Science

by

Louis Weimer

Committee in Charge:

Professor James Fowler, Chair
Professor Simeon Nichter
Professor Margaret Roberts
Professor Holly Shakya
Professor Jay Silverman

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The Dissertation of Louis Weimer is approved, and it is acceptable in quality and form for publication on microfilm and electronically:

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Chair

University of California San Diego
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DEDICATION

For Roslyn

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VITA

2012	Bachelor of Arts, Arizona State University
2013-2014	Incentive Lab
2015-2016	Teaching Assistant, University of California San Diego
2016	Master of Arts, University of California San Diego
2016-2018	CVS Caremark
2018-2019	Nationwide E&S/Specialty

FIELDS OF STUDY

Major Field: Political Science

Fields of Study: Public Health Economics
Professor James Fowler

ABSTRACT OF THE DISSERTATION

Consanguinity and Intimate Partner Violence

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Professor James Fowler, Chair

Why is marriage between relatives common throughout the world? Consanguineous marriage was commonplace throughout human history, but became increasingly rare in the developed world beginning in the 1800s. For large swaths of the world from Morocco to Indonesia, it is still ubiquitous.

This project investigates the theory that women use consanguineous marriage to mitigate their exposure to Intimate Partner Violence. Marrying relatives, particularly first cousins, provides women with an ex ante information gathering mechanism and an ex post behavior

enforcement mechanism, both of which serve to lower the amount of violence to which women are exposed.

Observational data taken from USAID's Demographic and Health Surveys confirms the expected result that consanguinity and Intimate Partner Violence are negatively correlated in three of the four countries studied—Pakistan, Egypt, and Jordan. In India, however, the two are positively linked. Relying on previous literature, I speculate that the reason behind this divergence lies in dowry practices in India. Subsequent chapters investigate the ex-ante mechanism in the Indian context and examine the impact of rainfall shocks on both Intimate Partner Violence and consanguineous marriage in Jordan, Egypt, and India.

Introduction

In this essay I investigate the theory that women marry first cousins as a means of protecting themselves in face of high rates of Domestic Violence. Health surveys conducted in Egypt, Jordan, and Pakistan offer strong support for this theory—marriage to a first cousin is significantly and negatively correlated with Domestic Violence in these countries. In India, however, consanguinity and Domestic Violence are significantly and positively correlated. Using rainfall as an exogenous shock to examine a theoretically causal chain—rain as a shock to domestic violence, then to consanguinity—yields mixed results in both Jordan and Egypt. Evidence from India, where first cousin marriage is positively correlated with Domestic Violence, suggests that there are important mediating variables the two, most notably dowry.

The first chapter lays out the theory in greater detail and derives testable hypotheses from it. Chapter two presents results from observational tests of the theory using data from USAID's Demographic and Health Surveys in Egypt, Jordan, Pakistan, and India. Chapter two also theorizes as to why results in India diverge so dramatically from those in the other countries. The third chapter describes a survey experiment in Mysore, India, that examined how women evaluate potential domestic abusers in the marriage market. Chapter four details tests run to examine a potential causal chain, with rainfall as a plausibly exogenous shock. I then conclude by discussing potential public policy implications, and outlining areas for further research.

Chapter One: Theory and Deriving Testable Hypotheses

Consanguineous marriage—the marriage of genetically close relatives—has been a common practice throughout human history. Though the practice now carries a strong stigma in the West, it remains popular in other regions of the world, particularly the Middle East, North Africa, and Central and South Asia.[1] Estimates of the rates of consanguineous marriage vary within country and region. At the high end of this spectrum lies Sudan, where more than half of all marriages are estimated to be consanguineous. Though few other countries and regions approach this level, countries from Morocco to India have rates of consanguineous marriage at 20 percent or more (Bittles, 2015). Given this geography, it is not surprising that rates of consanguineous marriage are consistently highest in countries that are Muslim or Hindu.

Such high rates of consanguinity are both perplexing and at least mildly concerning, considering the wealth of evidence that children of consanguineous couples have a higher risk for a variety of genetic disorders, predominantly autosomal recessive (Hamamy, 2011; Zlotogora, 2007; Mouzan et al., 2008; Temtamy and Aglan, 2012). Determining the motivation behind consanguineous marriage is thus an important practical and academic concern.

Existing social science literature on consanguineous marriage falls into two broad categories, though each are relatively scant. The first is the sociological approach, which focuses on the importance of culture and religion in motivating consanguineous marriage (Akrami and Osati, 2006; Barbour and Salameh, 2009; Givens and Hirschman, 1994; Hussain, 1999). The second is the economic approach, which belongs to a broader literature that examines marriage as an institution and the various features of marriage as means of solving institutional

[1] Though rates of consanguineous marriage are currently low in the developed world, as late as 1875 the practice was common enough that the average genetic closeness of partners was fourth cousins (Kaplanis et al., 2018)

commitment problems (e.g., Becker, 1981; Botticini and Siow, 2003; Dnes, 2002; Cigno, 1994). While it will also draw from and address public health literature, this project falls squarely into the second category.

The specific commitment problem most germane to this project is that potential husbands have no credible means of *ex ante* guaranteeing that they will not engage in Intimate Partner Violence (IPV) once they have married. Many of the countries in which consanguinity is common also experience high levels of IPV (Miller, 2002). For instance, about third of women in Egypt, Jordan, Pakistan, and India experience some form of physical abuse by their husband over the course of their life (WHO, 2012; Devries et al., 2013). For women living in these societies, Intimate Partner Violence is therefore a serious concern. Western-style dating can be seen as a means of gathering information about a prospective husband's abusive tendencies (Arvidsson, 2006), but in the relative absence of these institutions women must turn to other means or insuring against IPV in marriage. There are two common paths women and their families can achieve this: *ex ante* information gathering, and *ex post* behavior constraint.

The work of Jacoby and Mansuri (2010) provides an account of how some women use *ex post* behavior constraint examines *watta satta* marriages, a very specific subset of consanguineous marriage common in rural Pakistan. *Watta satta* is a type of marriage wherein families essentially exchange brides: a woman from family A marries into family B, while a woman from family B also marries into family A. Jacoby and Mansuri theorize that the threat of mutual retaliation prevents grooms and their families from treating wives poorly. If family A mistreats the new wife, then family B can mistreat their new wife in the same way. This credible mutual threat provides women with an *ex post* means of constraining abusive behavior. It also seems to make women in *watta satta* marriages better off. The authors show that wives in *watta*

satta marriages experience better marital outcomes, operationalized by a combination of mental health and exposure to IPV.

Though it may provide an excellent *ex post* behavior constraint, this particular marital institution is limited in scope to rural Pakistan. The type of bride exchange is considered to be based on dowry and is therefore de facto illegal in many Muslim countries (Bosworth et al., 1980; Rahim, 2017). So though it is an important work, Jacoby and Mansuri leave open the question of how marital institutions might provide a) *ex ante* information gathering about potential abusive tendencies, and b) *ex post* behavior constraints in countries in which *watta satta* marriages are illegal.

I argue that consanguineous marriage allows women and their families to address both of these problems. It offers women two mechanisms by which they can address problems stemming from high rates of Intimate Partner Violence. The first is to gather information about the abusive tendencies of potential husbands. It is simply easier and less costly to ascertain whether a man is a potential abuser when one already knows him, as is the case for family members. A marriageable woman (and her family) will know whether her relative has any violent tendencies to a much greater degree than she would for a stranger. Consanguineous marriage is therefore an *ex ante* mechanism for avoiding marriage to potentially violent husbands. I will refer to this as the ex ante and ex post mechanism throughout the paper.

Marrying a close relative also provides another mechanism for women to punish abusive behavior during a marriage. Just as it is easier for relatives to gather information about one another, it is also easier for relatives to coordinate punishment of other members of their family. For instance, a woman who marries an abusive cousin will have more recourse against him because she can go to her aunt and uncle (her husband's parents) if she wants to coordinate an

attempt to rein in his abuse. The underlying assumption in this scenario is that this woman has established relationships with her aunt and uncle, a relationship that has been shown in other contexts to be part of a support system for Intimate Partner Violence (Hadeed and El-Bassel, 2006; Djikanovic, 2011). A woman approaching her in-laws with whom she has no prior relationship is not as likely to elicit a sympathetic response. Consanguineous marriage thus also provides women with an *ex post* behavior enforcement mechanism by which they can insure themselves against domestic abuse. I will refer to this mechanism as the ex post mechanism.[2]

This paper therefore contributes to the existing literature on consanguinity on two main fronts. First, it posits the existence of the ex ante information gathering mechanism (the ex post mechanism is fairly similar to that of Jacoby and Mansuri, though not precisely the same). Second, it extends the scope of analysis, at least in principle, to any country in which consanguinity is practiced. This is particularly important because *watta satta*-type arrangements are not common in most of these places.

It is important to note that the level of consanguinity—that is, how closely a potential husband and wife pair are related—could play a significant role. We would expect that a woman who is a first cousin of a potential husband will know more about his penchant for abuse than she would for a second cousin. Likewise, this woman would likely have a stronger preexisting relationship with her first cousin's parents (her aunt and uncle) than she would with her second cousin's parents. The stronger the preexisting relationship, the more a married woman would be able to rely on it to constrain her husband's abusive behavior. We should thus expect that

[2] I should note here that this theory is almost entirely deduced from a few principles that I take to be axiomatic. The first and most prominent of these is that people derive disutility from physical and emotional harm, which Intimate Partner Violence inflicts. From this axiom, I then assume that marriageable women seek a.) information about potential husbands that will allow them to infer the likelihood that a potential husband will beat them, and b.) means to censure abusive behavior once in marriage

marriages between close relatives should also experience less IPV than marriages between more distant relatives. The above theory thus applies most obviously to first cousin marriage, which will be the focus of this paper.

Thus far in describing the theory I have assumed that marriageable women are the ones who decide whether they will marry individual men. It is of course entirely possible that this is not the case. In many cultures (particularly those in which dating is taboo), a woman's family has great influence over her match to a particular man. The same dynamic regarding consanguinity and IPV still applies when a woman's family has a preference for marrying her to a nonabusive man. Family members will know more about their relatives' penchant for violence than they would for strangers. Similarly, relatives will be more likely to coordinate punishment for abusive men if the recipient of the abuse is also a family member. As long as family members have a strong enough preference for their daughters to marry nonabusive men, this theory should still apply.

Admittedly, this theory does have strong limitations, and will only apply in very specific scope conditions. The idea that women use consanguineous marriage as a means of gathering information about potential husbands only really applies when women can't gather this information in other ways. The simplest way to gather information is to date marriageable men before actually entering into marriage. Women will only turn to consanguineous marriage when dating is not an option to gather information about marriageable men. We should therefore only expect consanguineous marriage and Intimate Partner Violence to be related in places of the world where dating is culturally unacceptable. This scope condition effectively removes the need for the ex ante mechanism.

The second major scope condition in this theory is that women have little formal recourse to punish violent spouses. If women could rely on legal authorities and/or police to prevent their husbands from engaging in IPV, they would have less reason to worry about screening out violent men on the marriage market. They would worry less about establishing ex post mechanisms to constrain violent behavior, and would have less need to gather information about potential abusers. This theory thus applies best in places in which laws against Intimate Partner Violence/Domestic Abuse are either nonexistent or are not effectively enforced.

These two conditions are of course not met everywhere in the world. Testing the theory would require a setting in which a.) dating is not available as a means of gathering information about spouses, and b.) There are high rates of Intimate Partner Violence, and little legal recourse for women to address it. I will return to this point when describing the site chosen for the survey.

Dowry and Brideprice:

In the explication of the theory, closeness between relatives benefits brides in part because it allows them to coordinate punishment of abusive behavior. It is conceivable, however, that this same closeness might not aid the wife if both her and her husband's families do not value her material safety. In this scenario, closeness of the family might if anything exacerbate the violent tendencies of the husband, since it would effectively remove the husband's parents from the wife's support system. Determining in what contexts the families of husband and wife would actually censure the husband's violent behavior is therefore an important factor for the theory to address.

While there are many characteristics particular to a given couple that could impact whether their families support a violent husband or not, there is a societal variable that prior literature suggests could be a mediator between consanguinity and IPV—dowry and brideprice.

A dowry is a payment or series of payments made from the bride's family to the groom's around the time of marriage. A brideprice is the same, but with payments flowing from the groom's family to that of the bride. Dowries tend to be much larger proportional to income and occur in the modern day primarily in South Asia, while brideprice payments are smaller and happen mostly in the Middle East and North Africa (Anderson, 2007). In future sections I will analyze data from all of Jordan, Egypt, India, and Pakistan. The two Arab countries—Egypt and Jordan—practice brideprice, while Pakistan and India practice dowry. I will rely on this distinction later to explain differing results from these countries.

The presence of dowry rather than brideprice could be an important factor shaping the relationship between consanguinity and IPV because past research has demonstrated that in some contexts dowries are used as a means of extracting wealth from the bride's family. Rao (2002) shows that grooms' families use the threat of violence against the wife to extract wealth from the wife's family in the form of continued dowry payments. When the bride's family has provided unsatisfactory funds, the groom and his family abuse the bride until her family relents and gives additional money or goods. In addition to documenting this phenomenon with surveys and interviews, Rao shows that brides who provide smaller initial dowries are more likely to suffer IPV later on in marriage.

Consanguinity could enable this strategic use of IPV in two ways. One, it could help the groom's family monitor the wealth status of the bride' family, and alert them to potential extractive opportunities. Two, it could make the process of wealth extraction easier since the groom's family has greater knowledge of their counterparts' residence, potential areas of travel, etc. The presence of dowry practices in India and Pakistan could therefore conceivably alter the relationship between consanguinity and IPV.

The practice of dowry could also provide context for whether a husband's parents will support their consanguineously married daughter-in-law. Families who view their daughter-in-law primarily as a source of wealth will presumably not prioritize her safety, and will even prefer for her to be unsafe if the consequence is more money or goods for them. Incorporating this dowry vs. brideprice into the theory also addresses the theoretical ambiguity of under what circumstances a woman's parents-in-law will support her.

The only other piece of economics literature that explicitly incorporates consanguineous marriage focuses on the link between consanguinity and dowries. Do, Iyer, and Joshi (2012) view consanguineous marriage as a solution to the problem of parents credibly committing to support the married couple after their wedding. Their idea is that the bride's family finds supporting the new couple more palatable when the groom is directly related to them. This analysis is limited in that it is almost entirely game theoretical, not empirical; that it flatly contradicts empirical evidence given by Rao in its formulating assumptions; and that it does not consider consanguinity in setting where brideprice is common instead of dowry. I therefore view it as having little relevance to this project.

There is compelling evidence in past literature that dowry and brideprice might be a mediating variable in determining the relationship between consanguinity and IPV. For simplicity's sake I will not incorporate this into the subsequent section of hypothesis formulation, but I will lean on it to explain why IPV and consanguinity are negatively correlated in Jordan, Egypt, and Pakistan, but positively so in India.

Past Public Health Literature:

I mentioned the two articles in the economics literature that directly address consanguinity—Jacoby and Mansuri, 2009; Do, Iyer, and Joshi, 2012—above. The only other

discipline that has considered any theoretical link between consanguinity and Intimate Partner Violence is public health. As with economics, there are only two articles of which I am aware that investigate this relationship at all, and the high-level results from each contradict one another.

The first such study is a cross sectional survey of married Indian women by Aswar N.R and coauthors. The authors found that consanguinity was significantly correlated with Intimate Partner Violence—that is, that women in consanguineous marriages were comparatively more likely to experience Intimate Partner Violence than their counterparts in nonconsanguineous marriages (Aswar et al., 2013). The second article was a 2009 study by CJ Clark and coauthors that investigated risk factors of Intimate Partner Violence against pregnant women in Jordan. They found that consanguinity is significantly and negatively correlated with IPV (Clark et al., 2009). The prior literature in public health therefore suggests that there could be different relationships between consanguinity and IPV in different contexts.

In neither study was the relationship between consanguinity and IPV the central focus—each one was primarily concerned with establishing the prevalence of IPV and investigating other variables of interest. Consanguinity is simply included as a covariate in the regressions each group of authors ran to test their theory, and consequently little attention is paid in either case to it (nor should we expect there to be). This project therefore will also contribute to the nascent public health literature linking IPV and consanguinity by both confirming the superficially contradictory results from these past two studies and by providing a theoretical explanation for the underlying relationship between consanguinity and IPV, though more work is needed to fully understand the reasons for its heterogeneous nature in different contexts.

Hypotheses and Empirical Strategy:

The overarching theory yields several testable hypotheses, some of which are introduced above. The first and most obvious is that cousin marriage should be negatively correlated with Intimate Partner Violence in observational data. Let us assume that the ex ante mechanism is taking place in the real world, and that women can gather information about their cousins' penchant for marital abuse more efficiently than they can for other men. If this were the case, we would expect to see that women who have judged their cousins to be nonviolent would be more favorably inclined toward marriage to them, and that therefore there would be more nonviolent marriage between cousins than in the general population. In this case, marriage to a cousin should be a protective factor (i.e., negatively correlated with) Intimate Partner Violence. Similarly, let us assume that the ex post is taking place, and that women who marry their cousins have greater recourse to punish abusive behavior than do women who do not marry their cousins. In this case we would also expect consanguineous marriage to be a negative correlate of IPV. This leads up to the first hypothesis:

H_1: Cousin Marriage is negatively correlated with IPV

As discussed above, women can marry other relatives besides their first cousins. We might also expect the above mechanisms to apply to second cousins and other relatives, though to a lesser degree, since we might expect the mechanisms to weaken the more distant the marriageable family member is. This leads us to hypotheses H1B and H2C:

H_{1B}: Marriage to a second cousin is also a negatively correlated with IPV, but not as strongly as is marriage to a first cousin

H_{1C}: Marriage to another relative is also negatively correlated with IPV, but not as strongly as is marriage to a first cousin or marriage to a second cousin

Now admittedly, the designation of "other relative" can hide quite a bit of variation within it. "Other relative" could be an uncle, third cousin, cousins once or twice removed, etc. This hidden variation makes testing this hypothesis difficult. I will return to this point when discussing the tests for this hypothesis.

I use USAID's Demographic Health Survey datasets to test the hypotheses above. Surveys conducted in Egypt, Jordan, and Pakistan all have modules that investigate both broader Domestic Violence (of which Intimate Partner Violence is a subset) and consanguinity. I will elaborate on these surveys in chapter three.

Potential Alternative Explanations:

The empirical footprint I am looking for in the DHS data is a negative correlation between consanguinity and IPV. There would, of course, be other explanations for this finding. The two most prominent are what I will call the in-group altruism and the patrilocal exogamy theories. The former would view any negative correlation between consanguinity and IPV as evidence that members of the same group of people are more generous to one another. This argument is not mutually exclusive with the ex post mechanism. Indeed the two might reinforce one another; a husband's in-group "altruism" could be as good as an *ex post* behavior constraint as having a prior relationship with one's in-laws. For this reason and because of the difficulty is disentangling the effects of each, I do not attempt to disprove this argument.

The second alternative explanation relies on the phenomenon of patrilocal exogamy. This explanation builds on research done by Rosenzweig and Stark that documents a strategy Indian

families use to insure against extreme drops in income (Rosenzweig and Stark, 1989). Their research shows that Indian families send their daughters to marry in relatively distant villages to spread the risk of negative rainfall shocks (this research has more recently come under question, but we will table a more detailed discussion for chapter four).

In this alternative explanation, a woman's proximity to her family is a confounding variable to consanguinity and IPV. Women who move away from their family due to negative income shocks are more likely to experience IPV and less likely to marry consanguineously, thus causing a spurious negative correlation between the two. I run tests in chapter four with rainfall as a source of exogeneity in part to address this alternative explanation and will return to this point at that chapter.

Survey Work:

Observational data can support the overarching theory, but survey data designed specifically to probe the implications of the theory will go much further in verifying or debunking it. To this end, I completed a survey experiment to explore the mechanisms by which consanguineous marriage might protect against IPV. In addition to investigating these mechanisms, I also use the survey to explore the assumptions undergirding the theory—specifically, whether consanguineously married women feel more comfortable approaching their in-laws for help compared to their counterparts not married to a relative. I will go into greater detail on this survey and its experiment and results in chapter three. The assumptions tested there are:

> **H_2**: Women married to their cousins are more comfortable approaching their husband's parents for help constraining his abusive behavior.

H_3: Women on the marriage market feel more confident in evaluating the potential penchants for violence for their cousins than they do for other men.

As was the case with Hypothesis 1, we might further expect the same dynamics to apply to women married to their second cousins or other relatives, though not to the same degree. Accordingly the last assumptions tested are:

H_{2B}: Women married to their second cousins are more comfortable approaching their husband's parents for help constraining his abusive behavior, though not as comfortable as women married to first cousins.

H_{2C}: Women married to other relatives are more comfortable approaching their husband's parents for help constraining his abusive behavior, though not as comfortable as women married to first or second cousins.

H_{3B}: Women on the marriage market feel more confident in evaluating the potential penchants for violence for their second cousins than they do for other men, though not as confident as women evaluating their first cousins.

H_{3C}: Women on the marriage market feel more confident in evaluating the potential penchants for violence for "other relatives" than they do for other men, though not as confident as women evaluating their first or second cousins.

I have chosen to list assumptions regarding second cousins and "other relatives" with the –B and –C suffixes because I want to emphasize that these are ancillary hypotheses. Tests regarding the dynamics of first cousin marriage are the cleanest tests of the overall theory, because first cousins are the people to whom the dynamics described in the theory apply most strongly and directly.

The next three chapters describe different empirical tests of the theory. Chapter two examines whether consanguinity is negatively correlated with IPV. Chapter three describes survey work done in India to investigate the behavior constraint mechanism. Chapter four examines a potential causal chain using rainfall as plausibly exogenous variation of IPV, in turn affecting consanguinity. Chaper five then recaps the evidence for the theory, and sketches ideas for futures research. I will then conclude by discussing the policy implications of this research and what it could mean for societies with high rates of consanguineous marriage if the theory is in fact correct.

Chapter Two: Correlational Support from Observational Studies

This chapter uses existing data to investigate the first set of hypotheses. First and foremost among these is whether marriage to a cousin is negatively correlated with Intimate Partner Violence. The secondary hypotheses are whether the same dynamic applies for women married to their second cousins or other relatives, though I also expect these relationships to be weaker than the relationship between first cousin marriage and IPV.

To test these hypotheses, I use USAID's Demographic and Health Survey (DHS) datasets. USAID's Demographic and Health Survey is a program designed to monitor and evaluate public health in developing nations. Though these surveys tend to focus on physical health and nutrition, different modules are added to country-specific questionnaires to better understand public health issues in these countries. Many of these modules focus on women's and children's issues. Two such modules are the module on domestic violence and the module on consanguinity. Consequently, every participant in the domestic violence and consanguinity modules is an adult woman.

The domestic violence module is fairly common, and consists of a battery of questions designed to ascertain how frequently respondents experience different types of domestic violence, and who perpetrates this violence on them. The consanguinity module is much less common, and much shorter. It simply asks respondents whether they are in a consanguineous marriage, and what type of relation they had to their husband prior to marriage.

Of the more than 90 countries in which DHS has sponsored surveys, I am aware of only four that contain both domestic violence and consanguinity modules. These are Egypt, Jordan, Pakistan, and India. Accordingly, I test hypotheses H_1, H_{1B}, and H_{1C} in each of these datasets.

Because each survey differs from the others in the presence of certain variables and how these variables are coded, and because past public health literature suggests that the link between consanguinity and IPV is different in different contexts, I will test these hypotheses country by country.

The DHS surveys I use do not contain any information or data on dowry or brideprice. I am consequently unable to use it in regressions to investigate its impact on the relationship between consanguinity and IPV. Nonetheless, the presence of dowry in India and Pakistan and brideprice in Jordan and Egypt gives some variability in the dowry vs. brideprice variable, if only at a very high level.

Overall, I find strong and consistent evidence in support of H_1. In all samples, marriage to a first cousin is significantly negatively correlated with certain types of Intimate Partner Violence. Support for hypotheses H_{1B} and H_{1C} is more mixed. In some cases, marriage to a second cousin or "other relative" is significantly negatively correlated with Intimate Partner Violence, and in other cases they are not. I will discuss these mixed findings after describing the data and tests in greater detail.

Before delving into the particularities of each survey, let us first establish the questions and variables that are common to each.

The specific questions posed to survey participants in the domestic violence module are consistent country to country. Most relevantly for the present analysis, respondents are asked a number of questions regarding the frequency, severity, and type of violence perpetrated by the respondent's husband. Though the DHS does not use this language, these questions clearly

represent inquiries specifically into Intimate Partner Violence. A few examples of such questions are:

1.) Have you ever had your arm twisted or hair pulled by your husband or partner?

2.) Have you ever been physically forced to perform sex by your husband/partner?

3.) Have you ever been kicked or dragged by your husband/partner?

There are fourteen such questions in total. The responses are aggregated in the DHS data into three binary variables—whether the respondent had ever experienced any less severe violence (being pushed, shook, slapped, or hit), more severe violence (kicked, dragged, strangled, burnt, or threatened with a weapon), or sexual violence (being forced to perform sexual acts). Each of these will serve as the dependent variable is the regressions I run to test the theory, and as such are the operationalizations of Intimate Partner Violence used in this essay.

Operationalization of consanguineous marriage is similarly straightforward. The DHS consanguinity modules ask participants whether they were related to their husbands prior to marriage, and if so, how they were related. Responses consist of first cousin on father's and mother's side, second cousin, and "other relationship." I aggregate respondents married to first cousins on their father's and mother's sides into one variable corresponding to marriage to a first cousin. All other values are treated as is. This is the operationalization of the independent variable of interest.

Many relevant control variables are consistent between datasets. Income and wealth are negatively correlated with Intimate Partner Violence in prior literature, though sometimes in an inverted-U fashion (Aizer, 2011; Strauss, Gelles, and Steinmetz, 1980). The DHS datasets include a wealth measure that is characterized as having five values in each dataset—poorest,

poor, middle, richer, and richest. These are coded in the following regressions as 1, 2, 3, 4, and 5, respectively. Education is also thought to be a potentially significant predictor of IPV, though it is unclear to what extent is a mediator for other variables (Jewkes, 2002). Accordingly, I include education as a control variable for both husband and wife (education being coded as primary, secondary, graduate, and postgraduate).

Alcohol consumption and drunkenness are perhaps the most consistent and significant correlates of Intimate Partner Violence in prior literature (Collins and Metterschmidt, 1993; Kantor, 1993; Leonard and Quigley, 1999; O'Leary and Schumacher, 2003). Accordingly, each is included as a control. The DHS questionnaire asks respondents if their husband/partner drinks alcohol, and if so, how frequently he is drunk. The former is treated as a binary 0/1 variable. The potential values for the latter question are Never, Sometimes, and Often, which are coded as 0, 1, and 2, respectively.

Each of the above variables is coded consistently between the four datasets from Jordan, Egypt, Pakistan, and India. All are included as controls in the regressions below, along with religious information when available. Though the specific religions differ country to country, they can be a useful proxy for culture.

One caveat before presentation of results: all of these regressions are correlational only, and employ no identification strategy. They should therefore not be taken as evidence of a causal relationship as posited in the explication of the theory. These correlations are consistent with the theory, but do not constitute overwhelming evidence for it.

Pakistan:

Less Severe Violence:

The first test of the theory is to determine whether marriage to a first cousin, and to other types of relatives, is negatively correlated with less severe Intimate Partner Violence (being pushed, shook, slapped, or hit by their husband/partner).[3] As discussed above, the dependent variable is coded as a 1 for respondents who have experienced less severe violence and 0 for those who have not. Accordingly, I run a logistic regression with the following results:

[3] The appendices contain alternative specifications to the models as well as diagnostics for each regression presented here.

Figure 1 – Pakistan DHS Logistic Regression – Less Severe Violence

Pakistan DHS

	Dependent variable:
	Less Severe Violence
First Cousin	-0.223***
	(0.085)
Second Cousin	0.234*
	(0.141)
Other Relative	0.187
	(0.145)
Husband Drunkenness	0.798***
	(0.094)
Wealth	-0.089***
	(0.033)
Wife Education	-0.561***
	(0.174)
Husband Employed	0.204
	(0.210)
Wife Employed	0.204**
	(0.090)
Constant	-0.552***
	(0.113)
Observations	3,678
Log Likelihood	-2,068.408
Akaike Inf. Crit.	4,156.816
Note:	*p<0.1; **p<0.05; ***p<0.01

This first test provides support for hypotheses H_1 but against hypotheses H_{1B} and H_{1C}. Marriage to a first cousin is negatively correlated with the experience of less severe violence, at a .01 significance level. This first test thus supports H1. Interestingly and at least somewhat confusingly, marriage to a second cousin is in fact *positively* correlated with less severe violence,

though at a .10 significance level. Marriage to an "other relative" is also positively correlated with less severe violence, though it does not reach levels of traditional statistical significance. I will return to these points in the discussion section for the Pakistani DHS.

More Severe Violence:

To extend the analysis of Hypotheses 1, 1_B, and 1_C, I next run essentially the same regression as above, but with a different dependent variable. In this case the dependent variable is whether a respondent experienced any more severe violence (being kicked, dragged, strangled, burnt, or threatened with a weapon).

Figure 2 – Pakistan DHS Logistic Regression: More Severe Violence

Pakistan DHS

	Dependent variable:
	More Severe Violence
First Cousin	-0.291**
	(0.147)
Second Cousin	0.069
	(0.239)
Other Relative	0.228
	(0.234)
Husband Drunkenness	0.547***
	(0.120)
Wealth	-0.026
	(0.056)
Wife Education	-0.271***
	(0.065)
Husband Employed	0.389
	(0.317)
Wife employed	0.171
	(0.152)
Constant	-2.308***
	(0.192)
Observations	3,678
Log Likelihood	-901.162
Akaike Inf. Crit.	1,820.324
Note:	*p<0.1; **p<0.05; ***p<0.01

As the above results show, marriage to a first cousin is again negatively correlated with experiencing more severe violence, though this time only at a .05 significance level. And again marriage to a second cousin and "other relative" are both positively correlated with experiencing more severe violence, though not at traditional significance levels.

Pakistan's DHS also asked respondents whether they had a say in choosing their husband or not. The presence of this variable, which is absent from any other DHS data, enables some interesting analysis of whether consanguineously married women are more likely to have had a say in choosing their husband. Please see Appendix E for this analysis.

Egypt:

The next survey I turn to is Egypt's 2014 DHS. For the most part, I am able to recreate the regression run for Pakistan, though with slightly different control variables due to some demographic variables not being included in Egypt's DHS. Some of these controls, such as number of children born and a dummy for Christian, are not shown. I do find differing results, though: marriage to a first cousin is significantly and negatively associated with more severe violence, but not against less severe violence:

Figure 3 – Egypt DHS Logistic Regression – Less Severe and More Severe Violence

Egypt DHS

	Dependent variable:	
	Less Severe	More Severe
	(1)	(2)
First Cousin	-0.059	-0.489***
	(0.080)	(0.189)
Second Cousin	-0.101	0.153
	(0.119)	(0.221)
Other Relative	-0.032	0.243
	(0.112)	(0.205)
Husband Education	-0.143***	-0.237***
	(0.023)	(0.047)
Wife Education	-0.160***	-0.092
	(0.040)	(0.079)
Husband Drinks	3.047***	2.547***
	(0.483)	(0.340)
Wealth	-0.050**	-0.001
	(0.024)	(0.048)
Constant	-0.912***	-3.205***
	(0.209)	(0.534)
Observations	6,636	6,635
Log Likelihood	-3,502.421	-1,189.744
Akaike Inf. Crit.	7,030.843	2,405.487
Note:	*p<0.1; **p<0.05; ***p<0.01	

Marriage to a second cousin or "other relative" are once again not significantly related with less or more severe violence. That being said, they are insignificantly negatively correlated with less severe violence, but insignificantly and positively correlated with more severe violence.

Because the significance levels are so low, we cannot say with confidence that there are differing dynamics with less severe and more severe violence.

Jordan:

The next dataset that contains information on both consanguinity and Intimate Partner Violence is Jordan's 2012 DHS. Once again, the questionnaire was very similar to those asked in Egypt and Pakistan. I am thus able to run similar regressions here as well, again with controls omitted from the table:

Figure 4 – Jordan DHS Logistic Regression – Less Severe and More Severe Violence

Jordan DHS

	Dependent variable:	
	Less Severe	More Severe
	(1)	(2)
First Cousin	-0.218***	-0.396***
	(0.075)	(0.141)
Second Cousin	-0.259***	-0.230
	(0.098)	(0.173)
Other Relative	-0.078	0.743
	(0.377)	(0.487)
Husband Education	-0.163***	-0.172*
	(0.053)	(0.089)
Wife Education	-0.160***	-0.129
	(0.051)	(0.086)
Wealth	-0.167***	-0.266***
	(0.028)	(0.052)
Constant	-0.260*	-1.292***
	(0.135)	(0.213)
Observations	7,022	7,022
Log Likelihood	-3,352.119	-1,350.685
Akaike Inf. Crit.	6,726.238	2,723.370
Note:	*p<0.1; **p<0.05; ***p<0.01	

As was the case with Pakistan, marriage to a first cousin is a significant and negative covariate of Intimate Partner Violence. However, unlike in Egypt and Pakistan, marriage to a

second cousin is in fact *negatively* correlated with Intimate Partner Violence; in the case of less severe violence, it is also significantly correlated (at a .01 level).[4]

Discussion of Results from Egypt, Jordan, and Pakistan:

To recap, for each hypothesis in the results from Jordan, Egypt, and Pakistan:

H_1: Marriage to a first cousin is significantly and negatively correlated in five out of six possible regressions (those six possibilities being the Cartesian product of the two levels of violence and the three different countries in which the DHS programs took place). The only instance above in which marriage to a first cousin was not negatively and significantly correlated with Intimate Partner Violence is Egypt's less severe violence regression. Considering that many of these relationships were significant at the .01 level (and sometimes higher), I find strong overall support for H_1.

$H1_B$: While I found overall strong support for H_1, the evidence for H_{1B} is at best mixed. In Pakistan, marriage to a second cousin is in fact a *risk* factor for Intimate Partner Violence, though only significantly so in the case of less severe violence. The relationship between marriage to a second cousin and Intimate Partner Violence in Egypt appears to be weak enough so as to be at best ambiguous and at worst nonexistent. In Jordan, however, marriage to a second cousin is strongly negatively correlated with less severe IPV. Marriage to a second cousin is likewise negatively correlated against severe IPV, though not a significant levels.

[4] Jordan also has an earlier version of USAID's DHS dataset that contains information on consanguinity and IPV. I do not reference this dataset because of some ambiguities in the coding of the data (consanguinity levels are given in both English and transliterated Arabic). Assuming these issues are resolved the way I believe they should be, the results from identical regressions are essentially the same

What can account for the differences in the direction and significance of the relationship between marriage to a second cousin and IPV in these countries, especially in Jordan and Pakistan? The theory suggests one possible answer, albeit an entirely speculative one. It is possible that family network ties are denser in Jordan than they are in Pakistan, and that this density allows women to both better gather information about the abusive tendencies for more distant relatives and to coordinate punishment against their husbands in the case of abuse. The density of family ties and networks could thus be an important control variable to account for in future work.

$H1_C$: Overall support for $H1_C$ is weak, bordering on nonexistent. The relationship between marriage to "other" relatives and Intimate Partner Violence, whether more or less severe, is all over the map in the regressions I ran. The only consistency is that the relationship was not significant in any of the above tests.

Of course, it is possible if not likely that the lack of finding here comes from a poor agglomeration of the data that hides more than it reveals. The designation of "other relative" could contain uncles, third cousins, cousins once or twice removed, and potentially other relatives as well. The dynamics of the theory I have outlined could apply differently to each of these disparate relations. It should therefore not be surprising that including all of them under one categorization would lead to inconsistent and insignificant results. Disaggregating this variable is another avenue for future work to take (and I attempt to do so in a small way during the survey in India).

The mixed (at best) results for hypotheses $H1_B$ and $H1_C$ do not qualify as evidence against the general theory. Both mechanisms, ex ante and ex post, apply most strongly to women who marry their first cousins. The theory is ambivalent about more distant relatives. Tests in this

section suggest that the relationship between marriage to a second cousin or other type of relative and Intimate Partner Violence are not as straightforward as is the relationship between marriage to a first cousin and IPV.

India:

The results presented thus far from surveys conducted in Egypt, Jordan, and Pakistan predominantly corroborate the primary hypothesis that consanguinity (especially marriage between first cousins) in these contexts is negatively correlated with IPV. This point is further elaborated on this point in subsequent sections, but results are first presented of similar regressions using from India's 2015/16 Demographic and Health Survey. These results are diverge from those from Egypt, Jordan, and Pakistan. In all operationalizations and specifications, marriage to a blood relative is a significant *risk* factor for Intimate Partner Violence. Below are regressions mirroring those from the previous three countries:

Figure 5 – India DHS Logistic Regression – Less Severe and More Severe Violence

India DHS

	Dependent variable:	
	Less Severe	More Severe
	(1)	(2)
First Cousin	0.031***	0.027***
	(0.007)	(0.004)
Second Cousin	0.080***	0.060***
	(0.021)	(0.013)
Uncle	0.108***	0.070***
	(0.026)	(0.016)
Brother in Law	0.075***	0.020
	(0.024)	(0.015)
Other Blood Relative	0.072***	0.031***
	(0.012)	(0.007)
Other non blood Relative	-0.005	0.010
	(0.012)	(0.007)
Wife Education	-0.027***	-0.014***
	(0.002)	(0.001)
Muslim	-0.006	0.006*
	(0.005)	(0.003)
Wealth	-0.032***	-0.014***
	(0.001)	(0.001)
Constant	0.292***	0.090***
	(0.006)	(0.004)
Observations	66,013	66,013
Log Likelihood	-36,441.090	-5,334.964
Akaike Inf. Crit.	72,910.180	10,697.930
Note:	*p<0.1; **p<0.05; ***p<0.01	

Why India?:

The next question is of course why the results from these regressions are so different. What accounts for the fact that the relationship between first cousin marriage and IPV is negative in Egypt, Jordan, and Pakistan, but positive in India? The explanation most consistent with the theory is that the relationship between consanguinity and IPV is determined in part by the presence of dowries.

To understand why, let us reexamine Rao, 2002—"Terror as a Bargaining Instrument: a Case Study of Violence in Rural India". Rao finds that the groom's family uses the practice of dowry and the threat of violence against the wife as a means of extracting money from the bride's family. It is certainly conceivable that marriages between first cousins would enable this sort of threat, since the groom's family has much greater knowledge of and access to the family of the bride. The preexisting ties between families that I theorized could help women censure abuse in contexts without dowries thus might actually exacerbate this abuse in cases with dowry.

This explanation is consistent with consanguinity's negative correlation with IPV in Egypt and Jordan, since dowries are not widely practiced in either country. Instead, both countries for the most part practice brideprice, rather than dowry (Anderson, 2007). That is, marriage practices in these places are characterized by transfers from the groom's family to that of the bride. There is therefore less opportunity for grooms and their families to coerce transfers from the bride's family than there would be in India. The presence of brideprice rather than dowry might therefore be a necessary condition for the mechanisms I theorized to occur.

There are three notable complications to this explanation. First, it is not clear to what extent wealth extraction from the family of a first cousin would actually be productive, since

wealth could be shared through families without this mechanism. Second, it makes the relationship between IPV and consanguinity in Pakistan puzzling, since dowry practices there mirror those in India far more than those in Egypt and Jordan (Anderson, 2007). We would therefore expect consanguinity to be positively correlated with IPV in Pakistan, but of course it is not. The only explanation I have for this is to reference the strong correlation between consanguineous coupling and *watta satta* marriages. It is possible that the effect of bride exchange is masking the effect of dowry on IPV. Third, it is not clear why opportunistic families in Egypt, Jordan, and Pakistan could abuse a wife to extract payments from her family and simply call these payments something other than dowry.

Elaborating on this third point, it is possible that the presence of brideprice or dowry as institutions might reflect underlying power (im)balances between men and women. That families in India use IPV to extract wealth but not those in Egypt, Jordan, or Pakistan is more due to this nebulous but still real value that women have in each respective society than dowry or brideprice as institutions. There are two reasons to give credence to the power of dowry as an institution in affecting the relationship between consanguinity and IPV. The first is that much prior literature on the determinants of dowry and brideprice has found societal complexity and class stratification to be more important than the relative power between genders (Hughes, 1985; Quale, 1988; Ebrey, 1993). This suggests that this power balance affects development of dowry vs. brideprice less than we might intuitively expect. Second, dowry practices exploded in popularity in India around its independence from Britain, during a time when women were gaining more access to education and political rights (Caldwell, Reddy, and Caldwell, 1983; Billig, 1992). This suggests that dowry as an institution might even grow stronger despite women's increased "power" or "value" in society. Both of these points show that dowry does not

in fact correspond neatly to any particular set of power relationship between genders, which in turn casts doubt on it as a confounding variable.

Incorporating dowry and brideprice into the theory gives an explanation for the results in India, but it also turns the results in Pakistan into a theoretical outlier. Dowry and marriage practices in India, or at least the north part of the country, are fairly similar to those in Pakistan (Jejeebhoy and Sathar, 2001). If this is the case, we might expect the relationship between consanguinity and IPV in Pakistan to mirror that in India. But of course it does not. Perhaps the *watta-satta* style marriage has a stronger effect than dowry practices on IPV. These answers are speculative, and require further research.

These conjectures regarding the role of dowries in the link between IPV and consanguinity cannot be tested using the DHS data, which does not contain information on dowries or brideprice. An important area for future research is thus to explore this role, a point discussed further in later sections.

Conclusion:

Consistent results across different types of IPV within Muslim countries, coupled with the results demonstrating that the ability to have a say in choosing one's husband is significantly and positively correlated with marriage to a first cousin, offers strong albeit qualified support for H_1. In addition to its relevance to the theory, this result is an important contribution to theories of consanguineous marriage and its decline in developed nations.

Initial research in this area theorized that consanguinity decreased as a byproduct of modernization, but high rates of consanguinity have persisted and even grown in the face of

modernizing factors such as industrialization and better access to education (Hamamy, 2012; Tadmouri et al., 2009). Other research has emphasized the roles of increasing mobility (Maleicot, 1969) or shifting cultural attitudes regarding consanguinity (Cavalli-Sforza, et al., 2004) in the decline of consanguineous marriage. The results here suggest another alternative (or offer more specifics on the role cultural attitudes have in the decline). Consanguineous marriage might have declined as a result of women gaining more legal recourse to address problems of Intimate Partner Violence. Exploring this hypothesis in the contexts of previously cited research in Europe and North America is beyond the scope of this paper, but it is at least an interesting route for future research.

The empirical evidence presented above is consistent with the theoretical logic discussed in Chapter 1, at least in the case of the three majority Muslim countries. As mentioned earlier, correlational analysis of observational data can only accomplish so much in terms of confirming the theory. There are several alternative explanations for these findings. Additionally, the specific mechanism at play is ambiguous, even in theory—the results presented in this chapter are consistent with both the ex post and ex ante mechanisms. The next chapter of this essay is therefore devoted to exploring *how* marriage to a first cousin might affect Intimate Partner Violence by employing a novel survey of women affected by it in Mysore, India.

Chapter Three: Survey Experiment in Mysore, India

This chapter describes a custom survey I conducted in partnership with a local Indian NGO to explore the ex post mechanism. We designed and ran this survey prior to the release of the Indian DHS data analyzed in the previous chapter, and therefore did not know that consanguineous marriage is positively correlated to IPV in India. Likewise, the survey was written prior to the consideration of dowry/brideprice as an important mediating variable. Consequently, important variables to the overall theory are not fully explored in this chapter. Despite these limitations, there are interesting results from the survey and survey experiment that provide avenues for further research. Indeed, exploring the relationship between consanguinity and IPV in a country where the two are positively correlated can help demonstrate the strength and weakness of the theory.

To test the theory that women turn to consanguineous marriage in the face of high rates of Intimate Partner Violence, I partnered with a local NGO, the Public Health Research Institute of India, to run a survey and survey experiment in the city of Mysore. The PHRII is a healthcare nonprofit that works to increase knowledge of and access to different healthcare options in Mysore and its surrounding areas.

Mysore is a city of about a million people in the province of Karnataka, in southwest India. Rates of consanguinity and intimate partner violence are both relatively high in Mysore. Additionally, Mysore is a fairly culturally conservative city (typical of southern India), in which western style dating practices are uncommon. The conditions under which the theory would hold—high rates of intimate partner violence and an inability for women to gather information about potential husbands on the marriage market—are thus present in Mysore. It is therefore a

good setting for work investigating the relationship between consanguineous marriage and Intimate Partner Violence.

Married women in and around Mysore who attended health clinics at the PHRII were asked to participate in this survey. 303 agreed to do so. PHRII workers administered the survey in Kannada, the local language, and recorded their responses.

Survey and Experiment:

We test the theory in the survey in three ways. To begin with, we collected a wide swath of demographic information—age, income, education, etc.—along with information on the level of consanguinity of the marriage and the frequency and type of Intimate Partner Violence. To measure consanguinity, we asked respondents if prior to marriage their husband was their first cousin, second cousin, uncle, other relative, or not a direct relation. Below are summary statistics on this variable:

Figure 6 – Mysore, India – Consanguinuity Compared to IPV

Data from PHRII Survey in Mysore, India; May-June 2017

Relationship	Number of Respondents	Percent of Total	Percent Experiencing IPV
First Cousin	30	9%	45%
Second Cousin	26	8%	50%
Uncle	30	9%	60%
Other Relative	20	7%	48%
Not Related	197	65%	45%

We also measured different types of Intimate Partner Violence. Following from the World Health Organization (WHO, 2005), we asked questions regarding whether participants'

husbands had ever slapped her, hit her, forced her to perform sexual acts without her consent, and threatened to or actually used weapons against her.

I then use this information to replicate, to the greatest extent possible, the regressions run in the previous chapter. Once again, the data in this survey do not match the theoretical expectation that consanguinity and Intimate Partner Violence are negatively correlated. In logistic regressions that replicate those in the previous chapter, marriage to a first cousin, second cousin, uncle, and "other relative" were not significantly correlated with Intimate Partner Violence, however defined. However, these regressions suggest that marriage to a first and second cousin are both consistently negatively correlated with the different types of IPV, but not at significant levels.

This insignificance may be partially explained by statistical power, or lack thereof. These other regressions on DHS data each had more than 10 times the sample size of the ones run from the survey data, so it should not be surprising that the lower-powered regressions did not find significant relationships between the different levels of consanguineous marriage and IPV.

The next step we took to test the theory was to ask participants about their comfort level in approaching their parents-in-law for help constraining on type of abusive behavior—hitting—on the part of their husband. As a follow up, we also asked participants whether they had in the past ever actually gone to their parents-in-law for their help in stopping their husbands from hitting them. The specific wording of these questions (in English) is as follows:

1.) If you ever felt your husband had hit or hurt you without good reason, how comfortable would you be approaching your husbands parents to ask them to stop him from hurting you? (Responses for this question are on a 1-5 Likert Scale, with 1 being very uncomfortable and 5 being very comfortable)

2.) Have you ever asked your husbands parents to intervene with him to stop hitting you?

These questions comprise the most straightforward test of the theory. The expectation is that women in consanguineous marriages feel more comfortable approaching their in-laws for help, and to also be more likely to have actually done so. Again, this relationship should extend but also attenuate for women married to second cousins and other relatives. The theory is ambiguous as to what to expect from women married to their uncles:

H_4: Women in consanguineous marriages should feel more comfortable approaching their parents-in-law for help constraining their husband than women married to nonrelatives

H_{4A}: Women married to their first cousins should feel more comfortable approaching their parents-in-law for help constraining their husband than women married to nonrelatives and more distant relatives

H_{4B}: Women married to their second cousins should feel more comfortable approaching their parents-in-law for help constraining their husband than women married to nonrelatives, but still should feel less comfortable doing so than women married to their first cousins

The results from the data are in line with theoretical expectations in some respects, but not in others. Below is a table detailing an ordered logistic regression to test whether being in a consanguineous marriage of any kind is significantly predictive of being comfortable approaching your in-laws for help with their husband[5]:

Figure 7 – Logistic Regression – Any Consanguinity and Comfort Approaching In-Laws

PHRII Survey Data

	Dependent variable:
	Comfort Approaching in-Laws
Consanguinity	0.664^{***}
	(0.222)
Income	0.365^{***}
	(0.095)
Husband Education	-0.172^{*}
	(0.102)
Childhood Violence	0.359
	(0.231)
Constant	0.267^{***}
	(0.008)
Observations	303
Log Likelihood	-131.090
Akaike Inf. Crit.	326.180
Note:	*p<0.1; **p<0.05; ***p<0.01

As shown, being in a consanguineous marriage is positively and significantly correlated with being comfortable approaching parents-in-law for help, corroborating H_4. However, these

[5] I recognize that running logistic regressions here isn't strictly speaking a true test of Hypotheses H4A and H4B, since they don't directly compare marriages to first cousins, second cousins, and other relatives. Nonetheless, this seems to be the best approach to testing the theory

results diverge with theoretical expectations when we replace the consanguinity dummy variable with variables identifying which type of consanguineous marriage a respondent was in:

Figure 8 – Logistic Regression – Specific Relationship and Comfort Approaching In-Laws

PHRII Survey Data

	Dependent variable:
	Comfort Approaching in-Laws
First Cousin	-0.028
	(0.363)
Second Cousin	0.634*
	(0.371)
Uncle	1.104***
	(0.380)
Other Relative	1.149***
	(0.413)
Income	0.338***
	(0.096)
Husband Education	-0.179*
	(0.102)
Childhood Violence	0.320
	(0.233)
Constant	0.289***
	(0.106)
Observations	303
Log Likelihood	-136.23
Akaike Inf. Crit.	327.45
Note:	*p<0.1; **p<0.05; ***p<0.01

Marriage to a first cousin essentially has no relationship with being comfortable approaching your in-laws. Every other type of consanguineous marriage is positively and significantly associated with this variable, however. This implies that the significance in the previous regression came about despite the relationship between first cousin marriage and approaching one's in-laws, not because of it. I interpret these results to be mild evidence for H_4, and no evidence for H_{4A}, and qualified evidence for H_{4B} (since marriage to a second cousin has a stronger relationship with the variable of interest than does marriage to a first cousin).

The next test of the theory was to ask participants if they had actually ever approached their husband's parents to ask them to intervene with him to prevent him from hitting them. In theory, women who are married to their first cousins should feel more comfortable approaching their parents-in-law for help constraining their husbands' abusive behavior than do women who are married to non-relatives. This relationship should also extend to second cousins, who themselves should still be less comfortable than first cousins doing so:

> **H_5**: Women in consanguineous marriages should have approached their parents-in-law for help constraining their husband more than women married to nonrelatives
>
> **H_{5A}**: Women married to their first cousins should have approached their parents-in-law for help constraining their husband more than women married to nonrelatives and more distant relatives
>
> **H_{5B}**: Women married to their second cousins should have approached their parents-in law for help constraining their husband more than women married to nonrelatives, but should still should have done so less than women married to their first cousins

This question did not apply to the respondents whose husbands had never hit them, so the total sample is smaller than in the previous question. As with the previous set of regressions, I first examine women in any kind of consanguineous marriage, then substitute in dummies for each particular type of it:

Figure 9 – Logistic Regression – Any Consanguinity and to Asked In-Laws for Help

PHRII Survey Data

	Dependent variable:
	Asked in-Laws for Help
Consanguinity	0.934***
	(0.405)
Income	-0.376**
	(0.188)
Husband Education	0.058
	(0.196)
Childhood Violence	0.212
	(0.397)
Constant	-0.0003
	(0.655)
Observations	127
Log Likelihood	-77.659
Akaike Inf. Crit.	165.318
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 10 – Logistic Regression – Specific Relationship and Asked In-Laws for Help

PHRII Survey Data

	Dependent variable:
	Asked in-Laws for Help
First Cousin	0.902
	(0.735)
Second Cousin	1.522**
	(0.772)
Uncle	0.840
	(0.589)
Other Relative	0.579
	(0.712)
Income	-0.362*
	(0.096)
Husband Education	0.073
	(0.198)
Childhood Violence	0.243
	(0.403)
Constant	-0.096
	(0.667)
Observations	303
Log Likelihood	-77.163
Akaike Inf. Crit.	170.326
Note:	*p<0.1; **p<0.05; ***p<0.01

Once again, consanguinity is significantly and positively associated with having actually asked in-laws for help. However, this relationship appears to be primarily driven by the strength of the correlation between being in a second cousin marriage and having actually gone to in-laws for advice. This means that the theory seems to apply to second cousins more so than first

cousins, unlike in the DHS samples. This is a contradictory result I will return to in the discussion.

The last test of the theory was a survey experiment. Participants were asked to imagine a scenario in which they evaluated hypothetical men as prospective husbands for a hypothetical friend. The experimentally manipulated variable was the description of these hypothetical men. About one quarter of participants received a description of a man who was a cousin of their friend and who also displayed violent tendencies, such as drinking and fighting. Another quarter of participants received a description of a man who was also a cousin of their friend but who displayed no violent tendencies. One more quarter of participants received a description of a man who was not related to their friend but who displayed violent tendencies. The final quarter received a description of a man who was unrelated to their friend and who displayed no violent tendencies. Thus we manipulated two experimental factors in this description: whether the hypothetical man was related to respondents' hypothetical friend, and this hypothetical man's penchant for violence.

After receiving these descriptions, respondents were asked whether they felt that the hypothetical man would engage in IPV after marriage to their hypothetical friend. We also asked them to explain why they thought he would or wouldn't do so in a free form response. In theory, women who marry consanguineously would be confident that they would be able to use their familial connections as a constraint on potential abusive behavior on the part of their husband. We would therefore expect participants who received a description of a consanguineous man who displayed violent tendencies to think that he would be less abusive than participants who received a description of a violent man but one who was unrelated to his wife.

The results of this survey experiment were inconclusive. There was a significant difference between all four experimental groups in whether respondents felt that the hypothetical man in question would engage in IPV. There was no difference, however, between respondents who received a description of a violent and related man and those who received descriptions of a violent and unrelated man.

How do we reconcile this finding with the earlier result that participants in consanguineous marriages were more comfortable approaching their in-laws for help constraining unjustified abusive behavior? Given the abstract nature of the question, and that it came at the end of a fairly lengthy survey, it is entirely possible that survey fatigue had set in with respondents by the time they were asked the survey experiment questions. If this is the case, we might discount the results from the survey experiment.

If this is not the case, however, it is entirely possible that women in consanguineous marriages are more likely to approach their husbands' parents for help constraining their husbands' abusive behavior but that they don't factor this into decisions regarding marriage. Future work in this area should explore this possibility, perhaps qualitatively by conducting interviews with marriageable women.

Although there were no statistically significant differences between groups that received descriptions of a related man and an unrelated man, about a third of respondents mentioned the relationship between the wife and her parents-in-law explicitly when discussing the reasoning behind their answer.[6] About 40 percent of these thought that the parents would support their

[6] Appendix A contains code and output from R's structural topic modelling package that attempted to glean what covariates were most associated with the topic of parental support for son and daughter-in-law. I don't include these results in the main text because I don't believe that structural topic modelling does enough to demarcate women who believe a consanguineously married woman would have the support of her in-laws in domestic abuse case from

daughter-in-law, but the remaining 60 thought that the parents would support their son. For illustration, below are a few of the quotes from each position (all quotes below came from respondents in the consanguineous treatment group):

> "His parents know about their son's behaviour so they will support their daughter-in-law."
>
> "His parents will not consent to him hitting their daughter-in-law."
>
> "In the case that the husband beats the wife, the parents will always support the man."
>
> "My sister-in-law married a relative and he was violent to her, but his parents supported him and told him he was doing right by her".

Investigating why some respondents believe the hypothetical parents would support their son vs. their daughter-in-law is therefore an important extension of this analysis. Inferring semantic meaning from free form responses is difficult, especially when the unordered bag-of-words usually contain the same words. To that end, I manually coded instances where the respondent thought the parents would support the daughter-in-law and when they would support their son. I then ran two separate regressions with support for son/daughter-in-law as dependent variables and various controls as the right hand side variables. These regressions yield null results (unsurprisingly, given the small sample size). So despite that lack of statistical significance, this chapter does at least develop a new and interesting question—the differential expectations of respondents with regard to whom the husband's parents support in a consanguineous marriage.

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those who believe her husband would have their support. As the output shows, word frequency doesn't help in making this distinction.

An interesting adaptation of this question to consider implementing in the next survey is to collect free form responses in Arabic. Because Arabic has a case system (albeit a light one), syntax is less important and semantic meaning might be able to be inferred from free-form responses with structural topic modelling (for an example of how text mining works with Arabic, see Alrefei et al., 2018). This is another motivation to conduct the follow up survey in either Jordan or Egypt, though the survey text provided to the researcher would need to include diacritic marks.

Discussion:

Some of the results from this chapter are difficult to square with those from the chapter analyzing the DHS in India, while others are perfectly in line with them. One the one hand, given that consanguineous marriage of all forms seems to be positively correlated with IPV in India, it is not surprising that women married to their first cousin and other relatives should not seek help from their in-laws in constraining abusive behavior. But then why do women married to their second cousins seek their in-laws' help far more frequently?

As discussed in previous chapters, past research (Rao 2002 and Aswar et al. 2013) suggests that marriage to a first cousin in India encourages IPV because grooms' families use dowries and the threat of violence to extract wealth from the bride and her family. I posited that marriage to a first cousin might exacerbate this violence, but it is possible this relationship does not generalize to second cousins and other relatives. Even if this were the case, however, it would be inconsistent with the results from the previous chapter that show that consanguinity in all its forms is positively correlated with IPV.

To what extent can we count the results from this survey as support for the ex post mechanism? In the context of the results from India's DHS, only in a very limited sense. I was testing for the existence of the ex post as an explanation for the relationship between consanguinity and IPV prior to incorporating, but that relationship seems to work in the exact opposite way from theoretical assumptions. I therefore don't believe that any experiment in India can tell us about the dynamics governing IPV and consanguinity in Egypt, Jordan, and Pakistan.

Consequently, a natural next step for this research agenda to redo this survey, or some version of it, in either Jordan, Egypt, or Pakistan. For practical reasons and because Arabic is a better language for semantic inference, the best country to run a follow up survey in would likely be Jordan. An ideal experiment would be run a similar survey experiment to the one just described, but on a population of marriageable women. This would better examine the dynamics governing consanguinity and IPV for people who are making the decision to marry. Although this survey focuses on examining the ex post mechanism, because it took place in India I think it would be worthwhile to continue to focus on this *ex post* behavior enforcement mechanism, since evidence suggests that it supersedes the *ex ante* information gathering mechanism.

Chapter Four: Examining the Causal Chain Using Rainfall

The previous chapter investigated the theory using observational and novel survey data. The weakness of this approach is that there are alternative explanations for the correlations derived in those regressions. The next step would ideally be to build an identification strategy by using some form of exogenous variation in domestic abuse and assess the response of first cousin marriages. Data and time constraints prevent me from doing so, but it is not difficult to imagine a strategy building upon prior microeconometric work to examine the impact of plausibly exogenous increases in domestic violence enforcement on first cousin marriage. One strategy that build upon past work might exploit differences in women's representation between federal states in the same country, as in Duflo and Chattopadhyay, 2004. Another, simpler strategy could examine the differential rollout of anti-domestic abuse laws, as in Beleche, 2017. This latter strategy would be predicated upon these laws actually being effective; many domestic abuse laws on the books in Middle Eastern and South Asian countries are essentially unenforced.

In lieu of a true identification strategy along those lines, I follow Miguel (2005) in building two different sets of regressions with rainfall as an explanatory variable. Miguel's article is interested in examining the impact poverty has on witch killing, and uses negative rainfall as an exogenous shock to the former. Data issues prevent Miguel from using an instrumental variable approach, so instead he uses rainfall shocks as an independent variable in two regressions; first with income as the response, then with number of witch killings. In this way he builds the argument that poverty directly impacts with killing.

I replicate this reduced-form strategy in estimating the impact domestic abuse has on first cousin marriage. Prior literature that finds that poverty is correlated with IPV in other contexts (Modie-Moroka, 2010; Slabbert, 2016) and that poverty might even cause IPV in both the

developing (Cools and Kotsadam, 2017) and developed world (Schneider et al., 2016). Some prior literature even uses rainfall shocks to establish this causality (Sekri and Storeygard, 2014).The arguments explaining this association emphasize the strategic use of IPV; they claim men whose income has decreased use IPV to reestablish control and power in their relationship. I posit that women might be aware of their increased risk of IPV during climate shocks and choose to marry their first cousins more frequently as a means of insuring against this outcome. Consequently, I follow Miguel in building two separate regressions. Rainfall variation is the independent variable of interest in each, while IPV is the dependent variable in the first, and first cousin marriage is the dependent variable in the second.

At this point I need to emphasize that this is approach is not intended to be a true instrumental variable, but rather a means of examining links in the causal chain. I am testing two hypotheses separately. First, that rainfall shocks are positively correlated to IPV. And second, that these shocks are also positively correlated to first cousin marriage.

Data and Population Selection:

The data I used to provide information on historical rainfall is the Climate Hazards Group InfraRed Precipitation with Station data (CHIRPS). This data contains yearly information on the amount of rainfall at each recording station, of which there are hundreds of thousands. The years recorded in this dataset go all the way back to 1981, so it is a rich repository of information regarding rainfall data. The dataset itself is organized by yearly rainfall values paired with unique longitude-latitude points corresponding to the location of the station that collected the data.

Three of the DHS datasets I analyzed in the previous chapters contain similar information on longitude-latitude location of the respondent—Egypt, Jordan, and India. I merge CHIRPS historical rainfall data to these datasets based on longitude-latitude pairings, so that each DHS respondent is paired to the closest station.

A note about these merges: the longitude-latitude location of each DHS respondent is actually displaced randomly up to five miles away from its true location for purposes of anonymity. Likewise, only about half of the listed locations of DHS correspondents lived within 1 mile of a CHIRPS station, but many more lived within two miles of one. Both of these complications likely introduce noise to any measure of rainfall, but Tobler's First Law suggests that this noise is likely not substantial (Tobler, 1970).

Testing the first hypothesis—that rainfall shocks are positively correlated with IPV—is fairly straightforward, since IPV varies with time and we have recent observations on it. To see whether IPV is correlated with rainfall shocks, we can simply regress IPV as reported in the DHS on rainfall deviation, however operationalized. This will tell us whether rainfall shocks during one year are positively correlated with IPV in the same or subsequent year.

H_6: Extreme Rainfall shocks the full year prior to a DHS are positively correlated with IPV in subsequent years

Testing the next hypothesis—that rainfall shocks are correlated with first cousin marriage—is more challenging for a number of reasons. The first is that marriage does not significantly vary with time. Once a person is married, they tend to stay married for long periods of time, especially in societies in which divorce is less common. Measuring marriage as a time-varying covariate is therefore more difficult than IPV. The second, more serious problem is that

these DHS datasets do not contain information on respondents' precise year of marriage. They do have information on the year of first cohabitation with husband, which likely corresponds fairly well to year of marriage. I use this latter variable as a stand in for date of marriage.

Even assuming that cohabitation corresponds well to marriage, there is a problem in terms of timeframe consistency with these regressions. In the rainfall and IPV tests, all observations occur during the year of the survey, while including all observations from the DHS in rainfall and consanguinity tests would mean that I would be examining the correlation of rainfall with *past observations*. For these reasons, for the rainfall and first cousin marriage tests I subset the DHS datasets to include only respondents who have first cohabitated within the past full year of the time of the survey. Because the original hypotheses regarding more distant relations were ancillary, I do not focus on including these as dependent variables in this section.

> **H_7**: Extreme Rainfall shocks the full year prior to a DHS are positively correlated with marriage to a first cousin in subsequent years

Extreme Rainfall Operationalization:

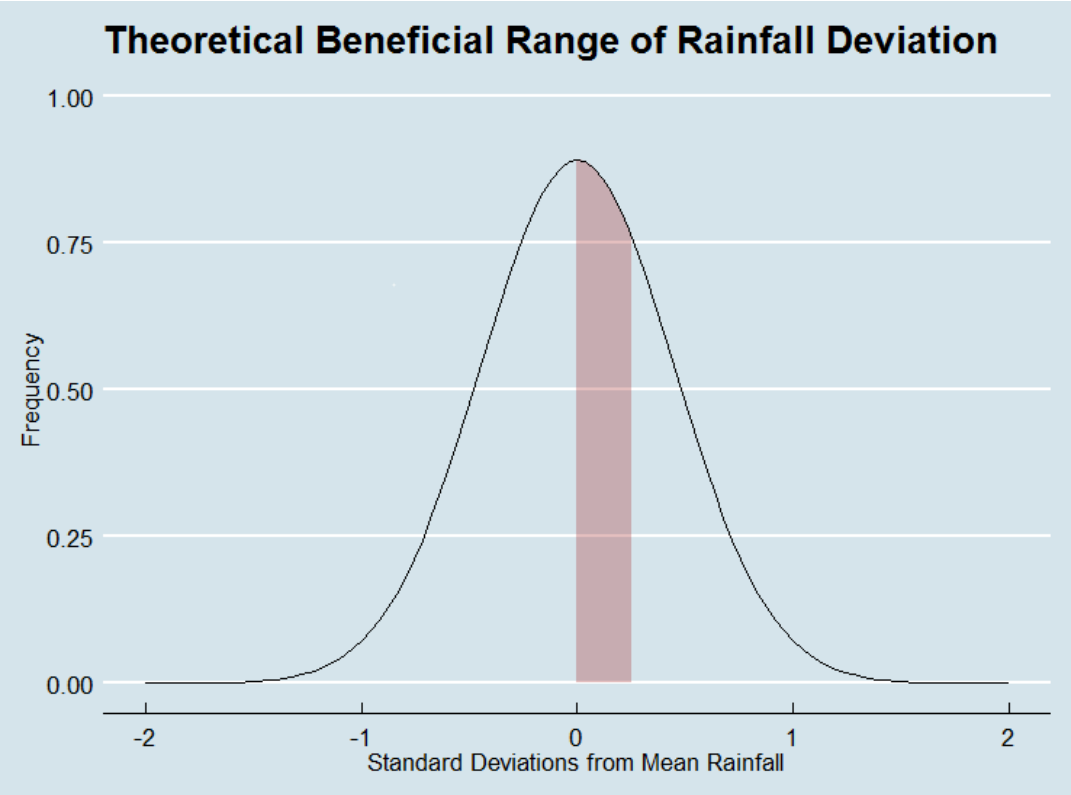
As a final note before presenting the regressions, it's worth describing the precise operationalization of rainfall shocks. For each dataset, I calculate the mean and standard deviation of rainfall prior to the last full year prior to the date of the interview. (For example, the 2014 Egypt DHS was conducted in March-April of 2014, so 2013 would be the last full year prior to the survey). I then subtract that mean from the value of rainfall in the last full year prior to the survey, then divide by the standard deviation calculated in the previous step. This gives the number of standard deviations away from the mean the most recent year's rainfall was.

I use the absolute value of this variable as one operationalization of rainfall deviation. The idea is that extreme rainfall in either direction—up or down—is bad for income because flood is every bit as impactful as drought. The number of standard deviations away from the mean is therefore a continuous measurement of the extremity of a rainfall shock.

Though this continuity is appealing as a measure, it does come with a drawback. To understand why, consider the range of possible values that the number of standard deviations away from the mean yearly rainfall can take. Any value below mean rainfall would be bad for income, as would many values above the mean, since flood is just as bad as drought. But there is a slight area above the mean in which rainfall would actually be beneficial, since there would be more water for plants, but not enough to drown them.

Below is an abstract representation of this dynamic for a zero-centered distribution. The brown area represents the narrow band for which increased rainfall would be beneficial; all other values of the rainfall distribution would be harmful. I am agnostic as to the specific value of the upper bound of this range, but pick .25 for illustrative purposes:

Graph 1 – Increased Rainfall can be Beneficial in Small Amounts

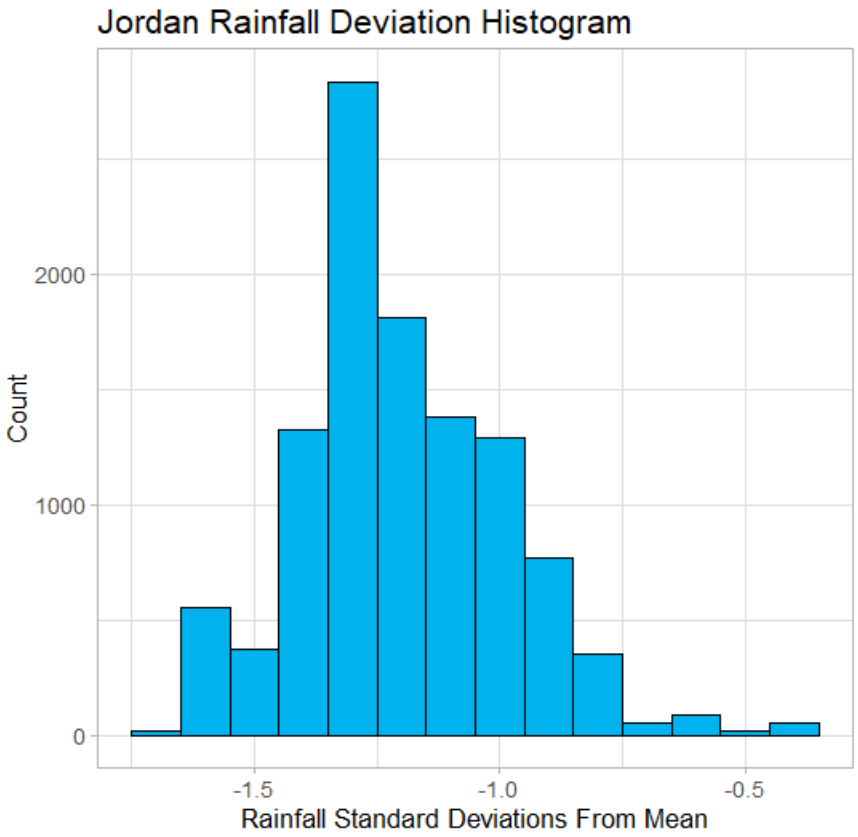


There is therefore a range of values of standard deviations away from mean rainfall for which taking the absolute value would mask the effects of rain. A two standard deviation distance away from the mean is bad for income regardless of which direction this distance takes; but .1 standard deviations away from the mean can be good or bad, depending on the direction. This is the downside of this operationalization of extreme rainfall.

Jordan offers a better context to use this operationalization of rainfall shock because it experienced a countrywide drought in the time period used to calculate the absolute rainfall deviation variable. This means that there are no values above the mean rainfall that might complicate the interpretation of the variable, and that in the context of Jordan all standard

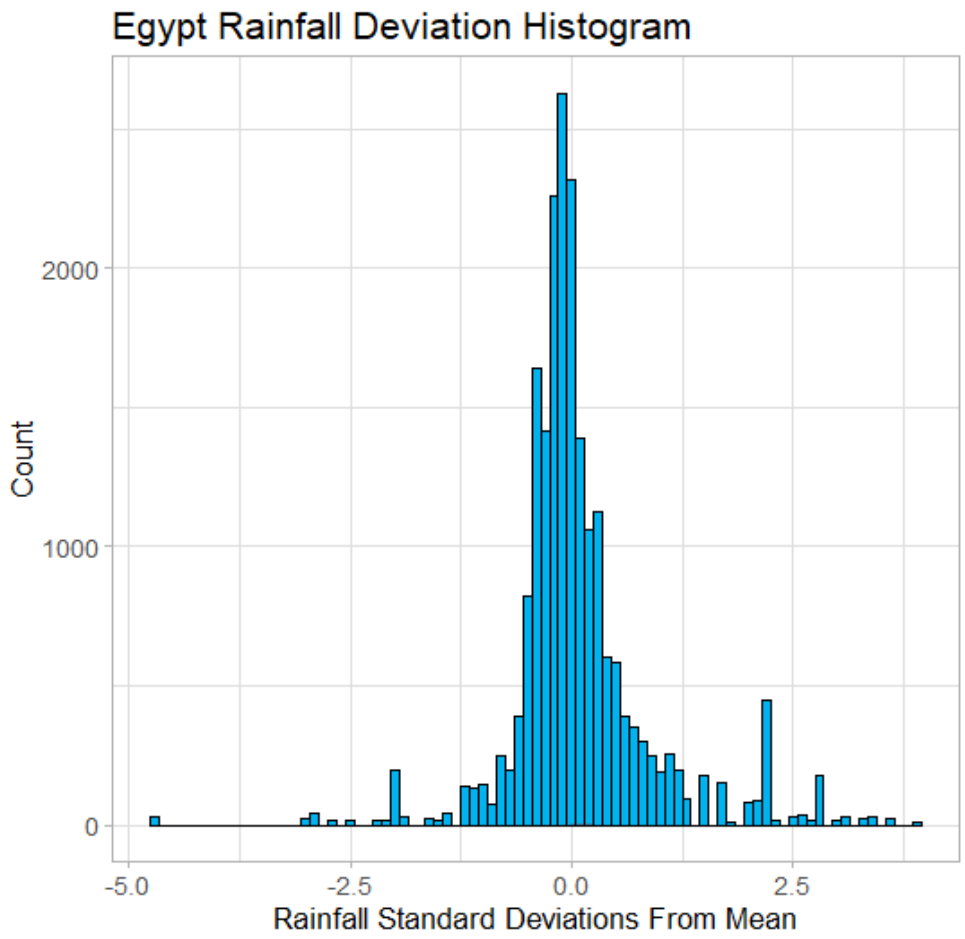
deviations away from the mean are negative. Below is a histogram detailing the distribution of the number of standard deviations from the mean that respondents in the Jordan DHS experienced the last full year prior to the survey:

Graph 2 – Jordan's Drought, No Floods



This contrasts with Egypt, where respondents experienced both positive and negative deviations from historical rainfall:

Graph 3 – Egypt's Droughts and Floods



Because of this countrywide drought, Jordan has none of the complications with regard to the absolute value of rainfall standard deviations that Egypt and India do. For this reason, I believe that Jordan's DHS offers the best data in which to test these hypotheses. I will return to this point when discussing regression results.

Standard deviations from the mean is the first measure of extreme rainfall. Following prior literature, the other operationalization I use is simply a dummy variable for whether rainfall was more than one standard deviation away from the mean in either direction (Hossain and Ahsan, 2018; Iyer and Topalova, 2014; Cole 2012, etc.). This is an arbitrary measure in the sense that it is not clear why one standard deviation is the cutoff for significance instead of .5, 1.25, or

any other number. Nonetheless, other literature incorporating rainfall shocks uses this as a measure, so I will as well.

Rainfall and Intimate Partner Violence:

For regressions with IPV as the dependent variable, I subset the data to include only rural observations (as defined by the DHS data). I do so because rural residents are far more likely to be affected by rainfall shocks than their urban counterparts are. The income shocks that rainfall deviation represents are more likely to strongly affect rural residents, who therefore present a better chance to test the theory.

I replicate the regressions in chapter 2, but replace consanguinity with rainfall as the independent variable of interest. As was the case in chapter 2, dependent variables are the different operationalizations of Intimate Partner Violence. Below are regressions from Egypt and Jordan, with standard errors clustered on latitude-longitude location of the CHIRPS station matched to each respondent (Esarey and Menger, 2017):

Figure 11 – Extreme Rainfall and IPV in Jordan

Rainfall and IPV in Jordan

	Dependent variable:			
	Severe	Less Severe	Severe	Less severe
	(1)	(2)	(3)	(4)
Wealth	-0.232*	-0.191***	-0.218*	-0.170**
	(0.130)	(0.069)	(0.130)	(0.069)
Wife Education	-0.141	-0.170*	-0.152	-0.184*
	(0.165)	(0.094)	(0.165)	(0.094)
Husband Education	-0.005	0.009	0.007	0.017
	(0.189)	(0.108)	(0.189)	(0.108)
Children Born	-0.220	-0.013	-0.213	-0.006
	(0.150)	(0.072)	(0.150)	(0.072)
Children at Home	0.271	0.029	0.264	0.023
	(0.166)	(0.082)	(0.165)	(0.082)
Wife Employed	0.097	-0.015	0.071	-0.053
	(0.342)	(0.186)	(0.341)	(0.186)
Husband Employed	-0.853***	-0.329**	-0.869***	-0.350**
	(0.248)	(0.148)	(0.248)	(0.148)
Absolute Rainfall Deviation	1.377**	1.888***		
	(0.591)	(0.329)		
Extreme Rain			0.738**	0.964***
			(0.309)	(0.171)
Constant	-3.733***	-3.093***	-2.727***	-1.663***
	(0.816)	(0.462)	(0.495)	(0.288)
Observations	1,992	1,992	1,992	1,992
Log Likelihood	-327.926	-839.451	-327.409	-838.010
Akaike Inf. Crit.	673.851	1,696.903	672.819	1,694.020
Note:				*p<0.1; **p<0.05; ***p<0.01

In line with theoretical expectations, rainfall does appear to be significantly and positively correlated with IPV in Jordan. Absolute Rainfall Deviation is positively related with both types of IPV, one at traditional significance (severe violence), and one just missing it (less severe violence). The dummy for extreme rainfall is positively and significantly correlated to

both operationalizations of IPV. These results in Jordan therefore conform to the theory that rainfall shocks should be positively correlated with IPV.

Below are the same regressions in Egypt:

Figure 12 – Egypt Rainfall IPV

Egypt Rainfall IPV

	Dependent variable:			
	Severe	Less Severe	Severe	Less Severe
	(1)	(2)	(3)	(4)
Wealth	-0.094	-0.131***	-0.118	-0.141***
	(0.091)	(0.044)	(0.090)	(0.044)
Wife Education	-0.300***	-0.220***	-0.297***	-0.226***
	(0.085)	(0.042)	(0.084)	(0.042)
Wife Employed	0.227	0.357***	0.197	0.376***
	(0.226)	(0.111)	(0.225)	(0.109)
Husband Employed	1.673*	0.470*	1.736*	0.425*
	(1.010)	(0.267)	(1.009)	(0.254)
Christian	-0.471	-0.568**	-0.452	-0.546**
	(0.595)	(0.274)	(0.595)	(0.273)
Husband Drinks	2.753***	2.464***	2.752***	2.466***
	(0.461)	(0.562)	(0.462)	(0.562)
Rainfall Absolute Deviation	-0.231	0.108*		
	(0.152)	(0.060)		
Extreme Rain			-0.704**	0.057
			(0.318)	(0.120)
Constant	-4.106***	-1.193***	-4.188***	-1.091***
	(1.012)	(0.269)	(1.010)	(0.256)
Observations	3,564	3,564	3,685	3,685
Log Likelihood	-664.619	-1,963.604	-679.980	-2,025.230
Akaike Inf. Crit.	1,345.238	3,943.208	1,375.959	4,066.460
Note:				*p<0.1; **p<0.05; ***p<0.01

Counter to expectations, extreme rain is significantly and negatively correlated with severe violence in Egypt. Consistent with expectations, though, the absolute deviation from mean rainfall is positively correlated with less severe violence and almost at traditional significance levels. Other operationalizations of rainfall and IPV are not related.

One explanation for these results stems from the fact that not many observations fell more than one standard deviation away from the mean rainfall, and those that did tended to fall quite some distance away. It might be possible that in the rural Egyptian context, such truly extreme swings in rainfall cause families to rely more on contributions from women, which increases their bargaining power and decreases the amount of IPV they endure. Past research has demonstrated this of inverted U relationship between wealth and IPV in the United States (Strauss, Gelles, and Steinmetz, 1980). No research of which I am aware has demonstrated this relationship in the Egyptian context, and in the DHS data the probability of experiencing any form of IPV monotonically decreases with increases in wealth. This explanation is therefore speculative and much additional work would need to be done to verify it.

Rainfall and IPV in India:

As the previous chapter hopefully demonstrated, it is not entirely clear that we should expect the same results from India that we do from Egypt and Jordan. The evidence from prior chapters suggest that dynamics governing consanguinity, IPV, and other related variables are fundamentally different in India than in Egypt and Jordan. One would think that the causal chain inspected in Egypt and Jordan wouldn't apply in India, since consanguinity is positively linked with IPV there.

Nonetheless, whether rainfall and IPV/consanguinity are correlated in the Indian context merits investigation. I therefore repeat the same regressions with the India DHS, with only variables of interest shown for brevity. As was the case with previous regressions, I include only rural observations. That the number of observations remains so high is evidence for how much more rural the residences of respondents in India were:

Figure 13 – Extreme Rainfall and IPV in India

Extreme Rainfall and IPV in India

	Dependent variable:			
	Less Violence	More Violence	Less Violence	More Violence
	(1)	(2)	(3)	(4)
Absolute Rainfall Deviation	-0.061**	0.086**		
	(0.021)	(0.032)		
Extreme Rain			-0.018	0.094*
			(0.025)	(0.040)
Constant	-1.020***	-2.641***	-1.061***	-2.604***
	(0.031)	(0.051)	(0.028)	(0.046)
Observations	44,500	44,500	44,500	44,500
Log Likelihood	-24,666.190	-12,154.230	-24,670.360	-12,154.920
Akaike Inf. Crit.	49,346.380	24,322.450	49,354.720	24,323.850
Note:				*p<0.1; **p<0.05; ***p<0.01

Similar to Egypt, rainfall is significantly related to IPV both positively and negatively—positive in the case of severe violence, and negative in the case of less severe. One explanation, albeit speculative, for this hearkens back to the explanation proffered for India's anomalous results in the previous chapter. If grooms and their families use dowries as a means of extracting wealth from the family of the bride, then it seems reasonable that they would need to engage in this behavior more when they most need to extract wealth—in times of extreme rainfall. This type of strategic use of IPV might call for more severe violence, since it would be more useful as

a negotiating tactic. This would explain why rainfall shocks are associated with more severe violence, but why they would also correlate with decreased "regular" violence is more difficult to explain.

Rainfall and IPV Conclusion:

Overall, I find mixed evidence of the first link in the causal chain—that rainfall shocks might lead to greater IPV. Past literature on this subject has found a consistent relationship between the two, so it is reasonable to speculate that these tests were not run on ideal data for investigating the impact of shocks on IPV. Regardless, the takeaway from this section is that rainfall shocks and IPV aren't correlated strongly, with the exception of Jordan.

Rainfall and First Cousin Marriage:

The next step in testing the theory is to examine the link between rainfall shocks and first cousin marriage. As mentioned earlier, this step has all of the complications involved in testing rainfall and IPV and more. Because marriage is relatively time-invariant and because I need to align the timing of the same rainfall shocks, I restrict the sample in these regressions to women who first began cohabitating with their partners within the past full year of the interview.

Another variable I could subset on is rural residence. In the previous section, I kept only observations that resided in rural areas because such respondents provided a better way to test the theory. Following the same logic should lead me to subset on rural residence again here.

The problem with subsetting so many times is that is severely diminishes the power of these regressions. To counteract this, I combine Egypt and Jordan into one dataset, and present

results from regressions using data with and without rural respondents (marriage to a first cousin is the DV in each regression):

Figure 14 – Jordan and Egypt Recent First Cousin Marriage Rainfall Shock

Jordan and Egypt Recent First Cousin Marriage Rainfall Shock

	Dependent variable:			
	First Cousin			
	(All obs)	(Rural)	(All obs)	(Rural)
Wealth	-0.328***	-0.257*	-0.338***	-0.278*
	(0.086)	(0.151)	(0.088)	(0.153)
Wife Education	0.166	0.094	0.120	0.055
	(0.154)	(0.202)	(0.155)	(0.205)
Children Born	-12.766	-0.268	-12.806	-0.237
	(509.375)	(0.362)	(509.600)	(0.365)
Children at Home	12.405		12.437	
	(509.375)		(509.600)	
Wife Employed	-0.608	0.037	-0.586	0.041
	(0.399)	(0.543)	(0.399)	(0.546)
Husband Employed	-0.369	-1.005*	-0.391	-1.158*
	(0.486)	(0.591)	(0.491)	(0.619)
Extreme Rainfall	1.160***	1.172***		
	(0.448)	(0.489)		
Rainfall Absolute Deviation			-0.204	-0.421
			(0.201)	(0.291)
Constant	-1.054*	-0.430	-0.654	0.261
	(0.558)	(0.695)	(0.578)	(0.742)
Observations	734	325	718	316
Log Likelihood	-293.277	-146.489	-293.574	-145.920
Akaike Inf. Crit.	602.553	306.979	603.149	305.840
Note:		*p<0.1; **p<0.05; ***p<0.01		

In both rural and non-rural data, the extreme rainfall dummy is positively and significantly correlated with first cousin marriage. The direction and significance reverses with the absolute deviation variable. On the one hand, it is encouraging that even with such small samples (observations around 700 and 300 with all respondents and rural respondents, respectively) extreme rainfall is positively and significantly correlated with first cousin marriage. On the other, it is unclear why the extreme rainfall measure was the operationalization of rainfall shock that produced the clearest relationship with the dependent variable, since in the regressions with IPV as the dependent variable, absolute rainfall deviation produced the clearest results.

Regressions using only Jordanian data have similar point estimates for the extreme rainfall coefficient. Unsurprisingly, their standard errors are much higher, but this is encouraging in that more data from Jordan, perhaps from additional DHS's, might yield better results.

Overall, then, I interpret these results as mixed evidence for the theory. The extreme rainfall operationalization is positively and significantly correlated to subsequent marriage to a first cousin for both rural correspondents and all correspondents—a significant point in favor of the theory. On the other hand, the absolute rainfall deviation operationalization has no consistent relationship—a point against the theory.

India First Cousin and Extreme Rainfall:

Although I don't consider this a test of the overarching theory for reasons discussed earlier, I replicate the previous regression using the extreme rainfall dummy for rural respondents in India. Below are these results:

Figure 15 – India First Cousin and Rainfall

India First Cousin and Rainfall

	Dependent variable:	
	First Cousin	
	(1)	(2)
Wealth	-0.011	-0.011
	(0.077)	(0.077)
Education	0.039	0.048
	(0.121)	(0.120)
Muslim	1.560***	1.503***
	(0.210)	(0.206)
North	0.187	0.377*
	(0.210)	(0.211)
Rainfall Absolute Deviation	-0.009	
	(0.151)	
Extreme Rain		0.567**
		(0.215)
Constant	-3.077***	-3.360***
	(0.338)	(0.324)
Observations	1,911	1,911
Log Likelihood	-435.995	-432.629
Akaike Inf. Crit.	885.989	879.258
Note:	*p<0.1; **p<0.05; ***p<0.01	

Again, extreme rain is positively and significantly correlated with marriage to a first cousin. This relationship is slightly perplexing, given that consanguinity is positively correlated with IPV in regressions from India's DHS. Perhaps the most plausible explanation for what is happening in India is that negative shocks to rainfall and income increase the need to keep wealth in the family, which would in turn increase consanguinity. This is a weak explanation, though, because it is inconsistent with the lack of relationship between wealth and consanguinity in the above regression. As is the case with Egypt, there are likely interplays between wealth, negotiating power for women, and consanguinity and IPV that require further research to explore.

Using Rainfall Variation to Test Alternative Explanations:

As a last addendum to this chapter, I use the expectation of rainfall shocks—operationalized by rainfall standard deviation—to explore the alternative explanation of patrilocal exogamy for the findings in Chapter Two. This argument posits that the relationship between consanguinity and IPV was a spurious one. The real relationship is that families send their daughters away from their homes as a means of insuring against income shocks; this distance from her family would increase the likelihood of experiencing IPV and decrease the likelihood of consanguinity. An extension of this argument would be that families that expect a large degree of rainfall shocks would be more likely to send their daughters away so as to provide insurance against large drops in income (Rosenzweig, 1989). This would mean that rainfall standard deviation should be negatively correlated with consanguinity, since the volatility of rainfall is a reasonable proxy for expectation of negative rainfall shocks. With regard to the theory, the volatility of rainfall wouldn't have any strong theoretical predictions regarding Intimate Partner Violence.

It is not clear that patrilocal exogamy exists to any large extent in either Jordan or Egypt, nor that the reason behind it in India is cash transfers back to parents (Fulford, working paper). These facts alone suggest to me that the patrilocal exogamy argument is misplaced. Additionally, given the impact of climate change on weather patterns all over the world, it is not clear to what extent individuals would be able to predict future extreme rainfall. Nonetheless, I repeat tests in the prior section with prior standard deviation substituted for rainfall shocks. This includes regressions using IPV as the dependent variable, since its relationship to rainfall standard deviation is potentially interesting—the patrilocal exogamy argument is agnostic as to the

relationship between the two, but the presence of a relationship might imply that expectation of shocks has an impact on first cousin marriage outside of the patrilocal exogamy argument.

Other covariates and standard error clustering from the previous section remain the same, but are not shown. Here are the rainfall standard deviations and IPV regressions:

Figure 16 – Rainfall Standard Deviation and IPV Jordan

Rainfall Standard Deviation and IPV Jordan

	Dependent variable:	
	Severe Violence	Less Severe
	(1)	(2)
Rainfall Standard Deviation	-0.002	0.005
	(0.005)	(0.005)
Constant	-2.063***	-1.072***
	(0.455)	(0.265)
Observations	1,992	1,992
Log Likelihood	-330.633	-854.948
Akaike Inf. Crit.	679.267	1,727.897
Note:	*p<0.1; **p<0.05; ***p<0.01	

Figure 17 – Rainfall Standard Deviation and IPV Egypt

Rainfall Standard Deviation and IPV Egypt

	Dependent variable:	
	Severe Violence	Less Severe
	(1)	(2)
Rainfall Standard Deviation	-0.037***	-0.011*
	(0.013)	(0.006)
Constant	-4.062***	-1.086***
	(1.011)	(0.269)
Observations	3,564	3,564
Log Likelihood	-660.797	-1,963.115
Akaike Inf. Crit.	1,337.593	3,942.231
Note:	*p<0.1; **p<0.05; ***p<0.01	

The fact that rainfall standard deviation in Egypt is negatively correlated with IPV is consistent with the speculative explanation for the negative correlation between rainfall shocks and IPV in Egypt. Families with high income variability that are also lower on the income latter rely on contributions from women more, thus increasing their bargaining power and decreasing the amount of IPV that husbands can get away with.

Below is a repeat of the regressions with first cousin marriage, again with the independent variable of interest substituted and other variable not shown in the regression tables:

Figure 18 – Egypt and Jordan Rainfall Standard Deviation and Cousin Marriage

Egypt and Jordan Rainfall Standard Deviation and First Cousin Marriage

	Dependent variable:
	First Cousin
Rainfall Standard Deviation	-0.015*
	(0.007)
Constant	0.148
	(0.734)
Observations	316
Log Likelihood	-144.554
Akaike Inf. Crit.	303.107
Note:	*p<0.1; **p<0.05; ***p<0.01

Somewhat supportive of the patrilocal exogamy argument, rainfall standard deviation is negatively correlated with marriage to a first cousin, though only at .1 levels. The strength of the correlation between rainfall standard deviation and IPV in Egypt and Jordan and the weakness of the relationship between rainfall deviation and first cousin marriage together make for weak

evidence for the patrilocal exogamy argument—but the evidence for this alternative explanation is still about as strong as that for the theory.

Chapter Four Conclusion and Next Steps:

The empirical results from this chapter are less self-consistent than are those from chapter two. Evidence exists for the overall hypotheses regarding the rainfall-IPV and rainfall-consanguinity links, but it is mostly restricted to Jordan. The sample size of Jordanians who first cohabitated in the past two years is so small that deriving satisfactory conclusions regarding first cousin marriage is difficult without also including Egyptian respondents. There are many potential reasons behind these nonresults, such as: disparate impact of extreme rainfall in different countries; small sample size; potential impact of rainfall on consanguinity through multiple channels (wealth and IPV could both be impacting consanguinity). Overall, then, I find weak evidence for the overarching theory using rainfall tests.

Below is a table detailing the outcomes just described. The question each cell answers is whether there was a positive and significant relationship between the variables of interest (rows) and the countries analyzed (columns):

Figure 19 – Rainfall Shock, IPV, and Consanguinity by Country

Summary of Rainfall Shocks by Country

	Brideprice		**Dowry**
	Jordan	**Egypt**	**India**
Rainfall Shock and IPV	Yes	Mostly No	Mostly No
Rainfall Shock and Consanginity	In 'Extreme Rain' Operationalization†	In 'Extreme Rain' Operationalization†	In 'Extreme rain' Operationalization

† Egypt and Jordan analyzed jointly

There are of course many ways to improve upon this analysis. One is to continue with the current form and identification strategy and wait for more data to become available. Jordan's 2018 DHS is due out soon. Data from this survey could easily be added to those from Jordan's 2012, which would at least partially address the potential pitfall of lumping observations from two different countries (Egypt and Jordan) together in the same regressions. Though there is no guarantee they would include information on consanguinity, or even GIS data, future surveys from Egypt, Pakistan, and India could all be combined with the surveys analyzed in this section to increase sample size and narrow down effects.

The above strategy would require years of patience and luck, since the consanguinity module would need to be included on any future survey and since it has been implemented scarcely in the past. Perhaps a better identification strategy would be to find plausibly exogenous variation in IPV or domestic violence enforcement, then examine any concomitant increase in first cousin marriage. One example might be the introduction of women's quotas on party ballot lists in Egypt in 2014. Though it is an authoritarian system, one might expect that an increase in representation for women might come with more funding for domestic abuse prevention; the test would be to then examine consanguineous marriage before and after this quota. Regardless of what form it takes, any new tests should focus on exogenous variation in IPV in a way that does not also affect consanguinity.

I conclude this essay in the next two chapters. I first summarize all empirical findings and attempt to make a holistic assessment of the theory. I will then briefly discuss practical applications of this research, along with the ethical problems of such applications.

Chapter Five: Summary of Empirical Evidence and Areas for Improvement

The overall theory I investigate in this paper is that consanguineous marriage is a strategy women can employ to lessen their exposure to Intimate Partner Violence in societies in which IPV is common. Strictly correlational tests conducted in chapter two support this theory, with the notable exception of India—marriage to a first cousin is consistently and negatively correlated to IPV. In light of these results, it is unsurprising that the survey experiment in India described in chapter three would yield mostly null results. There is slight evidence, based on their free-form verbal responses, that at least some women in this experiment thought about the relationship between consanguinity and IPV in ways that are consistent with the theory. Attempts to examine a plausible causal chain using rainfall also yielded mostly null results, though the results from Jordan in particular conformed to theoretical expectations, even while those in India and Egypt for the most part did not.

Figure 20 – Summary of Support for Each Hypothesis

Chapter Hypotheses and Support

Chapter	Hypothesis	Support
2	Consanguinity and IPV Negatively Correlated in Survey Data†	Strong
3	Respondents View Consanguinity as Important Factor for IPV in Experiment	Mixed
4	Rainfall Shocks correlated to IPV and consanguinity (in separate regressions)	Weak

† Apart from India

The problem with the attempts at examining the causal chain is that wealth and income are inextricably tied up in both IPV and consanguinity. A better approach might be to introduce an exogenous decrease in IPV and to observe its impact on first cousin marriage. How that exogenous decrease in IPV might happen in a way that does not affect wealth or any other potential confounder is beyond me, but perhaps another researcher will devise a scheme to

deliver this sort of test. Someone with research money could conceivably run some sort of randomized control trial in which men of some areas received anti-IPV training and others did not to see the effects on consanguinity. (Given the complicated ethics of this experiment, it might be appropriate for a staggered block design).

Because of the challenging nature of testing these hypotheses, qualitative evidence from interviews and surveys might be particularly important. The handful of subjects from the survey in India that identified consanguinity as an important factor in IPV suggest that future studies might simply interview respondents in India and Jordan about dynamics governing IPV and consanguinity in their society. Of course, it would also be beneficial to run a survey experiment on marriageable women in these countries to see if they would expect a theoretical consanguineous husband to be less abusive than a nonrelated man.

The overall evidence for the theory is mixed, but there is evidence for it. Future research in this area could improve on this work by engaging in some combination of stronger causal identification, survey experiments of marriageable women, and qualitative interviews. I conclude this paper in the next chapter by discussing policy implication of this research agenda.

Chapter Six: Public Policy Implications

As emphasized in the first chapter of this essay, consanguineous marriage is a commonplace practice in many places of the world. Most countries in the Middle East, North Africa, and South Asia have rates of consanguineous marriage above 10 percent. Marriage between first cousins is not in and of itself a public health or political concern. However, as most couples do, women and men married to their first cousins tend to reproduce, and therein lies significant public health concerns. Children of consanguineous marriage are at elevated risk of a wide array of genetic disorders, and treating these disorders can be expensive. Consider the case of four diseases commonly found in children of consanguineous couples: thalassemia, sickle-cell anemia, cystic fibrosis and hemophilia. Nonacademic research suggests that Arab countries spend billions more dollars on treating these diseases than their raw population numbers should suggest; the difference lies in the fact that Arab countries tend to have high rates of consanguineous marriage, and therefore consanguineous children (Maher, 2012).

The prevalence of consanguineous marriages, in conjunction with the concomitant health problems children of such marriages can experience, together make for a serious public health problem. Understanding why consanguineous coupling continues as a practice is therefore of obvious importance to anyone who lives in societies with high rates of consanguineous marriage. And indeed policymakers in such societies do take this seriously as a threat to public health. National governments in Tunisia and Egypt require consanguineous couples to receive genetic counseling before having children, suggesting that officials in countries with high rates of consanguineous marriage are fully cognizant of the risks children of consanguineous couples face. However, and completely justifiably, they are loathe to discourage consanguineous

marriage on medical grounds. A natural question then arises: how can we decrease the rates of consanguineous reproduction without entrenching on the rights of consanguineous couples?

The research presented here could furnish policymakers in Egypt, Tunisia, and any other country with high rates of consanguineous marriage with a tool for decreasing future rates of the practice. This study provides suggestive evidence that women marry their first cousins in part as a means to reduce Intimate Partner Violence by either gathering information about their potential husband or enabling punishment for abusive behavior in their marriage. But for this theory to hold, two things need to be true: gathering information about potential husbands by dating must be difficult, and there must be minimal formal recourse to address domestic abuse by the husband. Changing either of these two conditions could potentially do much to remove the incentives for consanguineous marriage.

Changing cultural norms around dating is either impossible or enormously difficult to do in a coordinated manner, though of course such norms change on their own (Bajnaid and Elyas, 2017; Smith-Hefner, 2005). Changing the laws regarding domestic abuse and enforcement thereof is much easier.

Imagine a society like those I have investigated in this essay. Rates of consanguineous marriage and Intimate Partner Violence are both high. Let us then imagine for the sake of argument that laws guarding against domestic abuse (IPV) are either passed or are actually enforced. The passage and enforcement of such laws would remove one of the two conditions that must hold for the theory to apply; namely, that women have no recourse to formal punishment for abusive husbands. If women on the marriage market believed that they could disincentivize their husbands from behaving abusively, then they would have less of a need to a.)

gather information regarding potential husbands' violent tendencies, and b.) to provide themselves with a means to censure abusive behavior. In the context of this theory, this means that if women were to have recourse to punish IPV, they would have less reason to marry consanguineously (or at least marry their first cousins).

To be clear, I do not believe that promulgating and enforcing stricter anti-domestic abuse laws will be a silver bullet solution to high rates of consanguineous marriage. For one thing, there are other economic and cultural reasons that people marry consanguineously. For another, this research only suggests that the dynamic described above only really applies to women who marry their first cousins, not all consanguineous marriages. But perhaps most importantly, the shift away from first cousin marriage can only happen once women perceive that their communities will provide them with recourse to punish domestic abuse. This perception cannot change overnight, and will only do so after a sustained effort on the part of societies with high rates of IPV. Nonetheless, it requires only a slight jump from the evidence presented in this essay to suspect that enforcing anti-domestic abuse laws could go a long way towards changing rates of consanguineous marriage (particularly first-cousin marriage).

Ethics:

It seems to me that there are two primary ethical issues entwined in the policy recommendations outlined above. The first is that these recommendations can appear at first pass to condemn consanguineous marriage as a practice. The second is that it also places a high premium on censuring Intimate Partner Violence, perhaps at the cost of ignoring or superseding local cultural values.

This first point is especially crucial because the history of western-style public health and medicine interacting with consanguineous couples is fraught poor cross-cultural misunderstanding. For years, clinical genetic consultants in the United States routinely exaggerated the risks of passing on genetic conditions to their children, causing undue harm and stress to consanguineous couples (Bennett et al., 2009). Clinical counselors eventually had to learn to balance the real risks that do exist for consanguineous couples with respect for the couples themselves. This phenomenon mirrors the larger problem of paternalism in public health (Nys, 2008; Anker, 2016).

Any practical adaption of this research should learn from the experience of both counselors dealing with consanguineous couples and implementation of public health programs more broadly, because paternalistically judging consanguineous couples for their choices is both inconsiderate and counterproductive. Fortunately, there is a rich literature that addresses ethical and cultural concerns of changing cultural practices regarding marriage (see, among others: Mackie, 1996; Mackie, 2003; Creanza et al., 2017, etc.). Likewise, considered efforts have been made to address concerns of paternalism when implementing public health research (for example, Wilson, 2009).

I am very much sympathetic to the argument that applying this research with the goal of decreasing both consanguinity and IPV ignores the cultural value of consanguineous marriage. I am less sympathetic to the same argument applied to Intimate Partner Violence. Of course, examples abound of well-intentioned reforms backfiring in unforeseen ways (Margetts et al., 2012). But it is valid as a value system to place improving physical safety of women over respecting cultural traditions. One could argue that this is an application of the harm principle,

since IPV very much harms women (Wilson, 2011; Mill, 1860). It is beyond the scope of both this paper and my own expertise to provide a formal defense of this position, but the situation is similar to Gerry Mackie's research regarding female genital mutilation insofar as both are concerned with changing a cultural tradition that has deleterious overall effects even while providing benefits to some individuals. Scholars interested in the ethical implications of any attempt to practically apply this research should examine that research program as well.

Ultimately, it is likely best from an ethical perspective (not to mention practical) to supply this information to local NGO's and governments to allow them to evaluate the values tradeoffs mentioned above on their own. While this does not entirely remove the possibility of paternalism, it does respect local cultural autonomy to the greatest extent possible.

Appendix A

Alternative Specifications to models presented in Chapter Two**:**

With data source and dependent variable:

Figure 21 – Pakistan Alternative Specifications Less Severe

	Dependent Variable:
	Less Severe Violence
Husband Education	0.448*
	(0.230)
First Cousin	−0.223***
	(0.085)
Second Cousin	0.234*
	(0.141)
Other Relative	0.187
	(0.145)
Husband drunkenness	0.798***
	(0.094)
Wealth	−0.089***
	(0.033)
Wife Education	−0.561***
	(0.174)
Husband Unemployed	0.204
	(0.210)
Wife Employed	0.204**
	(0.090)
Constant	−0.552***
	(0.113)
Observations	3,678
Log Likelihood	−2,068.408
Akaike Inf. Crit.	4,156.816
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 22 – Pakistan Alternative Specifications More Severe

	Dependent Variable:
	More Severe Violence
Husband Education	0.064
	(0.433)
First Cousin	−0.290**
	(0.147)
Second Cousin	0.070
	(0.239)
Other relative	0.228
	(0.234)
Drunkenness	0.547***
	(0.120)
Wealth	−0.027
	(0.057)
Wife Education	−0.319
	(0.330)
Husband unemployed	0.390
	(0.317)
Wife Employed	0.171
	(0.152)
Constant	−2.308***
	(0.192)
Observations	3,678
Log Likelihood	−901.151
Akaike Inf. Crit.	1,822.302
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 23 – Egypt Alternative Specifications Less Severe

	Dependent variable:
	Less Severe Violence
First Cousin	−0.059
	(0.080)
Second Cousin	−0.101
	(0.119)
Other Relative	−0.032
	(0.112)
Husband Education	−0.143***
	(0.023)
Wife Education	−0.160***
	(0.040)
Husband Drinks	3.047***
	(0.483)
Wealth	−0.050**
	(0.024)
Children Born	0.008
	(0.033)
Children at Home	0.031
	(0.039)
Husband Employed	0.347*
	(0.193)
Wife Employed	0.193**
	(0.083)
Christian	−0.717***
	(0.194)
Constant	−0.912***
	(0.209)
Observations	6,636
Log Likelihood	−3,502.421
Akaike Inf. Crit.	7,030.843
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 24 – Egypt Alternative Specification More Severe

	Dependent variable:
	More Severe Violence
First Cousin	−0.489***
	(0.189)
Second Cousin	0.153
	(0.221)
Other Relative	0.243
	(0.205)
Husband Education	−0.237***
	(0.047)
Wife Education	−0.092
	(0.079)
Husband Drinks	2.547***
	(0.340)
Wealth	−0.001
	(0.048)
Children Born	0.089
	(0.056)
Children at Home	−0.150**
	(0.068)
Husband Employed	0.927*
	(0.512)
Wife Employed	0.386**
	(0.156)
Christian	−0.322
	(0.367)
Constant	−3.205***
	(0.534)
Observations	6,635
Log Likelihood	−1,189.744
Akaike Inf. Crit.	2,405.487
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 25 – Jordan Alternative Specification Less Severe

	Dependent variable:
	Less Severe Violence
First Cousin	−0.218***
	(0.075)
Second Cousin	−0.259***
	(0.098)
Other Relative	−0.078
	(0.377)
Wealth	−0.167***
	(0.028)
Wife Education	−0.160***
	(0.051)
Husband Education	−0.163***
	(0.053)
Children Born	0.065**
	(0.032)
children at Home	−0.049
	(0.037)
Wife Employed	−0.065
	(0.090)
Husband Employed	−0.295***
	(0.076)
Constant	−0.260*
	(0.135)
Observations	7,022
Log Likelihood	−3,352.119
Akaike Inf. Crit.	6,726.238
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 26 – Jordan Alternative Specification More Severe

	Dependent variable:
	More Severe Violence
First Cousin	−0.396***
	(0.141)
Second Cousin	−0.230
	(0.173)
Other Relative	0.743
	(0.487)
Wealth	−0.266***
	(0.052)
Wife Education	−0.129
	(0.086)
Husband Education	−0.172*
	(0.089)
Children Born	0.057
	(0.052)
Children at Home	−0.072
	(0.060)
Wife Employed	0.172
	(0.155)
Husband Employed	−0.739***
	(0.123)
Constant	−1.292***
	(0.213)
Observations	7,022
Log Likelihood	−1,350.685
Akaike Inf. Crit.	2,723.370
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 27 – Pakistan Language Specification Less Severe

	Dependent variable:
	Less Severe Violence
Husband Education	0.687***
	(0.237)
First Cousin	−0.227**
	(0.090)
Second Cousin	0.150
	(0.149)
Other Relative	0.151
	(0.151)
Husband Drunkenness	0.788***
	(0.100)
Wealth	−0.134***
	(0.037)
Baluchi	0.751***
	(0.217)
Baruhi	2.090***
	(0.208)
Punjabi	0.669***
	(0.156)
Pushto	1.573***
	(0.146)
Saraiki	0.682***
	(0.178)
Sindhi	0.127
	(0.184)
Urdu	0.811***
	(0.170)
Wife Education	−0.685***
	(0.180)
Husband Unemployed	0.102
	(0.222)
Wife Employed	0.363***
	(0.098)
Constant	−1.329***
	(0.152)
Observations	3,678
Log Likelihood	−1,954.136
Akaike Inf. Crit.	3,942.271

Figure 28 – Pakistan Base Specification

	Dependent variable:
	Less Severe Violence
Husband Education	0.445*
	(0.230)
First Cousin	−0.290***
	(0.077)
Drunkenness	0.790***
	(0.094)
Wealth	−0.090***
	(0.033)
Wife Education	−0.563***
	(0.174)
Husband Unemployed	0.190
	(0.209)
Wife Employed	0.213**
	(0.090)
Constant	−0.483***
	(0.107)
Observations	3,678
Log Likelihood	−2,070.263
Akaike Inf. Crit.	4,156.526
Note:	*p<0.1; **p<0.05; ***p<0.01

Figure 29 – Pakistan Language Specification More Severe

	Dependent variable:
	More severe Violence
Husband Education	0.109
	(0.436)
First Cousin	−0.273*
	(0.152)
Second COusin	0.059
	(0.244)
Other Relative	0.180
	(0.237)
Husband Drunkenness	0.566***
	(0.125)
Wealth	−0.104*
	(0.063)
Baluchi	0.292
	(0.412)
Baruhi	1.137***
	(0.325)
Punjabi	0.837***
	(0.269)
Pushto	0.757***
	(0.258)
Saraiki	0.438
	(0.317)
Sindhi	0.241
	(0.318)
Urdu	0.962***
	(0.295)
Wife Education	−0.343
	(0.332)
Husband Unemployed	0.389
	(0.322)
Wife Employed	0.152
	(0.162)
Constant	−2.732***
	(0.263)
Observations	3,678
Log Likelihood	−889.170
Akaike Inf. Crit.	1,812.340

Appendix B

Code and output from using R's structural topic modelling on free response questions from the Indian survey (for survey respondents who received a description of the man as 'related'):

```
processed<-textProcessor(datanewformat$elaboration, metadata=datanewformat)

out<-prepDocuments(processed$documents, processed$vocab, processed$meta)

docs<-out$documents

vocab<-out$vocab

meta<-out$meta



out1 <- prepDocuments(processed$documents, processed$vocab, processed$meta, lower.thresh
= 15)


poliblogPrevFit <- stm(documents = out1$documents, vocab = out1$vocab, K = 10, prevalence
=~ consanguinity +  education+husbandeducation+income+childhoodviolence,

max.em.its = 75, data = out$meta, init.type = "Spectral")



summary(poliblogPrevFit)
```

```
Topic 1 Top Words:
         Highest Prob: give, violenc, may, tortur, advic, will, alcohol
         FREX: violenc, give, advic, tortur, may, alcohol, will
         Lift: advic, violenc, give, tortur, may, alcohol, take
         Score: advic, give, violenc, may, tortur, alcohol, will
Topic 2 Top Words:
         Highest Prob: well, may, wife, parent, son, alway, support
         FREX: well, may, wife, parent, alway, son, support
         Lift: well, may, wife, alway, parent, son, support
         Score: well, may, wife, alway, parent, support, believ
Topic 3 Top Words:
         Highest Prob: habit, alcohol, can, bad, futur, parent, son
         FREX: habit, bad, can, alcohol, futur, parent, never
         Lift: bad, futur, habit, can, alcohol, parent, never
         Score: bad, habit, alcohol, can, futur, parent, never
Topic 4 Top Words:
         Highest Prob: good, famili, will, also, know, member, disturb
```

```
         FREX: famili, good, member, know, also, disturb, will
         Lift: member, famili, disturb, know, good, also, will
         Score: member, famili, good, disturb, know, also, will
Topic 5 Top Words:
         Highest Prob: use, wife, quarrel, take, drink, fight, peopl
         FREX: use, quarrel, peopl, work, fight, wife, drink
         Lift: work, peopl, use, quarrel, fight, scold, drink
         Score: work, use, quarrel, peopl, fight, wife, drink
Topic 6 Top Words:
         Highest Prob: son, support, think, believ, attitud, never, parent
         FREX: son, think, support, attitud, believ, never, parent
         Lift: think, attitud, son, believ, support, never, parent
         Score: think, support, believ, son, attitud, never, parent
Topic 7 Top Words:
         Highest Prob: daughter--law, friend, support, chang, son, fight, will
         FREX: friend, daughter--law, chang, support, son, fight, take
         Lift: friend, chang, daughter--law, support, son, fight, take
         Score: friend, chang, daughter--law, support, son, fight, take
Topic 8 Top Words:
         Highest Prob: look, will, believ, wife, take, parent, alcohol
         FREX: look, believ, take, will, wife, drink, alcohol
         Lift: look, believ, drink, take, wife, will, alcohol
         Score: look, believ, wife, drink, will, alcohol, take
Topic 9 Top Words:
         Highest Prob: will, relat, marri, -law, tortur, never, parent
         FREX: marri, relat, -law, will, tortur, never, also
         Lift: marri, -law, relat, never, will, tortur, scold
         Score: marri, relat, -law, will, tortur, never, give
Topic 10 Top Words:
         Highest Prob: parent, will, son, support, behaviour, alway, take
         FREX: parent, behaviour, son, alway, will, support, take
         Lift: behaviour, alway, parent, support, son, will, take
         Score: behaviour, parent, support, alway, son, will, take
```

Topics 2, 4, 6, 7, and 10 (highlighted) all address at least in part the notion that the woman's relationship with her in-laws might be relevant, with topic ten seeming to be the most so. I find this reassuring since it implies that this dynamic is important, even if it doesn't precisely follow the patterns I theorize. But I am hesitant to use these topics in any statistical model because I am not confident I can delineate between the ones that assume parental support of the son and those that assume parental support of the daughter-in-law (i.e., niece). As mentioned above, I think compositional or semantic analysis is a good route to follow here.

With that said, below is output from the estimateEffect() function for the relevant estimated topics. There are really no consistent results to speak of here, which possibly reflects semantic incoherence between the different topics. The two variables of interest are consanguinity, which describes whether the respondent was in a consanguineous marriage herself, and experimentconsang, which denotes that the respondent received the description of a man who

was related to the hypothetical woman in the survey. We would expect both to be positively correlated with the topic dependent, but neither is consistently positively correlated. In fact, topics 7 and 10 are significantly negatively correlated with consanguineous marriage.

```
Call:
estimateEffect(formula = 1:10 ~ consanguinity + education + husbandeducation
+
    income + childhoodviolence + experimentconsang, stmobj = poliblogPrevFit,
    metadata = out1$meta, uncertainty = "Global")


Topic 2:

Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)        0.173044   0.025549   6.773 6.79e-11 ***
consanguinity1     0.023676   0.013199   1.794  0.07387 .
education         -0.009604   0.008056  -1.192  0.23415
husbandeducation   0.006763   0.007238   0.934  0.35084
income            -0.028396   0.005600  -5.070 7.01e-07 ***
childhoodviolence -0.036937   0.013863  -2.664  0.00814 **
experimentconsang -0.007596   0.014462  -0.525  0.59983
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1


Topic 4:

Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)        0.064981   0.023943   2.714  0.00704 **
consanguinity1    -0.009982   0.012030  -0.830  0.40734
education          0.002474   0.007871   0.314  0.75352
husbandeducation  -0.004112   0.006097  -0.675  0.50051
income             0.011769   0.005337   2.205  0.02821 *
childhoodviolence -0.012386   0.013108  -0.945  0.34547
experimentconsang -0.003481   0.011984  -0.290  0.77167
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Topic 6:

Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)        0.0422598  0.0225526   1.874  0.06194 .
consanguinity1     0.0167139  0.0123352   1.355  0.17646
education          0.0298337  0.0072209   4.132 4.69e-05 ***
husbandeducation  -0.0038456  0.0056312  -0.683  0.49520
income            -0.0141018  0.0048303  -2.919  0.00378 **
childhoodviolence  0.0005129  0.0121407   0.042  0.96633
experimentconsang  0.0257631  0.0114916   2.242  0.02571 *
```

```
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Topic 7:

```
Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)        3.317e-02  1.431e-02   2.318   0.0212 *
consanguinity1    -2.497e-02  6.249e-03  -3.996 8.15e-05 ***
education          2.929e-03  4.298e-03   0.681   0.4961
husbandeducation   1.151e-03  3.496e-03   0.329   0.7422
income             5.966e-03  2.739e-03   2.178   0.0302 *
childhoodviolence -7.589e-05  7.058e-03  -0.011   0.9914
experimentconsang -5.485e-03  6.599e-03  -0.831   0.4065
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Topic 10:

```
Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)        0.098191   0.024081   4.077 5.86e-05 ***
consanguinity1    -0.058915   0.013522  -4.357 1.82e-05 ***
education         -0.003386   0.008259  -0.410  0.68213
husbandeducation   0.011750   0.006650   1.767  0.07827 .
income             0.015734   0.005353   2.939  0.00355 **
childhoodviolence -0.016757   0.012925  -1.296  0.19582
experimentconsang -0.011420   0.013012  -0.878  0.38084
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

Appendix C

Diagnostic Tests for Specified Regressions:

In the below tables, I give Hosmer-Lemeshow goodness of fit tests and ROC curves for the logistic regression models presented in the main text.

Figure 30 – Pakistan Less Severe Diagnostics

	Dependent variable:
	Less Severe Violence
Wife Education	0.448*
	(0.230)
First Cousin	−0.223***
	(0.085)
Second Cousin	0.234*
	(0.141)
Other Relative	0.187
	(0.145)
Husband Drunkenness	0.798***
	(0.094)
Wealth	−0.089***
	(0.033)
Wife Education	−0.561***
	(0.174)
Husband Unemployed	0.204
	(0.210)
Wife Employed	0.204**
	(0.090)
Constant	−0.552***
	(0.113)
Observations	3,678
Log Likelihood	−2,068.408
Akaike Inf. Crit.	4,156.816
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)

X-squared = 9.9354, df = 8, p-value = 0.2696

Graph 4 – Pakistan Less Violent ROC Curve

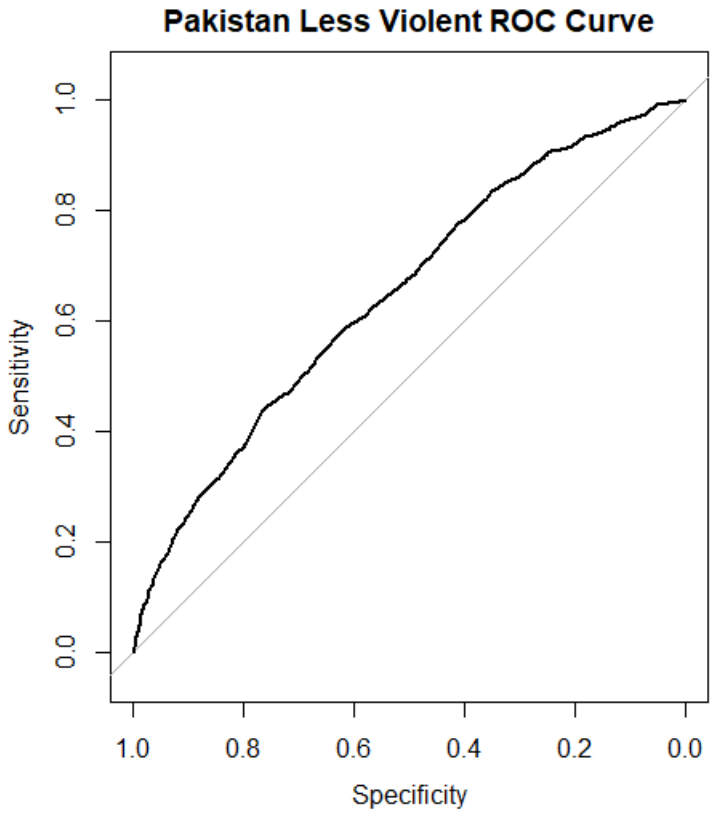


Figure 31 – Pakistan More Severe Diagnostics

	Dependent variable:
	More Severe Violence
Wife Education	0.064
	(0.433)
First cousin	−0.290**
	(0.147)
Second Cousin	0.070
	(0.239)
Other Relative	0.228
	(0.234)
Husband Drunkenness	0.547***
	(0.120)
Wealth	−0.027
	(0.057)
Wife Education	−0.319
	(0.330)
Husband Unemployed	0.390
	(0.317)
Wife EMployed	0.171
	(0.152)
Constant	−2.308***
	(0.192)
Observations	3,678
Log Likelihood	−901.151
Akaike Inf. Crit.	1,822.302
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)

X-squared = 6.9378, df = 8, p-value = 0.5434

Graph 5 – Pakistan More Violent ROC Curve

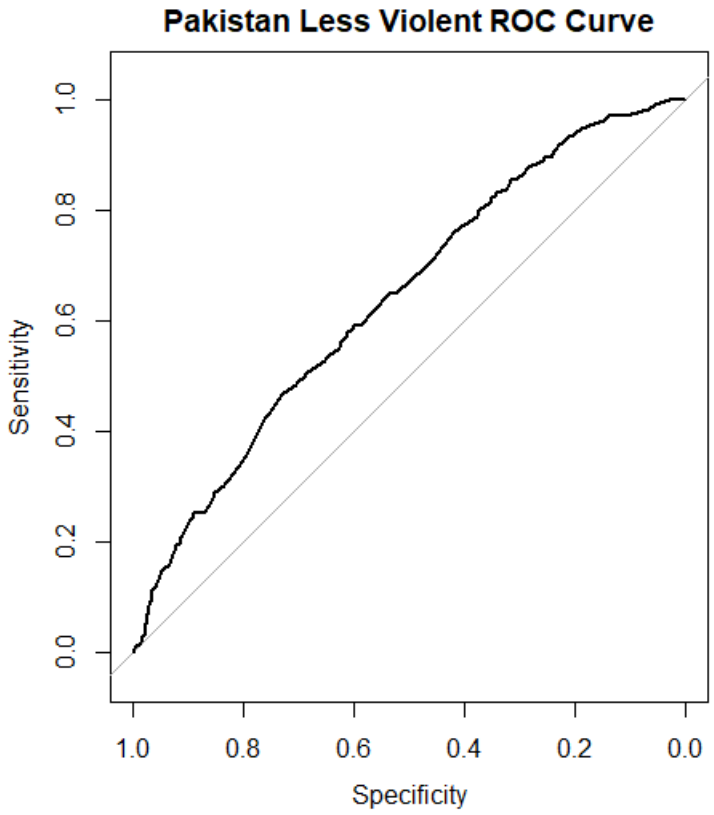


Figure 32 - Egypt More Severe Diagnostics

	Dependent variable:
	Severe Violence
First Cousin	−0.489***
	(0.189)
Second Cousin	0.153
	(0.221)
Other Relative	0.243
	(0.205)
Husband Education	−0.237***
	(0.047)
Wife Education	−0.092
	(0.079)
Husband Drinks	2.547***
	(0.340)
Wealth	−0.001
	(0.048)
Children Born	0.089
	(0.056)
Children at home	−0.150**
	(0.068)
Husband Employed	0.927*
	(0.512)
Wife Employed	0.386**
	(0.156)
Christian	−0.322
	(0.367)
Constant	−3.205***
	(0.534)
Observations	6,635
Log Likelihood	−1,189.744
Akaike Inf. Crit.	2,405.487
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)
X-squared = 13.498, df = 8, p-value = 0.09582

Graph 6 – Egypt Severe Violence ROC Curve

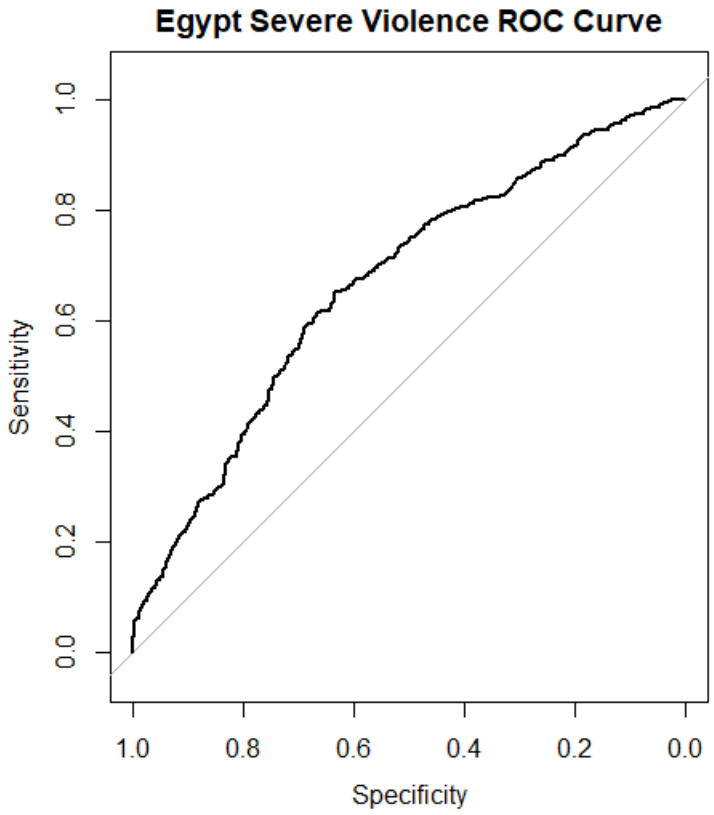


Figure 33 – Egypt Less Severe Diagnostics

	Dependent variable:
	Less Severe Violence
First Cousin	−0.059
	(0.080)
Second Cousin	−0.101
	(0.119)
Other Relative	−0.032
	(0.112)
Husband Education	−0.143***
	(0.023)
Wife Education	−0.160***
	(0.040)
Husband Drinks	3.047***
	(0.483)
Wealth	−0.050**
	(0.024)
Children born	0.008
	(0.033)
Children at home	0.031
	(0.039)
Husband Eployed	0.347*
	(0.193)
Wife Employed	0.193**
	(0.083)
Christian	−0.717***
	(0.194)
Constant	−0.912***
	(0.209)
Observations	6,636
Log Likelihood	−3,502.421
Akaike Inf. Crit.	7,030.843
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)
X-squared = 20.369, df = 8, p-value = 0.009027

Graph 7 - Egypt Less Severe Violence ROC Curve

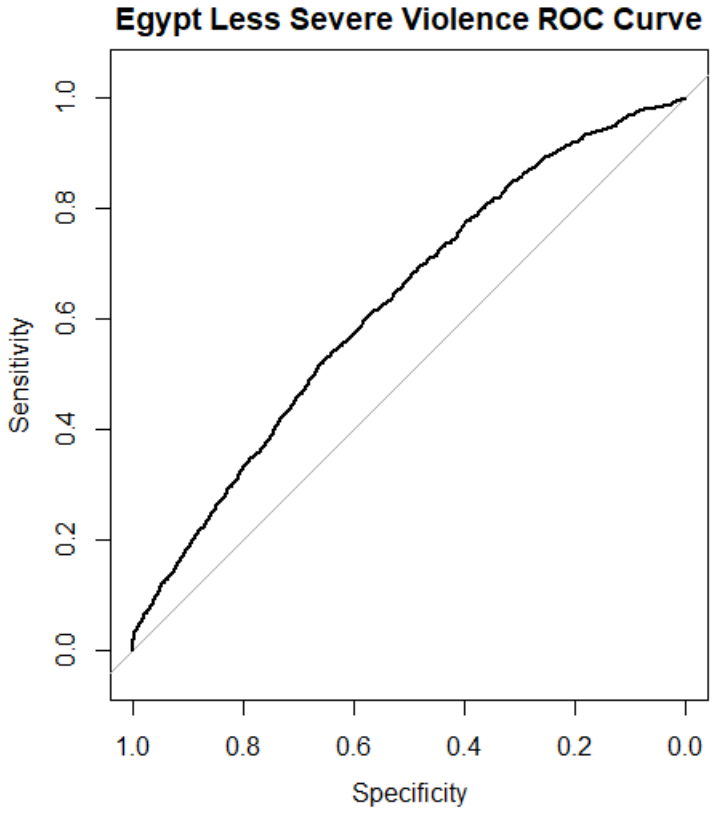


Figure 34 – Jordan Severe Diagnostics

	Dependent variable:
	Severe Violence
First Cousin	−0.396***
	(0.141)
Second Cousin	−0.230
	(0.173)
Other Relative	0.743
	(0.487)
Wealth	−0.266***
	(0.052)
Wife Education	−0.129
	(0.086)
Husband Education	−0.172*
	(0.089)
Children Born	0.057
	(0.052)
children at home	−0.072
	(0.060)
Wife Employed	0.172
	(0.155)
Husband Employed	−0.739***
	(0.123)
Constant	−1.292***
	(0.213)
Observations	7,022
Log Likelihood	−1,350.685
Akaike Inf. Crit.	2,723.370
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)
X-squared = 9.7974, df = 8, p-value = 0.2795

Graph 8 – Jordan Severe Violence ROC Curve

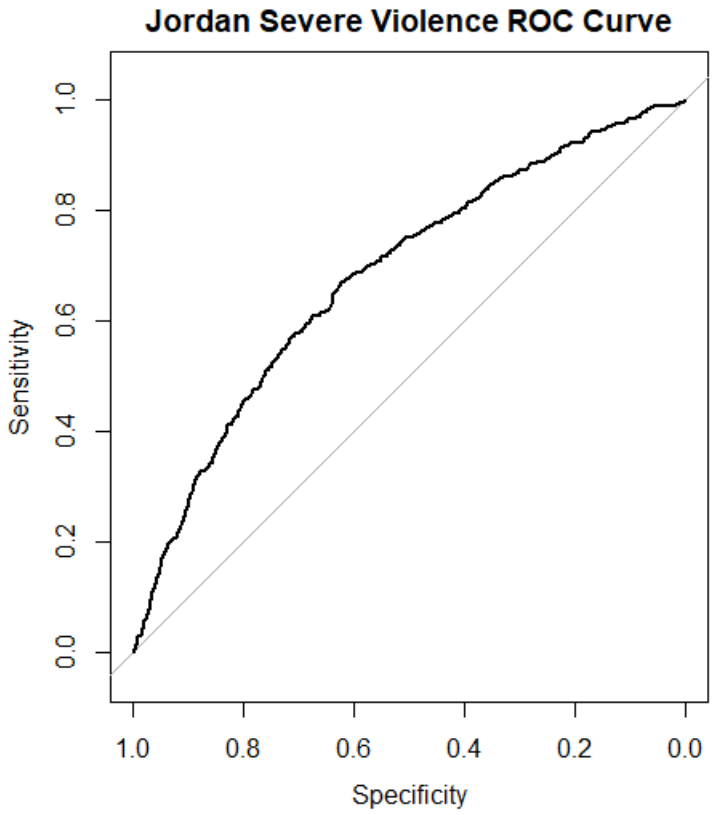


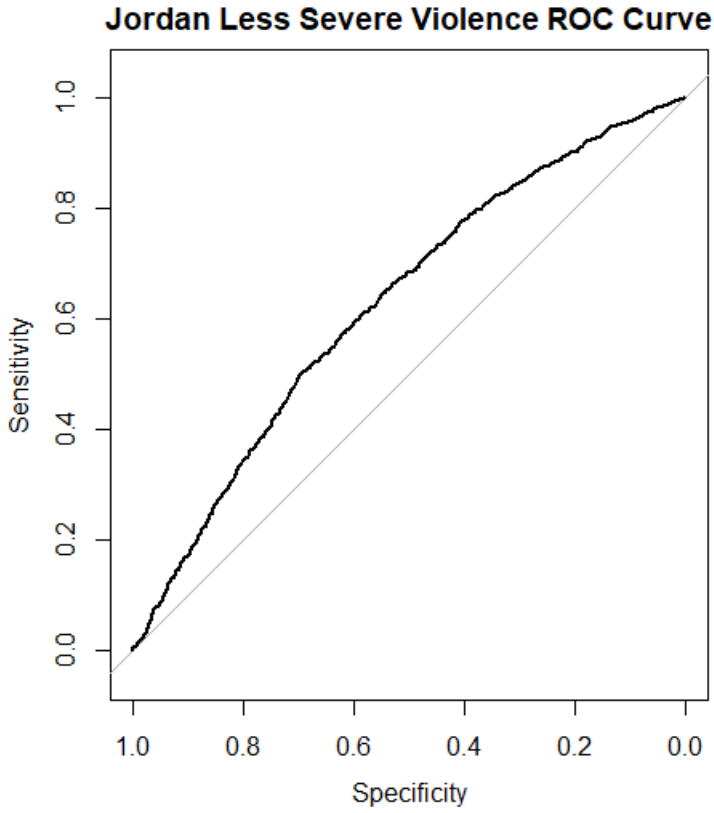
Figure 35 – Jordan More Severe Diagnostics

	Dependent variable:
	Less Sever Violence
First Cousin	−0.218***
	(0.075)
Second Cousin	−0.259***
	(0.098)
Other Relative	−0.078
	(0.377)
Wealth	−0.167***
	(0.028)
Wife Education	−0.160***
	(0.051)
Husband Education	−0.163***
	(0.053)
Children born	0.065**
	(0.032)
children at home	−0.049
	(0.037)
Wife Employed	−0.065
	(0.090)
Husband Employed	−0.295***
	(0.076)
Constant	−0.260*
	(0.135)
Observations	7,022
Log Likelihood	−3,352.119
Akaike Inf. Crit.	6,726.238
Note:	*p<0.1; **p<0.05; ***p<0.01

Hosmer and Lemeshow test (binary model)

X-squared = 16.202, df = 8, p-value = 0.03958

Graph 9 – Jordan Less Severe Violence ROC Curve



Appendix D

R code and output for mediation test for Egypt's DHS:

```
model.m<-
glm(husbanddrinks~firstcousin+secondcousin+otherrelative+husbanded+wifeeducation
        +Wealth+Childrenborn+Childrenathome
        +v705husbandemployed+v714wifeemployed+v130Christian,
        family=binomial(link='logit'),data=Egyptsub1,
        na.action=na.exclude)
model.y<-glm(severeviolhus~firstcousin+secondcousin+otherrelative+husbanded+wifeeducation
        +husbanddrinks+Wealth+Childrenborn+Childrenathome
        +v705husbandemployed+v714wifeemployed+v130Christian,
        family=binomial(link='logit'),data=EgyptIR,
        na.action=na.exclude)

firstmediate<-mediate(model.m, model.y, treat="firstcousin", mediator="husbanddrinks",
sims=5000)
summary(firstmediate)
```

```
Causal Mediation Analysis

Quasi-Bayesian Confidence Intervals

                         Estimate 95% CI Lower 95% CI Upper p-value
ACME (control)           -0.002425    -0.004622    -0.000258    0.04
ACME (treated)           -0.001895    -0.003842    -0.000202    0.04
ADE (control)            -0.026112    -0.047305    -0.007007    0.01
ADE (treated)            -0.025582    -0.046328    -0.006883    0.01
Total Effect             -0.028007    -0.049078    -0.009067    0.01
Prop. Mediated (control)  0.086068     0.006611     0.272370    0.04
Prop. Mediated (treated)  0.065507     0.004233     0.248879    0.04
ACME (average)           -0.002160    -0.004178    -0.000226    0.04
ADE (average)            -0.025847    -0.046885    -0.006945    0.01
Prop. Mediated (average)  0.075787     0.005576     0.261027    0.04

Sample Size Used: 6635
Simulations: 5000
```

Appendix E

Having a Say in Choosing your Husband:

Pakistan's 2012-13 DHS also is the only survey in the DHS archive to contain a question that asks respondents whether they had any say in choosing their husband. Responses are recorded as a binary yes/no.

The inclusion of this question presents a unique opportunity to test the theory that women turn to consanguineous marriage in the face of high rates of Intimate Partner Violence. One testable hypothesis that could be derived from this theory is that women who have a say in who they marry should marry first cousins more frequently than their counterparts who do not have a choice.

This hypothesis is at least somewhat at odds with the prior assertion that the theory could still apply to women who have no say in whom they choose to marry, since their families could also have a preference to avoid marrying their daughter to an abusive man. Despite this apparent tension, both can be true. A family can prefer its daughter marry a nonabusive man, but its preference for nonabuse might be weaker than the woman's preference, since the family does not directly suffer the consequences of abuse.

Regardless, the presence of this question on the survey offers at the very least an interesting opportunity to explore subtleties in how Intimate Partner Violence might be linked to marriage to a first cousin and consanguineous marriage in general. In these regressions, I use the ability of a woman to have a say in choosing her husband as an independent variable and marriage to different levels of relatives as the dependent variables. So for instance, in the first regression I treat marriage to a first cousin as a binary 0/1 dependent variable (with a 1 indicating

marriage to a first cousin). Subsequent regressions do the same but substitute marriage to a second cousin and "other relative" into the dependent variable.

Figure 36 – Pakistan Having a Say in Choosing Husband

Pakistan DHS	
	Dependent variable:
	Marriage to a First Cousin
Had a say in Choosing Husband	0.235***
	(0.079)
Husband Drunkenness	0.494**
	(0.217)
Wealth	-0.103***
	(0.029)
Wife Education	-0.149***
	(0.029)
Husband Employed	0.003
	(0.193)
Wife Employed	0.157*
	(0.082)
Constant	0.073
	(0.110)
Observations	3,678
Log Likelihood	-2,476.158
Akaike Inf. Crit.	4,968.316
Note:	*p<0.1; **p<0.05; ***p<0.01

As you can see, having a say in choosing your husband is positively correlated with marriage to a first cousin, at a .01 significance level. I interpret this as strong evidence in support of the theory. If either mechanism I propose is at least partially correct, then I would expect that having a say in choosing your husband should lead to more marriages to first cousins. And indeed it does.

We might also suspect that the negative relationship between consanguinity and IPV is stronger for women who do have a say in choosing their husband. In theory, women seek to avoid violent partners on the marriage market and to arm themselves with means of constraining such violence. It therefore seems reasonable that when given the choice, women would opt for husbands who offer them stronger guarantees against IPV.

To test this intuition, I recreated the regressions with different levels of Intimate Partner Violence as the dependent variables, but using only respondents who had a say in choosing their husbands. The coefficients of marriage to a first cousin are practically identical, but with larger standard errors due to fewer observations in the regression overall. There is therefore not enough evidence to suggest that the relationship between consanguinity and IPV is different for women who had a say in choosing their husband:

Figure 37 – Pakistan Tests for Respondents who Had a Say in Choosing Husband

Tests for Respondents who Had a Say in Choosing Husband

	Dependent variable:	
	Less severe (1)	More Severe (2)
First Cousin	-0.167*	-0.123
	(0.096)	(0.169)
Second Cousin	0.258	0.187
	(0.157)	(0.272)
Other Cousin	0.309*	0.305
	(0.163)	(0.274)
Husband Drunkenness	0.471**	-0.012
	(0.235)	(0.312)
Husband Drinker	0.511	0.993**
	(0.374)	(0.503)
Wife Employed	-0.089**	-0.084
	(0.037)	(0.065)
Husband Unemployed	0.175	-0.436
	(0.256)	(0.512)
Wife Education	-0.376*	0.069
	(0.193)	(0.386)
Constant	-0.526***	-2.240***
	(0.121)	(0.209)
Observations	2,977	2,977
Log Likelihood	-1,654.378	-695.682
Akaike Inf. Crit.	3,326.757	1,409.364
Note:	*p<0.1; **p<0.05; ***p<0.01	

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